Specification Details: **Date: 12/17/2008**

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: No
Specification contains space level reliability requirements: No
Specification allows test optimization: Yes

Contact Information:

DSCC Office of Primary Involvement: Electronic Devices Team, DSCC-VQE
Primary DSCC-VQ Contact: 614-692-0627, e-mail: vqe.ls@dla.mil
Secondary DSCC-VQ 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.

DSCC 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 DSCC 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-07-12577 VQE-06-12150
Panel Size:	20" X 26"	
Max./Min. Board Thickness:	0.22"/Not Specified	
Max./Min. Base CU Thickness:	0.006"/Not Specified	
Max./Min. Through Hole Size:	0.025"/0.008" ((after plating))	
Aspect Ratio:	11:1 (Through Hole)	
Max. Number of Layers:	24	
Min. Conductor Width:	0.003"	
Min. Conductor Space:	0.003" (+/-10%)	
Part Mounting:	SMT, THM, MIX	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG	
Hole Preparation:	Permanganate Desmear/Etchback	
Alternate Construction:	Buried Vias, Sequential Lamination, Blind Vias	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	Characteristic, Differential 50, 75, 100 ohms +/-10%	
Hole Fill/Via Plug:	Non-conductive Hole Fill/Via Plug	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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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-08-015934
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	0.062"/Not Specified	
Max./Min. Base CU Thickness:	0.006"/Not Specified ((1/2 oz.))	
Max./Min. Through Hole Size:	0.052"/0.009" ((after plating))	
Aspect Ratio:	7:1 (Through Hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004" (+/-10%)	
Part Mounting:	THM, SMT, MIX	
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:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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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-97-0649 VQE-06-10054 VQE-09-17008
Panel Size:	24" X 36", 30" X 36"	
Max./Min. Board Thickness:	0.322"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.008"	
Aspect Ratio:	11:1 (Through Hole) 0.5:1 (Blind Via)	
Max. Number of Layers:	28	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	THM, Compliant Pin, SMT, MIX	
Rigid Base Material:	Hybrid Built (GF/Hydrocarbon Ceramic) GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant Hydrocarbon Ceramic	
Flex Base Material:	N/A	
Finish System:	Fused SnB, Nickel, Electrolytic Hard & Soft Gold, Electrolytic Nickel	
Hole Preparation:	Permanganate Desmear/Etchback, Plasma Desmear	
Alternate Construction:	Blind Vias (Mechanicall Drilled)	
Copper Plating:	Acid Copper, DC Plate, Pulse Plate	
Solder Resist:	thermal cured Soldermask, LPI, SMOBC	
Controlled Impedance:	50 ohms ± 10%, 120 ohms ± 10%	
Hole Fill/Via Plug:	Non-conductive Via Fill, Conductive Via Fill	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

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:	0.125"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.125"/0.016"	
Aspect Ratio:	8:1 (Through Hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	0.006"	
Min. Conductor Space:	0.003"	
Part Mounting:	THM, SMT	
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, Au, 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	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

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-31032/3, MIL-PRF-31032/4	VQE-04-5354
Panel Size:	12" X 180"	
Max./Min. Board Thickness:	0.035"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.011"/Not Specified	
Aspect Ratio:	3:1 (Through Hole)	
Max. Number of Layers:	7	
Min. Conductor Width:	0.007"	
Min. Conductor Space:	0.007"	
Part Mounting:	SMT, THM	
Rigid Base Material:	N/A	
Flex Base Material:	FR4-IPC-4101/21 Flexible Polyimide Clad (IPC-4204/1) Flexible Polyimide Film (PIC-4202/1) Flexible Polyimide Film/Acrylic (IPC-4203/1)	
Finish System:	HASL	
Hole Preparation:	Plasma Desmear/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	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 4MEG7
Cirexx International 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-31032/2	VQE-07-014176
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	0.1"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.01"	
Aspect Ratio:	10:1 (Through Hole)	
Max. Number of Layers:	2	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	SMT, THM, MIX	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	HASL, Ni/AU, ENIG	
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	
Through Hole Metallization:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3	VQE-07-014176
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	0.1"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.01"	
Aspect Ratio:	10:1 (Through Hole)	
Max. Number of Layers:	2	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	SMT, THM, MIX	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	Copper-Clad Adhesiveless Polyimide Acrylic Adhesive Polyimide	
Finish System:	HASL, Ni/Au, ENIG	
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-Iinstall) Class B (Continuous Flex)	
Through Hole Metallization:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 4MEG7
Cirexx International 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:	0.125"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.01" ((Mechanical))	
Aspect Ratio:	12.5:1	
Max. Number of Layers:	22	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	THM, MIX, SMT	
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, ENIG	
Hole Preparation:	Plasma Etchback, Pemanganate Desmear	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	50 ohms +/- 10%, 100 ohms +/- 10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	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:	0.125"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.01" ((Mechanical))	
Aspect Ratio:	10:1	
Max. Number of Layers:	16	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	SMT, THM, MIX	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	Copper Clad Adhesiveless Polyimide Acrylic Adhesie	
Finish System:	ENIG, HASL	
Hole Preparation:	Plasma Etchback, Permanganate Desmear	
Alternate Construction:	N/A	
Copper Plating:	Acid Coper	
Solder Resist:	LPI	
Controlled Impedance:	50 ohms +/- 10%, 100 ohms +/-10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Class A (Flex-to-Install)	
Through Hole Metallization:	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	VQE-04-6002
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.127"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.228"/0.015"	
Aspect Ratio:	8.5:1 (Through Hole)	
Max. Number of Layers:	12	
Min. Conductor Width:	0.008"	
Min. Conductor Space:	0.005"	
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	
Through Hole Metallization:	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:	0.088"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.052"/0.021"	
Aspect Ratio:	4.2:1 (Through Hole)	
Max. Number of Layers:	14	
Min. Conductor Width:	0.006"	
Min. Conductor Space:	0.005"	
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	
Through Hole Metallization:	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-31032/4	VQE-04-6002
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	0.093"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.045"/0.025"	
Aspect Ratio:	3.7:1 (Through Hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.005"	
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/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	
Through Hole Metallization:	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:	0.083"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.045"/0.02"	
Aspect Ratio:	4.15:1 (Through Hole)	
Max. Number of Layers:	4	
Min. Conductor Width:	0.01"	
Min. Conductor Space:	0.011"	
Part Mounting:	PTH, SMT	
Rigid Base Material:	Rogers 4003	
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	
Through Hole Metallization:	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/Custom	VQE-04-6002
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	0.031"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.117"/0.02"	
Aspect Ratio:	1.55:1 (Through Hole)	
Max. Number of Layers:	2	
Min. Conductor Width:	0.025"	
Min. Conductor Space:	0.01"	
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	
Through Hole Metallization:	N/A	

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:	0.09"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.139"/0.021"	
Aspect Ratio:	4.29:1 (Through Hole)	
Max. Number of Layers:	8	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.005"	
Part Mounting:	PTH, SMT	
Rigid Base Material:	Woven E-Glass Hydrocarbon Resin with Ceramic Filler	
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	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 7Z463
Coretec Cleveland, Inc. 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-05-008414 VQE-06-010963 VQE-00-0289 VQE-01-0910
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.126"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.014"	
Aspect Ratio:	5:1 (Through Hole)	
Max. Number of Layers:	16	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	SMT, THM	
Rigid Base Material:	AF: Aramid Fabric, Woven, Majority Polyfunctional Epoxy Resin GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant BI: Aramid Fabric, Nonwoven, Polyimide Resin	
Flex Base Material:	N/A	
Finish System:	HASL, Fused Tin Lead late, Selective Solder Strip-Tin Lead Plate	
Hole Preparation:	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 ohm (±5%)	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 7Z463
Coretec Cleveland, Inc. 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-06-010963 VQE-01-0909
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.126"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.017"	
Aspect Ratio:	10:1 (Through Hole)	
Max. Number of Layers:	11	
Min. Conductor Width:	0.003"	
Min. Conductor Space:	0.003"	
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:	IPC-4204/1 (Acrylic Adhesive) IPC-4204/11 (Adhesiveless)	
Finish System:	HASL	
Hole Preparation:	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)	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 75815
Coretec Denver, Inc. 10570 Bradford Road Littleton, CO 80127, US	Same Address as Manufacturer	Contact: Douglas N. Berry Phone: 303-904-6119 Fax: 303-933-2934 EMail: dberry@coretec-denver.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-02-0317 VQE-05-9014 VQE-05-7627
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.125"/Not Specified	
Max./Min. Base CU Thickness:	0.001"/Not Specified	
Max./Min. Through Hole Size:	0.109"/0.015"	
Aspect Ratio:	7:1 (Through Hole)	
Max. Number of Layers:	16	
Min. Conductor Width:	0.006"	
Min. Conductor Space:	0.006"	
Part Mounting:	SMT, MIX, THM	
Rigid Base Material:	GM: Glass Base, Woven, Triazine and/or Bismaleimide Modified Epoxy Resin, Flame Resistant GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	HASL, IR Reflow Following SnPb Plate, ENIG	
Hole Preparation:	Permanganate Desmear/Etchback	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	LPI, Dry Film	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	Conductive Epoxy, Non-conductive Epoxy	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATIONS:	CAGE Code: 3AF82
Coretec, Inc. 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:	0.08"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.01" ((as drilled))	
Aspect Ratio:	7:1 (Through Hole)	
Max. Number of Layers:	14	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.005"	
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 Via Plug	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-08-015407 VQE-04-006240
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.08"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.01" ((as drilled))	
Aspect Ratio:	7:1 (Through Hole)	
Max. Number of Layers:	14	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.005"	
Part Mounting:	THM, SMT, MIX	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	HASL, ENIG	
Hole Preparation:	Plasma Etchback, Desmear	
Alternate Construction:	N/A	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	Characteristics (+/-10%), Differential (+/-10%)	
Hole Fill/Via Plug:	Non-conductive Via Plug	
Flex Usage:	N/A	
Through Hole Metallization:	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-05-009107 VQE-04-006966 VQE-06-010085 VQE-06-011248
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.335"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.014"	
Aspect Ratio:	15:1 (Through Hole)	
Max. Number of Layers:	36	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.004"	
Part Mounting:	SMT, THM, MIX	
Rigid Base Material:	GM: Glass Base, Woven, Triazine and/or Bismaleimide Modified Epoxy Resin, Flame Resistant GF: Woven E-Glass, Epoxy Resin, Flame Resistant AF: Aramid Fabric, Woven, Majority Polyfunctional Epoxy Resin GI: Glass Base, Woven, Polyimide Resin, Heat Resistant BF: Aramid Fabric, Nonwoven, Epoxy Resin BI: Aramid Fabric, Nonwoven, Polyimide Resin	
Flex Base Material:	N/A	
Finish System:	Fused SnPB, HASL, Selective Solder Strip-Tin Lead Plate, ENIG	
Hole Preparation:	Plasma Desmear/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	
Through Hole Metallization:	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-05-009107 VQE-04-006966 VQE-06-010085
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.165"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.012"	
Aspect Ratio:	8:1 (Through Hole)	
Max. Number of Layers:	22	
Min. Conductor Width:	0.006"	
Min. Conductor Space:	0.008"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GM: Glass Base, Woven, Triazine and/or Bismaleimide Modified Epoxy Resin, Flame Resistant GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant GI/GM Composite Material	
Flex Base Material:	IPC-4204/1 (Acrylic Adhesive) IPC-4204/11 (Adhesiveless)	
Finish System:	Fused SnPB, HASL, Selective Solder Strip-Tin Lead Plate, ENIG,	
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)	
Through Hole Metallization:	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-05-009107 VQE-04-006966 VQE-06-010085
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	0.225"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.02"	
Aspect Ratio:	10:1 (Through Hole)	
Max. Number of Layers:	16	
Min. Conductor Width:	0.011"	
Min. Conductor Space:	0.007"	
Part Mounting:	SMT	
Rigid Base Material:	Rogers 4003 (Ceramic-Filled Thermoset Resin) Rogers 4003/GI Composite	
Flex Base Material:	N/A	
Finish System:	HASL, ENIG	
Hole Preparation:	Plasma Desmear/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	
Through Hole Metallization:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 5S706
Diversified Systems 3939 West 56th Street Indianapolis, IN 46254, US	Same Address as Manufacturer	Contact: Linda Bell Phone: 317-299-9547, x238 Fax: 317-298-2061 EMail: linda.bell@divsys.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-01-0309 VQE-02-0015
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.11"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.012"	
Aspect Ratio:	5.5:1 (Through Hole)	
Max. Number of Layers:	14	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.005"	
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:	HASL	
Hole Preparation:	Pemanganate Desmear/Etchback	
Alternate Construction:	Foil Lamination	
Copper Plating:	Electro-deposited Acid Copper	
Solder Resist:	Dry Film, LPI	
Controlled Impedance:	Embedded Stripline & Microstrip	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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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:	0.1"/Not Specified	
Max./Min. Base CU Thickness:	0.001"/Not Specified	
Max./Min. Through Hole Size:	0.045"/0.032"	
Aspect Ratio:	3:1 (Through Hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	0.01"	
Min. Conductor Space:	0.01"	
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/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	
Through Hole Metallization:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-05-9356 VQE-06-10600
Panel Size:	18" X 24", 12" X 18"	
Max./Min. Board Thickness:	0.12"/Not Specified	
Max./Min. Base CU Thickness:	0.001"/Not Specified	
Max./Min. Through Hole Size:	0.045"/0.01"	
Aspect Ratio:	12:1 (Through Hole)	
Max. Number of Layers:	20	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.006"	
Part Mounting:	THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	IPC-4204/1 (Acrylic Adhesive)	
Finish System:	HASL, Fused Sn/Pb	
Hole Preparation:	Permanganate Desmear/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	
Through Hole Metallization:	N/A	

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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
Panel Size:	12" X 18", 18" X 24"	
Max./Min. Board Thickness:	0.1"/Not Specified	
Max./Min. Base CU Thickness:	0.001"/Not Specified	
Max./Min. Through Hole Size:	0.045"/0.032"	
Aspect Ratio:	3:1 (Through Hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	0.01"	
Min. Conductor Space:	0.01"	
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 Desmear/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)	
Through Hole Metallization:	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-98-1143 VQE-00-0007 VQE-01-0311 VQE-03-0818
Panel Size:	16" X 18"	
Max./Min. Board Thickness:	0.125"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.039"/0.018" (0.0135" Drilled)	
Aspect Ratio:	9.3:1 (Through Hole)	
Max. Number of Layers:	16	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.005"	
Part Mounting:	SMT, THM, MIX	
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:	LPI, Dry Film Solder Resist Plugs	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0K703
Dynamic Details, Inc. 1200 Severn Way Dulles, VA 20166-8904, US	Same Address as Manufacturer	Contact: Tony Trnka Phone: 703-652-2266 Fax: 703-652-2271 EMail: atnka@va.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:	0.1"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.038"/0.024" ((0.150" max. non-PTH))	
Aspect Ratio:	6.8:1 (Through Hole)	
Max. Number of Layers:	20	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.003"	
Part Mounting:	SMT, THM, MIX	
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 Desmear/Etchback	
Alternate Construction:	Blind Vias	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	N/A	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 79616
Electro Plate Circuitry 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-06-011433 VQE-06-010333
Panel Size:	18" X 16", 18" X 24"	
Max./Min. Board Thickness:	0.12"/0.03"	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.008"	
Aspect Ratio:	9.3:1 (Through Hole)	
Max. Number of Layers:	14	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	SMT, THM, MIX	
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, Reflowed SnPb, ENIG, Hard Gold	
Hole Preparation:	Plasma Desmear/Etchback	
Alternate Construction:	Sequential Lamination, Blind/Buried Vias, Filled Vias, Foil Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	LPI, Dry Film	
Controlled Impedance:	± 3% Tolerance	
Hole Fill/Via Plug:	CB100 (conductive), UVP100 (non-conductive)	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

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
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.115"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.012"	
Aspect Ratio:	9:1 (Through Hole)	
Max. Number of Layers:	18	
Min. Conductor Width:	0.003"	
Min. Conductor Space:	0.003"	
Part Mounting:	SMT, THM, MIX	
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, ENIG, ImmAg	
Hole Preparation:	Permanganate Desmear, Plasma Etchback	
Alternate Construction:	Via-fill Technology, 0.016" (±25%) Diameter	
Copper Plating:	Electroplated Acid Copper	
Solder Resist:	LPI, Dry Film	
Controlled Impedance:	GF: 100 ohms/50 ohms ± 10%, GI: 100 ohms ± 10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 3ECL3
Endicott Interconnect Technologies, Inc. 1701 North Street P.O. Box 658, 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-07-013506 VQE-07-012236 VQE-08-015922
Panel Size:	24" X 28"	
Max./Min. Board Thickness:	0.116"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.01"	
Aspect Ratio:	12:1 (Through Hole)	
Max. Number of Layers:	30	
Min. Conductor Width:	0.003"	
Min. Conductor Space:	0.004"	
Part Mounting:	MIX, THM, SMT	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	HASL, ENIG	
Hole Preparation:	Permanganate Desmear, Plasma Etchback, Glass Etch	
Alternate Construction:	Foil-Lamination, Cap-Lamination	
Copper Plating:	Electroplated Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 3ECL3
Endicott Interconnect Technologies, Inc. 1701 North Street P.O. Box 658, 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-07-013506 VQE-07-012236
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.084"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.012"	
Aspect Ratio:	7:1 (Through Hole)	
Max. Number of Layers:	12	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	MIX, THM, SMT	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	HASL, ENIG	
Hole Preparation:	Pemanganate Desmear, Plasma Etchback	
Alternate Construction:	Foil-Lamination, Cap-Lamination	
Copper Plating:	Electroplated Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/Custom	VQE-04-005311 VQE-07-013506 VQE-07-012236
Panel Size:	19.5" X 24"	
Max./Min. Board Thickness:	0.153"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.02"	
Aspect Ratio:	7.6:1 (Through Hole)	
Max. Number of Layers:	19	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.005"	
Part Mounting:	MIX	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	ENIG	
Hole Preparation:	Pemanganate 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	
Through Hole Metallization:	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:	0.22"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.025"/0.008" (Mechanical Drill) Not Specified/0.005" (Laser Control Depth) Not Specified/0.006" (Buried Via Mechanical Drill)	
Aspect Ratio:	7:1 (Through Hole)	
Max. Number of Layers:	20	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	GM: Glass Base, Woven, Triazine and/or Bismaleimide Modified Epoxy Resin, Flame Resistant GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant BI: Aramid Fabric, Nonwoven, Polyimide Resin GX: Glass Base, Woven, Polytetrafluoroethylene Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	HASL, Reflow Solder, Immersion Tin, Silver, ENIG	
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:	LPI, Hole Fill	
Controlled Impedance:	Characteristic (± 10%), Differential (± 10%)	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 04RV5
Global Innovation 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-31032/2	VQE-07-13270
Panel Size:	9" X 16"	
Max./Min. Board Thickness:	0.036"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.031"	
Aspect Ratio:	1.2:1 (Through Hole)	
Max. Number of Layers:	2	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.005"	
Part Mounting:	N/A	
Rigid Base Material:	GR: Glass Base, Nonwoven, Polytetrafluoroethylene Resin, Flame Resistant	
Flex Base Material:	N/A	
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:	N/A	
Through Hole Metallization:	N/A	

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:	0.119"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.01"	
Aspect Ratio:	7.5:1 (Through Hole)	
Max. Number of Layers:	18	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.005"	
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:	LPI, Dry Film	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 04RV5
Global Innovation 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:	0.074"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.012"	
Aspect Ratio:	6.2:1 (Through Hole)	
Max. Number of Layers:	12	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.005"	
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	
Through Hole Metallization:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 07248
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-31032/3, MIL-PRF-31032/4	VQE-08-014596
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.085"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.035"/0.018" Not Specified/"	
Aspect Ratio:	5:1 (Through Hole)	
Max. Number of Layers:	11	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	SMT, THM, MIX	
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 Etchback/Desmear	
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	
Through Hole Metallization:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: C4831
Hans Brockstedt GmbH Leiterplattenschnelldienst, Clara-Immerwahr-Str. 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:	0.2"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.01" (Mech. Drilled) Not Specified/0.004" (Laser Drilled)	
Aspect Ratio:	1:1 (Blind Vias) 7:1 (Through Hole)	
Max. Number of Layers:	12	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	SMT, THM, MIX	
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:	Fused SnPb, HASL, Electroless Sn, Electroplated Nickel/Gold, Electroless Nickel/Gold, Electroplated SnPb	
Hole Preparation:	Plasma Desmear/Etchback	
Alternate Construction:	Blind Vias, Buried Vias, Laser Drilled Vias	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: C4831
Hans Brockstedt GmbH Leiterplattenschnelldienst, Clara-Immerwahr-Str. 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:	0.2"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.01" (Mech. Drilled) Not Specified/0.004" (Laser Drilled)	
Aspect Ratio:	1:1 (Blind Vias) 7:1 (Through Hole)	
Max. Number of Layers:	12	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	SMT, THM, MIX	
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:	Fused SnPb, HASL, Electroless Sn, Electroplated Nickel/Gold, Electroless Nickel/Gold, Electroplated SnPb	
Hole Preparation:	Plasma Desmear/Etchback	
Alternate Construction:	Blind Vias, Buried Vias, Laser Drilled Vias	
Copper Plating:	Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Class A (Flex to Install)	
Through Hole Metallization:	N/A	

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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:	0.08"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.012"/Not Specified Not Specified/0.01"	
Aspect Ratio:	7:1 (Through Hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.005"	
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 Desmea	
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	
Through Hole Metallization:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 03640
Lockheed Martin Systems Integration-Owego 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-99-0130 VQE-00-0961
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.2"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.02"	
Aspect Ratio:	8:1 (Through Hole)	
Max. Number of Layers:	16	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
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	
Through Hole Metallization:	N/A	

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:	0.095"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.014"	
Aspect Ratio:	6.8:1 (Through Hole)	
Max. Number of Layers:	14	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
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	
Through Hole Metallization:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 03640
Lockheed Martin Systems Integration-Owego 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-99-0130 VQE-00-0961 VQE-07-013268 VQE-07-013459
Panel Size:		
Max./Min. Board Thickness:	0.2"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.018"	
Aspect Ratio:	8:1 (Through Hole)	
Max. Number of Layers:	24	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
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	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 03640
Lockheed Martin Systems Integration-Owego 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-99-0130 VQE-00-0961 VQE-07-013459
Panel Size:	24" X 30"	
Max./Min. Board Thickness:	0.2"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.018"	
Aspect Ratio:	8:1 (Through Hole)	
Max. Number of Layers:	16	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
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	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 03640
Lockheed Martin Systems Integration-Owego 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:	0.11"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.016"	
Aspect Ratio:	6:1 (Through Hole)	
Max. Number of Layers:	18	
Min. Conductor Width:	0.003"	
Min. Conductor Space:	0.004"	
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:	IPC-4204/4 IC-4204/11 (Adhesiveless) IPC-4204/2 IPC-4204/1 (Acrylic Adhesiveless) IPC-4204/3	
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	
Through Hole Metallization:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0MHG5
Merix Corp. 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@sj.merix.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:	0.13"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.25"/0.008" ((mechanical)) 0.004"/0.008" ((laser drilled))	
Aspect Ratio:	10:1 (Through Hole) 0.8:1 ((blind vias))	
Max. Number of Layers:	20	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	THM, SMT, MIX	
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, Nickel, Hard Gold, ENIG	
Hole Preparation:	Plasma Etchback, Desmear, Chemical Desmear	
Alternate Construction:	Sequential Lamination, Blind Vias, Buried Vias	
Copper Plating:	Electrodeposited Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	25-125 ohms +/-10%	
Hole Fill/Via Plug:	Non-conductive Filled Vias	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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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-03-2980 VQE-02-002780
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.239"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.007"	
Aspect Ratio:	11:1 (Through Hole)	
Max. Number of Layers:	28	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
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/Etchback, Plasma Desmear/Etchback	
Alternate Construction:	Blind & Buried Vias	
Copper Plating:	Acid Copper	
Solder Resist:	LPI, Dry Film	
Controlled Impedance:	Characteristic (±10%), Differential (±10%)	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 21971
Philway Products, Inc. 701 Virginia Avenue Ashland, OH 44806, US	Same Address as Manufacturer	Contact: Tom School Phone: 419-281-7777 Fax: 419-289-3447 EMail: quality@philway.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1	VQE-99-1107
Panel Size:	18" X 21"	
Max./Min. Board Thickness:	0.09"/Not Specified	
Max./Min. Base CU Thickness:	0.002"/Not Specified	
Max./Min. Through Hole Size:	0.044"/0.012"	
Aspect Ratio:	4:1 (Through Hole)	
Max. Number of Layers:	12	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.005"	
Part Mounting:	SMT, THM, MIX	
Rigid Base Material:	GM: Glass Base, Woven, Triazine and/or Bismaleimide Modified Epoxy Resin, Flame Resistant GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	HASL, IR Reflow following SnPb Plate	
Hole Preparation:	Permanganate Desmear/Etchback	
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	
Through Hole Metallization:	N/A	

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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:	0.12"/Not Specified	
Max./Min. Base CU Thickness:	(1/2 oz.)	
Max./Min. Through Hole Size:	Not Specified/0.01"	
Aspect Ratio:	10:1 (Through Hole)	
Max. Number of Layers:	16	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.005" (+/- 10%)	
Part Mounting:	SMT, MIX, 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:	HASL, Fused SnPb, Electrolytic Ni/Au, Electroless Ni/Au	
Hole Preparation:	Plasma Desmear/Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	LPI, Dry Film, SMOBC	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Class A (Flex to Install) Class B (Continuous Flex)	
Through Hole Metallization:	N/A	

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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:	0.062"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.25"/0.01"	
Aspect Ratio:	6:1 (Through Hole)	
Max. Number of Layers:	8	
Min. Conductor Width:	0.003"	
Min. Conductor Space:	0.003"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	HASL, ImmAg, ENIG, OSP	
Hole Preparation:	Plasma Desmear	
Alternate Construction:	Foil Lamination	
Copper Plating:	Acid Copper	
Solder Resist:	LPI, Dry Film	
Controlled Impedance:	50-110 ohms (± 5%)	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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:	0.04"/Not Specified (for Plasma Etchback) 0.25"/Not Specified (for Plasma Desmear)	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.25"/0.008"	
Aspect Ratio:	15:1 (Through Hole) 1:2 (Microvias, Laser)	
Max. Number of Layers:	30	
Min. Conductor Width:	0.003"	
Min. Conductor Space:	0.003"	
Part Mounting:	SMT, THM, MIX	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	HASL, ENIG, Electrolytic Nickel Gold, Reflowed Solder	
Hole Preparation:	Plasma Desmear//Etchback	
Alternate Construction:	Min. Blind Via: 0.005" Laser, Min. Buried Via: 0.010" Mechanical Drill, Foil Lamination, Sequential Lamination	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	LPI, Dry Film	
Controlled Impedance:	50-110 ohms (± 5%)	
Hole Fill/Via Plug:	Epoxy, Silver	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0GN71
Sovereign Circuits, Inc. 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-03-003214 VQE-03-003121 VQE-07-012925
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.25"/Not Specified	
Max./Min. Base CU Thickness:	0.005"/Not Specified	
Max./Min. Through Hole Size:	0.008"/"	
Aspect Ratio:	15:1 (Through Hole)	
Max. Number of Layers:	24	
Min. Conductor Width:	0.003"	
Min. Conductor Space:	0.003"	
Part Mounting:	THM, SMT, MIX, Press Fit	
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:	HASL, Fused SnPb, Immersion White tin, Immersion Ag, Ni/Au, OSP, Reflowed Pure Tin	
Hole Preparation:	Permanganate Desmear/Etchback, Plasma Desmear/Etchback	
Alternate Construction:	Blind Via, Buried Via, Foil Lamination, Cap Lamination	
Copper Plating:	Electroless Acid Copper, Electroplated Acid Copper	
Solder Resist:	LPI, Dry Film	
Controlled Impedance:	Characteristic & Differential, 50, 75, 100 ohms ± 10%	
Hole Fill/Via Plug:	Non-Conductive	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0GN71
Sovereign Circuits, Inc. 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-07-012925 VQE-03-003214 VQE-03-003121
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.25"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.008"/Not Specified	
Aspect Ratio:	15:1 (Through Hole)	
Max. Number of Layers:	24	
Min. Conductor Width:	0.003"	
Min. Conductor Space:	0.003"	
Part Mounting:	SMT, THM, MIX, Press Fit	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant BI: Aramid Fabric, Nonwoven, Polyimide Resin	
Flex Base Material:	N/A	
Finish System:	HASL, Fused SnPb, Immersion White Tin, Ni/Au, Ni/Pd/Au, OSP, Reflowed Pure Tin, Immersion Ag	
Hole Preparation:	Plasma Desmear/Etchback, Permanganate Desmear/Etchback	
Alternate Construction:	Blind Vias, Buried Vias, Foil Lamination, Cap Lamination	
Copper Plating:	Electroless Acid Copper, Electroplated Acid Copper	
Solder Resist:	LPI, Dry Film	
Controlled Impedance:	Range 30-150 ohms (±10%), Microstrip, Embedded Microstrip, Dual Stripline, Characteristic, Differential	
Hole Fill/Via Plug:	Conductive, Non-conductive	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 66982
Speedy Circuits 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
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.11"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.048"/0.02"	
Aspect Ratio:	4:1 (Through Hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.005"	
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:	HASL, Electro-deposited Fused SnPb, Electrolytic Hard Gold, Electrolytic Soft Gold, Electrolytic Nickel	
Hole Preparation:	Plasma Desmear, 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	
Through Hole Metallization:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-08-016434
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.11"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.048"/0.02"	
Aspect Ratio:	4:1 (Through Hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.005"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	Adhesiveless Polyimide	
Finish System:	HASL, Electro-deposited Fused SnPb, Electrolytic Hard Gold, Electrolytic Soft Gold, Electrolytic Nickel	
Hole Preparation:	Plasma Desmear, Etchback	
Alternate Construction:	Foil Lamination	
Copper Plating:	Electro-deposited 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:	Class A (Flex to Install) Class B (Continuous)	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 66982
Speedy Circuits 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:	0.036"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.048"/0.02"	
Aspect Ratio:	2:1 (Through Hole)	
Max. Number of Layers:	2	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.005"	
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	
Through Hole Metallization:	N/A	

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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:	0.035"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.011"/Not Specified	
Aspect Ratio:	3:1 (Through Hole)	
Max. Number of Layers:	7	
Min. Conductor Width:	0.007"	
Min. Conductor Space:	0.007"	
Part Mounting:	SM, THM	
Rigid Base Material:	N/A	
Flex Base Material:	Flexible Polyimide Film (IPC-4202/1) FR4 (IPC-4101/21) Flexible Polyimide Clad (IPC-4204/1) Woven E-Glass, Polyimide Resin (IPC-4101/41) Flexible Polyimide Film/Acrylic (IPC-4203/1)	
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	
Through Hole Metallization:	N/A	

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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-04-5354
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	0.035"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.011"/Not Specified	
Aspect Ratio:	3:1 (Through Hole)	
Max. Number of Layers:	7	
Min. Conductor Width:	0.007"	
Min. Conductor Space:	0.007"	
Part Mounting:	SMT, THM	
Rigid Base Material:	Flexible Polyimide Film (IPC-4202/1) FR4-IPC-4101/21 Flexible Polyimide Clad (IPC-4204/1) Flexible Polyimide Film/Acylic (IPC-4203/1)	
Flex Base Material:	N/A	
Finish System:	HASL	
Hole Preparation:	Plasma Desmear/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	
Through Hole Metallization:	N/A	

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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:	0.094"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.008"	
Aspect Ratio:	12:1 (Through Hole)	
Max. Number of Layers:	12	
Min. Conductor Width:	0.006"	
Min. Conductor Space:	0.004"	
Part Mounting:	N/A	
Rigid Base Material:	N/A	
Flex Base Material:	Woven E-Glass, Polyimide Resin (IPC-4101/40) Woven E-Glass, Polyimide Resin (IPC-4101/41) Woven E-Glass, Polyimide Resin (IPC-4101/42) Flexible Polyimide (IPC-4204/11) Flexible Polyimide Film/Acrylic (IC-4203/1)	
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	
Through Hole Metallization:	N/A	

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MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0BX48
Titan PCB East, Inc. 2 Industrial Way Amesbury, MA 01913, US	Same Address as Manufacturer	Contact: Lance Arlander Phone: 978-388-5740 Fax: 978-388-5538 EMail: larlander@titaneast.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-05-7439 VQE-04-6518
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.012"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.012"	
Aspect Ratio:	10:1 (Through Hole)	
Max. Number of Layers:	14	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	SMT, THM, MIX	
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, ENIG, Electroplated Gold	
Hole Preparation:	Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	LPI, Dry Film	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/4	VQE-05-7439 VQE-04-6518
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.012"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.012"	
Aspect Ratio:	10:1 (Through Hole)	
Max. Number of Layers:	14	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	SMT, THM, MIX	
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, Immesion Ni/Au, ENIG, Electroplated Gold	
Hole Preparation:	Plasma Etchback	
Alternate Construction:	N/A	
Copper Plating:	Electrodeposited Acid Copper	
Solder Resist:	LPI, Dry Film	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

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LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 0BX48
Titan PCB East, Inc. 2 Industrial Way Amesbury, MA 01913, US	Same Address as Manufacturer	Contact: Lance Arlander Phone: 978-388-5740 Fax: 978-388-5538 EMail: larlander@titaneast.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/3, MIL-PRF-31032/3	VQE-01-0024
Panel Size:	12" X 18", 18" X 24"	
Max./Min. Board Thickness:	0.12"/Not Specified	
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	
Through Hole Metallization:	N/A	

SECTION I
LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 3EDZ0
TTM Technologies (Redmond) 17550 NE 67th Court Redmond, WA 98052-4939, US	Same Address as Manufacturer	Contact: Margaret Schlosser Phone: 425-883-7575 Fax: EMail: mschlosser@ttmtech.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION		QUALIFICATION LETTERS:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-06-011027 VQE-06-011656
Panel Size:	21.5" X 24.5"	
Max./Min. Board Thickness:	0.063"/Not Specified (nominal)	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	Not Specified/0.01"	
Aspect Ratio:	6.3:1 (Through Hole)	
Max. Number of Layers:	12	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.003"	
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:	ENIG	
Hole Preparation:	Desmear/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	
Through Hole Metallization:	N/A	

SECTION I
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:	21" X 28"	
Max./Min. Board Thickness:	0.2"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.044"/0.013"	
Aspect Ratio:	14:1 (Through Hole)	
Max. Number of Layers:	24	
Min. Conductor Width:	0.003"	
Min. Conductor Space:	0.003"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
Flex Base Material:	N/A	
Finish System:	HASL, ENIG, OSP, ImmAg, Fused SnPb	
Hole Preparation:	Desmear Etchback	
Alternate Construction:	Min. Blind Via: 0.005" Laser, Min. Buried Via: 0.0135" Mechanical Drill, Sequential Lamination, Aspect Ratio Microvias: 1:1	
Copper Plating:	Acid Copper	
Solder Resist:	LPI, Dry Film	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	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:	18" X 24"	
Max./Min. Board Thickness:	0.2"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.044"/0.013"	
Aspect Ratio:	14:1 (Through Hole)	
Max. Number of Layers:	24	
Min. Conductor Width:	0.003"	
Min. Conductor Space:	0.003"	
Part Mounting:	SMT, THM	
Rigid Base Material:	GI: Glass Base, Woven, Polyimide Resin, Heat Resistant	
Flex Base Material:	N/A	
Finish System:	HASL, ENIG, OSP, ImmAg, Fused SnPb	
Hole Preparation:	Desmear Etchback	
Alternate Construction:	Min. Blind Via: 0.005" Laser, Min. Buried Via: 0.0135" Mechanical Drill, Sequential Lamination, Aspect Ratio Microvias: 1:1	
Copper Plating:	Acid Copper	
Solder Resist:	LPI, Dry Film	
Controlled Impedance:	N/A	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

SECTION I
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-03-3888 VQE-04-5823
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.12"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.191"/0.012"	
Aspect Ratio:	9:1 (Through Hole)	
Max. Number of Layers:	20	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	SMT, THM, MIX	
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, Immersion Ni/Au	
Hole Preparation:	Plasma Desmear/Etchback	
Alternate Construction:	Blind Vias	
Copper Plating:	Electrolytic Acid Copper	
Solder Resist:	LPI, Screen Printed	
Controlled Impedance:	Characteristic, Differential +/-10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

SECTION I
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-03-3895
Panel Size:	18" X 24"	
Max./Min. Board Thickness:	0.12"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.191"/0.012"	
Aspect Ratio:	9:1 (Through Hole)	
Max. Number of Layers:	10	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	SMT, THM, MIX	
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:	HASL, Immersion Ni/Au	
Hole Preparation:	Plasma Desmear/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) Class B (Continuous)	
Through Hole Metallization:	N/A	

SECTION I
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:	0.62"/0.006"	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.076"/0.015" ((drilled)) 0.02"/0.015" ((drilled))	
Aspect Ratio:	4:1 (Through Hole)	
Max. Number of Layers:	6	
Min. Conductor Width:	0.007"	
Min. Conductor Space:	0.008"	
Part Mounting:	MIX, SMT, THM	
Rigid Base Material:	IPC-4103/10 Construction GF: Woven E-Glass, Epoxy Resin, Flame Resistant	
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	
Through Hole Metallization:	N/A	

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, TX 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-03-3349
Panel Size:	30" X 54"	
Max./Min. Board Thickness:	0.3"/0.003"	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.221"/0.009" (drilled)	
Aspect Ratio:	9:1 (Through Hole)	
Max. Number of Layers:	28	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	SMT, THM, MIX	
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:	HASL, SMOBC, Reflowed Solder, Electroless Nickel/Immesion Gold, Electrolytic Hard & Soft Gold, Electrolytic Nickel, Bright Tin, Immersion Tin	
Hole Preparation:	Plasma Etchback	
Alternate Construction:	Buried Via Aspect Ratio: 5:1, Copper Invar Copper, Blind and Buried Vias, Micro Vias, Buried Resistors, Multiple Laminations	
Copper Plating:	Acid Copper	
Solder Resist:	LPI, Dy Film, Wet Mask, Hole Fill, Hole Plug	
Controlled Impedance:	Range 30-150 (±10%), Microstrip, Embedded Microstrip, Dual Stripline, Characteristic, Differential	
Hole Fill/Via Plug:	N/A	
Flex Usage:	Class A (Flex to Install) Class B (Continuous)	
Through Hole Metallization:	N/A	

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, TX 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
Panel Size:	30" X 54"	
Max./Min. Board Thickness:	1.088"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.095"/0.221" (drilled)	
Aspect Ratio:	10:1 (Through Hole)	
Max. Number of Layers:	68	
Min. Conductor Width:	0.004"	
Min. Conductor Space:	0.004"	
Part Mounting:	SMT, THM, MIX, Press Fit	
Rigid Base Material:	GM: Glass Base, Woven, Triazine and/or Bismaleimide Modified Epoxy Resin, Flame Resistant AF: Aramid Fabric, Woven, Majority Polyfunctional Epoxy Resin GF: Woven E-Glass, Epoxy Resin, Flame Resistant SC: Glass Base, Woven S-2, Fiber, Majority Cyanate Ester, Flame Resistant GI: Glass Base, Woven, Polyimide Resin, Heat Resistant BF: Aramid Fabric, Nonwoven, Epoxy Resin BI: Aramid Fabric, Nonwoven, Polyimide Resin	
Flex Base Material:	N/A	
Finish System:	HASL, SMOBC, Reflowed Solder, Electroless Nickel/Immesion Gold, Electrolytic Hard & Soft Gold, Electrolytic Nickel, Bright Tin, Immersion Tin	
Hole Preparation:	Plasma Etchback	
Alternate Construction:	Buried Via Aspect Ratio: 1:1, Copper Invar Copper, Blind and Buried Vias, Micro Vias, Buried Resistors, Multiple Laminations	
Copper Plating:	Acid Copper	
Solder Resist:	LPI, Dry Film, Wet Mask, Hole Fill, Hole Plug	
Controlled Impedance:	Range 30-150 (±10%), Microstrip, Embedded Microstrip, Dual Stripline, Characteristic, Differential	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	

SECTION I
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:
Specification:	MIL-PRF-31032/1, MIL-PRF-31032/2	VQE-07-13789
Panel Size:	12" X 18"	
Max./Min. Board Thickness:	0.12"/Not Specified	
Max./Min. Base CU Thickness:	N/A	
Max./Min. Through Hole Size:	0.02"/0.129" (Drilled Through Hole)	
Aspect Ratio:	6:1 (Through Hole)	
Max. Number of Layers:	16	
Min. Conductor Width:	0.005"	
Min. Conductor Space:	0.005"	
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:	Sequential Lamination, Blind Via, Bured Via, Laser-drilled Microvias, Foil Lamination	
Copper Plating:	Electrodeposited Acid Copper	
Solder Resist:	LPI	
Controlled Impedance:	55 ohms characteristic, 100 ohms differential +/-10%	
Hole Fill/Via Plug:	N/A	
Flex Usage:	N/A	
Through Hole Metallization:	N/A	
Laser Via Hole Size	.006 +/-.001	

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
791 Nuttman Street, Santa Clara, CA 95054,

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

Coretec Cleveland, Inc.
7 Ascot Parkway, Cuyahoga Falls, OH 44223, US

Coretec Denver, Inc.
10570 Bradford Road, Littleton, CO 80127, US

Coretec, Inc.
8150 Sheppard Avenue East, Scarborough, Ontario, Canada M1B 5K2

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

Diversified Systems
3939 West 56th Street, Indianapolis, IN 46254, US

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

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

Dynamic Details, Inc.
1200 Severn Way, Dulles, VA 20166-8904, US

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

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

Endicott Interconnect Technologies, Inc.
1701 North Street, P.O. Box 658, Endicott, NY 13760, US

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

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

Hans Brockstedt GmbH
Leiterplattenschnelldienst, Clara-Immerwahr-Str. 7, 24145, Kiel, Germany

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

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

Merix Corp.
355 Turtle Creek Court, San Jose, CA 95125-1316, US

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

Philway Products, Inc.
701 Virginia Avenue, Ashland, OH 44806, US

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

Sovereign Circuits, Inc.
12080 DeBartolo Drive, North Jackson, OH 44451, US

SECTION II
LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

MIL-PRF-31032/1

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

Titan PCB East, Inc.
2 Industrial Way, Amesbury, MA 01913, US

TTM Technologies (Redmond)
17550 NE 67th Court, Redmond, WA 98052-4939, 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, TX 77497, US

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

SECTION II
LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

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
791 Nuttman Street, Santa Clara, CA 95054,

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

Coretec Cleveland, Inc.
7 Ascot Parkway, Cuyahoga Falls, OH 44223, US

Coretec Denver, Inc.
10570 Bradford Road, Littleton, CO 80127, US

Coretec, Inc.
8150 Sheppard Avenue East, Scarborough, Ontario, Canada M1B 5K2

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

Diversified Systems
3939 West 56th Street, Indianapolis, IN 46254, US

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

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

Dynamic Details, Inc.
1200 Severn Way, Dulles, VA 20166-8904, US

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

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

Endicott Interconnect Technologies, Inc.
1701 North Street, P.O. Box 658, Endicott, NY 13760, US

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

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

Hans Brockstedt GmbH
Leiterplattenschnelldienst, Clara-Immerwahr-Str. 7, 24145, Kiel, Germany

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

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

Merix Corp.
355 Turtle Creek Court, San Jose, CA 95125-1316, US

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

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

Sovereign Circuits, Inc.
12080 DeBartolo Drive, North Jackson, OH 44451, US

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

MIL-PRF-31032/2

Titan PCB East, Inc.
2 Industrial Way, Amesbury, MA 01913, US

TTM Technologies (Redmond)
17550 NE 67th Court, Redmond, WA 98052-4939, 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, TX 77497, US

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

MIL-PRF-31032/3

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

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

Coretec Cleveland, Inc.
7 Ascot Parkway, Cuyahoga Falls, OH 44223, US

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

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

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

Hans Brockstedt GmbH
Leiterplattenschnelldienst, Clara-Immerwahr-Str. 7, 24145, Kiel, Germany

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

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

Sovereign Circuits, Inc.
12080 DeBartolo Drive, North Jackson, OH 44451, US

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

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

Titan PCB East, Inc.
2 Industrial Way, Amesbury, MA 01913, 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, TX 77497, US

MIL-PRF-31032/4

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

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

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

Coretec Cleveland, Inc.
7 Ascot Parkway, Cuyahoga Falls, OH 44223, US

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

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

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

Hans Brockstedt GmbH
Leiterplattenschnelldienst, Clara-Immerwahr-Str. 7, 24145, Kiel, Germany

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

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

Sovereign Circuits, Inc.
12080 DeBartolo Drive, North Jackson, OH 44451, US

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

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

Titan PCB East, Inc.
2 Industrial Way, Amesbury, MA 01913, 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, TX 77497, US

MIL-PRF-31032/6

Speedy Circuits

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.
1701 North Street, P.O. Box 658, Endicott, NY 13760, US

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

SECTION III
ALPHABETICAL LIST OF QUALIFIED MANUFACTURERS

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
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
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
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
MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 4MEG7
Cirexx International 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
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
MANUFACTURER INFORMATION:	PLANT LOCATION:	CAGE Code: 7Z463
Coretec Cleveland, Inc. 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

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ALPHABETICAL LIST OF QUALIFIED MANUFACTURERS

MANUFACTURER INFORMATION: **Coretec Denver, Inc.** 10570 Bradford Road Littleton, CO 80127, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 75815 Contact: Douglas N. Berry Phone: 303-904-6119 Fax: 303-933-2934 EMail: dberry@coretec-denver.com
MANUFACTURER INFORMATION: **Coretec, Inc.** 8150 Sheppard Avenue East Scarborough, Ontario, Canada M1B 5K2	PLANT LOCATIONS: 1. Same Address as Manufacturer 2. Coretec, Inc., CAGE Code: 3AF82, 2020 Ellesmere Road, Scarboough, Ontario, Canada M1H 2Z8	CAGE Code: 3AF82 Contact: Noor Al-Shaikh Phone: 416-208-2100 Fax: 416-439-1582 EMail: alshaikh@coretec-inc.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: **Diversified Systems** 3939 West 56th Street Indianapolis, IN 46254, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 5S706 Contact: Linda Bell Phone: 317-299-9547, x238 Fax: 317-298-2061 EMail: linda.bell@divsys.com
MANUFACTURER INFORMATION: **Dynaco Corp.** 1000 South Priest Drive Tempe, AZ 85281-5238, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 61642 Contact: Ted Edwards Phone: 480-736-3728 Fax: 480-921-9830 EMail: tedwards@dynacocorp.com
MANUFACTURER INFORMATION: **Dynamic & Proto Circuits, Inc.** 869 Barton Street Stoney Creek, Ontario, Canada L8E 5G6	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 38898 Contact: Stephen Hazell Phone: 905-643-9900 Fax: 905-643-9911 EMail: stephenhazell@dapc.com
MANUFACTURER INFORMATION: **Dynamic Details, Inc.** 1200 Severn Way Dulles, VA 20166-8904, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 0K703 Contact: Tony Trnka Phone: 703-652-2266 Fax: 703-652-2271 EMail: atnka@va.ddiglobal.com
MANUFACTURER INFORMATION: **Electro Plate Circuitry** 1430 Century Drive Carrollton, TX 75006, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 79616 Contact: James McNeal Phone: 972-466-0818 Fax: 972-466-9078 EMail: jimm@eplate.com

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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.** 1701 North Street P.O. Box 658, 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 Innovation 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: **Hamby Corporation** 27704 Avenue Scott Valencia, CA 91355, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 07248 Contact: Sue Sharp Phone: 661-257-1924 Fax: 661-257-1213 EMail: suesharp@hambycorp.com
MANUFACTURER INFORMATION: **Hans Brockstedt GmbH** Leiterplattenschnelldienst, Clara-Immerwahr-Str. 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
MANUFACTURER INFORMATION: **Lockheed Martin Systems Integration-Owego** 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

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ALPHABETICAL LIST OF QUALIFIED MANUFACTURERS

MANUFACTURER INFORMATION: **Merix Corp.** 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@sj.merix.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: **Philway Products, Inc.** 701 Virginia Avenue Ashland, OH 44806, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 21971 Contact: Tom School Phone: 419-281-7777 Fax: 419-289-3447 EMail: quality@philway.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: **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: **Sovereign Circuits, Inc.** 12080 DeBartolo Drive North Jackson, OH 44451, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 0GN71 Contact: Cynthia Savakis Phone: 330-538-3900, x211 Fax: 330-538-3820 EMail: quality@sovereign-circuits.com
MANUFACTURER INFORMATION: **Speedy Circuits** 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

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MANUFACTURER INFORMATION: **Titan PCB East, Inc.** 2 Industrial Way Amesbury, MA 01913, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 0BX48 Contact: Lance Arlander Phone: 978-388-5740 Fax: 978-388-5538 EMail: larlander@titaneast.com
MANUFACTURER INFORMATION: **TTM Technologies (Redmond)** 17550 NE 67th Court Redmond, WA 98052-4939, US	PLANT LOCATION: Same Address as Manufacturer	CAGE Code: 3EDZ0 Contact: Margaret Schlosser Phone: 425-883-7575 Fax: EMail: mschlosser@ttmtech.com
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, TX 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