

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Add unit quantity under paragraph 6.3. Update document paragraphs to current requirements. - ro	18-09-06	C. SAFFLE
B	Add typical limits to IGND, I_LIMIT, VI-LEAKAGE, and ADJ1_BIAS tested parameters under Table I. Update document to current requirements. - ro	24-02-07	J. ESCHMEYER



Prepared in accordance with ASME Y14.24

Vendor Item Drawing

Revision Status of Sheets

REV																				
SHEET																				
REV	B	B	B	B	B	B	B	B	B	B	B									
SHEET	1	2	3	4	5	6	7	8	9	10	11									

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

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:

<u>V62/12648</u>	-	<u>01</u>	<u>X</u>	<u>E</u>
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).

<u>Device type</u>	<u>Generic</u>	<u>Output voltage</u>	<u>Circuit function</u>
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.

<u>Outline letter</u>	<u>Number of pins</u>	<u>JEDEC PUB 95</u>	<u>Package style</u>
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:

<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

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/12648
		REV B	PAGE 2

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 (TSTG)	-65°C to +150°C
Operating junction temperature range (Tj)	-55°C to +125°C

1.4 Recommended operating conditions. 2/

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

1.5 Thermal characteristics.

Thermal resistance, junction to ambient (θJC)	66°C/W
Thermal resistance, junction to ambient (θJA)	246°C/W

2. APPLICABLE DOCUMENTS

JEDEC Solid State Technology Association

JEDEC PUB 95 – Registered and Standard Outlines for Semiconductor Devices

(Copies of these documents are available online at <https://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.

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.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/12648
		REV B	PAGE 3

TABLE I. Electrical performance characteristics. 1/

Test	Symbol	Conditions $V_{IN} = 12\text{ V}$, $I_{OUT} = 100\ \mu\text{A}$, $C_{IN} = C_{OUT} = 1\ \mu\text{F}$, 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	IGND	$I_{OUT} = 0\ \mu\text{A}$	+25°C	01, 02, 03	28 typical		μA
		$I_{OUT} = 0\ \mu\text{A}$, $V_{IN} = V_{OUT} + 0.5\text{ V}$ or 4 V (whichever is greater)	-55°C to +125°C		80		
		$I_{OUT} = 100\ \mu\text{A}$	+25°C		35 typical		
		$I_{OUT} = 100\ \mu\text{A}$, $V_{IN} = V_{OUT} + 0.5\text{ V}$ or 4 V (whichever is greater)	-55°C to +125°C		120		
		$I_{OUT} = 1\text{ mA}$	+25°C		74 typical		
		$I_{OUT} = 1\text{ mA}$, $V_{IN} = V_{OUT} + 0.5\text{ V}$ or 4 V (whichever is greater)	-55°C to +125°C		340		
		$I_{OUT} = 10\text{ mA}$	+25°C		300 typical		
		$I_{OUT} = 10\text{ mA}$, $V_{IN} = V_{OUT} + 0.5\text{ V}$ or 4 V (whichever is greater)	-55°C to +125°C		900		
		$100\ \mu\text{A} < I_{OUT} < 50\text{ mA}$, $V_{IN} = V_{OUT} + 0.5\text{ V}$ or 4 V, (whichever is greater)	-55°C to +125°C		2115		
Shutdown current	IGND-SD	EN = GND	+25°C	01, 02, 03	0.7 typical		μA
			-55°C to +125°C		1.7		
Output.							
Fixed output	V_{OUT}	$I_{OUT} = 100\ \mu\text{A}$	+25°C	01, 02	-0.5	+0.5	%
Voltage accuracy		$100\ \mu\text{A} < I_{OUT} < 50\text{ mA}$	+25°C	01, 02	-1	+1	%
			-55°C to +125°C		-2	+2	
Adjustable output <u>2/</u>	V_{OUT}	$I_{OUT} = 100\ \mu\text{A}$	+25°C	03	1.2188	1.2311	V
			1.2250 typical				
Voltage accuracy		$100\ \mu\text{A} < I_{OUT} < 50\text{ mA}$	+25°C	03	1.2127	1.2372	V
			-55°C to +125°C		1.2005	1.2495	

See footnotes at end of table.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/12648
		REV B	PAGE 4

TABLE I. Electrical performance characteristics – Continued. 1/

Test	Symbol	Conditions $V_{IN} = 12\text{ V}$, $I_{OUT} = 100\ \mu\text{A}$, $C_{IN} = C_{OUT} = 1\ \mu\text{F}$, unless otherwise specified	Temperature, T_A	Device type	Limits		Unit
					Min	Max	
Output – continued.							
Noise (10 Hz to 100 kHz)	OUTNOISE	$V_{OUT} = 1.6\text{ V}$, $C_{OUT} = 1\ \mu\text{F}$	+25°C	01, 02, 03	146	typical	μV_{rms}
		$V_{OUT} = 1.6\text{ V}$, $C_{OUT} = 10\ \mu\text{F}$			124	typical	
		$V_{OUT} = 5\text{ V}$, $C_{OUT} = 1\ \mu\text{F}$			340	typical	
		$V_{OUT} = 5\text{ V}$, $C_{OUT} = 10\ \mu\text{F}$			266	typical	
Regulation.							
Line regulation	$\Delta V_{OUT} / \Delta V_{IN}$	$V_{IN} = (V_{OUT} + 0.5\text{ V})$ to 28 V	-55°C to +125°C	01, 02, 03	-0.02	+0.02	%/V
Load regulation <u>3/</u>	$\Delta V_{OUT} / \Delta I_{OUT}$	1 mA < I_{OUT} < 50 mA	+25°C	01, 02, 03	0.001	typical	%mA
			-55°C to +125°C			0.005	
Dropout voltage <u>4/</u>	VDROPOUT	$I_{OUT} = 10\text{ mA}$	+25°C	01, 02, 03	55	typical	mV
			-55°C to +125°C			105	
		$I_{OUT} = 50\text{ mA}$	+25°C		275	typical	
			-55°C to +125°C			480	
Start up time <u>5/</u>	tSTARTUP		+25°C	01, 02, 03	200	typical	μs
Current limit <u>6/</u> threshold	ILIMIT		+25°C	01, 02, 03	55	140	mA
					90	typical	
Thermal characteristics.							
Thermal shutdown threshold	TSSD	T_J rising	+25°C	01, 02, 03	150	typical	°C
Thermal shutdown hysteresis	TSSD-HYS	T_J rising	+25°C	01, 02, 03	15	typical	°C

See footnotes at end of table.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/12648
		REV B	PAGE 5

TABLE I. Electrical performance characteristics – Continued. 1/

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

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/12648
		REV B	PAGE 6

Case X

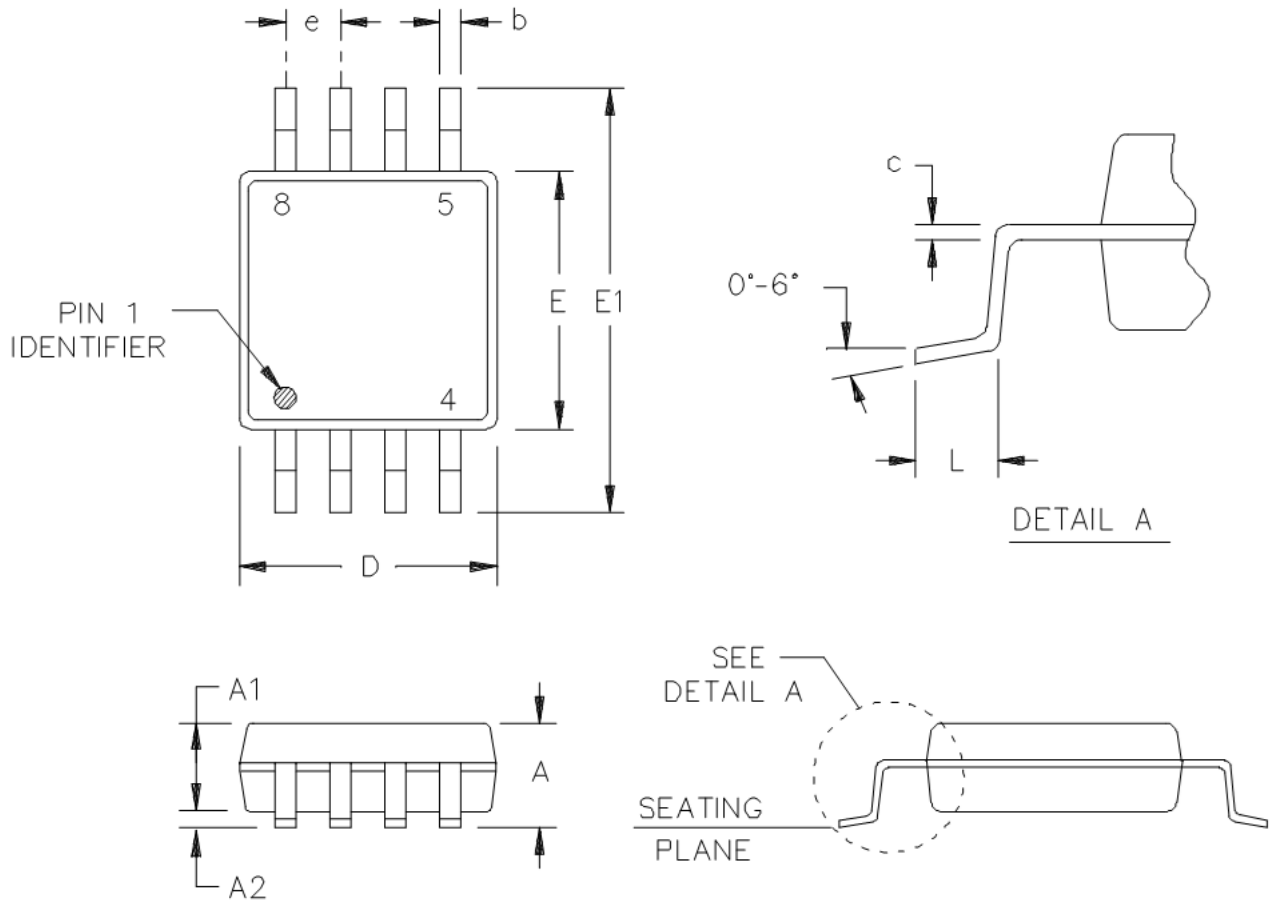


FIGURE 1. Case outline.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/12648
		REV B	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.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/12648
		REV B	PAGE 8

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 μ F or greater capacitor.
3	OUT	Regulator output voltage. Bypass OUT to GND with a 1 μ F 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.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/12648
		REV B	PAGE 9

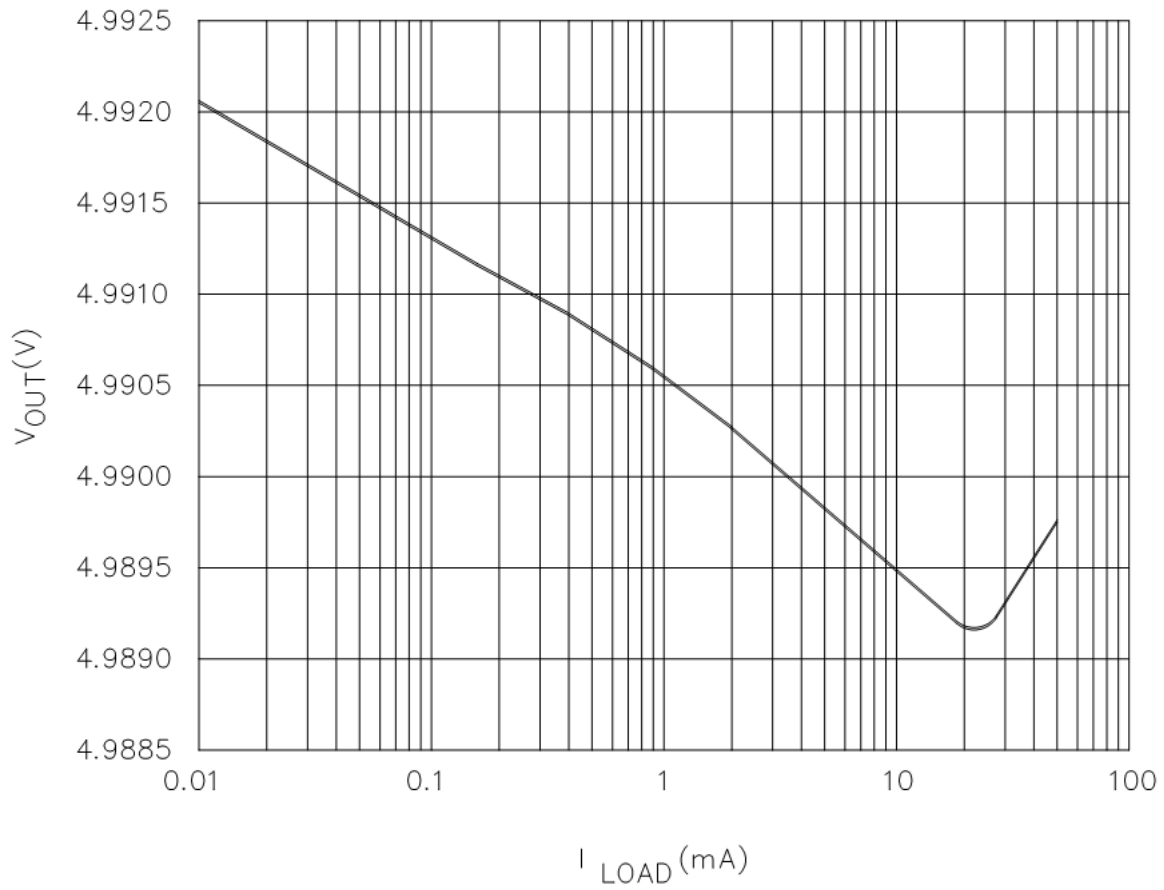


FIGURE 3. Output voltage versus load current.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/12648
		REV B	PAGE 10

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/>.

Vendor item drawing administrative control number ^{1/}	Device manufacturer CAGE code	Transportation mode and quantity	Vendor part number
V62/12648-01XE	24355	Tube, 50 units	ADP1720TRMZ3.3-EP
		Reel, 1000 units	ADP1720TRMZ3.3-EP-R7
V62/12648-02XE	24355	Tube, 50 units	ADP1720TRMZ5-EP
		Reel, 1000 units	ADP1720TRMZ5-EP-R7
V62/12648-03XE	24355	Tube, 50 units	ADP1720TRMZ-EP
		Reel, 1000 units	ADP1720TRMZ-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
 Route 1 Industrial Park
 P.O. Box 9106
 Norwood, MA 02062
 Point of contact: 20 Alpha Road
 Chelmsford, MA 01824-4123

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/12648
		REV B	PAGE 11