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 15-11-04	**CHECKED BY** RAJESH PITHADIA **APPROVED BY** CHARLES F. SAFFLE	**TITLE** MICROCIRCUIT, LINEAR, PRECISION, VERY LOW NOISE, LOW INPUT BIAS CURRENT DUAL, OPERATIONAL AMPLIFIER, MONOLITHIC SILICON
	SIZE **A** **CODE IDENT. NO.** **16236**	**DWG NO.** **V62/16603**
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AMSC N/A

5962-V003-16

1. SCOPE

1.1 Scope. This drawing documents the general requirements of a precision, very low noise, low input bias current 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:

V62/16603	-	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	AD8672-EP	Precision, very low noise, low input bias current dual 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) ..... 36 V
Input voltage (V_{IN}) ..... $-V_S$ to $+V_S$
Differential input voltage (V_{ID}) ..... ±0.7 V
Output short circuit duration ..... Indefinite
Power dissipation (P_D) ..... 0.210 W
Storage temperature range (T_{STG}) ..... -65°C to +150°C
Junction temperature range (T_J) ..... -65°C to +150°C
Lead temperature range (soldering, 60 seconds) ..... +300°C
Thermal resistance, junction to ambient (θ_{JC}) ..... 43°C/W
Thermal resistance, junction to ambient (θ_{JA}) ..... 120°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.

1.4 Recommended operating conditions. 2/

Supply voltage range (V_S) ..... ±5 V and ±15 V
Operating free-air temperature range (T_A) ..... -55°C to +125°C

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.

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.

TABLE I. Electrical performance characteristics. 1/

Test	Symbol	Conditions $V_S = \pm 5.0$ 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		75	µV
					20 typical		
			-55°C to +125°C			125	
					30 typical		
Offset voltage drift	$\Delta V_{OS} / \Delta T$		-55°C to +125°C	01		0.8	µV / °C
					0.3 typical		
Input bias current	I_B		+25°C	01	-14	+14	nA
					+3 typical		
			+25°C to +125°C		-20	+20	
					+5 typical		
			-55°C to +125°C		-60	+60	
					+8 typical		
Input offset current	I_{OS}		+25°C	01	-14	+14	nA
					+6 typical		
			+25°C to +125°C		-20	+20	
					+6 typical		
			-55°C to +125°C		-60	+60	
					+8 typical		
Input voltage range	V_{INR}		+25°C	01	-2.5	+2.5	V
Common mode rejection ratio	CMRR	V_{CM} = -2.5 V to +2.5 V	+25°C	01	100		dB
					120 typical		
Large signal voltage gain	A_{VO}	$R_L = 2$ kΩ, V_O = -3 V to +3 V	+25°C	01	1000		V / mV
					6000 typical		

See footnote at end of table.

TABLE I. Electrical performance characteristics – Continued. 1/

Test	Symbol	Conditions V_S = ±5.0 V, V_{CM} = 0 V unless otherwise specified	Temperature, T_A	Device type	Limits		Unit
					Min	Max	
Input capacitance, common mode	C_{INCM}		+25°C	01	6.25 typical		pF
Input capacitance, differential mode	C_{INDM}		+25°C	01	7.5 typical		pF
Input resistance, common mode	R_{IN}		+25°C	01	3.5 typical		GΩ
Input resistance, differential mode	R_{INDM}		+25°C	01	15 typical		MΩ
Output characteristics.							
High output voltage	V_{OH}	R_L = 600 Ω	+25°C	01	+3.7		V
					+3.9 typical		
		R_L = 2 kΩ	-55°C to +125°C		+3.8		
					+4.0 typical		
Low output voltage	V_{OL}	R_L = 600 Ω	+25°C	01		-3.7	V
					-3.8 typical		
		R_L = 2 kΩ	-55°C to +125°C			-3.8	
					-3.9 typical		
Output current	I_{OUT}		+25°C	01	±10 typical		mA
Power supply							
Power supply rejection ratio	PSRR	V_S = ±4 V to ±18 V	+25°C	01	110		dB
					130 typical		
Supply current per amplifier	I_{SY}	V_O = 0 V	+25°C	01		3.5	mA
					3 typical		
			-55°C to +125°C			4.2	

See footnote at end of table.

TABLE I. Electrical performance characteristics – Continued. 1/

Test	Symbol	Conditions $V_S = \pm 5.0$ V, $V_{CM} = 0$ V unless otherwise specified	Temperature, T_A	Device type	Limits		Unit
					Min	Max	
Dynamic performance							
Slew rate	SR	$R_L = 2$ kΩ	+25°C	01	4 typical		V/μs
Settling time	t_S	To 0.1%, 4 V step, G = 1	+25°C	01	1.4 typical		μs
		To 0.01%, 4 V step, G = 1			5.1 typical		
Gain bandwidth product	GBP		+25°C	01	10 typical		MHz
Noise performance							
Peak to peak noise	$e_{n\ p-p}$	0.1 Hz to 10 Hz	+25°C	01		100	nV p-p
					77 typical		
Voltage noise density	e_n	f = 1 kHz	+25°C	01		3.8	nV / $\sqrt{Hz}$
					2.8 typical		
Current noise density	i_n	f = 1 kHz	+25°C	01	0.3 typical		pA / $\sqrt{Hz}$
Channel separation	C_S	f = 1 kHz	+25°C	01	-130 typical		dB
		f = 10 kHz			-105 typical		

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							
Offset voltage	V_{OS}		+25°C	01		75	µV
					20 typical		
			-55°C to +125°C			125	
					30 typical		
Offset voltage drift	$\Delta V_{OS} / \Delta T$		-55°C to +125°C	01		0.8	µV / °C
					0.3 typical		
Input bias current	I_B		+25°C	01	-14	+14	nA
					+3 typical		
			+25°C to +125°C		-20	+20	
					+5 typical		
			-55°C to +125°C		-60	+60	
					+8 typical		
Input offset current	I_{OS}		+25°C	01	-14	+14	nA
					+6 typical		
			+25°C to +125°C		-20	+20	
					+6 typical		
			-55°C to +125°C		-60	+60	
					+8 typical		
Input voltage range	V_{INR}		+25°C	01	-12	+12	V
Common mode rejection ratio	CMRR	V_{CM} = -12 V to +12 V	+25°C	01	100		dB
					120 typical		
Large signal voltage gain	A_{VO}	$R_L = 2$ kΩ, V_O = -10 V to +10 V	+25°C	01	1000		V / mV
					6000 typical		

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 capacitance, common mode	C_{INCM}		+25°C	01	6.25 typical		pF
Input capacitance, differential mode	C_{INDM}		+25°C	01	7.5 typical		pF
Input resistance, common mode	R_{IN}		+25°C	01	3.5 typical		GΩ
Input resistance, differential mode	R_{INDM}		+25°C	01	15 typical		MΩ
Output characteristics.							
High output voltage	V_{OH}	$R_L = 600\ \Omega$	+25°C	01	+11		V
					+12.3 typical		
		$R_L = 2\ k\Omega$	-55°C to +125°C		+13.2		
					+13.8 typical		
Low output voltage	V_{OL}	$R_L = 600\ \Omega$	+25°C	01		-13.2	V
					-13.8 typical		
		$R_L = 2\ k\Omega$	-55°C to +125°C			-11	
					-12.4 typical		
Output current	I_{OUT}		+25°C	01	±20 typical		mA
Short circuit current	I_{SC}		+25°C	01	±30 typical		mA
Power supply							
Power supply rejection ratio	PSRR	$V_S = \pm 4$ V to ±18 V	+25°C	01	110		dB
					130 typical		
Supply current per amplifier	I_{SY}	$V_O = 0$ V	+25°C	01		3.5	mA
					3 typical		
			-55°C to +125°C			4.2	

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	$R_L = 2\ k\Omega$	+25°C	01	4 typical		V/μs
Settling time	t_S	To 0.1%, 10 V step, G = 1	+25°C	01	2.2 typical		μs
		To 0.01%, 10 V step, G = 1			6.3 typical		
Gain bandwidth product	GBP		+25°C	01	10 typical		MHz
Noise performance							
Peak to peak noise	en p-p	0.1 Hz to 10 Hz	+25°C	01		100	nV p-p
					77 typical		
Voltage noise density	e_n	f = 1 kHz	+25°C	01		3.8	nV / $\sqrt{Hz}$
					2.8 typical		
Current noise density	i_n	f = 1 kHz	+25°C	01	0.3 typical		pA / $\sqrt{Hz}$
Channel separation	C_S	f = 1 kHz	+25°C	01	-130 typical		dB
		f = 10 kHz			-105 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.

Case X

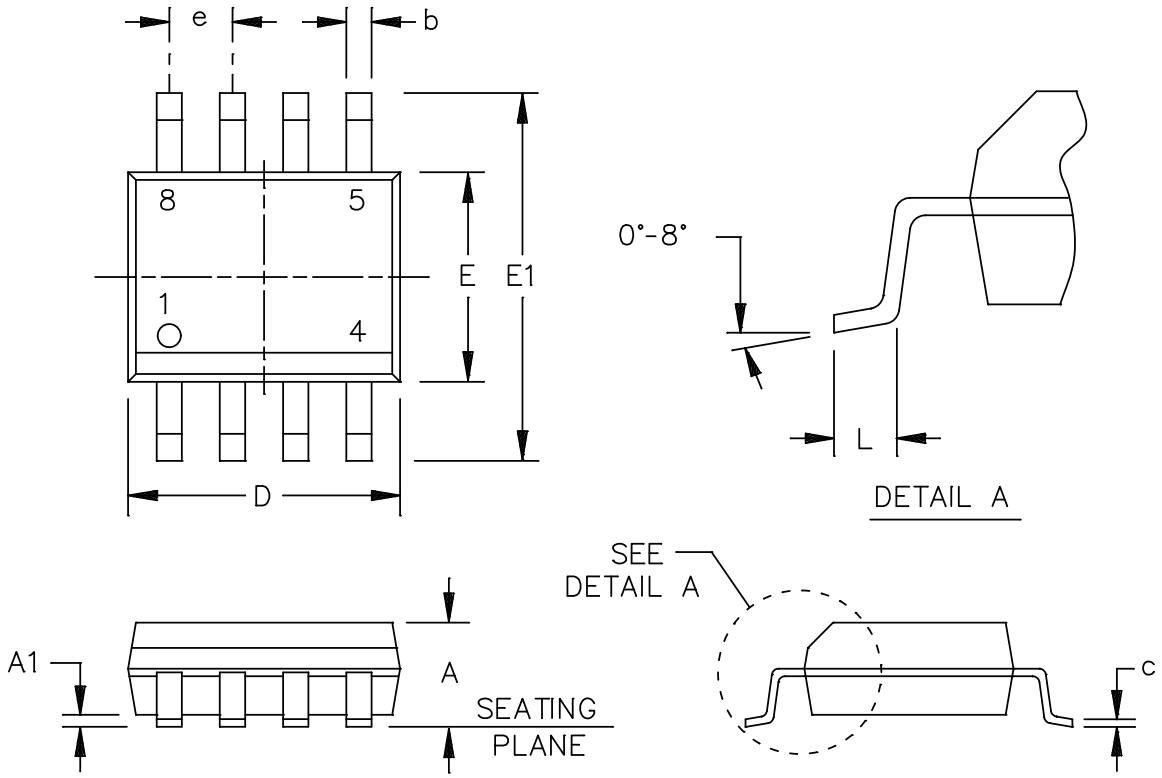

FIGURE 1. Case outline.

DLA LAND AND MARITIME COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/16603
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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	-VS
5	+INPUT B
6	-INPUT B
7	OUTPUT B
8	+VS

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
V62/16603-01XE	24355	Tube, 98 units	AD8672TRZ-EP
V62/16603-01XE	24355	Reel, 1,000 units	AD8672TRZ-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