REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Update drawing boilerplate. Editorial changes throughout.	02-08-08	Raymond Monnin
B	Update drawing.	06-12-11	Raymond Monnin

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

PMIC N/A

PREPARED BY
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STANDARD MICROCIRCUIT DRAWING

CHECKED BY
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APPROVED BY
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MICROCIRCUIT, HYBRID, LINEAR, 4-CHANNEL, OPTICALLY COUPLED ISOLATOR

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

DRAWING APPROVAL DATE
97-11-12

AMSC N/A

REVISION LEVEL
B

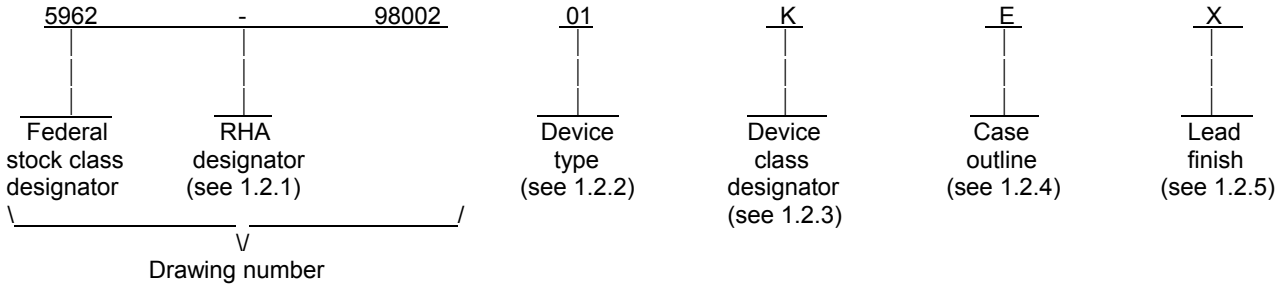
SIZE	CAGE CODE	
A	**67268**	**5962-98002**

SHEET 1 OF 11

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. Device classes H and K 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) shall identify the circuit function as follows: 1/

Device type	Generic number	Circuit function
01	HCPL-177K, HCPL-675K, 6N140-300	Optical coupler, 4 channel

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/ The devices listed herein are available as class H microcircuits (high reliability) on 83024.

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

Outline letter	Descriptive designator	Terminals	Package style
E	CDIP2-T16	16	Dual-in-line
F	CDFP4-F16	16	Flat package
X	See figure 1	16	Dual-in-line
Y	See figure 1	16	Dual-in-line
Z	See figure 1	16	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 (V_{CC})	-0.5 V dc to +20 V dc 2/
Peak input current (each channel, ≤ 1 ms duration)	20 mA
Average input current, I_F (each channel)	10 mA 3/
Reverse input voltage, V_R (each channel)	5 V dc
Output current, I_O (each channel)	40 mA
Output voltage, V_O (each channel)	-0.5 V dc to +20 V dc 2/
Output power dissipation (each channel)	50 mW 4/
Storage temperature	-65°C to +150°C
Junction temperature (T_J)	+175°C
Lead solder temperature (soldering, 10 seconds)	+260C (1.6 mm below seating plane)
Thermal resistance, junction-to-case (θ_{JC}):	
Case outlines E and F	See MIL-STD-1835
Case outlines X, Y, and Z	+28°C/W
Case temperature	+170°C

1.4 Recommended operating conditions.

Supply voltage range	2.0 V dc minimum to 18 V dc maximum
High level input current	0.5 mA minimum (each channel) to 5 mA maximum
Low level input voltage	0.8 V maximum (each channel)
Ambient operating temperature range (T_A)	-55°C 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 rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.
2/ Pin 10 should be the most negative voltage at the detector side. Keeping V_{CC} as low as possible, but greater than 2.0 volts, will provide the lowest total I_{OH} over temperature.
3/ Derate I_F at 0.33 mA/°C above +110°C.
4/ Output power is collector output power plus one fourth of total supply power. Derate at 1.66 mW/°C above +110°C.

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 http://assist.daps.dla.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 may 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.

3.3 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.

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	
Low level output voltage	V_{OL}	V_{CC} = 4.5 V, I_F = 0.5 mA, I_{OL} = 1.5 mA 1/	1,2,3	01		0.4	V
		V_{CC} = 4.5 V, I_F = 5 mA, I_{OL} = 10 mA 1/				0.4	
Current transfer ratio	$h_{F(CTR)}$	V_O = 0.4 V, I_F = 0.5 mA, V_{CC} = 4.5 V 1/ 2/	1,2,3	01	300		%
		V_O = 0.4 V, I_F = 1.6 mA, V_{CC} = 4.5 V 1/ 2/			300		
		V_O = 0.4 V, I_F = 5 mA, V_{CC} = 4.5 V 1/ 2/			200		
High level output current	I_{OH}	V_{CC} = 18 V, V_O = 18 V, I_F = 2 µA 1/ 3/	1,2,3	01		250	µA dc
High level supply current	I_{CCH}	V_{CC} = 18 V, $I_{F1} = I_{F2} = I_{F3} = I_{F4}$ = 0 mA	1,2,3	01		40	µA dc
Low level supply current	I_{CCL}	V_{CC} = 18 V, $I_{F1} = I_{F2} = I_{F3} = I_{F4}$ = 1.6 mA	1,2,3	01		4	mA dc
Input forward voltage	V_F	I_F = 1.6 mA 1/	1,2	01		1.7	V dc
			3			1.8	
Input reverse breakdown voltage	V_{BR}	I_R = 10 µA 1/	1,2,3	01	5.0		V dc
Input to output insulation leakage current	I_{I-O}	V_{I-O} = 1500 V dc, 4/ Relative humidity = 45%, t = 5 seconds, T_A = +25°C	1	01		1.0	µA dc
Capacitance between input-output	C_{I-O}	f = 1 MHz, T_A = +25°C, 1/ 5/ 6/	4	01		4	pF

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

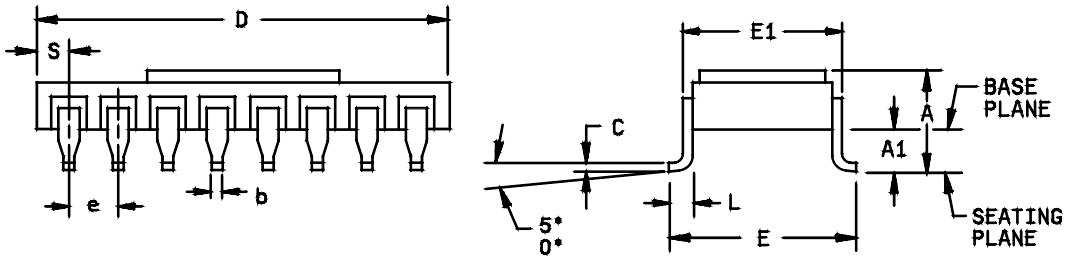
Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Propagation delay time, low to high output level	t_{PLH}	I_F = 0.5 mA, R_L = 4.7 kΩ, V_{CC} = 5.0 V 1/	9,10,11	01		60	µs
		I_F = 5 mA, R_L = 680Ω, V_{CC} = 5.0 V 1/	9	01		20	µs
			10,11			30	
Propagation delay time, high to low output level	t_{PHL}	I_F = 0.5 mA, R_L = 4.7 kΩ, V_{CC} = 5.0 V 1/	9,10,11	01		100	µs
		I_F = 5 mA, R_L = 680Ω, V_{CC} = 5.0 V 1/	9	01		5	µs
			10,11			10	
Common mode transient immunity at high output level	C_{MH}	V_{CM} = 25 V (peak), V_{CC} = 5.0 V, R_L = 1.5 kΩ, I_F = 0 mA, 1/ 6/ 7/ 8/	9,10,11	01	500		V/µs
Common mode transient immunity at low output level	C_{ML}	V_{CM} = 25 V (peak), V_{CC} = 5.0 V, R_L = 1.5 kΩ, I_F = 1.6 mA, 1/ 6/ 8/ 9/	9,10,11	01	500		V/µs

1/ Each channel.
2/ Current transfer ratio is defined as the ratio of output collector current I_O, to the forward LED input current, I_F, times 100 percent.
3/ I_F = 2 µA for channel under test. For all other channels, I_F = 10 mA.
4/ Device considered a two-terminal device. Pins 1 through 8 are shorted together and pins 9 through 16 are shorted together.
5/ Measured between the LED anode and cathode shorted together and pins 10 through 15 shorted together.
6/ Parameters shall be tested as part of device initial characterization and after design and process changes. Parameters shall be guaranteed to the limits specified in table I for all lots not specifically tested.
7/ C_{MH} is the maximum tolerable common mode transient to assure that the output will remain in a high logic state (i.e., V_O > 2.0 V).
8/ In applications where dV/dt may exceed 50,000 V/µs (such as a static discharge) a series resistor, R_{CC}, should be included to protect the detector IC's from destructively high surge currents. The recommended value is:

$$R_{CC} = \frac{1\ V}{0.6\ I_F(mA)}\ k\Omega$$

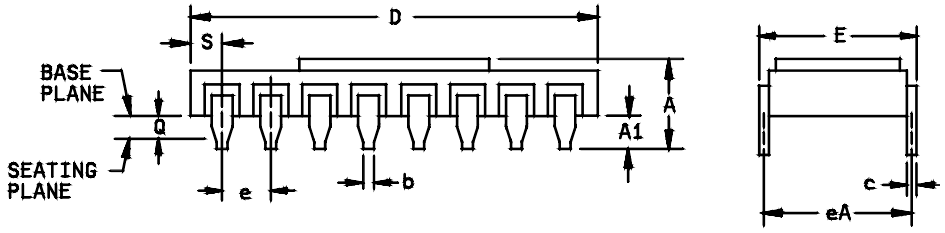
9/ C_{ML} is the maximum tolerable common mode transient to assure that the output will remain in a low logic state (i.e., V_O < 0.8 V).

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	20.07	20.83	.790	.820
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	1.52	.035	.060

Case outline Y.

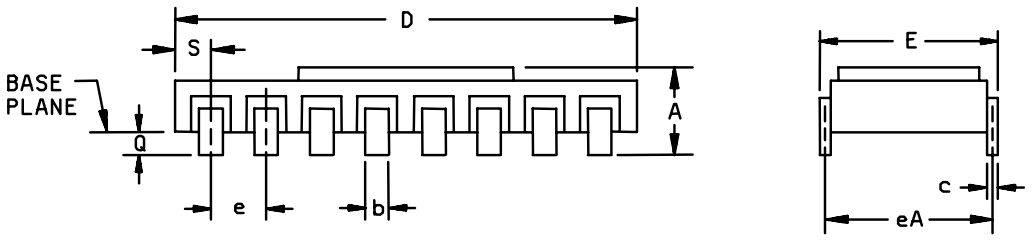


Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A		4.32		.170
A1	1.14	1.40	.045	.055
b	0.41	0.51	.016	.020
c	0.18	0.33	.007	.013
D	20.07	20.83	.790	.820
e	2.29	2.79	.090	.110
E		8.13		.320
eA	7.37	7.87	.290	.310
Q	0.51		.020	
S	0.89	1.52	.035	.060

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 a dot marked on top of the package.

FIGURE 1. Case outline(s).

Case outline Z.



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A		3.56		.140
b	0.89	1.14	.035	.045
c	0.18	0.33	.007	.013
D	20.07	20.83	.790	.820
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	1.52	.035	.060

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 a dot marked on top of the package.

FIGURE 1. Case outline(s) - Continued.

Device type	01
Case outlines	E, F, X, Y, and Z
Terminal number	Terminal connection
1	Cathode 1
2	Anode 1
3	Anode 2
4	Cathode 2
5	Cathode 3
6	Anode 3
7	Anode 4
8	Cathode 4
9	NC
10	GND
11	Output 4
12	Output 3
13	Output 2
14	Output 1
15	V_{CC}
16	NC

FIGURE 2. Terminal connections.

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	1,2,3,4,9,10,11
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.

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.

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 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, Post Office Box 3990, 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: 06-12-11

Approved sources of supply for SMD 5962-98002 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. DSCC maintains an online database of all current sources of supply at http://www.dscc.dla.mil/Programs/Smcr/.

Standard microcircuit drawing PIN 1/	Vendor CAGE number	Vendor similar PIN 2/
5962-9800201KEA	31757	66012-300
5962-9800201KEA	50434	HCPL-177K#200
5962-9800201KEC	31757	66012-300
5962-9800201KEC	50434	HCPL-177K
5962-9800201KFC	50434	HCPL-675K
5962-9800201KXA	31757	66012-300J
5962-9800201KXA	50434	HCPL-177K#300
5962-9800201KXC	31757	66012-300J
5962-9800201KYA	50434	HCPL-177K#100
5962-9800201KYC	50434	HCPL-177K#100
5962-9800201KZA	50434	HCPL-177K#600
5962-9800201KZC	50434	HCPL-177K#600

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
31757	Micropac Industries, Incorporated Optoelectronics Division 905 East Walnut Street Garland, TX 75040-6611
50434	Avago Technologies 350 West Trimble Road San Jose, CA 95131