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 15-11-05	**CHECKED BY** RAJESH PITHADIA	**TITLE** MICROCIRCUIT, LINEAR, DUAL ULTRALOW DISTORTION, ULTRALOW NOISE OPERATIONAL AMPLIFIER, MONOLITHIC SILICON
	APPROVED BY CHARLES F. SAFFLE	
	SIZE **A** / **CODE IDENT. NO.** **16236**	**DWG NO.** **V62/16604**
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AMSC N/A

5962-V004-16

1. SCOPE

1.1 Scope. This drawing documents the general requirements of a dual, ultralow distortion, ultralow noise 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:

V62/16604	-	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	AD8599-EP	Dual, ultralow distortion, ultralow noise operational 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 surface mount

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)	±18 V
Input voltage (V_{IN})	$-V_S \le V_{IN} \le +V_S$
Differential input voltage (V_{ID})	±1 V 2/
Output short circuit to GND	Indefinite
Storage temperature range (T_{STG})	-65°C to +150°C
Power dissipation (P_D)	0.180 W
Lead temperature (soldering, 60 seconds)	+300°C
Junction temperature (T_J)	+150°C
Thermal resistance, junction to ambient (θ_{JC})	36°C/W
Thermal resistance, junction to ambient (θ_{JA})	120°C/W

1.4 Recommended operating conditions. 3/

Supply voltage range (V_S)	±15 V
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/ If the differential input voltage exceeds 1 V, limit the current to 5 mA.

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 Solid State Technology Association

JEDEC PUB 95 – Registered and Standard Outlines for Semiconductor Devices

(Copies of these documents are available online at http:/www.jedec.org or from JEDEC – Solid State Technology Association, 3103 North 10th Street, Suite 240–S, Arlington, VA 22201-2107).

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 $V_S = \pm 15.0$ 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		120	µV
					10 typical		
			-55°C to +125°C			300	
Offset voltage drift	$\Delta V_{OS} / \Delta T$		-55°C to +125°C	01		2.5	µV / °C
					0.8 typical		
Input bias current	I_B		+25°C	01		200	nA
					25 typical		
			-55°C to +125°C			350	
Input offset current	I_{OS}		+25°C	01		200	nA
					50 typical		
			-55°C to +125°C			350	
Input voltage range	V_{INR}		+25°C	01	-12.5	+12.5	V
Common mode rejection ratio	CMRR	$V_{CM} = -12.5$ V ≤ V_{CM} ≤ +12.5 V	+25°C	01	120		dB
					135 typical		
			-55°C to +125°C		115		
Large signal voltage gain	A_{VO}	$R_L \geq 600\ \Omega$, $V_O = -11$ V to +11 V	+25°C	01	110		dB
					116 typical		
			-55°C to +125°C		106		

See footnote at end of table.

TABLE I. Electrical performance characteristics – Continued. 1/

Test	Symbol	Conditions $V_S = \pm 15.0$ V, $V_{CM} = 0$ V unless otherwise specified	Temperature, T_A	Device type	Limits		Unit
					Min	Max	
Input characteristics – continued.							
Input capacitance, common mode	C_{CM}		+25°C	01	5.1 typical		pF
Input capacitance, differential mode	C_{DIFF}		+25°C	01	12.1 typical		pF
Output characteristics.							
High output voltage	V_{OH}	$R_L = 600\ \Omega$	+25°C	01	13.1		V
					13.4 typical		
			-55°C to +125°C		12.8		
		$R_L = 2\ k\Omega$	+25°C		13.5		
					13.7 typical		
			-55°C to +125°C		13.2		
Low output voltage	V_{OL}	$R_L = 600\ \Omega$	+25°C	01		-12.9	V
					-13.2 typical		
			-55°C to +125°C			-12.8	
		$R_L = 2\ k\Omega$	+25°C			-13.4	
					-13.5 typical		
			-55°C to +125°C			-13.3	
Output short circuit current	I_{SC}		+25°C	01	±52 typical		mA
Closed loop output impedance	Z_{OUT}	At 1 MHz, $A_{VO} = 1$	+25°C	01	5 typical		Ω
Power supply							
Power supply rejection ratio	PSRR	$V_S = \pm 18$ V to ±4.5 V	+25°C	01	120		dB
					140 typical		
			-55°C to +125°C		118		
Supply current per amplifier	I_{SY}		+25°C	01		5.7	mA
					5.0 typical		
			-55°C to +125°C			6.75	

See footnote at end of table.

TABLE I. Electrical performance characteristics – Continued. 1/

Test	Symbol	Conditions $V_S = \pm 15.0$ V, $V_{CM} = 0$ V unless otherwise specified	Temperature, T_A	Device type	Limits		Unit
					Min	Max	
Dynamic performance							
Slew rate	SR	$A_{VO} = -1$, $R_L = 2$ kΩ	+25°C	01	16 typical		V/μs
		$A_{VO} = 1$, $R_L = 2$ kΩ			15 typical		
Settling time	t_S	To 0.01%, 10 V step	+25°C	01	2 typical		μs
Gain bandwidth product	GBP		+25°C	01	10 typical		MHz
Phase margin	Φ_M		+25°C	01	65 typical		Degrees
Noise performance							
Peak to peak noise	en p_{-p}	0.1 Hz to 10 Hz	+25°C	01	76 typical		nV p-p
Voltage noise density	e_n	f = 1 kHz	+25°C	01		1.15	nV / $\sqrt{Hz}$
					1.07 typical		
		f = 10 Hz				1.5	
Correlated current noise		f = 1 kHz	+25°C	01	1.9 typical		pA / $\sqrt{Hz}$
		f = 10 Hz			4.3 typical		
Uncorrelated current noise		f = 1 kHz	+25°C	01	2.3 typical		pA / $\sqrt{Hz}$
		f = 10 Hz			5.3 typical		
Total harmonic distortion + noise	THD+N	G = 1, $R_L \geq 1$ kΩ, f = 1 kHz, $V_{RMS} = 3$ V	+25°C	01	-120 typical		dB
Channel separation	CS	f = 10 kHz	+25°C	01	-120 typical		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

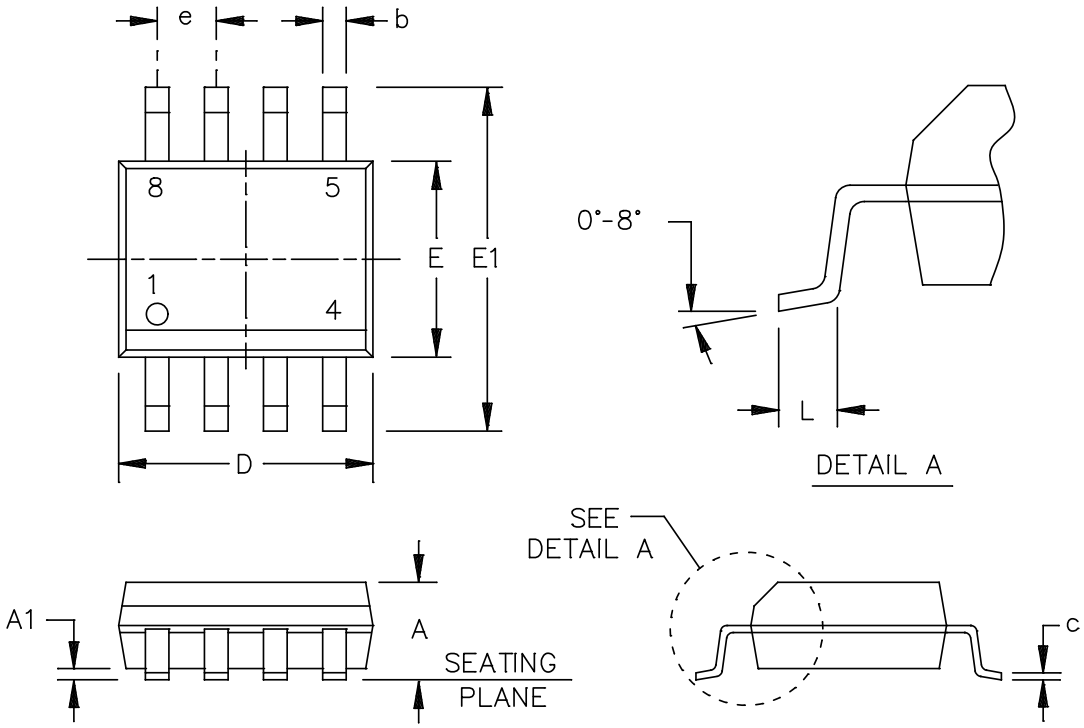

FIGURE 1. Case outline.

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Case X – continued.

Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.0122	.0201	0.31	0.51
c	.0067	.0098	0.17	0.25
D	.1890	.1968	4.80	5.00
e	.0500 BSC		1.27 BSC	
E	.1497	.1574	3.80	4.00
E1	.2284	.2441	5.80	6.20
L	.0157	.0500	0.40	1.27

NOTES:
1. Controlling dimensions are millimeter, inch dimensions are given for reference only.
2. Inch dimensions are rounded off millimeter equivalents for reference only and are not appropriate use in design.
3. Falls within reference to JEDEC MS-012-AA.

FIGURE 1. Case outline - Continued.

Device type	01
Case outline	X
Terminal number	Terminal symbol
1	OUTPUT A
2	-INPUT A
3	+INPUT A
4	$-V_S$
5	+INPUT B
6	-INPUT B
7	OUTPUT B
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	Mode of transportation and quantity	Vendor part number
V62/16604-01XE	24355	Tube, 98 units	AD8599TRZ-EP
V62/16604-01XE	24355	Reel, 1,000 units	AD8599TRZ-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