					F	REVISI	ONS										
LTR			DESCF	RIPTIO	N					DATE (YR-MO-DA)			APPROVED)		
A	Add device type 02	2. Editorial	changes	through	nout.						92-0)9-09			M. A	. FRYE	
В	Changes in accord	dance with N.O.R. 5962-R051-95.						94-12-23				M. A	. FRYE				
С	Drawing updated to	o reflect current requirements. Redrawn.					ro 05-12-15				R. M	ONNIN					
D	Update drawing as	s part of 5 year review jt							12-12-10				C. S.	AFFLE			
THE ORIGINA	L FIRST PAGE OF TH	HIS DRAWI	NG HAS	BEEN	REPLA	CED.											
REV															-		
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REV STATUS		REV		р	П	П	П	D	D	П	П	D					
OF SHEETS		SHEET		1	2	3	4	5	6	7	8	9	10				
OF STILLES STEET T Z 3 PMIC N/A PREPARED BY RICK C. OFFICER Image: Comparison of the co				DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990 http://www.landandmaritime.dla.mil													
THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE B9-09-25			HNSON OVAL D 09-25	N DATE		MIC RE	CROCIRCUIT, LINEAR, SWITCHING EGULATOR, MONOLITHIC SILICON										
AM	ISC N/A	REVISIO	N LEVEL	D			SI.	ZE A	CA	GE CC 6726	DDE B			5962	-8958	86	
1							I		51				vr 10				

1. SCOPE

1.1 <u>Scope</u>. This drawing describes device requirements for MIL-STD-883 compliant, non-JAN class level B microcircuits in accordance with MIL-PRF-38535, appendix A.

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



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1.4 Recommended operating conditions.

Total supply voltage (V _{IN}):	
Device types 01 and 02	+40 V dc
Ambient operating temperature range (T _A)	-55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 <u>Government specification, standards, and handbooks</u>. 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 https://assist.dla.mil/quicksearch/ or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2 <u>Order of precedence</u>. 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 <u>Item requirements</u>. The individual item requirements shall be in accordance with MIL-PRF-38535, appendix A for non-JAN class level B devices and as specified herein. Product built to this drawing that is produced by a Qualified Manufacturer Listing (QML) certified and qualified manufacturer or a manufacturer who has been granted transitional certification to MIL-PRF-38535 may be processed as QML product in accordance with the manufacturers approved program plan and qualifying activity approval in accordance with MIL-PRF-38535. This QML flow as documented in the Quality Management (QM) plan may make modifications to the requirements herein. These modifications shall not affect form, fit, or function of the device. These modifications shall not affect the PIN as described herein. A "Q" or "QML" certification mark in accordance with MIL-PRF-38535 is required to identify when the QML flow option is used.

3.2 <u>Design, construction, and physical dimensions</u>. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535, appendix A and herein.

3.2.1 <u>Case outlines</u>. The case outline shall be in accordance with 1.2.2 herein.

3.2.2 <u>Terminal connections</u>. The terminal connections shall be as specified on figure 1.

3.3 <u>Electrical performance characteristics</u>. 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 <u>Electrical test requirements</u>. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table I.

STANDARD MICROCIRCUIT DRAWING	SIZE A		5962-89586
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Test	Symbol	$Conditions \\ -55^{\circ}C \leq T_A \leq +125^{\circ}C \\ unless otherwise specified$		Group A subgroups	Device type	Lir	nits	Unit
					Min	Max		
Oscillator frequency	Fosc	V _{IN} = 2.0 V, C _T = 4000 pF		1	All	17.6	22.4	kHz
				2		13.2	26.9	
		V _{IN} = 2.2 V, C _T = 400	00 pF	3		13.2	26.9	
		$V_{IN} = 40 V, C_T = 4000$	0 pF	1		17.6	22.4	
				2,3		13.2	26.9	
Input reference	V _{REF}	<u>1/ 2/ 3/</u>	V _{IN} = 2.0 V	1	All	0.965	1.035	V
voltage		$I_1 = I_2 = 0 \text{ mA},$		2		0.950	1.050	
		25% duty cycle	V _{IN} = 2.2 V	3		0.950	1.050	
		$I_1 = I_2 = 1 \text{ mA } \pm 1\%,$	V _{IN} = 2.0 V	1		0.965	1.035	
		25% duty cycle		2		0.950	1.050	
			V _{IN} = 2.2 V	3	-	0.950	1.050	
		$I_1 = I_2 = 0 \text{ mA},$	V _{IN} = 2.0 V	1		0.965	1.035	
		75% duty cycle		2		0.950	1.050	
			V _{IN} = 2.2 V	3		0.950	1.050	
		$I_1 = I_2 = 1 \text{ mA } \pm 1\%,$	V _{IN} = 2.0 V	1		0.965	1.035	
		75% duty cycle		2		0.950	1.050	
			V _{IN} = 2.2 V	3		0.950	1.050	
		$I_1 = I_2 = 0 \text{ mA}, \underline{1}/\underline{2}/$	<u>3</u> /	1		0.965	1.035	-
		25% duty cycle, V _{IN} =	= 40 V	2,3		0.950	1.050	
		$I_1 = I_2 = 1 \text{ mA} \pm 1 \%,$		1		0.965	1.035	
		25% duty cycle, V _{IN} =	= 40 V	2,3		0.950	1.050	
		$I_1 = I_2 = 0 \text{ mA},$		1		0.965	1.035	
		75% duty cycle, V _{IN} =	75% duty cycle, V _{IN} = 40 V			0.950	1.050	
		$I_1 = I_2 = 1 \text{ mA} \pm 1 \%,$		1		0.965	1.035	
		75% duty cycle, V _{IN} =	= 40 V	2,3		0.950	1.050	
See footnotes at end of	table							

SIZE

TABLE I. Electrical performance characteristics.

ee footnotes at end of table.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990

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		-

Test	Symbol	$Conditions \\ -55^{\circ}C \leq T_A \leq +125^{\circ}C \\ unless otherwise specified$	Group A subgroups	Device type	Lir	nits	Unit
					Min	Max	
Input reference	V _{Rline}	$I_1 = I_2 = 0 \text{ mA}, 25\% \text{ duty cycle},$	1	All		±3.8	mV
voltage line		$2.0 \text{ V} \le \text{V}_{IN} \le 40 \text{ V}$ <u>1/2</u> /	2	-		±7.6	
regulation		$I_1 = I_2 = 0$ mA, 25% duty cycle, 2.2 V ≤ V _{IN} ≤ 40 V <u>1/2</u> /	3			±7.6	
		I ₁ = I ₂ = 1 mA ±1 %, <u>1/ 2</u> / 25% duty cycle,	1			±3.8	
		$2.0 \text{ V} \leq \text{V}_{IN} \leq 40 \text{ V} \qquad \qquad 2$			±7.6		
		I ₁ = I ₂ = 1 mA ±1 %, <u>1/2/</u> 25% duty cycle, 2.2 V ≤ VIN ≤ 40 V	3			±7.6	
		$I_1 = I_2 = 0 \text{ mA}, 75\% \text{ duty cycle},$	1			±3.8	-
		$2.0 \text{ V} \le \text{V}_{IN} \le 40 \text{ V}$	2			±7.6	
		$I_1 = I_2 = 0$ mA, 75% duty cycle, 2.2 V $\leq V_{IN} \leq 40$ V	3			±7.6	
		I ₁ = I ₂ = 1 mA ±1 %, 75% duty cycle,	1			±3.8	
		$2.0~V \leq V_{IN} \leq 40~V$	2			±7.6	
		I ₁ = I ₂ = 1 mA ±1 %, 75% duty cycle, 2.2 V ≤ V _{IN} ≤ 40 V	3			±7.6	

TABLE I. <u>Electrical performance characteristics</u> – Continued.

See footnotes at end of table.

STANDARD MICROCIRCUIT DRAWING	SIZE A		5962-89586
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Test	Symbol	Condit -55°C \leq T _A : unless otherwi	ons ≤ +125°C Group A se specified subgroups		Device type	Lir	Unit		
						Min	Max		
Level shift accuracy		<u>2</u> /	V _{IN} = 2 V	1	All		±75	mV	
		$I_1 = I_2 = 1 \text{ mA},$		2			±105		
		25% duty cycle	V _{IN} = 2.2 V	3			±105		
		$I_1 = I_2 = 1 \text{ mA}, V_{IN}$	= 40 V,	1			±75		
		25% duty cycle		2,3			±105		
		$I_1 = I_2 = 1 \text{ mA},$	V _{IN} = 2 V	1			±75	-	
		75% duty cycle		2			±105		
			V _{IN} = 2.2 V	3			±105		
		$I_1 = I_2 = 1 \text{ mA}, V_{IN} = 40 \text{ V},$		1			±75	_	
		75% duty cycle	% duty cycle				±105		
Collector saturation	VSATC	I _C = 750 mA,	V _{IN} = 2 V	1	All		0.85	V	
voltage		emitter grounded		2			1.2	_	
			V _{IN} = 2.2 V	3			1.2		
		I _C = 750 mA, V _{IN} =	40 V,	1			0.85		
		emitter grounded	emitter grounded				1.2]	
				3			1.2		
Emitter saturation	VSATE	I _E = 80 mA,		1	All		1.6	V	
voltage		collector at $V_{IN} = 40$	0 V	2,3			2.1		
Collector leakage	۱L	Collector at V _{IN} = 4	0 V,	1	All		50	μA	
current		emitter grounded, o	output off	2,3	1		100		
Sense voltage for	VSEN	V _{IN} = 40 V, referred	d to V _{IN 4/}	1,2,3	All	95	160	mV	
shutdown		$V_{IN} = 40 V$, referred	d to GND 4/	1,2,3		95	160		

TABLE I. <u>Electrical performance characteristics</u> – Continued.

See footnotes at end of table.

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	1 A	ABLE I. Electrical performance charact	<u>eristics</u> – Cont	inued.			
Test	Symbol	$Conditions \\ -55^{\circ}C \leq T_A \leq +125^{\circ}C \\ unless otherwise specified$	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Supply current	I _{SY}	Output off, V _{IN} = 2.0 V <u>5</u> /	1	All		3.0	mA
			2			3.3	
		Output off, V _{IN} = 2.2 V <u>5</u> /	3			3.3	
		V _{IN} = 40 V	1			3.0	
			2,3			3.3	
Collector emitter sustaining voltage	BV _{CEO}	V _C = 60 V, T _A = +25°C,	1	02	50	60	V
	(SUS)	I _C = 200 mA					

1/ I1 and I2 are the external sink currents at the inputs.

_. _ . _ . _ .

- 2/ Input terminals are protected from accidental shorts to ground. If external voltages higher than the reference voltage are applied, excessive current will flow and should be limited to less than 5 mA.
- 3/ The input reference voltage is that voltage which, when applied to either the inverting or noninverting inputs (measured with respect to ground), will cause the output to switch on or off.
- <u>4</u>/ Connection of a 10 k resistor from pin 1 to pin 4 establishes the duty cycle at its maximum of 90 percent with a maximum voltage swing on the output collector of 50 V. Applying the minimum current sense voltage will not reduce the duty cycle to less than 50 percent. Applying the maximum current limit sense voltage is certain to reduce the duty cycle below 50 percent. An additional 15 mV above the sense voltage may be required to reduce the duty cycle to 0 percent.
- 5/ The IC power supply excluding the output transistor's collector current, with oscillator operating.

3.5 <u>Marking</u>. Marking shall be in accordance with MIL-PRF-38535, appendix A. 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.

3.5.1 <u>Certification/compliance mark</u>. A compliance indicator "C" shall be marked on all non-JAN devices built in compliance to MIL-PRF-38535, appendix A. The compliance indicator "C" shall be replaced with a "Q" or "QML" certification mark in accordance with MIL-PRF-38535 to identify when the QML flow option is used.

3.6 <u>Certificate of compliance</u>. 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 herein). The certificate of compliance submitted to DLA Land and Maritime -VA prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-PRF-38535, appendix A and the requirements herein.

3.7 <u>Certificate of conformance</u>. A certificate of conformance as required in MIL-PRF-38535, appendix A shall be provided with each lot of microcircuits delivered to this drawing.

3.8 <u>Notification of change</u>. Notification of change to DLA Land and Maritime -VA shall be required for any change that affects this drawing.

3.9 <u>Verification and review</u>. 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.

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Device types	01 and 02
Case outline	G
Terminal number	Terminal symbol
1	-INPUT
2	+INPUT
3	OSCILLATOR
4	GND
5	EMITTER
6	COLLECTOR
7	CURRENT LIMIT
8	VIN

FIGURE 1. Terminal connections.

STANDARD MICROCIRCUIT DRAWING	SIZE A		5962-89586
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4. VERIFICATION

4.1 <u>Sampling and inspection</u>. Sampling and inspection procedures shall be in accordance with MIL-PRF-38535, appendix A.

4.2 <u>Screening</u>. 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 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 of MIL-STD-883.
 - (2) $T_A = +125^{\circ}C$, 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 <u>Quality conformance inspection</u>. 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 4, 5, 6, 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 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.
 - (2) $T_A = +125^{\circ}C$, minimum.
 - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

STANDARD MICROCIRCUIT DRAWING DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	SIZE A		5962-89586
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TABLE II.	Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (in accordance with MIL-STD-883, method 5005,
Interim electrical parameters	table I)
(method 5004)	1
Final electrical test parameters	1* 2 3
(method 5004)	1,2,0
Group A test requirements (method 5005)	1, 2, 3
Groups C and D end-point	
electrical parameters	1, 2, 3
(method 5005)	

* PDA applies to subgroup 1.

5. PACKAGING

5.1 <u>Packaging requirements</u>. The requirements for packaging shall be in accordance with MIL-PRF-38535, appendix A.

6. NOTES

6.1 <u>Intended use</u>. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

6.2 <u>Replaceability</u>. Microcircuits covered by this drawing will replace the same generic device covered by a contractorprepared specification or drawing.

6.3 <u>Configuration control of SMD's</u>. 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.

6.4 <u>Record of users</u>. Military and industrial users shall inform DLA Land and Maritime when a system application requires configuration control and the applicable SMD 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 microelectronics devices (FSC 5962) should contact DLA Land and Maritime -VA, telephone (614) 692-0544.

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

6.6 <u>Approved sources of supply</u>. Approved sources of supply 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: 12-12-10

Approved sources of supply for SMD 5962-89586 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	Vendor	Vendor
microcircuit drawing	CAGE	similar
PIN <u>1</u> /	number	PIN <u>2</u> /
5962-8958601GA	3V146	LM1578H/883
5962-8958602GA	3V146	LM1578AH/883

- <u>1</u>/ 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 <u>number</u> Vendor name and address

3V146

Rochester Electronics Inc. 16 Malcolm Hoyt Drive Newburyport, MA 01950

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