INCH-POUND
MIL-M-38510/128A
30 June 2004
SUPERSEDING
MIL-M-38510/128
12 May 1982

MILITARY SPECIFICATION

MICROCIRCUITS, LINEAR, PROGRAMMABLE VOLTAGE REFERENCES, MONOLITHIC SILICON

This specification is approved for use by all Departments and Agencies of the Department of Defense.

Reactivated after 30 June 2004 and may be used for either new or existing design acquisition.

The requirements for acquiring the product herein shall consist of this specification sheet and MIL-PRF-38535.

1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic silicon, programmable voltage references. Two product assurance classes and a choice of case outlines and lead finishes are provided and are reflected in the complete part number. For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535, (see 6.3)

1.2 Part or Identifying Number (PIN). The PIN is in accordance with MIL-PRF-38535, and as specified herein.

1.2.1 Device types. The device types are as follows:

Device type	Circuit
01	Programmable voltage reference, 10.000 V, 7.500 V, 5.000 V, 2.500 V (0.3%)
02	Programmable voltage reference, 10.000 V, 7.500 V, 5.000 V, 2.500 V (0.1%)

1.2.2 Device class. The device class is the product assurance level as defined in MIL-PRF-38535.

1.2.3 Case outline. The case outline is designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
G	MACY1-X8	8	Can

Comments, suggestions, or questions on this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAS, 3990 East Broad St., Columbus, OH 43216-5000, or emailed to bipolar@dscc.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at www.dodssp.daps.mil.

1.3 Absolute maximum ratings.

Supply voltage (V_{IN})	40 V
Power dissipation	600 mW
Lead temperature (soldering, 10 seconds)	+300°C
Storage temperature	-65°C to +175°C
Operating junction temperature (T_J)	-55°C to +150°C

1.4 Recommended operating conditions.

Supply voltage range	4.5 V minimum to 30 V maximum
Output current (max)	5 mA
Ambient operatingt temperature range (T_A)	-55°C to +125°C

1.5 Power and thermal characteristics.

Case outline	Maximum allowable power dissipation 1/	Maximum θ_{JC} 2/	Maximum θ_{JA}
G	330 mW @ T_A = 125°C	40°C/W	150°C/W

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.1.1 Specifications, standards, and handbooks. The following specifications and standards form a part of this specification 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-38535 - Integrated Circuits (Microcircuits) Manufacturing, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard for Microelectronics.
MIL-STD-1835 - Interface Standard Electronic Component Case Outlines.

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or www.dodssp.daps.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 specification and the references cited herein the text of this document shall takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

1/ All leads welded or soldered to PC board.
2/ Applies only when $T_C \geq 75°C$

3. REQUIREMENTS

3.1 Qualification. Microcircuits furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturers list before contract award (see 4.3 and 6.4).

3.2 Item requirements. The individual item requirements 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.

3.3 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein.

3.3.1 Terminal connections and block diagram. The terminal connections and block diagram shall be as specified on figure 1.

3.3.2 Schematic circuits. The schematic circuits shall be maintained by the manufacturer and made available to the qualifying activity and the preparing activity upon request.

3.3.3 Case outlines. The case outlines shall be as specified in 1.2.3.

3.4 Lead material and finish. The lead material and finish shall be in accordance with MIL-PRF-38535 (see 6.6).

3.5 Electrical performance characteristics. The electrical performance characteristics are as specified in table I, and apply over the full recommended ambient operating temperature range, unless otherwise specified.

3.6 Electrical test requirements. Electrical test requirements for each device class shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table III.

3.7 Marking. Marking shall be in accordance with MIL-PRF-38535.

3.8 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 50 (see MIL-PRF-38535, appendix A).

4. VERIFICATION.

4.1 Sampling and inspection. 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 effect the form, fit, or function as function as described herein.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38535, and shall be conducted on all devices prior to qualification and quality conformance inspection. The following additional criteria shall apply:

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 control by 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 test method 1015 of MIL-STD-883.

NOTE: If accelerated high-temperature test conditions are used, manufacturer shall ensure that at least 85 percent of the applied voltage is dropped across the device at temperature. The device is not considered functional under accelerated test conditions.

b. Interim and final electrical test parameters shall be as specified in table II, except interim electrical parameters test prior to burn-in is optional at the discretion of the manufacturer.

c. Additional screening for space level product shall be as specified in MIL-PRF-38535.

TABLE I. Electrical performance characteristics.

Characteristic	Symbol	Conditions $-55°C \le T_A \le +125°C$ V_{IN} = 15 V, I_L = 0 mA unless otherwise specified	Device type	Limits		Unit
				Min	Max	
Quiescent current	I_{CC}	V_{IN} = 38 V, T_A = 25°C, V_O = 10 V 1/	01, 02	0	1.0	mA
Output voltage	V_{OUT1}	V_O = 10 V, T_A = 25°C	01	9.97	10.03	V
			02	9.99	10.01	
	V_{OUT2}	V_O = 7.5 V, T_A = 25°C	01	7.478	7.522	
			02	7.492	7.508	
	V_{OUT3}	V_O = 5.0 V, T_A = 25°C	01	4.985	5.015	
			02	4.994	5.006	
	V_{OUT4}	V_O = 2.5 V, T_A = 25°C	01	2.4925	2.5075	
			02	2.4965	2.5035	
Line regulation	VR_{LINE1}	12.5 V $\le V_{IN} <$ 15 V, V_O = 10 V	01, 02	-0.005	0.005	%/V
	VR_{LINE2}	15 V $\le V_{IN} \le$ 30 V, V_O = 10 V		-0.002	0.002	
	VR_{LINE1}	12.5 V $\le V_{IN} <$ 15 V, V_O = 10 V		-0.010	0.010	
	VR_{LINE2}	15 V $\le V_{IN} \le$ 30 V, V_O = 10 V		-0.005	0.005	
Load regulation	VR_{LOAD1}	-5 mA $\le I_L \le$ 0 mA, V_O = 10 V	01, 02	-50	50	PPM/mA
	VR_{LOAD2}	-5 mA $\le I_L \le$ 0 mA, V_O = 7.5 V		-50	50	
	VR_{LOAD3}	-5 mA $\le I_L \le$ 0 mA, V_O = 5.0 V		-50	50	
	VR_{LOAD4}	-5 mA $\le I_L \le$ 0 mA, V_O = 2.5 V		-50	50	
	VR_{LOAD1}	-5 mA $\le I_L \le$ 0 mA, V_O = 10 V		-100	100	
	VR_{LOAD2}	-5 mA $\le I_L \le$ 0 mA, V_O = 7.5 V		-100	100	
	VR_{LOAD3}	-5 mA $\le I_L \le$ 0 mA, V_O = 5.0 V		-100	100	
	VR_{LOAD4}	-5 mA $\le I_L \le$ 0 mA, V_O = 2.5 V		-100	100	
Output short circuit current	I_{OS}	V_O = 10 V	01, 02	-55	----	mA

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Characteristic	Symbol	Conditions $-55°C \le T_A \le +125°C$ V_{IN} = 15 V, I_L = 0 mA unless otherwise specified	Device type	Limits		Unit
				Min	Max	
Output voltage temperature coefficient	$D_{VOUT1/DT}$	T_A = -55°C, +125°C, V_O = 10 V	01	-0.3	0.3	%FS
	$D_{VOUT2/DT}$	T_A = -55°C, +125°C, V_O = 7.5 V		-0.3	0.3	
	$D_{VOUT3/DT}$	T_A = -55°C, +125°C, V_O = 5.0 V		-0.3	0.3	
	$D_{VOUT4/DT}$	T_A = -55°C, +125°C, V_O = 2.5 V		-0.3	0.3	
	$D_{VOUT1/DT}$	T_A = -55°C, +125°C, V_O = 10 V	02	-0.15	0.15	
	$D_{VOUT2/DT}$	T_A = -55°C, +125°C, V_O = 7.5 V		-0.15	0.15	
	$D_{VOUT3/DT}$	T_A = -55°C, +125°C, V_O = 5.0 V		-0.15	0.15	
	$D_{VOUT4/DT}$	T_A = +125°C, V_O = 2.5 V		-0.2	0.2	
	$D_{VOUT4/DT}$	T_A = -55°C, V_O = 2.5 V		-0.3	0.3	
Output noise	N_O	V_O = 10 V; T_A = +25°C, See figures 3 & 4, 0.1 Hz ≤ BW ≤ 10 Hz	01, 02		150	μV_{P-P}
		V_O = 10 V; T_A = +25°C, See figures 3 & 4, 10 Hz ≤ BW ≤ 100 Hz			150	µVrms
Settling time to 0.1% of final value (Power up)	$t_{s(p)}$ (power)	V_O = 10 V; T_A = +25°C, See figure 5, I_L = 0 mA	01, 02		500	µs
		V_O = 10 V; T_A = +25°C, See figure 5, I_L = -5 mA			500	

1/ See figure 1 for programming instructions required to obtain the specified values of "V_O".

TABLE II. Electrical test requirements.

MIL-PRF-38535 test requirements	Subgroups (see table III)	
	Class S devices	Class B devices
Interim electrical parameters	1	1
Final electrical test parameters	1*, 2, 3	1*, 2, 3
Group A test requirements	1,2,3,4,9	1,2,3,4
Group B electrical test parameters when using the method 5005 QCI option	1,2,3 and table IV delta limits	N/A
Group C end-point electrical parameters	1,2,3 and table IV delta limits	1 and table IV delta limits
Additional electrical subgroups for group C periodic inspections	N/A	9
Group D end-point electrical parameters	1,2,3	1

* PDA applies to subgroup 1.

4.3 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-38535.

4.4 Technology Conformance inspection (TCI). Technology conformance inspection shall be in accordance with MIL-PRF-38535 and herein for groups A, B, C, and D inspections (see 4.4.1 through 4.4.4).

4.4.1 Group A inspection. Group A inspection shall be in accordance with table III of MIL-PRF-38535 and as follows:

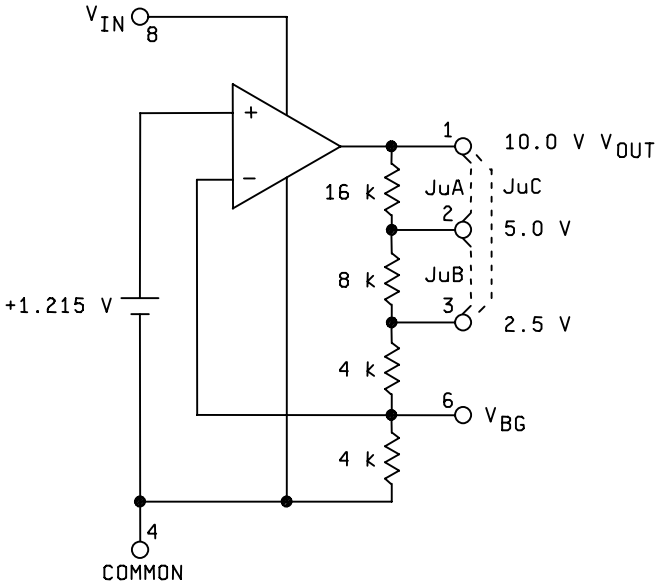
a. Tests shall be as specified in table II herein.

b. Subgroups 5, 6, 7, 8, 10, and 11 shall be omitted.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II of MIL-PRF-38535.

Device types	01 and 02
Case outline	G
Terminal number	Terminal symbol
1	10.0 V
2	5.0 V
3	2.5 V
4	COMMON
5	STROBE
6	V_{BG}
7	CAP
8	V_{IN}

Terminal connections



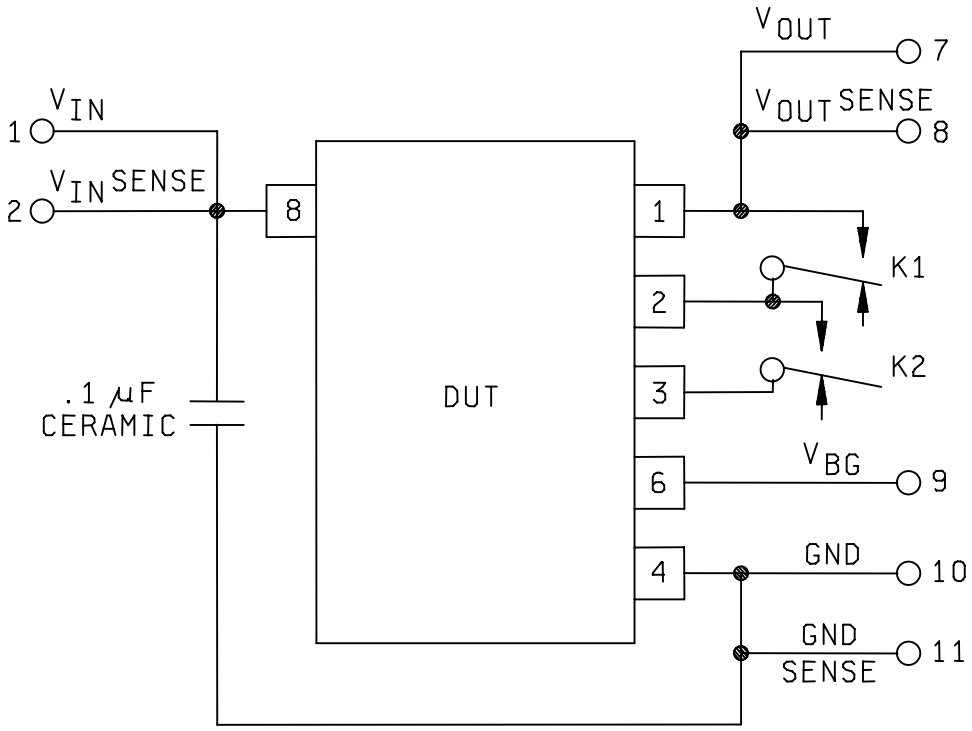
Block diagram

Output Voltage

Voltage	Jumper
V_O = 10 V	--
V_O = 7.5 V	JuB
V_O = 5.0 V	JuA
V_O = 2.5 V	JuC

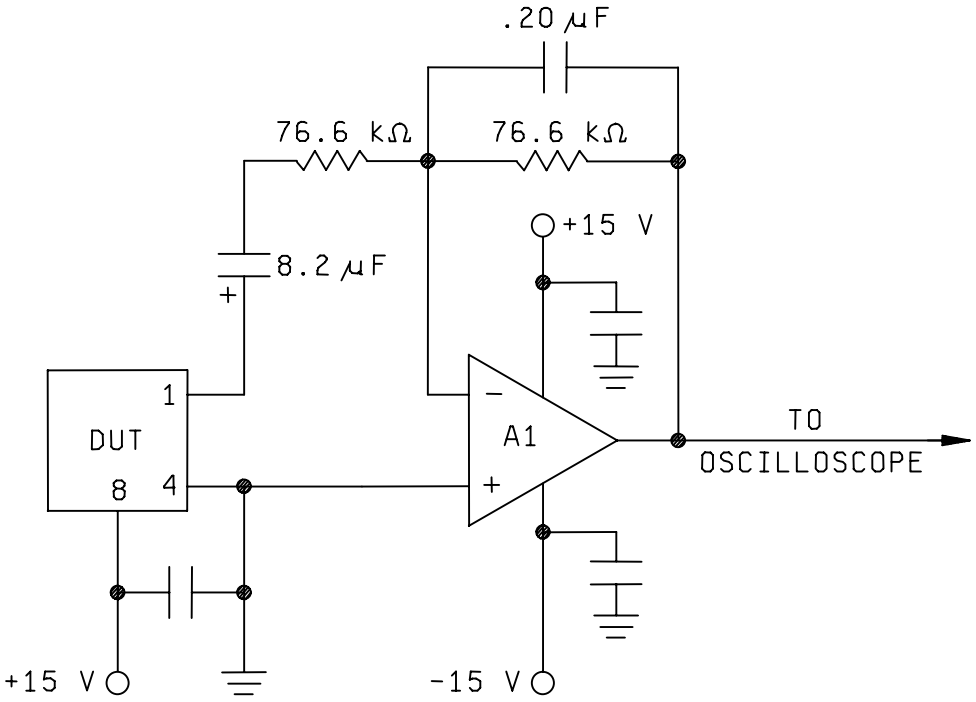
Other voltages may be programmed by substituting an appropriate adjustable resistor for the above jumper.

Figure 1. Terminal connections and block diagram.



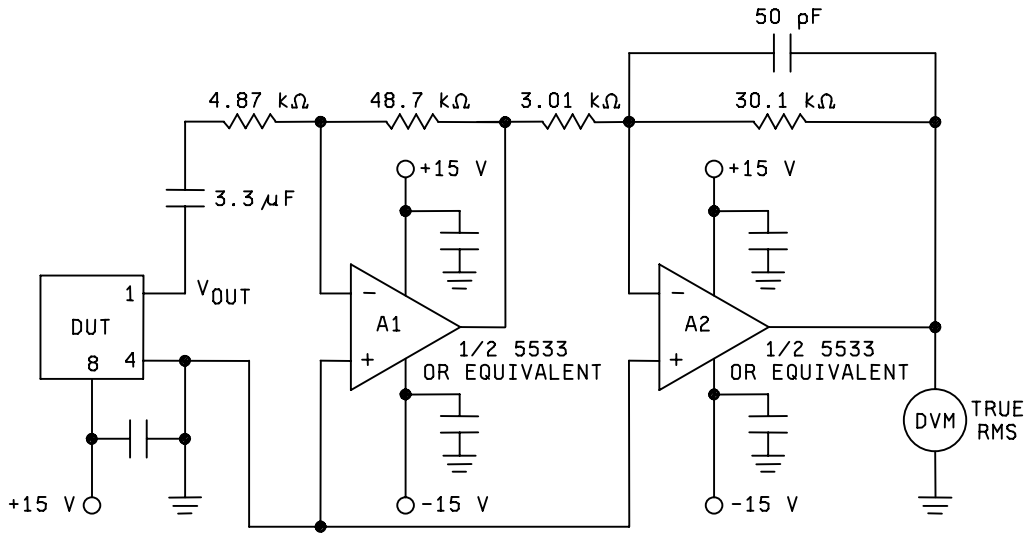
NOTE: 1. For the load regulation test, the load pulse shall be 100 ms maximum, and the duty cycle shall be 1% maximum.

FIGURE 2. Test circuit for static tests.



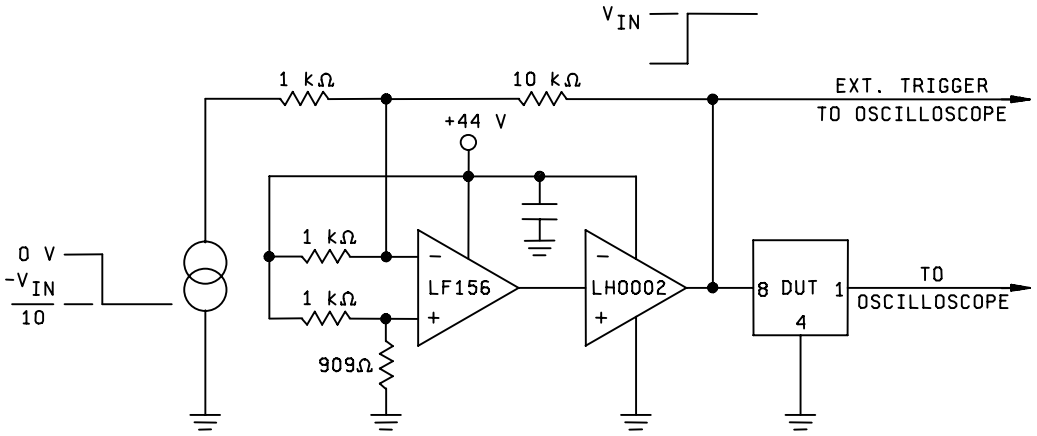
NOTES:
1. Unless otherwise stated, all capacitors are 47 µF tantalum paralleled with 0.1 µF ceramic.
2. The oscilloscope pre-amp shall be a dc voltage comparator type.
3. The oscilloscope time base shall be set to 1 s/cm and the horizontal display shall be 10 cm long.

Figure 3. Output “1/f” noise test circuit.



NOTES:
1. Unless otherwise stated, all capacitors are 47 μF tantalum paralleled with 0.1 μF ceramic.
2. The meters shall be true rms reading and shall have a bandwidth greater than 1MHz.
3. A1 and A2 shall have a gain bandwidth product greater than 10 MHz and an output noise density less than 10 nV/$\sqrt{\text{Hz}}$.

Figure 4. Output “white” noise test circuit.



NOTES:
1. The capacitor is 47 µF tantalum paralleled with 0.1 µF ceramic.
2. The oscilloscope pre-amp shall be a dc voltage comparator type.
3. The settling time is measured at the point in time where the device output Voltage is within 0.1% of its final value.
4. The oscilloscope bandwidth shall be greater than 2 MHz.

Figure 5. Power up settling time test circuit.

TABLE III. Group A inspection for device type 01 and 02.

Subgroup	Symbol	Test no.	Test conditions (figure 2) Applied voltage and current reference pin 10					Relays energized	Measurement sense lines reference pin 11			Equations	Device type	Limits		Unit
			V_{IN} (V)	I_L (mA)	V_O (V)	1 (V)	7 (mA)		Pin	Value	Unit			Min	Max	
1	I_{CC1}	1	40	0	10	40	----	----	1	I1	mA	I_{CC1} = I1	01, 02	0	1.0	mA
T_A =+25°C	I_{CC2}	2	15	"	10	15	----	----	1	I2	mA	I_{CC2} = I2	01, 02	0	1.0	mA
	V_{OUT1}	3	15	"	10	"	----	----	8	E1	V	V_{OUT1} = E1	01	9.97	10.03	V
													02	9.99	10.01	"
	V_{OUT2}	4	"	"	7.5	"	----	K2	"	E2	"	V_{OUT2} = E2	01	7.478	7.522	"
													02	7.492	7.508	"
													01	4.985	5.015	"
	V_{OUT3}	5	"	"	5.0	"	----	K1	"	E3	"	V_{OUT3} = E3	02	4.994	5.006	"
													01	2.4925	2.5075	"
	V_{OUT4}	6	"	"	2.5	"	----	K1, K2	"	E4	"	V_{OUT4} = E4	02	2.4965	2.5035	"
	VR_{LINE1}	7	12.5	"	10	12.5	----	----	"	E5	"	VR_{LINE1} = 100 (E1-E5)/(2.5E1)	01, 02	-0.005	0.005	%/V
	VR_{LINE2}	8	30	"	10	30	----	----	"	E6	"	VR_{LINE2} = 100 (E6-E1)/(15E1)	01, 02	-0.002	0.002	%/V
	VR_{LOAD1}	9	15	-5	10	15	-5	----	"	E7	"	VR_{LOAD1} = (E1-E7) (10^6)/(5E1)	01, 02	-50	50	ppm/mA
	VR_{LOAD2}	10	"	"	7.5	"	"	K2	"	E8	"	VR_{LOAD2} = (E2-E8) (10^6)/(5E2)	01, 02	"	"	"
	VR_{LOAD3}	11	"	"	5.0	"	"	K1	"	E9	"	VR_{LOAD3} = (E3-E9) (10^6)/(5E3)	01, 02	"	"	"
	VR_{LOAD4}	12	"	"	2.5	"	"	K1, K2	"	E10	"	VR_{LOAD4} = (E4-E10) (10^6)/(5E4)	01, 02	"	"	"
	I_{OS1}	13	"	----	10	"	----	----	7	I3	mA	I_{OS1} = I3	01, 02	-55	----	mA
2	DV_{OUT1}/DT	15	"	0	10	"	----	----	8	E11	V	DV_{OUT1}/DT = (E1-E11) (10^2)/(E1)	01	-0.3	0.3	%FS
													02	-0.15	0.15	"
T_A =+125°C	DV_{OUT2}/DT	16	"	"	7.5	"	----	K2	"	E12	"	DV_{OUT2}/DT = (E2-E12) (10^2)/(E2)	01	-0.3	0.3	"
													02	-0.15	0.15	"
													01	-0.3	0.3	"
	DV_{OUT3}/DT	17	"	"	5.0	"	----	K1	"	E13	"	DV_{OUT3}/DT = (E3-E13) (10^2)/(E3)	02	-0.15	0.15	"
													01	-0.3	0.3	"
	DV_{OUT4}/DT	18	"	"	2.5	"	----	K1, K2	"	E14	"	DV_{OUT4}/DT = (E4-E14) (10^2)/(E4)	02	-0.2	0.2	"

TABLE III. Group A inspection for device type 01 and 02 – Continued.

Subgroup	Symbol	Test no.	Test conditions (figure 2)		Applied voltage and current reference pin 10			Relays energized	Measurement sense lines reference pin 11			Equations	Device type	Limits		Unit
			V_{IN} (V)	I_L (mA)	V_O (V)	1 (V)	7 (mA)		Pin	Value	Unit			Min	Max	
2 T_A =+125°C	VR_{LINE1} VR_{LINE2}	19 20	12.5 30	0 0	10 10	12.5 30	---- ----	---- “	8 “	E15 E16	V “	VR_{LINE1} = 100 (E11-E15)/(2.5E11) VR_{LINE2} = 100 (E16-E11)/(15E11)	01, 02 01, 02	-0.010 -0.005	0.010 0.005	%/V %/V
	VR_{LOAD1}	21	15	-5	10	15	-5	----	“	E17	“	VR_{LOAD1} = (E11-E17) (10^5)/(5E11)	01, 02	-100	100	ppm/mA
	VR_{LOAD2}	22	“	“	7.5	“	“	K2	“	E18	“	VR_{LOAD2} = (E12-E18) (10^6)/(5E12)	01, 02	“	“	“
	VR_{LOAD3}	23	“	“	5.0	“	“	K1	“	E19	“	VR_{LOAD3} = (E13-E19) (10^6)/(5E13)	01, 02	“	“	“
	VR_{LOAD4}	24	“	“	2.5	“	“	K1, K2	“	E20	“	VR_{LOAD4} = (E14-E20) (10^6)/(5E14)	01, 02	“	“	“
	I_{OS1}	25	“	----	10	“	----	----	7	I4	mA	I_{OS1} = I4	01, 02	-55	----	mA
3 T_A =-55°C	DV_{OUT1}/DT	26	“	0	10	“	----	----	8	E21	V	DV_{OUT1}/DT = (E1-E21) (10^2)/(E1)	01 02	-0.3 -0.15	0.3 0.15	%FS “
	DV_{OUT2}/DT	27	“	“	7.5	“	----	K2	“	E22	“	DV_{OUT2}/DT = (E2-E22) (10^2)/(E2)	01 02	-0.3 -0.15	0.3 0.15	“ “
	DV_{OUT3}/DT	28	“	“	5.0	“	----	K1	“	E23	“	DV_{OUT3}/DT = (E3-E23) (10^2)/(E3)	01 02	-0.3 -0.15	0.3 0.15	“ “
	DV_{OUT4}/DT	29	“	“	2.5	“	----	K1, K2	“	E24	“	DV_{OUT4}/DT = (E4-E24) (10^2)/(E4)	01 02	-0.3 -0.3	0.3 0.3	“ “
	VR_{LINE1} VR_{LINE2}	30 31	12.5 30	“ “	10 10	12.5 30	---- ----	---- ----	“ “	E25 E26	“ “	VR_{LINE1} = 100 (E21-E25)/(2.5E21) VR_{LINE2} = 100 (E26-E21)/(15E21)	01, 02 01, 02	-0.010 -0.005	0.010 0.005	%/V %/V
	VR_{LOAD1}	32	15	-5	10	15	-5	----	“	E27	“	VR_{LOAD1} = (E21-E27) (10^5)/(5E21)	01, 02	-100	100	ppm/mA
	VR_{LOAD2}	33	“	“	7.5	“	“	K2	“	E28	“	VR_{LOAD2} = (E22-E28) (10^6)/(5E22)	01, 02	“	“	“
	VR_{LOAD3}	34	“	“	5.0	“	“	K1	“	E29	“	VR_{LOAD3} = (E23-E29) (10^6)/(5E23)	01, 02	“	“	“
	VR_{LOAD4}	35	“	“	2.5	“	“	K1, K2	“	E30	“	VR_{LOAD4} = (E24-E30) (10^6)/(5E24)	01, 02	“	“	“
	I_{OS1}	36	“	----	10	“	----	----	7	I5	mA	I_{OS1} = I5	01, 02	-55	----	mA

TABLE III. Group A inspection for device type 01 and 02 – Continued.

Subgroup	Symbol	Test no.	Test conditions (figure 2) Applied voltage and current reference pin 10					Relays energized	Measurement sense lines reference pin 11			Equations	Device type	Limits		Unit
			V_{IN} (V)	I_L (mA)	V_O (V)	1 (V)	7 (mA)		Pin	Value	Unit			Min	Max	
4	N_O	37	15	0	10	15	----	----	----	E31	μV_{P-P}	N_O = E31 (see figure 3)	01, 02	----	150	μV_{P-P}
T_A = 25°C		38	15	0	10	15	----	----	----	E32	µVrms	N_O = E32 (see figure 4)		----	150	µVrms
9	$t_s(p)$	39	15	0	10	15	----	----	1	t1	µs	$t_s(p)$ = t1 (see figure 5)	01, 02	----	500	µs
T_A = 25°C																

4.4.3 Group C inspection. Group C inspection shall be in accordance with table IV of MIL-PRF-38535 and as follows:

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

b. 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 burn-in test circuit shall be maintained under document control by 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 test method 1005 of MIL-STD-883.

4.4.4 Group D inspection. Group D inspection shall be in accordance with table V of MIL-PRF-38535. End point electrical parameters shall be as specified in table II herein.

Table IV. Groups C end point electrical parameters.

Device type	Characteristic	Symbol	Delta limits 1/	Limits		Unit
				Min	Max	
01	Output voltage 1 V_O = 10 V	V_{OUT1}	±0.05%	9.965	10.035	V
02	V_O = 10 V		"	9.985	10.015	"
01	Output voltage 2 V_O = 7.5 V	V_{OUT2}	"	7.474	7.526	"
02	V_O = 7.5 V		"	7.488	7.512	"
01	Output voltage 3 V_O = 5.0 V	V_{OUT3}	"	4.982	5.018	"
02	V_O = 5.0 V		"	4.991	5.009	"
01	Output voltage 4 V_O = 2.5 V	V_{OUT4}	"	2.4913	2.5088	"
02	V_O = 2.5 V		"	2.4952	2.5048	"

1/ Delta limits apply to the measured value (see delta limit definition in MIL-PRF-38535).

4.5 Methods of inspection. Methods of inspection shall be as specified and as follows.

4.5.1 Voltage and current. All voltage values given are referenced to the microcircuit ground terminals. Currents given are conventional current and positive when flowing into the referenced terminal.

5. PACKAGING

5.1 Packaging requirements. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department of Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

6.1 Intended use. Microcircuits conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of the specification.

b. PIN and compliance identifier, if applicable (see 1.2).

c. Requirements for delivery of one copy of the conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.

d. Requirements for certificate of compliance, if applicable.

e. Requirements for notification of change of product or process to acquiring activity in addition to notification of the qualifying activity, if applicable.

f. Requirements for failure analysis (including required test condition of MIL-STD-883, method 5003), corrective action and reporting of results, if applicable.

g. Requirements for product assurance options.

h. Requirements for special carriers, lead lengths, or lead forming, if applicable. These requirements should not affect the part number. Unless otherwise specified, these requirements will not apply to direct purchase by or direct shipment to the Government.

i. Requirements for “JAN” marking.

j. Packaging requirements (see 5.1).

6.3 Superseding information. The requirements of MIL-M-38510 have been superseded to take advantage of the available Qualified Manufacturer Listing (QML) system provided by MIL-PRF-38535. Previous references to MIL-M-38510 in this document have been replaced by appropriate references to MIL-PRF-38535. All technical requirements now consist of this specification and MIL-PRF-38535. The MIL-M-38510 specification sheet number and PIN have been retained to avoid adversely impacting existing government logistics systems and contractor's parts lists.

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List QML-38535 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DSCC-VQ, 3990 E. Broad Street, Columbus, Ohio 43123-1199.

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

VR_{LINE}	Line regulation is the change in the output voltage for a specified change in the input voltage
VR_{LOAD}	Load regulation is the change in the output voltage for a specified change in the load current
N_O	Output noise is the electrical noise, measured at the output, with a constant load current and a constant input voltage. The “1/f” noise is the peak-to-peak noise voltage measured over a frequency band from 0.1 Hz to 10 Hz. The “white” noise is the rms noise voltage measured over a frequency band from 10 Hz to 100 kHz.
t_S	Settling time is the time for the output voltage to settle to within 0.1% of its final value.

6.6 Logistic support. Lead materials and finishes (see 3.4) are interchangeable. Unless otherwise specified, microcircuits acquired for Government logistic support will be acquired to device class B (see 1.2.2), lead material and finish A (see 3.4). Longer length leads and lead forming should not affect the part number.

6.7 Substitutability. The cross-reference information below is presented for the convenience of users. Microcircuits covered by this specification will functionally replace the listed generic-industry type. Generic-industry microcircuit types may not have equivalent operational performance characteristics across military temperature ranges or reliability factors equivalent to MIL-M-38510 device types and may have slight physical variations in relation to case size. The presence of this information should not be deemed as permitting substitution of generic-industry types for MIL-M-38510 types or as a waiver of any of the provisions of MIL-PRF-38535.

Military device type	Generic-industry type
01	584S
02	584T

6.8 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue, due to the extent of the changes.

Custodians:
Army – CR
Navy - EC
Air Force - 11
NASA – NA
DLA – CC

Preparing activity:
DLA - CC

Project 5962-2022

Review activities:
Army – MI, SM
Navy – AS, CG, MC, SH, TD
Air Force – 03, 19, 99

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at www.dodssp.daps.mil.