

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Inactivate device type 01XE. Add case outline Y for the MS-012-AA package. - ro	17-10-04	C. SAFFLE
B	Under Table I, $V_S = 5.0\text{ V}$ condition, make changes to VOS, IB, IOS, and CMRR test limits. Delete Supply voltage (Vs) test entirely. Under Table I, $V_S = \pm 15.0\text{ V}$ condition, make changes to VOS, IB, and IOS, test limits. Under Table I, both $V_S = 5.0\text{ V}$ and $V_S = \pm 15.0\text{ V}$ conditions, add Offset voltage drift test. Update document paragraphs to current requirements. - ro	24-06-12	J. ESCHMEYER



Prepared in accordance with ASME Y14.24

Vendor Item Drawing

Revision Status of Sheets

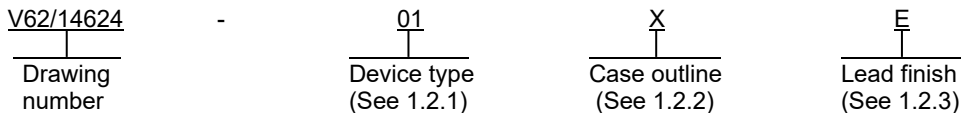
REV																				
SHEET																				
REV	B	B	B	B	B	B	B	B	B	B	B	B	B	B						
SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14						

PMIC N/A Original date of drawing YY-MM-DD 15-02-19	PREPARED BY RICK OFFICER		DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990 https://www.dla.mil/landandmaritime	
	CHECKED BY RAJESH PITHADIA		TITLE MICROCIRCUIT, LINEAR, PRECISION, RAIL-TO RAIL INPUT AND OUTPUT DUAL OPERATIONAL AMPLIFIER, MONOLITHIC SILICON	
	APPROVED BY CHARLES F. SAFFLE		DWG NO. V62/14624	
	SIZE A	CAGE CODE 16236	PAGE 1 OF 14	
	REV B			

1. SCOPE

1.1 Scope. This drawing documents the general requirements of a high performance precision rail to rail input and output (RRIO) dual operational amplifier 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	OP284-EP	Precision rail to rail input and output (RRIO) dual operational amplifier

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-001	Plastic dual in line
Y	8	MS-012-AA	Plastic small outline

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. V62/14624
		REV B	PAGE 2

1.3 Absolute maximum ratings. 1/

Supply voltage range (VS)	±18 V
Input voltage (VIN)	±18 V
Differential input voltage	±0.6 V 2/
Output short circuit duration to GND	Indefinite
Storage temperature range (TSTG)	-65°C to +150°C
Junction temperature range (TJ)	-65°C to +150°C
Lead temperature (soldering, 60 seconds)	300°C
Power dissipation (PD)	45 mW
Thermal resistance, junction to ambient (θJC) :	
Case outline X	43°C/W
Case outline Y	43°C/W
Thermal resistance, junction to ambient (θJA) :	
Case outline X	158°C/W
Case outline Y	158°C/W

1.4 Recommended operating conditions. 3/

Supply voltage range (VS)	+5.0 V to ±15 V
Operating temperature range (TA)	-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/ For input voltages greater than 0.6 V, the input current should be, limited to less than 5 mA to prevent degradation or destruction of the input devices.
- 3/ 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. V62/14624
		REV B	PAGE 3

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.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/14624
		REV B	PAGE 4

TABLE I. Electrical performance characteristics. 1/

Test	Symbol	Conditions VS = 5.0 V, VCM = 2.5 V unless otherwise specified	Temperature, TA	Device type	Limits		Unit
					Min	Max	
Input characteristics.							
Offset voltage	VOS		25°C	01		125	µV
			-55°C to +125°C			250	
Input bias current	IB		25°C	01		450	nA
			-55°C to +125°C			600	
			25°C		60 typical		
Input offset current	IOS		-55°C to +125°C	01		50	nA
Input voltage range	VINR		25°C	01	0	5	V
Common mode rejection ratio	CMRR	VCM = 1.0 V to 4.0 V	-55°C to +125°C	01	86		dB
Large signal voltage gain	AVO	1 V ≤ VO ≤ 4 V, RL = 2 kΩ	25°C	01	50		V/mV
			-55°C to +125°C		25		
			25°C		240 typical		
Offset voltage drift	ΔVOS / ΔT		25°C	01		2.00	µV/°C
					0.2 typical		
Bias current drift	ΔIB / ΔT		25°C	01	150 typical		pA/°C
Output characteristics.							
Output voltage high	VOH	IL = 1.0 mA	25°C	01	4.80		V
Output voltage low	VOL	IL = 1.0 mA	25°C	01		125	mV
Output current	IOUT		25°C	01	±6.5		mA
Power supply.							
Supply current/amplifier	ISY	VO = 2.5 V	-55°C to +125°C	01		1.45	mA

See footnote at end of table.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/14624
		REV B	PAGE 5

TABLE I. Electrical performance characteristics – Continued. 1/

Test	Symbol	Conditions Vs = 5.0 V, VCM = 2.5 V unless otherwise specified	Temperature, TA	Device type	Limits		Unit
					Min	Max	
Dynamic performance							
Slew rate	SR	RL = 2 kΩ	25°C	01	1.65		V/μs
					2.4 typical		
Settling time	tS	To 0.01%, 1.0 V step	25°C	01	2.5 typical		μs
Gain bandwidth product	GBP		25°C	01	3.25 typical		MHz
Phase margin	ΦM		25°C	01	45 typical		Degrees
Noise performance							
Voltage noise	en p-p	0.1 Hz to 10 Hz	25°C	01	0.3 typical		μV p-p
Voltage noise density	en	f = 1 kHz	25°C	01	3.9 typical		nV/√Hz
Current noise density	in		25°C	01	0.4 typical		pA/√Hz

See footnote at end of table.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/14624
		REV B	PAGE 6

TABLE I. Electrical performance characteristics – Continued. 1/

Test	Symbol	Conditions V _S = ±15.0 V, V _{CM} = 0 V unless otherwise specified	Temperature, T _A	Device type	Limits		Unit
					Min	Max	
Input characteristics.							
Offset voltage	V _{OS}		25°C	01		100	μV
			-55°C to +125°C			200	
Input bias current	I _B		25°C	01		450	nA
			-55°C to +125°C			600	
			25°C		80 typical		
Input offset current	I _{OS}		-55°C to +125°C	01		50	nA
Input voltage range	V _{INR}		25°C	01	-15	+15	V
Common mode rejection ratio	CMRR	V _{CM} = -14.0 V to +14.0 V	-55°C to +125°C	01	86		dB
			25°C		90 typical		
Large signal voltage gain	A _{VO}	-10 V ≤ V _O ≤ 10 V, R _L = 2 kΩ	25°C	01	150		V/mV
			-55°C to +125°C		75		
			25°C		1000 typical		
Offset voltage drift	ΔV _{OS} / ΔT		25°C	01		2.00	μV/°C
					0.2 typical		
Bias current drift	ΔI _B / ΔT		25°C	01	150 typical		pA/°C
Output characteristics.							
Output voltage high	V _{OH}	I _L = 1.0 mA	25°C	01	14.8		V
Output voltage low	V _{OL}	I _L = 1.0 mA	25°C	01		-14.875	mV
Output current	I _{OUT}		25°C	01	±10		mA
Power supply.							
Power supply rejection ratio	PSRR	V _S = ±2.0 V to ±18 V	-55°C to +125°C	01	90		dB
Supply current/amplifier	I _{SY}	V _O = 0 V	-55°C to +125°C	01		2.0	mA
Supply current/amplifier	I _{SY}	V _S = ±18 V	-55°C to +125°C	01		2.25	mA

See footnote at end of table.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/14624
		REV B	PAGE 7

TABLE I. Electrical performance characteristics – Continued. 1/

Test	Symbol	Conditions VS = ±15.0 V, VCM = 0 V unless otherwise specified	Temperature, TA	Device type	Limits		Unit
					Min	Max	
Dynamic performance.							
Slew rate	SR	RL = 2 kΩ	25°C	01	2.4		V/μs
					4.0 typical		
Full power bandwidth	BWP	1% distortion, RL = 2 kΩ, VO = 29 Vp-p	25°C	01	35 typical		kHz
Settling time	tS	To 0.01%, 1.0 V step	25°C	01	4 typical		μs
Gain bandwidth product	GBP		25°C	01	4.25 typical		MHz
Phase margin	ΦM		25°C	01	50 typical		Degrees
Noise performance.							
Voltage noise	en p-p	0.1 Hz to 10 Hz	25°C	01	0.3 typical		μV p-p
Voltage noise density	en	f = 1 kHz	25°C	01	3.9 typical		nV/√Hz
Current noise density	in		25°C	01	0.4 typical		pA/√Hz

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.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/14624
		REV B	PAGE 8

Case X

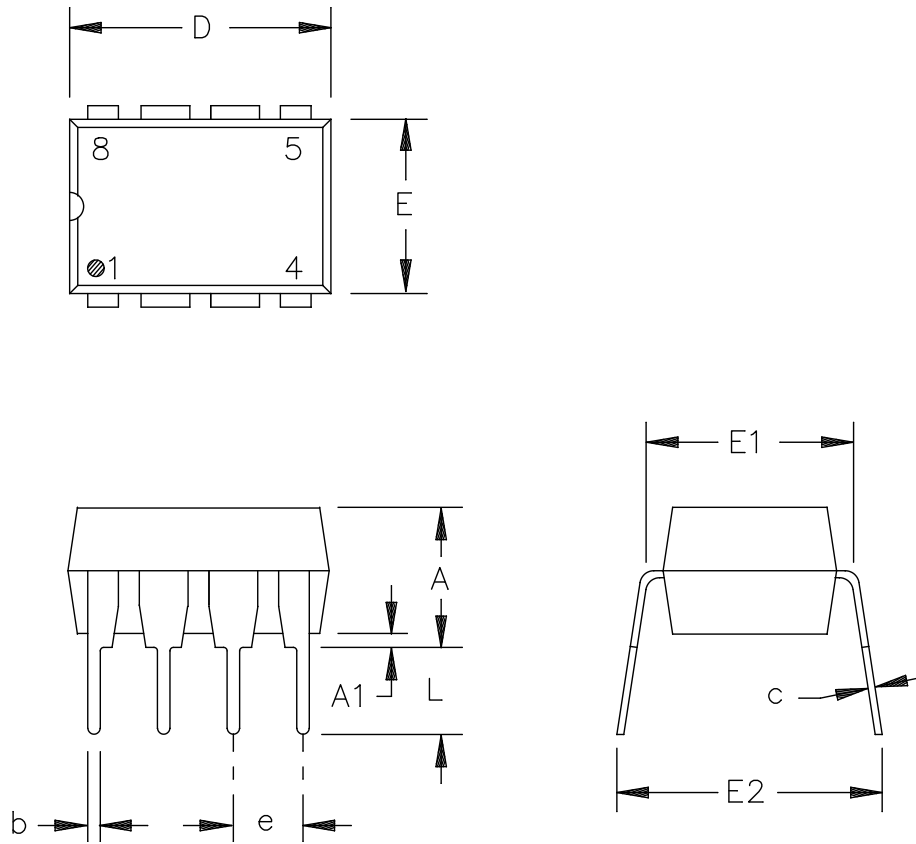


FIGURE 1. Case outlines.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/14624
		REV B	PAGE 9

Case X – continued.

Symbol	Dimensions					
	Inches			Millimeters		
	Minimum	Nominal	Maximum	Minimum	Nominal	Maximum
A	---	---	0.210	---	---	5.33
A1	0.015	---	---	0.38	---	---
b	0.014	0.018	0.022	0.36	0.46	0.56
c	0.008	0.010	0.014	0.20	0.25	0.36
D	0.355	0.365	0.400	9.02	9.27	10.16
E	0.240	0.250	0.280	6.10	6.35	7.11
E1	0.300	0.310	0.325	7.62	7.87	8.26
E2	---	---	0.430	---	---	10.92
e	0.100 BSC			2.54 BSC		
L	0.115	0.130	0.150	2.92	3.30	3.81

NOTES:

1. Controlling dimensions are inch, millimeter dimensions are rounded off inch equivalents for reference only and are not appropriate for use in design.
2. Corner leads may be configured as whole or half leads.
3. Falls within reference to JEDEC MS-001.

FIGURE 1. Case outlines - Continued.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/14624
		REV B	PAGE 10

Case Y

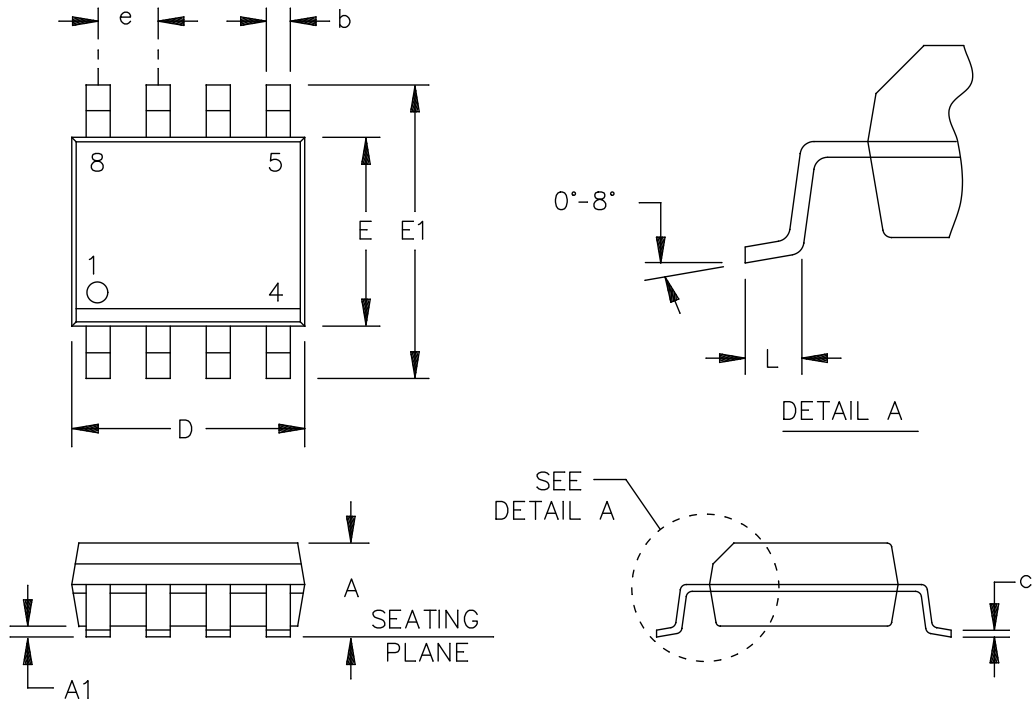


FIGURE 1. Case outlines - Continued.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/14624
		REV B	PAGE 11

Case Y – continued.

Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.0532	0.0688	1.35	1.75
A1	0.0040	0.0098	0.10	0.25
b	0.0122	0.0201	0.31	0.51
c	0.0067	0.0098	0.17	0.25
D	0.1890	0.1968	4.80	5.00
e	0.0500 BSC		1.27 BSC	
E	0.1497	0.1574	3.80	4.00
E1	0.2284	0.2441	5.80	6.20
L	0.0157	0.0500	0.40	1.27
n	8 leads		8 leads	

NOTE:

1. Controlling dimensions are millimeter, inch dimensions are given for reference only and are not appropriate for use in design.
2. Falls within reference to JEDEC MS-012-AA.

FIGURE 1. Case outlines - Continued.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/14624
		REV B	PAGE 12

Device type	01
Case outlines	X and Y
Terminal number	Terminal symbol
1	OUTPUT A
2	-INPUT A
3	+INPUT A
4	-Vs
5	+INPUT B
6	-INPUT B
7	OUTPUT B
8	+Vs

FIGURE 2. Terminal connections.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CAGE CODE 16236	DWG NO. V62/14624
		REV B	PAGE 13

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 <u>1/</u>	Device manufacturer CAGE code	Vendor part number
V62/14624-01XE	<u>2/</u>	OP284TRZ-EP-R7
V62/14624-01YE	24355	OP284TRZ-EP-R7

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

2/ Not available from an approved source of supply.

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. V62/14624
		REV B	PAGE 14