

**REVISIONS**

LTR	DESCRIPTION	DATE	APPROVED



Prepared in accordance with ASME Y14.24

Vendor item drawing

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PMIC N/A	PREPARED BY	Phu H. Nguyen
	DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990 <a href="http://www.dla.mil/landandmaritime">http://www.dla.mil/landandmaritime</a>	

Original date of drawing YY MM DD  18-12-11	CHECKED BY	Phu H. Nguyen	TITLE	MICROCIRCUIT, LINEAR-DIGITAL, ULTRALOW NOISE, LDO XFET VOLTAGE REFERENCE WITH CURRENT SINK AND SOURCE, MONOLITHIC SILICON
	APPROVED BY	Thomas M. Hess	DWG NO.	<b>V62/18620</b>

SIZE	CODE IDENT. NO.
<b>A</b>	<b>16236</b>

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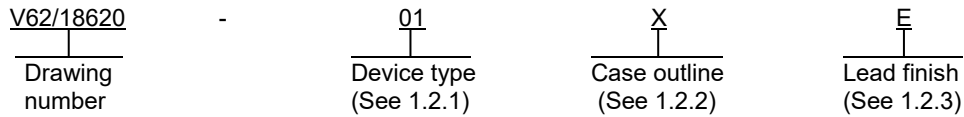
AMSC N/A

5962-V025-19

1. SCOPE

1.1 Scope. This drawing documents the general requirements of a high performance Ultralow Noise, LDO XFET Voltage Reference with Current Sink and Source microcircuit, with an operating temperature range of -55°C to +125°C.

1.2 Vendor Item Drawing Administrative Control Number. The manufacturer's 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	ADR441 –EP	Ultralow Noise, LDO XFET Voltage Reference with Current Sink and Source

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

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

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

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

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1.3 Absolute maximum ratings. 1/

Supply voltage .....	20 V
Output Short Circuit Duration to GND .....	Indefinite
Operating temperature range: .....	-55°C to +125°C
Storage temperature range .....	-65°C to 150°C
Junction temperature range .....	-65°C to 150°C
Lead temperature (Soldering, 60 sec) .....	300°C

1.5 Thermal resistance.

Case outline 2/	$\theta_{JA}$	$\theta_{JC}$	Unit
Case X	130	43	°C/W

2. APPLICABLE DOCUMENTS

JEDEC – SOLID STATE TECHNOLOGY ASSOCIATION (JEDEC)

- JEP95 – Registered and Standard Outlines for Semiconductor Devices
- JESD51 – Methodology for the Thermal Measurement of Component Packages (Single Semiconductor Device).

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

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- 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/ Thermal impedance simulated values are based on a JEDEC 2S2P thermal test board. See JEDEC JESD-51.

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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 Terminal function. The terminal function shall be as shown in figure 3.

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TABLE I. Electrical performance characteristics. <sup>1/</sup>

Test	Symbol	Test conditions <sup>2/</sup>	Limits			Unit
			Min	Typ	Max	
Output Voltage	V <sub>OUT</sub>		2.499	2.500	2.501	V
Initial Accuracy	V <sub>OERR</sub>				±1 0.04	mV %
Temperature Drift	TCV <sub>OUT</sub>	-55°C < T <sub>A</sub> < +125°C		1	5	ppm/°C
Regulation Line Load	$\Delta V_{OUT}/\Delta V_{IN}$ $\Delta V_{OUT}/\Delta I_{LOAD}$ $\Delta V_{OUT}/\Delta I_{LOAD}$	-55°C < T <sub>A</sub> < +125°C Load current (I <sub>LOAD</sub> ) = 0 mA to 10 mA, V <sub>IN</sub> = 4 V, -55°C < T <sub>A</sub> < +125°C I <sub>LOAD</sub> = 0 mA to -5 mA, V <sub>IN</sub> = 4 V, -55°C < T <sub>A</sub> < +125°C		10 -50	20 +50	ppm/V ppm/mA ppm/mA
Output current capacity Sourcing Sinking	I <sub>LOAD</sub>			10 -5		mA mA
Quiescent Current	I <sub>IN</sub>	No load, -55°C < T <sub>A</sub> < +125°C		3	3.75	mA
Voltage Noise Density	e <sub>N</sub> p-p e <sub>N</sub>	0.1 Hz to 10 Hz 1 kHz		1.2 48		μV p-p nV/√Hz
Turn-On Settling time	t <sub>R</sub>			10		μs
Long-Term Stability <sup>3/</sup>	ΔV <sub>OUT</sub>	1000 hours		50		ppm
Output Voltage Hysteresis	V <sub>OUT_HYS</sub>			70		ppm
Ripple Rejection Ratio	RRR	Input frequency (f <sub>IN</sub> ) = 1 kHz		-80		dB
Short Circuit to GND	I <sub>SC</sub>			27		mA
Supply Voltage Operating Range Headroom	V <sub>IN</sub> V <sub>IN</sub> - V <sub>OUT</sub>		3 500		18	V mV

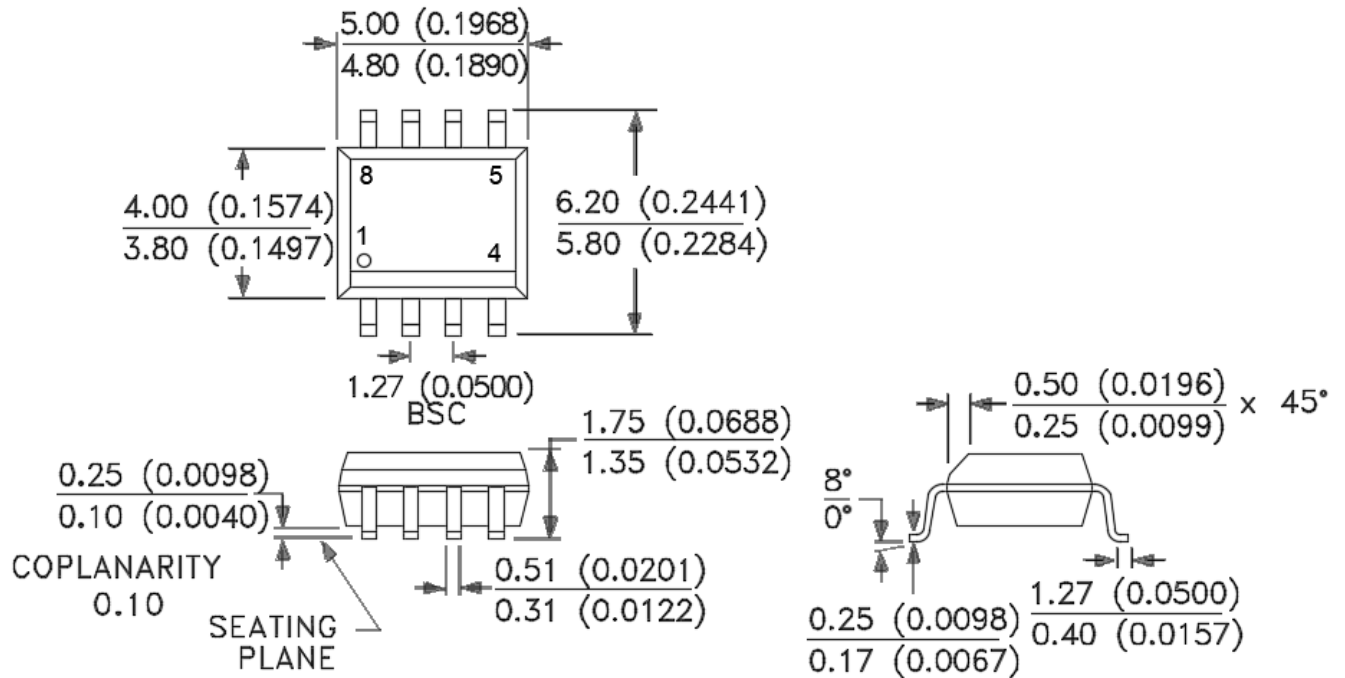
<sup>1/</sup> Testing and other quality control techniques are used to the extent deemed necessary to assure product performance over the specified temperature range. Product may not necessarily be tested across the full temperature range and all parameters may not necessarily be tested. In the absence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

<sup>2/</sup> V<sub>IN</sub> = 3 V to 18 V, T<sub>A</sub> = 25°C, and input capacitance (C<sub>IN</sub>) = output capacitance (C<sub>OUT</sub>) = 0.1 μF, unless otherwise noted.

<sup>3/</sup> The long-term stability specification is noncumulative. The drift in the subsequent 1000 hour period is significantly lower than in the first 1000 hour period.

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Case X



**NOTES:**

1. All linear dimensions are in millimeters. Inch dimension (in parenthesis) are rounded-Off millimeters for reference only and are not appropriate for use in design.
2. Falls within JEDEC MS-012-AA.

FIGURE 1. Case outline.

<p align="center"><b>DLA LAND AND MARITIME COLUMBUS, OHIO</b></p>	<p align="center"><b>SIZE A</b></p>	<p align="center"><b>CODE IDENT NO. 16236</b></p>	<p align="center"><b>DWG NO. V62/18620</b></p>
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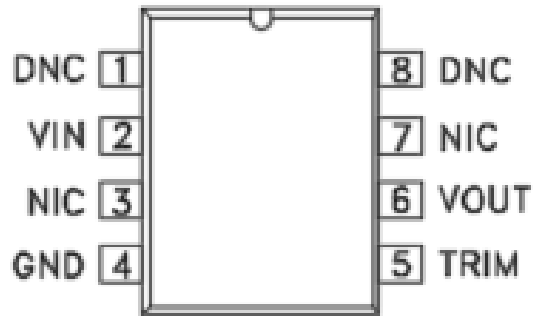


FIGURE 2. Terminal connections.

Terminal number	Mnemonic	Description
1, 8	DNC	Do Not Connect. Do not connect to these pins.
2	V <sub>IN</sub>	Input Voltage Connection.
3, 7	NIC	Not Internally Connected. These pins are not connected internally.
4	GND	Ground.
5	TRIM	Output Voltage Trim.
6	V <sub>OUT</sub>	Output Voltage.

FIGURE 3. Terminal function.

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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 1 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. DLA Land and Maritime maintains an online database of all current sources of supply at <https://landandmaritimeapps.dla.mil/programs/smcr/default.aspx>

Vendor item drawing administrative control number <u>1/</u>	Device manufacturer CAGE code	Order Quantity	Vendor part number
V62/18620-01XE	24355	Tube units = 98	ADR441TRZ-EP
		Reel units = 1000	ADR441TRZ-EP-R7

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

CAGE code

24355

Source of supply

Analog Devices  
 1 Technology Way  
 P.O. Box 9106  
 Norwood, MA 02062-9106

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