REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Add case outlines Y and Z.	99-08-11	Ray Monnin

REV																			
SHEET																			
REV																			
SHEET																			

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

PMIC N/A

STANDARD MICROCIRCUIT DRAWING

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

AMSC N/A

PREPARED BY
Gary Zahn

CHECKED BY
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DRAWING APPROVAL DATE
96-06-28

REVISION LEVEL
A

DEFENSE SUPPLY CENTER COLUMBUS
P. O. BOX 3990
COLUMBUS, OHIO 43216-5000

MICROCIRCUIT, HYBRID, LINEAR, ±12 VOLT, DUAL CHANNEL, DC/DC CONVERTER

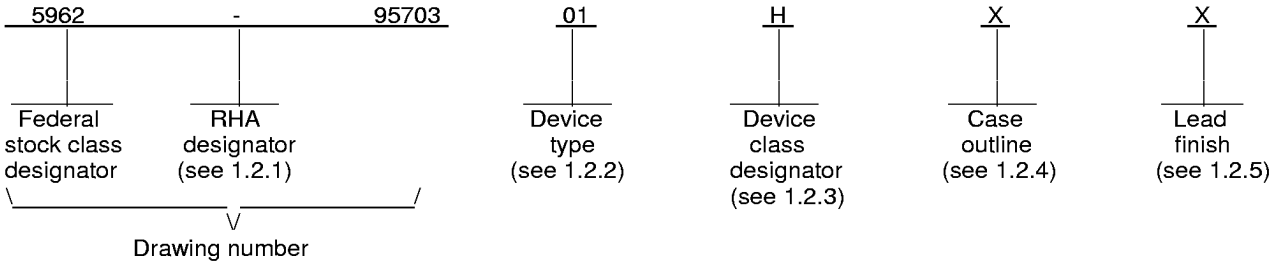
SIZE	CAGE CODE	
A	**67268**	**5962-95703**

SHEET 1 OF 12

1. SCOPE.

1.1 Scope. This drawing documents five product assurance classes, class D (lowest reliability), class E, (exceptions), class G (lowest high reliability), class H (high reliability), and class K, (highest reliability) and 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 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. Only, the RHA levels specified herein are available.

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

Device type	Generic number	Circuit function
01	MCH2812D, MGH2812D	DC-DC converter, 1.5 W, ±12 V outputs

1.2.3 Device class designator. This device class designator shall be a single letter identifying the product assurance level as follows:

Device class	Device performance documentation
D, E, G, H, or K	Certification and qualification to MIL-PRF-38534

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
X	See figure 1	7	Dual-in-line
Y	See figure 1	18	Flat pack
Z	See figure 1	18	Flat pack with formed leads

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

1.3 Absolute maximum ratings. 1/

Input voltage range	-0.5 V dc to +50 V dc
Power dissipation (P_D)	4.2 W
Output power	1.56 W
Lead soldering temperature (10 seconds)	+300°C
Storage temperature range	-65°C to +150°C

1/ Stresses above the absolute maximum rating may cause permanent damage to the device. Except for input voltage transients up to 80 volts for no more than 120 milliseconds.

1.4 Recommended operating conditions.

Input voltage range	+12 V dc to +50 V dc
Case operating temperature range (T_C)	-55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbook. The following specification, standards, and handbook form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

SPECIFICATION

DEPARTMENT OF DEFENSE

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

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-883 - Test Methods and Procedures for Microelectronics.
MIL-STD-973 - Configuration Management.
MIL-STD-1835 - Microcircuit Case Outlines.

HANDBOOK

DEPARTMENT OF DEFENSE

MIL-HDBK-780 - Standard Microcircuit Drawings.

(Unless otherwise indicated, copies of the specification, standards, and handbook are available 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. Therefore, the tests and inspections herein may not be performed for the applicable device class (see MIL-PRF-38534). Futhermore, the manufacturers may take exceptions or use alternate methods to the tests and inspections herein and not perform them. However, the performance requirements as defined in MIL-PRF-38534 shall be met 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 as listed in QML-38534.

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

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

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

4. QUALITY ASSURANCE PROVISIONS

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 test method 1015 of MIL-STD-883.

(2) T_C 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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ V_{IN} = 28 V dc ±0.5 V unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Output voltage	$\pm V_{OUT}$	$\pm I_{OUT}$ = ±31.3 mA	1	01	11.88	12.12	V
			2,3		11.52	12.48	
Output current 1/	I_{OUT}	V_{IN} = 12, 28, and 50 V dc	1,2,3	01	0.0	100	mA
Output ripple voltage 2/ ($\pm V_{OUT}$)	V_{RIP}	$\pm I_{OUT}$ = ±62.5 mA, B.W. = 10 kHz to 2 MHz	1	01		150	mVp-p
			2,3			250	
Line regulation ($\pm V_{OUT}$)	VR_{LINE}	$\pm I_{OUT}$ = ±62.5 mA, V_{IN} = 12 V dc to 50 V dc	1,2,3	01		400	mV
Load regulation ($\pm V_{OUT}$)	VR_{LOAD}	$\pm I_{OUT}$ = ±6.3 to ±62.5 mA	1,2,3	01		1200	mV
Input current	I_{IN}	I_{OUT} = 0, inhibit (pin 7) = 0	1,2,3	01		3.5	mA
		I_{OUT} = 0, inhibit (pin 7) = open				14	
Input ripple current	I_{RIP}	$\pm I_{OUT}$ = ±62.5 mA, B.W. = 10 kHz to 10 MHz, L_{IN} = 2 µH	1	01		200	mAp-p
			2,3			250	
Efficiency	Eff	$\pm I_{OUT}$ = ±62.5 mA	1	01	73		%
			2,3		70		
Isolation	ISO	Input to output or any pin to case except pin 5 at 500 V dc, T_C = +25°C	1	01	100		MΩ
Power dissipation, load fault	P_D	Short circuit	1	01		3.8	W
			2,3			4.2	
Switching frequency	F_S	$\pm I_{OUT}$ = ±62.5 mA	4	01	300	450	kHz
			5,6		270	470	
Output response to step transient load changes ($\pm V_{OUT}$) 3/	VO_{TLOAD}	50 percent load to/from 100 percent load; balanced loads on each output	4	01	-600	+600	mV pk
			5,6		-700	+700	
Recovery time, step transient load changes ($\pm V_{OUT}$) 3/ 4/	TT_{LOAD}	50 percent load to/from 100 percent load; balanced loads on each output	4	01		700	µs
			5,6			800	

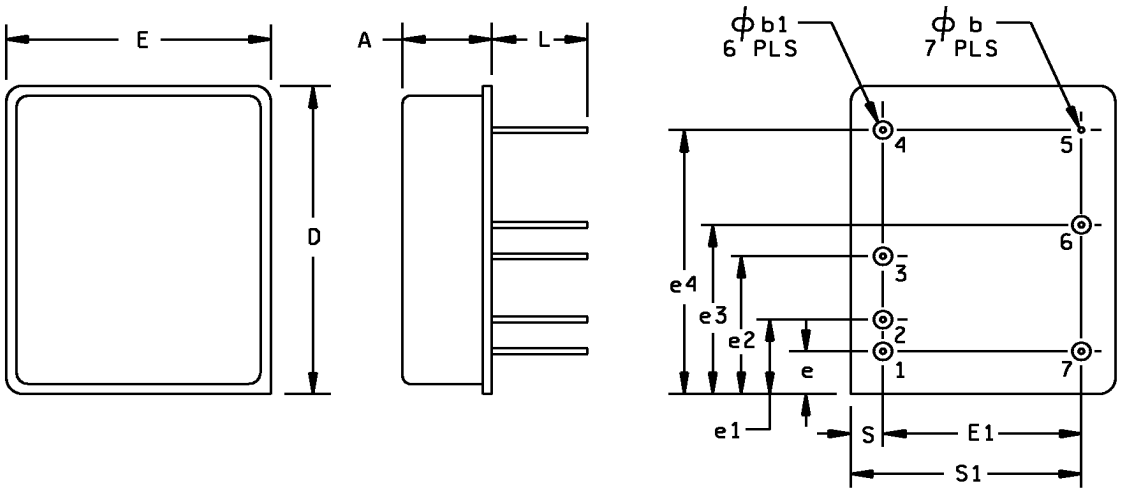
See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ V_{IN} = 28 V dc ±0.5 V unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Output response to transient step line changes ($\pm V_{OUT}$) 5/ 6/	VO_{TLINE}	Input step from 12 V dc to 50 V dc, $\pm I_{OUT}$ = ±62.5 mA	4,5,6	01	-600	+600	mV pk
		Input step from 50 V dc to 12 V dc, $\pm I_{OUT}$ = ±62.5 mA			-600	+600	
Recovery time to transient step line changes ($\pm V_{OUT}$) 4/ 5/ 6/	TT_{LINE}	Input step from 12 V dc to 50 V dc, $\pm I_{OUT}$ = ±62.5 mA	4,5,6	01		4	ms
		Input step from 50 V dc to 12 V dc, $\pm I_{OUT}$ = ±62.5 mA				4	
Turn-on overshoot 5/	$Vton_{OS}$	V_{IN} = 0 to 28 V dc, $\pm I_{OUT}$ = ±62.5 mA	4,5,6	01		350	mV pk
Turn-on delay 4/ 7/	Ton_D	V_{IN} = 0 to 28 V dc, $\pm I_{OUT}$ = ±62.5 mA	4,5,6	01		45	ms
Load fault recovery 4/ 5/	Tr_{LF}	$\pm I_{OUT}$ = from S. C. to ±62.5 mA	4,5,6	01		20	ms
Capacitive load (both outputs) 5/ 8/	C_L	No effect on dc performance, T_C = +25°C	4	01		100	µF

1/ The total output power available is 80 percent from either output up to 1.2 watts, providing the opposite output is simultaneously carrying 20 percent of the total output power. Each output must carry a minimum of 20 percent of the total output power in order to maintain regulation on the negative output.
2/ Bandwidth guaranteed by design. Tested for 10 kHz to 2 MHz.
3/ Load step transition time is 10 microseconds minimum.
4/ Recovery time is measured from the initiation of the transient to where V_{OUT} has returned to within ±1 percent of V_{OUT} final value.
5/ Parameter shall be tested as part of design characterization and after design or process changes. Therefore, the parameter shall be guaranteed to the limits specified in table I.
6/ Input step transition time greater than 10 microseconds.
7/ Turn-on delay time measurement is for either a step application of power at the input or the removal of a ground signal from the inhibit pin (pin 7) while power is applied to the input.
8/ Capacitive load may be any value from 0 to the maximum limit without compromising dc performance.

Case outline X.

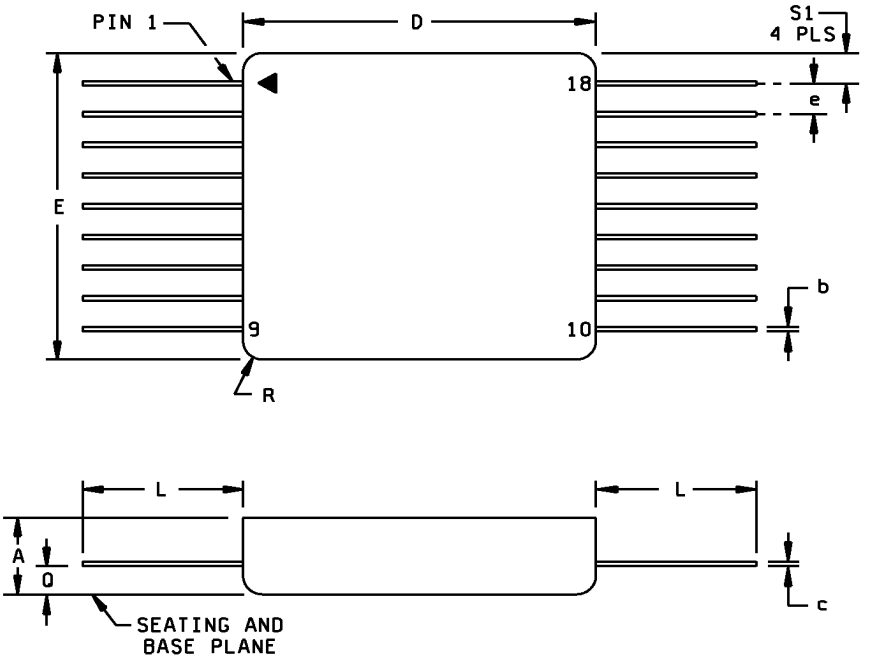


Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A		6.86		0.270
øb	0.41	0.51	0.016	0.020
øb1	1.37	1.47	0.054	0.058
D		24.77		0.975
e	3.30	3.56	0.130	0.140
e1	5.84	6.10	0.230	0.240
e2	10.92	11.18	0.430	0.440
e3	13.46	13.72	0.530	0.540
e4	21.08	21.34	0.830	0.840
E		20.32		0.800
E1	15.11	15.37	0.595	0.605
L		7.40		0.290
S	2.34	2.60	0.092	0.102
S1	17.58	17.83	0.692	0.702

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 numbers are for reference only.
3. Device weight - 12 grams maximum.

FIGURE 1. Case outline(s).

Case outline Y.

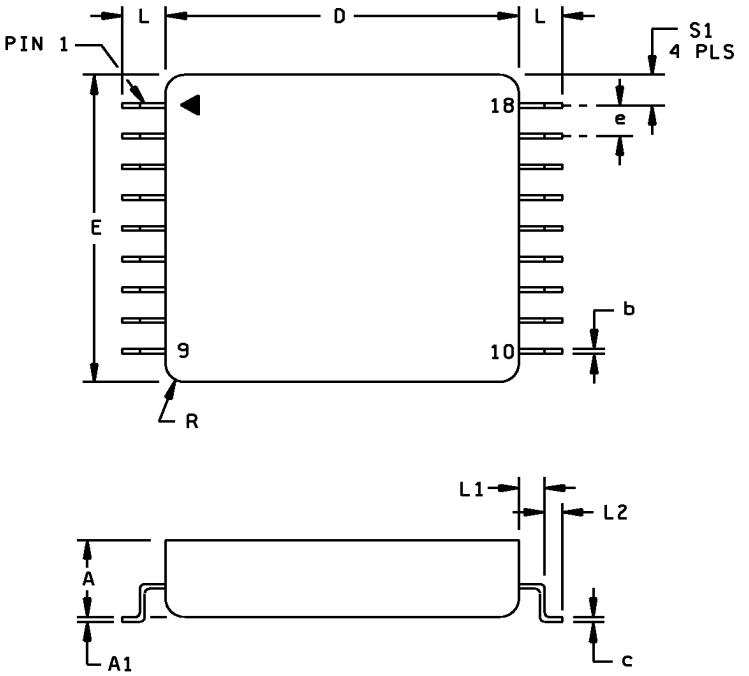


Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A		6.36		0.250
b	0.30	0.56	0.012	0.022
c	0.20	0.41	0.008	0.016
D	21.84	22.35	0.860	0.880
E	25.15	25.65	0.990	1.010
e	2.54 BSC		0.100 BSC	
L	12.7 TYP		0.500 TYP	
Q	1.78	2.29	0.070	0.090
R		1.52		0.060
S1	2.29	2.79	0.090	0.110

NOTES:
1. The U.S. government preferred system of measurement is the metric SI. This case outline 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. Lead identification for reference only.
3. Case outline Y weight: 13 grams maximum.

FIGURE 1. Case outline(s) - Continued.

Case outline Z.



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A		6.36		0.250
A1	0.13	0.51	0.005	0.020
b	0.30	0.56	0.012	0.022
c	0.20	0.41	0.008	0.016
D	21.84	22.35	0.860	0.880
E	25.15	25.65	0.990	1.010
e	2.54 BSC		0.100 BSC	
L	3.43 REF		0.135 REF	
L1	1.52	2.03	0.060	0.080
L2	1.14	1.65	0.045	0.065
R		1.52		0.060
S1	2.29	2.79	0.090	0.110

NOTES:
1. The U.S. government preferred system of measurement is the metric SI. This case outline 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. Lead identification for reference only.
3. Case outline Z weight: 13 grams maximum.

FIGURE 1. Case outline(s) - Continued.

Device types	01	01
Case outlines	Y and Z	X
Terminal number	Terminal symbol	Terminal symbol
1	Positve input	Input
2	No connection	Input return
3	Input common	Positive output
4	Positive output	Output return
5	Positive output	Case ground
6	Case ground	Negative output
7	Case ground	Inhibit
8	Output common	
9	Output common	
10	Case ground	
11	Case ground	
12	No connection	
13	Negative output	
14	Negative output	
15	No connection	
16	No connection	
17	No connection	
18	Inhibit	

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	
Final electrical parameters	1*,2,3,4,5,6
Group A test requirements	1,2,3,4,5,6
Group C end-point electrical parameters	1
MIL-STD-883, group E end-point electrical parameters for RHA devices	Subgroups** (in accordance with method 5005, group A test table)

* PDA applies to subgroup 1.
** When applicable to this standard microcircuit drawing, the subgroups shall be defined.

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 7, 8, 9, 10, and 11 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 test method 1005 of MIL-STD-883.

(2) T_C 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 Group E inspection. Group E inspection is required only for parts intended to be marked as radiation hardness assured (see 3.5 herein). RHA levels for device classes H and K shall be M, D, R, and H. RHA quality conformance inspection sample tests shall be performed at the RHA level specified in the acquisition document.

a. RHA tests for device classes H and K for levels M, D, R, and H shall be performed through each level to determine at what levels the devices meet the RHA requirements. These RHA tests shall be performed for initial qualification and after design or process changes which may affect the RHA performance of the device.

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

c. Prior to total dose irradiation, each selected sample shall be assembled in its qualified package. It shall pass the specified group A electrical parameters in table I for subgroups specified in table II herein.

d. For device classes H and K, the devices shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38534 for RHA level being tested, and meet the postirradiation end-point electrical parameter limits as defined in table I at T_A = +25°C ±5 percent, after exposure.

e. Prior to and during total dose irradiation testing, the devices shall be biased to establish a worst case condition as specified in the radiation exposure circuit.

f. For device classes H and K, subgroups 1 and 2 in table V, method 5005 of MIL-STD-883 shall be tested as appropriate for device construction.

g. When specified in the purchase order or contract, a copy of the RHA delta limits shall be supplied.

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 with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-973 using DD Form 1692, Engineering Change Proposal.

6.4 Record of users. Military and industrial users shall inform Defense Supply Center Columbus 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, P. O. Box 3990, Columbus, Ohio 43216-5000, or telephone (614) 692-0512.

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

STANDARD MICROCIRCUIT DRAWING SOURCE APPROVAL BULLETIN

DATE: 99-08-11

Approved sources of supply for SMD 5962-95703 are listed below for immediate acquisition only and shall be added to QML-38534 during the next revision. 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 bulletin is superseded by the next dated revision of QML-38534.

Standard microcircuit drawing PIN 1/	Vendor CAGE number	Vendor similar PIN 2/
5962-9570301HXA	50821	MCH2812D/883
5962-9570301HXC	50821	MCH2812D/883
5962-9570301HYA	50821	MGH2812DY/883
5962-9570301HYC	50821	MGH2812DY/883
5962-9570301HZA	50821	MGH2812DZ/883
5962-9570301HZC	50821	MGH2812DZ/883

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
50821	Interpoint Corporation 10301 Willows Road Redmond, WA 98073-9705

The information contained herein is disseminated for convenience only and the Government assumes no liability whatsoever for any inaccuracies in this information bulletin.