REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Add vendor CAGE 48726 to the 02XX device. Make corrections to tables I and II. Change name and address for CAGE U4637. Inactivate 01 device for new design. Make changes to 6.4.	1988 DEC 02	M. A. Frye
B	Add vendors CAGE 69210 and 27014. Add case outlines T and U. Editorial changes throughout.	1991 NOV 04	M. A. Frye

REV																				
SHEET																				
REV																				
SHEET																				

REV STATUS OF SHEETS	REV	B	B	B	B	B	B	B	B	B	B				
	SHEET	1	2	3	4	5	6	7	8	9	10				

PMIC N/A

STANDARDIZED MILITARY DRAWING

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

AMSC N/A

PREPARED BY
Joseph A. Kirby

CHECKED BY
Charles E. Besore

APPROVED BY
M. A. Frye

DRAWING APPROVAL DATE
18 NOVEMBER 1987

REVISION LEVEL
B

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, LINEAR, ADJUSTABLE POSITIVE REGULATOR, MONOLITHIC SILICON

SIZE	CAGE CODE	5962-87675
A	67268	

SHEET 1 OF 10

DESC FORM 193
JUL 91

5962-E1599

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

9004708 0010681 0T4

1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part or Identifying Number (PIN). The complete PIN shall be as shown in the following example:

5962-87675	01	X	X
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

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

Device type	Generic number	Circuit function
01	150	3.0 A positive regulator, adjustable
02	150A	3.0 A positive regulator, adjustable

1.2.2 Case outline(s). The case outline(s) shall be as designated in appendix C of MIL-M-38510, and as follows:

Outline letter	Case outline
X	See figure 1, TO-3 (2-lead can)
U	See figure 1, TO-257 (3-lead flange mounted case), with isolated tab
T	See figure 1, TO-257 (3-lead flange mounted case)

1.3 Absolute maximum ratings.

Input to output voltage differential	35 V
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C
Power dissipation (P_D) 1/	Internally limited
Thermal resistance, junction-to-case (Θ_{JC}):	
Case X	1.5°C/W
Case T	3.5°C/W
Case U	4.2°C/W
Junction temperature (T_J)	+150°C

1.4 Recommended operating conditions.

Ambient operating temperature range (T_A)	-55°C to +125°C

1/ Power dissipation is guaranteed at 30 W up to 15 V input-output differential. Above 15 V, input-output differential power dissipation is limited by device internal protection circuitry.

2. APPLICABLE DOCUMENTS

2.1 Government specification, standard, and bulletin. Unless otherwise specified, the following specification, standard, and bulletin of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARD

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

BULLETIN

MILITARY

MIL-BUL-103 - List of Standardized Military Drawing (SMD's).

(Copies of the specification, standard, and bulletin required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

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 shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

3.2.1 Case outlines. The case outlines shall be in accordance with 1.2.2 herein.

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 ambient 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 described in table I.

3.5 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked as listed in MIL-BUL-103 (see 6.6 herein).

3.6 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-BUL-103 (see 6.6 herein). The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.7 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

TABLE I. Electrical performance characteristics

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified		Device type	Group A subgroups	Limits Min	Limits Max	Unit
Reference voltage	V_{REF}	I_{OUT} = 10 mA, T_A = +25°C		01	1	1.20	1.30	V
				02	1	1.238	1.262	V
		3.0 V $\le (V_{IN} - V_{OUT}) \le$ 35 V, 10 mA $\le I_{OUT} \le$ 3.0 A, P $\le$ 30 W 2/		01	1, 2, 3	1.20	1.30	V
				02	1, 2, 3	1.225	1.270	V
Line regulation 3/	$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	3.0 V $\le (V_{IN} - V_{OUT}) \le$ 35 V, I_{OUT} = 10 mA, T_J = +25°C		All	1		0.01	%/V
		3.0 V $\le (V_{IN} - V_{OUT}) \le$ 35 V, I_{OUT} = 10 mA		All	2, 3		0.05	%/V
Load regulation 3/ 4/	$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	10 mA $\le I_{OUT} \le$ 3.0 A, $V_{OUT} \le$ 5.0 V, T_J = +25°C	Cases X and T	All	1		15	mV
			Case U				17.5	
		10 mA $\le I_{OUT} \le$ 3.0 A, $V_{OUT} \le$ 5.0 V		All	2, 3		50	mV
		10 mA $\le I_{OUT} \le$ 3.0 A, $V_{OUT} \ge$ 5.0 V, T_J = +25°C	Cases X and T	All	1		0.3	%
			Case U				0.35	
		10 mA $\le I_{OUT} \le$ 3.0 A, $V_{OUT} \ge$ 5.0 V		All	2, 3		1.0	%
Thermal regulation	---	20 ms pulse, T_A = +25°C		All	1		0.01	%/W
Ripple rejection 5/	$\frac{\Delta V_{IN}}{\Delta V_{REF}}$	V_{OUT} = 10 V, f = 120 Hz, C_{ADJ} = 10 µF		All	4, 5, 6	66		dB
Adjust pin current	I_{ADJ}			All	1, 2, 3		100	µA
Adjust pin current change	ΔI_{ADJ}	10 mA $\le I_{OUT} \le$ 3.0 A, I_{OUT} = 10 mA, 3.0 V $\le (V_{IN} - V_{OUT}) \le$ 35 V		All	1, 2, 3		5.0	µA

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Device type	Group A subgroups	Limits		Unit
					Min	Max	
Minimum load current	I_{MIN}	$(V_{IN} - V_{OUT}) = 35$ V	All	1, 2, 3		5.0	mA
Current limit	I_{CL} or I_{SC}	$(V_{IN} - V_{OUT}) \le 10$ V	All	1, 2, 3	3.0		A
		$(V_{IN} - V_{OUT}) = 30$ V	All	1, 2, 3	0.3		A
Temperature stability 5/	$\frac{\Delta V_{OUT}}{\Delta T}$		02	1, 2, 3		2.0	%
Long term stability 5/	$\frac{\Delta V_{OUT}}{\Delta t}$	$T_A = +25°C$	All	1		1.0	%

1/ Unless otherwise specified, these specifications apply for $(V_{IN} - V_{OUT}) = 5.0$ V and $I_{OUT} = 1.5$ A. Although power dissipation is internally limited, these characteristics are applicable for power dissipation up to 30 W.

2/ Cases T and U: For output voltage readings not taken at the case, decrease minimum limits by I_{OUT} (10 mΩ) per inch of case to measurement-point lead length, e.g., 15 mV per inch at 1.5 A and 30 mV per inch at 3.0 A.

3/ Regulation is measured at a constant junction temperature using a pulse technique. Changes in output voltage due to heating effects are covered under the specification for thermal regulation.

4/ Cases T and U: For load regulation readings not taken at the case, increase maximum limits by I_{OUT} (10 mΩ) per inch of case to measurement-point lead length, e.g., 30 mV per inch at 3.0 A.

5/ Guaranteed, if not tested, to the limits specified.

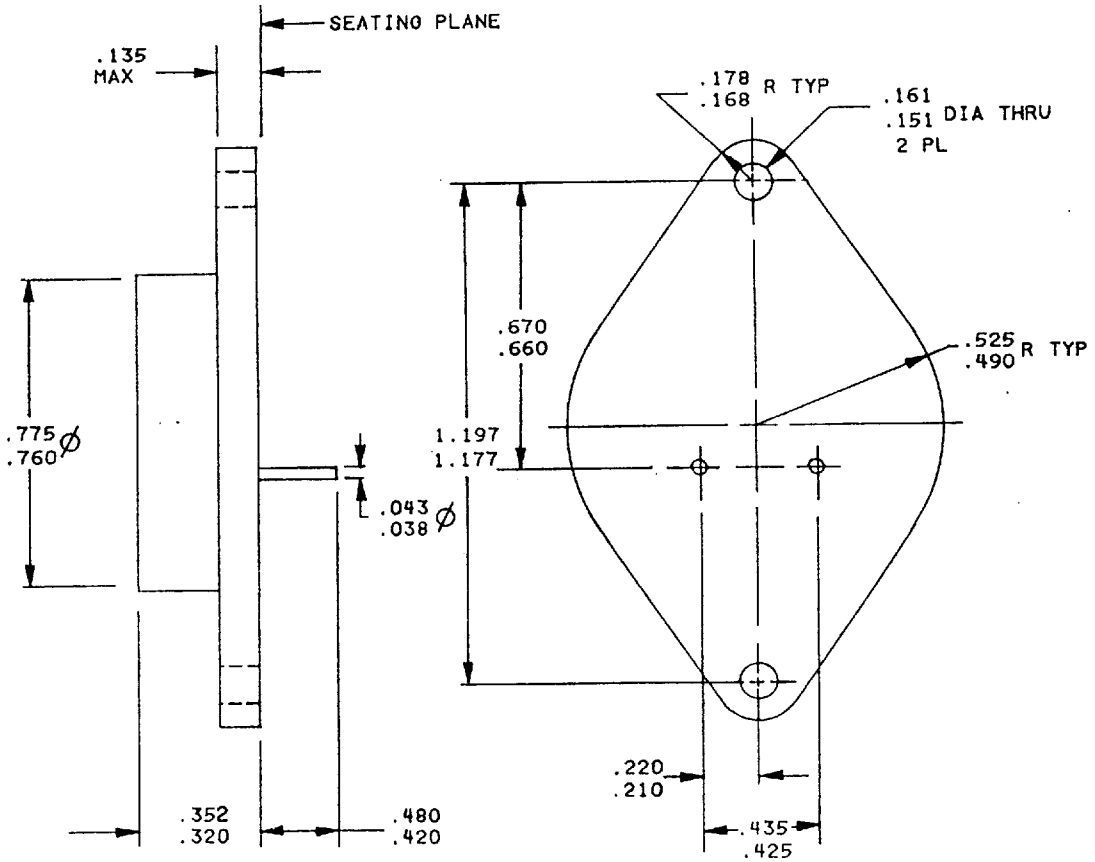
3.8 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.9 Verification and review. DESC, DESC'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.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

Case outline X

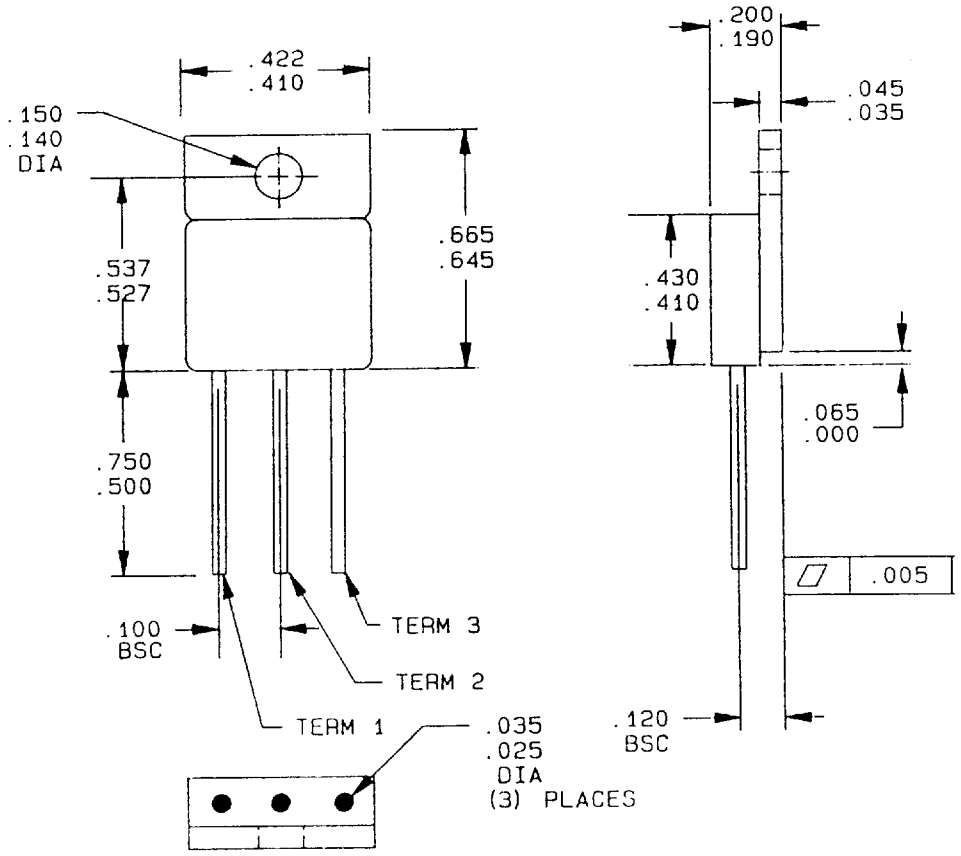


Inches	mm	Inches	mm
.038	0.97	.425	10.80
.043	1.09	.435	11.50
.135	3.43	.480	12.19
.151	3.84	.490	12.45
.161	4.09	.525	13.34
.168	4.27	.660	16.76
.178	4.52	.670	17.02
.210	5.33	.760	19.30
.220	5.59	.775	19.69
.320	8.13	1.177	29.90
.352	8.94	1.197	30.40
.420	10.67		

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for information only.

FIGURE 1. Case outlines.

Case outlines T and U



Inches	mm	Inches	mm
.028	0.71	.250	6.35
.034	0.86	.340	8.64
.050	1.27	.350	8.89
.075	1.91	.360	9.14
.093	2.36	.470	11.94
.107	2.72	.500	12.70
.142	3.61	.570	14.48
.145	3.68	.590	14.99
.152	3.86	.620	15.75
.190	4.83	.958	24.33
.210	5.33	.962	24.43

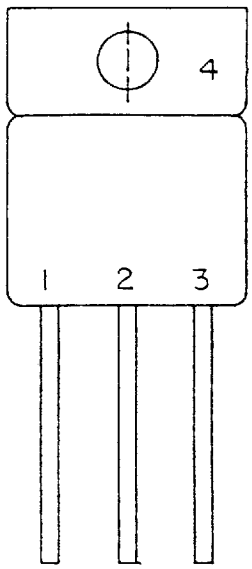
NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for information only.

FIGURE 1. Case outlines - Continued.

Case outlines T and U

Case outline T

1. Adjust
2. Output
3. Input
4. Output



Case outline U

1. Adjust
2. Output
3. Input
4. No connection

Case outline X

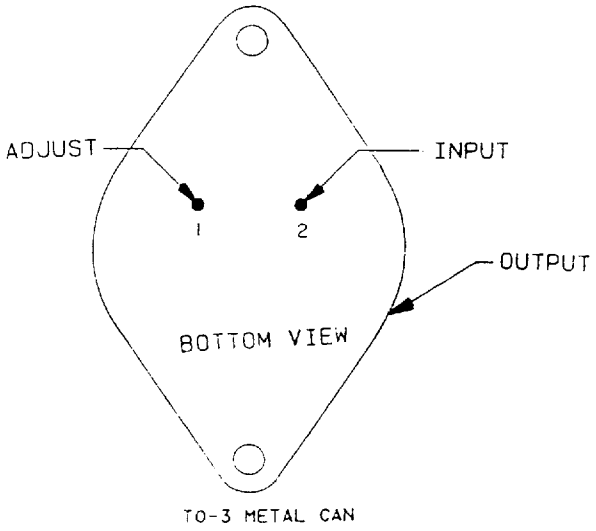


FIGURE 2. Terminal conections.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004)	1*, 2, 3
Group A test requirements (method 5005)	1, 2, 3, 4, 5, 6**
Groups C and D end-point electrical parameters (method 5005)	1

* PDA applies to subgroup 1.
** Subgroups 4, 5, and 6 are guaranteed if not tested to the limits specified in table I herein.

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.6 herein).

(2) T_A = +125°C, minimum.

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 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

a. Tests shall be as specified in table II herein.

b. Subgroups 7, 8, 9, 10, and 11 in table I, method 5005 of MIL-STD-883 shall be omitted.

4.3.2 Groups C and D inspections.

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

b. Steady-state life test conditions method 1005 of MIL-STD-883.

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.6 herein).

(2) T_A = +125°C, minimum.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.2 Replaceability. Replaceability is determined as follows:

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

b. When a QPL source is established, the device specified in this drawing will be replaced by the microcircuit identified as PIN M38510/11705BYX.

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-481 using DD Form 1693, Engineering Change Proposal (Short Form).

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC 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 microelectronics devices (FSC 5962) should contact DESC-ECS, telephone (513) 296-6022.

6.5 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone (513) 296-6010.

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL-103. The vendors listed in MIL-BUL-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-ECS.