

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

Prepared in accordance with ASME Y14.24

Vendor item drawing

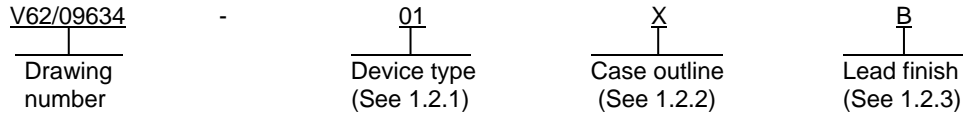
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PMIC N/A	PREPARED BY RICK OFFICER	DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990	
Original date of drawing YY-MM-DD 11-06-28	CHECKED BY RAJESH PITHADIA	TITLE MICROCIRCUIT, LINEAR, +5 V PROGRAMMABLE LOW DROPOUT VOLTAGE REGULATOR, MONOLITHIC SILICON	
	APPROVED BY CHARLES F. SAFFLE		
	SIZE A	CODE IDENT. NO. 16236	DWG NO. V62/09634
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1. SCOPE

1.1 Scope. This drawing documents the general requirements of a +5 V programmable low dropout voltage regulator microcircuit, with an operating temperature range of -55°C to +125°C.

1.2 Vendor Item Drawing Administrative Control Number. The manufacturers PIN is the item of identification. The vendor item drawing establishes an administrative control number for identifying the item on the engineering documentation:



1.2.1 Device type(s).

<u>Device type</u>	<u>Generic</u>	<u>Circuit function</u>
01	MAX667	+5 V programmable low dropout voltage regulator

1.2.2 Case outline(s). The case outline(s) are as specified herein.

<u>Outline letter</u>	<u>Number of pins</u>	<u>JEDEC PUB 95</u>	<u>Package style</u>
X	8	MS-012-AA	Small outline

1.2.3 Lead finishes. The lead finishes are as specified below or other lead finishes as provided by the device manufacture:

<u>Finish designator</u>	<u>Material</u>
A	Hot solder dip
B	Tin-lead plate
C	Gold plate
D	Palladium
E	Gold flash palladium
Z	Other

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1.3 Absolute maximum ratings. 1/

Input supply voltage (V_{IN})	+18 V
Output short circuited to ground	1 second
LBO output sink current	50 mA
LBO output voltage	GND to V_{OUT}
SHDN input voltage	-0.3 V to ($V_{IN} + 0.3$ V)
Input voltages LBI, SET pins	-0.3 V to ($V_{IN} - 1.0$ V)
Junction temperature range (T_J)	150°C
Storage temperature range (T_{STG})	-65°C to +160°C
Lead temperature (soldering, 10 seconds)	+300°C
Electrostatic discharge (ESD):	
Human body model (HBM)	800 V
MSL	Level 1

1.4 Recommended operating conditions. 2/

Input supply voltage (V_{IN})	+9 V
Operating free-air temperature range (T_A)	-55°C to +125°C

1.5 Thermal data table.

Case outline letter	X	X	Units
PC board	Single layer	Multi-layer <u>3/</u>	
Power dissipation (P_D), maximum at +70°C	471	606	mW
Power dissipation (P_D) derating above +70°C	5.9	7.6	mW/°C
Thermal resistance, junction to case (θ_{JC})	40	38	°C/W
Thermal resistance, junction to ambient (θ_{JA})	170	132	°C/W

- 1/ Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- 2/ Use of this product beyond the manufacturers design rules or stated parameters is done at the user’s risk. The manufacturer and/or distributor maintain no responsibility or liability for product used beyond the stated limits.
- 3/ Package thermal resistances were obtained using the method described in JEDEC specification JESD51-7, using a four-layer board. For detailed information on package thermal considerations, refer to www.maxim-ic.com/thermal-tutorial.

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2. APPLICABLE DOCUMENTS

JEDEC PUB 95 - Registered and Standard Outlines for Semiconductor Devices
JESD51-7 - High Effective Thermal Conductivity Test Board for Leaded Surface Mount Packages

(Applications for copies should be addressed to the JEDEC Office, 3103 North 10th Street, Suite 240-S, Arlington, VA 22201-2107 or online at <http://www.jedec.org>)

3. REQUIREMENTS

3.1 Marking. Parts shall be permanently and legibly marked with the manufacturer's part number as shown in 6.3 herein and as follows:

- A. Manufacturer's name, CAGE code, or logo
- B. Pin 1 identifier
- C. ESDS identification (optional)

3.2 Unit container. The unit container shall be marked with the manufacturer's part number and with items A and C (if applicable) above.

3.3 Electrical characteristics. The maximum and recommended operating conditions and electrical performance characteristics are as specified in 1.3, 1.4, and table I herein.

3.4 Design, construction, and physical dimension. The design, construction, and physical dimensions are as specified herein.

3.5 Diagrams.

3.5.1 Case outline. The case outline shall be as shown in 1.2.2 and figure 1.

3.5.2 Terminal connections. The terminal connections shall be as shown in figure 2.

3.5.3 Block diagram. The block diagram shall be as shown in figure 3.

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TABLE I. Electrical performance characteristics. 1/

Test	Symbol	Conditions <u>2/</u>	Temperature, T _A	Device type	Limits		Unit
					Min	Max	
Input voltage	V _{IN}		-55°C to +125°C	01	3.5	16.5	V
Output voltage	V _{OUT}	V _{SET} = 0 V, V _{IN} = 6 V, I _{OUT} = 10 mA	-55°C to +125°C	01	4.75	5.25	V
Maximum output current	I _{OUT}	V _{IN} = 6 V, 4.5 V < V _{OUT} < 5.5 V	-55°C to +125°C	01	250		mA
Quiescent current	I _Q	V _{SHDN} = 2 V	-55°C to +125°C	01		2	μA
		I _{OUT} = 0 μA, V _{SHDN} = 0 V, V _{SET} = 0 V				35	
		I _{OUT} = 100 μA, V _{SHDN} = 0 V, V _{SET} = 0 V				50	
		I _{OUT} = 200 mA, V _{SHDN} = 0 V, V _{SET} = 0 V				20	mA
Dropout voltage <u>3/</u>		I _{OUT} = 100 μA	-55°C to +125°C	01		75	mV
		I _{OUT} = 200 mA				350	
Load regulation		I _{OUT} = 10 mA to 200 mA	-55°C to +125°C	01		250	mV
Line regulation		V _{IN} = 6 V to 10 V, I _{OUT} = 10 mA	-55°C to +125°C	01		15	mV
SET reference voltage	V _{SET}		-55°C to +125°C	01	1.20	1.25	V
SET input leakage current	I _{SET}	V _{SET} = 1.5 V	-55°C to +125°C	01		±1000	nA
Output leakage current	I _{OUT}	V _{SHDN} = 2 V	-55°C to +125°C	01		1	μA
Short circuit current	I _{OUT}	<u>4/</u>	-55°C to +125°C	01		450	mA
Low battery detector reference voltage	V _{LBI}		-55°C to +125°C	01	1.195	1.255	V
Low battery detector input leakage current	I _{LBI}	V _{LBI} = 1.5 V	-55°C to +125°C	01		±1000	nA
Low battery detector output voltage	V _{LBO}	V _{IN} = 9 V, V _{LBI} = 2 V, I _{LBO} = 10 mA	-55°C to +125°C	01		0.4	V

See footnotes at end of table.

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TABLE I. Electrical performance characteristics – Continued. 1/

Test	Symbol	Conditions <u>2/</u>	Temperature, T _A	Device type	Limits		Unit
					Min	Max	
SHDN threshold	V _{SHDN}	V _{IH}	-55°C to +125°C	01	1.5		V
		V _{IL}				0.3	
SHDN leakage current	I _{SHDN}	V _{SHDN} = 0 V to V _{IN}	-55°C to +125°C	01		±1000	nA
Dropout detector output voltage	V _{DD}	V _{IN} = 7 V, V _{SET} = 0 V, V _{SHDN} = 0 V, R _{DD} = 100 kΩ, I _{OUT} = 10 mA	-55°C to +125°C	01		0.25	V
		V _{IN} = 4.5 V, V _{SET} = 0 V, V _{SHDN} = 0 V, R _{DD} = 100 kΩ, I _{OUT} = 10 mA			3.5		

1/ Testing and other quality control techniques are used to the extent deemed necessary to assure product performance over the specified temperature range. Product may not necessarily be tested across the full temperature range and all parameters may not necessarily be tested. In the absence of specific parametric testing, product performance is assured by characterization and/or design.

2/ Unless otherwise specified, GND = 0 V, V_{IN} = +9 V, V_{OUT} = +5 V, and C1 = 10 μF.

3/ Dropout voltage is V_{IN} – V_{OUT} when V_{OUT} fall to 0.1 V below its value at V_{IN} = V_{OUT} + 2 V.

4/ Short circuit current is pulse tested to maintain junction temperature. Short circuit duration is limited by package dissipation.

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Case X

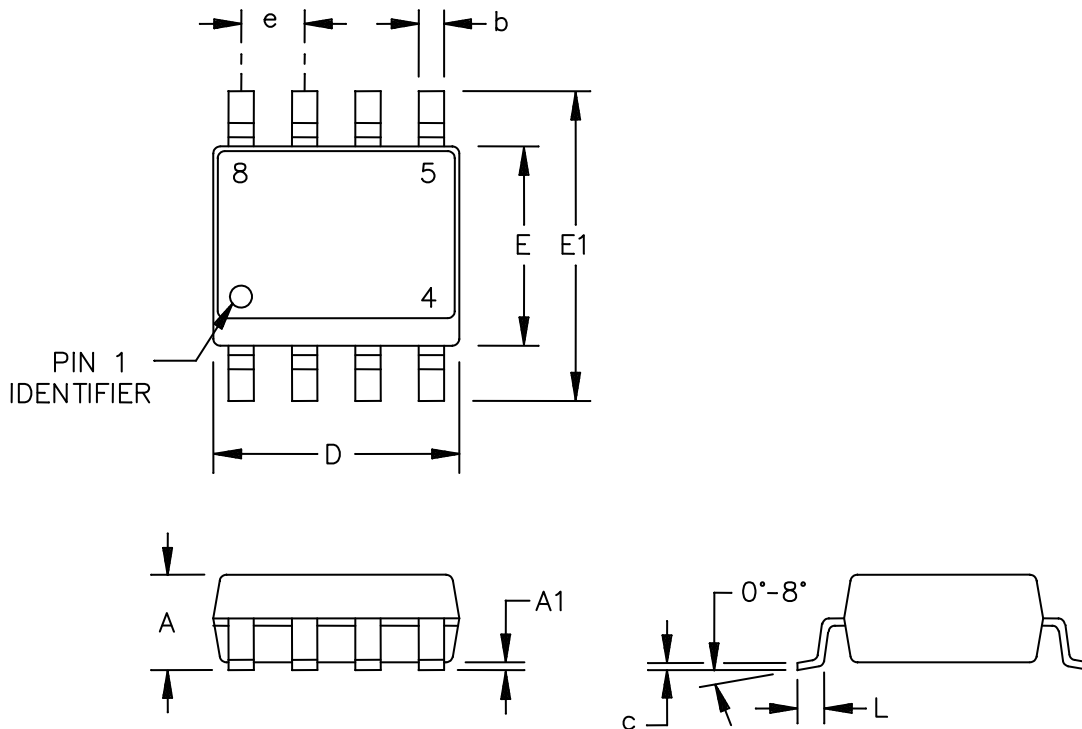


FIGURE 1. Case outline.

<p>DLA LAND AND MARITIME COLUMBUS, OHIO</p>	<p>SIZE A</p>	<p>CODE IDENT NO. 16236</p>	<p>DWG NO. V62/09634</p>
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Case X – continued.

Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.053	0.069	1.35	1.75
A1	0.004	0.010	0.10	0.25
b	0.014	0.019	0.35	0.49
c	0.007	0.010	0.19	0.25
D	0.189	0.197	4.80	5.00
e	0.050 BSC		1.27 BSC	
E	0.150	0.157	3.80	4.00
E1	0.228	0.244	5.80	6.20
L	0.016	0.050	0.40	1.27
n	8		8	

NOTES:

1. Controlling dimensions are millimeter, inch dimensions are given for reference only.
2. Dimensions D and E do not include mold flash.
3. Mold flash or protrusions do not exceed 0.15 mm (0.006 inch).
4. Leads to be coplanar within 0.10 mm (.004 inch).
5. Falls within reference to JEDEC MS-012-AA.

FIGURE 1. Case outline - Continued.

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Device type	01	
Case outline	X	
Terminal number	Terminal symbol	Function
1	DD	Dropout detector output. This is the collector of a PNP pass transistor. Normally an open circuit, it sources current as dropout is reached.
2	OUT	Regulated output voltage. OUT falls to 0 V when SHDN is above 1.5 V. SET determines output voltage when SET is above 50 mV; otherwise it is 5 V. OUT must be connected to an output filter capacitor.
3	LBI	Low battery detector. A CMOS input to an internal 1.225 V comparator whose output is the LBO pin.
4	GND	Ground.
5	SHDN	Shutdown input. Connect to GND for normal operation (output active). Pull above 1.5 V to disable OUT, LBO, and DD and to reduce quiescent current to less than 1 μ A
6	SET	(Output) voltage set, CMOS input. Connect to GND for 5 V output. For other voltages, connect external resistive divider from OUT.
7	LBO	Low battery output. An open drain N-channel transistor that sinks current to GND when LBI is less than 1.22 V.
8	IN	Positive input voltage (unregulated).

FIGURE 2. Terminal connections.

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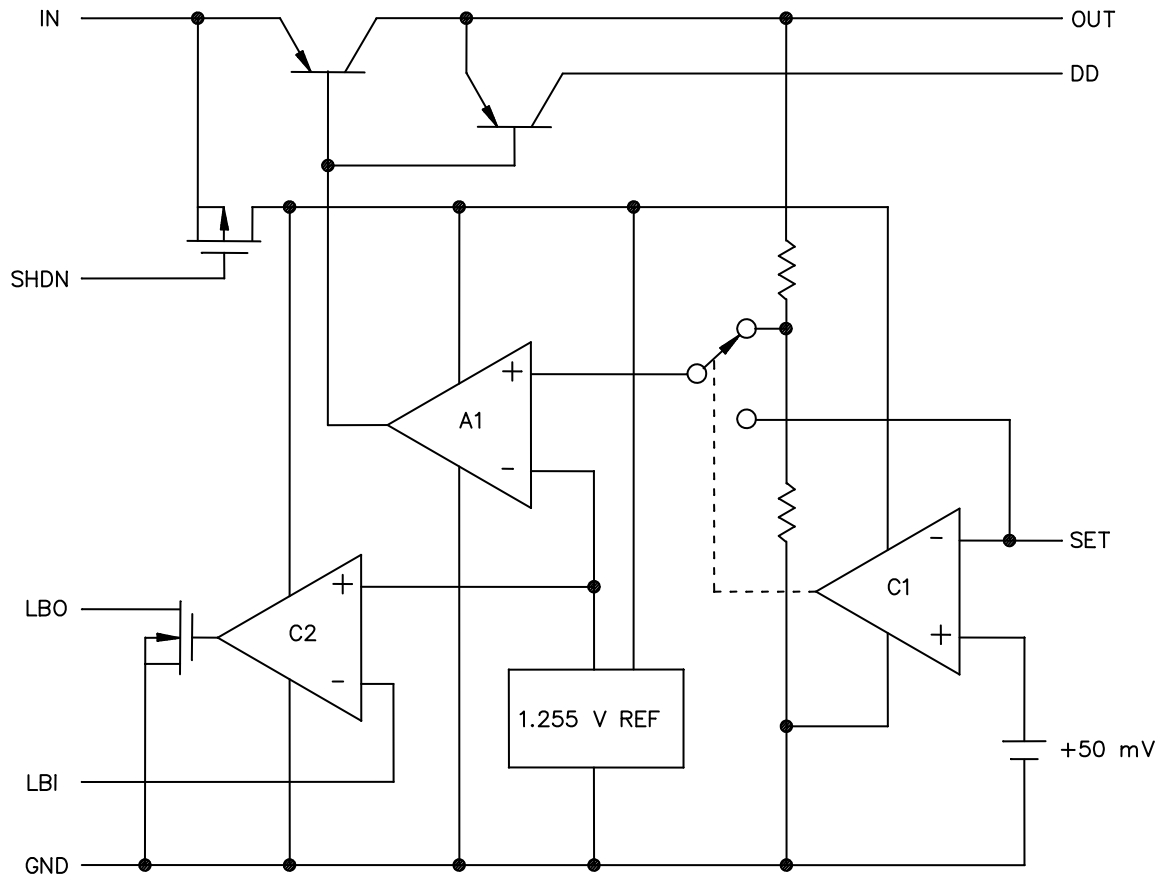


FIGURE 3. Block diagram.

<p>DLA LAND AND MARITIME COLUMBUS, OHIO</p>	<p>SIZE A</p>	<p>CODE IDENT NO. 16236</p>	<p>DWG NO. V62/09634</p>
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4. VERIFICATION

4.1 Product assurance requirements. The manufacturer is responsible for performing all inspection and test requirements as indicated in their internal documentation. Such procedures should include proper handling of electrostatic sensitive devices, classification, packaging, and labeling of moisture sensitive devices, as applicable.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Preservation, packaging, labeling, and marking shall be in accordance with the manufacturer's standard commercial practices for electrostatic discharge sensitive devices.

6. NOTES

6.1 ESDS. Devices are electrostatic discharge sensitive and are classified as ESDS class 1B minimum.

6.2 Configuration control. The data contained herein is based on the salient characteristics of the device manufacturer's data book. The device manufacturer reserves the right to make changes without notice. This drawing will be modified as changes are provided.

6.3 Suggested source(s) of supply. Identification of the suggested source(s) of supply herein is not to be construed as a guarantee of present or continued availability as a source of supply for the item.

Vendor item drawing administrative control number <u>1/</u>	Device manufacturer CAGE code	Vendor part number <u>2/</u>
V62/09634-01XB	1ES66	MAX667MSA/PR-T

1/ The vendor item drawing establishes an administrative control number for identifying the item on the engineering documentation.

2/ Add "-T" suffix for tape and reel.

CAGE code

1ES66

Source of supply

Maxim Integrated Products
120 San Gabriel Drive
Sunnyvale, CA 94086-5125

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