REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED

REV																			
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REV STATUS OF SHEETS	REV														
	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
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CHECKED BY
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APPROVED BY
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DRAWING APPROVAL DATE
99-08-09

REVISION LEVEL

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

MICROCIRCUIT, LINEAR, VOLTAGE REGULATOR, 12 VOLT, NEGATIVE, FIXED, MONOLITHIC SILICON

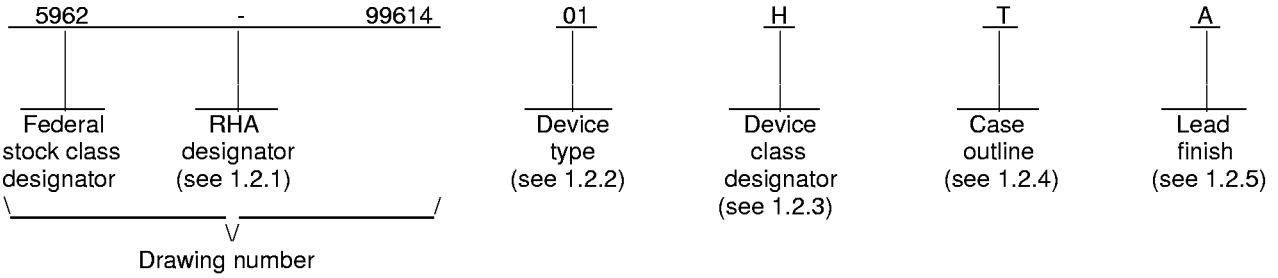
SIZE	CAGE CODE	
A	67268	5962-99614

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.

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

Device type	Generic number 1/	Circuit function
01	SDP7912A	Negative voltage regulator, 12 volt, fixed

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
N	See figure 1	3	Z-tab with nonisolated tab, (TO-257Z), with glass seal
T	See figure 1	3	Flange mount with nonisolated tab, (TO-257), with glass seal
U	See figure 1	3	Flange mount with isolated tab, (TO-257), with glass seal
Z	See figure 1	3	Z-tab with isolated tab, (TO-257Z), with glass seal

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

1/ The SDP7912A is similar to the 7912A listed on Standard Microcircuit Drawing 5962-88747.

1.3 Absolute maximum ratings. 1/

Input voltage:	
Operating or output shorted to ground	-35 V dc
Transient	-50 V dc 2/
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C
Junction temperature (T_J)	+150°C 3/
Power dissipation (P_D):	
T_C = +25°C	15 W
T_A = +25°C	3.0 W
Thermal resistance junction-to-case (θ_{JC}):	
Case N and T	3.5°C/W
Case U and Z	4.2°C/W
Thermal resistance junction-to-ambient (θ_{JA})	42°C/W

1.4 Recommended operating conditions.

Input voltage range	-14.5 V dc to -27 V dc
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 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 Method Standard Microcircuits.
MIL-STD-973 - Configuration Management.
MIL-STD-1835 - Interface Standard For Microcircuit Case Outlines.

HANDBOOKS

DEPARTMENT OF DEFENSE

MIL-HDBK-103 - List of Standard Microcircuit Drawings (SMD's).
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.)

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/ The -50 volt input rating refers to the ability of the regulator to withstand high line or transient condition without damage. Since the regulator's maximum current capability is reduced, the output may fall out of regulation at high input voltages under nominal loading.
3/ The device is protected by a thermal shutdown circuit which is designed to turn off the output transistor whenever the device junction temperature is in excess of +150°C.

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 applicable device class. Therefore, the tests and inspections herein may not be performed for 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. The modification in the QM plan shall not affect the form, fit, or function as described herein.

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 MIL-HDBK-103 and 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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Output voltage	V_{OUT}	T_A = +25°C	1	01	-11.88	-12.12	V
		V_{IN} = -14.5 V to -27 V 2/	1, 2, 3		-11.64	-12.36	
Line regulation 3/ 4/	V_{RLINE}	V_{IN} = -14.5 V to -27 V	1	01		20	mV
			2, 3			50	
		V_{IN} = -16 V to -22 V	1	01		10	mV
			2, 3			30	
Load regulation 3/	V_{RLOAD}	V_{IN} = -19 V, I_O = 5.0 mA to 1.5 A	1	01		32	mV
			2, 3			60	
		V_{IN} = -19 V, I_O = 250 mA to 750 mA	1	01		16	mV
			2, 3			30	
Standby current drain	I_{SCD}		1	01		3.5	mA
			2, 3			4.0	
Standby current drain change with line	ΔI_{SCD} (line)	V_{IN} = -14.5 V to -27 V	1, 2, 3	01		0.8	mA
Standby current drain change with load	ΔI_{SCD} (load)	I_O = 5.0 mA to 1.0 A	1, 2, 3	01		0.5	mA
Dropout voltage	V_{DO}	ΔV_{OUT} = 100 mV, I_O = 1.0 A	1, 2, 3	01		1.8	V
Peak output current	$I_{O(pk)}$	T_A = +25°C	1	01	1.5	3.3	A
Short circuit current 5/	I_{OS}	V_{IN} = -35 V	1	01		1.2	A
			2, 3			2.8	
Ripple rejection	$\frac{\Delta V_{IN}}{\Delta V_{OUT}}$	f = 120 Hz, I_O = 0.5 A, V_{IN} = -15 V to -25 V	4	01	56		dB
			5, 6 6/		53		

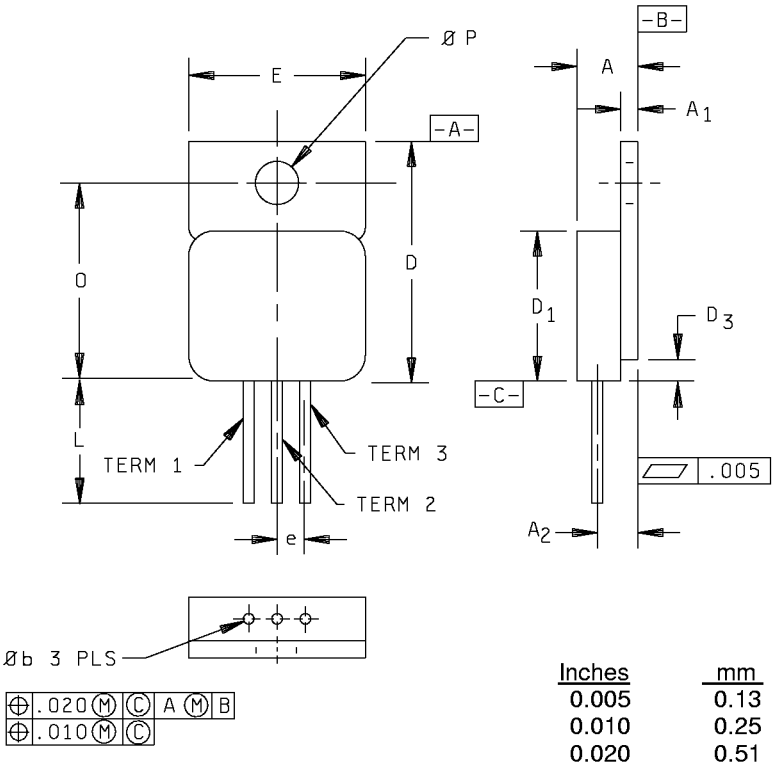
See footnotes at end of table.

TABLE 1. 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	
Output noise voltage 6/	N_O	f = 10 Hz to 100 kHz, T_A = +25°C	7	01		40	µV/V rms
Long term stability 6/	$\frac{\Delta V_{OUT}}{\Delta t}$	t = 1000 hours, T_A = +25°C	7	01		120	mV

1/ Unless otherwise specified, V_{IN} = -19 V and I_O = 500 mA.
2/ I_O = 5 mA to 1.0 A, P ≤ 15 W.
3/ All measurements except output noise voltage and ripple rejection are made at constant junction temperature and with low duty cycle.
4/ Minimum load current for full line regulation is 5.0 mA.
5/ Short circuit protection is only assured up to V_{IN} = -35 V.
6/ If not tested, shall be guaranteed to the limits specified in table I.

Case outlines T and U.



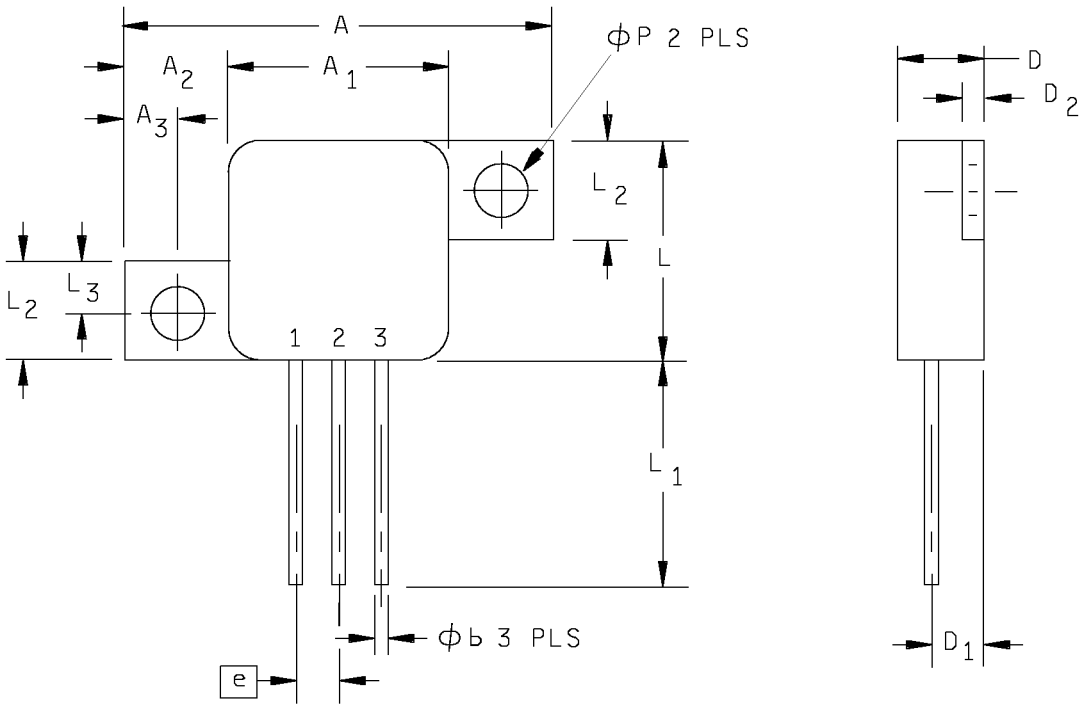
Inches	mm
0.005	0.13
0.010	0.25
0.020	0.51

Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	4.83	5.08	0.190	0.200
A1	0.89	1.14	0.035	0.045
A2	3.05 BSC		0.120 BSC	
øb	0.64	0.89	0.025	0.035
D	16.38	16.89	0.645	0.665
D1	10.41	10.92	0.410	0.430
D3	0.00	1.65	0.000	0.065
e	2.54 BSC		0.100 BSC	
E	10.41	10.72	0.410	0.422
L	12.70	19.05	0.500	0.750
O	13.39	13.64	0.527	0.537
øP	3.56	3.81	0.140	0.150

NOTE:
The U.S. government preferred system of measurement is the metric SI system. However, this item was originally designed using inch-pound units of measurement. In the event of conflict between the metric and inch-pound units, the inch-pound units shall take precedence.

FIGURE 1. Case outline(s).

Case outlines N and Z.

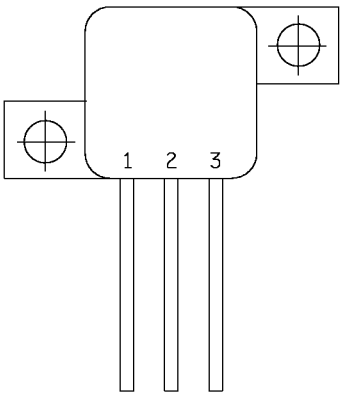


Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	23.11	23.37	0.910	0.920
A1	10.41	10.67	0.410	0.420
A2	6.22	6.48	0.245	0.255
A3	3.05	3.30	0.120	0.130
øb	0.71	0.81	0.028	0.032
D	4.70	5.59	0.135	0.220
D1	2.92	3.18	0.115	0.125
D2	0.89	1.14	0.035	0.045
e	2.54 BSC		0.100 BSC	
L	10.41	10.67	0.410	0.420
L1	12.70	19.05	0.500	0.750
L2	6.22	6.48	0.245	0.255
L3	3.05	3.30	0.120	0.130
øP	3.05	3.30	0.120	0.130

NOTE:
The U.S. government preferred system of measurement is the metric SI system. However, this item was originally designed using inch-pound units of measurement. In the event of conflict between the metric and inch-pound units, the inch-pound units shall take precedence.

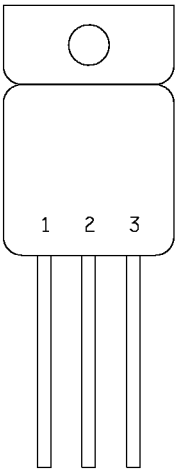
FIGURE 1. Case outline(s) - Continued.

Case outlines N and Z



Top view

Case outlines T and U



Top view

Device type	01	
Case outlines	N and T (nonisolated tab)	U and Z (isolated tab)
Terminal number	Terminal symbol	Terminal symbol
1 2 3 Tab	Ground No connection Output Input	Ground Input Output No connection

FIGURE 2. Terminal connections.

TABLE II. Electrical test requirements.

MIL-PRF-38534 test requirements	Subgroups (in accordance with MIL-PRF-38534, group A test table)
Interim electrical parameters	1
Final electrical parameters	1*, 2, 3, 4
Group A test requirements	1, 2, 3, 4, 5**, 6**, 7**
Group C end-point electrical parameters	1
End-point electrical parameters for radiation hardness assurance (RHA) devices	Not applicable

* PDA applies to subgroup 1.
** Subgroups 5, 6, and 7, if not tested shall be guaranteed to the limits specified in table I.

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_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 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_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 currently not 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 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 MIL-HDBK-103 and QML-38534. The vendors listed in MIL-HDBK-103 and QML-38534 have submitted a certificate of compliance (see 3.7 herein) to DSCC-VA and have agreed to this drawing.

STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 99-08-09

Approved sources of supply for SMD 5962-99614 are listed below for immediate acquisition only and shall be added to MIL-HDBK-103 and QML-38534 during the next revision. MIL-HDBK-103 and QML-38534 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DSCC-VA. This bulletin is superseded by the next dated revision of MIL-HDBK-103 and QML-38534.

Standard microcircuit drawing PIN 1/ 2/	Vendor CAGE number	Vendor similar PIN 3/
5962-9961401HNA 5962-9961401HNC	21845 21845	SDP7912ANHD SDP7912ANHG
5962-9961401HTA 5962-9961410HTC	21845 21845	SDP7912ATHD SDP7912ATHG
5962-9961410HUA 5962-9961410HUC	21845 21845	SDP7912AUHD SDP7912AUHG
5962-9961410HZA 5962-9961410HZC	21845 21845	SDP7912AZHD SDP7912AZHG

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 availability.

2/ The SMD device types listed above are similar to the device types listed on SMD 5962-88747. 5962-9961401HTA or C is similar to 5962-8874701TX. 5962-9961401HUA or C is similar to 5962-8874701UX.

3/ 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
21845	Solitron Devices, Incorporated 3301 Electronics Way West Palm Beach, FL 33407-4697