Specification Details: **Date: 4/19/2011**

Specification: MIL-PRF-31032
Title: Printed Circuit Board/Printed Wiring Board
Federal Supply Class (FSC): 5998
Conventional: No
Specification contains quality assurance program: Yes
MIL-STD-790 Established Reliability & High Reliability: No
MIL-STD-690 Failure Rate Sampling Plans & Procedures: No
Weibull Graded: Yes
Specification contains space level reliability requirements: No
Specification allows test optimization: Yes

Contact Information:

Office of Primary Involvement: Electronic Devices Branch, DLA Land and Maritime - VQE
Primary Qualifying Activity Contact: 614-692-0627, e-mail: vqe.ls@dla.mil
Secondary Qualifying Activity Contact: 614-692-0631, e-mail: vqe.bw@dla.mil

Notes:

If a manufacturer desires to have test data considered for qualification, it must be certified and meet all qualification test requirements of MIL-PRF-31032 and the applicable associated specification.

The listing of printed board manufacturing lines in the QML applies only to printed boards produced in the plant(s) specified herein. Therefore, only those printed boards that have been manufactured and tested on the certified/qualified lines listed herein can be supplied as QML printed boards.

The DLA Land and Maritime - VQE contacts for QML companies can be located in the file "31032 main points-of-contact" at website: http://www.dscc.dla.mil/offices/sourcing and qualification/offices.asp?section=VQE

QML is a definition of a manufacturer's verified capabilities. Manufacturers may use the add-on qualification process to qualify capabilities that are not currently listed on the QML. The user is encouraged to contact the manufacturer or Qualifying Activity to make arrangements for QML availability.

The following abbreviations are used in this listing:

Ag: Silver
Au: Gold
CAGE: Commercial and Government Entity (Code)
Cu: Copper
ENIG: Electroless Nickel Immersion Gold
HASL: Hot Air Solder Level
ImmAg: Immersion Silver
IR: Infrared
LPI: Liquid Photoimageable
MIX: Mix of SMT and THM
Ni: Nickel
OSP: Organic Surface Protection
Pb: Lead
Pd: Palladium
PTH: Plated Thru Hole
SMOBC: Solder Mask Over Bare Copper
SMT: Surface-Mount Technology
Sn: Tin
THM: Through-Hole Mounting

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0MNN9
Accurate Circuit Engineering 3019 S. Kilson Drive Santa Ana, CA 92707, US	Same Address as Manufacturer	Contact: James Hofer Phone: 714-546-162 Fax: 714-433-7418 EMail: James@ace-pcb.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-06-12150 VQE-07-12577 VQE-09-18384
Panel Size:	20" X 26"	
Max./Min. Board Thickness:	.22"/Not Specified	
Max./Min. Base CU Thickness:	.0056"/Not Specified	
Max./Min. Through Hole Size:	.075"/.008" (after plating) .247"/Not Specified (mounting-after plating)	
Aspect Ratio:	11:1 (Through Hole)	
Max. Number of Layers:	24	
Min. Conductor Width:	.003"	
Min. Conductor Space:	.003" (+/-10%)	
Part Mounting:	MIX, SM, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Ni/Hard Au, HASL, Immersion Ag	
Hole Preparation:	Permanganate Desmear, Permanganate Etchback	
Alternate Construction:	Blind Vias, Buried Vias, Foil Lamination, Sequential Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	Characteristic, Differential 50, 75, 100 ohms +/-10%	
Hole Fill/Via Plug:	Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 4AA34
American Standard Circuits RF Division, 475 Industrial Drive West Chicago, IL 60185, US	Same Address as Manufacturer	Contact: Lori Ryan Phone: 603-639-5438 Fax: EMail: lori@asc-i.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-11-022358
Panel Size:	12" X 18" ((max))	
Max./Min. Board Thickness:	.125"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.052"/.02" ((after drill)) .125"/Not Specified ((mounting))	
Aspect Ratio:	5:1	
Max. Number of Layers:	10	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004" (+/- 10%)	
Part Mounting:	MIX, SM, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	Electrolytic Ni/Hard Au, HASL, Immersion Ag	
Hole Preparation:	Permanganate Desmear, Plasma Desmear	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper (DC Plate)	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-08-015934 VQE-11-021830
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.062"/Not Specified	
Max./Min. Base CU Thickness:	.006"/Not Specified (1/2 oz.)	
Max./Min. Through Hole Size:	.052"/.009" (Drilled Through Hole (before plating))	
Aspect Ratio:	7:1 (Through Hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004" (+/-10%)	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	Electrolytic Ni-Au Tab Plating, HASL, Immersion Ag	
Hole Preparation:	Permanganate Desmear	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 57034
Amphenol Printed Circuits 91 Northeastern Boulevard Nashua, NH 03062, US	Same Address as Manufacturer	Contact: Denise Chevalier Phone: 603-879-3268 Fax: 603-879-2818 EMail: denise.chevalier@amphenol-tcs.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-09-018717
Panel Size:	21" X 24"	
Max./Min. Board Thickness:	.078"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	"/.026"	
Aspect Ratio:	3:1	
Max. Number of Layers:	10	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	Compliant Pin, MIX, SMT, THM	
Rigid Base Material:	GM (Woven E-Glass, Triazine/Bismaleimide Modified Epoxy Resin)	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Hard and Solf Gold, Electrolytic Nickel, Fused SnPb, HASL	
Hole Preparation:	Plasma Desmear	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper: DC Plate, Pulse Plate	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 57034
Amphenol Printed Circuits 91 Northeastern Boulevard Nashua, NH 03062, US	Same Address as Manufacturer	Contact: Denise Chevalier Phone: 603-879-3268 Fax: 603-879-2818 EMail: denise.chevalier@amphenol-tcs.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-06-010054 VQE-09-017008 VQE-10-020582 VQE-97-000649
Panel Size:	24" X 36", 30" X 36"	
Max./Min. Board Thickness:	.322"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.008"	
Aspect Ratio:	0.5:1 (Blind Via) 11:1 (Through Hole)	
Max. Number of Layers:	28	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	Compliant Pin, MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant Hybrid Built GF/Hydrocarbon Ceramic Hydrocarbon Ceramic	
Flex Base Material:	N/A	
Finish System:	Electrolytic Hard & Soft Gold, Electrolytic Nickel, Fused SnB, Nickel	
Hole Preparation:	Permanganate Desmear, Permanganate Etchback, Plasma Desmear	
Alternate Construction:	Blind Vias Mechanicall Drilled	
Copper Plating:	Acid Copper, DC Plate, Pulse Plate	
Solder Resist:	Dry Film Soldermask, LPI, SMOBC, Thermal Cured Soldermask	
Controlled Impedance:	120 ohms ± 10%, 50 ohms ± 10%	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 57034
Amphenol Printed Circuits 91 Northeastern Boulevard Nashua, NH 03062, US	Same Address as Manufacturer	Contact: Denise Chevalier Phone: 603-879-3268 Fax: 603-879-2818 EMail: denise.chevalier@amphenol-tcs.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-10-019533
Panel Size:	18" X 24" ((max))	
Max./Min. Board Thickness:	.031"/Not Specified	
Max./Min. Base CU Thickness:	1"/"	
Max./Min. Through Hole Size:	"/.055" ((drilled))	
Aspect Ratio:	0.7:1 ((Through Hole))	
Max. Number of Layers:	4	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	MIX, SM, THM	
Rigid Base Material:	N/A (types 1, 2 & 3 only)	
Flex Base Material:	4203/1 Acrylic Adhesive Polyimide Coverlayer 4204/1 Acrylic Adhesive	
Finish System:	HASL, Hot Oil Reflow following SnPb plate	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	Dru Film Soldermask	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Use A (Flex to Install), Use B (Dynamic Flex)	
Hole Wall Conductive Coating:	Direct Metallization	
Max. Base Cu Weight	1 oz.	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-10-019533
Panel Size:	18" X 24" ((max))	
Max./Min. Board Thickness:	.125"/Not Specified	
Max./Min. Base CU Thickness:	1"/"	
Max./Min. Through Hole Size:	"/.012" ((drilled))	
Aspect Ratio:	7.75:1 ((Through Hole))	
Max. Number of Layers:	15	
Min. Conductor Width:	.006"	
Min. Conductor Space:	.005"	
Part Mounting:	MIX, SM, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	4203/1 Acrylic Adhesive Polyimide Coverlayer 4204/11 Adhesiveless Polyimide	
Finish System:	HASL, Hot Oil Reflow following SnPb plate	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper (DC and Pulse Plate)	
Solder Resist:	N/A	
Controlled Impedance:	Characteristic, Differential, Range 50-100 ohms (+/- 10%)	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Use A (Flex to Install)	
Hole Wall Conductive Coating:	Direct Metallization	
Max. Base Cu Weight	1 oz.	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 65337
Calumet Electronics Corp. 25830 Depot Street Calumet, MI 49913-1985, US	Same Address as Manufacturer	Contact: Robert Hall Phone: 906-337-1305 Fax: 906-337-5359 EMail: rhall@cec-up.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-03-4657 VQE-04-6280
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.125"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.125"/.016"	
Aspect Ratio:	8:1 (Through Hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	.006"	
Min. Conductor Space:	.003"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	Au, HASL, Ni	
Hole Preparation:	FR4: Chemical Etchback, Non FR4: Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electro-deposited Acid Copper	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 4MEG7
Cirexx International, Inc. 791 Nuttman Street Santa Clara, CA 95054,	Same Address as Manufacturer	Contact: Don Angulo Phone: 408-988-3980 Fax: 408-988-4534 EMail: dangulo@cirexxintl.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1	VQ-08-016602
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.125"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.01" (Mechanical)	
Aspect Ratio:	12.5:1	
Max. Number of Layers:	22	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	100 ohms +/- 10%, 50 ohms +/- 10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/2	VQE-07-014176
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.1"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.01"	
Aspect Ratio:	10:1 (Through Hole)	
Max. Number of Layers:	2	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL, Ni/AU	
Hole Preparation:	Plasma Desmear	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 4MEG7
Cirexx International, Inc. 791 Nuttman Street Santa Clara, CA 95054,	Same Address as Manufacturer	Contact: Don Angulo Phone: 408-988-3980 Fax: 408-988-4534 EMail: dangulo@cirexxintl.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3	VQE-07-014176
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.1"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.01"	
Aspect Ratio:	10:1 (Through Hole)	
Max. Number of Layers:	2	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	Acrylic Adhesive Polyimide Copper-Clad Adhesiveless Polyimide	
Finish System:	ENIG, HASL, Ni/Au	
Hole Preparation:	Plasma Desmear	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	Kapton Covelay	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Class A Flex-to-Install, Class B Continuous Flex	
Hole Wall Conductive Coating:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/4	VQ-08-016602
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.125"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.01" (Mechanical)	
Aspect Ratio:	10:1	
Max. Number of Layers:	16	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	Acrylic Adhesie Copper Clad Adhesiveless Polyimide	
Finish System:	ENIG, HASL	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Acid Coper	
Solder Resist:	LPI	
Controlled Impedance:	100 ohms +/-10%, 50 ohms +/- 10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Class A Flex-to-Install	
Hole Wall Conductive Coating:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 6T499
Colonial Circuits, Inc. 1026 Warrenton Road Fredericksburg, VA 22406-6200, US	Same Address as Manufacturer	Contact: Mike Hill Phone: 540-753-5511, x125 Fax: 540-752-2109 EMail: quality@colonialcircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1	VQE-04-6002
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.127"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.228"/.015"	
Aspect Ratio:	8.5:1 (Through Hole)	
Max. Number of Layers:	12	
Min. Conductor Width:	.008"	
Min. Conductor Space:	.005"	
Part Mounting:	PTH, SMT	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	Tin/Lead HASL	
Hole Preparation:	Plasma Desmear	
Alternate Construction:	N/A	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	55 Ohms ± 10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1	VQE-04-6002
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.088"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.052"/.021"	
Aspect Ratio:	4.2:1 (Through Hole)	
Max. Number of Layers:	14	
Min. Conductor Width:	.006"	
Min. Conductor Space:	.005"	
Part Mounting:	PTH, SMT	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	Tin/Lead HASL	
Hole Preparation:	Plasma Desmear	
Alternate Construction:	N/A	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 6T499
Colonial Circuits, Inc. 1026 Warrenton Road Fredericksburg, VA 22406-6200, US	Same Address as Manufacturer	Contact: Mike Hill Phone: 540-753-5511, x125 Fax: 540-752-2109 EMail: quality@colonialcircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-04-6002 VQE-06-010192
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.09"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.139"/.021"	
Aspect Ratio:	4.29:1 (Through Hole)	
Max. Number of Layers:	8	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	PTH, SMT	
Rigid Base Material:	Hydrocarbon Resin with Ceramic Filler Woven E-Glass	
Flex Base Material:	N/A	
Finish System:	Tin/Lead HASL, Tin/Lead Reflow	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	55 ohms ±10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQ-10-019425
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.093"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.15"/.01"	
Aspect Ratio:	8.6:1	
Max. Number of Layers:	10	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	PTH, SMT	
Rigid Base Material:	Rigid Flex/Kapton Adhesive	
Flex Base Material:	IPC-FC-241/11 (Adhesiveless)	
Finish System:	N/A	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Class A (Flex During Installation), Class B (Dynamic)	
Hole Wall Conductive Coating:	Immersion Tin, Tin/Lead Reflow	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 6T499
Colonial Circuits, Inc. 1026 Warrenton Road Fredericksburg, VA 22406-6200, US	Same Address as Manufacturer	Contact: Mike Hill Phone: 540-753-5511, x125 Fax: 540-752-2109 EMail: quality@colonialcircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/4	VQE-04-6002
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.093"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.045"/.025"	
Aspect Ratio:	3.7:1 (Through Hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	PTH, SMT	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	IPC-4204/1 Acrylic Adhesive	
Finish System:	Tin/Lead Reflow	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/Custom	VQE-04-6002
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.031"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.117"/.02"	
Aspect Ratio:	1.55:1 (Through Hole)	
Max. Number of Layers:	2	
Min. Conductor Width:	.025"	
Min. Conductor Space:	.01"	
Part Mounting:	SMT	
Rigid Base Material:	PTFE Resin with Ceramic Filler With or Without Woven E-Glass	
Flex Base Material:	N/A	
Finish System:	Tin/Lead HASL	
Hole Preparation:	Plasma Desmear	
Alternate Construction:	N/A	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 63695
Cosmotronic, Inc. 16721 Noyes Avenue Irvine, CA 92606, US	Same Address as Manufacturer	Contact: Alan Exley Phone: 949-660-0740 Fax: 949-553-8371 EMail: alan_exley@cosmotronic.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-04-006966 VQE-05-009107 VQE-06-010085 VQE-06-011248
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.335"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.014"	
Aspect Ratio:	15:1 (Through Hole)	
Max. Number of Layers:	36	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	AF: Aramid Fabric, Woven, Majority Polyfunctional Epoxy Resin BF: Aramid Fabric, Nonwoven, Epoxy Resin BI: Aramid Fabric, Nonwoven, Polyimide Resin GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant GM: Glass Base, Woven, Triazine and/or Bismaleimide Modified Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, Fused SnPB, HASL, Selective Solder Strip-Tin Lead Plate	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind Vias, Sequential Lamination	
Copper Plating:	Electro-deposited Acid Copper	
Solder Resist:	LPI, SMOBC	
Controlled Impedance:	50 ohms ± 10% nominal/tolerance	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 63695
Cosmotronic, Inc. 16721 Noyes Avenue Irvine, CA 92606, US	Same Address as Manufacturer	Contact: Alan Exley Phone: 949-660-0740 Fax: 949-553-8371 EMail: alan_exley@cosmotronic.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-04-006966 VQE-05-009107 VQE-06-010085
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.165"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.012"	
Aspect Ratio:	8:1 (Through Hole)	
Max. Number of Layers:	22	
Min. Conductor Width:	.006"	
Min. Conductor Space:	.008"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant GI/GM Composite Material GM: Glass Base, Woven, Triazine and/or Bismaleimide Modified Epoxy Resin, Flame Resistant	
Flex Base Material:	IPC-4204/1 Acrylic Adhesive IPC-4204/11 Adhesiveless	
Finish System:	ENIG, Fused SnPB, HASL, Selective Solder Strip-Tin Lead Plate	
Hole Preparation:	N/A	
Alternate Construction:	N/A	
Copper Plating:	Electro-deposited Acid Copper	
Solder Resist:	LPI, SMOBC	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Class A Flex to Install, Class B Continuous Flex	
Hole Wall Conductive Coating:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 63695
Cosmotronic, Inc. 16721 Noyes Avenue Irvine, CA 92606, US	Same Address as Manufacturer	Contact: Alan Exley Phone: 949-660-0740 Fax: 949-553-8371 EMail: alan_exley@cosmotronic.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/Custom	VQE-04-006966 VQE-05-009107 VQE-06-010085
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.225"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.02"	
Aspect Ratio:	10:1 (Through Hole)	
Max. Number of Layers:	16	
Min. Conductor Width:	.011"	
Min. Conductor Space:	.007"	
Part Mounting:	SMT	
Rigid Base Material:	Rogers 4003 Ceramic-Filled Thermoset Resin Rogers 4003/GI Composite	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind Vias, Sequential Lamination	
Copper Plating:	Electro-deposited Acid Copper	
Solder Resist:	LPI, SMOBC	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 7Z463
DDi Cleveland Corp. 7 Ascot Parkway Cuyahoga Falls, OH 44223, US	Same Address as Manufacturer	Contact: Mark Kasting Phone: 330-572-3400 Fax: 330-572-3434 EMail: mark_kasting/coretec@coretec-inc.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-00-000289 VQE-01-000910 VQE-05-008414 VQE-06-010963
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.126"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.021"/.015"	
Aspect Ratio:	5:1	
Max. Number of Layers:	10	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SM, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	Fused SnPb, HASL, Selective SnPb Plate	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Sequential Lamination for Blind & Buried Vias 8 layer max	
Copper Plating:	Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	100/50 ohm ±10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 7Z463
DDi Cleveland Corp. 7 Ascot Parkway Cuyahoga Falls, OH 44223, US	Same Address as Manufacturer	Contact: Mark Kasting Phone: 330-572-3400 Fax: 330-572-3434 EMail: mark_kasting/coretec@coretec-inc.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-00-000289 VQE-01-000910 VQE-05-008414 VQE-06-010963
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.126"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.045"/.013"	
Aspect Ratio:	5:1	
Max. Number of Layers:	16	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	Fused SnPb, HASL, Selective SnPb Plate	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Sequential Lamination for Blind & Buried Vias 8 layer max	
Copper Plating:	Acid Copper	
Solder Resist:	N/A	
Controlled Impedance:	100/50 ohms +/- 10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 7Z463
DDi Cleveland Corp. 7 Ascot Parkway Cuyahoga Falls, OH 44223, US	Same Address as Manufacturer	Contact: Mark Kasting Phone: 330-572-3400 Fax: 330-572-3434 EMail: mark_kasting/coretec@coretec-inc.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-01-000909 VQE-06-010963
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.126"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.039"/.013"	
Aspect Ratio:	10:1	
Max. Number of Layers:	11	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SM, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	IPC-4204/11 Adhesiveless	
Finish System:	HASL	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	
Flex Usage	Class A Flex to Install	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 7Z463
DDi Cleveland Corp. 7 Ascot Parkway Cuyahoga Falls, OH 44223, US	Same Address as Manufacturer	Contact: Mark Kasting Phone: 330-572-3400 Fax: 330-572-3434 EMail: mark_kasting/coretec@coretec-inc.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-01-000909 VQE-06-010963
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.07"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.026"	
Aspect Ratio:	2.6:1	
Max. Number of Layers:	7	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	IPC-4204/1 Acrylic Adhesive	
Finish System:	HASL	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Class A Flex to Install	
Hole Wall Conductive Coating:	Electroless Copper	
Flex Usage	Class A Flex to Install	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 75815
DDi Denver Corp. 10570 Bradford Road Littleton, CO 80127, US	Same Address as Manufacturer	Contact: Douglas N. Berry Phone: 303-972-4105 Fax: 303-933-2934 EMail: dberry@ddiglobal.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-02-0317 VQE-05-7627 VQE-05-9014 VQE-09-18719 VQE-10-020224
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.125"/Not Specified	
Max./Min. Base CU Thickness:	.001"/Not Specified	
Max./Min. Through Hole Size:	.109"/.013"	
Aspect Ratio:	7:1	
Max. Number of Layers:	20	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL, IR Reflow Following SnPb Plate	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	
Max. Base Cu Weight	2 oz.	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 75815
DDi Denver Corp. 10570 Bradford Road Littleton, CO 80127, US	Same Address as Manufacturer	Contact: Douglas N. Berry Phone: 303-972-4105 Fax: 303-933-2934 EMail: dberry@ddiglobal.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-02-0217 VQE-05-7626 VQE-05-9014 VQE-09-18719 VQE-10-020224
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.125"/Not Specified	
Max./Min. Base CU Thickness:	.001"/"	
Max./Min. Through Hole Size:	.109"/.013"	
Aspect Ratio:	10:1	
Max. Number of Layers:	20	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL, IR Reflow following SnPb plate	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	
Max. Base Cu Weight	2 oz.	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0BSG1
DDI Global Corp. - Anaheim 1220 N. Simon Circle Anaheim, CA 92806, US	Same Address as Manufacturer	Contact: Rick Sylvain Phone: 714-688-7371 Fax: EMail: rsylvain@ddiglobal.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQ-09-018147
Panel Size:	N/A	
Max./Min. Board Thickness:	.1"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.045"/.032" (drilled)	
Aspect Ratio:	3:1	
Max. Number of Layers:	10	
Min. Conductor Width:	.01"	
Min. Conductor Space:	.01"	
Part Mounting:	THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	HASL ENIG	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Foil Lamination	
Copper Plating:	Electrodeposited Acid Copper, Electroless Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQ-09-018147
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.115"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.009"/Not Specified (Vias) "/.05" (Plated Hole Size)	
Aspect Ratio:	10:1	
Max. Number of Layers:	22	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.006"	
Part Mounting:	BGA, MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Foil Lamination	
Copper Plating:	Electrodeposited Acid Copper, Electroless Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	Differentail: 100 ohms +/-10%, Single Ended: 50 ohms +/-10%	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0K703
DDi Global Corp. - Sterling, VA 1200 Severn Way Dulles, VA 20166-8904, US	Same Address as Manufacturer	Contact: Juan Vasquez Phone: 703-652-2200 Fax: 703-652-2272 EMail: jvasquez@ddiglobal.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-03-3545
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.1"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.05"/.009" (nominal) .15"/Not Specified (non-PTH)	
Aspect Ratio:	10:1	
Max. Number of Layers:	22	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.003"	
Part Mounting:	BGA, MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	0.005 Blind Vias laser, 0.006 Blind Micro Vias laser, Buried Resistors 33 ohms ± 15%	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	Differential 100 ohms ± 10%, Single Ended 50 ohms ± 10%	
Hole Fill/Via Plug:	Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/2	VQE-11-021244
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.034"/.03"	
Max./Min. Base CU Thickness:	1"/"	
Max./Min. Through Hole Size:	.142"/.02"	
Aspect Ratio:	1.6:1	
Max. Number of Layers:	2	
Min. Conductor Width:	.015"	
Min. Conductor Space:	.005"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	Woven Golass, Reinforced, Hydrocarbon Resin with Ceramic Fill	
Flex Base Material:	N/A	
Finish System:	ENIG	
Hole Preparation:	Plasma Desmear	
Alternate Construction:	Capped Thru Via With Fill	
Copper Plating:	Panel Plate, Pattern Plate, Copper Wrap	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0GN71
DDi North Jackson Corp. 12080 DeBartolo Drive North Jackson, OH 44451, US	Same Address as Manufacturer	Contact: Cynthia Savakis Phone: 330-538-3900, x211 Fax: 330-538-3820 EMail: quality@sovereign-circuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-03-003121 VQE-03-003214 VQE-07-012925 VQE-10-020405
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.25"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.008"/Not Specified	
Aspect Ratio:	15:1 (Through Hole)	
Max. Number of Layers:	24	
Min. Conductor Width:	.003"	
Min. Conductor Space:	.003"	
Part Mounting:	MIX, Press Fit, SMT, THM	
Rigid Base Material:	BI: Aramid Fabric, Nonwoven, Polyimide Resin GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, Fused SnPb, HASL, Immersion Ag, Immersion White Tin, Ni/Au, Ni/Pd/Au, OSP, Reflowed Pure Tin	
Hole Preparation:	Permanganate Desmear, Permanganate Etchback, Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind Vias, Buried Vias, Cap Lamination, Foil Lamination	
Copper Plating:	Electroless Acid Copper, Electroplated Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	Characteristic, Differential, Dual Stripline, Embedded Microstrip, Microstrip, Range 30-150 ohms ±10%	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0GN71
DDi North Jackson Corp. 12080 DeBartolo Drive North Jackson, OH 44451, US	Same Address as Manufacturer	Contact: Cynthia Savakis Phone: 330-538-3900, x211 Fax: 330-538-3820 EMail: quality@sovereign-circuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-03-003121 VQE-03-003214 VQE-07-012925 VQE-10-020405
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.25"/Not Specified	
Max./Min. Base CU Thickness:	.005"/Not Specified	
Max./Min. Through Hole Size:	.008"/Not Specified	
Aspect Ratio:	15:1 (Through Hole)	
Max. Number of Layers:	24	
Min. Conductor Width:	.003"	
Min. Conductor Space:	.003"	
Part Mounting:	MIX, Press Fit, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	IPC-4204/1 Acrylic Adhesive IPC-4204/11 Adhesiveless	
Finish System:	ENIG, Fused SnPb, HASL, Immersion Ag, Immersion White tin, Ni/Au, OSP, Reflowed Pure Tin	
Hole Preparation:	Permanganate Desmear, Permanganate Etchback, Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind Via, Buried Via, Cap Lamination, Foil Lamination	
Copper Plating:	Electroless Acid Copper, Electroplated Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	30 - 150 ohms ± 10%	
Hole Fill/Via Plug:	Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATIONS:	CAGE Code: 3AF82
DDi Ontario 8150 Sheppard Avenue East Scarborough, Ontario, Canada M1B 5K2	1. Same Address as Manufacturer 2. Coretec, Inc., CAGE Code: 3AF82, 2020 Ellesmere Road, Scarboough, Ontario, Canada M1H 2Z8	Contact: Noor Al-Shaikh Phone: 416-208-2100 Fax: 416-439-1582 EMail: alshaikh@coretec-inc.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-04-006240 VQE-08-015407
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.08"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.01" (as drilled)	
Aspect Ratio:	7:1 (Through Hole)	
Max. Number of Layers:	14	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	Characteristics +/-10%, Differential +/-10%	
Hole Fill/Via Plug:	Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-04-006240 VQE-08-015407
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.08"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.01" (as drilled)	
Aspect Ratio:	7:1 (Through Hole)	
Max. Number of Layers:	14	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL	
Hole Preparation:	Chemical Desmear	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	Characteristics ± 10%, Differential ± 10%	
Hole Fill/Via Plug:	Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 61642
Dynaco Corp. 1000 South Priest Drive Tempe, AZ 85281-5238, US	Same Address as Manufacturer	Contact: Ted Edwards Phone: 480-736-3728 Fax: 480-921-9830 EMail: tedwards@dynacocorp.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-05-9356
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.1"/Not Specified	
Max./Min. Base CU Thickness:	.001"/Not Specified	
Max./Min. Through Hole Size:	.045"/.032"	
Aspect Ratio:	3:1 (Through Hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	.01"	
Min. Conductor Space:	.01"	
Part Mounting:	THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	HASL	
Hole Preparation:	Permanganate Desmear, Permanganate Etchback	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-05-9356
Panel Size:	12" X 18", 18" X 24"	
Max./Min. Board Thickness:	.1"/Not Specified	
Max./Min. Base CU Thickness:	.001"/Not Specified	
Max./Min. Through Hole Size:	.045"/.032"	
Aspect Ratio:	3:1 (Through Hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	.01"	
Min. Conductor Space:	.01"	
Part Mounting:	THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	IPC-241/11 Adhesiveless IPC-4204/11 Adhesiveless	
Finish System:	HASL	
Hole Preparation:	Permanganate Etchback, Permanganate Etchback	
Alternate Construction:	Foil Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Class A Flex to Install, Class B Continuous Flex	
Hole Wall Conductive Coating:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 61642
Dynaco Corp. 1000 South Priest Drive Tempe, AZ 85281-5238, US	Same Address as Manufacturer	Contact: Ted Edwards Phone: 480-736-3728 Fax: 480-921-9830 EMail: tedwards@dynacocorp.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-05-9356 VQE-06-10600
Panel Size:	12" X 18", 18" X 24"	
Max./Min. Board Thickness:	.12"/Not Specified	
Max./Min. Base CU Thickness:	.001"/Not Specified	
Max./Min. Through Hole Size:	.045"/.01"	
Aspect Ratio:	12:1 (Through Hole)	
Max. Number of Layers:	20	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.006"	
Part Mounting:	THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	IPC-4204/1 Acrylic Adhesive	
Finish System:	Fused Sn/Pb, HASL	
Hole Preparation:	Permanganate Desmear, Permanganate Etchback, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electroless Acid Copper, Electroplated Acid Copper	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 38898
Dynamic & Proto Circuits, Inc. 869 Barton Street Stoney Creek, Ontario, Canada L8E 5G6	Same Address as Manufacturer	Contact: Stephen Hazell Phone: 905-643-9900 Fax: 905-643-9911 EMail: stephenhazell@dapc.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-00-0007 VQE-01-0311 VQE-03-0818 VQE-98-1143
Panel Size:	16" X 18"	
Max./Min. Board Thickness:	.125"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.039"/.018" (0.0135" Drilled)	
Aspect Ratio:	9.3:1 (Through Hole)	
Max. Number of Layers:	16	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	HASL	
Hole Preparation:	Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	Dry Film Solder Resist Plugs, LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 79616
Electro Plate Circuitry, Inc. 1430 Century Drive Carrollton, TX 75006, US	Same Address as Manufacturer	Contact: James McNeal Phone: 972-466-0818 Fax: 972-466-9078 EMail: jimm@eplate.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-06-010333 VQE-06-011433 VQE-10-020352
Panel Size:	18" X 24", 18" X 16"	
Max./Min. Board Thickness:	.12"/.03"	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	"/.008"	
Aspect Ratio:	9.3:1 (Through Hole)	
Max. Number of Layers:	14	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL, Hard Au, Reflowed SnPb	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind/Buried Vias, Filled Vias, Foil Lamination, Sequential Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	± 3% Tolerance	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-06-010333 VQE-06-011433 VQE-10-020352
Panel Size:	18" X 16", 18" X 24"	
Max./Min. Board Thickness:	.17"/.03"	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	"/.008"	
Aspect Ratio:	9.3:1 ((Through Hole))	
Max. Number of Layers:	18	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL, Hard Au, Reflowed SnPb	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind/Buried Vias, Filled Vias, Foil Lamination, Sequential Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	± 3% Tolerance	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 79616
Electro Plate Circuitry, Inc. 1430 Century Drive Carrollton, TX 75006, US	Same Address as Manufacturer	Contact: James McNeal Phone: 972-466-0818 Fax: 972-466-9078 EMail: jimm@eplate.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/5, MIL-PRF-31032/6	VQE-10-021161
Panel Size:	12" X 18", 18" X 24"	
Max./Min. Board Thickness:	.18"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	"/.008"	
Aspect Ratio:	6:1	
Max. Number of Layers:	6	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GT: Woven E-Glass, PTFE Resin GX: Glass Base, Non-Woven, PTFE Resin, Flame Resistant GY: Glass Base, Woven, PTFE Resin, Flame Resistant, for Microwave Application With or Without Woven or Non-Woven E-Glass, Polytetrafluoroethylene (PTFE) Resin, Ceramic Filler	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Nickel with Electrolytic Hard/Soft Gold, HASL, Hot Oil Reflow of Plated SnPb, Tin Lead Plate	
Hole Preparation:	Plasma Desmear	
Alternate Construction:	Blind Vias, Cavity, Exposed Inner Layer, Foil Lamination, Sequential Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	± 3% Characteristic, ± 3% Differential	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 79616
Electro Plate Circuitry, Inc. 1430 Century Drive Carrollton, TX 75006, US	Same Address as Manufacturer	Contact: James McNeal Phone: 972-466-0818 Fax: 972-466-9078 EMail: jimm@eplate.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	N/A	N/A
Panel Size:	N/A	
Max./Min. Board Thickness:	N/A	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	N/A	
Aspect Ratio:	N/A	
Max. Number of Layers:	N/A	
Min. Conductor Width:	N/A	
Min. Conductor Space:	N/A	
Part Mounting:	N/A	
Rigid Base Material:	N/A	
Flex Base Material:	N/A	
Finish System:	N/A	
Hole Preparation:	N/A	
Alternate Construction:	N/A	
Copper Plating:	N/A	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 66030
Electrotek Corp. 7745 S. 10th Street Oak Creek, WI 53154, US	Same Address as Manufacturer	Contact: Tom Tikusis Phone: 414-762-1390 Fax: 414-762-1510 EMail: sales@boards4u.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQ-06-011451 VQ-08-014513 VQE-09-018692
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.115"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	"/.012"	
Aspect Ratio:	9:1 (Through Hole)	
Max. Number of Layers:	18	
Min. Conductor Width:	.003"	
Min. Conductor Space:	.003"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Nickel/Gold, HASL, ImmAg	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	Cap Lamination, Foil Lamination	
Copper Plating:	Electroplated Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	GF: 100 ohms/50 ohms ± 10%, GI: 100 ohms ± 10%	
Hole Fill/Via Plug:	Via-fill Technology, 0.016" ±25% Diameter	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 3ECL3
Endicott Interconnect Technologies, Inc. Dept. 0069/014-3, 1093 Clark Street Endicott, NY 13760, US	Same Address as Manufacturer	Contact: Jose Rios Phone: 607-755-5896 Fax: 607-755-4649 EMail: JoseA.Rios@eitny.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-04-005311 VQE-07-012236 VQE-07-013506 VQE-08-015922
Panel Size:	24" X 28"	
Max./Min. Board Thickness:	.116"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	"/.01"	
Aspect Ratio:	12:1 (Through Hole)	
Max. Number of Layers:	30	
Min. Conductor Width:	.003"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL	
Hole Preparation:	Glass Etch, Permanganate Desmear, Plasma Etchback	
Alternate Construction:	Cap-Lamination, Foil-Lamination	
Copper Plating:	Electroplated Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 3ECL3
Endicott Interconnect Technologies, Inc. Dept. 0069/014-3, 1093 Clark Street Endicott, NY 13760, US	Same Address as Manufacturer	Contact: Jose Rios Phone: 607-755-5896 Fax: 607-755-4649 EMail: JoseA.Rios@eitny.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-04-005311 VQE-07-012236 VQE-07-013506
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.084"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.012"	
Aspect Ratio:	7:1 (Through Hole)	
Max. Number of Layers:	12	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	Cap-Lamination, Foil-Lamination	
Copper Plating:	Electroplated Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/Custom	VQE-04-005311 VQE-07-012236 VQE-07-013506
Panel Size:	19.5" X 24"	
Max./Min. Board Thickness:	.153"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.02"	
Aspect Ratio:	7.6:1 (Through Hole)	
Max. Number of Layers:	19	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	MIX	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	Foil-Lamination, Copper Core	
Copper Plating:	Electroplated Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: L2665
Firan Technology Group 250 Finchdene Square Scarborough, Ontario, Canada M1X 1A5	Same Address as Manufacturer	Contact: Bryan Clark Phone: 416-299-4000 Fax: 416-292-4308 EMail: byanclark@firantechnology.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-05-009339 VQE-06-010764 VQE-06-010889
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.22"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.005" (Laser Control Depth) Not Specified/.006" (Buried Via Mechanical Drill) .025"/.008" (Mechanical Drill)	
Aspect Ratio:	7:1 (Through Hole)	
Max. Number of Layers:	20	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	BI: Aramid Fabric, Nonwoven, Polyimide Resin GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant GM: Glass Base, Woven, Triazine and/or Bismaleimide Modified Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL, Immersion Tin, Silver, Reflow Solder	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	Sequential Lamination for Blind & Buried Vias and Micro Vias	
Copper Plating:	Electroless Acid Copper, Electrolytic Acid Copper	
Solder Resist:	Hole Fill, LPI	
Controlled Impedance:	Characteristic ± 10%, Differential ± 10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 04RV5
Global Innovations Corp. 901 Hensley Drive Wylie, TX 75098, US	Same Address as Manufacturer	Contact: Bob Noland Phone: 214-291-1427 Fax: EMail: bnoland@globalinnovationcorp.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-03-4341 VQE-04-5599 VQE-04-5891 VQE-05-7288
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.119"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.01"	
Aspect Ratio:	7.5:1 (Through Hole)	
Max. Number of Layers:	18	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.005"	
Part Mounting:	MIX	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	HASL	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	Foil Lamination	
Copper Plating:	Electro-deposited Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 04RV5
Global Innovations Corp. 901 Hensley Drive Wylie, TX 75098, US	Same Address as Manufacturer	Contact: Bob Noland Phone: 214-291-1427 Fax: EMail: bnoland@globalinnovationcorp.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-04-4957 VQE-05-7288
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.074"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.012"	
Aspect Ratio:	6.2:1 (Through Hole)	
Max. Number of Layers:	12	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	MIX	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	HASL	
Hole Preparation:	Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electro-deposited Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	62/37.5 ohms ±10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/6	VQE-11-021947
Panel Size:	12" X 17"	
Max./Min. Board Thickness:	N/A	
Max./Min. Base CU Thickness:	.031"/"	
Max./Min. Through Hole Size:	"/.039"	
Aspect Ratio:	1:1 ((Through Hole))	
Max. Number of Layers:	2	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	N/A	
Rigid Base Material:	GY: Glass Base, Woven, Polytetrafluoroethylene Resin, Flame Resistant, for Microwave Application	
Flex Base Material:	N/A	
Finish System:	Hot Oil Reflow of Plated Sn/Pb	
Hole Preparation:	Sodium Treatment	
Alternate Construction:	N/A	
Copper Plating:	Direct Current Plate	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 04RV5
Global Innovations Corp. 901 Hensley Drive Wylie, TX 75098, US	Same Address as Manufacturer	Contact: Bob Noland Phone: 214-291-1427 Fax: EMail: bnoland@globalinnovationcorp.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/6	VQE-07-013270 VQE-09-017797 VQE-10-020600
Panel Size:	9" X 16"	
Max./Min. Board Thickness:	.098"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.031"	
Aspect Ratio:	3.2:1 (Through Hole)	
Max. Number of Layers:	2	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	MIX	
Rigid Base Material:	GR: Glass Base, Nonwoven, Polytetrafluoroethylene Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	HASL, Ni/Au	
Hole Preparation:	Fluoroetch	
Alternate Construction:	N/A	
Copper Plating:	Electro-deposited Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:

Gorilla Circuits

1445 Old Oakland Road
San Jose, CA 95112, US

CAGE Code: 3C7D2

Contact: David Williams
Phone: 408-294-9897
Fax: 408-297-1540
EMail: info@gorillacircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-11-022314
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.093"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	"/.01"	
Aspect Ratio:	1.25:1 ((microvia)) 9.3:1 ((plated thru hole))	
Max. Number of Layers:	18	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.005"	
Part Mounting:	N/A	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Nickel/Hard Gold, HASL	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	Blind Vias, Buried Vias, Sequential Lamination	
Copper Plating:	Periodic Reverse Plate	
Solder Resist:	LPI	
Controlled Impedance:	Differential, Single-Ended	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-11-022314
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.18"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	"/.01"	
Aspect Ratio:	18:1	
Max. Number of Layers:	18	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.005"	
Part Mounting:	N/A	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Nickel/Hard Gold, HASL	
Hole Preparation:	Permanganage Desmear, Plasma Desmear	
Alternate Construction:	N/A	
Copper Plating:	Periodic Reverse Plate	
Solder Resist:	LPI	
Controlled Impedance:	Differential, Single-Ended	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 07284
Hamby Corporation 27704 Avenue Scott Valencia, CA 91355, US	Same Address as Manufacturer	Contact: Sue Sharp Phone: 661-257-1924 Fax: 661-257-1213 EMail: suesharp@hambycorp.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-09-017349
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.035"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.05"/.02" (drilled)	
Aspect Ratio:	2:1 (Through Hole)	
Max. Number of Layers:	6	
Min. Conductor Width:	.009"	
Min. Conductor Space:	.009"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	HASL, Ni/Au	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electrodeposited Acid Copper	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-08-014596
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.085"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.035"/.018"	
Aspect Ratio:	5:1 (Through Hole)	
Max. Number of Layers:	11	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	IPC-4204/1 Acrylic Adhesive IPC-4204/11 Adhesiveless	
Finish System:	HASL, Ni/Au	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electrodeposited Acid Copper	
Solder Resist:	N/A	
Controlled Impedance:	Characteristic: 35-50 ohms +/-10%, Differential: 100 ohms +/-10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: C4831
Hans Brockstedt GmbH Clara-Immerwahr Strasse 7 24145 Kiel, Germany	Same Address as Manufacturer	Contact: Hilmar Klammer Phone: 0049-431-71966-0, -30 Fax: 0049-431-71966-29 EMail: klammer@brockstedt.de

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-03-2619 VQE-05-7480
Panel Size:	9" X 13", 13" X 20", 15" X 21", 18" X 24"	
Max./Min. Board Thickness:	.2"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.004" (Laser Drilled) Not Specified/.01" (Mech. Drilled)	
Aspect Ratio:	1:1 (Blind Vias) 7:1 (Through Hole)	
Max. Number of Layers:	12	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	Electroless Nickel/Gold, Electroplated Nickel/Gold, Electroplated SnPb, Fused SnPb, HASL	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind Vias, Buried Vias, Foil Lamination, Laser Drilled Vias	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: C4831
Hans Brockstedt GmbH Clara-Immerwahr Strasse 7 24145 Kiel, Germany	Same Address as Manufacturer	Contact: Hilmar Klammer Phone: 0049-431-71966-0, -30 Fax: 0049-431-71966-29 EMail: klammer@brockstedt.de

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-03-2619 VQE-05-7480
Panel Size:	9" X 13", 13" X 20"	
Max./Min. Board Thickness:	.2"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.004" (Laser Drilled) Not Specified/.01" (Mech. Drilled)	
Aspect Ratio:	1:1 (Blind Vias) 7:1 (Through Hole)	
Max. Number of Layers:	12	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	IPC-4204/1 Acrylic Adhesive IPC-4204/11 Adhesiveless	
Finish System:	Electroless Nickel/Gold, Electroplated Nickel/Gold, Electroplated SnPb, Fused SnPb, HASL	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind Vias, Buried Vias, Foil Lamination, Laser Drilled Vias	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Use A (Flex to Install), Use B (Continuous Flex)	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 1KXU6
Hughes Circuits 540 S. Pacific Street San Marcos, CA 92078-4056, US	Same Address as Manufacturer	Contact: Joe Hughes Phone: 760-744-0300 Fax: 760-744-6388 EMail: joe@hughescircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-07-014018
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.08"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.01" .012"/Not Specified	
Aspect Ratio:	7:1 (Through Hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	MIX	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	HASL	
Hole Preparation:	Plasma Desmear	
Alternate Construction:	N/A	
Copper Plating:	Electrodeposited Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 1VUH8
KCA Electronics, Inc. 223 North Crescent Way Anaheim, CA 92801, US	Same Address as Manufacturer	Contact: Mr. Jeffrey Frost Phone: 714-239-2433 Fax: 714-239-2455 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3	VQE-11-021796
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.008"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	N/A	
Aspect Ratio:	N/A	
Max. Number of Layers:	1	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.006"	
Part Mounting:	THM	
Rigid Base Material:	N/A	
Flex Base Material:	Acrylic Adhesive Polyimide Coverlayer Copper Clad Polyimide with Acrylic Adhesive	
Finish System:	HASL	
Hole Preparation:	N/A	
Alternate Construction:	N/A	
Copper Plating:	N/A	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Use A (Flex During Installation), Use B (Dynamic Flex)	
Hole Wall Conductive Coating:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-11-021796
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.074"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	"/.01" (Drilled Through Hole (before plating))	
Aspect Ratio:	7:1	
Max. Number of Layers:	16	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.004"	
Part Mounting:	SMT	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	Acrylic Adhesive Polyimide Coverlayer Copper Clad Adhesiveless Polyimide	
Finish System:	HASL	
Hole Preparation:	Plasma Etchback/Desmear	
Alternate Construction:	Blind Vias, Foil Lamination, Sequential Lamination	
Copper Plating:	Acid Copper: DC Plate	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	Non-conductive	
Flex Usage:	Use A (Flex During Installation)	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 03640
Lockheed Martin Systems Integration 1801 State Route 17C Owego, NY 13827, US	Same Address as Manufacturer	Contact: Melita Nagerl Phone: 607-751-4665 Fax: 607-751-7714 EMail: melita.nagerl@lmco.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-00-0961 VQE-99-0130
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.2"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.02"	
Aspect Ratio:	8:1 (Through Hole)	
Max. Number of Layers:	16	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	SMT, THM	
Rigid Base Material:	AF: Aramid Fabric, Woven, Majority Polyfunctional Epoxy Resin	
Flex Base Material:	N/A	
Finish System:	Fused SnPb, HASL, NiAu	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electro-deposited Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-01-0539
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.095"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.014"	
Aspect Ratio:	6.8:1 (Through Hole)	
Max. Number of Layers:	14	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	SMT, THM	
Rigid Base Material:	BI: Aramid Fabric, Nonwoven, Polyimide Resin	
Flex Base Material:	N/A	
Finish System:	Fused SnPb, HASL, NiAu	
Hole Preparation:	Permanganate Desmear	
Alternate Construction:	N/A	
Copper Plating:	Electro-deposited Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 03640
Lockheed Martin Systems Integration 1801 State Route 17C Owego, NY 13827, US	Same Address as Manufacturer	Contact: Melita Nagerl Phone: 607-751-4665 Fax: 607-751-7714 EMail: melita.nagerl@lmco.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-00-0961 VQE-07-013268 VQE-07-013459 VQE-99-0130
Panel Size:	24" X 30"	
Max./Min. Board Thickness:	.2"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.018"	
Aspect Ratio:	8:1 (Through Hole)	
Max. Number of Layers:	24	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	Fused SnPb, HASL, NiAu	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electro-deposited Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 03640
Lockheed Martin Systems Integration 1801 State Route 17C Owego, NY 13827, US	Same Address as Manufacturer	Contact: Melita Nagerl Phone: 607-751-4665 Fax: 607-751-7714 EMail: melita.nagerl@lmco.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-00-0961 VQE-07-013459 VQE-99-0130
Panel Size:	24" X 30"	
Max./Min. Board Thickness:	.2"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.018"	
Aspect Ratio:	8:1 (Through Hole)	
Max. Number of Layers:	16	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	Fused SnPb, HASL, NiAu	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electro-deposited Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 03640
Lockheed Martin Systems Integration 1801 State Route 17C Owego, NY 13827, US	Same Address as Manufacturer	Contact: Melita Nagerl Phone: 607-751-4665 Fax: 607-751-7714 EMail: melita.nagerl@lmco.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-00-0684 VQE-07-013459
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.11"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.016"	
Aspect Ratio:	6:1 (Through Hole)	
Max. Number of Layers:	18	
Min. Conductor Width:	.003"	
Min. Conductor Space:	.004"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	IC-4204/11 Adhesiveless IPC-4204/1 Acrylic Adhesive IPC-4204/2 IPC-4204/3 IPC-4204/4	
Finish System:	Fused SnPb, HASL	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electro-deposited Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 34076
Micom Corp. 475 Old Highway 8 NW New Brighton, MN 55112, US	Same Address as Manufacturer	Contact: Larry Leonard Phone: 651-604-2639 Fax: 651-636-1352 EMail: lleonard@micomcircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-02-002780 VQE-03-2980
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.239"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.007"	
Aspect Ratio:	11:1 (Through Hole)	
Max. Number of Layers:	28	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	Fuse Following SnPb Plate, HASL	
Hole Preparation:	Permanganate Desmear, Permanganate Etchback, Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind & Buried Vias	
Copper Plating:	Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	Characteristic ±10%, Differential ±10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:		CAGE Code: 65723
Pioneer Circuits, Inc. 3000 S. Shannon Street Santa Ana, CA 92704-6321, US		Contact: Elias Gabriel Phone: 714-641-3132 x234 Fax: 714-641-3120 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-09-017323 VQE-09-017656
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.177"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.206"/.0135"	
Aspect Ratio:	11:1	
Max. Number of Layers:	22	
Min. Conductor Width:	.0035"	
Min. Conductor Space:	.0035"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Ni/Au Bondable, HASL, Reflowed Tin/Lead Fused, SMOBC, Selective Tin/Lead Strip	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	Blind/Buried Vias, Filled Via Holes, Plated Sub-Assemblies, Sequential Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	Characteristic & Differential ± 10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:		CAGE Code: 65723
Pioneer Circuits, Inc. 3000 S. Shannon Street Santa Ana, CA 92704-6321, US		Contact: Elias Gabriel Phone: 714-641-3132 x234 Fax: 714-641-3120 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-09-017323 VQE-09-017656
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.275"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.252"/.012"	
Aspect Ratio:	11:1	
Max. Number of Layers:	20	
Min. Conductor Width:	.0035"	
Min. Conductor Space:	.0035"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Ni/Au Bondable, HASL, Reflowed Tin/Lead Fused, SMOBC, Selective Tin/Lead Strip	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	Blind/Buried Vias, Filled Via Holes, Plated Sub-Assemblies, Sequential Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	Characteristic & Differential ± 10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:

Pioneer Circuits, Inc.

3000 S. Shannon Street
Santa Ana, CA 92704-6321, US

CAGE Code: 65723

Contact: Elias Gabriel
Phone: 714-641-3132 x234
Fax: 714-641-3120
EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-09-017323 VQE-09-017656 VQE-10-020651
Panel Size:	18" X 26"	
Max./Min. Board Thickness:	.231"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.169"/.02"	
Aspect Ratio:	8.5:1	
Max. Number of Layers:	22	
Min. Conductor Width:	.003"	
Min. Conductor Space:	.003"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF (Epoxy Glass)	
Flex Base Material:	Adhesiveless Epoxy	
Finish System:	ENIG, Electrolytic Ni/Au (Bondable), HASL, Reflowed Tin/Lead (Fused), SMOBC, Selective Tin/Lead Strip	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	Blind/Buried Vias, Filled Via Holes, Plated Sub-Assemblies, Sequential Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	Characteristic & Differential +/- 10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Class A (Flex During Installation)	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION: **Pioneer Circuits, Inc.** 3000 S. Shannon Street Santa Ana, CA 92704-6321, US		CAGE Code: 65723 Contact: Elias Gabriel Phone: 714-641-3132 x234 Fax: 714-641-3120 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-09-017323 VQE-09-017656
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.1"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.193"/.016"	
Aspect Ratio:	6:1	
Max. Number of Layers:	10	
Min. Conductor Width:	.003"	
Min. Conductor Space:	.003"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	Adhesive Polyimide	
Finish System:	ENIG, Electrolytic Ni/Au Bondable, HASL, Reflowed Tin/Lead Fused, SMOBC, Selective Tin/Lead Strip	
Hole Preparation:	Permanganate Copper, Plasma Etchback	
Alternate Construction:	Blind/Buried Vias, Filled Via Holes, Plated Sub-Assemblies, Sequential Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	Characteistic & Differential ± 10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Class A Flex During Installation, Class B Dynamic	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:		CAGE Code: 65723
Pioneer Circuits, Inc. 3000 S. Shannon Street Santa Ana, CA 92704-6321, US		Contact: Elias Gabriel Phone: 714-641-3132 x234 Fax: 714-641-3120 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-09-017323 VQE-09-017656
Panel Size:	24" X 36"	
Max./Min. Board Thickness:	.185"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.167"/.013"	
Aspect Ratio:	11:1	
Max. Number of Layers:	26	
Min. Conductor Width:	.003"	
Min. Conductor Space:	.003"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	Adhesiveless Polyimide	
Finish System:	ENIG, Electrolytic Ni/Au Bondable, HASL, Reflowed Tin/Lead Fused, SMOBC, Selectiive Tin/Lead Strip	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	Blind/Buried Vias, Bood Binder, Filled Via Holes, Plated Sub-Assemblies, Sequential Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	Characteristic & Differential ± 10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Class A Flex During Installation, Class B Dynamic	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:		CAGE Code: 66766
PNC, Inc. 115 East Centre Street Nutley, NJ 07110, US		Contact: Carmela Conte Phone: 973-284-1600 Fax: EMail: carmela@pnconline.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-10-19440
Panel Size:	18" X 22"	
Max./Min. Board Thickness:	.093"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.12"/.014"	
Aspect Ratio:	6.6:1	
Max. Number of Layers:	10	
Min. Conductor Width:	.008"	
Min. Conductor Space:	.008"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	HASL	
Hole Preparation:	Permanganate Desmear	
Alternate Construction:	Foil Lamination	
Copper Plating:	Electroplated Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 65114
Printed Circuits, Inc. 1200 West 96th Street Bloomington, MN 55431, US	Same Address as Manufacturer	Contact: Jim Smith Phone: 612-888-7900 Fax: 612-888-2719 EMail: jsmith@printedcircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-01-0024
Panel Size:	12" X 18", 18" X 24"	
Max./Min. Board Thickness:	.12"/Not Specified	
Max./Min. Base CU Thickness:	(1/2 oz.)	
Max./Min. Through Hole Size:	Not Specified/.01"	
Aspect Ratio:	10:1 (Through Hole)	
Max. Number of Layers:	16	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.005" (+/- 10%)	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	IPC-4204/1 Acrylic Adhesive IPC-4204/11 Adhesiveless	
Finish System:	Electroless Ni/Au, Electrolytic Ni/Au, Fused SnPb, HASL, SMOBC	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	Dry Film, LPI,	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Class A Flex to Install, Class B Continuous Flex	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 3CP65
Pro-Tech Interconnect Solutions 4300 Peavey Road Chaska, MN 55318-2351, US	Same Address as Manufacturer	Contact: Harland Kooda Phone: 952-442-2189 Fax: 952-442-2472 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-11-021704
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.1"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	"/.024" ((drilled))	
Aspect Ratio:	4:1	
Max. Number of Layers:	10	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	N/A	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	HASL	
Hole Preparation:	Plasma Desmear, Etchback	
Alternate Construction:	N/A	
Copper Plating:	Direct Current Plate	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Direct Metallization	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-11-021704
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.1"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	"/.024" ((drilled))	
Aspect Ratio:	4:1	
Max. Number of Layers:	10	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	N/A	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	HASL	
Hole Preparation:	Plasma Desmear, Etchback	
Alternate Construction:	N/A	
Copper Plating:	Direct Current Plate	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Direct Metallization	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION: **Sanmina-SCI (Owego)** 1200 Taylor Road Owega, NY 13827, US		CAGE Code: 4GZ84 Contact: Rick Sylvain Phone: 607-689-5543 Fax: EMail: rick.sylvain@sanmina-sci.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-11-021597
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.11"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.13"/.012"	
Aspect Ratio:	9.3:1	
Max. Number of Layers:	12	
Min. Conductor Width:	.008"	
Min. Conductor Space:	.0045"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	HASL	
Hole Preparation:	Plasma Etchback	
Alternate Construction:	Foil Lamination	
Copper Plating:	Electroplated Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 3DR67
Sanmina-SCI (San Jose) 2050 Bering Drive San Jose, CA 95131, US	Same Address as Manufacturer	Contact: Darrell Myers Phone: 408-964-6515 Fax: 408-964-6453 EMail: darrell.myers@sanmina-sci.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-06-011137 VQE-10-019381
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.062"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.25"/.01"	
Aspect Ratio:	6:1 (Through Hole)	
Max. Number of Layers:	8	
Min. Conductor Width:	.003"	
Min. Conductor Space:	.003"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL, ImmAg, OSP	
Hole Preparation:	Plasma Desmear	
Alternate Construction:	Buried Via Mechanical Drill, Foil Lamination, Sequential Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	50-110 ohms ± 5%	
Hole Fill/Via Plug:	Epoxy, Silver	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 3DR67
Sanmina-SCI (San Jose) 2050 Bering Drive San Jose, CA 95131, US	Same Address as Manufacturer	Contact: Darrell Myers Phone: 408-964-6515 Fax: 408-964-6453 EMail: darrell.myers@sanmina-sci.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-06-011137
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.04"/Not Specified (for Plasma Etchback) .25"/Not Specified (for Plasma Desmear)	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.25"/.008"	
Aspect Ratio:	15:1 (Through Hole) 1:2 (Microvias, Laser)	
Max. Number of Layers:	30	
Min. Conductor Width:	.003"	
Min. Conductor Space:	.003"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Nickel Gold, HASL, Reflowed Solder	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Foil Lamination, Min. Blind Via: 0.005" Laser, Min. Buried Via: 0.010" Mechanical Drill, Sequential Lamination	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	50-110 ohms ± 5%	
Hole Fill/Via Plug:	Epoxy, Silver	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 3DR67
Sanmina-SCI (San Jose) 2050 Bering Drive San Jose, CA 95131, US	Same Address as Manufacturer	Contact: Darrell Myers Phone: 408-964-6515 Fax: 408-964-6453 EMail: darrell.myers@sanmina-sci.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-06-11137 VQE-10-19381 VQE-11-22038
Panel Size:	21" X 27"	
Max./Min. Board Thickness:	.25"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	"/.01"	
Aspect Ratio:	14:1	
Max. Number of Layers:	30	
Min. Conductor Width:	.003"	
Min. Conductor Space:	.003"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL, Hot Oil Reflow of Plated Sn/Pb, ImmAg, OSP	
Hole Preparation:	Plasma Desmear	
Alternate Construction:	Buried Vias, Foil Lamination, Sequential Lamination	
Copper Plating:	Direct Current Plate, Pulse Plate	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	Differential, Single-Ended	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 3DR67
Sanmina-SCI (San Jose) 2050 Bering Drive San Jose, CA 95131, US	Same Address as Manufacturer	Contact: Darrell Myers Phone: 408-964-6515 Fax: 408-964-6453 EMail: darrell.myers@sanmina-sci.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/5	VQE-11-021514
Panel Size:	21" X 24"	
Max./Min. Board Thickness:	.066"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.151"/.01"	
Aspect Ratio:	7:1	
Max. Number of Layers:	7	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant With or Without Woven or Non-woven E Glass, Polytetrafluorethylene (PTFE) Resin, Ceramic Filler	
Flex Base Material:	N/A	
Finish System:	ENIG	
Hole Preparation:	Plasma Desmear	
Alternate Construction:	Blind Via Mechanical Drill, Sequential Lamination	
Copper Plating:	Electroplated Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	Epoxy, Silver	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	N/A	N/A
Panel Size:	N/A	
Max./Min. Board Thickness:	N/A	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	N/A	
Aspect Ratio:	N/A	
Max. Number of Layers:	N/A	
Min. Conductor Width:	N/A	
Min. Conductor Space:	N/A	
Part Mounting:	N/A	
Rigid Base Material:	N/A	
Flex Base Material:	N/A	
Finish System:	N/A	
Hole Preparation:	N/A	
Alternate Construction:	N/A	
Copper Plating:	N/A	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 66982
Speedy Circuits, Inc. 5331 McFadden Avenue Huntington Beach, CA 92649-1204, US	Same Address as Manufacturer	Contact: Jan Lesky Phone: 714-766-6243 Fax: 714-899-7074 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-08-016434 VQE-10-021007
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.11"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.194"/.015"	
Aspect Ratio:	7:1	
Max. Number of Layers:	14	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	Electroless Nickel Immersion Gold, HASL	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Foil Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	100/50 ohms +/-10% Characteristic, 100/50 ohms +/-10% Differential	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 66982
Speedy Circuits, Inc. 5331 McFadden Avenue Huntington Beach, CA 92649-1204, US	Same Address as Manufacturer	Contact: Jan Lesky Phone: 714-766-6243 Fax: 714-899-7074 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-08-016434 VQE-10-019157 VQE-10-021007
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.13"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.048"/.02"	
Aspect Ratio:	7:1	
Max. Number of Layers:	18	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	Adhesiveless Polyimide	
Finish System:	Electro-deposited Fused SnPb, Electrolytic Hard Gold, Electrolytic Nickel, Electrolytic Soft Gold, HASL	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Foil Lamination	
Copper Plating:	Electro-deposited Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	100/50 ohms +/-10% Characteristic, 100/50 ohms +/-10% Differential	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Class A (Flex During Installation), Class B (Dynamic)	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 66982
Speedy Circuits, Inc. 5331 McFadden Avenue Huntington Beach, CA 92649-1204, US	Same Address as Manufacturer	Contact: Jan Lesky Phone: 714-766-6243 Fax: 714-899-7074 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/5	VQE-09-018657 VQE-10-021007
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.068"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.125"/.01"	
Aspect Ratio:	6:1	
Max. Number of Layers:	10	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	Electro-deposited Fused SnPb, Electrolytic Hard Gold, Electrolytic Nickel, Electrolytic Soft Gold, HASL	
Hole Preparation:	Plasma Desmear	
Alternate Construction:	Electro-deposited Fused SnPb, Electrolytic Hard and Soft Gold, Electrolytic Nickel, HASL	
Copper Plating:	Acid Copper	
Solder Resist:	LPI,	
Controlled Impedance:	50 ohms +/- 10% (Characteristic, Differential)	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Ceramic Filler, Epoxy Resin - Mixed, PTFE Resin, With or Without Woven or Non-woven E-Glass, Woven E-Glass	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 66982
Speedy Circuits, Inc. 5331 McFadden Avenue Huntington Beach, CA 92649-1204, US	Same Address as Manufacturer	Contact: Jan Lesky Phone: 714-766-6243 Fax: 714-899-7074 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/5, MIL-PRF-31032/6	VQE-09-018657
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.1"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.048"/.02" .125"/.01"	
Aspect Ratio:	10:1	
Max. Number of Layers:	10	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	Electro-deposited Fused SnPb, Electrolytic Hard and Soft Gold, Electrolytic Nickel, HASL	
Hole Preparation:	Plasma Desmear	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	100/50 ohms +/-10% Characteristic, Differential	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 66982
Speedy Circuits, Inc. 5331 McFadden Avenue Huntington Beach, CA 92649-1204, US	Same Address as Manufacturer	Contact: Jan Lesky Phone: 714-766-6243 Fax: 714-899-7074 EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/6	VQE-08-016434
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.036"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.048"/.02"	
Aspect Ratio:	2:1 (Through Hole)	
Max. Number of Layers:	2	
Min. Conductor Width:	.005"	
Min. Conductor Space:	.005"	
Part Mounting:	SMT	
Rigid Base Material:	GR: Glass Base, Nonwoven, Polytetrafluoroethylene Resin, Flame Resistant GY: Glass Base, Woven, Polytetrafluoroethylene Resin, Flame Resistant, for Microwave Application	
Flex Base Material:	N/A	
Finish System:	Electro-deposited fused SnPb	
Hole Preparation:	N/A	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 38661
Strataflex Corp. 11 Dohme Avenue Toronto, Ontario, Canada M4B 1Y7	Same Address as Manufacturer	Contact: Peter Pialis Phone: 416-752-2224 Fax: 416-752-6719 EMail: ppialis@strataflex.ca

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-04-005354 VQE-08-015729
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.094"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.008"	
Aspect Ratio:	12:1 (Through Hole)	
Max. Number of Layers:	12	
Min. Conductor Width:	.006"	
Min. Conductor Space:	.004"	
Part Mounting:	N/A	
Rigid Base Material:	N/A	
Flex Base Material:	Flexible Polyimide Film/Acrylic IC-4203/1 Flexible Polyimide IPC-4204/11 Woven E-Glass, Polyimide Resin IPC-4101/40 Woven E-Glass, Polyimide Resin IPC-4101/41 Woven E-Glass, Polyimide Resin IPC-4101/42	
Finish System:	HASL	
Hole Preparation:	Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electrodeposited Acid Copper	
Solder Resist:	TA140 PSR-4000 HG	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Direct Metallization	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 38661
Strataflex Corp. 11 Dohme Avenue Toronto, Ontario, Canada M4B 1Y7	Same Address as Manufacturer	Contact: Peter Pialis Phone: 416-752-2224 Fax: 416-752-6719 EMail: ppialis@strataflex.ca

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-04-005354 VQE-08-015729
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	.035"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.011"/Not Specified	
Aspect Ratio:	3:1 (Through Hole)	
Max. Number of Layers:	7	
Min. Conductor Width:	.007"	
Min. Conductor Space:	.007"	
Part Mounting:	SM, THM	
Rigid Base Material:	N/A	
Flex Base Material:	FR4 IPC-4101/21 Flexible Polyimide Clad IPC-4204/1 Flexible Polyimide Film IPC-4202/1 Flexible Polyimide Film/Acrylic IPC-4203/1 Woven E-Glass, Polyimide Resin IPC-4101/41	
Finish System:	HASL	
Hole Preparation:	Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electrodeposited Acid Copper	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 1WQ42
TTM Technologies (Santa Ana) 2630 South Harbor Boulevard Santa Ana, CA 92704, US	Same Address as Manufacturer	Contact: Terry Lichte Phone: 714-241-0303, x3127 Fax: 714-241-0708 EMail: tlichte@ttmtech.comca

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-05-8644 VQE-06-011211
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.2"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.044"/.013"	
Aspect Ratio:	14:1 (Through Hole)	
Max. Number of Layers:	24	
Min. Conductor Width:	.003"	
Min. Conductor Space:	.003"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, Fused SnPb, HASL, ImmAg, OSP	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Aspect Ratio Microvias: 1:1, Min. Blind Via: 0.005" Laser, Min. Buried Via: 0.0135" Mechanical Drill, Sequential Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-05-8644 VQE-06-011211
Panel Size:	21" X 28"	
Max./Min. Board Thickness:	.2"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.044"/.013"	
Aspect Ratio:	14:1 (Through Hole)	
Max. Number of Layers:	24	
Min. Conductor Width:	.003"	
Min. Conductor Space:	.003"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, Fused SnPb, HASL, ImmAg, OSP	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Aspect Ratio Microvias: 1:1, Min. Blind Via: 0.005" Laser, Min. Buried Via: 0.0135" Mechanical Drill, Sequential Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 65916
TTM Technologies (Santa Clara) 400 Matthew Street Santa Clara, CA 95050, US	Same Address as Manufacturer	Contact: Nellie Guitierez Phone: 408-486-3184 Fax: 408-727-1003 EMail: nellie.guitierez@ttmtech.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-03-003888 VQE-10-020500 VQE-10-020581
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.12"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.191"/.012"	
Aspect Ratio:	9:1 (Through Hole)	
Max. Number of Layers:	20	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SM, THM	
Rigid Base Material:	GF (Woven E-Glass, Epoxy Resin)	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Ni, HASL	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind Vias	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	LPI, Screen Printed	
Controlled Impedance:	+/-10% tolerance	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-03-003888 VQE-10-020500 VQE-10-020581
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.12"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.191"/.012"	
Aspect Ratio:	9:1	
Max. Number of Layers:	12	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SM, THM	
Rigid Base Material:	GI (Woven E-Glass, Polyimide Resin)	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Ni, HASL	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind Vias	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	LPI, Screen Printed	
Controlled Impedance:	+/- 10% tolerance	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 65916
TTM Technologies (Santa Clara) 400 Matthew Street Santa Clara, CA 95050, US	Same Address as Manufacturer	Contact: Nellie Guitierez Phone: 408-486-3184 Fax: 408-727-1003 EMail: nellie.guitierez@ttmtech.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2, MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-03-003888 VQE-03-003895 VQE-10-020500 VQE-10-020500 VQE-10-020581 VQE-10-020581 VQE-11-021181
Panel Size:	18" X 24", 18" X 24"	
Max./Min. Board Thickness:	.12"/Not Specified .12"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.191"/.012" .191"/.012"	
Aspect Ratio:	6.45:1 9:1	
Max. Number of Layers:	11, 16	
Min. Conductor Width:	.004" .004"	
Min. Conductor Space:	.004" .004"	
Part Mounting:	MIX, MIX, SM, SM, THM, THM	
Rigid Base Material:	BI (Aramid Fabric, Non-Woven, Polyimide Resin) GF (Woven E-Glass, Epoxy Resin) GI (Woven E-Glass, Polyimide Resin)	
Flex Base Material:	IPC-4203/1 (Acrylic Adhesive Coverlay) IPC-4204/11 (Adhesiveless Polyimide)	
Finish System:	ENIG, ENIG, Electrolytic Ni, Electrolytic Ni, HASL, HASL	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind Vias	
Copper Plating:	Electrolytic Acid Copper, Electrolytic Acid Copper	
Solder Resist:	LPI, Screen Printed	
Controlled Impedance:	+/- 10% tolerance	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper, Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 65916
TTM Technologies (Santa Clara) 400 Matthew Street Santa Clara, CA 95050, US	Same Address as Manufacturer	Contact: Nellie Guitierez Phone: 408-486-3184 Fax: 408-727-1003 EMail: nellie.guitierez@ttmtech.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-03-003895 VQE-10-020500 VQE-10-020581
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.1"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.045"/.031"	
Aspect Ratio:	9:1 (Through Hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SM, THM	
Rigid Base Material:	GF (Woven E-Glass, Epoxy Resin) GI (Woven E-Glass, Polyimide Resin)	
Flex Base Material:	IPC-4203/1 (Acrylic Adhesive Coverlay) IPC-4204/1 (Adhesive Polyimide)	
Finish System:	ENIG, Electrolytic Ni, HASL	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 65916
TTM Technologies (Santa Clara) 400 Matthew Street Santa Clara, CA 95050, US	Same Address as Manufacturer	Contact: Nellie Guitierez Phone: 408-486-3184 Fax: 408-727-1003 EMail: nellie.guitierez@ttmtech.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/Custom	VQE-07-13211
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.62"/.006"	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.02"/.015" (drilled) .076"/.015" (drilled)	
Aspect Ratio:	4:1 (Through Hole)	
Max. Number of Layers:	6	
Min. Conductor Width:	.007"	
Min. Conductor Space:	.008"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant IPC-4103/10 Construction	
Flex Base Material:	N/A	
Finish System:	ENIG	
Hole Preparation:	Chemical Desmear	
Alternate Construction:	Blind vias	
Copper Plating:	Electroless, Electrolytic Acid Copper	
Solder Resist:	LPI, SMOBC	
Controlled Impedance:	50 ohms +/-10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	N/A	N/A
Panel Size:	N/A	
Max./Min. Board Thickness:	N/A	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	N/A	
Aspect Ratio:	N/A	
Max. Number of Layers:	N/A	
Min. Conductor Width:	N/A	
Min. Conductor Space:	N/A	
Part Mounting:	N/A	
Rigid Base Material:	N/A	
Flex Base Material:	N/A	
Finish System:	N/A	
Hole Preparation:	N/A	
Alternate Construction:	N/A	
Copper Plating:	N/A	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 5L706
TTM Technologies (Stafford) 4 Old Monson Road P.O. Box 145, Stafford, CT 77497, US	Same Address as Manufacturer	Contact: Michelle Herbert Phone: 860-684-5881 Fax: 860-684-7425 EMail: michele.hebert@tycoelectronics.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-03-003348 VQE-09-18855
Panel Size:	30" X 32"	
Max./Min. Board Thickness:	.1"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.067"/.032" (drilled)	
Aspect Ratio:	3:1 (Through hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.003"	
Part Mounting:	MIX, Press Fit, SM, THM	
Rigid Base Material:	GC: Glass Base, Woven E, Reinforcement, Majority Cyanate Ester, Flame Resistant SC: Glass Base, Woven S-2, Fiber, Majority Cyanate Ester, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Nickel, Electrolytic Soft & Hard Gold, HASL, Hot Oil Reflow following SnPb plate	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind and Buried Vias, Buried Resistors, Micro Vias, Multiple Laminations	
Copper Plating:	Acid Copper	
Solder Resist:	Dry-Film, LPI, Wet Mask	
Controlled Impedance:	Characteristic, Differential, Dual Stripline, Embedded Microstrip, Microstrip, Range 30-150 ohms (+/- 10%)	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	
Max. Base Cu Weight	1 oz.	

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 5L706
TTM Technologies (Stafford) 4 Old Monson Road P.O. Box 145, Stafford, CT 77497, US	Same Address as Manufacturer	Contact: Michelle Herbert Phone: 860-684-5881 Fax: 860-684-7425 EMail: michele.hebert@tycoelectronics.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-03-003348 VQE-09-18855
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.1"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.045"/.032" (drilled)	
Aspect Ratio:	3:1 (Through hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.003"	
Part Mounting:	MIX, Press Fit, SM, THM	
Rigid Base Material:	GM: Glass Base, Woven, Triazine and/or Bismaleimide Modified Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Nickel, Electrolytic Soft & Hard Gold, HASL, Hot Oil Reflow following SnPb plate	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind and Buried Vias, Buried Resistors, Micro Vias, Multiple Laminations	
Copper Plating:	Acid Copper	
Solder Resist:	Dry-Film, LPI, Wet Mask	
Controlled Impedance:	Characteristic, Differential, Dual Stripline, Embedded Microstrip, Microstrip, Range 30-150 ohms (+/- 10%)	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	
Max. Base Cu Weight	1 oz.	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 5L706
TTM Technologies (Stafford) 4 Old Monson Road P.O. Box 145, Stafford, CT 77497, US	Same Address as Manufacturer	Contact: Michelle Herbert Phone: 860-684-5881 Fax: 860-684-7425 EMail: michele.hebert@tycoelectronics.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-03-3348 VQE-09-18855
Panel Size:	30" X 54"	
Max./Min. Board Thickness:	.4"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.195"/.0079" (drilled)	
Aspect Ratio:	14:1 (Through Hole) 2.5:1 (Buried Vias)	
Max. Number of Layers:	50	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.003"	
Part Mounting:	MIX, Press Fit, SM, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Nickel, Electrolytic Soft & Hard Gold, HASL, Hot Oil Reflow following SnPb plate, Reflowed Solder	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind and Buried Vias, Buried Resistors, Copper Invar Copper, Micro Vias, Multiple Laminations	
Copper Plating:	Acid Copper	
Solder Resist:	Dry Film, LPI, Wet Mask	
Controlled Impedance:	Characteristic, Differential, Dual Stripline, Embedded Microstrip, Microstrip, Range 30-150 ohms (+/- 10%)	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	
Max. Base Cu Weight	1 oz.	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 5L706
TTM Technologies (Stafford) 4 Old Monson Road P.O. Box 145, Stafford, CT 77497, US	Same Address as Manufacturer	Contact: Michelle Herbert Phone: 860-684-5881 Fax: 860-684-7425 EMail: michele.hebert@tycoelectronics.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-03-003348 VQE-09-18855
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.13"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.133"/.0118" (drilled)	
Aspect Ratio:	11:1 (Through hole) 2.5:1 (Buried Vias)	
Max. Number of Layers:	32	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.003"	
Part Mounting:	MIX, Press Fit, SM, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Nickel, Electrolytic Soft & Hard Gold, HASL, Hot Oil Reflow following SnPb plate	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind and Buried Vias, Buried Resistors, Copper Invar Copper, Micro Vias, Multiple Laminations	
Copper Plating:	Acid Copper	
Solder Resist:	Dry-Film, LPI, Wet Mask	
Controlled Impedance:	Characteristic, Differential, Dual Stripline, Embedded Microstrip, Microstrip, Range 30-150 ohms (+/- 10%)	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	
Max. Base Cu Weight	1 oz.	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 5L706
TTM Technologies (Stafford) 4 Old Monson Road P.O. Box 145, Stafford, CT 77497, US	Same Address as Manufacturer	Contact: Michelle Herbert Phone: 860-684-5881 Fax: 860-684-7425 EMail: michele.hebert@tycoelectronics.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-03-003348 VQE-09-18855
Panel Size:	16" X 18"	
Max./Min. Board Thickness:	.1"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.045"/.0118" (drilled)	
Aspect Ratio:	6:1 (Through hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.003"	
Part Mounting:	MIX, Press Fit, SM, THM	
Rigid Base Material:	BI: Aramid Fabric, Nonwoven, Polyimide Resin	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Nickel, Electrolytic Soft & Hard Gold, HASL, Hot Oil Reflow following SnPb plate	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind and Buried Vias, Buried Resistors, Micro Vias, Multiple Laminations	
Copper Plating:	Acid Copper	
Solder Resist:	Dry-Film, LPI, Wet Mask	
Controlled Impedance:	Characteristic, Differential, Dual Stripline, Embedded Microstrip, Microstrip, Range 30-150 ohms (+/- 10%)	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	
Max. Base Cu Weight	1 oz.	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 5L706
TTM Technologies (Stafford) 4 Old Monson Road P.O. Box 145, Stafford, CT 77497, US	Same Address as Manufacturer	Contact: Michelle Herbert Phone: 860-684-5881 Fax: 860-684-7425 EMail: michele.hebert@tycoelectronics.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-03-003348 VQE-09-18855
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.1"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.045"/.032" (drilled)	
Aspect Ratio:	3:1 (Through hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.003"	
Part Mounting:	MIX, Press Fit, SM, THM	
Rigid Base Material:	AF: Aramid Fabric, Woven, Majority Polyfunctional Epoxy Resin	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Nickel, Electrolytic Soft & Hard Gold, HASL, Hot Oil Reflow following SnPb plate	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind and Buried Vias, Buried Resistors, Micro Vias, Multiple Laminations	
Copper Plating:	Acid Copper	
Solder Resist:	Dry-Film, LPI, Wet Mask	
Controlled Impedance:	Characteristic, Differential, Dual Stripline, Embedded Microstrip, Microstrip, Range 30-150 ohms (+/- 10%)	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	
Max. Base Cu Weight	1 oz.	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 5L706
TTM Technologies (Stafford) 4 Old Monson Road P.O. Box 145, Stafford, CT 77497, US	Same Address as Manufacturer	Contact: Michelle Herbert Phone: 860-684-5881 Fax: 860-684-7425 EMail: michele.hebert@tycoelectronics.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-03-003348 VQE-09-18855
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	N/A	
Max./Min. Base CU Thickness:	.002"/"	
Max./Min. Through Hole Size:	.045"/.0118" (drilled)	
Aspect Ratio:	7:1 (Through hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.003"	
Part Mounting:	MIX, Press Fit, SM, THM	
Rigid Base Material:	BF: Aramid Fabric, Nonwoven, Epoxy Resin	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Nickel, Electrolytic Soft & Hard Gold, HASL, Hot Oil Reflow following SnPb plate	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind and Buried Vias, Buried Resistors, Micro Vias, Multiple Laminations	
Copper Plating:	Acid Copper	
Solder Resist:	Dry-Film, LPI, Wey Mask	
Controlled Impedance:	Characteristic, Differential, Dual Stripline, Embedded Microstrip, Microstrip, Range 30-150 ohms (+/- 10%)	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	
Max. Base Cu Weight	1 oz.	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 5L706
TTM Technologies (Stafford) 4 Old Monson Road P.O. Box 145, Stafford, CT 77497, US	Same Address as Manufacturer	Contact: Michelle Herbert Phone: 860-684-5881 Fax: 860-684-7425 EMail: michele.hebert@tycoelectronics.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-03-003349 VQE-09-18855 VQE-10-19456
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.125"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.063"/.013" (drilled)	
Aspect Ratio:	9:1 (Through Hole)	
Max. Number of Layers:	24	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.003"	
Part Mounting:	MIX, Press Fit, SM, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	4201/11 Acrylic Adhesive Coverlayer 4204/11 Adhesive Polyimide	
Finish System:	ENIG, Electrolytic Nickel, Electrolytic Soft & Hard Gold, HASL, Hot Oil Reflow following SnPb plate	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind and Buried Vias, Buried Resistors, Micro Vias, Multiple Laminations	
Copper Plating:	Acid Copper	
Solder Resist:	Dy Film, LPI, Wet Mask	
Controlled Impedance:	Characteristic, Differential, Dual Stripline, Embedded Microstrip, Microstrip, Range 30-150 ohms (+/- 10%)	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	Class A Flex to Install, Class B Continuous	
Hole Wall Conductive Coating:	Electroless Copper	
Max. Base Cu Weight	1 oz.	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 5L706
TTM Technologies (Stafford) 4 Old Monson Road P.O. Box 145, Stafford, CT 77497, US	Same Address as Manufacturer	Contact: Michelle Herbert Phone: 860-684-5881 Fax: 860-684-7425 EMail: michele.hebert@tycoelectronics.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4, MIL-PRF-31032/Custom	VQE-03-003348 VQE-03-003349 VQE-10-19456 VQE-10-19855
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.07"/Not Specified .11"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/.035" (drilled) .0413"/.0197" (drilled)	
Aspect Ratio:	2:1 3.3:1 ((through hole))	
Max. Number of Layers:	11, 12	
Min. Conductor Width:	.004" .006"	
Min. Conductor Space:	.003" .004"	
Part Mounting:	MIX, Press Fit, SM, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant Hydrocarbon with Ceramic Filler PTFE Resin with Ceramic Filler,	
Flex Base Material:	4204/1 Acrylic Adhesive	
Finish System:	ENIG, Electrolytic Nickel, Electrolytic Soft & Hard Gold, HASL, Hot Oil Reflow following SnPb plate	
Hole Preparation:	Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind and Buried Vias, Buried Resistors, Micro Vias, Multiple Laminations	
Copper Plating:	Acid Copper	
Solder Resist:	Dry-Film, LPI, LPI, Dry-Film, Wet Mask, Wet Mask	
Controlled Impedance:	Characteristic, Differential, Dual Stripline, Embedded Microstrip, Microstrip, Range 30-150 ohms (+/- 10%)	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Electroless Copper	
Max. Base Cu Weight	1 oz.	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 66311
Unicircuit, Inc. 8192 Southpark Lane Littleton, CO 80120, US	Same Address as Manufacturer	Contact: Bob Lageman Phone: 303-730-0505, x110 Fax: EMail: blageman@unicircuit.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

QUALIFICATION LETTERS:

VQE-07-13789
VQE-09-17422

Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2
Panel Size:	12" X 18"
Max./Min. Board Thickness:	.12"/Not Specified
Max./Min. Base CU Thickness:	N/A
Max./Min. Through Hole Size:	.129"/.02"
Aspect Ratio:	6:1 (Through Hole)
Max. Number of Layers:	16
Min. Conductor Width:	.005"
Min. Conductor Space:	.005"
Part Mounting:	SMT, THM
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant
Flex Base Material:	N/A
Finish System:	HASL, Reflowed Tin Lead
Hole Preparation:	Plasma Etchback
Alternate Construction:	Blind Via, Bured Via, Foil Lamination, Laser-drilled Microvias, Sequential Lamination
Copper Plating:	Electrodeposited Acid Copper
Solder Resist:	LPI
Controlled Impedance:	100 ohms differential +/-10%, 53 ohms characteristic +/-7%
Hole Fill/Via Plug:	Conductive, Non-conductive
Flex Usage:	N/A
Hole Wall Conductive Coating:	Electroless Copper
Laser Via Hole Size	.006 +/-.001

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

QUALIFICATION LETTERS:

VQE-09-17422

Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2
Panel Size:	20" X 26"
Max./Min. Board Thickness:	.19"/Not Specified
Max./Min. Base CU Thickness:	N/A
Max./Min. Through Hole Size:	.252"/.029"
Aspect Ratio:	6.5:1 ((thru hole))
Max. Number of Layers:	24
Min. Conductor Width:	.005"
Min. Conductor Space:	.005"
Part Mounting:	SMT, THM
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Flex Base Material:	N/A
Finish System:	HASL, Reflowed Tin Lead
Hole Preparation:	Plasma Etchback
Alternate Construction:	N/A
Copper Plating:	Electrodeposited Acid Copper
Solder Resist:	LPI
Controlled Impedance:	100 ohms differential +/-10%, 53 ohms characteristic +/-7%
Hole Fill/Via Plug:	Conductive, Non-conductive
Flex Usage:	N/A
Hole Wall Conductive Coating:	Electroless Copper

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 45032
Universal Circuits, Inc. 8860 Zachary Lane North Maple Grove, MN 55369-4524, US	Same Address as Manufacturer	Contact: Phone: Fax: EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-10-019530 VQE-10-020323
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.125"/Not Specified .18"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	"/.008" "/.021"	
Aspect Ratio:	7.75:1 8.57:1	
Max. Number of Layers:	16, 18	
Min. Conductor Width:	.0032" .005"	
Min. Conductor Space:	.0032" .005"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant Hybrid GF Hydrocarbon/Ceramic	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL	
Hole Preparation:	Chemical Desmear, Plasma Etchback	
Alternate Construction:	Blind Vias, Foil Lamination, Sequential Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	Differential 77.5 +/- 7.5, 90 +/- 13.5, 98 +/- 13, 100 +/- 10, 120 +/- 12, 150 +/- 7 ohms, Single-ended 50 +/- 2.5, 55 +/- 5 ohms	
Hole Fill/Via Plug:	Acid Copper	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Direct Metallization	
Through Hole Metallization	Direct Metallization	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 45032
Universal Circuits, Inc. 8860 Zachary Lane North Maple Grove, MN 55369-4524, US	Same Address as Manufacturer	Contact: Phone: Fax: EMail:

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-10-019530 VQE-11-021326
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.062"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	"/.0138"	
Aspect Ratio:	4.5:1	
Max. Number of Layers:	8	
Min. Conductor Width:	.007"	
Min. Conductor Space:	.006"	
Part Mounting:	SMT	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, Electrolytic Ni/Au, HASL	
Hole Preparation:	Chemical Desmear, Plasma Etchback	
Alternate Construction:	Foil Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	Direct Metallization	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:

Vermont Circuits, Inc.

76 Technology Drive
P.O. Box 1890, Brattleboro, VT 05302-1890, US

CAGE Code: 65200

Contact: Bob Downing
Phone: 802-257-4571
Fax: 802-257-0011
EMail: Bob.Downing@vtcicuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION

Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2
Panel Size:	18" X 24"
Max./Min. Board Thickness:	.1"/Not Specified
Max./Min. Base CU Thickness:	1"/.5"
Max./Min. Through Hole Size:	.04"/.008" ((.0453/.012 Drilled))
Aspect Ratio:	7.5:1
Max. Number of Layers:	10
Min. Conductor Width:	.005"
Min. Conductor Space:	.005"
Part Mounting:	THM
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant
Flex Base Material:	N/A
Finish System:	ENIG, HASL
Hole Preparation:	Permanganate Desmear, Plasma Desmear, Plasma Etchback
Alternate Construction:	Foil Lamination
Copper Plating:	Acid Copper: DC Plate
Solder Resist:	LPI
Controlled Impedance:	N/A
Hole Fill/Via Plug:	N/A
Flex Usage:	N/A
Hole Wall Conductive Coating:	Electroless Copper

QUALIFICATION LETTERS:

VQE-10-019275

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0MHG5
Viasystems Corp. (CA) 355 Turtle Creek Court San Jose, CA 95125-1316, US	Same Address as Manufacturer	Contact: Dave Williams Phone: 408-280-0422 Fax: 408-280-0641 EMail: david.williams@viasystems.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-08-016481 VQE-08-016632
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.13"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.004"/.008" (laser drilled) .25"/.008" (mechanical)	
Aspect Ratio:	0.8:1 (Blind Vias) 10:1 (Through Hole)	
Max. Number of Layers:	20	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL, Hard Gold, Nickel	
Hole Preparation:	Chemical Desmear, Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind Vias, Buried Vias, Sequential Lamination	
Copper Plating:	Electrodeposited Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	25-125 ohms +/-10%	
Hole Fill/Via Plug:	Non-conductive	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 01KV9
Viasystems Corp. (OR) 1521 Poplar Lane Forest Grove, OR 97116, US	Same Address as Manufacturer	Contact: Roger Michalowski Phone: 781-639-5410 Fax: EMail: Customerservice@viasystems.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQ-09-017325
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	.13"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	.003"/Not Specified (Laser Via) "/.008" (Mechanical)	
Aspect Ratio:	0.8:1 (Blind Vias) 10:1 (Through Hole)	
Max. Number of Layers:	26	
Min. Conductor Width:	.004"	
Min. Conductor Space:	.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG, HASL, Immersion Ag, Ni/Hard-Au	
Hole Preparation:	Chemical Desmear Permanganate, Plasma Desmear, Plasma Etchback	
Alternate Construction:	Blind Vias, Laser Drilled Vias	
Copper Plating:	Electrodeposited Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	Differential Methods ±5% at 50 ohms, Microstrip, Single Ended, Single Line	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Hole Wall Conductive Coating:	N/A	

SECTION II
LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

MIL-PRF-31032/1

Accurate Circuit Engineering
3019 S. Kilson Drive, Santa Ana, CA 92707, US

American Standard Circuits
RF Division, 475 Industrial Drive, West Chicago, IL 60185, US

Amphenol Printed Circuits
91 Northeastern Boulevard, Nashua, NH 03062, US

Calumet Electronics Corp.
25830 Depot Street, Calumet, MI 49913-1985, US

Cirexx International, Inc.
791 Nuttman Street, Santa Clara, CA 95054,

Colonial Circuits, Inc.
1026 Warrenton Road, Fredericksburg, VA 22406-6200, US

Cosmotronic, Inc.
16721 Noyes Avenue, Irvine, CA 92606, US

DDi Cleveland Corp.
7 Ascot Parkway, Cuyahoga Falls, OH 44223, US

DDi Denver Corp.
10570 Bradford Road, Littleton, CO 80127, US

DDI Global Corp. - Anaheim
1220 N. Simon Circle, Anaheim, CA 92806, US

DDi Global Corp. - Sterling, VA
1200 Severn Way, Dulles, VA 20166-8904, US

DDi North Jackson Corp.
12080 DeBartolo Drive, North Jackson, OH 44451, US

DDi Ontario
8150 Sheppard Avenue East, Scarborough, Ontario, Canada M1B 5K2

Dynaco Corp.
1000 South Priest Drive, Tempe, AZ 85281-5238, US

Dynamic & Proto Circuits, Inc.
869 Barton Street, Stoney Creek, Ontario, Canada L8E 5G6

Electro Plate Circuitry, Inc.
1430 Century Drive, Carrollton, TX 75006, US

Electrotek Corp.
7745 S. 10th Street, Oak Creek, WI 53154, US

Endicott Interconnect Technologies, Inc.
Dept. 0069/014-3, 1093 Clark Street, Endicott, NY 13760, US

Firan Technology Group
250 Finchdene Square, Scarborough, Ontario, Canada M1X 1A5

Global Innovations Corp.
901 Hensley Drive, Wylie, TX 75098, US

Gorilla Circuits
1445 Old Oakland Road, San Jose, CA 95112, US

Hamby Corporation
27704 Avenue Scott, Valencia, CA 91355, US

Hans Brockstedt GmbH
Clara-Immerwahr Strasse 7, 24145 Kiel, Germany

Hughes Circuits
540 S. Pacific Street, San Marcos, CA 92078-4056, US

Lockheed Martin Systems Integration
1801 State Route 17C, Owego, NY 13827, US

Micom Corp.
475 Old Highway 8 NW, New Brighton, MN 55112, US

Pioneer Circuits, Inc.
3000 S. Shannon Street, Santa Ana, CA 92704-6321, US

SECTION II
LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

MIL-PRF-31032/1

PNC, Inc.
115 East Centre Street, Nutley, NJ 07110, US

Pro-Tech Interconnect Solutions
4300 Peavey Road, Chaska, MN 55318-2351, US

Sanmina-SCI (Owego)
1200 Taylor Road, Owega, NY 13827, US

Sanmina-SCI (San Jose)
2050 Bering Drive, San Jose, CA 95131, US

Speedy Circuits, Inc.
5331 McFadden Avenue, Huntington Beach, CA 92649-1204, US

TTM Technologies (Santa Ana)
2630 South Harbor Boulevard, Santa Ana, CA 92704, US

TTM Technologies (Santa Clara)
400 Matthew Street, Santa Clara, CA 95050, US

TTM Technologies (Stafford)
4 Old Monson Road, P.O. Box 145, Stafford, CT 77497, US

Unicircuit, Inc.
8192 Southpark Lane, Littleton, CO 80120, US

Universal Circuits, Inc.
8860 Zachary Lane North, Maple Grove, MN 55369-4524, US

Vermont Circuits, Inc.
76 Technology Drive, P.O. Box 1890, Brattleboro, VT 05302-1890, US

Viasystems Corp. (CA)
355 Turtle Creek Court, San Jose, CA 95125-1316, US

Viasystems Corp. (OR)
1521 Poplar Lane, Forest Grove, OR 97116, US

MIL-PRF-31032/2

Accurate Circuit Engineering
3019 S. Kilson Drive, Santa Ana, CA 92707, US

American Standard Circuits
RF Division, 475 Industrial Drive, West Chicago, IL 60185, US

Amphenol Printed Circuits
91 Northeastern Boulevard, Nashua, NH 03062, US

Calumet Electronics Corp.
25830 Depot Street, Calumet, MI 49913-1985, US

Cirexx International, Inc.
791 Nuttman Street, Santa Clara, CA 95054,

Colonial Circuits, Inc.
1026 Warrenton Road, Fredericksburg, VA 22406-6200, US

Cosmotronic, Inc.
16721 Noyes Avenue, Irvine, CA 92606, US

DDi Cleveland Corp.
7 Ascot Parkway, Cuyahoga Falls, OH 44223, US

DDi Denver Corp.
10570 Bradford Road, Littleton, CO 80127, US

DDI Global Corp. - Anaheim
1220 N. Simon Circle, Anaheim, CA 92806, US

DDi Global Corp. - Sterling, VA
1200 Severn Way, Dulles, VA 20166-8904, US

DDi North Jackson Corp.
12080 DeBartolo Drive, North Jackson, OH 44451, US

DDi Ontario
8150 Sheppard Avenue East, Scarborough, Ontario, Canada M1B 5K2

Dynaco Corp.
1000 South Priest Drive, Tempe, AZ 85281-5238, US

Dynamic & Proto Circuits, Inc.
869 Barton Street, Stoney Creek, Ontario, Canada L8E 5G6

Electro Plate Circuitry, Inc.
1430 Century Drive, Carrollton, TX 75006, US

Electrotek Corp.
7745 S. 10th Street, Oak Creek, WI 53154, US

Endicott Interconnect Technologies, Inc.
Dept. 0069/014-3, 1093 Clark Street, Endicott, NY 13760, US

Firan Technology Group
250 Finchdene Square, Scarborough, Ontario, Canada M1X 1A5

Global Innovations Corp.
901 Hensley Drive, Wylie, TX 75098, US

Gorilla Circuits
1445 Old Oakland Road, San Jose, CA 95112, US

Hamby Corporation
27704 Avenue Scott, Valencia, CA 91355, US

Hans Brockstedt GmbH
Clara-Immerwahr Strasse 7, 24145 Kiel, Germany

Hughes Circuits
540 S. Pacific Street, San Marcos, CA 92078-4056, US

Lockheed Martin Systems Integration
1801 State Route 17C, Owego, NY 13827, US

Micom Corp.
475 Old Highway 8 NW, New Brighton, MN 55112, US

Pioneer Circuits, Inc.
3000 S. Shannon Street, Santa Ana, CA 92704-6321, US

SECTION II
LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

MIL-PRF-31032/2

PNC, Inc.
115 East Centre Street, Nutley, NJ 07110, US

Pro-Tech Interconnect Solutions
4300 Peavey Road, Chaska, MN 55318-2351, US

Sanmina-SCI (Owego)
1200 Taylor Road, Owega, NY 13827, US

Sanmina-SCI (San Jose)
2050 Bering Drive, San Jose, CA 95131, US

Speedy Circuits, Inc.
5331 McFadden Avenue, Huntington Beach, CA 92649-1204, US

TTM Technologies (Santa Ana)
2630 South Harbor Boulevard, Santa Ana, CA 92704, US

TTM Technologies (Santa Clara)
400 Matthew Street, Santa Clara, CA 95050, US

TTM Technologies (Stafford)
4 Old Monson Road, P.O. Box 145, Stafford, CT 77497, US

Unicircuit, Inc.
8192 Southpark Lane, Littleton, CO 80120, US

Universal Circuits, Inc.
8860 Zachary Lane North, Maple Grove, MN 55369-4524, US

Vermont Circuits, Inc.
76 Technology Drive, P.O. Box 1890, Brattleboro, VT 05302-1890, US

Viasystems Corp. (CA)
355 Turtle Creek Court, San Jose, CA 95125-1316, US

Viasystems Corp. (OR)
1521 Poplar Lane, Forest Grove, OR 97116, US

SECTION II
LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

MIL-PRF-31032/3

Amphenol Printed Circuits
91 Northeastern Boulevard, Nashua, NH 03062, US

Cirexx International, Inc.
791 Nuttman Street, Santa Clara, CA 95054,

Colonial Circuits, Inc.
1026 Warrenton Road, Fredericksburg, VA 22406-6200, US

Cosmotronic, Inc.
16721 Noyes Avenue, Irvine, CA 92606, US

DDi Cleveland Corp.
7 Ascot Parkway, Cuyahoga Falls, OH 44223, US

DDi North Jackson Corp.
12080 DeBartolo Drive, North Jackson, OH 44451, US

Dynaco Corp.
1000 South Priest Drive, Tempe, AZ 85281-5238, US

Hamby Corporation
27704 Avenue Scott, Valencia, CA 91355, US

Hans Brockstedt GmbH
Clara-Immerwahr Strasse 7, 24145 Kiel, Germany

KCA Electronics, Inc.
223 North Crescent Way, Anaheim, CA 92801, US

Lockheed Martin Systems Integration
1801 State Route 17C, Owego, NY 13827, US

Pioneer Circuits, Inc.
3000 S. Shannon Street, Santa Ana, CA 92704-6321, US

Printed Circuits, Inc.
1200 West 96th Street, Bloomington, MN 55431, US

Speedy Circuits, Inc.
5331 McFadden Avenue, Huntington Beach, CA 92649-1204, US

Strataflex Corp.
11 Dohme Avenue, Toronto, Ontario, Canada M4B 1Y7

TTM Technologies (Santa Clara)
400 Matthew Street, Santa Clara, CA 95050, US

TTM Technologies (Stafford)
4 Old Monson Road, P.O. Box 145, Stafford, CT 77497, US

MIL-PRF-31032/4

Amphenol Printed Circuits
91 Northeastern Boulevard, Nashua, NH 03062, US

Cirexx International, Inc.
791 Nuttman Street, Santa Clara, CA 95054,

Colonial Circuits, Inc.
1026 Warrenton Road, Fredericksburg, VA 22406-6200, US

Cosmotronic, Inc.
16721 Noyes Avenue, Irvine, CA 92606, US

DDi Cleveland Corp.
7 Ascot Parkway, Cuyahoga Falls, OH 44223, US

DDi North Jackson Corp.
12080 DeBartolo Drive, North Jackson, OH 44451, US

Dynaco Corp.
1000 South Priest Drive, Tempe, AZ 85281-5238, US

Hamby Corporation
27704 Avenue Scott, Valencia, CA 91355, US

Hans Brockstedt GmbH
Clara-Immerwahr Strasse 7, 24145 Kiel, Germany

KCA Electronics, Inc.
223 North Crescent Way, Anaheim, CA 92801, US

Lockheed Martin Systems Integration
1801 State Route 17C, Owego, NY 13827, US

Pioneer Circuits, Inc.
3000 S. Shannon Street, Santa Ana, CA 92704-6321, US

Printed Circuits, Inc.
1200 West 96th Street, Bloomington, MN 55431, US

Speedy Circuits, Inc.
5331 McFadden Avenue, Huntington Beach, CA 92649-1204, US

Strataflex Corp.
11 Dohme Avenue, Toronto, Ontario, Canada M4B 1Y7

TTM Technologies (Santa Clara)
400 Matthew Street, Santa Clara, CA 95050, US

TTM Technologies (Stafford)
4 Old Monson Road, P.O. Box 145, Stafford, CT 77497, US

SECTION II
LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

MIL-PRF-31032/5

Electro Plate Circuitry, Inc.
1430 Century Drive, Carrollton, TX 75006, US

Sanmina-SCI (San Jose)
2050 Bering Drive, San Jose, CA 95131, US

Speedy Circuits, Inc.
5331 McFadden Avenue, Huntington Beach, CA 92649-1204, US

SECTION II
LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

MIL-PRF-31032/6

Electro Plate Circuitry, Inc.
1430 Century Drive, Carrollton, TX 75006, US

Global Innovations Corp.
901 Hensley Drive, Wylie, TX 75098, US

Speedy Circuits, Inc.
5331 McFadden Avenue, Huntington Beach, CA 92649-1204, US

SECTION II
LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

MIL-PRF-31032/Custom

Colonial Circuits, Inc.
1026 Warrenton Road, Fredericksburg, VA 22406-6200, US

Cosmotronic, Inc.
16721 Noyes Avenue, Irvine, CA 92606, US

Endicott Interconnect Technologies, Inc.
Dept. 0069/014-3, 1093 Clark Street, Endicott, NY 13760, US

TTM Technologies (Santa Clara)
400 Matthew Street, Santa Clara, CA 95050, US

TTM Technologies (Stafford)
4 Old Monson Road, P.O. Box 145, Stafford, CT 77497, US

SECTION III
ALPHABETICAL LIST OF QUALIFIED MANUFACTURERS

MANUFACTURER INFORMATION: **Accurate Circuit Engineering** 3019 S. Kilson Drive Santa Ana, CA 92707, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 0MNN9 Contact: James Hofer Phone: 714-546-162 Fax: 714-433-7418 EMail: James@ace-pcb.com
MANUFACTURER INFORMATION: **American Standard Circuits** RF Division, 475 Industrial Drive West Chicago, IL 60185, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 4AA34 Contact: Lori Ryan Phone: 603-639-5438 Fax: EMail: lori@asc-i.com
MANUFACTURER INFORMATION: **Amphenol Printed Circuits** 91 Northeastern Boulevard Nashua, NH 03062, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 57034 Contact: Denise Chevalier Phone: 603-879-3268 Fax: 603-879-2818 EMail: denise.chevalier@amphenol-tcs.com
MANUFACTURER INFORMATION: **Calumet Electronics Corp.** 25830 Depot Street Calumet, MI 49913-1985, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 65337 Contact: Robert Hall Phone: 906-337-1305 Fax: 906-337-5359 EMail: rhall@cec-up.com
MANUFACTURER INFORMATION: **Cirexx International, Inc.** 791 Nuttman Street Santa Clara, CA 95054,	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 4MEG7 Contact: Don Angulo Phone: 408-988-3980 Fax: 408-988-4534 EMail: dangulo@cirexxintl.com
MANUFACTURER INFORMATION: **Colonial Circuits, Inc.** 1026 Warrenton Road Fredericksburg, VA 22406-6200, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 6T499 Contact: Mike Hill Phone: 540-753-5511, x125 Fax: 540-752-2109 EMail: quality@colonialcircuits.com
MANUFACTURER INFORMATION: **Cosmotronic, Inc.** 16721 Noyes Avenue Irvine, CA 92606, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 63695 Contact: Alan Exley Phone: 949-660-0740 Fax: 949-553-8371 EMail: alan_exley@cosmotronic.com
MANUFACTURER INFORMATION: **DDi Cleveland Corp.** 7 Ascot Parkway Cuyahoga Falls, OH 44223, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 7Z463 Contact: Mark Kasting Phone: 330-572-3400 Fax: 330-572-3434 EMail: mark_kasting/coretec@coretec-inc.com

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 75815
DDi Denver Corp. 10570 Bradford Road Littleton, CO 80127, US	Same Address as Manufacturer	Contact: Douglas N. Berry Phone: 303-972-4105 Fax: 303-933-2934 EMail: dberry@ddiglobal.com
MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0BSG1
DDI Global Corp. - Anaheim 1220 N. Simon Circle Anaheim, CA 92806, US	Same Address as Manufacturer	Contact: Rick Sylvain Phone: 714-688-7371 Fax: EMail: rsylvain@ddiglobal.com
MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0K703
DDi Global Corp. - Sterling, VA 1200 Severn Way Dulles, VA 20166-8904, US	Same Address as Manufacturer	Contact: Juan Vasquez Phone: 703-652-2200 Fax: 703-652-2272 EMail: jvasquez@ddiglobal.com
MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0GN71
DDi North Jackson Corp. 12080 DeBartolo Drive North Jackson, OH 44451, US	Same Address as Manufacturer	Contact: Cynthia Savakis Phone: 330-538-3900, x211 Fax: 330-538-3820 EMail: quality@sovereign-circuits.com
MANUFACTURER INFORMATION:	PLANT LOCATIONS: 1. Same Address as Manufacturer 2. Coretec, Inc., CAGE Code: 3AF82, 2020 Ellesmere Road, Scarboough, Ontario, Canada M1H 2Z8	CAGE Code: 3AF82
DDi Ontario 8150 Sheppard Avenue East Scarborough, Ontario, Canada M1B 5K2		Contact: Noor Al-Shaikh Phone: 416-208-2100 Fax: 416-439-1582 EMail: alshaikh@coretec-inc.com
MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 61642
Dynaco Corp. 1000 South Priest Drive Tempe, AZ 85281-5238, US	Same Address as Manufacturer	Contact: Ted Edwards Phone: 480-736-3728 Fax: 480-921-9830 EMail: tedwards@dynacocorp.com
MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 38898
Dynamic & Proto Circuits, Inc. 869 Barton Street Stoney Creek, Ontario, Canada L8E 5G6	Same Address as Manufacturer	Contact: Stephen Hazell Phone: 905-643-9900 Fax: 905-643-9911 EMail: stephenhazell@dapc.com
MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 79616
Electro Plate Circuitry, Inc. 1430 Century Drive Carrollton, TX 75006, US	Same Address as Manufacturer	Contact: James McNeal Phone: 972-466-0818 Fax: 972-466-9078 EMail: jimm@eplate.com

SECTION III
ALPHABETICAL LIST OF QUALIFIED MANUFACTURERS

MANUFACTURER INFORMATION: **Electrotek Corp.** 7745 S. 10th Street Oak Creek, WI 53154, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 66030 Contact: Tom Tikusis Phone: 414-762-1390 Fax: 414-762-1510 EMail: sales@boards4u.com
MANUFACTURER INFORMATION: **Endicott Interconnect Technologies, Inc.** Dept. 0069/014-3, 1093 Clark Street Endicott, NY 13760, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 3ECL3 Contact: Jose Rios Phone: 607-755-5896 Fax: 607-755-4649 EMail: JoseA.Rios@eitny.com
MANUFACTURER INFORMATION: **Firan Technology Group** 250 Finchdene Square Scarborough, Ontario, Canada M1X 1A5	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: L2665 Contact: Bryan Clark Phone: 416-299-4000 Fax: 416-292-4308 EMail: byanclark@firantechnology.com
MANUFACTURER INFORMATION: **Global Innovations Corp.** 901 Hensley Drive Wylie, TX 75098, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 04RV5 Contact: Bob Noland Phone: 214-291-1427 Fax: EMail: bnoland@globalinnovationcorp.com
MANUFACTURER INFORMATION: **Gorilla Circuits** 1445 Old Oakland Road San Jose, CA 95112, US		CAGE Code: 3C7D2 Contact: David Williams Phone: 408-294-9897 Fax: 408-297-1540 EMail: info@gorillacircuits.com
MANUFACTURER INFORMATION: **Hamby Corporation** 27704 Avenue Scott Valencia, CA 91355, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 07284 Contact: Sue Sharp Phone: 661-257-1924 Fax: 661-257-1213 EMail: suesharp@hambycorp.com
MANUFACTURER INFORMATION: **Hans Brockstedt GmbH** Clara-Immerwahr Strasse 7 24145 Kiel, Germany	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: C4831 Contact: Hilmar Klammer Phone: 0049-431-71966-0, -30 Fax: 0049-431-71966-29 EMail: klammer@brockstedt.de
MANUFACTURER INFORMATION: **Hughes Circuits** 540 S. Pacific Street San Marcos, CA 92078-4056, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 1KXU6 Contact: Joe Hughes Phone: 760-744-0300 Fax: 760-744-6388 EMail: joe@hughescircuits.com

SECTION III
ALPHABETICAL LIST OF QUALIFIED MANUFACTURERS

MANUFACTURER INFORMATION: **KCA Electronics, Inc.** 223 North Crescent Way Anaheim, CA 92801, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 1VUH8 Contact: Mr. Jeffrey Frost Phone: 714-239-2433 Fax: 714-239-2455 EMail:
MANUFACTURER INFORMATION: **Lockheed Martin Systems Integration** 1801 State Route 17C Owego, NY 13827, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 03640 Contact: Melita Nagerl Phone: 607-751-4665 Fax: 607-751-7714 EMail: melita.nagerl@lmco.com
MANUFACTURER INFORMATION: **Micom Corp.** 475 Old Highway 8 NW New Brighton, MN 55112, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 34076 Contact: Larry Leonard Phone: 651-604-2639 Fax: 651-636-1352 EMail: lleonard@micomcircuits.com
MANUFACTURER INFORMATION: **Pioneer Circuits, Inc.** 3000 S. Shannon Street Santa Ana, CA 92704-6321, US		CAGE Code: 65723 Contact: Elias Gabriel Phone: 714-641-3132 x234 Fax: 714-641-3120 EMail:
MANUFACTURER INFORMATION: **PNC, Inc.** 115 East Centre Street Nutley, NJ 07110, US		CAGE Code: 66766 Contact: Carmela Conte Phone: 973-284-1600 Fax: EMail: carmela@pnconline.com
MANUFACTURER INFORMATION: **Printed Circuits, Inc.** 1200 West 96th Street Bloomington, MN 55431, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 65114 Contact: Jim Smith Phone: 612-888-7900 Fax: 612-888-2719 EMail: jsmith@printedcircuits.com
MANUFACTURER INFORMATION: **Pro-Tech Interconnect Solutions** 4300 Peavey Road Chaska, MN 55318-2351, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 3CP65 Contact: Harland Kooda Phone: 952-442-2189 Fax: 952-442-2472 EMail:
MANUFACTURER INFORMATION: **Sanmina-SCI (Owego)** 1200 Taylor Road Owega, NY 13827, US		CAGE Code: 4GZ84 Contact: Rick Sylvain Phone: 607-689-5543 Fax: EMail: rick.sylvain@sanmina-sci.com

MANUFACTURER INFORMATION: **Sanmina-SCI (San Jose)** 2050 Bering Drive San Jose, CA 95131, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 3DR67 Contact: Darrell Myers Phone: 408-964-6515 Fax: 408-964-6453 EMail: darrell.myers@sanmina-sci.com
MANUFACTURER INFORMATION: **Speedy Circuits, Inc.** 5331 McFadden Avenue Huntington Beach, CA 92649-1204, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 66982 Contact: Jan Lesky Phone: 714-766-6243 Fax: 714-899-7074 EMail:
MANUFACTURER INFORMATION: **Strataflex Corp.** 11 Dohme Avenue Toronto, Ontario, Canada M4B 1Y7	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 38661 Contact: Peter Pialis Phone: 416-752-2224 Fax: 416-752-6719 EMail: ppialis@strataflex.ca
MANUFACTURER INFORMATION: **TTM Technologies (Santa Ana)** 2630 South Harbor Boulevard Santa Ana, CA 92704, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 1WQ42 Contact: Terry Lichte Phone: 714-241-0303, x3127 Fax: 714-241-0708 EMail: tlichte@ttmtech.comca
MANUFACTURER INFORMATION: **TTM Technologies (Santa Clara)** 400 Matthew Street Santa Clara, CA 95050, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 65916 Contact: Nellie Guitierez Phone: 408-486-3184 Fax: 408-727-1003 EMail: nellie.guitierez@ttmtech.com
MANUFACTURER INFORMATION: **TTM Technologies (Stafford)** 4 Old Monson Road P.O. Box 145, Stafford, CT 77497, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 5L706 Contact: Michelle Herbert Phone: 860-684-5881 Fax: 860-684-7425 EMail: michele.hebert@tycoelectronics.com
MANUFACTURER INFORMATION: **Unicircuit, Inc.** 8192 Southpark Lane Littleton, CO 80120, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 66311 Contact: Bob Lageman Phone: 303-730-0505, x110 Fax: EMail: blageman@unicircuit.com
MANUFACTURER INFORMATION: **Universal Circuits, Inc.** 8860 Zachary Lane North Maple Grove, MN 55369-4524, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 45032 Contact: Phone: Fax: EMail:

SECTION III
ALPHABETICAL LIST OF QUALIFIED MANUFACTURERS

MANUFACTURER INFORMATION: **Vermont Circuits, Inc.** 76 Technology Drive P.O. Box 1890, Brattleboro, VT 05302-1890, US		CAGE Code: 65200 Contact: Bob Downing Phone: 802-257-4571 Fax: 802-257-0011 EMail: Bob.Downing@vtcicuits.com
MANUFACTURER INFORMATION: **Viasystems Corp. (CA)** 355 Turtle Creek Court San Jose, CA 95125-1316, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 0MHG5 Contact: Dave Williams Phone: 408-280-0422 Fax: 408-280-0641 EMail: david.williams@viasystems.com
MANUFACTURER INFORMATION: **Viasystems Corp. (OR)** 1521 Poplar Lane Forest Grove, OR 97116, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 01KV9 Contact: Roger Michalowski Phone: 781-639-5410 Fax: EMail: Customerservice@viasystems.com