REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

Prepared in accordance with ASME Y14.24

Vendor item drawing

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	PAGE	1	2	3	4	5	6	7	8	9	10	11									

PMIC N/A	**PREPARED BY** RICK OFFICER	**DLA LAND AND MARITIME** **COLUMBUS, OHIO 43218-3990** **http://www.landandmaritime.dla.mil/**
Original date of drawing YY-MM-DD 13-02-06	**CHECKED BY** RAJESH PITHADIA	**TITLE** MICROCIRCUIT, LINEAR, 50 mA, HIGH VOLTAGE, MICROPOWER LINEAR REGULATOR, MONOLITHIC SILICON
	APPROVED BY CHARLES F. SAFFLE	
	SIZE **A** **CODE IDENT. NO.** **16236**	**DWG NO.** **V62/12648**
	REV	**PAGE** 1 **OF** 11

AMSC N/A

5962-V102-12

1. SCOPE

1.1 Scope. This drawing documents the general requirements of a high performance 50 mA, high voltage, micropower linear regulator 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:

V62/12648	-	01	X	E
Drawing number		Device type (See 1.2.1)	Case outline (See 1.2.2)	Lead finish (See 1.2.3)

1.2.1 Device type(s).

Device type	Generic	Output voltage	Circuit function
01	ADP1720	3.3 V	50 mA, high voltage, micropower linear regulator
02	ADP1720	5.0 V	50 mA, high voltage, micropower linear regulator
03	ADP1720	1.225 V to 5 V	50 mA, high voltage, micropower linear regulator

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

Outline letter	Number of pins	JEDEC PUB 95	Package style
X	8	MO-187-AA	Plastic 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:

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

1.3 Absolute maximum ratings. 1/

Regulator input supply (IN) to ground (GND) ..... -0.3 V to +30 V
Regulated output voltage (OUT) to GND ..... -0.3 V to IN or +6 V (whichever is less)
Enable input (EN) to GND ..... -0.3 V to +30 V
Adjust (ADJ) to GND ..... -0.3 V to +6 V
Storage temperature range (T_{STG}) ..... -65°C to +150°C
Operating junction temperature range (T_J) ..... -55°C to +125°C

1.4 Recommended operating conditions. 2/

Operating free-air temperature range (T_A) ..... -55°C to +125°C

1/ Stresses beyond those listed under "absolute maximum rating" 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.

1.5 Thermal characteristics.

Thermal resistance, junction to ambient (θ_{JC}) ..... 66°C/W
Thermal resistance, junction to ambient (θ_{JA}) ..... 246°C/W

2. APPLICABLE DOCUMENTS

JEDEC PUB 95 – Registered and Standard Outlines for Semiconductor Devices

(Applications for copies should be addressed to the Electronic Industries Alliance, 2500 Wilson Boulevard, Arlington, VA 22201-3834 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.

TABLE I. Electrical performance characteristics. 1/

Test	Symbol	Conditions V_{IN} = 12 V, I_{OUT} = 100 μA, C_{IN} = C_{OUT} = 1 μF, unless otherwise specified	Temperature, T_A	Device type	Limits		Unit
					Min	Max	
Input voltage range	V_{IN}		-55°C to +125°C	01,02, 03	4	28	V
Operating supply current	I_{GND}	I_{OUT} = 0 μA	+25°C	01,02, 03	28 typical		μA
		I_{OUT} = 0 μA, V_{IN} = V_{OUT} + 0.5 V or 4 V (whichever is greater)	-55°C to +125°C			80	
		I_{OUT} = 100 μA	+25°C		35 typical		
		I_{OUT} = 100 μA, V_{IN} = V_{OUT} + 0.5 V or 4 V (whichever is greater)	-55°C to +125°C			120	
		I_{OUT} = 1 mA	+25°C		74 typical		
		I_{OUT} = 1 mA, V_{IN} = V_{OUT} + 0.5 V or 4 V (whichever is greater)	-55°C to +125°C			340	
		I_{OUT} = 10 mA	+25°C		300 typical		
		I_{OUT} = 10 mA, V_{IN} = V_{OUT} + 0.5 V or 4 V (whichever is greater)	-55°C to +125°C			900	
		100 μA < I_{OUT} < 50 mA, V_{IN} = V_{OUT} + 0.5 V or 4 V (whichever is greater)	-55°C to +125°C			2115	
Shutdown current	I_{GND-SD}	EN = GND	+25°C	01,02, 03	0.7 typical		μA
			-55°C to +125°C			1.7	
Output.							
Fixed output	V_{OUT}	I_{OUT} = 100 μA	+25°C	01,02	-0.5	+0.5	%
Voltage accuracy		100 μA < I_{OUT} < 50 mA	+25°C	01,02	-1	+1	%
			-55°C to +125°C		-2	+2	
Adjustable output 2/	V_{OUT}	I_{OUT} = 100 μA	+25°C	03	1.2188	1.2311	V
Voltage accuracy		100 μA < I_{OUT} < 50 mA	+25°C	03	1.2127	1.2372	V
			-55°C to +125°C		1.2005	1.2495	

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued. 1/

Test	Symbol	Conditions V_{IN} = 12 V, I_{OUT} = 100 μA, C_{IN} = C_{OUT} = 1 μF, unless otherwise specified	Temperature, T_A	Device type	Limits		Unit
					Min	Max	
Output – continued.							
Noise (10 Hz to 100 kHz)	OUT_{NOISE}	V_{OUT} = 1.6 V, C_{OUT} = 1 μF	+25°C	01,02, 03	146 typical		μVrms
		V_{OUT} = 1.6 V, C_{OUT} = 10 μF			124 typical		
		V_{OUT} = 5 V, C_{OUT} = 1 μF			340 typical		
		V_{OUT} = 5 V, C_{OUT} = 10 μF			266 typical		
Regulation.							
Line regulation	$\Delta V_{OUT}/\Delta V_{IN}$	V_{IN} = (V_{OUT} + 0.5 V) to 28 V	-55°C to +125°C	01,02, 03	-0.02	+0.02	%/V
Load regulation 3/	$\Delta V_{OUT}/\Delta I_{OUT}$	1 mA < I_{OUT} < 50 mA	+25°C	01,02, 03	0.001 typical		%/mA
			-55°C to +125°C			0.005	
Dropout voltage 4/	$V_{DROPOUT}$	I_{OUT} = 10 mA	+25°C	01,02, 03	55 typical		mV
			-55°C to +125°C			105	
		I_{OUT} = 50 mA	+25°C		275 typical		
			-55°C to +125°C			480	
Start up time 5/	$t_{STARTUP}$		+25°C	01,02, 03	200 typical		μs
Current limit threshold 6/	I_{LIMIT}		+25°C	01,02, 03	55	140	mA
Thermal characteristics.							
Thermal shutdown threshold	TS_{SD}	T_J rising	+25°C	01,02, 03	150 typical		°C
Thermal shutdown hysteresis	TS_{SD-HYS}	T_J rising	+25°C	01,02, 03	15 typical		°C

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued. 1/

Test	Symbol	Conditions V_{IN} = 12 V, I_{OUT} = 100 μA, C_{IN} = C_{OUT} = 1 μF, unless otherwise specified	Temperature, T_A	Device type	Limits		Unit
					Min	Max	
Enable (EN) characteristics.							
Enable input logic high	V_{IH}	4 V ≤ V_{IN} ≤ 28 V	+25°C	01,02, 03	1.8		V
Enable input logic low	V_{IL}	4 V ≤ V_{IN} ≤ 28 V	+25°C	01,02, 03		0.4	V
Enable input leakage current	$V_{I-LEAKAGE}$	EN = GND	+25°C	01,02, 03		1	μA
		EN = IN				1	
Adjust input bias current	ADJ_{I-BIAS}		+25°C	01,02, 03		100	nA
Power supply rejection ratio	PSRR	f = 120 Hz, V_{IN} = 8 V, V_{OUT} = 1.6 V	+25°C	01,02, 03	-90 typical		dB
		f = 1 kHz, V_{IN} = 8 V, V_{OUT} = 1.6 V			-80 typical		
		f = 10 kHz, V_{IN} = 8 V, V_{OUT} = 1.6 V			-60 typical		
		f = 120 Hz, V_{IN} = 8 V, V_{OUT} = 5 V			-83 typical		
		f = 1 kHz, V_{IN} = 8 V, V_{OUT} = 5 V			-70 typical		
		f = 10 kHz, V_{IN} = 8 V, V_{OUT} = 5 V			-50 typical		

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/ Accuracy when OUT is connected directly to ADJ. When OUT voltage is set by external feedback resistors, absolute accuracy in adjust mode depends on the tolerances of resistors used.

3/ Based on an end point calculation using 1 mA and 50 mA loads. See figure 3 for typical load regulation performance for loads less than 1 mA.

4/ Dropout voltage is defined as the input to output voltage differential when the input voltage is set to the nominal output voltage. This applies only for output voltages above 4 V.

5/ Start up time is defined as the time between the rising edge of EN to OUT being at 95% of its nominal value.

6/ Current limit threshold is defined as the current at which the output voltage drops to 90% of the specified typical value. For example, the current limit for a 5.0 V output voltage is defined as the current that causes the output voltage to drop 90% of 5.0 V, or 4.5 V.

Case X

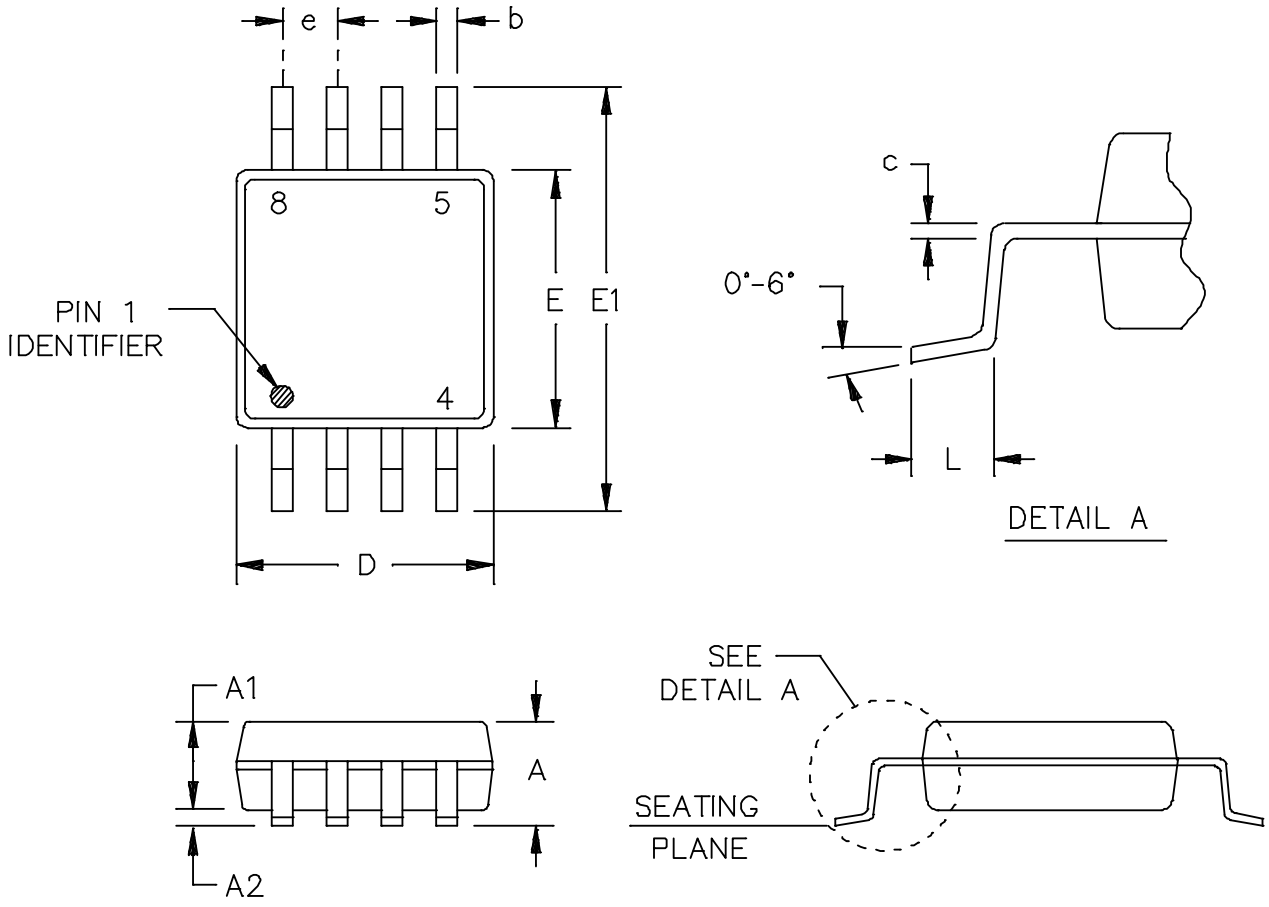

FIGURE 1. Case outline.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/12648
		REV	PAGE 7

Case X

Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	---	.043	---	1.10
A1	.029	.037	0.75	0.95
A2	.001	.005	0.05	0.15
b	.009	.015	0.25	0.40
c	.003	.009	0.09	0.23
D	.110	.125	2.80	3.20
E	.110	.125	2.80	3.20
E1	.183	.202	4.65	5.15
L	.015	.031	0.40	0.80

NOTES:
1. Controlling dimensions are millimeter, inch dimensions are given for reference only.
2. Falls within reference to JEDEC MO-187-AA.

FIGURE 1. Case outline - Continued.

Device types	01, 02	03
Case outline	X	X
Terminal number	Terminal symbol	
1	GND	ADJ
2	IN	IN
3	OUT	OUT
4	EN	EN
5	GND	GND
6	GND	GND
7	GND	GND
8	GND	GND

Terminal number	Terminal symbol	Description
1	GND	Device types 01 and 02. Fixed output voltage option. This pin is internally connected to ground.
1	ADJ	Device type 03. Adjustable output voltage option. A resistor divider from OUT to ADJ sets the output voltage.
2	IN	Regulator input supply. Bypass IN to GND with a 1 μF or greater capacitor.
3	OUT	Regulator output voltage. Bypass OUT to GND with a 1 μF or greater capacitor.
4	EN	Enable input. Drive EN high to turn on the regulator; drive it low to turn off the regulator. For automatic startup, connect EN to IN.
5	GND	Ground.
6	GND	Ground.
7	GND	Ground.
8	GND	Ground.

FIGURE 2. Terminal connections.

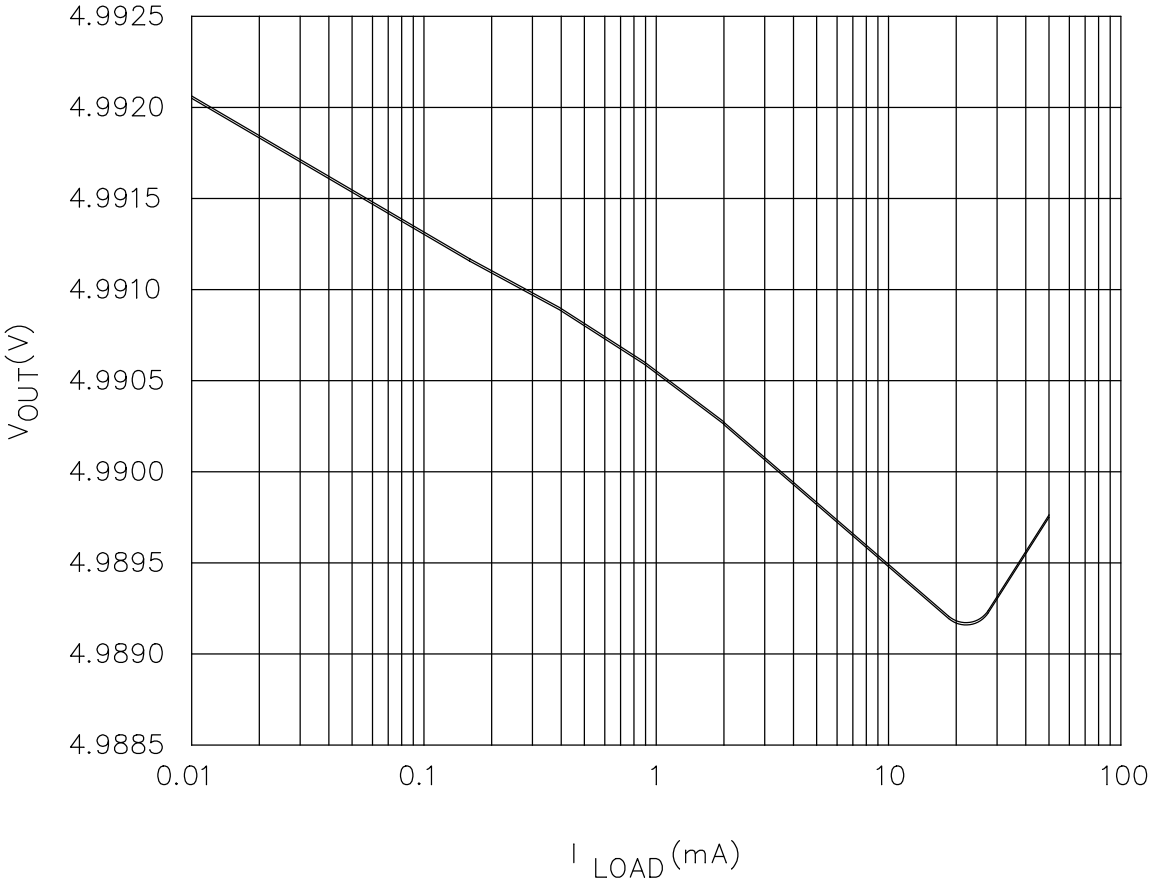

FIGURE 3. Output voltage versus load current.

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 http://www.landandmaritime.dla.mil/Programs/Smcr/.

Vendor item drawing administrative control number 1/	Device manufacturer CAGE code	Transportation package	Vendor part number
V62/12648-01XE	24355	Tube	ADP1720TRMZ3.3-EP
		Reel	ADP1720TRMZ3.3-EP-R7
V62/12648-02XE	24355	Tube	ADP1720TRMZ5-EP
		Reel	ADP1720TRMZ5-EP-R7
V62/12648-03XE	24355	Tube	ADP1720TRMZ-EP
		Reel	ADP1720TRMZ-EP-R7

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

CAGE code	Source of supply
24355	Analog Devices Route 1 Industrial Park P.O. Box 9106 Norwood, MA 02062 Point of contact: Raheen Business Park Limerick, Ireland