

QUALIFICATIONS VALIDATED  
ANNUALLY

QML-31032-8  
31 October 2000  
SUPERSEDING  
QML-31032-7  
25 January 2000

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/](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.

**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.

---

Accudyne, Inc.  
5800 McHines Place  
Raleigh, NC 27616-1839

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. 96<sup>th</sup> 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.

---

Accudyne, Inc.  
5800 McHines Place  
Raleigh, NC 27616-1839

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. 96<sup>th</sup> 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. 96<sup>th</sup> 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 Stiffeners, for Soldered Part Mounting

---

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

Printed Circuits, Inc.  
1200 W. 96<sup>th</sup> 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**

<b>MANUFACTURER NAME &amp; ADDRESS</b>  Accudyne, Inc. 5800 McHines Place Raleigh, NC 27616-1839	<b>PLANT LOCATION</b>  Same	<b>CAGE CODE: 1JQF6</b>  CONTACT: Patrick J. Gardner PHONE #: 919-713-4872 FAX #: 919-876-6385 EMAIL: Accuengr@mindspring.com																										
<b>CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</b>		<b>QUALIFICATION LETTER:</b>																										
MIL-PRF-31032/1 MIL-PRF-31032/2  <table border="0"> <tr><td>Panel Size</td><td>18" X 24"</td></tr> <tr><td>Max. Board Thickness</td><td>0.090"</td></tr> <tr><td>Max/Min Hole Size</td><td>/0.010"</td></tr> <tr><td>Aspect Ratio</td><td>7:1</td></tr> <tr><td>Max. Number of Layers</td><td>8</td></tr> <tr><td>Min. Conductor Width</td><td>0.005"</td></tr> <tr><td>Min. Conductor Spacing</td><td>0.005"</td></tr> <tr><td>Part Mounting</td><td>SM, THM, COB</td></tr> <tr><td>Base Material</td><td>GF (Epoxy resin)</td></tr> <tr><td>Finish System</td><td>Fused SnPB Hot Air Solder Leveling</td></tr> <tr><td>Hole Preparation</td><td>Permanganate Desmear</td></tr> <tr><td>Copper Plating</td><td>Acid Copper</td></tr> <tr><td>Solder Resist</td><td>Liquid Photo Imagable, Dry Film BGA Platform 250 volt testing max.</td></tr> </table>		Panel Size	18" X 24"	Max. Board Thickness	0.090"	Max/Min Hole Size	/0.010"	Aspect Ratio	7:1	Max. Number of Layers	8	Min. Conductor Width	0.005"	Min. Conductor Spacing	0.005"	Part Mounting	SM, THM, COB	Base Material	GF (Epoxy resin)	Finish System	Fused SnPB Hot Air Solder Leveling	Hole Preparation	Permanganate Desmear	Copper Plating	Acid Copper	Solder Resist	Liquid Photo Imagable, Dry Film BGA Platform 250 volt testing max.	VQE-99-0871
Panel Size	18" X 24"																											
Max. Board Thickness	0.090"																											
Max/Min Hole Size	/0.010"																											
Aspect Ratio	7:1																											
Max. Number of Layers	8																											
Min. Conductor Width	0.005"																											
Min. Conductor Spacing	0.005"																											
Part Mounting	SM, THM, COB																											
Base Material	GF (Epoxy resin)																											
Finish System	Fused SnPB Hot Air Solder Leveling																											
Hole Preparation	Permanganate Desmear																											
Copper Plating	Acid Copper																											
Solder Resist	Liquid Photo Imagable, Dry Film BGA Platform 250 volt testing max.																											

**SECTION II**

**LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY**

<b>MANUFACTURER NAME &amp; ADDRESS</b>  Dynamic & Proto Circuits, Inc. 869 Barton Street Stoney Creek, Ontario L8E 566 Canada	<b>PLANT LOCATION</b>  Same	<b>CAGE CODE: 38898</b>  CONTACT: Mr. Sal Sanchez PHONE #: 905-643-9900 FAX #: 905-643-9911 EMAIL: ssanchez@dapc.com
<b>CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</b>		<b>QUALIFICATION LETTER:</b>
MIL-PRF-31032/1 MIL-PRF-31032/2 Panel Size                      12"X18" Max. Board Thickness        0.072" Max/Min Hole Size            0.039"/0.018" Aspect Ratio                    8:1 Max. Number of Layers       10 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) Finish System                 Hot Air Solder Leveling Hole Preparation               Plasma Etch Copper Plating                 Acid Copper Solder Resist                   Liquid Photoimagable Dry film solder resist plugs		VQE-98-1143, VQE-00-0007  VQE-00-0007 VQE-98-1143 VQE-98-1143 VQE-00-0007 VQE-98-1143 VQE-98-1143 VQE-98-1143, VQE-00-0007 VQE-98-1143, VQE-00-0007 VQE-00-0007 VQE-98-1143 VQE-98-1143, VQE-00-0007 VQE-98-1143, VQE-00-0007 VQE-98-1143, VQE-00-0007 VQE-98-1143 VQE-00-0007

**SECTION II**

**LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY**

<p><b>MANUFACTURER NAME &amp; ADDRESS</b></p> <p>Lockheed Martin Corp. Missiles &amp; Fire Control Orlando 5600 West Sandlake Road Orlando, FL 32819-8907</p>	<p><b>PLANT LOCATION</b></p> <p>Same</p>	<p><b>CAGE CODE:</b> 04939</p> <p><b>CONTACT:</b> Vijay Kumar <b>PHONE #:</b> 407-356-0282 <b>FAX #:</b> 407-356-8291 <b>EMAIL:</b> <a href="mailto:vijay.kumar@lmco.com">vijay.kumar@lmco.com</a></p> <p><b>CONTACT:</b> Paul Rose <b>PHONE #:</b> 407-356-5537 <b>EMAIL:</b> <a href="mailto:paul.b.rose@lmco.com">paul.b.rose@lmco.com</a></p>
<p><b>CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</b></p>		<p><b>QUALIFICATION LETTER:</b></p>
<p>MIL-PRF-31032/1 MIL-PRF-31032/2</p> <p>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</p>		<p>VQE-00-0193 VQE-00-0734</p>

**SECTION II**

**LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY**

MANUFACTURER NAME & ADDRESS	PLANT LOCATION	CAGE CODE: 03640
Lockheed Martin Federal Systems, Inc. 1801 State Route 17C Owego, NY 13827	Same	CONTACT: Chris Conklin PHONE #: 607-751-4251 FAX #: 607-751-7714 EMAIL: c.j.conklin@lmco.com
CAPABILITIES BY TECHNOLOGY/PRINTEDBOARD TYPE:		QUALIFICATION LETTER:
MIL-PRF-31032/1, /2		VQE-99-0130 VQE-00-0961
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	
CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:		QUALIFICATION LETTER:
MIL-PRF-31032/3, /4		VQE-00-0684
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	

**SECTION II**

**LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY**

<b>MANUFACTURER NAME &amp; ADDRESS</b>  Philway Products, Inc. 701 Virginia Avenue Ashland, OH 44806	<b>PLANT LOCATION</b>  Same	<b>CAGE CODE: 21971</b>  <b>CONTACT: Ted Norris</b> <b>PHONE #: 419-281-7777</b> <b>FAX #: 419-289-3447</b> <b>EMAIL: chris@philway.com</b>																												
<b>CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</b>		<b>QUALIFICATION LETTER:</b>																												
<b>MIL-PRF-31032/1</b>  <table border="0"> <tr> <td>Panel Size</td> <td>18" X 21"</td> </tr> <tr> <td>Max. Board Thickness</td> <td>0.090"</td> </tr> <tr> <td>Max. Base Cu Thickness</td> <td>0.002"</td> </tr> <tr> <td>Max/Min Plated Hole Size</td> <td>0.044"/0.012</td> </tr> <tr> <td>Aspect Ratio</td> <td>4:1</td> </tr> <tr> <td>Max. Number of Layers</td> <td>12</td> </tr> <tr> <td>Min. Conductor Width</td> <td>0.005"</td> </tr> <tr> <td>Min. Conductor Spacing</td> <td>0.005"</td> </tr> <tr> <td>Part Mounting</td> <td>SM, THM, MIX</td> </tr> <tr> <td>Base Material</td> <td>GF (Woven E-Glass, Epoxy resin) GI (Woven E-Glass, Polyimide resin) GM (Woven E-Glass, Triazine and/or Bismaleimide Modified Epoxy resin)</td> </tr> <tr> <td>Finish System</td> <td>Hot Air Solder Leveling: IR Reflow following SnPb plate</td> </tr> <tr> <td>Hole Preparation</td> <td>Permanganate Desmear/Etchback</td> </tr> <tr> <td>Copper Plating</td> <td>Acid Copper</td> </tr> <tr> <td>Solder Resist</td> <td>Liquid Photoimagable</td> </tr> </table>		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	<b>VQE-99-1107</b>
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																													



**SECTION II**

**LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY**

<b>MANUFACTURER NAME &amp; ADDRESS</b>  Printed Circuits, Inc. 1200 W. 96 <sup>th</sup> Street Bloomington, MN 55431-2699	<b>PLANT LOCATION</b>  Same	<b>CAGE CODE: 65114</b>  <b>CONTACT: Dennis Cantwell</b> PHONE #: 612-888-7900 FAX #: 612-888-2719 EMAIL: <a href="mailto:dcant@printedcircuits.com">dcant@printedcircuits.com</a>																										
<b>CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</b>		<b>QUALIFICATION LETTER:</b>																										
MIL-PRF-31032/1, /2, /3, /4  <table border="0"> <tr> <td>Panel Size</td> <td>12" X 18", 18" X 24"</td> </tr> <tr> <td>Max. Board Thickness</td> <td>0.120"</td> </tr> <tr> <td>Max/Min Hole Size</td> <td>/0.010"</td> </tr> <tr> <td>Aspect Ratio</td> <td>10:1</td> </tr> <tr> <td>Max. Number of Layers</td> <td>16</td> </tr> <tr> <td>Min. Conductor Width</td> <td>0.004"</td> </tr> <tr> <td>Min. Conductor Spacing</td> <td>0.005"</td> </tr> <tr> <td>Part Mounting</td> <td>SM/THM, MIX</td> </tr> <tr> <td>Base Material</td> <td>GF (Woven E-glass Epoxy Resin) GI (Woven, E-glass Polyimide Resin) IPC-FC-241/1 through /4 IPC-FC-241/11</td> </tr> <tr> <td>Finish System</td> <td>Fused SnPb HASL Electroplated Nickel/Gold Electroless Nickel/Gold</td> </tr> <tr> <td>Hole Preparation</td> <td>Plasma Desmear/Etchback</td> </tr> <tr> <td>Copper Plating</td> <td>Acid Copper</td> </tr> <tr> <td>Solder Resist</td> <td>Liquid/Dry Film Photo Imageable SMOBC</td> </tr> </table>		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	VQE-01-0024
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																											

**SECTION II**

**LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY**

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

**SECTION II**

**LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY**

<b>MANUFACTURER NAME &amp; ADDRESS</b>  Teradyne, Inc. Connection Systems Division MS-124 4 Pittsburgh Avenue Nashua, New Hampshire 03062	<b>PLANT LOCATION</b>  Same	<b>CAGE CODE: 3T000</b>  CONTACT: Mark Buechner PHONE #: 603-791-3832 FAX #: 603-791-3080 EMAIL:buechner.mark @tcs.teradyne.com
<b>CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</b>		<b>QUALIFICATION LETTER:</b>
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		VQE-97-0649 VQE-97-0721

**SECTION II**

**LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY**

<p>MANUFACTURER NAME &amp; ADDRESS</p> <p>Tyco Printed Circuits Group Austin Division 12501 Research Blvd., Module 1 Austin, TX 78759</p>	<p>PLANT LOCATION</p> <p>Same</p>	<p>CAGE CODE: 96214</p> <p>CONTACT: Roddy Scherff PHONE #: (512) 250-7538 FAX #: (512) 250-7010 EMAIL: r-scherff@raytheon.com</p>
<p>CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</p>		<p>QUALIFICATION LETTER:</p>
<p>MIL-PRF-31032/1 MIL-PRF-31032/2</p> <p>Panel Size                    18" X 24"</p> <p>Max. Board Thickness       0.150"</p> <p>Max/Min Hole Size         /0.010"</p> <p>Aspect Ratio                9:1</p> <p>Max. Number of Layers     20</p> <p>Min. Conductor Width      0.004"</p> <p>Min. Conductor Spacing    0.004"</p> <p>Part Mounting              THM, SM</p> <p>Base Material               BI (Nonwoven aramid reinforced    polyimide resin)    GF (Epoxy resin)    GI (Polyimide resin)</p> <p>Finish System               Fused SnPB    Hot Air Solder Leveling    OSP    Nickel    Gold</p> <p>Hole Preparation            Plasma Desmear/Etchback</p> <p>Copper Plating              Acid Copper</p> <p><b>Solder Resist</b>               Liquid Photo Imageable (spray coated and    screen printed), Dry Film Photo Imageable,    SMOBC</p>		<p>VQE-97-0509 VQE-97-0718</p>
<p>MIL-PRF-31032/3</p> <p>Panel Size                    18" X 24"</p> <p>Max/Min Hole Size         /0.010"</p> <p>Aspect Ratio                9:1</p> <p>Min. Conductor Width      0.004"</p> <p>Min. Conductor Spacing    0.004"</p> <p>Part Mounting              THM</p> <p>Flex Base Material         IPC-FC-241/1    IPC-FC-241/11</p> <p>Finish System               Fused SnPB, HAL, OSP, Nickel, Gold    Immersion Silver</p> <p>Copper Plating              Electro-deposited Acid Copper</p> <p>Usage                         Class A</p>		<p>VQE-99-0935</p>

**SECTION II**

**LIST OF MANUFACTURERS' QUALIFIED CAPABILITIES FOR EACH TECHNOLOGY**

<b>MANUFACTURER NAME &amp; ADDRESS</b>  Tyco Printed Circuits Group Austin Division 12501 Research Blvd., Module 1 Austin, TX 78759	<b>PLANT LOCATION</b>  Same	CAGE CODE: 96214  CONTACT: Roddy Scherff PHONE #: (512) 250-7538 FAX #: (512) 250-7010 EMAIL: r-scherff@ti.com																														
<b>CAPABILITIES BY TECHNOLOGY / ASSOCIATED SPECIFICATION:</b>		<b>QUALIFICATION LETTER:</b>																														
MIL-PRF-31032/4  <table border="0"> <tr><td>Panel Size</td><td>18" X 26"</td></tr> <tr><td>Max. Board Thickness</td><td>0.150"</td></tr> <tr><td>Max/Min Hole Size</td><td>/0.010"</td></tr> <tr><td>Aspect Ratio</td><td>9:1</td></tr> <tr><td>Max. Number of Layers</td><td>20</td></tr> <tr><td>Internal Connections</td><td>Blind Vias</td></tr> <tr><td>Min. Conductor Width</td><td>0.004"</td></tr> <tr><td>Min. Conductor Spacing</td><td>0.004"</td></tr> <tr><td>Part Mounting</td><td>THM, SM</td></tr> <tr><td>Rigid Base Material</td><td>GF (Epoxy resin) GI (Polyimide resin)</td></tr> <tr><td>Flex Base Material</td><td>IPC-FC-241/1 IPC-FC-241/11</td></tr> <tr><td>Finish System</td><td>Fused SnPb, HAL, OSP, Nickel Gold, Immersion Silver</td></tr> <tr><td>Copper Plating</td><td>Electro-deposited Acid Copper</td></tr> <tr><td>Solder Resist</td><td>UV-Cured Wet Screen</td></tr> <tr><td>Usage</td><td>Class A (Flex during installation)</td></tr> </table>		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)	VQE-99-0933
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)																															

**SECTION III**  
**ALPHABETICAL LIST OF QUALIFIED MANUFACTURERS**

MANUFACTURER'S NAME & ADDRESS	PLANT LOCATION	OTHER INFORMATION
Accudyne, Inc. 5800 McHines Place Raleigh, NC 27616-1839	Same	CAGE CODE: 1JQF6 CONTACT: Patrick Gardner PHONE #: 919-713-4872 FAX #: 919-876-6385 EMAIL: <a href="mailto:Accuengr@mindspring.com">Accuengr@mindspring.com</a>
Dynamic & Proto Circuits, Inc. 869 Barton Street Stoney Creek, Ontario L8E 566 Canada	Same	CAGE CODE: 38898 CONTACT: Mr. Sal Sanchez PHONE #: 905-643-9900 FAX #: 905-643-9911 EMAIL: <a href="mailto:ssanchez@dapc.com">ssanchez@dapc.com</a>
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: <a href="mailto:vijay.kumar@lmco.com">vijay.kumar@lmco.com</a>  CONTACT: Paul Rose PHONE #: 407-356-5537 EMAIL: <a href="mailto:paul.b.rose@lmco.com">paul.b.rose@lmco.com</a> CAGE CODE: 03640
Lockheed Martin Federal Systems, Inc. 1801 State Route 17C Owego, NY 13827	Same	CONTACT: Chris Conklin PHONE #: 607-751-4251 FAX #: 607-751-7714 EMAIL: <a href="mailto:c.j.conklin@lmco.com">c.j.conklin@lmco.com</a>
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: <a href="mailto:chris@philway.com">chris@philway.com</a>
Printed Circuits, Inc. 1200 W. 96 <sup>th</sup> Street Bloomington, MN 55431-2699	Same	CAGE CODE: 65114 CONTACT: Dennis Cantwell PHONE #: 612-888-7900 FAX #: 612-888-2719 EMAIL: <a href="mailto:dcant@printedcircuits.com">dcant@printedcircuits.com</a>
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: <a href="mailto:menuez@protocircuit.com">menuez@protocircuit.com</a>
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: <a href="mailto:buechner.mark@tcs.teradyne.com">buechner.mark@tcs.teradyne.com</a>
Tyco Printed Circuits Group Austin Division 12501 Research Blvd., Module 1 Austin, TX 78759	Same	CAGE CODE: 96214 CONTACT: Roddy Scherff PHONE #: (512) 250-7538 FAX #: (512) 250-7010 EMAIL: <a href="mailto:r.scherff@tyco.com">r.scherff@tyco.com</a>