QUALIFICATIONS VALIDATED ANNUALLY

QML-31032-10
28 March 2001
SUPERSEDING
QML-31032-9
1 March 2001

QUALIFIED MANUFACTURERS LIST

OF

PERFORMANCE SPECIFICATION

MIL-PRF-31032

PRINTED CIRCUIT BOARDS / PRINTED WIRING BOARDS

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-VQ), COLUMBUS, OH 43216-5000.

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 within the United States and its territories and as provided by international agreement(s) establishing reciprocal and equivalent quality systems and procedures, 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.dscccols.com/offices/sourcing_and_qualification/

QML: http://www.dscccols.com/programs/qmlqpl/QPLdetail.asp?QPL=31032

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.

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

Dynamic & Proto Circuits, Inc.
869 Barton Street
Stoney Creek, Ontario L8E 566
Canada

Lockheed Martin Corp.
Missiles and Fire Control Orlando
5600 West Sandlake Road
Orlando, FL 32819-8907

Lockheed Martin Federal Systems, Inc.
1801 State Route 17C
Owego, NY 13827

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

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

Proto Circuit, Inc.
7 Ascot Parkway
Cuyahoga Falls, OH 44223

Teradyne Circuits Operation
4 Pittsburgh Avenue
Nashua, New Hampshire 03060

Tyco Printed Circuits Group
Austin Division
12501 Research Boulevard, Module 1
Austin, TX 78759

MIL-PRF-31032/2 - Printed Wiring Board, Rigid, Single and Double Layer, Woven E-Glass Reinforced Thermosetting Resin Base Material, With or Without Plated Through Holes, For Soldered Part Mounting.

Dynamic & Proto Circuits, Inc.
869 Barton Street
Stoney Creek, Ontario L8E 566
Canada

Lockheed Martin Corp.
Missiles and Fire Control Orlando
5600 West Sandlake Road
Orlando, FL 32819-8907

Lockheed Martin Federal Systems, Inc.
1801 State Route 17C
Owego, NY 13827

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

Teradyne Circuits Operation
4 Pittsburgh Avenue
Nashua, New Hampshire 03060

Tyco Printed Circuits Group
Austin Division
12501 Research Boulevard, Module 1
Austin, TX 78759

SECTION I

LIST OF MANUFACTURERS BY ASSOCIATED SPECIFICATION

MIL-PRF-31032/3 - Printed Wiring Board, Flexible, Single and Double Layer, With or Without Plated Through Holes, With or Without Stiffeners, For Soldered Part Mounting.

Lockheed Martin Federal Systems, Inc.
1801 State Route 17C
Owego, NY 13827

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

Tyco Printed Circuits Group
Austin Division
12501 Research Boulevard, Module 1
Austin, TX 78759

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

Lockheed Martin Federal Systems, Inc.
1801 State Route 17C
Owego, NY 13827

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

Tyco Printed Circuits Group
Austin Division
12501 Research Boulevard, Module 1
Austin, TX 78759

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS Diversified Systems 3939 W. 56th Street Indianapolis, IN 46254	PLANT LOCATION Same	CAGE CODE: 5S706 CONTACT: Doreen Palmert PHONE #: 317-299-9547, x161 FAX #: 317-298-2055 EMAIL: dpalmert@divsys.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1 Panel Size — 18" X 24" Max. Board Thickness — 0.110" Max/Min Hole Size — /0.020" Aspect Ratio — 5.5:1 Max. Number of Layers — 10 Min. Conductor Width — 0.005" Min. Conductor Spacing — 0.005" Part Mounting — THM, SM Base Material — GF (Epoxy resin) Finish System — Hot Air Solder Leveling Hole Preparation — Permanganate Desmear Copper Plating — Electro-deposited Acid Copper		VQE-01-0309

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 38898
Dynamic & Proto Circuits, Inc. 869 Barton Street Stoney Creek, Ontario L8E 566 Canada	Same	CONTACT: Mr. David Foster PHONE #: 905-643-9900 FAX #: 905-643-9911 EMAIL: dfoster@dapc.com

CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1		VQE-98-1143, VQE-00-0007
MIL-PRF-31032/2		VQE-01-0311
Panel Size	16"X18"	VQE-01-0311
Max. Board Thickness	0.125"	VQE-01-0311
Max/Min Hole Size	0.039"/0.018" (0.0135" drilled)	VQE-98-1143, VQE-01-0311
Aspect Ratio	9:3:1	VQE-01-0311
Max. Number of Layers	10	VQE-98-1143
Min. Conductor Width	0.005"	VQE-98-1143
Min. Conductor Spacing	0.005"	VQE-98-1143, VQE-00-0007
Part Mounting	SM, THM, MIX	VQE-98-1143, VQE-00-0007
Base Material	GF (Woven E-Glass, Epoxy resin)	VQE-00-0007
	GI (Woven E-Glass, Polyimide resin)	VQE-98-1143
Finish System	Hot Air Solder Leveling	VQE-98-1143, VQE-00-0007
Hole Preparation	Plasma Etch	VQE-98-1143, VQE-00-0007
Copper Plating	Acid Copper	VQE-98-1143, VQE-00-0007
Solder Resist	Liquid Photoimagable	VQE-98-1143
	Dry film solder resist plugs	VQE-00-0007

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

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

Lockheed Martin Corp.
Missiles & Fire Control Orlando
5600 West Sandlake Road
Orlando, FL 32819-8907</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 04939

CONTACT: Vijay Kumar
PHONE #: 407-356-0282
FAX #: 407-356-8291
EMAIL: vijay.kumar@lmco.com

CONTACT: Paul Rose
PHONE #: 407-356-5537
EMAIL: paul.b.rose@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-31032/1
MIL-PRF-31032/2

Panel Size: 12" X 18"
Max. Board Thickness: 0.088" (nominal)
Max/Min Hole Size: 0.052"/0.031"
Aspect Ratio: 3:1
Max. Nuber of Layers: 10
Min. Conductor Width: 0.010"
Min. Conductor Spacing: 0.006"
Part Mounting: SMT, THM
Base Material: GI (Woven E-glass Epoxy Resin)
Finish System: Reflow Solder
Hole Preparation: Plasma Desmear
Copper Plating: Electro-deposited Acid Copper</td><td>VQE-00-0193
VQE-00-0734</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

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

Lockheed Martin Federal Systems, Inc.
1801 State Route 17C
Owego, NY 13827</td><td>PLANT LOCATION

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

CONTACT: Chris Conklin
PHONE #: 607-751-4251
FAX #: 607-751-7714
EMAIL: c.j.conklin@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-31032/1, /2

Panel Size: 18" X 24"
Max. Board Thickness: 0.200"
Max/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: Liquid Photoimagable</td><td>VQE-99-0130
VQE-00-0961</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: 0.110"
Max/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

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

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

CONTACT: Ted Norris
PHONE #: 419-281-7777
FAX #: 419-289-3447
EMAIL:chris@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: SM, 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: Hot Air Solder Leveling:
IR Reflow following SnPb plate
Hole Preparation: Permanganate Desmear/Etchback
Copper Plating: Acid Copper
Solder Resist: Liquid Photoimagable</td><td>VQE-99-1107</td></tr>
</table>

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: Dennis Cantwell
PHONE #: 612-888-7900
FAX #: 612-888-2719
EMAIL: dcant@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, /2, /3, /4

Panel Size: 12" X 18", 18" X 24"
Max. Board Thickness: 0.120"
Max/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: SM/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: Liquid/Dry Film Photo Imageable
SMOBC</td><td>VQE-01-0024</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

MANUFACTURER NAME & ADDRESS Proto Circuit, Inc. 7 Ascot Parkway Cuyahoga Falls, OH 44223	PLANT LOCATION Same	CAGE CODE: 7Z463 CONTACT: Peter Menuez PHONE #: 330-572-3400 FAX #: 330-572-3434 EMAIL: menuez@protocircuit.com
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/1 Panel Size Max. Board Thickness Max/Min Hole Size Aspect Ratio Max. Number of Layers Min. Conductor Width Min. Conductor Spacing Part Mounting Base Material Finish System Hole Preparation Copper Plating	 18" X 24" 0.126" /0.017" 5:1 16 0.004" 0.004" SM/THM GF (Woven E-glass Epoxy resin) HASL Plasma Etchback Acid Copper	VQE-00-0289

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

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

Teradyne, Inc.
Connection Systems Division
MS-124
4 Pittsburgh Avenue
Nashua, New Hampshire 03062</td><td>PLANT LOCATION

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

CONTACT: Mark Buechner
PHONE #: 603-791-3832
FAX #: 603-791-3080
EMAIL:buechner.mark
@tcs.teradyne.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"
Max/Min Hole Size: /0.016"
Aspect Ratio: 8:1
Max. Number of Layers: 27
Min. Conductor Width: 0.004"
Min. Conductor Spacing: 0.004"
Part Mounting: THM, Compliant Pin, SMT
Base Material:
GF (Epoxy resin)
GI (Polyimide resin)
Finish System: Fused SnPB
Nickel
Gold
Hole Preparation: Permanganate Desmear/Etchback
Copper Plating: Acid Copper
Solder Resist: Thermal cured soldermask and SMOBC</td><td>VQE-97-0649
VQE-97-0721</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

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

Tyco Printed Circuits Group
Austin Division
12501 Research Blvd., Module 1
Austin, TX 78759</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 96214

CONTACT: Scott Grover
PHONE #: (512) 250-6456
FAX #: (512) 250-7010
EMAIL: grover@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 — 0.150"
Max/Min Hole Size — /0.010"
Aspect Ratio — 9:1
Max. Number of Layers — 20
Min. Conductor Width — 0.004"
Min. Conductor Spacing — 0.004"
Part Mounting — THM, SM
Base Material — BI (Nonwoven aramid reinforced polyimide resin)
GF (Epoxy resin)
GI (Polyimide resin)
Finish System — Fused SnPB
Hot Air Solder Leveling
OSP
Nickel
Gold
Hole Preparation — Plasma Desmear/Etchback
Copper Plating — Acid Copper
Solder Resist — Liquid Photo Imageable (spray coated and screen printed), Dry Film Photo Imageable, SMOBC</td><td>VQE-97-0509
VQE-97-0718</td></tr>
</table>

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

Panel Size — 18" X 24"
Max/Min Hole Size — /0.010"
Aspect Ratio — 9:1
Min. Conductor Width — 0.004"
Min. Conductor Spacing — 0.004"
Part Mounting — THM
Flex Base Material — IPC-FC-241/1
IPC-FC-241/11
Finish System — Fused SnPB, HAL, OSP, Nickel, Gold
Immersion Silver
Copper Plating — Electro-deposited Acid Copper
Usage — Class A</td><td>VQE-99-0935</td></tr>
</table>

SECTION II

LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY

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

Tyco Printed Circuits Group
Austin Division
12501 Research Blvd., Module 1
Austin, TX 78759</td><td>PLANT LOCATION

Same</td><td>CAGE CODE: 96214

CONTACT: Scott Grover
PHONE #: (512) 250-6456
FAX #: (512) 250-7010
EMAIL: grover@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-31032/4

Panel Size: 18" X 26"
Max. Board Thickness: 0.150"
Max/Min Hole Size: /0.010"
Aspect Ratio: 9:1
Max. Number of Layers: 20
Internal Connections: Blind Vias
Min. Conductor Width: 0.004"
Min. Conductor Spacing: 0.004"
Part Mounting: THM, SM
Rigid Base Material: GF (Epoxy resin)
GI (Polyimide resin)
Flex Base Material: IPC-FC-241/1
IPC-FC-241/11
Finish System: Fused SnPb, HAL, OSP, Nickel Gold, Immersion Silver
Copper Plating: Electro-deposited Acid Copper
Solder Resist: UV-Cured Wet Screen
Usage: Class A (Flex during installation)</td><td>VQE-99-0933</td></tr>
</table>

SECTION III
ALPHABETICAL LIST OF QUALIFIED MANUFACTURERS

MANUFACTURER'S NAME & ADDRESS	PLANT LOCATION	OTHER INFORMATION
Diversified Systems 3939 W. 56th Street Indianapolis, IN 46254	Same	CAGE CODE: 5S706 CONTACT: Doreen Palmert PHONE #: 317-299-9547, x161 FAX #: 317-298-2055 EMAIL: dpalmert@divsys.com
Dynamic & Proto Circuits, Inc. 869 Barton Street Stoney Creek, Ontario L8E 566 Canada	Same	CAGE CODE: 38898 CONTACT: Mr. David Foster PHONE #: 905-643-9900 FAX #: 905-643-9911 EMAIL: dfoster@dapc.com
Lockheed Martin Corp. Missiles & Fire Control Orlando 5600 Sandlake Road Orlando, FL 32819-8907	Same	CAGE CODE: 09205 CONTACT: Vijay Kumar PHONE #: 407-356-0282 FAX #: 407-356-8291 EMAIL: vijay.kumar@lmco.com CONTACT: Paul Rose PHONE #: 407-356-5537 EMAIL: paul.b.rose@lmco.com
Lockheed Martin Federal Systems, Inc. 1801 State Route 17C Owego, NY 13827	Same	CAGE CODE: 03640 CONTACT: Chris Conklin PHONE #: 607-751-4251 FAX #: 607-751-7714 EMAIL: c.j.conklin@lmco.com
Philway Products, Inc. 701 Virginia Avenue Ashland, OH 44806	Same	CAGE CODE: 21971 CONTACT: Ted Norris PHONE #: 419-281-7777 FAX #: 419-289-3447 EMAIL: chris@philway.com
Printed Circuits, Inc. 1200 W. 96th Street Bloomington, MN 55431-2699	Same	CAGE CODE: 65114 CONTACT: Dennis Cantwell PHONE #: 612-888-7900 FAX #: 612-888-2719 EMAIL: dcant@printedcircuits.com
Proto Circuit, Inc. 7 Ascot Parkway Cuyahoga Falls, OH 44223	Same	CAGE CODE: 7Z463 CONTACT: Peter Menuez PHONE #: 330-572-3400 FAX #: 330-572-3434 EMAIL: menuez@protocircuit.com
Teradyne, Inc. Connection Systems Division MS-124 4 Pittsburgh Avenue Nashua, New Hampshire 03062	Same	CAGE CODE: 3T000 CONTACT: Mark Buechner PHONE #: 603-791-3832 FAX #: 603-791-3080 EMAIL:buechner.mark @tcs.teradyne.com
Tyco Printed Circuits Group Austin Division 12501 Research Blvd., Module 1 Austin, TX 78759	Same	CAGE CODE: 96214 CONTACT: Scott Grover PHONE #: (512) 250-6456 FAX #: (512) 250-7010 EMAIL:grover@tycoelectronics.com