REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
G	Added device types 04, 05, and 06 as class K. Redrew entire document. -sld	98-05-10	K.A. Cottongim
H	Updated drawing to the latest requirements. -sld	05-04-25	Raymond Monnin
J	Updated drawing paragraphs. -sld	11-11-08	Charles F. Saffle
K	Table I; corrected the max limits for device types 02 and 05 for the supply current tests I_{CCL} and I_{CCH}. -sld	12-04-25	Charles F. Saffle

REV																				
SHEET																				
REV	K																			
SHEET	15																			

REV STATUS	REV	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
OF SHEETS	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14	

PMIC N/A

PREPARED BY
Steve Duncan

CHECKED BY
Robert M. Heber

APPROVED BY
William K. Heckman

DRAWING APPROVAL DATE
89-04-10

REVISION LEVEL
K

STANDARD MICROCIRCUIT DRAWING

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

AMSC N/A

DLA LAND AND MARITIME
COLUMBUS, OHIO 43218-3990
http://www.landandmaritime.dla.mil/

MICROCIRCUIT, HYBRID, DIGITAL, DUAL AND QUAD CHANNEL, HIGH SPEED LOGIC GATE OPTOCOUPLER

SIZE	CAGE CODE	
A	**67268**	**5962-88769**

SHEET 1 OF 15

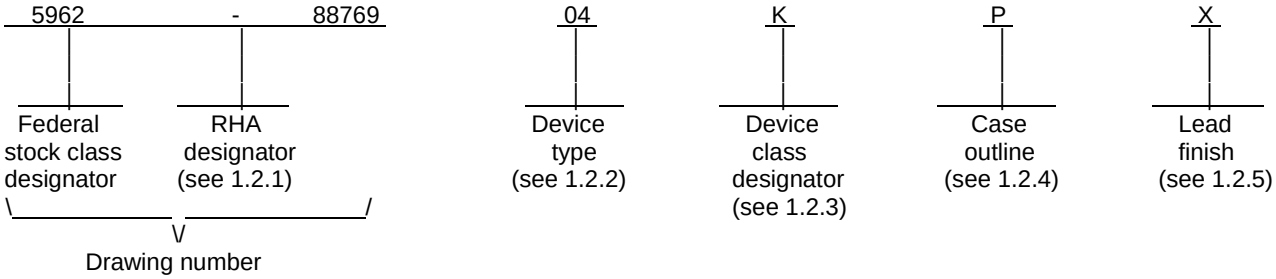
1. SCOPE

1.1 Scope. This drawing describes device requirements for hybrid microcircuits to be processed in accordance with 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:

For class H devices:

For class K devices:



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-5231	Dual channel, optocoupler with common supply voltage and ground connections
02	HCPL-6231	Dual channel, optocoupler with seperate supply voltage and ground connections
03	HCPL-6251	Quad channel, optocoupler with common supply voltage and ground connections
04	HCPL-523K	Dual channel, optocoupler with common supply voltage and ground connections
05	HCPL-623K	Dual channel, optocoupler with seperate supply voltage and ground connections
06	HCPL-625K	Quad channel, optocoupler with common supply voltage and ground connections

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
2	CQCC1-N20	20	Square leadless chip carrier
F	CDFP4-F16	16	Flat package

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})	0.0 V dc to 20 V dc
Average forward current (I_{FAVG})	8.0 mA
Peak forward current (I_{FPK})	20 mA 2/
Reverse input voltage (V_R)	3.0 V dc
Average output current, per channel (I_O)	15 mA
Output voltage range (V_O)	-0.3 V dc to +20 V dc
Power dissipation, per channel (P_D)	200 mW
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+260°C
Junction temperature	+175°C
Thermal resistance, junction-to-case (θ_{JC}):	
Case outlines F, P, and 2	See MIL-STD-1835
Case outlines X and Y	28°C/W
Case temperature (T_C)	+170°C

1.4 Recommended operating conditions.

Supply voltage range (V_{CC})	4.5 V dc to 20 V dc
High level input current range ($I_{F(ON)}$)	2.0 mA to 8.0 mA
Low level input voltage range ($V_{F(OFF)}$)	0 V dc to 0.8 V dc
Fan out (N)	4 TTL loads maximum
Ambient operating temperature range (T_A)	-55°C to +125°C

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/ Peak forward input current pulse width < 50 μs at 1.0 kHz maximum repetition rate.

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 SPECIFICATIONS

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.

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 https://assist.daps.dla.mil/quicksearch/ 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 Propagation delay times test circuit and waveform(s). The propagation delay times 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 (DLA Land and Maritime -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 DLA Land and Maritime -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 1/ -55°C £ T_A £+125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Logic low output voltage 2/	V_{OL}	I_{OL} = 6.4 mA	1,2,3	All		0.5	V
Logic high output voltage 2/	V_{OH}	I_{OH} = -2.6 mA	1,2,3	All	2.4		V
Output leakage current 2/	I_{OHH}	V_O = 5.5 V, I_F = 8.0 mA, V_{CC} = 4.5 V, V_{OUT} > V_{CC}	1,2,3	All		100	mA
		V_O = 20 V, I_F = 8.0 mA, V_{CC} = 4.5 V, V_{OUT} > V_{CC}				500	
Supply current 3/	I_{CCL}	V_{F1} = V_{F2} = V_{F3} = V_{F4} = 0.0 V, V_{CC} = 5.5 V	1,2,3	01,04 02,05 03,06		12 12 24	mA
		V_{F1} = V_{F2} = V_{F3} = V_{F4} = 0.0 V, V_{CC} = 20 V	1,2,3	01,04 02,05 03,06		15 15 30	
	I_{CCH}	I_{F1} = I_{F2} = I_{F3} = I_{F4} = 8.0 mA, V_{CC} = 5.5 V	1,2,3	01,04 02,05 03,06		9.0 9.0 18	mA
		I_{F1} = I_{F2} = I_{F3} = I_{F4} = 8.0 mA, V_{CC} = 20 V	1,2,3	01,04 02,05 03,06		12 12 24	
Output short circuit current 2/ 4/	I_{OSL}	V_F = 0.0 V, V_O = V_{CC} = 5.5 V	1,2,3	All	20		mA
		V_F = 0.0 V, V_O = V_{CC} = 20 V			35		
	I_{OSH}	I_F = 8.0 mA, V_{CC} = 5.5 V, V_O = GND	1,2,3	All		-10	mA
		I_F = 8.0 mA, V_{CC} = 20 V, V_O = GND				-25	
Input forward voltage 2/	V_F	I_F = 8.0 mA	1,2,3	All	1.0	1.8	V

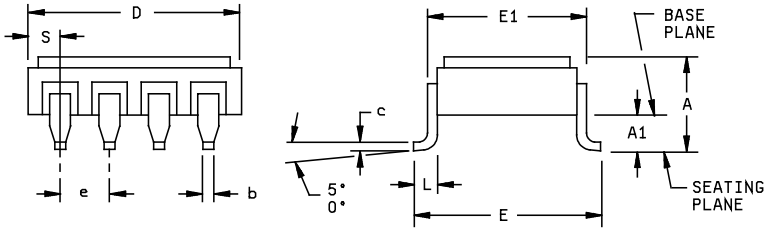
See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Input reverse breakdown voltage 2/	V_R	I_R = 10 µA	1,2,3	All	3.0		V
Input to output insulation leakage current 5/	I_{I-O}	V_{I-O} = 1500 V dc, t = 5.0 seconds, 45% RH, T_A = +25°C 6/	1	All		1.0	mA
Logic high common mode transient immunity 2/ 7/ 8/	$\lvert C_{MH} \rvert$	V_{CM} = 50 V_{p-p}, I_F = 2.0 mA	9,10,11	All	1000		V/ns
Logic low common mode transient immunity 2/ 7/ 8/	$\lvert C_{ML} \rvert$	V_{CM} = 50 V_{p-p}, I_F = 0.0 mA	9,10,11	All	1000		V/ns
Propagation delay time high to low level output 2/	t_{PHL}	See figure 2	9,10,11	All		350	ns
Propagation delay time low to high level output 2/	t_{PLH}	See figure 2	9,10,11	All		350	ns

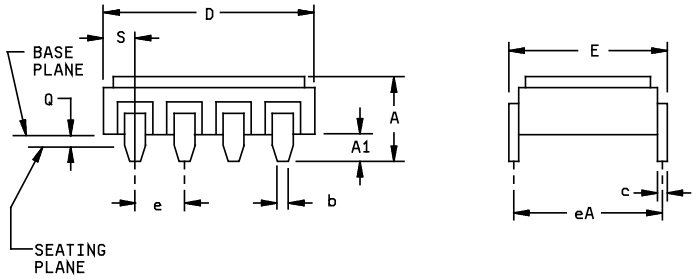
1/ Unless otherwise specified, 0.0 V dc $\le V_{F(OFF)} \le$ 0.8 V dc, 4.5 V dc $\le V_{CC} \le$ 20 V dc, and 2.0 mA $\le I_{F(ON)} \le$ 8.0 mA.
2/ Applies to each channel.
3/ V_{F3}, V_{F4}, I_{F3}, and I_{F4} apply to device types 03 and 06 only.
4/ Not more than one output should be shorted at a time and duration of short circuit condition shall not exceed 10 ms.
5/ This is a momentary withstand test, not an operating condition.
6/ All devices are considered two terminal devices: measured between all input leads or terminals shorted together and all output leads or terminals shorted together.
7/ $\lvert C_{ML} \rvert$ is the maximum rate of rise of the common mode voltage that can be sustained with the output voltage in the logic low state ($V_O \le$ 0.8 V dc). $\lvert C_{MH} \rvert$ is the maximum rate of fall of the common mode voltage that can be sustained with the output voltage in the logic high state ($V_O >$ 2.0 V dc).
8/ 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.

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 types	01 and 04	02 and 05	03 and 06
Case outlines	P, X, and Y	2	F
Terminal number	Terminal symbol		
1	$+V_{F1}$ (anode)	NC	$-V_{F1}$ (cathode)
2	$-V_{F1}$ (cathode)	$-V_{F1}$ (cathode)	$+V_{F1}$ (anode)
3	$-V_{F2}$ (cathode)	$+V_{F1}$ (anode)	$+V_{F2}$ (anode)
4	$+V_{F2}$ (anode)	NC	$-V_{F2}$ (cathode)
5	GND	NC	$-V_{F3}$ (cathode)
6	V_{O2}	NC	$+V_{F3}$ (anode)
7	V_{O1}	GND	$+V_{F4}$ (anode)
8	V_{CC}	V_{O1}	$-V_{F4}$ (cathode)
9	---	NC	NC
10	---	V_{CC1}	GND
11	---	NC	V_{O4}
12	---	GND	V_{O3}
13	---	V_{O2}	V_{O2}
14	---	NC	V_{O1}
15	---	V_{CC2}	V_{CC}
16	---	NC	NC
17	---	NC	---
18	---	NC	---
19	---	$+V_{F2}$ (anode)	---
20	---	$-V_{F2}$ (cathode)	---

NOTE: NC is no connection.

FIGURE 2. Terminal connections.

Device types 01 and 04

(Each channel)

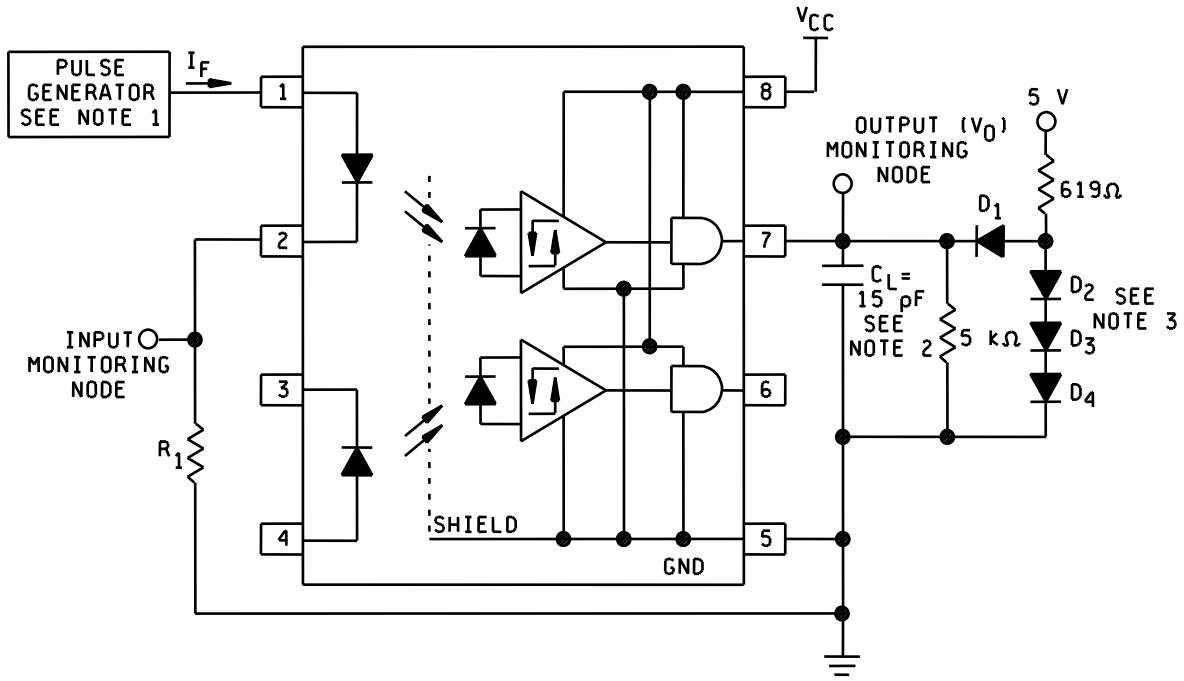


FIGURE 3. Propagation delay times test circuit and waveform.

Device types 02 and 05

(Each channel)

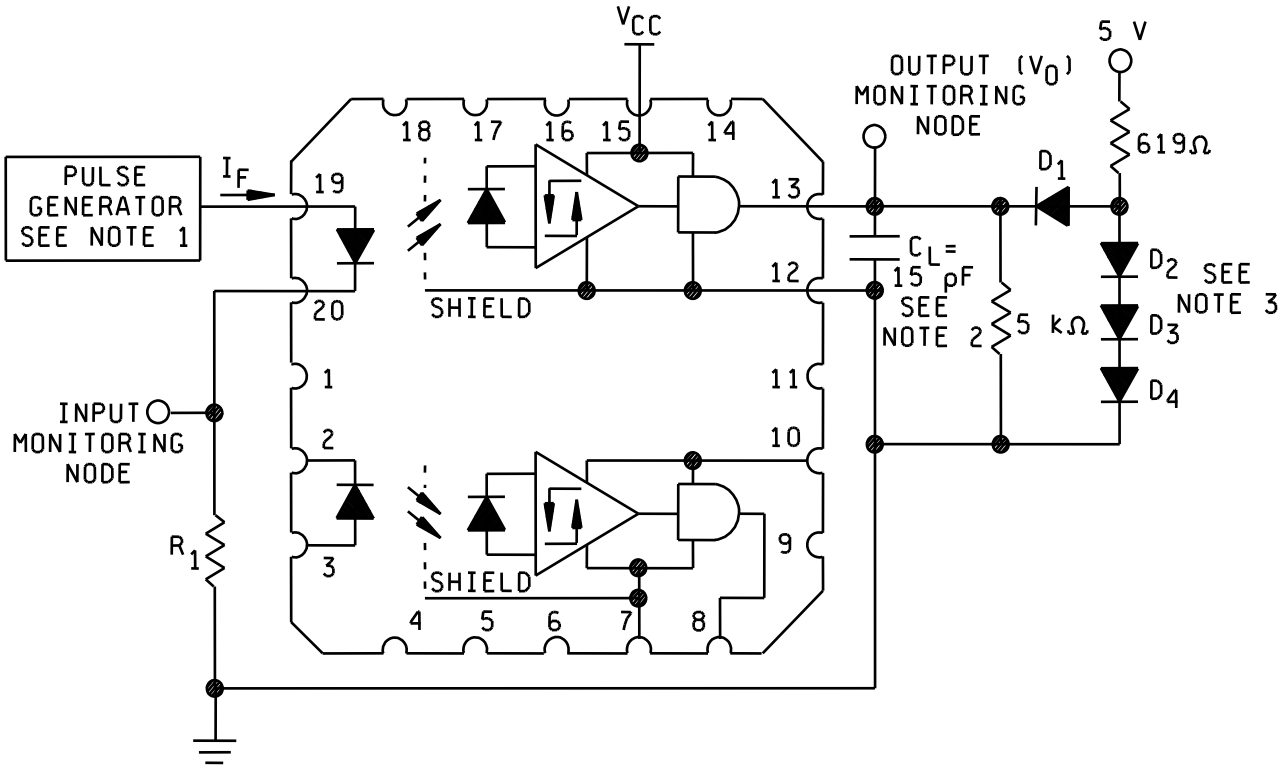


FIGURE 3. Propagation delay times test circuit and waveform - Continued.

Device types 03 and 06

(Each channel)

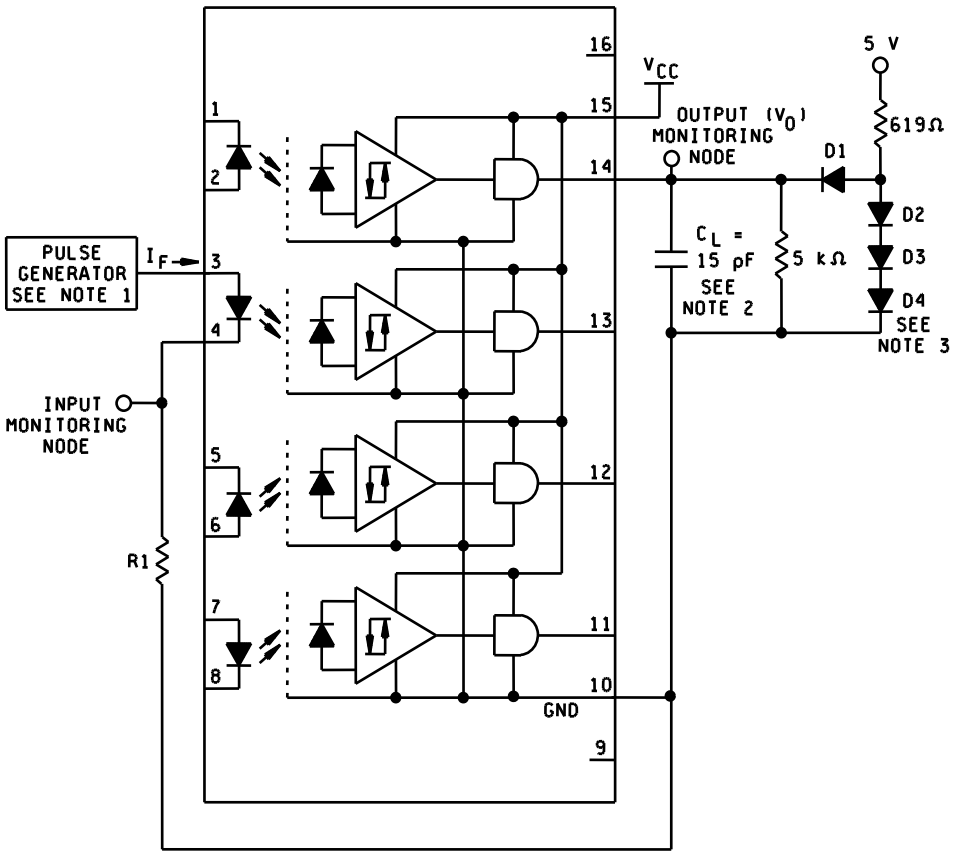
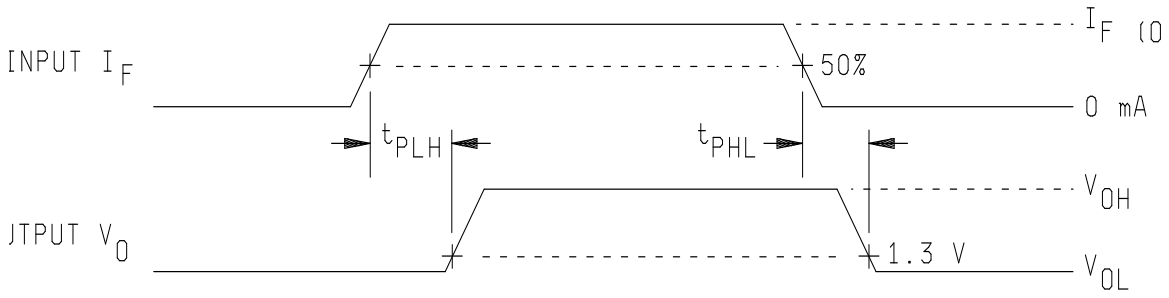


FIGURE 3. Propagation delay times test circuit and waveform - Continued.



NOTES:
1. Pulse generator having the following characteristics:
   $t_r = t_f = 5.0$ ns
   f = 100 kHz
   10% duty cycle
2. Load capacitance (C_L) includes probe and jig capacitance.
3. All diodes (D_1 through D_4) are 1N916 or 1N3064.

FIGURE 3. Propagation delay times test circuit and waveform - Continued.

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.

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 eithe DLA Land and Maritime -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 DLA Land and Maritime -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 DLA Land and Maritime when a system application requires configuration control and the applicable SMD to that system. DLA Land and Maritime 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 DLA Land and Maritime-VA, telephone (614) 692-0547.

6.5 Comments. Comments on this drawing should be directed to DLA Land and Maritime-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 DLA Land and Maritime-VA and have agreed to this drawing.

STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 12-04-25

Approved sources of supply for SMD 5962-88769 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 DLA Land and Maritime -VA. This information bulletin is superseded by the next dated revisions of MIL-HDBK-103 and QML-38534. DLA Land and Maritime maintains an online database of all current sources of supply at http://www.landandmaritime.dla.mil/Programs/Smcr/.

Standard microcircuit drawing PIN 1/	Vendor CAGE number	Vendor similar PIN 2/
5962-8876901PA 5962-8876901PC	50434 50434	HCPL-5231#200 HCPL-5231
5962-8876901XA	50434	HCPL-5231#300
5962-8876901YA 5962-8876901YC	50434 50434	HCPL-5231#100 HCPL-5231#100
5962-88769022A	50434	HCPL-6231
5962-8876903FC	50434	HCPL-6251
5962-8876904KPA 5962-8876904KPC	50434 50434	HCPL-523K#200 HCPL-523K
5962-8876904KXA	50434	HCPL-523K#300
5962-8876904KYA 5962-8876904KYC	50434 50434	HCPL-523K#100 HCPL-523K#100
5962-8876905K2A	50434	HCPL-623K
5962-8876906KFC	50434	HCPL-625K

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	Avago Technologies U.S. Incorporated Division Avago Technologies 350 West Trimble Road San Jose, CA 95131