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** **http://www.landandmaritime.dla.mil/**
Original date of drawing YY-MM-DD 12-11-29	**CHECKED BY** RAJESH PITHADIA	**TITLE** MICROCIRCUIT, LINEAR, LOW POWER, 350 MHz VOLTAGE FEEDBACK AMPLIFIER, MONOLITHIC SILICON
	APPROVED BY CHARLES F. SAFFLE	
	SIZE **A** / **CODE IDENT. NO.** **16236**	**DWG NO.** **V62/12644**
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AMSC N/A

5962-V099-12

1. SCOPE

1.1 Scope. This drawing documents the general requirements of a high performance low power, 350 MHz voltage feedback amplifier microcircuit, with an operating temperature range of -55°C to +105°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:

V62/12644	-	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	Circuit function
01	AD8039	Low power, 350 MHz voltage feedback amplifier

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	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:

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/

Supply voltage (V_S) ..... 12.6 V
Power dissipation (P_D) ..... 360 mW 2/
Common mode input voltage (V_{IN}) ..... $\pm V_S$
Differential input voltage ..... $\pm$4 V
Storage temperature range (T_{STG}) ..... -65°C to +125°C
Lead temperature (soldering, 10 seconds) ..... +300°C
Junction temperature range (TJ) ..... 150°C

1.4 Recommended operating conditions. 3/

Supply voltage range (V_S) ..... $\pm$5 V
Operating free-air temperature range (T_A) ..... -55°C to +105°C

1.5 Thermal characteristics.

Thermal resistance, junction to ambient (θ_{JA}) ..... 125°C/W

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/ Power dissipation arrived by $P_D = (T_J – T_A) / \theta_{JA}$. $P_D = (150 – 105) / 125 = 0.36$ W

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.

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 $V_S = \pm 5$ V, $R_L = 2$ kΩ, gain = +1 unless otherwise specified	Temperature, T_A	Device type	Limits		Unit
					Min	Max	
Dynamic performance.							
-3 dB bandwidth		G = +1, V_{OUT} = 0.5 Vpp	-55°C to +105°C	01	300		MHz
		G = +2, V_{OUT} = 0.5 Vpp	+25°C		175 typical		
		G = +1, V_{OUT} = 2 Vpp	+25°C		100 typical		
Bandwidth for 0.1 dB flatness		G = +2, V_{OUT} = 0.2 Vpp	+25°C	01	45 typical		MHz
Slew rate	SR	G = +1, V_{OUT} = 2 V step, R_L = 2 kΩ	+25°C	01	400		V/μs
			-55°C to +105°C		300		
Overdrive recovery time		G = +2, 1 V overdrive	+25°C	01	50 typical		ns
Settling time to 0.1%		G = +2, V_{OUT} = 2 V step	+25°C	01	18 typical		ns
Noise/harmonic performance.							
Signal frequency distortion response (SFDR)							
Second harmonic		f_c = 1 MHz, V_{OUT} = 2 Vpp, R_L = 2 kΩ	+25°C	01	-90 typical		dBc
Third harmonic		f_c = 1 MHz, V_{OUT} = 2 Vpp, R_L = 2 kΩ	+25°C	01	-92 typical		dBc
Second harmonic		f_c = 5 MHz, V_{OUT} = 2 Vpp, R_L = 2 kΩ	+25°C	01	-65 typical		dBc
Third harmonic		f_c = 5 MHz, V_{OUT} = 2 Vpp, R_L = 2 kΩ	+25°C	01	-70 typical		dBc
Crosstalk, output to output	CT	f = 5 MHz, G = +2	+25°C	01	-70 typical		dB
Input voltage noise		f = 100 kHz	+25°C	01	8 typical		nV/$\sqrt{Hz}$
Input current noise		f = 100 kHz	+25°C	01	600 typical		fA/$\sqrt{Hz}$

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued. 1/

Test	Symbol	Conditions $V_S = \pm5$ V, $R_L = 2$ kΩ, gain = +1 unless otherwise specified	Temperature, T_A	Device type	Limits		Unit
					Min	Max	
DC performance.							
Input offset voltage	V_{IO}		+25°C	01		3	mV
			-55°C to +105°C			4.5	
Input offset voltage drift	ΔV_{IO}		+25°C	01	4.5 typical		µV/°C
Input bias current	I_{IB}		+25°C	01		750	nA
			-55°C to +105°C			2.0	µA
Input bias current drift	ΔI_{IB}		+25°C	01	3 typical		nA/°C
Input offset current	I_{IO}		+25°C	01	±25 typical		nA
Open loop gain	A_{OL}	$V_{OUT} = \pm2.5$ V	+25°C	01	70 typical		dB
Input characteristics.							
Input resistance	R_{IN}		+25°C	01	10 typical		MΩ
Input capacitance	C_{IN}		+25°C	01	2 typical		pF
Input common mode voltage range	V_{INR}	$R_L = 1$ kΩ	+25°C	01	±4 typical		V
Common mode rejection ratio	CMRR	$V_{CM} = \pm2.5$ V	+25°C	01	61		dB
			-55°C to +105°C		59		
Output characteristics.							
DC output voltage swing		$R_L = 2$ kΩ, saturated output	+25°C	01	±4 typical		V
Capacitive load drive	C_L	30% overshoot, G = +2	+25°C	01	20 typical		pF

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued. 1/

Test	Symbol	Conditions $V_S = \pm 5$ V, $R_L = 2$ kΩ, gain = +1 unless otherwise specified	Temperature, T_A	Device type	Limits		Unit
					Min	Max	
Power supply .							
Operating range			+25°C	01	3	12	V
Quiescent current per amplifier			+25°C	01		1.5	mA
			-55°C to +105°C			2.6	
Power supply rejection ratio		Positive supply	+25°C	01	71		dB
			-55°C to +105°C		63		
		Negative supply	+25°C		64		
			-55°C to +105°C		63		

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued. 1/

Test	Symbol	Conditions V_S = 5 V, R_L = 2 kΩ to V_S/2, gain = +1, unless otherwise specified	Temperature, T_A	Device type	Limits		Unit
					Min	Max	
Dynamic performance.							
-3 dB bandwidth		G = +1, V_{OUT} = 0.2 Vpp	-55°C to +105°C	01	275		MHz
		G = +2, V_{OUT} = 0.2 Vpp	+25°C		150 typical		
		G = +1, V_{OUT} = 2 Vpp	+25°C		30 typical		
Bandwidth for 0.1 dB flatness		G = +2, V_{OUT} = 0.2 Vpp	+25°C	01	45 typical		MHz
Slew rate	SR	G = +1, V_{OUT} = 2 V step, R_L = 2 kΩ	+25°C	01	340		V/μs
			-55°C to +105°C		275		
Overdrive recovery time		G = +2, 1 V overdrive	+25°C	01	50 typical		ns
Settling time to 0.1%		G = +2, V_{OUT} = 2 V step	+25°C	01	18 typical		ns
Noise/harmonic performance.							
Signal frequency distortion response (SFDR)							
Second harmonic		f_c = 1 MHz, V_{OUT} = 2 Vpp, R_L = 2 kΩ	+25°C	01	-82 typical		dBc
Third harmonic		f_c = 1 MHz, V_{OUT} = 2 Vpp, R_L = 2 kΩ	+25°C	01	-79 typical		dBc
Second harmonic		f_c = 5 MHz, V_{OUT} = 2 Vpp, R_L = 2 kΩ	+25°C	01	-60 typical		dBc
Third harmonic		f_c = 5 MHz, V_{OUT} = 2 Vpp, R_L = 2 kΩ	+25°C	01	-67 typical		dBc
Crosstalk, output to output	CT	f = 5 MHz, G = +2	+25°C	01	-70 typical		dB
Input voltage noise		f = 100 kHz	+25°C	01	8 typical		nV/$\sqrt{Hz}$
Input current noise		f = 100 kHz	+25°C	01	600 typical		fA/$\sqrt{Hz}$

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued. 1/

Test	Symbol	Conditions V_S = 5 V, R_L = 2 kΩ to V_S/2, gain = +1, unless otherwise specified	Temperature, T_A	Device type	Limits		Unit
					Min	Max	
DC performance.							
Input offset voltage	V_{IO}		+25°C	01		3	mV
			-55°C to +105°C			4.5	
Input offset voltage drift	ΔV_{IO}		+25°C	01	3 typical		µV/°C
Input bias current	I_{IB}		+25°C	01		750	nA
			-55°C to +105°C			2.0	µA
Input bias current drift	ΔI_{IB}		+25°C	01	3 typical		nA/°C
Input offset current	I_{IO}		+25°C	01	±30 typical		nA
Open loop gain	A_{OL}	V_{OUT} = ±2.5 V	+25°C	01	70 typical		dB
Input characteristics.							
Input resistance	R_{IN}		+25°C	01	10 typical		MΩ
Input capacitance	C_{IN}		+25°C	01	2 typical		pF
Input common mode voltage range	V_{INR}	R_L = 1 kΩ	+25°C	01	1.0 to 4.0 typical		V
Common mode rejection ratio	CMRR	V_{CM} = ±1 V	+25°C	01	59		dB
			-55°C to +105°C		59		
Output characteristics.							
DC output voltage swing		R_L = 2 kΩ, saturated output	+25°C	01	0.9 to 4.1 typical		V
Capacitive load drive	C_L	30% overshoot, G = +2	+25°C	01	20 typical		pF
Power supply .							
Operating range			+25°C	01	3	12	V
Quiescent current per amplifier			+25°C	01		1.5	mA
Power supply rejection ratio			-55°C to +105°C	01	65		dB

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.

Case X

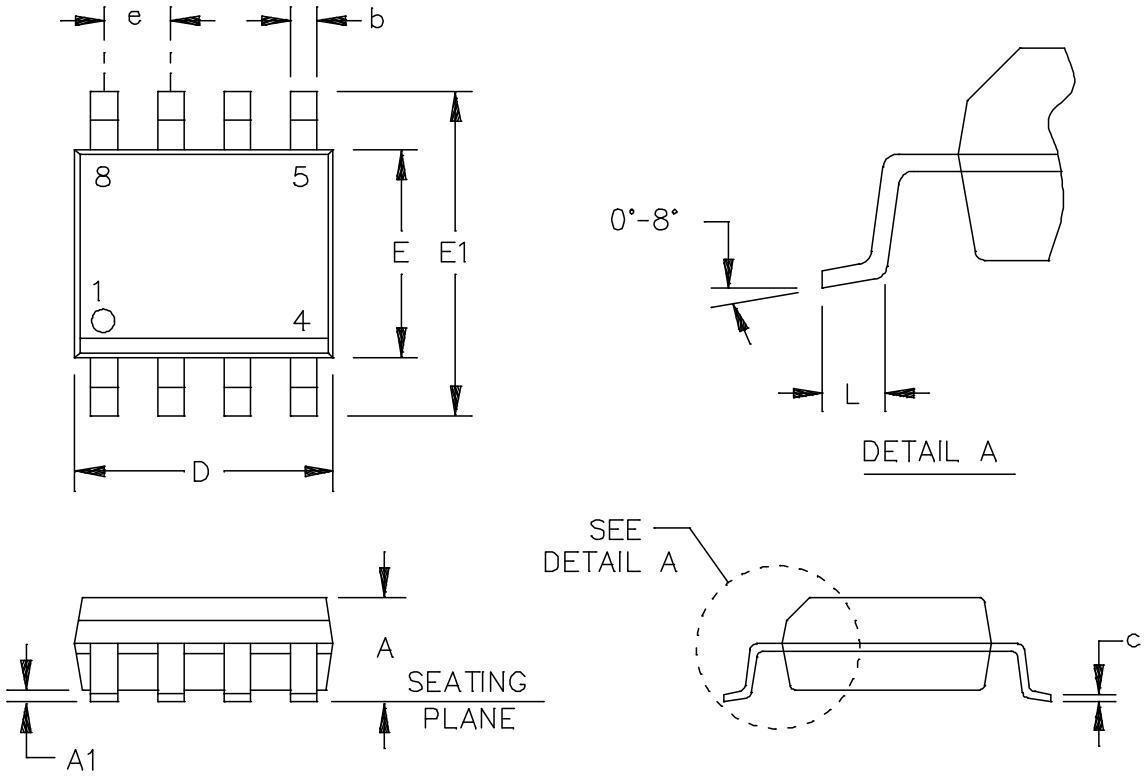

FIGURE 1. Case outline.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/12644
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Case X

Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.053	.068	1.35	1.75
A1	.004	.010	0.10	0.25
b	.012	.020	0.31	0.51
c	.006	.009	0.17	0.25
D	.188	.196	4.80	5.00
E	.149	.157	3.80	4.00
E1	.228	.244	5.80	6.20
e	.050 BSC		1.27 BSC	
L	.015	.049	0.40	1.27

NOTES:
1. Controlling dimensions are millimeter, inch dimensions are given for reference only.
2. Falls within reference to JEDEC MS-012-AA.

FIGURE 1. Case outline - Continued.

Device type	01
Case outline	X
Terminal number	Terminal symbol
1	V_{OUT1}
2	-INPUT1
3	+INPUT1
4	$-V_S$
5	+INPUT2
6	-INPUT2
7	V_{OUT2}
8	$+V_S$

FIGURE 2. Terminal connections.

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	Vendor part number
V62/12644-01XE	24355	AD8039SARZ-EPR7

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