

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
D	Add packages C, E, F, 2, H, and X. Changes unity gain bandwidth limit. Editorial changes throughout.	92-11-23	M. A. Frye
E	Add device types 05, 06, 07, and 08. Add vendor CAGE 48726 for device type 05, 06, 07, and 08. Changes to table I electricals. Delete vendor CAGE U4637 from drawing. Add vendor CAGE U3158. Editorial changes throughout.	93-09-10	M. A. Frye
F	Make changes to the figure 1 terminal connections in accordance with NOR 5962-R146-94.	94-05-17	M. A. Frye
G	Make changes to the minimum operating voltage test for device types 02 and 04 only as specified under table I in accordance with NOR 5962-R251-97.	97-03-19	M. A. Frye
H	Change vendor CAGE 48726 to 01295. Add class V for vendor CAGE 01295. Editorial changes throughout. Redrawn. - lgt	00-11-08	R. Monnin
J	Correction to the V _{MIN} limit in table I for device types 03 and 06. Editorial changes throughout. - rrp	01-10-10	R. Monnin
K	Add case outline D. - ro	02-05-30	R. Monnin
L	For CAGE 01295 only, delete case outline 2 and substitute case outline X for device class V devices. - ro	03-12-19	R. Monnin
M	Add device type 09 and Table IIB. Make changes to 1.2.2, 1.4, and Table I. - ro	09-01-07	R. Heber
N	Add device type 10. Add a microcircuit die appendix A. Add paragraph 3.1.1. Add footnote 7/ under Table I. Make changes to 1.2.2, Table I, figure 1, and Table IIB. - ro	10-05-26	C. Saffle
P	Add device type 11, case outline Y, and irradiation requirements. - ro	15-06-02	C. Saffle
R	Add radiation requirements to device type 09. - ro	16-12-19	C. Saffle



CURRENT CAGE CODE 67268

THE ORIGINAL FIRST PAGE OF THIS DRAWING HAS BEEN REPLACED.

REV																				
SHEET																				
REV	R	R	R	R	R	R	R	R												
SHEET	15	16	17	18	19	20	21	22												
REV STATUS OF SHEETS	REV			R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
	SHEET			1	2	3	4	5	6	7	8	9	10	11	12	13	14			

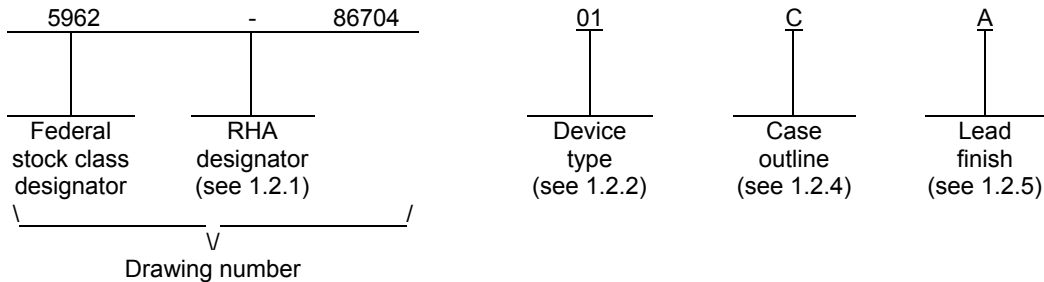
PMIC N/A	PREPARED BY DONALD R. OSBORNE	<p align="center">DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990 http://www.landandmaritime.dla.mil</p>																	
<p align="center">STANDARD MICROCIRCUIT DRAWING</p> THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE	CHECKED BY D. A. DICENZO																		
	APPROVED BY N. A. HAUCK	MICROCIRCUIT, LINEAR, PROGRAMMABLE PRIMARY SIDE PULSE WIDTH MODULATOR, MONOLITHIC SILICON																	
	DRAWING APPROVAL DATE 86-11-10																		
AMSC N/A	REVISION LEVEL R	SIZE A	CAGE CODE 14933	5962-86704															
SHEET 1 OF 22																			

1. SCOPE

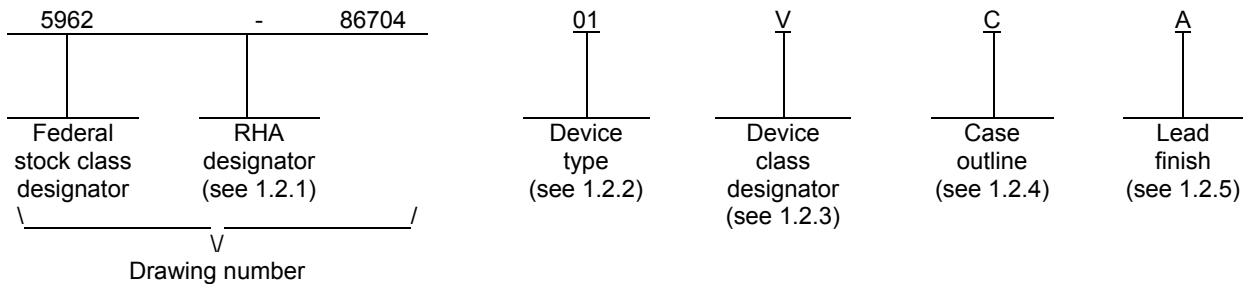
1.1 Scope. This drawing documents two product assurance class levels consisting of high reliability (device class Q and M) and space application (device class V). A choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of Radiation Hardness Assurance (RHA) levels is reflected in the PIN.

1.2 PIN. The PIN is as shown in the following examples.

For device class M and Q:



For device class V:



1.2.1 RHA designator. Device classes Q and V RHA marked devices meet the MIL-PRF-38535 specified RHA levels and are marked with the appropriate RHA designator. Device class M RHA marked devices meet the MIL-PRF-38535, appendix A specified RHA levels and are marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

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

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	1842	Off-line current mode pulse width modulator controller
02	1843	Off-line current mode pulse width modulator controller
03	1844	Off-line current mode pulse width modulator controller
04	1845	Off-line current mode pulse width modulator controller
05	1842A	Off-line current mode pulse width modulator controller
06	1843A	Off-line current mode pulse width modulator controller
07	1844A	Off-line current mode pulse width modulator controller
08	1845A	Off-line current mode pulse width modulator controller
09	1843A-SP	Off-line current mode pulse width modulator controller
10	1843-SP	Off-line current mode pulse width modulator controller
11	1845A-SP	Off-line current mode pulse width modulator controller

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1.2.3 Device class designator. The device class designator is a single letter identifying the product assurance level as listed below. Since the device class designator has been added after the original issuance of this drawing, device classes M and Q designators will not be included in the PIN and will not be marked on the device.

<u>Device class</u>	<u>Device requirements documentation</u>
M	Vendor self-certification to the requirements for MIL-STD-883 compliant, non-JAN class level B microcircuits in accordance with MIL-PRF-38535, appendix A
Q or V	Certification and qualification to MIL-PRF-38535

1.2.4 Case outline(s). The case outline(s) are as designated in MIL-STD-1835 and as follows:

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
C	GDIP1-T14 or CDIP2-T14	14	Dual-in-line
D	GDFP1-F14 or CDFP2-F14	14	Flat pack
E	GDIP1-T16 or CDIP2-T16	16	Dual-in-line
F	GDFP2-F16 or CDFP3-F16	16	Flat pack
H	GDFP1-F10 or CDFP2-F10	10	Flat pack
P	GDIP1-T8 or CDIP2-T8	8	Dual-in-line
X	CQCC1-N20	20	Square leadless chip carrier (see figure 2)
Y	See figure 1	10	Flat pack
2	CQCC1-N20	20	Square leadless chip carrier (see figure 2)

1.2.5 Lead finish. The lead finish is as specified in MIL-PRF-38535 for device classes Q and V or MIL-PRF-38535, appendix A for device class M.

1.3 Absolute maximum ratings. 1/ 2/ 3/

Supply voltage (VCC)	30 V
Output current (I _{OUT})	±1.0 A
Output energy (capacitance load)	5.0 μ j
Analog input voltage (V _{FB} and I _{SENSE} pins)	-0.3 V to +6.3 V
Error amplifier output sink current	10 mA
Power dissipation (PD)(T _A = +25°C):	
Cases C, E, F, H, P, X, Y, and 2	1.0 W 4/
Case D	700 mW 4/
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C
Junction temperature (T _J)	+150°C
Thermal resistance, junction-to-case (θ _{JC}) :	
Cases C, D, E, F, H, P, X, and 2	See MIL-STD-1835
Thermal resistance, junction-to-case (bottom)(θ _{JC bot}) :	
Case Y	6.6°C/W

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/ All voltages are with respect to ground, and all currents are positive when flowing into the specified terminal.

3/ All references to pin numbers are for case outline P.

4/ Derate at 8.0 mW/°C above T_A = +25°C for cases P and Y, 10 mW/°C above T_A = +50°C for cases C and E, 5.5 mW/°C above T_A = +25°C for case D, 8.7 mW/°C above T_A = +25°C for case F, 9.0 mW/°C above T_A = +40°C for cases 2 and X, and 6.9 mW/°C above T_A = +25°C for case H.

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1.4 Recommended operating conditions.

Supply voltage (VCC):	
Device types 01 – 08, 10	+15 V ±5.0 percent
Device type 09, 11	12 V to 25 V
Sink/source output current (continuous or time average):	
Device type 09, 11	0 mA to 200 mA
Reference load current:	
Device type 09, 11	0 mA to 20 mA
Ambient operating temperature range (TA)	-55°C to +125°C

1.5 Radiation features.

Maximum total dose available (dose rate = 10 mrads(Si)/s):	
Device types 09 and 11	30 krads(Si) <u>5/ 6/</u>

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 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 <http://quicksearch.dla.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 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.

5/ The device types 09 and 11 may exhibit enhanced low dose rate sensitivity (ELDRS). However, post irradiation electrical parametric limits remain within the pre-irradiation specifications limits at low dose rate condition D to TID level 30 krads (Si).
6/ The manufacturer supplying device types 09 and 11 has performed low dose rate irradiation test. The radiation end point limits for the noted parameters are guaranteed only for the conditions as specified in MIL-STD-883, methods 1019, condition D for total dose of 30 krads (Si).

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3. REQUIREMENTS

3.1 Item requirements. The individual item requirements for device classes Q and V 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. The individual item requirements for device class M shall be in accordance with MIL-PRF-38535, appendix A for non-JAN class level B devices and as specified herein.

3.1.1 Microcircuit die. For the requirements of microcircuit die, see appendix A to this document.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein for device classes Q and V or MIL-PRF-38535, appendix A and herein for device class M.

3.2.1 Case outlines. The case outlines 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.

3.2.3 Logic diagram. The logic diagram shall be as specified on figure 3.

3.3 Electrical performance characteristics and postirradiation parameter limits. Unless otherwise specified herein, the electrical performance characteristics and postirradiation parameter limits 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 IIA. The electrical tests for each subgroup are defined in table I.

3.5 Marking. 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. For RHA product using this option, the RHA designator shall still be marked. Marking for device classes Q and V shall be in accordance with MIL-PRF-38535. Marking for device class M shall be in accordance with MIL-PRF-38535, appendix A.

3.5.1 Certification/compliance mark. The certification mark for device classes Q and V shall be a "QML" or "Q" as required in MIL-PRF-38535. The compliance mark for device class M shall be a "C" as required in MIL-PRF-38535, appendix A.

3.6 Certificate of compliance. For device classes Q and V, a certificate of compliance shall be required from a QML-38535 listed manufacturer in order to supply to the requirements of this drawing (see 6.6.1 herein). For device class M, 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 6.6.2 herein). The certificate of compliance submitted to DLA Land and Maritime-VA prior to listing as an approved source of supply for this drawing shall affirm that the manufacturer's product meets, for device classes Q and V, the requirements of MIL-PRF-38535 and herein or for device class M, the requirements of MIL-PRF-38535, appendix A and herein.

3.7 Certificate of conformance. A certificate of conformance as required for device classes Q and V in MIL-PRF-38535 or for device class M in MIL-PRF-38535, appendix A shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change for device class M. For device class M, notification to DLA Land and Maritime-VA of change of product (see 6.2 herein) involving devices acquired to this drawing is required for any change that affects this drawing.

3.9 Verification and review for device class M. For device class M, 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.

3.10 Microcircuit group assignment for device class M. Device class M devices covered by this drawing shall be in microcircuit group number 110 (see MIL-PRF-38535, appendix A).

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions <u>1/ 2/</u> -55°C ≤ TA ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
REFERENCE section							
Reference output voltage	VREF	IO = 1.0 mA, TJ = +25°C	1	01 - 08	4.95	5.05	V
				09,10,11	4.94	5.06	
			M, P, D	1	11	4.85	
Line regulation	VRLINE	12 V ≤ VIN ≤ 25 V	1, 2, 3	All		20	mV
Load regulation	VRLOAD	1.0 mA ≤ IO ≤ 20 mA	1, 2, 3	All		25	mV
Total output variation		Over line, load, and temperature <u>3/</u>	1, 2, 3	All	4.90	5.10	V
Long term stability <u>3/</u>		TA = +125°C, 1000 hours, VREF	2	01 - 08		25	mV
Output short-circuit current	IOS		1, 2, 3	All	-30	-180	mA
OSCILLATOR section							
Initial accuracy		TJ = +25°C <u>4/</u>	4	All	47	57	kHz
Voltage stability		12 V ≤ VCC ≤ 25 V	4, 5, 6	All		1.0	%
Discharge current		VRT/CT = 2 V <u>5/</u>	1	05 - 09,	7.8	8.8	mA
			2, 3	11	7.5	8.8	
ERROR AMP section							
Input voltage	VIN	VCOMP = 2.5 V	1, 2, 3	All	2.45	2.55	V
Input bias current	IIB		1, 2, 3	All		-1.0	μA
Open loop voltage gain	AVOL	2.0 V ≤ VO ≤ 4.0 V	4, 5, 6	All	65		dB
Unity gain bandwidth	GBW	<u>3/</u>	4, 5, 6	01 - 08, 10	0.55		MHz
			4	09, 11	0.7		
Power supply rejection ratio	PSRR	12 V ≤ VCC ≤ 25 V	4, 5, 6	All	60		dB
Output sink current	ISINK	VVFB = 2.7 V, VCOMP = 1.1 V	1, 2, 3	All	2.0		mA
Output source current	ISOURCE	VVFB = 2.3 V, VCOMP = 5.0 V	1, 2, 3	All	-0.5		mA
VOUT high	VOH	VVFB = 2.3 V, RL = 15 kΩ to ground	1, 2, 3	All	5.0		V
VOUT low	VOL	VVFB = 2.7 V, RL = 15 kΩ to VREF	1, 2, 3	All		1.1	V

See footnotes at end of table.

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TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions <u>1/ 2/</u> -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
CURRENT SENSE section							
Gain	A	<u>6/ 7/</u>	4, 5, 6	All	2.85	3.15	V/V
Maximum input signal		V _{COMP} = 5.0 V <u>6/</u>	4, 5, 6	All	0.9	1.1	V
Input bias current	I _{IB}		1, 2, 3	All		-10	μA
Delay to output	T _D	V _{VFB} = 0 V, <u>3/</u>	9	01 - 08,		300	ns
		V _{ISENSE} = 2 V (step input)	10, 11	10		400	
		V _{VFB} = 0 V, <u>3/</u> V _{ISENSE} = 0 to 2 V (step input)	9	09,11		300	
OUTPUT section							
Output low voltage	V _{OL}	I _{SINK} = 20 mA	1, 2, 3	All		0.4	V
		I _{SINK} = 200 mA				2.2	
Output high voltage	V _{OH}	I _{SOURCE} = 20 mA	1, 2, 3	All	13		V
		I _{SOURCE} = 200 mA			12		
Rise time	t _r	C _L = 1000 pF <u>3/</u>	9	All		150	ns
			10, 11	01 - 08, 10		200	
Fall time	t _f	C _L = 1000 pF <u>3/</u>	9	All		150	ns
			10, 11	01 - 08, 10		200	
UVLO saturation voltage	UVLOSAT	V _{CC} = 5 V, I _{SINK} = 10 mA	1, 2, 3	05 – 09, 11		1.2	V
UNDER-VOLTAGE LOCKOUT section							
Start threshold	V _{TH}		1, 2, 3	01, 03, 05, 07	15	17	V
				02, 04, 06, 08, 09, 10, 11	7.8	9.0	
Minimum operating voltage	V _{MIN}	After turn-on	1, 2, 3	01, 05, 03	9.0	11	V
				06, 07, 08, 09, 11	7.0	8.2	
				02, 04, 10	7.0	8.3	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions <u>1/ 2/</u> -55°C ≤ TA ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Pulse width modulation section							
Maximum duty cycle	tON / tOSC		1, 2, 3	01, 02, 05, 06	93	100	%
	(max)			03, 04, 07, 08, 11	46	50	
	<u>8/</u>			09,10	94	100	
Minimum duty cycle	tON / tOSC (min)		1, 2, 3	01 – 09, 11		0	%
	<u>8/</u>			10			
TOTAL STANDBY CURRENT section							
Start-up current	I _{START}		1, 2, 3	01 - 08, 10		1.0	mA
				09, 11		0.5	
Operating supply current	I _{CC}	V _{VFB} = V _{ISENSE} = 0 V	1, 2, 3	All		17	mA
VCC zener voltage	V _Z	I _{CC} = 25 mA	1,2,3	09, 11	30		V

- 1/ TA = TJ. Characteristics apply at VCC = 15 V (adjust VCC above the start threshold before setting at 15 V), RT = 10 kΩ and CT = 3.3 nF unless otherwise specified.
- 2/ Device types 09 and 11 supplied to this drawing has been characterized through all levels M, D and P of irradiation. However, device type 11 is only tested at the “P” level. Pre and Post irradiation values are identical unless otherwise specified in table I. When performing post irradiation electrical measurement for any RHA level, TA = +25°C. The manufacturer supplying device types 09 and 11 has performed low dose rate irradiation test. The radiation end point limits for the noted parameters are guaranteed only for the conditions as specified in MIL-STD-883, methods 1019, condition D for total dose of 30 krad (Si).
- 3/ These parameters are guaranteed if not tested.
- 4/ Output frequency equals oscillator frequency for device types 01, 02, 05, 06, and 09. Output frequency is one half oscillator frequency for device types 03, 04, 07, and 08.
- 5/ For device type 09 only, this parameter is measured with RT = 10 kΩ to VREF. This contributes approximately 300 μA of current to the measurement. The total current flowing into the RT / CT pin will be approximately 300 μA higher than the measured value.
- 6/ Parameter measured at trip point of latch with VFB = 0 V.
- 7/ Gain is defined as :
- $$A = \frac{\Delta V_{COMP}}{\Delta V_{SENSE}} ; 0 V \leq V_{ISENSE} \leq 0.8 V$$
- 8/ Duty cycle is extensively characterized over temperature but, not production tested for device type 10.

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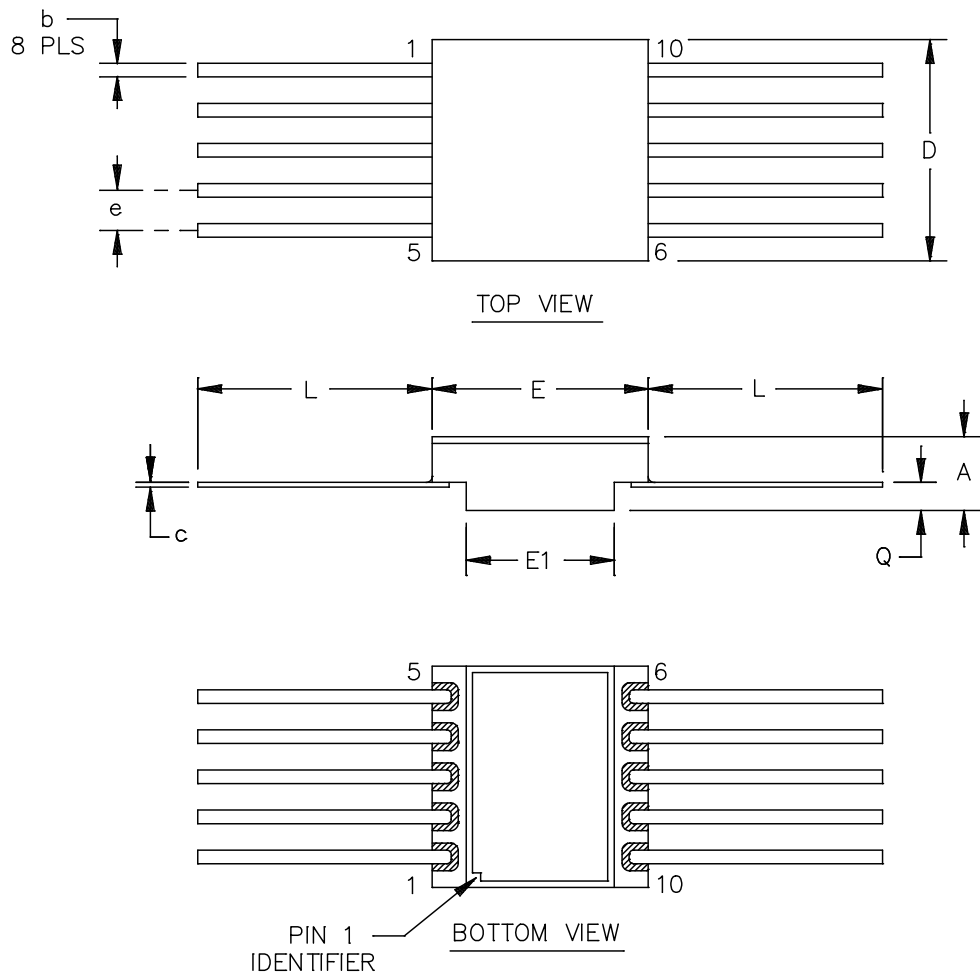
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Case Y



Symbol	Inches		Millimeters	
	Min	Max	Min	Max
A	.0820	.1021	2.08	2.59
b	.0150	.0190	0.38	0.48
c	.0034	.0066	0.09	0.17
D	.2695	.2833	6.85	7.20
E	.2632	.2770	6.69	7.04
E1	.1780	.1921	4.52	4.88
e	.0500		1.27	
L	.2781	.3081	7.07	7.83
Q	.0299	.0401	0.76	1.02

FIGURE 1. Case outline.

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Device types	All	All	All	01, 02	03, 04
Case outlines	C and D	H	P	2	2
Terminal number	Terminal symbol				
1	COMP	COMP	COMP	NC	NC
2	NC	VFB	VFB	COMP	NC
3	VFB	ISENSE	ISENSE	NC	COMP
4	NC	RT/CT	RT/CT	NC	NC
5	ISENSE	POWER GND	GROUND	VFB	VFB
6	NC	GROUND	OUTPUT	NC	NC
7	RT/CT	OUTPUT	VCC	ISENSE	ISENSE
8	POWER GND	Vc	VREF	NC	RT/CT
9	GROUND	VCC	---	NC	NC
10	OUTPUT	VREF	---	RT/CT	NC
11	Vc	---	---	NC	NC
12	VCC	---	---	GROUND	POWER GND
13	NC	---	---	NC	GROUND
14	VREF	---	---	NC	NC
15	---	---	---	OUTPUT	OUTPUT
16	---	---	---	NC	NC
17	---	---	---	VCC	Vc
18	---	---	---	NC	VCC
19	---	---	---	NC	NC
20	---	---	---	VREF	VREF

NOTES: Case outlines E and F are not available from an approved source.
NC = No connect.

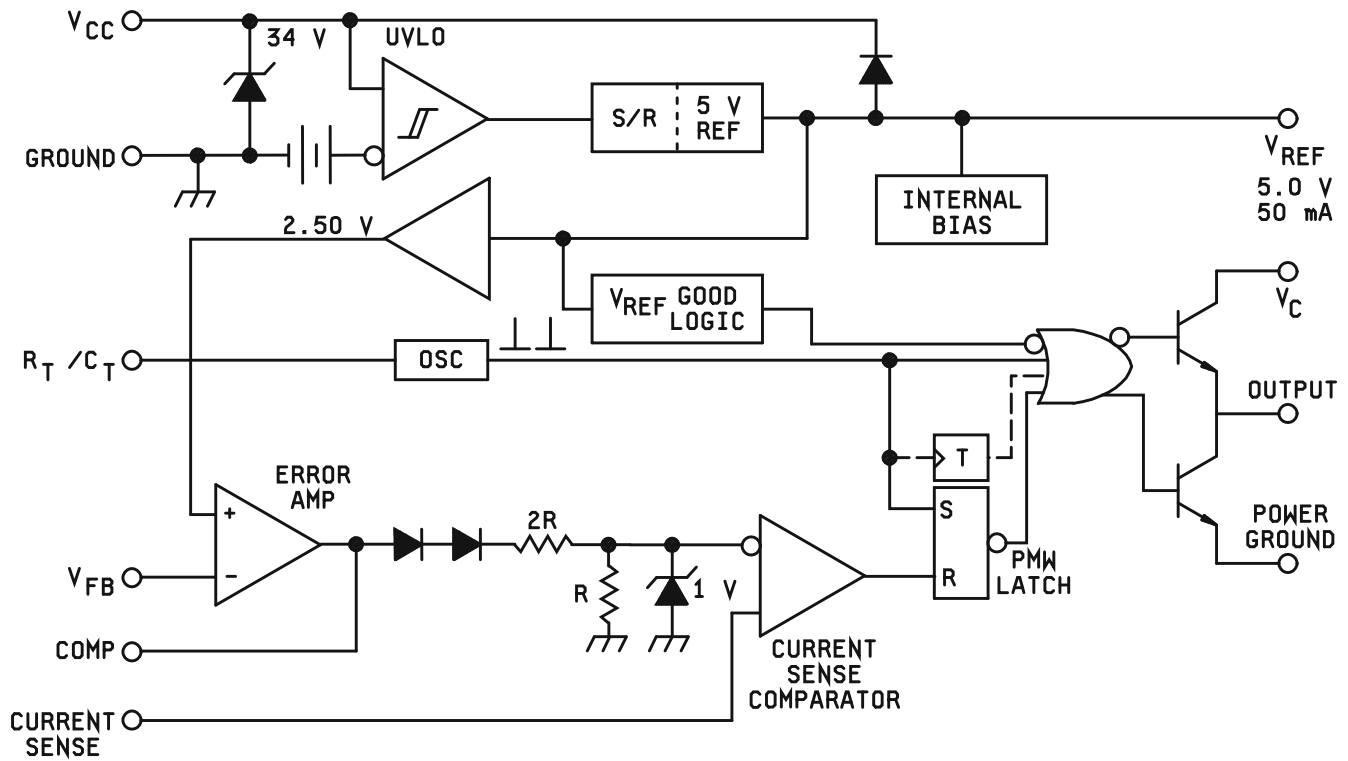
FIGURE 2. Terminal connections.

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Device types	All	11
Case outlines	X	Y
Terminal number	Terminal symbol	
1	NC	COMP
2	COMP	VFB
3	NC	ISENSE
4	NC	RT/CT
5	VFB	NC
6	NC	NC
7	ISENSE	GROUND
8	NC	OUTPUT
9	NC	VCC
10	RT/CT	VREF
11	NC	---
12	POWER GND	---
13	GROUND	---
14	NC	---
15	OUTPUT	---
16	NC	---
17	Vc	---
18	VCC	---
19	NC	---
20	VREF	---

FIGURE 2. Terminal connections - continued.

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NOTE : Toggle flip flop used only in device types 03, 04, 07, and 08.

FIGURE 3. Logic diagram.

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4. VERIFICATION

4.1 Sampling and inspection. For device classes Q and V, 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 affect the form, fit, or function as described herein. For device class M, sampling and inspection procedures shall be in accordance with MIL-PRF-38535, appendix A.

4.2 Screening. For device classes Q and V, screening shall be in accordance with MIL-PRF-38535, and shall be conducted on all devices prior to qualification and technology conformance inspection. For device class M, screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection.

4.2.1 Additional criteria for device class M.

- 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 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.
 - (2) $T_A = +125^\circ\text{C}$, minimum.
- b. Interim and final electrical test parameters shall be as specified in table IIA herein.

4.2.2 Additional criteria for device classes Q and V.

- 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 revision level control of 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 method 1015 of MIL-STD-883.
- b. Interim and final electrical test parameters shall be as specified in table IIA herein.
- c. Additional screening for device class V beyond the requirements of device class Q shall be as specified in MIL-PRF-38535, appendix B.

4.3 Qualification inspection for device classes Q and V. Qualification inspection for device classes Q and V shall be in accordance with MIL-PRF-38535. Inspections to be performed shall be those specified in MIL-PRF-38535 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.4).

4.4 Conformance inspection. Technology conformance inspection for classes Q and V shall be in accordance with MIL-PRF-38535 including groups A, B, C, D, and E inspections and as specified. Quality conformance inspection for device class M shall be in accordance with MIL-PRF-38535, appendix A and as specified herein. Inspections to be performed for device class M shall be those specified in method 5005 of MIL-STD-883 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.4).

4.4.1 Group A inspection.

- a. Tests shall be as specified in table IIA herein.
- b. Subgroups 7 and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.

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TABLE IIA. Electrical test requirements.

Test requirements	Subgroups (in accordance with MIL-STD-883, method 5005, table I)	Subgroups (in accordance with MIL-PRF-38535, table III)	
	Device class M	Device class Q	Device class V
Interim electrical parameters (see 4.2)	---	---	1
Final electrical parameters (see 4.2)	1, 2, 3, 4 <u>1/</u>	1, 2, 3, 4 <u>1/</u>	1, 2, 3, 4 <u>1/3/</u>
Group A test requirements (see 4.4)	1, 2, 3, 4, 5, 6, 9, 10, 11 <u>2/</u>	1, 2, 3, 4, 5, 6, 9, 10, 11 <u>2/</u>	1, 2, 3, 4, 5, 6, 9, 10, 11 <u>2/</u>
Group C end-point electrical parameters (see 4.4)	1	1	1 <u>3/</u>
Group D end-point electrical parameters (see 4.4)	1	1	1
Group E end-point electrical parameters (see 4.4)	---	---	1, 4, 9

1/ PDA applies to subgroup 1.

2/ Subgroups 9, 10, and 11 are guaranteed if not tested to the limits specified in table I.

3/ Delta limits as specified in table IIB shall be required where specified, and delta limits shall be computed with reference to the previous endpoint electrical parameters.

TABLE IIB. Burn-in and operating life test delta parameters. TA = +25°C. 1/

Parameters	Device types	Delta limits		Units
		Min	Max	
Reference output voltage	09, 10, 11	-50	+50	mV
CT discharge current	09, 11	-0.5	+0.5	mA
Error amp input bias current	09, 10, 11	-0.2	+0.2	μA
Operating supply current	09, 10, 11	-1.0	+1.0	mA

1/ Deltas are performed at room temperature.

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4.4.2 Group C inspection. The group C inspection end-point electrical parameters shall be as specified in table IIA herein.

4.4.2.1 Additional criteria for device class M. Steady-state life test conditions, method 1005 of MIL-STD-883:

- a. 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 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.
- b. $T_A = +125^{\circ}\text{C}$, minimum.
- c. Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.4.2.2 Additional criteria for device classes Q and V. 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 test circuit shall be maintained under document revision level control by the device manufacturer's 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 method 1005 of MIL-STD-883.

4.4.3 Group D inspection. The group D inspection end-point electrical parameters shall be as specified in table IIA herein.

4.4.4 Group E inspection. Group E inspection is required only for parts intended to be marked as radiation hardness assured (see 3.5 herein).

- a. End-point electrical parameters shall be as specified in table IIA herein.
- b. For device classes Q and V, the devices or test vehicle shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38535 for the RHA level being tested. For device class M, the devices shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38535, appendix A for the RHA level being tested. All device classes must meet the postirradiation end-point electrical parameter limits as defined in table I at $T_A = +25^{\circ}\text{C} \pm 5^{\circ}\text{C}$, after exposure, to the subgroups specified in table IIA herein.

4.4.4.1 Total dose irradiation testing. Total dose irradiation testing shall be performed in accordance with MIL-STD-883 method 1019, condition D for device types 09 and 11, and as specified herein.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38535 for device classes Q and V or MIL-PRF-38535, appendix A for device class M.

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.

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

6.2 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 using DD Form 1692, Engineering Change Proposal.

6.3 Record of users. Military and industrial users should inform DLA Land and Maritime when a system application requires configuration control and which SMD's are applicable 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 microelectronic devices (FSC 5962) should contact DLA Land and Maritime-VA, telephone (614) 692-8108.

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

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

6.6 Sources of supply.

6.6.1 Sources of supply for device classes Q and V. Sources of supply for device classes Q and V are listed in MIL-HDBK-103 and QML-38535. The vendors listed in QML-38535 have submitted a certificate of compliance (see 3.6 herein) to DLA Land and Maritime-VA and have agreed to this drawing.

6.6.2 Approved sources of supply for device class M. Approved sources of supply for class M 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.

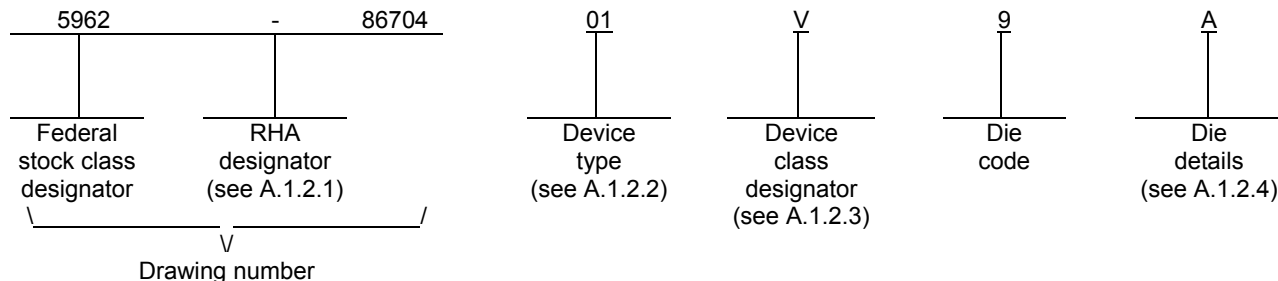
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APPENDIX A
APPENDIX A FORMS A PART OF SMD 5962-86704

A.1 SCOPE

A.1.1 Scope. This appendix establishes minimum requirements for microcircuit die to be supplied under the Qualified Manufacturers List (QML) Program. QML microcircuit die meeting the requirements of MIL-PRF-38535 and the manufacturers approved QM plan for use in monolithic microcircuits, multi-chip modules (MCMs), hybrids, electronic modules, or devices using chip and wire designs in accordance with MIL-PRF-38534 are specified herein. Two product assurance classes consisting of military high reliability (device class Q) and space application (device class V) are reflected in the Part or Identification Number (PIN). When available, a choice of Radiation Hardness Assurance (RHA) levels are reflected in the PIN.

A.1.2 PIN. The PIN is as shown in the following example:



A.1.2.1 RHA designator. Device classes Q and V RHA identified die meet the MIL-PRF-38535 specified RHA levels. A dash (-) indicates a non-RHA die.

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

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
10 1/	1843-SP	Off-line current mode pulse width modulator controller

A.1.2.3 Device class designator.

<u>Device class</u>	<u>Device requirements documentation</u>
Q or V	Certification and qualification to the die requirements of MIL-PRF-38535

1/ VREF parameter is sensitive to very high temperature die attach/die assembly processes. Processing conditions should not exceed 170°C per 24 hours or 245°C per 40 seconds.

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A.1.2.4 Die details. The die details designation is a unique letter which designates the die's physical dimensions, bonding pad location(s) and related electrical function(s), interface materials, and other assembly related information, for each product and variant supplied to this appendix.

A.1.2.4.1 Die physical dimensions.

<u>Die type</u>	<u>Figure number</u>
10	A-1

A.1.2.4.2 Die bonding pad locations and electrical functions.

<u>Die type</u>	<u>Figure number</u>
10	A-1

A.1.2.4.3 Interface materials.

<u>Die type</u>	<u>Figure number</u>
10	A-1

A.1.2.4.4 Assembly related information.

<u>Die type</u>	<u>Figure number</u>
10	A-1

A.1.3 Absolute maximum ratings. See paragraph 1.3 herein for details.

A.1.4 Recommended operating conditions. See paragraph 1.4 herein for details.

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A.2 APPLICABLE DOCUMENTS.

A.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 cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

MIL-PRF-38535 - Integrated Circuits, Manufacturing, General Specification for.

DEPARTMENT OF DEFENSE STANDARD

MIL-STD-883 - Test Method Standard Microcircuits.

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 <http://quicksearch.dla.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

A.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.

A.3 REQUIREMENTS

A.3.1 Item requirements. The individual item requirements for device classes Q and V 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.

A.3.2 Design, construction and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein and the manufacturer's QM plan for device classes Q and V.

A.3.2.1 Die physical dimensions. The die physical dimensions shall be as specified in A.1.2.4.1 and on figure A-1.

A.3.2.2 Die bonding pad locations and electrical functions. The die bonding pad locations and electrical functions shall be as specified in A.1.2.4.2 and on figure A-1.

A.3.2.3 Interface materials. The interface materials for the die shall be as specified in A.1.2.4.3 and on figure A-1.

A.3.2.4 Assembly related information. The assembly related information shall be as specified in A.1.2.4.4 and on figure A-1.

A.3.2.5 Radiation exposure circuit. The radiation exposure circuit shall be as defined in paragraph 3.2.4 herein.

A.3.3 Electrical performance characteristics and post-irradiation parameter limits. Unless otherwise specified herein, the electrical performance characteristics and post-irradiation parameter limits are as specified in table I of the body of this document.

A.3.4 Electrical test requirements. The wafer probe test requirements shall include functional and parametric testing sufficient to make the packaged die capable of meeting the electrical performance requirements in table I.

A.3.5 Marking. As a minimum, each unique lot of die, loaded in single or multiple stack of carriers, for shipment to a customer, shall be identified with the wafer lot number, the certification mark, the manufacturer's identification and the PIN listed in A.1.2 herein. The certification mark shall be a "QML" or "Q" as required by MIL-PRF-38535.

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A.3.6 Certification of compliance. For device classes Q and V, a certificate of compliance shall be required from a QML-38535 listed manufacturer in order to supply to the requirements of this drawing (see A.6.4 herein). The certificate of compliance submitted to DLA Land and Maritime -VA prior to listing as an approved source of supply for this appendix shall affirm that the manufacturer's product meets, for device classes Q and V, the requirements of MIL-PRF-38535 and the requirements herein.

A.3.7 Certificate of conformance. A certificate of conformance as required for device classes Q and V in MIL-PRF-38535 shall be provided with each lot of microcircuit die delivered to this drawing.

A.4 VERIFICATION

A.4.1 Sampling and inspection. For device classes Q and V, die 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 modifications in the QM plan shall not affect the form, fit, or function as described herein.

A.4.2 Screening. For device classes Q and V, screening shall be in accordance with MIL-PRF-38535, and as defined in the manufacturer's QM plan. As a minimum, it shall consist of:

- a. Wafer lot acceptance for class V product using the criteria defined in MIL-STD-883, method 5007.
- b. 100% wafer probe (see paragraph A.3.4 herein).
- c. 100% internal visual inspection to the applicable class Q or V criteria defined in MIL-STD-883, method 2010 or the alternate procedures allowed in MIL-STD-883, method 5004.

A.4.3 Conformance inspection.

A.4.3.1 Group E inspection. Group E inspection is required only for parts intended to be identified as radiation assured (see A.3.5 herein). RHA levels for device classes Q and V shall be as specified in MIL-PRF-38535. End point electrical testing of packaged die shall be as specified in table IIA herein. Group E tests and conditions are as specified in paragraphs 4.4.4 herein.

A.5 DIE CARRIER

A.5.1 Die carrier requirements. The requirements for the die carrier shall be accordance with the manufacturer's QM plan or as specified in the purchase order by the acquiring activity. The die carrier shall provide adequate physical, mechanical and electrostatic protection.

A.6 NOTES

A.6.1 Intended use. Microcircuit die conforming to this drawing are intended for use in microcircuits built in accordance with MIL-PRF-38535 or MIL-PRF-38534 for government microcircuit applications (original equipment), design applications, and logistics purposes.

A.6.2 Comments. Comments on this appendix should be directed to DLA Land and Maritime -VA, Columbus, Ohio, 43218-3990 or telephone (614)-692-0540.

A.6.3 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-PRF-38535 and MIL-HDBK-1331.

A.6.4 Sources of supply for device classes Q and V. Sources of supply for device classes Q and V are listed in QML-38535. The vendors listed within MIL-HDBK-103 and QML-38535 have submitted a certificate of compliance (see A.3.6 herein) to DLA Land and Maritime -VA and have agreed to this drawing.

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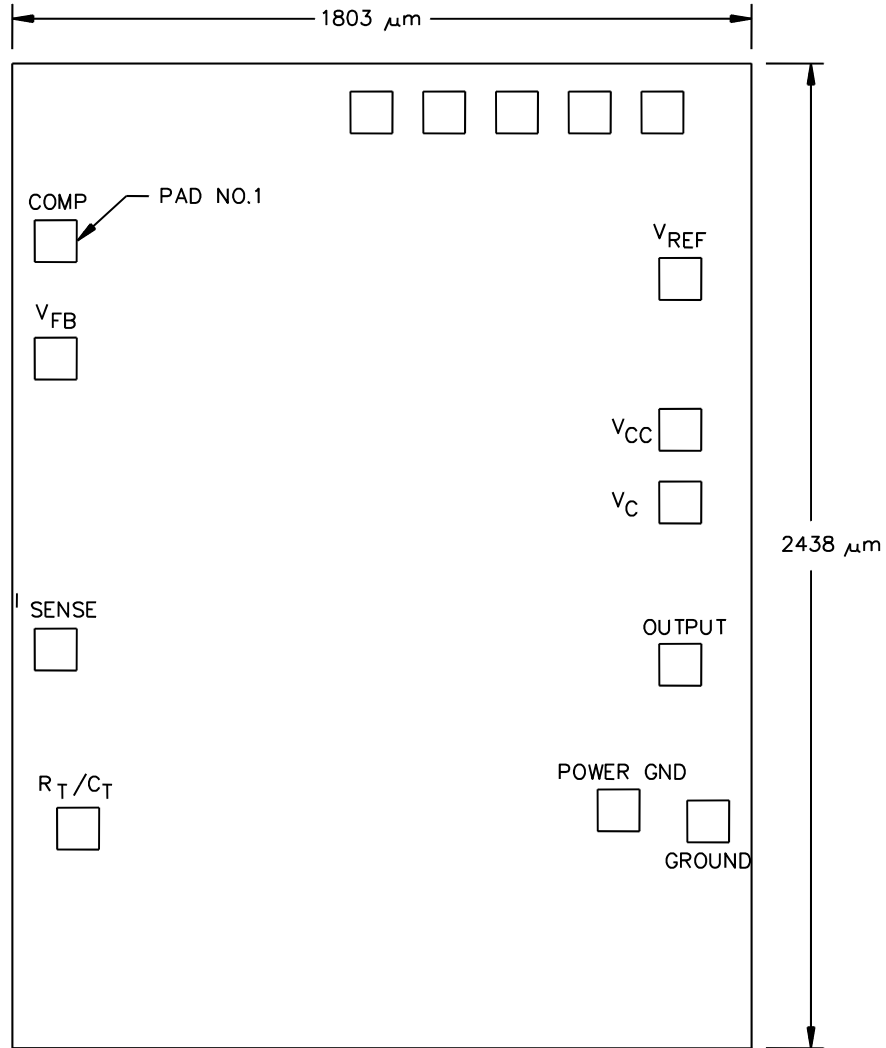


FIGURE A-1. Die bonding pad locations and electrical functions.

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Die physical dimensions.

Die size: 1803 μm x 2438 μm

Die thickness: 15 \pm 1 mils

Interface materials.

Top metallization: AlCu (0.5%)

Thickness: 20.0 kÅ \pm 2 kÅ

Backside metallization: None

Glassivation.

Type: TEOS

Thickness: 7.0 kÅ

Substrate: P(111) 10-21 ohm-cm

Assembly related information.

Substrate potential: Insulated (backside of the die is left floating in factory package assembly).

Special assembly instructions: None

FIGURE A-1. Die bonding pad locations and electrical functions - continued.

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STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 16-12-19

Approved sources of supply for SMD 5962-86704 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 <https://landandmaritimeapps.dla.mil/Programs/Smcr/>.

Standard microcircuit drawing PIN <u>1/</u>	Vendor CAGE number	Vendor similar PIN <u>2/</u>
5962-8670401CA	34333	SG1842J/883B
5962-8670401DA	01295	UC1842W883B
5962-8670401EA	<u>3/</u>	SG1842J/883B
5962-8670401FA	<u>3/</u>	SG1842F/883B
5962-8670401HA	34333	SG1842F/883B
5962-8670401PA	01295	UC1842J883B
	34333	SG1842Y/883B
	U3158	IP1842J-DESC
5962-8670401XA	01295	UC1842L883B
5962-86704012A	34333	SG1842L/883B
5962-8670401VPA	01295	UC1842JQMLV
5962-8670401VXA	01295	UC1842LQMLV
5962-8670401V2A	<u>3/</u>	UC1842LQMLV
5962-8670402CA	34333	SG1843J/883B
5962-8670402DA	01295	UC1843W883B
5962-8670402EA	<u>3/</u>	SG1843J/883B
5962-8670402FA	<u>3/</u>	SG1843F/883B
5962-8670402HA	34333	SG1843F/883B
5962-8670402PA	01295	UC1843J883B
	34333	SG1843Y/883B
	U3158	IP1843J-DESC
5962-8670402XA	01295	UC1843L883B
5962-86704022A	34333	SG1843L/883B

See footnotes at end of table.

STANDARD MICROCIRCUIT DRAWING BULLETIN – Continued.

DATE: 16-12-19

Standard microcircuit drawing PIN <u>1/</u>	Vendor CAGE number	Vendor similar PIN <u>2/</u>
5962-8670402VPA	01295	UC1843JQMLV
5962-8670402VXA	01295	UC1843LQMLV
5962-8670402V2A	<u>3/</u>	UC1843LQMLV
5962-8670403CA	34333	SG1844J/883B
5962-8670403DA	01295	UC1844W883B
5962-8670403EA	<u>3/</u>	SG1844J/883B
5962-8670403FA	<u>3/</u>	SG1844F/883B
5962-8670403HA	34333	SG1844F/883B
5962-8670403PA	01295	UC1844J883B
	34333	SG1844Y/883B
	U3158	IP1844J-DESC
5962-8670403XA	01295	UC1844L883B
5962-86704032A	34333	SG1844L/883B
5962-8670403VPA	01295	UC1844JQMLV
5962-8670403VXA	01295	UC1844LQMLV
5962-8670403V2A	<u>3/</u>	UC1844LQMLV
5962-8670404CA	34333	SG1845J/883B
5962-8670404DA	01295	UC1845W883B
5962-8670404EA	<u>3/</u>	SG1845J/883B
5962-8670404FA	<u>3/</u>	SG1845F/883B
5962-8670404HA	34333	SG1845F/883B
5962-8670404PA	01295	UC1845J883B
	34333	SG1845Y/883B
	U3158	IP1845J-DESC
5962-8670404XA	01295	UC1845L883B
5962-86704042A	34333	SG1845L/883B
5962-8670404VPA	01295	UC1845JQMLV
5962-8670404VXA	01295	UC1845LQMLV
5962-8670404V2A	<u>3/</u>	UC1845LQMLV

See footnotes at end of table.

STANDARD MICROCIRCUIT DRAWING BULLETIN – Continued.

DATE: 16-12-19

Standard microcircuit drawing PIN <u>1</u> /	Vendor CAGE number	Vendor similar PIN <u>2</u> /
5962-8670405DA	<u>3</u> /	UC1842AW/883B
5962-8670405PA	01295	UC1842AJ883B
5962-8670405XA	01295	UC1842AL883B
5962-8670405VPA	01295	UC1842AJQMLV
5962-8670405VXA	01295	UC1842ALQMLV
5962-8670405V2A	<u>3</u> /	UC1842ALQMLV
5962-8670406DA	01295	UC1843AW/883B
5962-8670406PA	01295	UC1843AJ883B
5962-8670406XA	01295	UC1843AL883B
5962-8670406VPA	01295	UC1843AJQMLV
5962-8670406VXA	01295	UC1843ALQMLV
5962-8670406V2A	<u>3</u> /	UC1843ALQMLV
5962-8670407DA	01295	UC1844AW/883B
5962-8670407PA	01295	UC1844AJ883B
5962-8670407XA	01295	UC1844AL883B
5962-8670407VPA	01295	UC1844AJQMLV
5962-8670407VXA	01295	UC1844ALQMLV
5962-8670407V2A	<u>3</u> /	UC1844ALQMLV
5962-8670408DA	01295	UC1845AW/883B
5962-8670408PA	01295	UC1845AJ883B
5962-8670408XA	01295	UC1845AL883B
5962-8670408VPA	01295	UC1845AJQMLV
5962-8670408VXA	01295	UC1845ALQMLV
5962-8670408V2A	<u>3</u> /	UC1845ALQMLV
5962-8670409VPA	01295	UC1843AJG-SP

See footnotes at end of table.

STANDARD MICROCIRCUIT DRAWING BULLETIN – Continued.

DATE: 16-12-19

Standard microcircuit drawing PIN <u>1/</u>	Vendor CAGE number	Vendor similar PIN <u>2/</u>
5962-8670410VPA	01295	UC1843JG-SP
5962-8670410V9A	01295	UC1843KGD-SP
5962P8670409VPA	01295	UC1843AJG-SP
5962P8670409VYC	01295	UC1843AHKU-SP
5962P8670411VPA	01295	UC1845AJG-SP
5962P8670411VYC	01295	UC1845AHKU-SP

- 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.
- 3/ Not available from an approved source of supply.

Vendor CAGE number

Vendor name and address

01295

Texas Instruments, Inc.
Semiconductor Group
8505 Forest Lane
P.O. Box 660199
Dallas, TX 75243
Point of contact: U.S. Highway 75 South
P.O. Box 84, M/S 853
Sherman, TX 75090-9493

34333

Microsemi Analog Mixed Signal Group
11861 Western Avenue
Garden Grove, CA 92841-2119

U3158

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