REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED

REV																				
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REV STATUS	REV														
OF SHEETS	SHEET	1	2	3	4	5	6	7	8	9	10	11			

PMIC N/A

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DRAWING APPROVAL DATE
04-08-13

REVISION LEVEL

DEFENSE SUPPLY CENTER COLUMBUS
COLUMBUS, OHIO 43218-3990
http://www.dscc.dla.mil/

STANDARD MICROCIRCUIT DRAWING

THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

AMSC N/A

MICROCIRCUIT, HYBRID, 0.5 AMP GATE DRIVE OPTOCOUPLER

SIZE	CAGE CODE	
A	**67268**	**5962-04205**

SHEET 1 OF 11

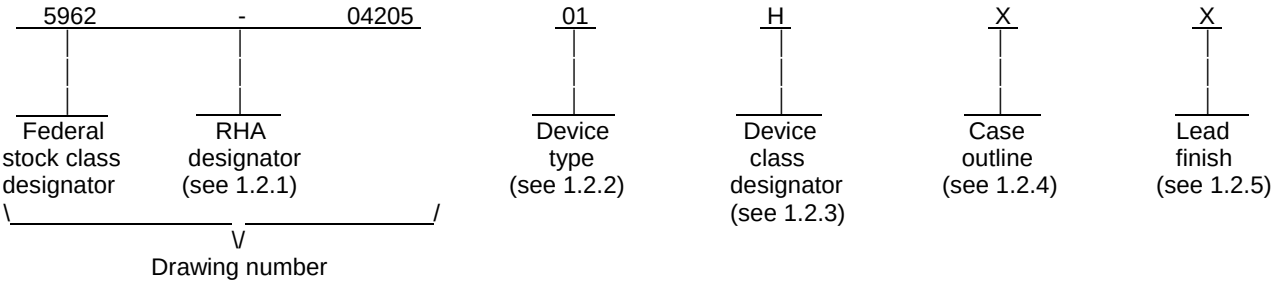
DSCC FORM 2233
APR 97

5962-E321-04

1. SCOPE

1.1 Scope. This drawing documents five product assurance classes as defined in paragraph 1.2.3 and MIL-PRF-38534. A choice of case outlines and lead finishes which are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of radiation hardness assurance levels are reflected in the PIN.

1.2 PIN. The PIN shall be as shown in the following example:



1.2.1 Radiation hardness assurance (RHA) designator. RHA marked devices shall meet the MIL-PRF-38534 specified RHA levels and shall be marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

1.2.2 Device type(s). The device type(s) identify the circuit function as follows:

Device type	Generic number	Circuit function
01	HCPL-5151	Optocoupler, single channel, 0.5 Amp

1.2.3 Device class designator. This device class designator shall be a single letter identifying the product assurance level. All levels are defined by the requirements of MIL-PRF-38534 and require QML Certification as well as qualification (Class H, K, and E) or QML Listing (Class G and D). The product assurance levels are as follows:

Device class	Device performance documentation
K	Highest reliability class available. This level is intended for use in space applications.
H	Standard military quality class level. This level is intended for use in applications where non-space high reliability devices are required.
G	Reduced testing version of the standard military quality class. This level uses the Class H screening and In-Process Inspections with a possible limited temperature range, manufacturer specified incoming flow, and the manufacturer guarantees (but may not test) periodic and conformance inspections (Group A, B, C and D).
E	Designates devices which are based upon one of the other classes (K, H, or G) with exception(s) taken to the requirements of that class. These exception(s) must be specified in the device acquisition document; therefore the acquisition document should be reviewed to ensure that the exception(s) taken will not adversely affect system performance.
D	Manufacturer specified quality class. Quality level is defined by the manufacturers internal, QML certified flow. This product may have a limited temperature range.

1.2.4 Case outline(s). The case outline(s) are as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
P	CDIP2-T8	8	Dual-in-line
X	See figure 1	8	Dual-in-line
Y	See figure 1	8	Dual-in-line

1.2.5 Lead finish. The lead finish shall be as specified in MIL-PRF-38534.

1.3 Absolute maximum ratings. 1/

Supply voltage range (V_{CC}-V_{EE})	0 V dc to +35.0 V dc	
Average input current ($I_{F\ AVG}$)	25 mA	2/
Peak transient input current ($I_{F\ PK}$), (< 1µs pulse width, 300 pps)	1.0 A	
Reverse input voltage (V_R)	5 V	
"High" peak output current ($I_{OH\ (PEAK)}$)	0.6 A	3/
"Low peak output current ($I_{OL\ (PEAK)}$)	0.6 A	3/
Output voltage range ($V_{O\ (PEAK)}$)	0 V to VCC	
Input power dissipation (P_E)	45 mW	2/
Output power dissipation (P_O)	250 mW	4/
Total power dissipation (P_T)	295 mW	4/
Lead solder temperature	260°C for 10 seconds	
Junction temperature (T_J)	150°C	
Case temperature (T_C)	145°C	
Storage temperature range (T_S)	-65 to +150°C	

1.4 Recommended operating conditions.

Power supply voltage range (V_{CC}-V_{EE})	15 to 30 V
Input current range (ON), ($I_{F\ (ON)}$)	10 to 18 mA
Input Voltage range (OFF), ($V_{F\ (OFF)}$)	-3.0 to 0.8 V
Ambient operating temperature range (T_A)	-55° to +125°C

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbooks. The following specification, standards, and handbooks form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

MIL-PRF-38534 - Hybrid Microcircuits, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-1835 - Interface Standard for Electronic Component Case Outlines.

1/ Stresses above the absolute maximum ratings may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.
2/ No derating required with the typical case-to-ambient thermal resistance (θ_{CA} = 140°C/W).
3/ Maximum pulse width = 10 µs, maximum duty cycle = 0.2%. This value is intended to allow for component tolerances for designs with I_O peak minimum = 0.5 A.
4/ Derate linearly above 102°C free air temperature at a rate of 6mW/°C with the typical case-to-ambient thermal resistance (θ_{CA} = 140°C/W).

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-103 - List of Standard Microcircuit Drawings.
MIL-HDBK-780 - Standard Microcircuit Drawings.

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or www.dodssp.daps.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Item requirements. The individual item performance requirements for device classes D, E, G, H, and K shall be in accordance with MIL-PRF-38534. Compliance with MIL-PRF-38534 shall include the performance of all tests herein or as designated in the device manufacturer's Quality Management (QM) plan or as designated for the applicable device class. The manufacturer may eliminate, modify or optimize the tests and inspections herein, however the performance requirements as defined in MIL-PRF-38534 shall be met for the applicable device class. In addition, the modification in the QM plan shall not affect the form, fit, or function of the device for the applicable device class.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38534 and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.4 herein and figure 1.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 2.

3.2.3 Switching time test circuit and waveform(s). The switching time test circuit and waveform(s) shall be as specified on figure 3.

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall apply over the full specified operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are defined in table I.

3.5 Marking of device(s). Marking of device(s) shall be in accordance with MIL-PRF-38534. The device shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's vendor similar PIN may also be marked.

3.6 Data. In addition to the general performance requirements of MIL-PRF-38534, the manufacturer of the device described herein shall maintain the electrical test data (variables format) from the initial quality conformance inspection group A lot sample, for each device type listed herein. Also, the data should include a summary of all parameters manually tested, and for those which, if any, are guaranteed. This data shall be maintained under document revision level control by the manufacturer and be made available to the preparing activity (DSCC-VA) upon request.

3.7 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to supply to this drawing. The certificate of compliance (original copy) submitted to DSCC-VA shall affirm that the manufacturer's product meets the performance requirements of MIL-PRF-38534 and herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-PRF-38534 shall be provided with each lot of microcircuits delivered to this drawing.

4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38534 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
High level output current	I_{OH}	$V_O = (V_{CC} - 4\ V)$ 1/	1, 2, 3	01	0.1		A
		$V_O = (V_{CC} - 15\ V)$ 2/			0.5		
Low level output current	I_{OL}	$V_O = (V_{EE} + 2.5\ V)$ 1/	1, 2, 3	01	0.1		A
		$V_O = (V_{EE} + 15\ V)$ 2/			0.5		
High level output voltage	V_{OH}	I_O = -100 mA 3/ 4/	1, 2, 3	01	(V_{cc} - 4)		V
Low level output voltage	V_{OL}	I_O = 100 mA	1, 2, 3	01		1.0	V
High level supply current	I_{CCH}	Output open, I_F = 10 to 18 mA	1, 2, 3	01		5.0	mA
Low level supply current	I_{CCL}	Output open, V_F = -3.0 to +0.8 V	1, 2, 3	01		5.0	mA
Threshold input current Low to high	I_{FLH}	I_O = 0 mA, V_O > 5 V	1, 2, 3	01		9.0	mA
Threshold input voltage High to low	V_{FHL}	I_O = 0 mA, V_O > 5 V	1, 2, 3	01	0.8		V
Input forward voltage	V_F	I_F = 10 mA	1, 2, 3	01	1.2	1.8	V
Input reverse breakdown voltage	B_{VR}	I_R = 10 µA	1, 2, 3	01	5		V
UVLO Threshold	V_{UVLO+}	V_O > 5 V, I_F = 10 mA	1, 2, 3	01	11.0	13.5	V
	V_{UVLO-}				9.5	12.0	
Input-output leakage current 5/ 6/	I_{I-O}	V_{I-O} = 1500 Vdc, RH ≤ 45 %, t = 5 seconds, T_A = +25°C	1	01		1.0	µA
Propagation delay time to high output level 7/	t_{PLH}	Rg = 47 Ω, Cg = 3 nF, f = 10 kHz, Duty cycle = 50%	9, 10, 11	01	0.10	0.50	µs
Propagation delay time to low output level 7/	t_{PHL}		9, 10, 11	01	0.10	0.50	µs
Pulse width distortion	PWD		9, 10, 11	01		0.30	µs
Propagation delay difference between any two parts 8/	PDD ($t_{PHL} - t_{PLH}$)		9, 10, 11	01	-0.35	0.35	µs

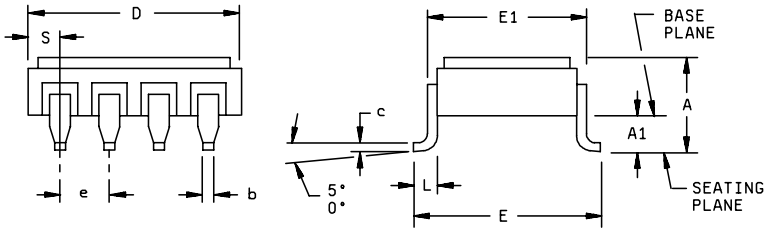
See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Output high level common mode transient immunity 9/, 10/, 12/	$\|CM_H\|$	I_F = 10mA, V_{CM} = 1000V, V_{CC} = 30 V, T_A = +25°C	9	01	10		kV/µs
Output low level common mode transient immunity 9/, 11/, 12/	$\|CM_L\|$	V_F = 0 V, V_{CM} = 1000V, V_{CC} = 30 V, T_A = +25°C	9	01	10		kV/µs

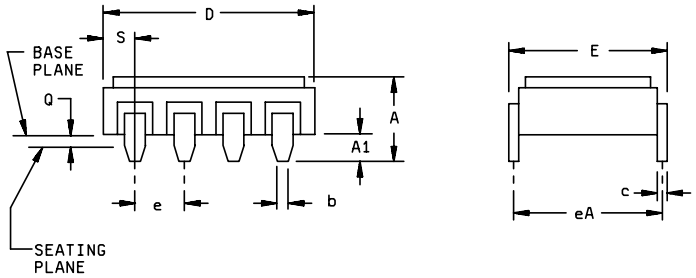
1/ Maximum pulse width = 50 µs, maximum duty cycle = 0.5%.
2/ Maximum pulse width = 10 µs, maximum duty cycle = 0.2%. This value is intended to allow for component tolerances for designs with I_O peak minimum = 0.5 A.
3/ In this test V_{OH} is measured with a dc load current. When driving capacitive loads V_{OH} will approach V_{CC} as I_{OH} approaches zero amps.
4/ Maximum pulse width = 1 ms, maximum duty cycle = 20%.
5/ This is a momentary withstand test, not an operating condition.
6/ Device considered a two-terminal device: pins on input side shorted together and pins on output side shorted together.
7/ This load condition approximates the gate load of a 1200 V/25 A IGBT.
8/ The difference between t_{PHL} and t_{PLH} between any two of the same devices under the same test condition.
9/ Pins 1 and 4 need to be connected to LED common.
10/ Common mode transient immunity in the high state is the maximum tolerable $|dV_{CM}/dt|$ of the common mode pulse, V_{CM}, to assure that the output will remain in the high state (i.e., $V_O > 15.0$ V).
11/ Common mode transient immunity in the low state is the maximum tolerable $|dV_{CM}/dt|$ of the common mode pulse, V_{CM}, to assure that the output will remain in the low state (i.e., $V_O < 1.0$ V).
12/ $|CM_H|$ and $|CM_L|$ shall be tested as part of device initial characterization and after design or process changes. $|CM_H|$ and $|CM_L|$ shall be guaranteed to the limits specified in table 1 for all lots not specifically tested.

Case outline X.



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A		4.57		.180
A1	1.40	1.65	.055	.065
b	0.41	0.51	.016	.020
c	0.18	0.33	.007	.013
D	9.40	9.91	.370	.390
e	2.29	2.79	.090	.110
E	9.65	9.91	.380	.390
E1		8.13		.320
L	1.07	1.32	.042	.052
S	0.89	1.27	.035	.050

Case outline Y.



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A		4.32		.170
A1	1.14	1.40	.045	.055
b	0.41	0.51	.016	.020
c	0.18	0.33	.007	.013
D	9.40	9.91	.370	.390
e	2.29	2.79	.090	.110
E		8.13		.320
eA	7.37	7.87	.290	.310
Q	0.51		.020	
S	0.89	1.27	.035	.050

NOTES:
1. The U.S. government preferred system of measurement is the metric SI. This item was designed using inch-pound units of measurement. In case of problems involving conflicts between the metric and inch-pound units, the inch-pound units shall rule.
2. Pin 1 is indicated by the ESD triangle(s) marked on top of the package.

FIGURE 1. Case outline(s).

Device type	01
Case outlines	All
Terminal number	Terminal symbol
1	No connection
2	Anode
3	Cathode
4	No connection
5	V_{EE}
6	V_O
7	V_O
8	V_{CC}

FIGURE 2. Terminal connections.

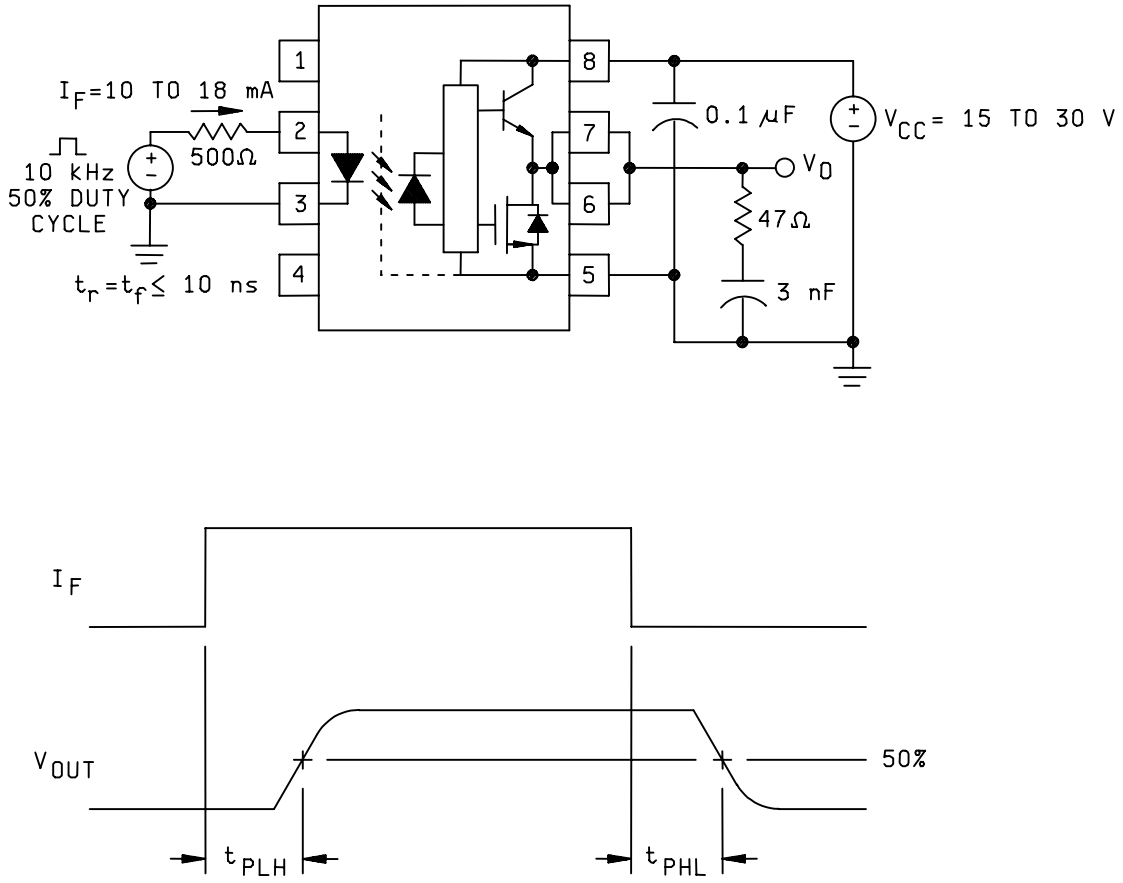


FIGURE 3. Switching time test circuit and waveform(s).

TABLE II. Electrical test requirements.

MIL-PRF-38534 test requirements	Subgroups (in accordance with MIL-PRF-38534, group A test table)
Interim electrical parameters	1
Final electrical parameters	1*, 2, 3, 9
Group A test requirements	1, 2, 3, 9**, 10, 11
Group C end-point electrical parameters	1, 2, 3
End-point electrical parameters for Radiation Hardness Assurance (RHA) devices	Not applicable

* PDA applies to subgroup 1.
** See Note 12 of table 1.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38534. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DSCC-VA or the acquiring activity upon request. Also, the test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1015 of MIL-STD-883.

(2) T_A as specified in accordance with table I of method 1015 of MIL-STD-883.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

4.3 Conformance and periodic inspections. Conformance inspection (CI) and periodic inspection (PI) shall be in accordance with MIL-PRF-38534 and as specified herein.

4.3.1 Group A inspection (CI). Group A inspection shall be in accordance with MIL-PRF-38534 and as follows:

a. Tests shall be as specified in table II herein.

b. Subgroups 4, 5, 6, 7, and 8 shall be omitted.

4.3.2 Group B inspection (PI). Group B inspection shall be in accordance with MIL-PRF-38534.

4.3.3 Group C inspection (PI). Group C inspection shall be in accordance with MIL-PRF-38534 and as follows:

a. End-point electrical parameters shall be as specified in table II herein.

b. Steady-state life test, method 1005 of MIL-STD-883.

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DSCC-VA or the acquiring activity upon request. Also, the test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1005 of MIL-STD-883.

(2) T_A as specified in accordance with table I of method 1005 of MIL-STD-883.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.3.4 Group D inspection (PI). Group D inspection shall be in accordance with MIL-PRF-38534.

4.3.5 Radiation Hardness Assurance (RHA) inspection. RHA inspection is not currently applicable to this drawing.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38534.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated as specified in MIL-PRF-38534.

6.4 Record of users. Military and industrial users shall inform Defense Supply Center Columbus (DSCC) when a system application requires configuration control and the applicable SMD. DSCC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronic devices (FSC 5962) should contact DSCC-VA, telephone (614) 692-0544.

6.5 Comments. Comments on this drawing should be directed to DSCC-VA, Columbus, Ohio 43218-3990, or telephone (614) 692-1081.

6.6 Sources of supply. Sources of supply are listed in MIL-HDBK-103 and QML-38534. The vendors listed in MIL-HDBK-103 and QML-38534 have submitted a certificate of compliance (see 3.7 herein) to DSCC-VA and have agreed to this drawing.

STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 04-08-13

Approved sources of supply for SMD 5962-04205 are listed below for immediate acquisition information only and shall be added to MIL-HDBK-103 and QML-38534 during the next revisions. MIL-HDBK-103 and QML-38534 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DSCC-VA. This information bulletin is superseded by the next dated revisions of MIL-HDBK-103 and QML-38534.

Standard microcircuit drawing PIN 1/	Vendor CAGE number	Vendor similar PIN 2/
5962-0420501HPC 5962-0420501HPA	50434 50434	HCPL-5151 HCPL-5151-200
5962-0420501HYA 5962-0420501HYC	50434 50434	HCPL-5151-100 HCPL-5151-100
5962-0420501HXA	50434	HCPL-5151-300

1/ The lead finish shown for each PIN representing a hermetic package is the most readily available from the manufacturer listed for that part. If the desired lead finish is not listed contact the Vendor to determine its availability.

2/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

Vendor CAGE number	Vendor name and address
50434	Agilent Technologies Semiconductor Products Group 350 West Trimble Road San Jose, CA 95131