

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Changed to reflect MIL-H-38534 processing. Editorial changes throughout.	92-03-23	K. A. Cottongim
B	Changed in accordance with NOR 5962-R111-95.	95-04-11	K. A. Cottongim
C	Add vendor CAGE codes 31757 and 51651. Changes to table I.	98-03-05	K. A. Cottongim
D	Changes to table I, conditions column for device type 02. Add case outline Y.	99-02-19	K. A. Cottongim
E	Updated drawing to the latest requirements. -sld	05-04-04	Raymond Monnin
F	Updated drawing paragraphs -sld	12-02-02	Charles F. Saffle
G	Add device types 03 and 04. -gc	13-05-20	Charles F. Saffle

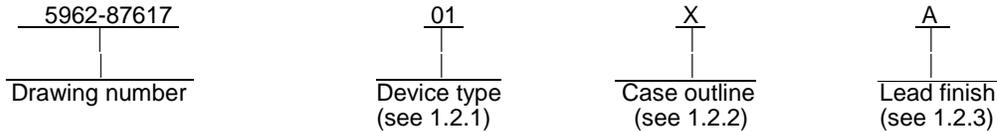
THE ORIGINAL FIRST PAGE OF THIS DRAWING HAS BEEN REPLACED.

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REV STATUS	REV	G	G	G	G	G	G	G	G	G	G	G	G	G	G				
OF SHEETS	SHEET	1	2	3	4	5	6	7	8	9	10	11	12						
PMIC N/A	PREPARED BY Charles E. Besore	<p align="center">DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990 http://www.landandmaritime.dla.mil/</p>																	
<p align="center">STANDARD MICROCIRCUIT DRAWING</p> <p align="center">THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE</p> <p align="center">AMSC N/A</p>	CHECKED BY D. A. DiCenzo																		
	APPROVED BY Robert P. Evans	<p align="center">MICROCIRCUIT, HYBRID, DIGITAL, HIGH VOLTAGE DRIVERS</p>																	
	DRAWING APPROVAL DATE 87-11-10																		
	REVISION LEVEL G	SIZE A	CAGE CODE 67268	5962-87617															
		SHEET 1 OF 12																	

1. SCOPE

1.1 Scope. This drawing describes device requirements for class H hybrid microcircuits to processed in accordance with MIL-PRF-38534.

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



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

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	0006, 51992, 11105, 11563	1.5 amperes, high voltage driver
02	0008	3.0 amperes, high voltage, high current driver
03	0006	1.5 amperes, high voltage driver
04	0008	3.0 amperes, high voltage, high current driver

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

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
X	See figure 1	10	Can (with standoff)
Y	See figure 1	10	Can (without standoff)

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

1.3 Absolute maximum ratings. 1/ 2/

Peak power supply voltage (V_P), for less than 0.1 s	+60 V dc
Continuous supply voltage (V_S)	+45 V dc
Input voltage (V_{IN})	+5.5 V dc
Input extender current (I_X)	5.0 mA
Peak output current (I_{OUT}), 50 ms on, 1 s off:	
Device type 01,03	1.5 A
Device type 02,04	3.0 A
Continuous output current (I_{OUTC}):	
Device type 01,03	0.4 A
Device type 02,04	0.5 A
Thermal resistance, junction-to-case (θ_{JC})	(See MIL-STD-1835)
Power dissipation (P_D), $T_A = +25^\circ\text{C}$:	
Device type 01,03	750 mW 3/
Device type 02,04	950 mW 3/
Junction temperature (T_J)	+175°C
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C

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/ Unless otherwise specified, all voltages are referenced to ground.

3/ Derate at 210°C/W above $T_A = +25^\circ\text{C}$.

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1.4 Recommended operating conditions.

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 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 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 <http://quicksearch.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 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 1.2.2 herein and figure 1.

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

3.2.3 Switching time waveform(s). The switching time 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.

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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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Logic "1" input voltage <u>1/</u>	V _{IH}	10 V ≤ V _{CC} ≤ 45 V	1,2,3	01,02	2.0		V
		20 V ≤ V _{CC} ≤ 45 V		03,04	2.0		
Logic "0" input voltage <u>1/</u>	V _{IL}	10 V ≤ V _{CC} ≤ 45 V	1,2,3	01,02		0.8	V
		20 V ≤ V _{CC} ≤ 45 V		03,04		0.8	
Logic "1" output voltage	V _{OH}	V _{CC} = 10 V, V _{IN} = 2 V, <u>1/</u> I _{OUT} = 150 mA	1, 2, 3	01	8.8		V
		V _{CC} = 28 V, V _{IN} = 2 V, R _L = 82 Ω			26.5		
		V _{CC} = 28 V, V _{IN} = 2 V, R _L = 40 Ω	1, 2, 3	02	26.5		
		V _{CC} = 45 V, V _{IN} = 2 V, <u>1/</u> I _{OUT} = 1.6 A		02,04	43.0		
		V _{CC} = 20 V, V _{IN} = 2 V, <u>1/</u> R _L = 82 Ω	1, 2, 3	03	13		
		V _{CC} = 28 V, V _{IN} = 2 V, R _L = 82 Ω			26.5		
		V _{CC} = 20 V, V _{IN} = 2 V, R _L = 100 Ω	1, 2, 3	04	13		
		V _{CC} = 28 V, V _{IN} = 2 V, R _L = 40 Ω			26.5		
Logic "0" output voltage	V _{OL}	V _{CC} = 45 V, V _{IN} = 0.8 V, R _L = 100 Ω	1, 2, 3	01,03		10	mV
				02,04		100	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Logic "1" input current <u>1/</u>	I _{IH}	V _{CC} = 45 V, V _{IN} = 2.4 V	1,2,3	All		5.0	μA
		V _{CC} = 45 V, V _{IN} = 5.5 V				100	
Logic "0" input current <u>1/</u>	I _{IL}	V _{CC} = 45 V, V _{IN} = 0.4 V	1, 2, 3	All	-1.0		mA
Input breakdown voltage <u>1/</u>	B _{VIN}		1,2,3	All	5.5		V
"Off" power supply current	I _{CC(off)}	V _{CC} = 45 V, V _{IN} = 0.8 V	1,2,3	01,03		2.0	mA
		V _{CC} = 45 V, V _{IN} = 0 V		02,04		2.0	
"On" power supply current	I _{CC(on)}	V _{CC} = 45 V, V _{IN} = 2 V, I _{OUT} = 0 mA	1, 2, 3	All		8.0	mA
Rise time <u>2/</u>	t _r	V _{CC} = 28 V, V _{IN} = 5 V, R _L = 82 Ω, see figure 3	9, 10, 11	01,03		300	ns
		V _{CC} = 28 V, V _{IN} = 5 V, R _L = 40 Ω, see figure 3		02,04		500	
Fall time <u>2/</u>	t _f	V _{CC} = 28 V, V _{IN} = 5 V, R _L = 82 Ω, see figure 3	9, 10, 11	01,03		1.7	μs
		V _{CC} = 28 V, V _{IN} = 5 V, R _L = 40 Ω, see figure 3	9,11	02,04		4.0	
			10			6.0	
Turn on time <u>2/</u>	t _{ON}	V _{CC} = 28 V, V _{IN} = 5 V, R _L = 82 Ω, see figure 3	9, 10, 11	01,03		1.0	μs
		V _{CC} = 28 V, V _{IN} = 5 V, R _L = 40 Ω, see figure 3		02,04		1.0	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

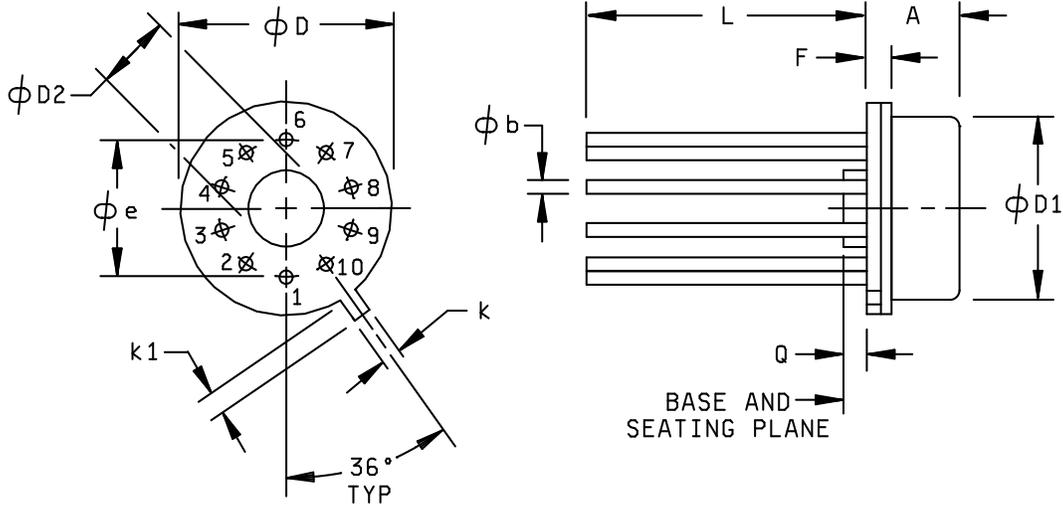
Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Turn off time <u>2/</u>	t _{OFF}	V _{CC} = 28 V, V _{IN} = 5 V, R _L = 82 Ω, see figure 3	9, 10, 11	01,03		8.0	μs
		V _{CC} = 28 V, V _{IN} = 5 V, R _L = 40 Ω, see figure 3	9,11	02,04		10	
			10			14	

1/ Parameter shall be guaranteed to the limits specified in table I for all lots not specifically tested.

2/ Subgroups 10 and 11 shall be tested as part of device initial characterization and after design and process changes. Parameter shall be guaranteed to the limits specified in table I for all lots not specifically tested.

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Case outline X.



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	3.94	4.70	.155	.185
ϕb	0.38	0.48	.015	.019
ϕD	8.51	9.40	.335	.370
$\phi D1$	7.75	8.51	.305	.335
$\phi D2$	3.05	4.06	.120	.160
ϕe	5.84 BSC		.230 BSC	
F		1.02		.040
k	0.66	0.86	.026	.034
k1	0.74	1.14	.029	.045
L	12.70		.500	
Q		1.27		.050

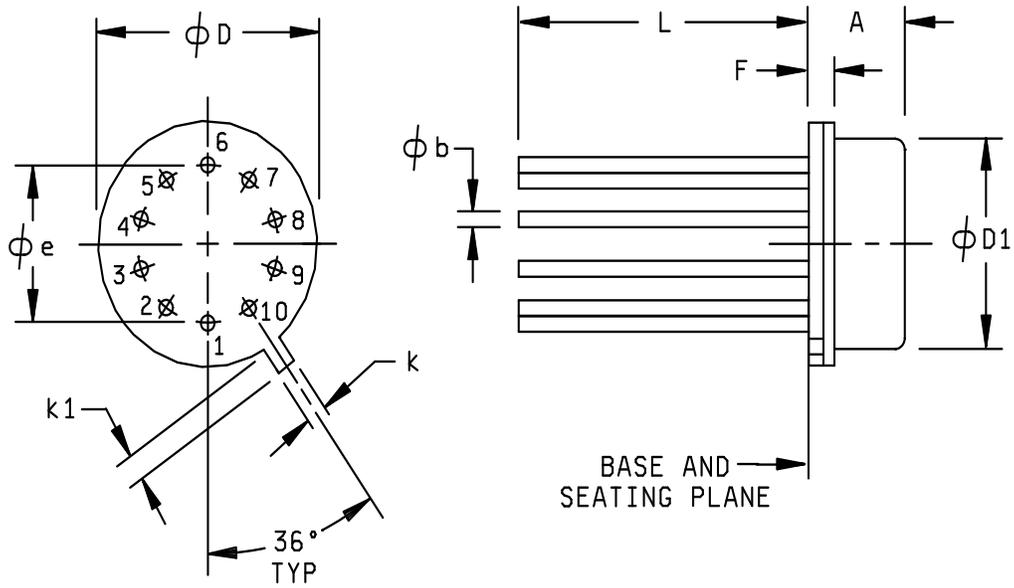
NOTES:

1. The U.S. 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 numbers shown for reference only.

FIGURE 1. Case outline(s).

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Case outline Y.



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	3.94	4.70	.155	.185
ϕb	0.38	0.48	.015	.019
ϕD	8.51	9.40	.335	.370
$\phi D1$	7.75	8.51	.305	.335
ϕe	5.84 BSC		.230 BSC	
F		1.02		.040
k	0.66	0.86	.026	.034
k1	0.74	1.14	.029	.045
L	12.70		.500	

NOTES:

1. The U.S. 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 numbers shown for reference only.

FIGURE 1. Case outline(s) - Continued.

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DEVICE TYPES 01 AND 03

DEVICE TYPES 02 AND 04

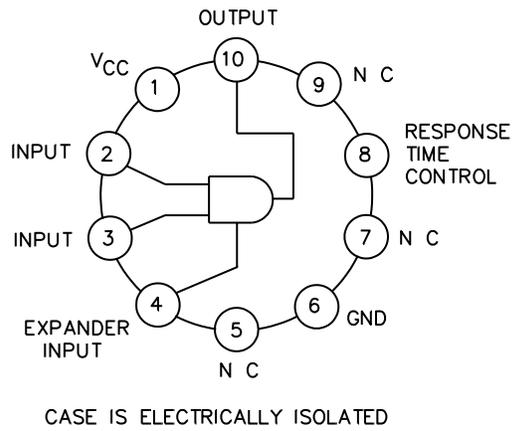
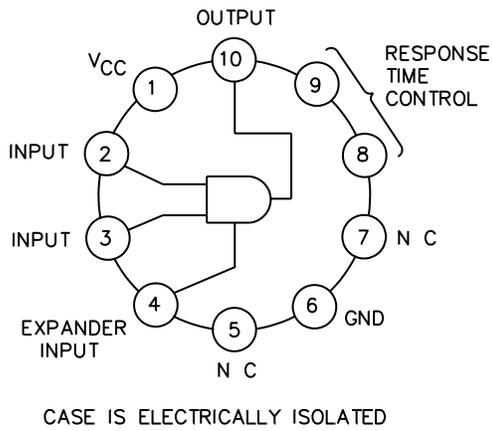


FIGURE 2. Terminal connections and functional diagram (top view).

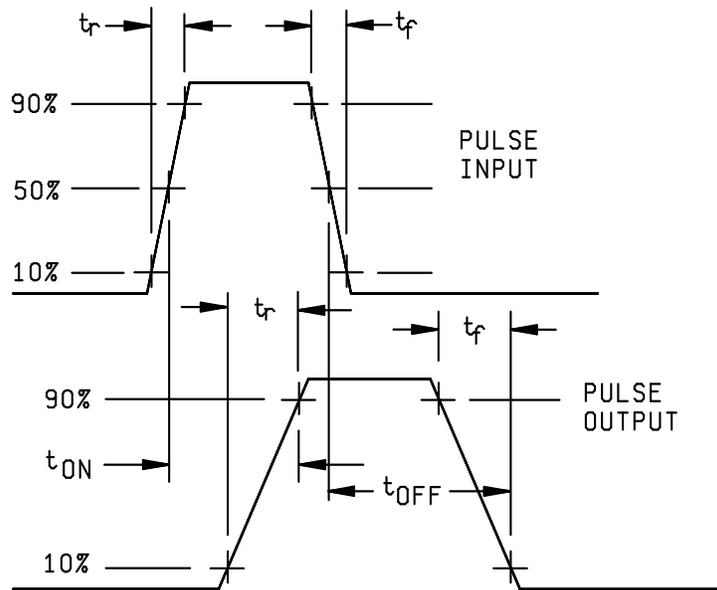


FIGURE 3. Switching time waveforms.

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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.

4.2 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 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.

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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) 692-8108.

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.

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STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 13-05-20

Approved sources of supply for SMD 5962-87617 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 <u>1/</u>	Vendor CAGE number	Vendor similar PIN <u>2/</u>
5962-8761701XA 5962-8761701XA 5962-8761701XA 5962-8761701XA 5962-8761701XC 5962-8761701XC 5962-8761701XC 5962-8761701XC	31757 <u>3/</u> <u>3/</u> U4388 31757 <u>3/</u> <u>3/</u> U4388	51992 MSK 0006H 11105-DESC 11563-DESC 51992 MSK 0006H 11105-DESC 11563-DESC
5962-8761701YA 5962-8761701YC	U4388 U4388	11105-DESC 11105-DESC
5962-8761702XA 5962-8761702XC	<u>3/</u> <u>3/</u>	MSK 0008H MSK 0008H
5962-8761703XA 5962-8761703XC	51651 51651	MSK 0006H MSK 0006H
5962-8761704XA 5962-8761704XC	51651 51651	MSK 0008H MSK 0008H

- 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.
- 3/ Not available from an approved source.

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DATE: 13-05-20

<u>Vendor CAGE number</u>	<u>Vendor name and address</u>
31757	Micropac Industries, Incorporated. 905 East Walnut Street Garland, TX 75040
51651	M. S. Kennedy Corporation 4707 Dey Road Liverpool, NY 13088
U4388	C-Mac Microelectronics, Limited. South Denes Great Yarmouth Norfolk NR30 3PX England

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