QUALIFICATIONS VALIDATED EVERY TWO YEARS

QML-31032-18
21 November 2006
SUPERSEDING
QML-31032-17
18 November 2004

QUALIFIED MANUFACTURERS LIST

OF

PRODUCTS QUALIFIED UNDER PERFORMANCE SPECIFICATION

MIL-PRF-31032

PRINTED CIRCUIT BOARD / PRINTED WIRING BOARD,

GENERAL SPECIFICATION FOR

This list has been prepared for use by or for the Government in the acquisition of printed circuit boards / printed wiring boards (hereafter referred to as printed boards) covered by Department of Defense Performance Specification MIL-PRF-31032. Listing of a manufacturer is not intended to and does not connote endorsement of the manufacturer by the Department of Defense. All listings herein have been qualified under the requirements as specified in the latest effective issue of MIL-PRF-31032. This list is subject to change without notice; revision or amendment of this list will be issued as necessary. The listing of a manufacturer does not in any way release the manufacturer from compliance with the individual item specification requirements.

THE ACTIVITY RESPONSIBLE FOR THIS QML IS THE DEFENSE SUPPLY CENTER COLUMBUS (DSCC-VQE), 3990 EAST BROAD STREET, COLUMBUS, OH 43218-3990.

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.

QML-31032 is available from the DSCC-VQ World Wide Web pages at the following addresses:

Web pages: http://www.dscc.dla.mil/offices/sourcing_and_qualification/

QML: http://www.dscc.dla.mil/programs/qmlqpl/QPLdetail.asp?QPL=31032

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.

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

SECTION I

LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

MIL-PRF-31032/1 - Printed Wiring Board, Rigid, Multilayered, Woven E-Glass Reinforced Thermosetting Resin Base Material, With Plated Through Holes, For Soldered Part Mounting.

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

Amphenol TCS
91 Northeastern Boulevard
Nashua, New Hampshire 03062

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

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

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

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

Coretec, Inc. (Ellesmere Location)
2020 Ellesmere Road
Scarborough, Ontario, Canada M1H 2Z8

Coretec, Inc. (Lawrence Location)
6530 Lawrence Avenue, E.
Scarborough, Ontario, Canada M1C 4A7

Cosmotronic
16721 Noyes Avenue
Irvine, CA 92606

Diversified Systems
3939 W. 56th Street
Indianapolis, IN 46254

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

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

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

Electro Plate Circuitry
1430 Century Drive
Carrollton, TX 75006

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

Endicott Interconnect Technologies, Inc.
1701 North Street
Endicott, NY 13760

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

Geometric Circuits, Inc.
11 Michael Avenue
Farmingdale, NY 11735

Global Innovation Corp.
901 Hensley Drive
Wylie, TX 75098

Graphic Electronics, Inc. (GEI)
1143 S. 71 S&E Avenue
Tulsa, OK 74112

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

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

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

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

Photocircuits Corp.
31 Sea Cliff Avenue
Glen Cove, NY 11542

SECTION I

LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

MIL-PRF-31032/1 - Printed Wiring Board, Rigid, Multilayered, Woven E-Glass Reinforced Thermosetting Resin Base Material, With Plated Through Holes, For Soldered Part Mounting.

Printed Circuits, Inc.
1200 W. 96th Street
Bloomington, MN 55431-2699

Sanmina – SCI (Costa Mesa)
2945 Airway Avenue
Costa Mesa, CA 92626

Sanmina SCI (Phoenix)
5020 South 36th Street
Phoenix, AZ 85040

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

TTM Technologies
2630 South Harbor Boulevard
Santa Ana, CA 92704

TTM Technologies
17550 NE 67th Court
Redmond, WA 98052-4939

Titan PCB East, inc.
2 Industrial Way
Amesbury, MA 01913

Tyco Printed Circuits Group
Santa Clara Division
400 Matthew Street
Santa Clara, CA 95050

Tyco Printed Circuits Group
Stafford Division
4 Old Monson Road
P.O. Box 145
Stafford, CT 06075

SECTION I

LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

MIL-PRF-31032/2 - Printed Wiring Board, Rigid, Single and Double Layer, Woven E-Glass Reinforced Thermosetting Resin Base Material, With Plated Through Holes, For Soldered Part Mounting.

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

Amphenol TCS
91 Northeastern Boulevard
Nashua, New Hampshire 03062

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

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

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

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

Coretec, Inc. (Ellesmere Location)
2020 Ellesmere Road
Scarborough, Ontario, Canada M1H 2Z8

Coretec, Inc. (Lawrence Location)
6530 Lawrence Avenue, E.
Scarborough, Ontario, Canada M1C 4A7

Cosmotronic
16721 Noyes Avenue
Irvine, CA 92606

Diversified Systems
3939 W. 56th Street
Indianapolis, IN 46254

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

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

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

Electro Plate Circuitry
1430 Century Drive
Carrollton, TX 75006

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

Endicott Interconnect Technologies, Inc.
1701 North Street
Endicott, NY 13760

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

Geometric Circuits, Inc.
11 Michael Avenue
Farmingdale, NY 11735

Global Innovation Corp.
901 Hensley Drive
Wylie, TX 75098

Graphic Electronics, Inc. (GEI)
1143 S. 71 S&E Avenue
Tulsa, OK 74112

Hans Brockstedt GmbH
Leiterplattenschnelldienst
Clara-Immerwahr-Strape7
24145 Kiel, Germany

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

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

Photocircuits Corp.
31 Sea Cliff Avenue
Glen Cove, NY 11542

Printed Circuits, Inc.
1200 W. 96th Street
Bloomington, MN 55431-2699

Sanmina – SCI (Costa Mesa)
2945 Airway Avenue
Costa Mesa, CA 92626

SECTION I

LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

MIL-PRF-31032/2 - Printed Wiring Board, Rigid, Single and Double Layer, Woven E-Glass Reinforced Thermosetting Resin Base Material, With Plated Through Holes, For Soldered Part Mounting.

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

TTM Technologies
2630 South Harbor Boulevard
Santa Ana, CA 92704

TTM Technologies
17550 NE 67th Court
Redmond, WA 98052-4939

Titan PCB East, inc.
2 Industrial Way
Amesbury, MA 01913

Tyco Printed Circuits Group
Santa Clara Division
400 Matthew Street
Santa Clara, CA 95050

Tyco Printed Circuits Group
Stafford Division
4 Old Monson Road
Stafford, CT 06075

SECTION I

LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

MIL-PRF-31032/3 – Printed Wiring Board, Flexible, Single and Double Layer, With or Without Plated Holes, With or Without Stiffiners, for Soldered Part Mounting

---

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

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

Cosmotronic
16721 Noyes Avenue
Irvine, CA 92606

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

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

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

Printed Circuits, Inc.
1200 W. 96th Street
Bloomington, MN 55431-2699

Titan PCB East, inc.
2 Industrial Way
Amesbury, MA 01913

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

StrataFLEX Corp.
11 Dohme avenue
Toronto, Ontario, Canada M4B 1Y7

Tyco Printed Circuits Group
Santa Clara Division
400 Matthew Street
Santa Clara, CA 95050

Tyco Printed Circuits Group
Stafford Division
4 Old Monson Road
P.O. Box 145
Stafford, CT 06075

SECTION I

LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

MIL-PRF-31032/4 – Printed Wiring Board, Rigid-Flex or Flexible, Multilayer with Plated Holes, With or Without Stiffiners, for Soldered Part Mounting

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

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

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

Cosmotronic
16721 Noyes Avenue
Irvine, CA 92606

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

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

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

Printed Circuits, Inc.
1200 W. 96th Street
Bloomington, MN 55431-2699

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

StrataFLEX Corp.
11 Dohme avenue
Toronto, Ontario, Canada M4B 1Y7

Titan PCB East, inc.
2 Industrial Way
Amesbury, MA 01913

Tyco Printed Circuits Group
Santa Clara Division
400 Matthew Street
Santa Clara, CA 95050

Tyco Printed Circuits Group
Stafford Division
4 Old Monson Road, P.O. Box 145
Stafford, CT 06075

SECTION I

LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

MIL-PRF-31032/CUSTOM TECHNOLOGIES

MIL-PRF-31032/Custom - Printed Wiring Board, Rigid, Multilayered, PTFE Resin Ceramic Filler Base Material, with Plated Holes Through Holes, For Soldered Part Mounting

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

Cosmotronic
16721 Noyes Avenue
Irvine, CA 92606

MIL-PRF-31032/Custom - Printed Wiring Board, Rigid, Multilayered, E-Glass Reinforced Hydrocarbon Resin Ceramic Filler Base Material, with Plated Holes Through Holes, For Soldered Part Mounting

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

Cosmotronic
16721 Noyes Avenue
Irvine, CA 92606

SECTION II

COMMON ABBREVIATIONS

The following abbreviations are used in this section:

Abbreviation	Meaning
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 II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

Accurate Circuit Engineering
3019 S. Kilson Drive
Santa Ana, CA 92707</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 0MNN9

CONTACT: James Hofer
PHONE #: 714-546-2162
FAX #: 714-433-7418
EMAIL: James@ace-pcb.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1
MIL-PRF-31032/2

Panel Size: 20" X 26"
Max/Min. Board Thickness: 0.220"
Max. Base Cu Thickness: 0.0056"
Max/Min Hole Size: 0.075"/0.008" (after plating)
Max. Plated Hole Size (mounting): 0.247# (after plating)
Aspect Ratio: 11:1
Max. Number of Layers: 24
Min. Conductor Width: 0.003"
Min. Conductor Spacing: 0.003" ±10%
Part Mounting: THM, SM, MIX
Base Material: GF (Woven E-glass, Epoxy Resin)
Finish System: ENIG
Hole Preparation: Permanganate Desmear/Etchback
Alternate Construction: Sequential Lamination, Blind & Buried Vias
Copper Plating: Acid Copper
Controlled Impedance: Characteristic & Differential, 50, 75, 100 ohms ±10%
Hole Fill/Via Plug: Non-conductive Hole Fill/Via Plug</td><td>VQE-06-12150</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

Amphenol TCS
91 Northeastern Boulevard
Nashua, New Hampshire 03062</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 3T000

CONTACT: Melissa Baker
PHONE #: 603-879-3818
FAX #: 603-879-2818
email: melissa.k.baker@amphenol-cs.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1
MIL-PRF-31032/2

Panel Size: 24" X 36"
Max. Board Thickness: 0.322"
Min. Hole Size: 0.016"
Aspect Ratio: 8:1
Blind Via Aspect Ratio: 0.5:1
Max. Number of Layers: 27
Min. Conductor Width: 0.004"
Min. Conductor Spacing: 0.004"
Part Mounting: THM, Compliant Pin, SMT, MIX
Base Material: GF (Woven E-glass, Epoxy resin)
GI (Woven E-glass, Polyimide resin)
Hybrid Build (GF/Hydrocarbon Ceramic)
Finish System: Fused SnPB, Nickel, Electrolytic Hard & Soft Gold, Electrolytic Nickel
Hole Preparation: Permanganate Desmear/Etchback
Plasma Desmear
Copper Plating: Acid Copper: DC Plate, Pulse Plate
Solder Resist: Thermal Cured Soldermask, LPI, SMOBC
Controlled Impedance: 50 ohms (± 10%)
Alternate Construction: Blind Vias (Mechanically Drilled)
Hole Fill/Via Plug: Non-conductive Via Fill/Plug</td><td>VQE-97-0649
VQE-97-0721
VQE-06-10054</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 65337
Calumet Electronics Corp. 25830 Depot Street Calumet, MI 49913-1985	Same	CONTACT: Robert Hall PHONE #: 906-337-1305 FAX #: 906-337-5359 EMAIL: rhall@cec-up.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
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"	
Max/Min Hole Size	0.125"/0.016"	
Aspect Ratio	8:1	
Max. Number of Layers	10	
Min. Conductor Width	0.006"	
Min. Conductor Spacing	0.003"	
Part Mounting	THM/SM	
Base Material	GF (Woven E-glass, Epoxy Resin) GI (Woven E-glass, Polyimide Resin)	
Finish System	HASL, Au , Ni	
Hole Preparation	FR4: Chemical Etchback Non FR4: Plasma Etchback	
Copper Plating	Electrodeposited Acid Copper	

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS Colonial Circuits, Inc. 1026 Warrenton Road Fredericksburg, VA 22406-6200	PLANT LOCATION Same	CAGE CODE: 6T499 CONTACT: Mike Hill PHONE #: 540-753-5511, X125 FAX #: 540-752-2109 EMAIL: quality@colonialcircuits.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1 MIL-PRF-31032/2 Panel Size 18" X 24" Max. Board Thickness 0.127" Max/Min Hole Size 0.228"/0.015" Aspect Ratio 8.5:1 Max. Number of Layers 12 Min. Conductor Width 0.008" Min. Conductor Spacing 0.005" Part Mounting PTH, SMT Base Material GF (Woven E-glass, Epoxy Resin) Finish System Tin/Lead HASL Hole Preparation Plasma Desmear Copper Plating Electrolytic Acid Copper Solder Resist LPI Controlled Impedance 55 ohms ±10%		VQE-04-6002 VQE-06-010192

MANUFACTURER NAME & ADDRESS Colonial Circuits, Inc. 1026 Warrenton Road Fredericksburg, VA 22406-6200	PLANT LOCATION Same	CAGE CODE: 6T499 CONTACT: Mike Hill PHONE #: 540-753-5511, X125 FAX #: 540-752-2109 EMAIL: quality@colonialcircuits.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1 MIL-PRF-31032/2 Panel Size 18" X 24" Max. Board Thickness 0.088" Max/Min Hole Size 0.052"/0.021" Aspect Ratio 4.2:1 Max. Number of Layers 14 Min. Conductor Width 0.006" Min. Conductor Spacing 0.005" Part Mounting PTH, SMT Base Material GI (Woven E-glass, Polyimide Resin) Finish System Tin/Lead HASL Hole Preparation Plasma Desmear and Etchback Copper Plating Electrolytic Acid Copper Solder Resist LPI		VQE-04-6002 VQE-06-010192

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 6T499
Colonial Circuits, Inc. 1026 Warrenton Road Fredericksburg, VA 22406-6200	Same	CONTACT: Mike Hill PHONE #: 540-753-5511, X125 FAX #: 540-752-2109 EMAIL: quality@colonialcircuits.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1 MIL-PRF-31032/2		VQE-04-6002 VQE-06-010192
Panel Size	12" X 18"	
Max. Board Thickness	0.090"	
Max/Min Hole Size	0.139"/0.021"	
Aspect Ratio	4.29:1	
Max. Number of Layers	8	
Min. Conductor Width	0.005"	
Min. Conductor Spacing	0.005"	
Part Mounting	PTH, SMT	
Base Material	Woven E-Glass, Hydrocarbon Resin with Ceramic Filler	
Finish System	Tin/Lead HASL, Tin/Lead Reflow	
Hole Preparation	Plasma Desmear, Plasma Etchback	
Copper Plating	Electrolytic Acid Copper	
Solder Resist	LPI	
Impedance	55 ohms ±10%	

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 6T499
Colonial Circuits, Inc. 1026 Warrenton Road Fredericksburg, VA 22406-6200	Same	CONTACT: Mike Hill PHONE #: 540-753-5511, X125 FAX #: 540-752-2109 EMAIL: quality@colonialcircuits.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/4		VQE-04-6002 VQE-06-010192
Panel Size	12" X 18"	
Max. Board Thickness	0.093"	
Max/Min Hole Size	0.045"/0.025"	
Aspect Ratio	3.7:1	
Max. Number of Layers	10	
Min. Conductor Width	0.005"	
Min. Conductor Spacing	0.005"	
Part Mounting	PTH, SMT	
Base Material	GI (Woven E-glass, Polyimide Resin)	
Finish System	Tin/Lead Reflow	
Hole Preparation	Plasma Desmear and Etchback	
Copper Plating	Electrolytic Acid Copper	
Solder Resist	LPI	
Flex Base Material	Adhesive Material	

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS Colonial Circuits, Inc. 1026 Warrenton Road Fredericksburg, VA 22406-6200	PLANT LOCATION Same	CAGE CODE: 6T499 CONTACT: Mike Hill PHONE #: 540-753-5511, X125 FAX #: 540-752-2109 EMAIL: quality@colonialcircuits.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/Custom Base Material Panel Size Max. Board Thickness Max/Min Hole Size Aspect Ratio Max. Number of Layers Min. Conductor Width Min. Conductor Spacing Part Mounting Finish System Hole Preparation Copper Plating Solder Resist	 Rogers 4003 12" X 18" 0.083" 0.045"/0.020" 4.15:1 4 0.010" 0.011" PTH, SMT Tin/Lead HASL Plasma Desmear Electrolytic Acid Copper LPI	VQE-04-6002 VQE-06-010192

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

Colonial Circuits, Inc.
1026 Warrenton Road
Fredericksburg, VA 22406-6200</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 6T499

CONTACT: Mike Hill
PHONE #: 540-753-5511, X125
FAX #: 540-752-2109
EMAIL: quality@colonialcircuits.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/Custom

Base Material: With or Without Woven E-Glass, PTFE Resin with Ceramic Filler
Panel Size: 12” X 18”
Max. Board Thickness: 0.031”
Max/Min Hole Size: 0.117”/0.020”
Aspect Ratio: 1.55:1
Max. Number of Layers: 2
Min. Conductor Width: 0.025”
Min. Conductor Spacing: 0.010”
Part Mounting: SMT
Finish System: Tin/Lead HASL
Hole Preparation: Plasma Desmear
Copper Plating: Electrolytic Acid Copper
Solder Resist: LPI</td><td>VQE-04-6002
VQE-06-010192</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 7Z463
Coretec Cleveland, Inc. 7 Ascot Parkway Cuyahoga Falls, OH 44223	Same	CONTACT: Mark Kasting PHONE #: 330-572-3400 FAX #: 330-572-3434 EMAIL:mark_kasting/coretec@coretec-inc.com

CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1		VQE-00-0289 VQE-01-0910 VQE-05-008414
Panel Size	18" X 24"	
Max. Board Thickness	0.126"	
Min Hole Size	0.014"	
Aspect Ratio	5:1	
Max. Number of Layers	16	
Min. Conductor Width	0.004"	
Min. Conductor Spacing	0.004"	
Part Mounting	SMT/THM	
Base Material	GF (Woven E-glass Epoxy resin) GI (Woven E-glass Polyimide Resin) AF (Woven Aramid Epoxy Resin) BI (Non-woven Aramid Polyimide Resin	
Finish System	HASL, Fused Tin Lead Plate, Selective Solder Strip-Tin Lead Plate	
Hole Preparation	Plasma Etchback	
Copper Plating	Acid Copper	
Controlled Impedance	100/50 ohm ±5%	
Alternate Construction	Sequential Lamination for Blind & Buried Vias (8 layer max)	

CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/3 MIL-PRF-31032/4		VQE-01-0909 VQE-05-008414 VQE-06-010963
Panel Size	18" X 24"	
Max. Board Thickness	0.126"	
Min Hole Size	0.017"	
Aspect Ratio	10:1	
Max. Number of Layers	11	
Min. Conductor Width	0.003"	
Min. Conductor Spacing	0.003"	
Part Mounting	SMT/THM	
Base Material		
Rigid	GF (Woven E-glass Epoxy resin) GI (Woven E-glass Polyimide Resin)	
Flex	Adhesive or Adhesiveless Construction	
Finish System	HASL	
Hole Preparation	Plasma Etchback	
Copper Plating	Acid Copper	
Flexibility Class	Class A	

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

Coretec Denver, Inc.
10570 Bradford Road
Littleton, CO 80127</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 75815

CONTACT: Douglas N. Berry
PHONE #: 303-904-6119
FAX #: 303-933-2934
EMAIL: dberry@coretec-denver.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1, /2

Panel Size: 18" X 24"
Max. Board Thickness: 0.125"
Max. Base Cu Thickness: 0.001"
Max/Min Hole Size: 0.109"/0.015"
Aspect Ratio: 7:1
Max. Number of Layers: 16
Min. Conductor Width: 0.006"
Min. Conductor Spacing: 0.006"
Part Mounting: SMT, THM, MIX
Base Material: GF (Woven E-glass, Epoxy resin)
GI (Woven E-glass, Polyimide Resin)
GM (Woven E-glass, Triazine and/or Bismaleimide Modified Epoxy Resin)
Finish System: HASL, IR Reflow following SnPb Plate, ENIG
Hole Preparation: Permanganate Desmear/Etchback
Copper Plating: Acid Copper
Solder Resist: LPI, Dry Film
Hole Fill/Via Plug: Conductive and Non-conductive Epoxy Hole Fill/Via Plug</td><td>VQE-02-0317
VQE-05-9014</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/3, /4

Panel Size: 18" X 24"
Max. Board Thickness: 0.100"
Max. Base Cu Thickness: 0.001"
Max/Min Hole Size: 0.109"/0.018"
Aspect Ratio: 10:1
Max. Number of Layers: 12
Min. Conductor Width: 0.005"
Min. Conductor Spacing: 0.006"
Part Mounting: SMT, THM
Base Material: GF (Woven E-glass, Epoxy resin)
GI (Woven E-glass, Polyimide Resin)
Flex Base Material: IPC-4204/1 (Acrylic Adhesive)
IPC-4204/11 (Adhesiveless)
Finish System: HASL, IR Reflow following SnPb Plate
Hole Preparation: Plasma Desmear/Etchback
Copper Plating: Electrolytic Acid Copper
Solder Resist: LPI, Dry Film</td><td>VQE-05-9139</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr>
<td>MANUFACTURER
NAME & ADDRESS

Coretec, Inc. (Ellesmere Location)
2020 Ellesmere Road
Scarborough, Ontario, Canada M1H 2Z8

Coretec, Inc. (Lawrence Location)
6530 Lawrence Avenue, E.
Scarborough, Ontario, Canada M1C 4A7</td>
<td>PLANT LOCATION

Same</td>
<td>CAGE CODE: 3AF82

CONTACT: Paul Green
PHONE #: 416-208-2100
FAX #: 416-208-2196
EMAIL: pgreen@coretec-inc.com</td>
</tr>
<tr>
<td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td>
<td>QUALIFICATION LETTER:</td>
</tr>
<tr>
<td colspan="2">MIL-PRF-31032/1
MIL-PRF-31032/2

Panel Size: 18" X 24"
Max. Board Thickness: 0.080"
Min. PTH Size (as drilled): Mech. Drill 0.0098" (Min)
Aspect Ratio: 7:1
Max. Number of Layers: 14
Min. Conductor Width: 0.005"
Min. Conductor Spacing: 0.005"
Part Mounting: SMT, THM, MIX
Base Material: GF (Woven E-glass, Epoxy resin)
GI (Woven E-glass, Polyimide Resin)
Finish System: HASL, ENIG
Hole Preparation: Non FR4: Permanganate Desmear/Etchback
FR4: Chemical Desmear
Copper Plating: Electroless and electrolytic copper
Solder Resist: LPI, Hole Plug
Alternative Construction: N/A
Controlled Impedence: Characteristics (±10%)
Differential (±10%)</td>
<td>VQE-04-6240</td>
</tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS Cosmotronic 16721 Noyes Avenue Irvine, CA 92606	PLANT LOCATION Same	CAGE CODE: 63695 CONTACT: Alan Exley PHONE #: 949-660-0740 FAX #: 949-553-8371 EMAIL: alan_exley@cosmotronic.com

CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1, /2		VQE-04-6966 VQE-05-9107 VQE-06-010085
Panel Size	18" X 24"	
Max. Board Thickness	0.335"	
Max/Min Hole Size	/0.0135"	
Aspect Ratio	15:1	
Max. Number of Layers	36	
Min. Conductor Width	0.005"	
Min. Conductor Spacing	0.004"	
Part Mounting	SMT, THM	
Base Material	BF (Non-woven Aramid) BI (Non-woven Aramid) GF (Woven E-glass, Epoxy Resin) GI (Woven E-glass, Polyimide Resin) GM (Glass Base, Woven, Triazine and/or Bismaleide Modified Epoxy Resin, Flame Resistant)	
Finish System	Fused SnPb, HASL, Selective Solder Strip-Tin Lead Plate, ENIG	
Hole Preparation	Plasma Desmear/Etchback	
Copper Plating	Electrodeposited Acid Copper	
Solder Resist	LPI, SMOBC	
Controlled Impedance	50 ohm ±10% (nominal/tolerance)	

CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/3, /4		VQE-04-6966 VQE-05-9107 VQE-06-010085
Panel Size	18" X 24"	
Max. Board Thickness	0.165"	
Max/Min Hole Size	/0.012"	
Aspect Ratio	8:1	
Max. Number of Layers	22	
Min. Conductor Width	0.006"	
Min. Conductor Spacing	0.008"	
Part Mounting	SMT, THM	
Rigid Base Material	GF (Woven E-glass, Epoxy Resin) GI (Woven E-glass, Polyimide Resin) GM (Glass Base, Woven, Triazine and/or Bismaleide Modified Epoxy Resin, Flame Resistant) GI/GM Composite	
Flex Base Material	Adhesiveless or With Adhesives	
Finish System	Fused SnPb, HASL, Selective Solder Strip-Tin Lead Plate, ENIG	
Copper Plating	Electrodeposited Acid Copper	
Solder Resist	LPI, SMOBC	
Usage	Class A (Flex During Installation) Class B (Dynamic Flex)	

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 63695
Cosmotronic 16721 Noyes Avenue Irvine, CA 92606	Same	CONTACT: Alan Exley PHONE #: 949-660-0740 FAX #: 949-553-8371 EMAIL: alan_exley@cosmotronic.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/Custom		VQE-04-6966 VQE-05-9107 VQE-06-010085
Panel Size	12" X 18"	
Max. Board Thickness	0.225"	
Max/Min Hole Size	/0.020"	
Aspect Ratio	10:1	
Max. Number of Layers	16	
Min. Conductor Width	0.011"	
Min. Conductor Spacing	0.007"	
Part Mounting	SMT	
Base Material	Woven E-Glass, Hydrocarbon Resin, Ceramic-Filled Woven E-Glass, Hydrocarbon Resin, Ceramic-Filled With GF or GI Composites	
Finish System	HASL, ENIG	
Hole Preparation	Plasma Desmear/Etchback	
Copper Plating	Electrodeposited Acid Copper	
Solder Resist	LPI, SMOBC	

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER NAME & ADDRESS

Diversified Systems
3939 W. 56th Street
Indianapolis, IN 46254</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 5S706
CONTACT: Linda Bell
PHONE #: 317-299-9547, x238
FAX #: 317-298-2061
EMAIL: linda.bell@divsys.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1
MIL-PRF-31032/2

Panel Size: 18" X 24"
Max. Board Thickness: 0.110"
Min. Hole Size: 0.012"
Aspect Ratio: 5.5:1
Max. Number of Layers: 14
Min. Conductor Width: 0.005"
Min. Conductor Spacing: 0.005"
Part Mounting: SMT/THM
Base Material: GF (Woven E-glass, Epoxy Resin)
GI (Woven E-glass, Polyimide Resin)
Finish System: HASL
Solder Resist: LPI, Dry Film
Hole Preparation: Permanganate Desmear/Etchback
Copper Plating: Electro-deposited Acid Copper
Controlled Impedance: Embedded Stripline & Microstrip</td><td>VQE-01-0309
VQE-02-0015</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 61642
Dynaco Corp 1000 South Priest Drive Tempe, AZ 85281-5238	Same	CONTACT: Ted Edwards PHONE #: 480-736-3728 FAX #: 480-921-9830 EMAIL: tedwards@dynacocorp.com

CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1, /2		VQE-05-9356
Panel Size	18" X 24"	
Max. Board Thickness	0.100"	
Max. Base Cu Thickness	0.001"	
Max/Min Hole Size	0.045/0.032"	
Aspect Ratio	3:1	
Max. Number of Layers	10	
Min. Conductor Width	0.010"	
Min. Conductor Spacing	0.010"	
Part Mounting	THM	
Base Material	GF (Woven E-glass, Epoxy Resin) GI (Woven E-glass, Polyimide Resin)	
Finish System	HASL	
Hole Preparation	Permanganate Desmear/Etchback	
Copper Plating	Acid Copper	

CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/3, /4		VQE-05-9356 VQE-06-10600
Panel Size	18" X 24", 12" X 18"	
Max. Board Thickness	0.120"	
Max. Base Cu Thickness	0.001"	
Max/Min Hole Size	0.045"/0.010"	
Aspect Ratio	12:1	
Max. Number of Layers	20	
Min. Conductor Width	0.004"	
Min. Conductor Spacing	0.006"	
Part Mounting	THM	
Rigid Base Material	GI (Woven E-glass, Polyimide Resin)	
Flex Base Material	IPC-4203/1 (Covercoat) IPC-4204/1 (Acrylic Adhesive) IPC-4204/11 (Adhesiveless)	
Hole Preparation	Permanganate Desmear/Etchback Plasma Etchback	
Finish System	Fused SnPb, HASL	
Copper Plating	Electroless & Electroplated Acid Copper	
Alternate Construction	Foil Lamination	
Flexibility Class	Class A (Flex During Installation) Class B (Continuous Flexing)	

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS Dynamic & Proto Circuits, Inc. 869 Barton Street Stoney Creek, Ontario Canada L8E 5G6	PLANT LOCATION Same	CAGE CODE: 38898 CONTACT: Stephen Hazell PHONE #: 905-643-9900 FAX #: 905-643-9911 EMAIL: stephenhazell@dapc.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1 MIL-PRF-31032/2		VQE-98-1143, VQE-00-0007 VQE-01-0311, VQE-02-0818

Capability	Value	
Panel Size	16"X18"	
Max. Board Thickness	0.125"	
Max/Min Hole Size	0.039"/0.018" (0.0135" drilled)	
Aspect Ratio	9:3:1	
Max. Number of Layers	16	
Min. Conductor Width	0.005"	
Min. Conductor Spacing	0.005"	
Part Mounting	SMT, THM, MIX	
Base Material	GF	(Woven E-Glass, Epoxy resin)
	GI	(Woven E-Glass, Polyimide resin)
Finish System	HASL	
Hole Preparation	Plasma Etch	
Copper Plating	Acid Copper	
Solder Resist	LPI, Dry film solder resist plugs	

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS Dynamic Details, Inc. 1200 Severn Way Dulles, VA 20166-8904	PLANT LOCATION Same	CAGE CODE: 0K703 CONTACT: Tony Trnka PHONE #: 703-652-2266 FAX #: 703-652-2271 EMAIL: jtrna@va.ddiglobal.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1 MIL-PRF-31032/2 Panel Size: 18"X24" Max. Board Thickness: 0.1003" Max./Min. Hole Size: 0.038"/0.024" (0.150" max. non-PTH) Aspect Ratio: 6:8:1 Max. Number of Layers: 20 Min. Conductor Width: 0.004" Min. Conductor Spacing: 0.003" Part Mounting: SMT, THM, MIX Base Material: GF (Woven E-Glass, Epoxy resin) GI (Woven E-Glass, Polyimide resin) Finish System: HASL Hole Preparation: Plasma Desmear/Etchback Copper Plating: Electrolytic Acid Copper Alternate Construction: Blind Vias		VQE-03-3545

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 79616
Electro Plate Circuitry 1430 Century Drive Carrollton, TX 75006	Same	CONTACT: James McNeal PHONE #: 972-466-0818 FAX #: 972-466-9078 EMAIL: jimm@eplate.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1 MIL-PRF-31032/2		VQE-06-011433 VQE-06-010333
Panel Size	18" X 16", 18" X 24"	
Max. Board Thickness	0.120"/0.030"	
Max./Min. Hole Size	0.008"	
Aspect Ratio	9.3:1	
Max. Number of Layers	14	
Min. Conductor Width	0.004"	
Min. Conductor Spacing	0.0035"	
Part Mounting	MIX, SMT, THM	
Base Material	GF (Woven E-Glass, Epoxy Resin) GI (Woven E-Glass, Polyimide Resin)	
Finish System	HASL, Reflowed SnPb, ENIG, Gold	
Hole Preparation	Plasma Etchback Desmear	
Copper Plating	Acid Copper	
Solder Resist	LPI, Dry Film	
Controlled Impedance	± 3% tolerance	
Alternate Construction	Sequential Lamination Blind/Buried Vias Filled Vias	

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

Electrotek Corp.
7745 S. 10th Street
Oak Creek, WI 53154</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 66030

CONTACT: Tom Tikusis, Don Dawson
PHONE #: 414-762-1390
FAX #: 414-762-1510
EMAIL: sales@boards4u.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1

Panel Size: 18" X 24"
Max. Board Thickness: 0.115"
Max./Min. Hole Size: 0.012"
Aspect Ratio: 9:1
Max. Number of Layers: 18
Min. Conductor Width: 0.003"
Min. Conductor Spacing: 0.003"
Part Mounting: MIX, SMT, THM
Base Material: GF (Woven E-Glass, Epoxy Resin)
GI (Woven E-Glass, Polyimide Resin)
Finish System: HASL, ImmAg, ENIG
Hole Preparation: Plasma/Permanganate Desmear Etchback
Copper Plating: Electroplated Acid Copper
Solder Resist: LPI, Dry Film
Controlled Impedance: GF: 100 ohms/50 ohms ± 10%
GI: 100 ohms ± 10%</td><td>VQE-06-011451</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS Endicott Interconnect Technologies, Inc. 1701 North Street, P.O. Box 658 Endicott, NY 13760	PLANT LOCATION Same	CAGE CODE: 3ECL3 CONTACT: Jose Rios PHONE #: 607-755-5896 FAX #: 607-755-4649 EMAIL: JoseA.Rios@eitny.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1 MIL-PRF-31032/2 Panel Size 24"X28" Max. Board Thickness 0.116" Max./Min. Hole Size 0.010" Aspect Ratio 12:1 Max. Number of Layers 30 Min. Conductor Width 0.003" Min. Conductor Spacing 0.004" Part Mounting MIX, PTH, SMT Base Material GF (Woven E-Glass, Epoxy resin) Finish System HASL, ENIG Hole Preparation Permanganate Desmear Plasma Etchback Copper Plating Electrolplated Acid Copper Solder Resist LPI		VQE-04-5311 VQE-07-012236

MANUFACTURER NAME & ADDRESS Endicott Interconnect Technologies, Inc. 1701 North Street, P.O. Box 658 Endicott, NY 13760	PLANT LOCATION Same	CAGE CODE: 3ECL3 CONTACT: Jose Rios PHONE #: 607-755-5896 FAX #: 607-755-4649 EMAIL: JoseA.Rios@eitny.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1 MIL-PRF-31032/2 Panel Size 18"X24" Max. Board Thickness 0.084" Max./Min. Hole Size 0.012" Aspect Ratio 7:1 Max. Number of Layers 12 Min. Conductor Width 0.0045" Min. Conductor Spacing 0.0040" Part Mounting MIX Base Material GI (Woven E-Glass, Polyimide Resin) Finish System HASL, ENIG Hole Preparation Permanganate Desmear Plasma Etchback Copper Plating Electrolplated Acid Copper Solder Resist LPI		VQE-04-5509 VQE-07-012236

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

Firan Technology Group
250 Finchdene Square
Scarborough, Ontario, Canada M1X 1A5</td><td>PLANT LOCATION

Same</td><td>CAGE CODE:L2665

CONTACT: Bryan Clark
PHONE #: 416-299-4000, ext. 222
FAX #: 416-292-4308
EMAIL: bryanclark@firantechnology.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1
MIL-PRF-31032/2

Panel Size: 18" X 24"
Max. Board Thickness: 0.220" (nominal)
Max./Min. Hole Size: 0.0250"/0.008" Mechanical Drill; 0.005" Laser Control Depth; 0.006" Buried Via Mechanical Drill
Aspect Ratio: 7:1
Max. Number of Layers: 20
Min. Conductor Width: 0.004"
Min. Conductor Spacing: 0.004"
Part Mounting: MIX, SMT, THM
Base Material: BI (Aramidfabric, Nonwoven, Polyimide Resin); GF (Woven E-Glass, Epoxy Resin); GI (Woven E-Glass, Polyimide Resin); GM (Woven E-Glass, Triazine and/or Bismaleimide Modified Epoxy Resin); GX (Teflon) Custom Polytetrafluoroethylene (PTFE))
Finish System: HASL, Reflow Solder, Immersion Tin, Silver, ENIG
Hole Preparation: Plasma, Permanganate, Desmear/Etchback
Copper Plating: Electroless and Electrolytic Copper
Solder Resist: LPI, Hole Fill
Alternate Construction: Sequential Lamination for Blind and Buried Vias and MicroVias
Controlled Impedance: Characteristic (± 10%); Differential (± 10%)</td><td>VQE-05-009339</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS Geometric Circuits, Inc. 11 Michael Avenue Farmingdale, NY 11735	PLANT LOCATION Same	CAGE CODE: 65423 CONTACT: Phil Cate PHONE #: 631-249-0230 FAX #: 631-249-0286 EMAIL: phil@geometriccircuits.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1 MIL-PRF-31032/2 Panel Size: 18"X24" Max. Board Thickness: 0.100" Max./Min. PTH Hole Size: 0.100"/0.025" (drill) Aspect Ratio: 4:1 Max. Number of Layers: 10 Min. Conductor Width: 0.007" Min. Conductor Spacing: 0.007" Part Mounting: SM, THM, MIX Base Material: GF (Woven E-Glass, Epoxy resin) Finish System: HASL Hole Preparation: Permanganate Desmear/Etchback Copper Plating: Electrolytic Acid Copper Solder Resist: LPI		VQE-03-4303

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 04RV5
Global Innovations Corp. 901 Hensley Drive Wylie, TX 75098	Same	CONTACT: Bob Noland PHONE #: 214-291-1427 EMAIL: bnoland@lonestarcircuits.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
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. Board Thickness	0.119"	
Min Hole Size	0.0100"	
Aspect Ratio	7.5: 1	
Max. Number of Layers	18	
Min. Conductor Width	0.004"	
Min. Conductor Spacing	0.005"	
Part Mounting	MIX	
Base Material	GF (Woven E-Glass, Epoxy Resin)	
Finish System	HASL	
Hole Preparation	Permanganate Desmear/Plasma Etchback	
Copper Plating	Electrodeposited Acid Copper	
Solder Resist	LPI, Dry Film	

CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1 MIL-PRF-31032/2		VQE-04-4957 VQE-05-7288
Panel Size	18" X 24"	
Max. Board Thickness	0.074"	
Min Hole Size	0.012"	
Aspect Ratio	6.2:1	
Max. Number of Layers	12	
Min. Conductor Width	0.015"	
Min. Conductor Spacing	0.005"	
Part Mounting	MIX	
Rigid Base Material	GI (Woven E-glass, Polyimide Resin)	
Finish System	HASL	
Hole Preparation	Plasma Etchback	
Copper Plating	Electrodeposited Acid Copper	
Solder Resist	LPI	
Controlled Impedance	62/37.5 ohms (±10%)	

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

Graphic Electronics, Inc. (GEI)
143 S. 71 S&E Avenue
Tulsa, OK 74112</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 0TZ92

CONTACT: John Barber
PHONE #: 918-835-4417
FAX #: 918-835-4571
EMAIL: john@geicircuits.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1
MIL-PRF-31032/2

Panel Size 18"X24"
Max. Board Thickness 0.100"
Max./Min. PTH Hole Size 0.045"/0.012"
Max Base Cu Thickness 0.001"
Aspect Ratio 7:1
Max. Number of Layers 10
Min. Conductor Width 0.006"
Min. Conductor Spacing 0.006"
Part Mounting SM, THM
Base Material GF (Woven E-Glass, Epoxy resin)
Finish System HASL
Hole Preparation Permanganate Desmear/Etchback
Copper Plating Electrolytic Acid Copper
Solder Resist LPI</td><td>VQE-05-7306</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: C4831
Hans Brockstedt GmbH Leiterplattenschnelldienst Clara-Immerwahr-Strape 7 24145 Kiel Federal Republic of Germany	Same	CONTACT: Hilmar Klammer PHONE #: 0049-431-71966-0, -30 FAX #: 0049-431-71966-29 EMAIL: klammer@brockstedt.de

CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1 MIL-PRF-31032/2		VQE-03-2619 VQE-05-7480
Panel Size	9"X13", 13"x20", 15"x21", 18"x24"	
Max. Board Thickness	0.200"	
Max/Min Hole Size	Mech. Drilled: 0.01" Laser Drilled: 0.004"	
Aspect Ratio	7:1 (Blind Vias 1:1)	
Max. Number of Layers	12	
Min. Conductor Width	0.004"	
Min. Conductor Spacing	0.004"	
Internal Connections	Blind Vias, Buried Vias, Laser Drilled Vias	
Part Mounting	SMT, THM, MIX	
Base Material	GF (Woven E-Glass, Epoxy resin) GI (Woven E-Glass, Polyimide resin)	
Finish System	Fused SnPb, Electroplated SnPb, HASL, Electroless Sn, Electroplated Nickel/Gold, Electroless Nickel/Gold	
Hole Preparation	Plasma Desmear/Etchback	
Copper Plating	Acid Copper	
Solder Resist	LPI	

CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/3 MIL-PRF-31032/4		VQE-03-2619 VQE-05-7480
Panel Size	9"X13", 13"x20"	
Max. Board Thickness	0.200"	
Max/Min Hole Size	Mech. Drilled: 0.01" Laser Drilled: 0.004"	
Aspect Ratio	7:1 (Blind Vias 1:1)	
Max. Number of Layers	12	
Min. Conductor Width	0.004"	
Min. Conductor Spacing	0.004"	
Internal Connections	Blind Vias, Buried Vias, Laser Drilled Vias	
Part Mounting	SMT, THM, MIX	
Rigid Base Material	GF (Woven E-Glass, Epoxy resin) GI (Woven E-Glass, Polyimide resin)	
Flex Base material	IPC-FC-241/1 IPC-FC-241/11	
Finish System	Fused SnPb, Electroplated SnPb, HASL, Electroless Sn, Electroplated Nickel/Gold, Electroless Nickel/Gold	
Hole Preparation	Plasma Desmear/Etchback	
Copper Plating	Acid Copper	
Solder Resist	LPI	

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 03640
Lockheed Martin Systems Integration-Owego 1801 State Route 17C Owego, NY 13827	Same	CONTACT: Melita Nagerl PHONE #: 607-751-4665 FAX #: 607-751-7714 EMAIL: melita.nagerl@lmco.com

CAPABILITIES BY TECHNOLOGY/ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1 MIL-PRF-31032/2		VQE-99-0130 VQE-00-0961
Panel Size	18" X 24"	
Max. Board Thickness	0.200"	
Min Hole Size	0.020"	
Aspect Ratio	8:1	
Max. Number of Layers	16	
Min. Conductor Width	0.004"	
Min. Conductor Spacing	0.004"	
Part Mounting	SMT, THM	
Base Material	GF (Woven E-glass Epoxy Resin) GI (Woven E-glass, Polyimide Resin) AF (Woven Aramid, Epoxy Resin)	
Finish System	Fused SnPb, HASL	
Hole Preparation	Permanganate Desmear, Plasma Etchback	
Copper Plating	Electro-deposited Copper	
Solder Resist	LPI	

CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1		VQE-01-0539
Panel Size	18" X 24"	
Max. Board Thickness	0.095"	
Min Hole Size	0.014"	
Aspect Ratio	6.8:1	
Max. Number of Layers	14	
Min. Conductor Width	0.004"	
Min. Conductor Spacing	0.004"	
Part Mounting	SMT, THM	
Base Material	BI (Aramid fabric, Nonwoven, Polyimide Resin)	
Finish System	Fused SnPb, HASL, NiAu	
Hole Preparation	Permanganate Desmear	
Copper Plating	Electro-deposited Cu	
Solder Resist	LPI	

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

Lockheed Martin Systems Integration-Owego
1801 State Route 17C
Owego, NY 13827</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 03640

CONTACT: Renee Akers
PHONE #: 607-751-4251
FAX #: 607-751-7714
EMAIL: renee.akers@lmco.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/3
MIL-PRF-31032/4

Panel Size: 18" X 24"
Max. Board Thickness: 0.110"
Min Hole Size: 0.040"
Aspect Ratio: 2.75:1
Max. Number of Layers: 10
Min. Conductor Width: 0.004"
Min. Conductor Spacing: 0.004"
Part Mounting: SMT, THM
Rigid Base Material: GF (Woven E-glass, Epoxy Resin)
GI (Woven E-glass, Polyimide Resin)
Flex Base Material: IPC-FC-241/1 through /4
IPC-FC-241/11
Finish System: Fused SnPb, HASL
Hole Preparation: Permanganate Desmear/Plasma Etchback
Copper Plating: Electro-deposited Acid Copper
Solder Resist: UV-Cured Wet Screen</td><td>VQE-00-0684</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

Micom Corp.
475 Old Highway 8 NW
New Brighton, MN 55112</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 34076

CONTACT: Larry Leonard
PHONE #: 651-604-2639
FAX #: 651-636-1352
EMAIL:lleonard@micomcircuits.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1
MIL-PRF-31032/2

Panel Size: 18" X 24"
Max. Board Thickness: 0.239"
Max./Min. Plated Hole Size: 0.0079"
Aspect Ratio: 11:1
Max. Number of Layers: 28
Min. Conductor Width: 0.004"
Min. Conductor Spacing: 0.004"
Part Mounting: SMT, THM
Base Material: GF (Woven E-Glass, Epoxy resin)
GI (Woven E-Glass, Polyimide resin)
Finish System: HASL, Fuse Following SnPb Plate
Hole Preparation: Plasma Desmear/Etchback,
Permanganate Desmear/Etchback
Copper Plating: Acid Copper
Solder Resist: LPI, Dry Film
Controlled Impedance: Characteristic (±10%)
Differential (±10%)
Alternate Construction: Blind & Buried Vias</td><td>VQE-03-2980</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

Philway Products, Inc.
701 Virginia Avenue
Ashland, OH 44806</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 21971

CONTACT: Tom School
PHONE #: 419-281-7777
FAX #: 419-289-3447
EMAIL:quality@philway.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1

Panel Size: 18" X 21"
Max. Board Thickness: 0.090"
Max. Base Cu Thickness: 0.002"
Max/Min Plated Hole Size: 0.044"/0.012
Aspect Ratio: 4:1
Max. Number of Layers: 12
Min. Conductor Width: 0.005"
Min. Conductor Spacing: 0.005"
Part Mounting: SMT, THM, MIX
Base Material: GF (Woven E-Glass, Epoxy resin)
GI (Woven E-Glass, Polyimide resin)
GM (Woven E-Glass, Triazine and/or Bismaleimide Modified Epoxy resin)
Finish System: HASL, IR Reflow following SnPb plate
Hole Preparation: Permanganate Desmear/Etchback
Copper Plating: Acid Copper
Solder Resist: LPI</td><td>VQE-99-1107</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 3XYL4
Photocircuits Corp. 31 Sea Cliff Avenue Glen Cove, NY 11542	Same	CONTACT: Sue Macaluso PHONE #: 516-609-1231 FAX #: 516-609-1713 EMAIL: smacaluso@photocircuits.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1, /2		VQE-05-9571
Panel Size	18" X 24"	
Max. Board Thickness	0.095"	
Max/Min Plated Hole Size (After Plating)	0.060"/0.010	
Aspect Ratio	7:1	
Max. Number of Layers	12	
Min. Conductor Width	0.005"	
Min. Conductor Spacing	0.005"	
Part Mounting	SMT, THM	
Base Material	GF (Woven E-Glass, Epoxy resin)	
Finish System	HASL, ENIG, ImmAg	
Hole Preparation	Permanganate Desmear/Etchback	
Copper Plating	Acid Copper	
Solder Resist	LPI	
Thru Hole Metallization	Electroless Copper	

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

Printed Circuits, Inc.
1200 W. 96th Street
Bloomington, MN 55431-2699</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 65114

CONTACT: Jim Smith
PHONE #: 612-888-7900
FAX #: 612-888-2719
EMAIL: jsmith@printedcircuits.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1
MIL-PRF-31032/2
MIL-PRF-31032/3
MIL-PRF-31032/4

Panel Size: 12" X 18", 18" X 24"
Max. Board Thickness: 0.120"
Min. Hole Size: 0.010"
Aspect Ratio: 10:1
Max. Number of Layers: 16
Min. Conductor Width: 0.004"
Min. Conductor Spacing: 0.005"
Part Mounting: SMT, THM, MIX
Base Material: GF (Woven E-glass, Epoxy Resin)
GI (Woven, E-glass, Polyimide Resin)
IPC-FC-241/1 through /4
IPC-FC-241/11
Finish System: Fused SnPb, HASL, Electroplated Nickel/Gold, Electroless Nickel/Gold
Hole Preparation: Plasma Desmear/Etchback
Copper Plating: Acid Copper
Solder Resist: LPI, Dry Film, SMOBC</td><td>VQE-01-0024</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

Sanmina –SCI (Costa Mesa)
2945 Airway Avenue
Costa Mesa, CA 92626</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 3BKL5

CONTACT: John DeBrita
PHONE #: 714-371-2847
FAX #: 714-371-2833
email: john.debrita@sanmina-sci.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1
MIL-PRF-31032/2

Panel Size: 12" X 18"
Max. Board Thickness: 0.093"
Min Thru Hole Size: 0.010"
Min. Blind Via: 0.005" Laser Controlled Depth
Min. Buried Via: 0.006" Mechanical Drill
Aspect Ratio: 7:1
Max. Number of Layers: 18
Min. Conductor Width: 0.002"
Min. Conductor Spacing: 0.003"
Part Mounting: SMT, THM
Base Material: GF (Woven E-glass, Epoxy resin)
GI (Woven E-glass, Polyimide Resin)
Finish System: HASL, Electroless Nickel Immersion Gold (ENIG), Electrolytic Soft Bondable Gold
Hole Preparation: Desmear, Etchback
Copper Plating: Acid Copper
Solder Resist: LPI</td><td>VQE-03-3327</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

Sanmina –SCI (Phoenix)
5020 South 36th Street
Phoenix, AZ 85040</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 1V6J6

CONTACT: Alfred Macha
PHONE #: 602-824-8456
FAX #: 602-824-8674
EMAIL: Macha@sanmina-sci.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1

Panel Size: 18" X 24"
Max. Board Thickness: 0.0925"
Min Hole Size: 0.013" (TH)
Aspect Ratio: 5.7:1
Max. Number of Layers: 16
Min. Conductor Width: 0.006"
Min. Conductor Spacing: 0.005"
Part Mounting: SMT, THM, MIX
Base Material: GF (Woven E-glass, Epoxy resin)
GI (Woven E-glass, Polyimide Resin)
Finish System: HASL, Electrolytic Nickel Gold, Electroless Nickel/ Immersion Gold, Immersion Silver
Hole Preparation: Desmear
Copper Plating: Acid Copper
Solder Resist: LPI
Controlled Impedance: 200/28 ohms ± 10%
Hypot Test: Max Voltage: 1000V</td><td>VQE-03-4646</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

Sanmina –SCI (San Jose)
2050 Bering Drive
San Jose, CA 95131</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 3DR67

CONTACT: Darrell Myers
PHONE #: 408-964-6515
FAX #: 408-964-6453
EMAIL: darrell.myers@sanmina-sci.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1
MIL-PRF-31032/2

Panel Size — 18" X 24"
Max. Board Thickness — 0.062" (for Plasma Desmear)
Max./Min. Drilled Thru Hole — 0.250"/0.010"
Aspect Ratio — 6:1
Max. Number of Layers — 8
Min. Conductor Width — 0.003"
Min. Conductor Spacing — 0.003"
Part Mounting — SMT, THM
Base Material — GI (Woven E-glass, Polyimide Resin)
Finish System — HASL, Electrolytic Nickel Gold, ENIG, OSP, ImmAg
Hole Preparation — Plasma Desmear
Copper Plating — Acid Copper
Solder Resist — LPI, Dry Film
Controlled Impedance — Yes</td><td>VQE-06-011137</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1
MIL-PRF-31032/2

Panel Size — 18" X 24"
Max. Board Thickness — 0.050" (for Plasma Desmear)
0.040" (for Plasma Etchback)
Max./Min. Drilled Thru Hole — 0.250"/0.008"
Max. Aspect Ratio — 15:1
Aspect Ration Microvias — 1:2 Laser
Min. Blind Via — 0.005" Laser
Min. Buried Via — 0.010: Mechanical Drill
Via Fill — Epoxy, Siler
Max. Number of Layers — 30
Min. Conductor Width — 0.003"
Min. Conductor Spacing — 0.003"
Part Mounting — SMT, THM, MIX
Base Material — GF (Woven E-glass, Epoxy Resin)
Finish System — HASL, Electrolytic Nickel Gold, ENIG, OSP, Reflowed solder
Hole Preparation — Plasma Desmear/Etchback
Copper Plating — Electrolytic Acid Copper
Solder Resist — LPI, Dry Film
Controlled Impedance — Yes
Other — Sequential Lamination</td><td>VQE-06-011137</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 0GN71
Sovereign Circuits, Inc. 12080 DeBartolo Drive North Jackson, OH 44551	Same	CONTACT: Cynthia Savakis PHONE #: 330-538-3900 FAX #: 330-538-3820 EMAIL: savakis@sovereign-circuits.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1 MIL-PRF-31032/2		VQE-03-3120 VQE-03-3213
Panel Size	18" X 24"	
Max. Board Thickness	0.160"	
Max./Min. Hole Size	0.008"	
Aspect Ratio	10:1	
Max. Number of Layers	20	
Min. Conductor Width	0.004"	
Min. Conductor Spacing	0.004"	
Part Mounting	SMT, THM, MIX, Press Fit	
Base Material	GF (Woven E-glass, Epoxy resin) GI (Woven E-glass, Polyimide Resin) BI (Non-woven Aramid, Reinforced Polyimide)	
Finish System	HASL, Fused, SnPb, Immersion White Tin, Ni/Au, Ni/Pd/Au, OSP, Reflowed Pure Tin	
Hole Preparation	Plasma Desmear/Etchback, Permanganate Desmear/Etchback	
Copper Plating	Electroless & Electroplated Acid Copper	
Solder Resist	LPI, Dry Film	
Controlled Impedance	Range 30-150 ohms (± 10%), Microstrip, Embedded Microstrip, Dual Stripline, Characteristic, Differential	
Alternate Construction	Blind & Buried Vias	

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 0GN71
Sovereign Circuits, Inc. 12080 DeBartolo Drive North Jackson, OH 44551	Same	CONTACT: Cynthia Savakis PHONE #: 330-538-3900 FAX #: 330-538-3820 EMAIL: savakis@sovereign-circuits.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/3 MIL-PRF-31032/4		VQE-03-3121 VQE-03-3214
Panel Size	18" X 24"	
Max. Board Thickness	0.160"	
Max./Min. Hole Size	0.008"	
Aspect Ratio	10:1	
Max. Number of Layers	20	
Min. Conductor Width	0.003"	
Min. Conductor Spacing	0.003"	
Part Mounting	SMT, THM, MIX, Press Fit	
Rigid Base Material	GF (Woven E-glass, Epoxy resin) GI (Woven E-glass, Polyimide Resin)	
Finish System	HASL, Fused, SnPb, Immersion White Tin, Ni/Au, OSP, Reflowed Pure Tin, ImmAg	
Hole Preparation	Plasma Desmear/Etchback Permanganate Dsmear/Etchback	
Solder Resist	LPI, Dry Film	
Copper Plating	Electroless & Electroplated Acid Copper	
Controlled Impedance	Range 30-150 ohms (± 10%), Microstrip, Embedded Microstrip, Dual Stripline, Characteristic, Differential	
Flexibility Class	Class A (Flex During Installation Class B (Continuous Flexing)	
Alternate Construction	Blind & Buried Vias	

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

StrataFLEX Corp.
11 Dohme Avenue
Toronto, Ontario, Canada M4B 1Y7</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 65337

CONTACT: Robert Gleaves
PHONE #: 416-752-2224
FAX #: 416-752-6719
EMAIL: rgleaves@strataflex.ca</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/3
MIL-PRF-31032/4

Panel Size: 12" X 18"
Max. Board Thickness: 0.035"
Max./Min. Hole Size: 0.011"
Aspect Ratio: 3:1
Max. Number of Layers: 7
Min. Conductor Width: 0.007"
Min. Conductor Spacing: 0.007"
Part Mounting: SMT THM
Base Material: Flexible Polyimide Clad (IPC-4204/1)
Flexible Polyimide Film (IPC-4202/1)
Flexible Polyimide Film/Acrylic (IPC-4203/1)
FR4-IPC-4101/21
Finish System: HASL
Hole Preparation: Plasma Desmear/Etchback
Copper Plating: Acid Copper</td><td>VQE-04-5354</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

TTM Technologies
2630 South Harbor Boulevard
Santa Ana, CA 92704</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 1WQ42

CONTACT: Terry Lichte
PHONE #: 714-241-0303, x3127
FAX #: 714-241-0708
EMAIL: tlichte@ttmtech.comca</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1
MIL-PRF-31032/2

Panel Size: 21" X 28"
Max. Board Thickness: 0.200"
Max./Min. Hole Size: 0.044"/0.0135"
Aspect Ratio: 14:1
Aspect Ratio Microvias: 1:1
Max. Number of Layers: 24
Min. Conductor Width: 0.003"
Min. Conductor Spacing: 0.003"
Part Mounting: SMT THM
Base Material: GF (Woven E-Glass, Epoxy Resin)
Finish System: HASL, ENIG, ImmAg, OSP
Hole Preparation: Desmear Etchback
Copper Plating: Acid Copper
Solder Resist: LPI, Dry Film
Other: Sequential Lamination</td><td>VQE-05-8644
VQE-06-011211</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1
MIL-PRF-31032/2

Panel Size: 18" X 24"
Max. Board Thickness: 0.200" (for Desmear)
0.105" (for Etchback)
Max./Min. Hole Size: 0.044"/0.0135"
Aspect Ratio: 14:1
Aspect Ratio Microvias: 1:1
Min. Blind Via: 0.005: Laser
Min. Buried Via: 0.0135" Mechanical Drill
Max. Number of Layers: 24
Min. Conductor Width: 0.003"
Min. Conductor Spacing: 0.003"
Part Mounting: SMT THM
Base Material: GF (Woven E-Glass, Epoxy Resin)
Finish System: HASL, ENIG, ImmAg, OSP, Fused SnPb
Hole Preparation: Desmear Etchback
Copper Plating: Acid Copper
Solder Resist: LPI, Dry Film
Other: Sequential Lamination</td><td>VQE-05-8644
VQE-06-011211</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 3EDZ0
TTM Technologies 17550 NE 67th Court Redmond, WA 98052-4939	Same	CONTACT: Margaret Schlosser PHONE #: 425-883-7575
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1, /2 Panel Size: 21.5" X 24.5" Max. Board Thickness: 0.063" (nominal) Max./Min. Hole Size: .0098" (nominal) Aspect Ratio: 6.3:1 Aspect Ratio Microvias: 1:1 Max. Number of Layers: 12 Min. Conductor Width: 0.005 Min. Conductor Spacing: 0.00325" Part Mounting: SMT, THM Base Material: GF (Woven E-Glass, Epoxy Resin); GI (Woven E-Glass, Polyimide Resin) Finish System: ENIG Hole Preparation: Desmear/Etchback Copper Plating: Electrolytic Acid Copper		VQE-06-011027 VQE-06-011656

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 0BX48
Titan PCB East, Inc. 2 Industrial Way Amesbury, MA 01913	Same	CONTACT: Lance Arlander PHONE #: (978) 388-5740 FAX #: (978) 388-5538 EMAIL: larlander@titaneast.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:

MIL-PRF-31032/1 MIL-PRF-31032/2		VQE-05-7439 VQE-04-6518
Panel Size	18" X 24"	
Max. Board Thickness	0.125"	
Min Hole Size	0.012"	
Aspect Ratio	10:1	
Max. Number of Layers	14	
Min. Conductor Width	0.004"	
Min. Conductor Spacing	0.004"	
Part Mounting	SMT, THM, MIX	
Base Material	GF (Woven E-glass, Epoxy resin) GI (Woven E-glass, Polyimide resin)	
Finish System	HASL, Electroplated Gold, ENIG	
Hole Preparation	Plasma Etchback	
Copper Plating	Electrolytic Acid Copper	
Solder Resist	LPI, Dry Film	

MIL-PRF-31032/3 MIL-PRF-31032/4		VQE-05-7439 VQE-046518
Panel Size	18" X 24"	
Max./Min. Board Thickness	0.125"	
Max./Min. PTH Hole Size	0.012	
Aspect Ratio	10:1	
Max.Number of Layers	14	
Min. Conductor Width	0.004"	
Min. Conductor Spacing	0.004"	
Part Mounting	SMT, THM, MIX	
Rigid Base Material	GF (Woven E-glass, Epoxy resin)	
Flex Base Material	GI (Woven E-glass, Polyimide resin)	
Finish System	HASL, Immersion Ni/Au, ENIG, Electroplated Gold	
Hole Preparation	Plasma Etchback	
Copper Plating	Electro-deposited Acid Copper	
Solder Resist	LPI, Dry Film	
Flex Usage	Flex During Installation (Class A)	

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

Tyco Printed Circuits Group
Santa Clara Division
400 Matthew Street
Santa Clara, CA 95054</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 65916

CONTACT: Nellie Gurierrez
PHONE #: (408) 486-3184
FAX #: (408) 727-1003
EMAIL: nellie.gutierrez@tycoelectronics.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1
MIL-PRF-31032/2

Panel Size: 18" X 24"
Max. Board Thickness: 0.120"
Min Hole Size: 0.191"/0.012"
Aspect Ratio: 9:1
Max. Number of Layers: 20
Min. Conductor Width: 0.004"
Min. Conductor Spacing: 0.004"
Part Mounting: SMT, THM, MIX
Base Material: BI (Nonwoven Aramid Reinforced Polyimide resin)
GF (Woven E-glass, Epoxy resin)
GI (Woven E-glass, Polyimide resin)
Finish System: HASL, Immersion Ni/Au
Hole Preparation: Plasma Desmear/Etchback
Copper Plating: Electrolytic Acid Copper
Solder Resist: LPI, Screen Printed
Controlled Impedance: Range 30-150 ohms (±10%), Microstrip, Embedded Microstrip, Dual Stripline, Characteristic, Differential
Alternate Construction: Blind Vias</td><td>VQE-03-3888
VQE-04-5823</td></tr>
</table>

<table>
<tr><td>MIL-PRF-31032/3
MIL-PRF-31032/4

Panel Size: 18" X 24"
Max./Min. Board Thickness: 0.0120"
Max./Min. PTH Hole Size: 0.191"/0.012"
Aspect Ratio: 9:1
Max.Number of Layers: 10
Min. Conductor Width: 0.004"
Min. Conductor Spacing: 0.004"
Part Mounting: SMT, THM, MIX
Rigid Base Material: GF (Woven E-glass, Epoxy resin)
GI (Woven E-glass, Polyimide resin)
Flex Base Material: IPC-4204/1, IPC-241/1 (Acrylic Adhesive)
IPC-4204/11, IPC-241/11 (Adhesiveless)
Finish System: HASL, Immersion Ni/Au
Hole Preparation: Plasma Desmear/Etchback
Copper Plating: Electro-deposited Acid Copper</td><td>VQE-03-3895</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

<table>
<tr><td>MANUFACTURER
NAME & ADDRESS

Tyco Printed Circuits Group
Stafford Division
4 Old Monson Road, P.O. Box 145
Stafford, CT 06075</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 5L706

CONTACT: Michele Herbert
PHONE #: (860) 684-5881
FAX #: (860) 684-7425
EMAIL: michele.hebert@tycoelectronics.com</td></tr>
<tr><td colspan="2">CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</td><td>QUALIFICATION LETTER:</td></tr>
<tr><td colspan="2">MIL-PRF-31032/1
MIL-PRF-31032/2

Panel Size: 30" X 54"
Max. Board Thickness: 1.088"
Max./Min,.Hole Size: 0.09510"/0.221" drilled
Aspect Ratio: 10:1
Buried Via Aspect Ratio: 1:1
Max. Number of Layers: 68
Min. Conductor Width: 0.004"
Min. Conductor Spacing: 0.004"
Part Mounting: SMT, THM, MIX, Press Fit
Base Material: AF (Woven Aramid, Epoxy Resin)
BF (Nonwoven, Aramid Fabric, EpoxyResin)
BI (Nonwoven Aramid Reinforced Polyimide Resin)
GF (Woven E-glass, Epoxy resin)
GI (Woven E-glass, Polyimide resin)
GM (Woven E-Glass, Triazine/Bismaleimide Modified Epoxy Resin)
SC (Woven S-glass Cyanate Ester)
Finish System: HASL, SMOBC, Reflowed Solder, Electroless Nickel/Immersion Gold, Electrolytic Hard and Soft Gold, Electrolytic Nickel, Bright Tin, Immersion Tin
Hole Preparation: Plasma Etchback
Copper Plating: Electroless and Electrolytic Copper
Solder Resist: LPI, Dry Film, Wet Mask, Hole Fill, Hole Plug
Controlled Impedance: Range 30-150 ohms (± 10%), Microstrip, Embedded Microstrip, Dual Stripline, Characteristic, Differential
Alternate Construction: Copper Invar Copper, Blind and Buried Vias, Micro Vias, Buried Resistors, Multiple Laminations</td><td>VQE-03-3348</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 5L706
Tyco Printed Circuits Group Stafford Division 4 Old Monson Road, P.O. Box 145 Stafford, CT 06075	Same	CONTACT: Michele Herbert PHONE #: (860) 684-5881 FAX #: (860) 684-7425 EMAIL:michele.hebert@tycoelectronics.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/3 MIL-PRF-31032/4		VQE-03-3349
Panel Size	30" X 54"	
Max. Board Thickness	0.300"/0.003"	
Max./Min,.Hole Size	0.221"/0.0095" drilled	
Aspect Ratio	9:1	
Buried Via Aspect Ratio	5:1	
Max. Number of Layers	28	
Min. Conductor Width	0.004"	
Min. Conductor Spacing	0.004"	
Part Mounting	SMT, THM, MIX GF (Woven E-glass, Epoxy resin) GI (Woven E-glass, Polyimide resin)	
Flex Base Material	IPC-4204/1 Acrylic Adhesive IPC-4204/11 Adhesiveless SC (Woven S-glass Cyanate Ester)	
Finish System	HASL, SMOBC, Reflowed Solder, Electroless Nickel/Immersion Gold, Electrolytic Hard and Soft Gold, Electrolytic Nickel, Bright Tin, Immersion Tin	
Hole Preparation	Plasma Etchback	
Copper Plating	Electroless and Electrolytic Copper	
Solder Resist	LPI, Dry Film, Wet Mask, Hole Fill, Hole Plug	
Controlled Impedance	Range 30-150 ohms (± 10%), Microstrip, Embedded Microstrip, Dual Stripline, Characteristic, Differential	
Alternate Construction	Copper Invar Copper, Blind and Buried Vias, Micro Vias, Buried Resistors, Multiple Laminations	
Flexibility Class	Class A (Flex During Installation) Class B (Continuous Flexing)	

SECTION III
ALPHABETICAL LIST OF QUALIFIED MANUFACTURERS

MANUFACTURER'S NAME & ADDRESS	PLANT LOCATION	OTHER INFORMATION
Accurate Circuit Engineering 3019 S. Kilson Drive Santa Ana, CA 92707	Same	CAGE CODE: 0MNN9 CONTACT: James Hofer PHONE #: 714-546-2162 FAX #: 714-433-7418 EMAIL: James@ace-pcb.com
Amphenol TCS 91 Northeastern Boulevard Nashua, NH 03062	Same	CAGE CODE: 3T000 CONTACT: Melissa Baker PHONE #: 603-879-3818 FAX #: 603-879-2818 EMAIL: melissa.k.baker@amphenol-tcs.com
Calumet Electronics Corp. 25830 Depot Street Calumet, MI 49913-1985	Same	CAGE CODE: 65337 CONTACT: Robert Hall PHONE #: 906-337-1305 FAX #: 906-337-5359 EMAIL: rhall@cec-up.com
Colonial Circuits, Inc. 1026 Warrenton road Fredericksburg, VA 22406-6200	Same	CAGE CODE: 6T499 CONTACT: Mike Hill PHONE #: 540-753-5511, X125 FAX #: 540-752-2109 EMAIL: quality@colonialcircuits.com
Coretec-Cleveland, Inc. 7 Ascot Parkway Cuyahoga Falls, OH 44223	Same	CAGE CODE: 7Z463 CONTACT: Mark Kasting PHONE #: 330-572-3400 FAX #: 330-572-3434 EMAIL: mark_kasting/coretec@coretec-inc.com
Coretec Denver, Inc. 10570 Bradford Road Littleton, CO 80127	Same	CAGE CODE: 75815 CONTACT: Douglas N. Berry PHONE #: 303-904-6119 FAX #: 303-933-2934 EMAIL: dberry@coretec-denver.com
Coretec, Inc. (Ellesmere Location) 2020 Ellesmere road Scarborough, Ontario, Canada M1H 2Z8 Coretec, Inc. (Lawrence Location) 6530 Lawrence Avenue, E. Scarborough, Ontario, Canada M1C 4A7	Same	CAGE CODE: 3AF82 CONTACT: Paul Green PHONE #: 416-208-2100 FAX #: 416-208-2196 EMAIL: pgreen@coretec-inc.com
Cosmotronic. 16721 Noyes Avenue Irvine, CA 92606	Same	CAGE CODE: 63695 CONTACT: Alan Exley PHONE #: 949-660-0740 FAX #: 949-553-8371 EMAIL: alan_exley@cosmotronic.com
Diversified Systems 3939 W. 56th Street Indianapolis, IN 46254	Same	CAGE CODE: 5S706 CONTACT: Linda Bell PHONE #: 317-299-9547, x238 FAX #: 317-298-2061 EMAIL: linda.bell@divsys.com
Dynaco Corp 1000 South Priest Drive Tempe, AZ 85281-5238	Same	CAGE CODE: 61642 CONTACT: Ted Edwards PHONE #: 480-736-3728 FAX #: 480-921-9830 EMAIL tedwards@dynacocorp.com

SECTION III
ALPHABETICAL LIST OF QUALIFIED MANUFACTURERS

MANUFACTURER'S NAME & ADDRESS	PLANT LOCATION	OTHER INFORMATION
Dynamic & Proto Circuits, Inc. 869 Barton Street Stoney Creek, Ontario L8E 5G6 Canada	Same	CAGE CODE: 38898 CONTACT: Mr. Stephen Hazell PHONE #: 905-643-9900 FAX #: 905-643-9911 EMAIL: stephenhazell@dapc.com
Dynamic Details, Inc. 1200 Severn Way Dulles, VA 20166-8904	Same	CAGE CODE: 0K703 CONTACT: Tony Trnka PHONE #: 703-652-2266 FAX #: 703-652-2271 EMAIL: atrnka@va.ddiglobal.com
Electro Plate Circuitry 1430 Century Drive Carrollton, TX 75006	Same	CAGE CODE: 79616 CONTACT: James McNeal PHONE #: 972-466-0818 FAX: 972-466-9078 EMAIL: jimm@eplate.com
Electrotek Corp. 7745 S. 10th Street Oak Creek, WI 53154	Same	CAGE CODE: 66030 CONTACT: Tom Tikusis, Don Dawson PHONE #: 414-762-1390 FAX #: 414-762-1510 EMAIL: sales @boards4u.com
Endicott Interconnect Technologies, Inc. 1701 North Street, P.O. Box 658 Endicott, NY 13760	Same	CAGE CODE: 3ECL3 CONTACT: Jose Rios PHONE #: 607-755-5896 FAX #: 607-755-4649 EMAIL: JoseA.Rios@eitny.com
Firan Technology Group 250 Finchdene Square Scarborough, Ontario, Canada M1X 1A5	Same	CAGE CODE: L2665 CONTACT: Bryan Clark PHONE #: 416-299-4000, ext. 222 FAX #: 416-292-4308 EMAIL: bryanclark@firantechnology.com
Geometric Circuits, Inc. 11 Michael Avenue Farmingdale, NY 11735	Same	CAGE CODE: 65423 CONTACT: Phil Cate PHONE #: 631-249-0230 FAX #: 631-249-0286 EMAIL: phil@geometriccircuits.com
Global Innovation Corp. 901 Hensley Drive Wylie, TX 75098	Same	CAGE CODE: 04RV5 CONTACT: Bob Noland PHONE #: 214-291-1427 EMAIL: bnoland@lonestar-circuits.com
Graphic Electronics, Inc. (GEI) 143 S. 71 S&E Avenue Tulsa, OK 74112	Same	CAGE CODE: 0TZ92 CONTACT: John Barber PHONE #: 918-835-4417 FAX #: 918-835-4571 EMAIL: john@geicircuits.com
Hans Brockstedt GmbH Leiterplattenschnelldienst Clara-Immerwahr-Strape 7 24145 Kiel, Germany	Same	CAGE CODE: C4831 CONTACT: Hilmar Klammer PHONE #: 0049-431-71966-0, -30 FAX #: 0049-431-71966-29 EMAIL: klammer@brockstedt.de
Lockheed Martin Systems Integration-Owego	Same	CAGE CODE: 03640 CONTACT: Melita Nagerl PHONE #: 607-751-4665 FAX #: 607-751-7714 EMAIL: melita.nagerl@lmco.com

SECTION III
ALPHABETICAL LIST OF QUALIFIED MANUFACTURERS

MANUFACTURER'S NAME & ADDRESS	PLANT LOCATION	OTHER INFORMATION
Micom Corp. 475 Old Highway 8 NW New Brighton, MN 55112	Same	CAGE CODE: 34076 CONTACT: Larry Leonard PHONE #: 651-604-2639 FAX #: 651-636-1352 EMAIL:lleonard@micomcircuits.com
Philway Products, Inc. 701 Virginia Avenue Ashland, OH 44806	Same	CAGE CODE: 21971 CONTACT: Tom School PHONE #: 419-281-7777 FAX #: 419-289-3447 EMAIL: quality@philway.com
Printed Circuits, Inc. 1200 W. 96th Street Bloomington, MN 55431-2699	Same	CAGE CODE: 65114 CONTACT: Jim Smith PHONE #: 612-888-7900 FAX #: 612-8882719 EMAIL: jsmith@printedcircuits.com
Photocircuits Corp. 31 Sea Cliff Avenue Glen Cove, NY 11542	Same	CAGE CODE: 3XYL4 CONTACT: Sue Macaluso PHONE #: 516-609-1231 FAX #: 516-609-1713 EMAIL: smacaluso@photocircuits.com
Sanmina –SCI (Costa Mesa) 2945 Airway Avenue Costa Mesa, CA 92626	Same	CAGE CODE: 3BKL5 CONTACT: John DeBrita PHONE #: 714-371-2847 FAX #: 714-371-2833 EMAIL: john.debrita@sanmina-sci.com
Sanmina – SCI (Phoenix) 5020 South 36th Street Phoenix, AZ 85040	Same	CAGE CODE: 1V6J6 CONTACT: Alfred Macha PHONE #: 602-824-8456 FAX #: 602-824-8674 EMAIL: Macha@sanmina-sci.com
Sovereign Circuits, Inc 12080 DeBartolo Drive North Jackson, OH 44451	Same	CAGE CODE: 0GN71 CONTACT: Cynthia Savakis PHONE #: 330-538-3900 FAX #: 330-538-2434 EMAIL: savakis@sovereign-circuits.com
Sanmina – SCI (San Jose) 2050 Bering Drive San Jose, CA 95131	Same	CAGE CODE: 3DR67 CONTACT: Darrell Myers PHONE #: 408-964-6515 FAX #: 408-964-6453 EMAIL: darrell.myers@sanmina-sci.com
StrataFLEX Corp. 11 Dohme Avenue Toronto, Ontario, Canada M4B 1Y7	Same	CAGE CODE: 65337 CONTACT: Robert Gleaves PHONE #: 416-752-2224 FAX #: 416-752-6719 EMAIL: rgleaves@strataflex.ca
TTM Technologies, Inc. 2630 South Harbor Boulevard Santa Ana, CA 92704	Same	CAGE CODE: 1WQ42 CONTACT: Terry Lichte PHONE #: 714-241-0303, x3127 FAX #: 714-241-0708 EMAIL:tlichte@ttmtech.com
TTM Technologies, Inc. 17550 ME 67th Court Redmond, WA 98052-4939	Same	CAGE CODE: 3EDZ0 CONTACT: Margaret Schlosser PHONE #: 425-883-7575

SECTION III
ALPHABETICAL LIST OF QUALIFIED MANUFACTURERS

MANUFACTURER'S NAME & ADDRESS	PLANT LOCATION	OTHER INFORMATION
Titan PCB East, Inc. 2 Industrial Way Amesbury, MA 01913	Same	CAGE CODE: 0BX48 CONTACT: Lance Arlander PHONE #: (978) 388-5740 FAX #: (978) 388-5538 EMAIL: larlander@titaneast.com
Tyco Printed Circuits Group Santa Clara Division 400 Matthew Street Santa Clara, CA 95050	Same	CAGE CODE: 65916 CONTACT: Nellie Gutierrez PHONE #: 408-486-3184 FAX #: 408-727-1003 EMAIL: nellie.gurierrez@tycoelectronics.com
Tyco Printed Circuits Group Stafford Division 4 Old Monson Road P.O. Box 145 Stafford, TX 77497	Same	CAGE CODE: 5L706 CONTACT: Michele Herbert PHONE #: (860) 684-5881 FAX #: (860) 684-7425 EMAIL: michele.hebert@tycoelectronics.com