

REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Add case outline 2. Make changes to 1.3 and Figure 1. Make changes to E _{ND} and V _{OUT} tests as specified under Table I. Changes in accordance with N.O.R. 5962-R228-92.	92-08-11	M. A. FRYE
B	Add case outline D. Make changes to 1.2.2 and Figure 1. Changes in accordance with N.O.R. 5962-R047-95.	94-12-14	M. A. FRYE
C	Make changes to E _N , E _{ND} , and A _{VO} tests as specified under Table I. Changes in accordance with N.O.R. 5962-R190-95.	95-08-16	M. A. FRYE
D	Add case outline X. Make changes to 1.2.2 and Figure 1. Changes in accordance with N.O.R. 5962-R146-97.	96-12-03	R. MONNIN
E	Make changes to slew rate test as specified under TABLE I herein. Redrawn. - ro	98-12-11	R. MONNIN
F	Drawing updated to reflect current requirements. -rrp	03-07-01	R. MONNIN
G	Corrected typo by renumbering the pages. - gt	04-02-06	R. MONNIN
H	Update boilerplate paragraphs. - ro	09-08-24	C. SAFFLE
J	Update drawing to current MIL-PRF-38535 requirements. -rrp	15-07-24	C. SAFFLE
K	Add device type 03 along with device class V and RHA requirements. Add table IIB. - ro	16-01-07	C. SAFFLE



REV																			
SHEET																			
REV	K	K	K																
SHEET	15	16	17																
REV STATUS OF SHEETS	REV			K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	
	SHEET			1	2	3	4	5	6	7	8	9	10	11	12	13	14		

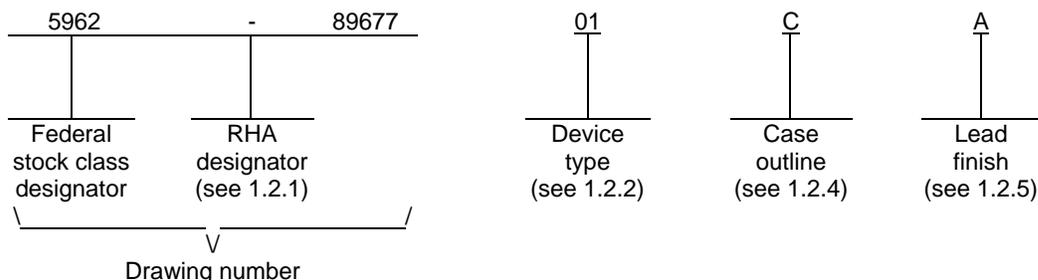
PMIC N/A	PREPARED BY RICK OFFICER	DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990 http://www.landandmaritime.dla.mil																
STANDARD MICROCIRCUIT DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A	CHECKED BY CHARLES REUSING																	
	APPROVED BY MICHAEL A. FRYE	MICROCIRCUIT, LINEAR, QUAD PRECISION OPERATIONAL AMPLIFIER, MONOLITHIC SILICON																
	DRAWING APPROVAL DATE 89-10-19																	
	REVISION LEVEL K	SIZE A	CAGE CODE 67268	5962-89677														
SHEET 1 OF 17																		

1. SCOPE

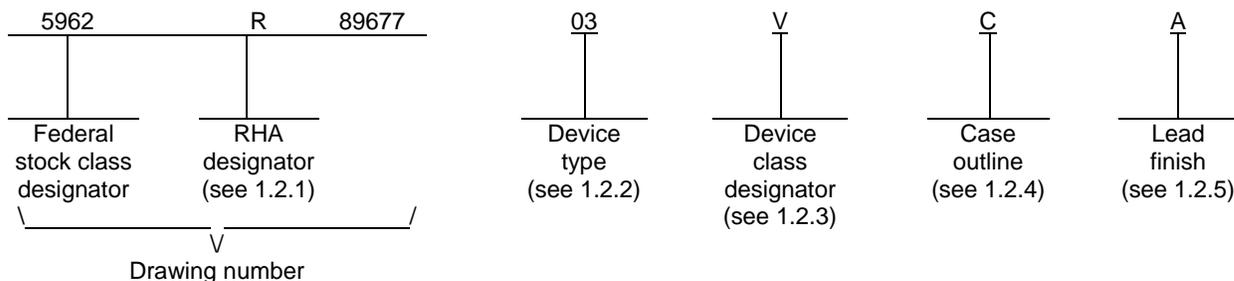
1.1 Scope. This drawing documents two product assurance class levels consisting of high reliability (device class Q and M) and space application (device class V). A choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of Radiation Hardness Assurance (RHA) levels is reflected in the PIN.

1.2 PIN. The PIN is as shown in the following examples.

For device class M and Q:



For device class V:



1.2.1 RHA designator. Device classes Q and V RHA marked devices meet the MIL-PRF-38535 specified RHA levels and are marked with the appropriate RHA designator. Device class M RHA marked devices meet the MIL-PRF-38535, appendix A specified RHA levels and are 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:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	LT1014A	Quad precision operational amplifier
02	LT1014	Quad precision operational amplifier
03	RH1014	RHA, Quad precision operational amplifier

1.2.3 Device class designator. The device class designator is a single letter identifying the product assurance level as listed below. Since the device class designator has been added after the original issuance of this drawing, device classes M and Q designators will not be included in the PIN and will not be marked on the device.

<u>Device class</u>	<u>Device requirements documentation</u>
M	Vendor self-certification to the requirements for MIL-STD-883 compliant, non-JAN class level B microcircuits in accordance with MIL-PRF-38535, appendix A
Q or V	Certification and qualification to MIL-PRF-38535

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1.2.4 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>
C	GDIP1-T14 or CDIP2-T14	14	Dual-in-line
D	GDFP1-F14 or CDFP2-F14	14	Flat pack
X	CDFP3-F14	14	Flat pack
2	CQCC1-N20	20	Square leadless chip carrier

1.2.5 Lead finish. The lead finish is as specified in MIL-PRF-38535 for device classes Q and V or MIL-PRF-38535, appendix A for device class M.

1.3 Absolute maximum ratings. ^{1/}

Positive supply voltage (V ₊)	+22 V
Negative supply voltage (V ₋)	-22 V
Power dissipation (P _D)	500 mW ^{2/ 3/}
Differential input voltage	±30 V
Input voltage	Equal to positive supply voltage 5 V below negative supply voltage
Output short-circuit duration	Indefinite
Storage temperature range	-65°C to +150°C
Lead temperature:	
Device types 01 and 02 (soldering, 60 seconds)	
Cases C, D, and X	+300°C
Case 2	+260°C
Device type 03 (soldering, 10 seconds)	+300°C
Junction temperature (T _J)	-65°C to +150°C
Thermal resistance, junction-to-case (θ _{JC})	See MIL-STD-1835
Thermal resistance, junction-to-ambient (θ _{JA}):	
Device types 01 and 02:	
Cases C and X	100°C/W
Case D	180°C/W
Case 2	65°C/W
Device type 03:	
Case C	95°C/W
Case D	160°C/W

1.4 Recommended operating conditions.

Positive supply voltage (V ₊)	+15 V
Negative supply voltage (V ₋)	-15 V
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/} Must withstand the added P_D due to short circuit test; e.g., I_{OS}.

^{3/} For device type 03, parameter is guaranteed by design, characterization, or correlation to the other tested parameters.

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1.5 Radiation features.

For device type 03:

Maximum total dose available (dose rate = 50 – 300 rads(Si)/s) = 100 krads(Si) 4/
 Maximum total dose available (dose rate = 10 mrads(Si)/s) = 50 krads(Si) 4/

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-38535 - Integrated Circuits, Manufacturing, 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.

4/ Device type 03 has been irradiation tested at high dose rate and low dose rate. The end point limits for the noted parameters are guaranteed only for the conditions as specified in MIL-STD-883, method 1019, condition A to a maximum total dose of 100 krads(Si), and condition D to a maximum total dose of 50 krads (Si). However, device type 03 may be dose rate sensitive in a space environment and may demonstrate enhanced low dose rate effects to 100 krads (Si).

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3. REQUIREMENTS

3.1 Item requirements. The individual item requirements for device classes Q and V shall be in accordance with MIL-PRF-38535 and as specified herein 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. The individual item requirements for device class M shall be in accordance with MIL-PRF-38535, appendix A for non-JAN class level B devices and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein for device classes Q and V or MIL-PRF-38535, appendix A and herein for device class M.

3.2.1 Case outlines. The case outlines shall be in accordance with 1.2.4 herein.

3.2.2 Terminal connections. The terminal connections shall be as specified in figure 1.

3.2.3 Radiation exposure circuit. The radiation exposure circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing and acquiring activity upon request.

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

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

3.5 Marking. The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked. For packages where marking of the entire SMD PIN number is not feasible due to space limitations, the manufacturer has the option of not marking the "5962-" on the device. For RHA product using this option, the RHA designator shall still be marked. Marking for device classes Q and V shall be in accordance with MIL-PRF-38535. Marking for device class M shall be in accordance with MIL-PRF-38535, appendix A.

3.5.1 Certification/compliance mark. The certification mark for device classes Q and V shall be a "QML" or "Q" as required in MIL-PRF-38535. The compliance mark for device class M shall be a "C" as required in MIL-PRF-38535, appendix A.

3.6 Certificate of compliance. For device classes Q and V, a certificate of compliance shall be required from a QML-38535 listed manufacturer in order to supply to the requirements of this drawing (see 6.6.1 herein). For device class M, a certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-HDBK-103 (see 6.6.2 herein). The certificate of compliance submitted to DLA Land and Maritime-VA prior to listing as an approved source of supply for this drawing shall affirm that the manufacturer's product meets, for device classes Q and V, the requirements of MIL-PRF-38535 and herein or for device class M, the requirements of MIL-PRF-38535, appendix A and herein.

3.7 Certificate of conformance. A certificate of conformance as required for device classes Q and V in MIL-PRF-38535 or for device class M in MIL-PRF-38535, appendix A shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change for device class M. For device class M, notification to DLA Land and Maritime-VA of change of product (see 6.2 herein) involving devices acquired to this drawing is required for any change that affects this drawing.

3.9 Verification and review for device class M. For device class M, DLA Land and Maritime, DLA Land and Maritime's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

3.10 Microcircuit group assignment for device class M. Device class M devices covered by this drawing shall be in microcircuit group number 049 (see MIL-PRF-38535, appendix A).

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions <u>1/ 2/</u> -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit	
					Min	Max		
Input offset voltage <u>3/</u>	V _{OS}		1	01		±180	μV	
			2,3			±350		
			1	02		±300		
			2,3			±550		
			1	03		300		
			2,3			550		
			D		1			450
			L		1			600
			R		1			750
Input offset current <u>3/</u>	I _{OS}		1	01		±0.8	nA	
			2,3			±2.8		
			1	02		±1.5		
			2,3			±5		
			1	03		10		
			2,3			20		
			D		1			10
			L		1			15
			R		1			20
Input bias current <u>3/</u>	I _B		1	01		±20	nA	
			2,3			±30		
			1	02		±30		
			2,3			±45		
			1	03		30		
			2,3			45		
			D		1			60
			L		1			100
			R		1			175

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions <u>1/ 2/</u> -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit	
					Min	Max		
Input voltage range <u>3/ 4/</u>	IVR		1	01	-15.0	+13.5	V	
			2,3		-14.9	+13.0		
			1	02	-15.0	+13.5		
			2,3		-14.9	+13.0		
			1	03	-15.0	13.5		
			2		0	3.5		
D, L, R	1	-15.0	13.5					
Common mode <u>3/</u> rejection ratio	CMRR	V _{CM} = +13.5 V, -15.0 V	1	01	100		dB	
		V _{CM} = +13.0 V, -14.9 V	2,3		96			
		V _{CM} = +13.5 V, -15.0 V	1	02, 03	97			
		V _{CM} = +13.0 V, -14.9 V	2,3		94			
		V _{CM} = +13.0 V, -15.0 V	D	1	03	97		
			L			94		
R	90							
Power supply rejection <u>3/</u> ratio	PSRR	V ₊ = +2 V to +18 V,	1	01	103		dB	
		V ₋ = -2 V to -18 V	2,3		100			
		V ₊ = +2 V to +18 V,	1	02, 03	100			
		V ₋ = -2 V to -18 V	2,3		97			
		V = ±10 V to ±18 V	D	1	03	100		
			L			94		
R	86							

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions <u>1/ 2/</u> -55°C ≤ T _A ≤ +125°C unless otherwise specified		Group A subgroups	Device type	Limits		Unit
						Min	Max	
Output voltage swing <u>3/</u>	V _{OUT}	R _L ≥ 2 kΩ		4	01	±13		V
				5,6		±12		
				4	02, 03	±12.5		
				5,6		±11.5		
		R _L = 10 kΩ	D, L, R	4	03	±12.5		
Large signal voltage <u>3/</u> gain	A _{VO}	R _L ≥ 2 kΩ, V _O = ±10 V		4	01	1.5		V/μV
				5,6		0.4		
				4	02, 03	1.2		
				5,6		0.25		
		R _L ≥ 600 Ω, V _O = ±10 V		4	03	0.5		
		R _L ≥ 2 kΩ, V _O = ±10 V	D	4	03	500		V/mV
			L			100		
R	50							
Power supply current <u>3/</u>	I _{SY}	No load each amplifier		1	01		0.5	mA
				2,3		0.6		
				1	02, 03	0.55		
				2,3		0.70		
				D, L, R		1	03	
Power dissipation <u>3/</u>	P _D	No load each amplifier, guaranteed by I _{SY} limits		1	01		15	mW
				2,3		18		
				1	02	16.5		
				2,3		21		
Channel separation <u>3/</u>	CS	T _A = +25°C <u>5/</u>		7	01	123		dB
				7	02	120		
		V _O = ±10 V, R _L = 2 kΩ		7	03	120		
Input noise voltage <u>3/ 5/</u>	E _N	f = 0.1 Hz to 10 Hz		4	01, 02		1.1	μV _{P-P}

See footnotes at end of table.

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TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions <u>1/ 2/</u> -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit	
					Min	Max		
Input noise voltage <u>3/ 5/</u> density	END	f _O = 10 Hz	4	01, 02		40	nV /	
		f _O = 1 kHz	4	01, 02		30	√Hz	
Output short circuit <u>3/ 5/</u> current	I _{SC-}	T _A = +25°C	1	01, 02		-60	mA	
	I _{SC+}		1			60		
Input resistance <u>3/ 5/</u> differential mode	R _{IN}		1	01	100		MΩ	
			1	02, 03	70			
Slew rate <u>3/</u>	SR	<u>5/</u>	4	01, 02	0.2		V/μs	
			4	03	0.2			
		R _L = 10 kΩ	D	4	03	0.13		
			L			0.11		
R	0.07							
Input offset voltage <u>3/</u> match	ΔV _{OS}	Guaranteed by V _{OS} limits	1	01		±360	μV	
			2,3			±700		
			1	02		±600		
			2,3			±1100		

See footnotes at end of table.

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TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions <u>1/ 2/</u> -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit	
					Min	Max		
Input offset voltage <u>6/</u>	V _{OS}		1	01		±280	μV	
			V _{CM} = 0.1 V	2,3	01			±480
				2	01			±960
				3	01			±480
				1	02			±450
			V _{CM} = 0.1 V	2,3	02			±750
				2	02			±1500
				3	02			±750
				1	03			450
				3	03			750
			V _{CM} = 0.1 V	2	03			750
				D	1	03		
	L		750					
	R		900					
Input offset current <u>6/</u>	I _{OS}		1	01		1.3	nA	
			2,3			7.0		
			1	02		2.0		
			2,3			10.0		
			1	03		10		
			2,3			20		
			D	1	03			10
			L					15
			R					20
			Input bias current <u>6/</u>	I _B		1		01
2,3		90						
1	02, 03					50		
2,3						120		
D	1	03					80	
L							125	
R							200	
Input voltage range <u>6/</u>	IVR					1	01	0
			1	02, 03	0	3.5		
			D, L, R	1	03	0	3.5	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions <u>1/ 2/</u> -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Output voltage swing <u>6/</u>	V _{OUT}	No load, output low	4	All		25	mV
		L	4	03		25	
		D				40	
		R				50	
		No load, output high	4	All	4		V
		L, D, R	4	03	4		
		Output low, sink = 1 mA	4	All		350	mV
		L	4	03		0.6	V
		D				1.0	
		R				1.6	
		600 Ω load, output low	4	All		10	mV
		L, D, R	4	03		10	
		600 Ω load, output low	5,6	01		15	
				02, 03		18	
		600 Ω load, output high	4	All	3.4		V
600 Ω load, output high	5,6	01	3.2				
		02, 03	3.1				
L	4	03	3.4				
D			3.0				
R			2.8				
Supply current <u>6/</u>	I _{SY}	Per amplifier	1	01		0.45	mA
			2,3			0.55	
			1	02, 03		0.50	
			2,3			0.65	
			L, D, R	1	03		

See footnotes at end of table.

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TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions <u>1/</u> <u>2/</u> -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Large signal voltage <u>5/</u> <u>6/</u> gain	A _{VO}	R _L = 2 kΩ to GND, V _O = 0.1 V to 3.4 V	4	01, 02	0.5		V/μV
Power dissipation <u>6/</u>	P _D	No load each amplifier, guaranteed by I _{SY} limits	1	01		2.25	mW
			2,3			2.75	
			1	02		2.5	
			2,3			3.25	
Power supply <u>6/</u> rejection ratio	PSRR	V ₊ = +2 V to +18 V	1	01	103		dB
		V ₋ = -2 V to -18 V	2,3		100		
		V ₊ = +2 V to +18 V	1	02	100		
		V ₋ = -2 V to -18 V	2,3		97		

- 1/ Device type 03 supplied to this drawing has been characterized through all levels D, L, and R of irradiation. However, this device is tested at RHA level L and R level. Pre and Post irradiation values are identical unless otherwise specified in Table I. When performing post irradiation electrical measurements for any RHA level, T_A = +25°C.
- 2/ Device type 03 has been irradiation tested at high dose rate and low dose rate. The end point limits for the noted parameters are guaranteed only for the conditions as specified in MIL-STD-883, method 1019, condition A to a maximum total dose of 100 krad(Si), and condition D to a maximum total dose of 50 krad (Si). However, device type 03 may be dose rate sensitive in a space environment and may demonstrate enhanced low dose rate effects to 100 krad (Si).
- 3/ Unless otherwise specified, V = ±15 V and V_{CM} = 0 V.
- 4/ IVR is guaranteed by CMRR test.
- 5/ If not tested, shall be guaranteed to the limits specified in table I herein.
- 6/ Unless otherwise specified, V₊ = +5 V, V₋ = 0 V, V_{CM} = 0 V, and V_{OUT} = 1.4 V.

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Device types	01, 02 and 03	02 and 03	02	01 and 02
Case outlines	C	D	X	2
Terminal number	Terminal symbol			
1	OUT A	OUT A	OUT A	NC
2	-IN A	-IN A	-IN A	OUT A
3	+IN A	+IN A	+IN A	-IN A
4	V+	V+	V+	+IN A
5	+IN B	+IN B	+IN B	NC
6	-IN B	-IN B	-IN B	V+
7	OUT B	OUT B	OUT B	NC
8	OUT C	OUT C	OUT C	+IN B
9	-IN C	-IN C	-IN C	-IN B
10	+IN C	+IN C	+IN C	OUT B
11	V-	V-	V-	NC
12	+IN D	+IN D	+IN D	OUT C
13	-IN D	-IN D	-IN D	-IN C
14	OUT D	OUT D	OUT D	+IN C
15	---	---	---	NC
16	---	---	---	V-
17	---	---	---	NC
18	---	---	---	+IN D
19	---	---	---	-IN D
20	---	---	---	OUT D

FIGURE 1. Terminal connections.

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4. VERIFICATION

4.1 Sampling and inspection. For device classes Q and V, sampling and inspection procedures shall be in accordance with MIL-PRF-38535 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. For device class M, sampling and inspection procedures shall be in accordance with MIL-PRF-38535, appendix A.

4.2 Screening. For device classes Q and V, screening shall be in accordance with MIL-PRF-38535, and shall be conducted on all devices prior to qualification and technology conformance inspection. For device class M, screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection.

4.2.1 Additional criteria for device class M.

- 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 the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1015.
 - (2) T_A = +125°C, minimum.
- b. Interim and final electrical test parameters shall be as specified in table IIA herein.

4.2.2 Additional criteria for device classes Q and V.

- a. The burn-in test duration, test condition and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document revision level control of the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. 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.
- b. Interim and final electrical test parameters shall be as specified in table IIA herein.
- c. Additional screening for device class V beyond the requirements of device class Q shall be as specified in MIL-PRF-38535, appendix B.

4.3 Qualification inspection for device classes Q and V. Qualification inspection for device classes Q and V shall be in accordance with MIL-PRF-38535. Inspections to be performed shall be those specified in MIL-PRF-38535 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.4).

4.4 Conformance inspection. Technology conformance inspection for classes Q and V shall be in accordance with MIL-PRF-38535 including groups A, B, C, D, and E inspections and as specified. Quality conformance inspection for device class M shall be in accordance with MIL-PRF-38535, appendix A and as specified herein. Inspections to be performed for device class M shall be those specified in method 5005 of MIL-STD-883 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.4).

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TABLE IIA. Electrical test requirements.

Test requirements	Subgroups (in accordance with MIL-STD-883, method 5005, table I)	Subgroups (in accordance with MIL-PRF-38535, table III)	
	Device class M	Device class Q	Device class V
Interim electrical parameters (see 4.2)	1	1	1
Final electrical parameters (see 4.2)	1,2,3,4,5,6 <u>1/</u>	1,2,3,4,5,6 <u>1/</u>	1,2,3, <u>1/ 3/</u> 4,5,6
Group A test requirements (see 4.4)	1,2,3,4,5,6,7 <u>2/</u>	1,2,3,4, <u>2/</u> 5,6,7	1,2,3,4, <u>2/</u> 5,6,7
Group C end-point electrical parameters (see 4.4)	1	1	1,2,3 <u>3/</u>
Group D end-point electrical parameters (see 4.4)	1	1	1,2,3
Group E end-point electrical parameters (see 4.4)	---	---	1,7 <u>2/</u>

1/ PDA applies to subgroup 1.

2/ Subgroup 7, if not tested, shall be guaranteed to the limits specified in table I.

3/ Delta limits as specified in table IIB shall be required where specified,
and the delta limits shall be completed with reference to the zero hour
electrical parameters (see table I).

TABLE IIB. Burn-in and operating life test delta parameters. $T_A = +25^\circ\text{C}$. 1/

Parameters	Symbol	Endpoint limit		Delta limits		Units
		Min	Max	Min	Max	
Input offset voltage	V_{OS}	-300	300	-200	200	μV
Input bias current	+I _B	-30	30	-4	4	nA
	-I _B	-30	30	-4	4	nA

1/ $V_S = \pm 15\text{ V}$ and $V_{CM} = 0\text{ V}$. Deltas are performed at room temperature.

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4.4.1 Group A inspection.

- a. Tests shall be as specified in table IIA herein.
- b. Subgroups 8, 9, 10, and 11 in table I, method 5005 of MIL-STD-883 shall be omitted.

4.4.2 Group C inspection. The group C inspection end-point electrical parameters shall be as specified in table IIA herein.

4.4.2.1 Additional criteria for device class M. Steady-state life test conditions, method 1005 of MIL-STD-883:

- a. 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 the preparing or acquiring activity upon request. 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.
- b. $T_A = +125^{\circ}\text{C}$, minimum.
- c. Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.4.2.2 Additional criteria for device classes Q and V. The steady-state life test duration, test condition and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The test circuit shall be maintained under document revision level control by the device manufacturer's TRB in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing activity upon request. 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.

4.4.3 Group D inspection. The group D inspection end-point electrical parameters shall be as specified in table IIA herein.

4.4.4 Group E inspection. Group E inspection is required only for parts intended to be marked as radiation hardness assured (see 3.5 herein).

- a. End-point electrical parameters shall be as specified in table IIA herein.
- b. For device classes Q and V, the devices or test vehicle shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38535 for the RHA level being tested. For device class M, the devices shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38535, appendix A for the RHA level being tested. All device classes must meet the postirradiation end-point electrical parameter limits as defined in table I at $T_A = +25^{\circ}\text{C} \pm 5^{\circ}\text{C}$, after exposure, to the subgroups specified in table IIA herein.

4.4.4.1 Total dose irradiation testing. Total dose irradiation testing shall be performed in accordance with MIL-STD-883 method 1019 condition A and condition D as specified herein.

4.4.4.1.1 Accelerated annealing test. Accelerated annealing tests shall be performed on all devices requiring a RHA level greater than 5 krad(Si). The post-anneal end-point electrical parameter limits shall be as specified in table I herein and shall be the pre-irradiation end-point electrical parameter limit at $+25^{\circ}\text{C} \pm 5^{\circ}\text{C}$. Testing shall be performed at initial qualification and after any process or design changes which may affect the RHA response of the device.

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5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38535 for device classes Q and V or MIL-PRF-38535, appendix A for device class M.

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.

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

6.2 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished using DD Form 1692, Engineering Change Proposal.

6.3 Record of users. Military and industrial users should inform DLA Land and Maritime when a system application requires configuration control and which SMD's are applicable 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.

6.4 Comments. Comments on this drawing should be directed to DLA Land and Maritime-VA, Columbus, Ohio 43218-3990, or telephone (614) 692-0540.

6.5 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-PRF-38535 and MIL-HDBK-1331.

6.6 Sources of supply.

6.6.1 Sources of supply for device classes Q and V. Sources of supply for device classes Q and V are listed in MIL-HDBK-103 and QML-38535. The vendors listed in QML-38535 have submitted a certificate of compliance (see 3.6 herein) to DLA Land and Maritime-VA and have agreed to this drawing.

6.6.2 Approved sources of supply for device class M. Approved sources of supply for class M are listed in MIL-HDBK-103. The vendors listed in MIL-HDBK-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DLA Land and Maritime-VA.

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STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 16-01-07

Approved sources of supply for SMD 5962-89677 are listed below for immediate acquisition information only and shall be added to MIL-HDBK-103 and QML-38535 during the next revision. MIL-HDBK-103 and QML-38535 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 revision of MIL-HDBK-103 and QML-38535. 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>
5962-8967701CA	01295	LT1014AMJB
	60264	MTLT1014AQD
	<u>3/</u>	LT1014AMJ/883
5962-8967701XA	60264	MTLT1014AQWB
5962-89677012A	01295	LT1014AMFKB
	60264	MTLT1014AQLS
5962-8967702CA	01295	LT1014MJB
	60264	MTLT1014QD
	<u>3/</u>	LT1014MJ/883
5962-8967702DA	<u>3/</u>	LT1014MW/883
5962-8967702XA	60264	MTLT1014QWB
	<u>3/</u>	LT1014MW/883
5962-89677022A	01295	LT1014MFKB
	60264	MTLT1014QLS
5962R8967703VCA	64155	RH1014MJ
5962R8967703VDA	64155	RH1014MW

- 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 of supply.

STANDARD MICROCIRCUIT DRAWING BULLETIN - Continued

DATE: 16-01-07

<u>Vendor CAGE number</u>	<u>Vendor name and address</u>
01295	Texas Instruments, Inc. Semiconductor Group 8505 Forest Lane P.O. Box 660199 Dallas, TX 75243
60264	Minco Technology Labs, Inc. 1805 Rutherford Lane Austin, TX 78754-5101
64155	Linear Technology Corporation 1630 McCarthy Boulevard Milpitas, CA 95035-7417

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