REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Drawing updated to reflect current requirements. -ro	02-05-28	R. MONNIN
B	Update drawing as part of 5 year review. -rrp	09-05-18	J. RODENBECK

REV																			
SHEET																			
REV																			
SHEET																			

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

PMIC N/A

PREPARED BY
RICK C. OFFICER

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STANDARD MICROCIRCUIT DRAWING

THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS

AND AGENCIES OF THE DEPARTMENT OF DEFENSE

AMSC N/A

CHECKED BY
CHARLES E. BESORE

APPROVED BY
MICHAEL A. FRYE

DRAWING APPROVAL DATE
93-01-19

MICROCIRCUIT, LINEAR, HIGH SPEED, LOW POWER, OPERATIONAL AMPLIFIER, MONOLITHIC SILICON

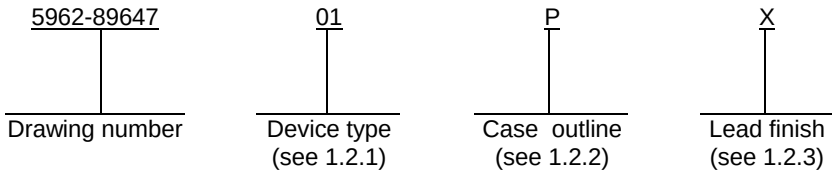
REVISION LEVEL	SIZE	CAGE CODE	
B	A	**67268**	**5962-89647**

SHEET 1 OF 11

1. SCOPE

1.1 Scope. This drawing describes device requirements for MIL-STD-883 compliant, non-JAN class level B microcircuits in accordance with MIL-PRF-38535, appendix A.

1.2 Part or Identifying Number (PIN). The complete PIN is as shown in the following example:



1.2.1 Device type(s). The device type(s) identify the circuit function as follows:

Device type	Generic number	Circuit function
01	AD847S	High speed, low power, operational amplifier

1.2.2 Case outline(s). The case outline(s) are as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
P	GDIP1-T8 or CDIP2-T8	8	Dual-in-line

1.2.3 Lead finish. The lead finish is as specified in MIL-PRF-38535, appendix A.

1.3 Absolute maximum ratings. (Unless otherwise specified, T_A = +25°C)

Positive supply voltage ($+V_S$) ..... +18 V dc
Negative supply voltage ($-V_S$) ..... -18 V dc
Differential input voltage ..... ±6.0 V dc
Input common mode voltage ..... $\pm V_S$
Junction temperature (T_J) ..... +175°C
Storage temperature range ..... -65°C to +150°C
Power dissipation (P_D) ..... 1.1 W 1/
Lead temperature (soldering, 10 seconds) ..... +300°C
Thermal resistance, junction-to-case (θ_{JC}) ..... See MIL-STD-1835
Thermal resistance, junction-to-ambient (θ_{JA}) ..... 110°C/W

1.4 Recommended operating conditions.

Positive supply voltage range ($+V_S$) ..... +4.5 V dc to +15 V dc
Negative supply voltage range ($-V_S$) ..... -4.5 V dc to -15 V dc
Common mode input voltage (V_{CM}) ..... ±12 V dc
Ambient operating temperature range(T_A) ..... -55°C to +125°C

1/ Derate linearity above T_A = +25°C at 7.3 mW/°C.

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbooks. The following specification, standards, and handbooks form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

MIL-PRF-38535 - Integrated Circuits, Manufacturing, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-1835 - Interface Standard Electronic Component Case Outlines.

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-103 - List of Standard Microcircuit Drawings.
MIL-HDBK-780 - Standard Microcircuit Drawings.

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with MIL-PRF-38535, appendix A for non-JAN class level B devices and as specified herein. Product built to this drawing that is produced by a Qualified Manufacturer Listing (QML) certified and qualified manufacturer or a manufacturer who has been granted transitional certification to MIL-PRF-38535 may be processed as QML product in accordance with the manufacturers approved program plan and qualifying activity approval in accordance with MIL-PRF-38535. This QML flow as documented in the Quality Management (QM) plan may make modifications to the requirements herein. These modifications shall not affect form, fit, or function of the device. These modifications shall not affect the PIN as described herein. A "Q" or "QML" certification mark in accordance with MIL-PRF-38535 is required to identify when the QML flow option is used.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535, appendix A and herein.

3.2.1 Case outline. The case outline shall be in accordance with 1.2.2 herein.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 1.

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall apply over the full ambient operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table I.

3.5 Marking. Marking shall be in accordance with MIL-PRF-38535, appendix A. The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked. For packages where marking of the entire SMD PIN number is not feasible due to space limitations, the manufacturer has the option of not marking the "5962-" on the device.

3.5.1 Certification/compliance mark. A compliance indicator “C” shall be marked on all non-JAN devices built in compliance to MIL-PRF-38535, appendix A. The compliance indicator “C” shall be replaced with a "Q" or "QML" certification mark in accordance with MIL-PRF-38535 to identify when the QML flow option is used.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits 2/		Unit
					Min	Max	
Input offset voltage	V_{IO}	V_{CM} = 0 V, V_S = ±5 V	1	01		±1.0	mV
			2,3			±4.0	
Input bias current	$+I_{IB}$	V_{CM} = 0 V, V_S = ±5 V, V_S = ±15 V	1	01		+5.0	µA
			2,3			+7.5	
	$-I_{IB}$		1			+5.0	
			2,3			+7.5	
Input offset current	I_{IO}	V_{CM} = 0 V, V_S = ±5 V, ±15 V	1	01		±300	nA
			2,3			±400	
Common mode input 3/ voltage range	+IVR	V_{CM} = +2.5 V, V_S = ±5 V	1,2,3	01		+2.5	V
	-IVR	V_{CM} = -2.5 V, V_S = ±5 V				-2.5	
	+IVR	V_{CM} = +12 V, V_S = ±15 V				+12	
	-IVR	V_{CM} = -12 V, V_S = ±15 V				-12	
Open loop gain	$+A_{VOL}$	V_{OUT} = +2.5 V, V_S = ±5 V, R_L = 500 Ω	1	01	2.0		V/mV
			2,3		1.0		
		V_{OUT} = +10 V, V_S = ±15 V, R_L = 1 kΩ	1		3.0		
			2,3		1.5		

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits 2/		Unit
					Min	Max	
Open loop gain	$-A_{VOL}$	V_{OUT} = -2.5 V,	1	01	2.0		V/mV
		V_S = ±5 V, R_L = 500 Ω	2,3		1.0		
		V_{OUT} = -10 V,	1		3.0		
		V_S = ±15 V, R_L = 1 kΩ	2,3		1.5		
Common mode rejection ratio	+CMRR	V_{CM} = +2.5 V, V_S = ±5 V	1	01	80		dB
		V_{CM} = +12 V, V_S = ±15 V	1		80		
			2,3		75		
	-CMRR	V_{CM} = -2.5 V, V_S = ±5 V	1		80		
		V_{CM} = -12 V, V_S = ±15 V	1		80		
			2,3		75		
Output current 4/	I_{OUT}	V_{OUT} = ±2.5 V, V_S = ±5 V, T_A = +25°C	4	01	13		mA
		V_{OUT} = ±10 V, V_S = ±15 V, T_A = +25°C			20		
Output voltage swing	$+V_{OUT}$	V_S = ±5 V, R_L = 500 Ω	1	01	+3.0		V
			2,3		+2.5		
		V_S = ±5 V, R_L = 150 Ω	1		+2.5		
		V_S = ±15 V, R_L = 1 kΩ	1,2,3		+12		
		V_S = ±15 V, R_L = 500 Ω	1		+10		

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits 2/		Unit
					Min	Max	
Output voltage swing	$-V_{OUT}$	$V_S = \pm5$ V, $R_L = 500\ \Omega$	1	01	-3.0		V
			2,3		-2.5		
		$V_S = \pm5$ V, $R_L = 150\ \Omega$	1		-2.5		
		$V_S = \pm15$ V, $R_L = 1$ kΩ	1,2,3		-12		
		$V_S = \pm15$ V, $R_L = 500\ \Omega$	1		-10		
Quiescent power supply current	I_{CC}	$V_{OUT} = 0$ V, $I_{OUT} = 0$ mA, $V_S = \pm5$ V	1	01		5.7	mA
			2,3			7.8	
		$V_{OUT} = 0$ V, $I_{OUT} = 0$ mA, $V_S = \pm15$ V	1			6.3	
			2,3			8.4	
Power supply rejection ratio	PSRR	$V_S = \pm5$ V to ±15 V	1	01	75		dB
			2,3		72		
Quiescent power consumption 5/	P_Q	$V_{OUT} = 0$ V, $I_{OUT} = 0$ mA, $V_S = \pm5$ V	1	01		57	mW
			2,3			78	
		$V_{OUT} = 0$ V, $I_{OUT} = 0$ mA, $V_S = \pm15$ V	1			189	
			2,3			252	
Differential input resistance 4/	R_{IN}	$V_{CM} = 0$ V, $T_A = +25°C$, $V_S = \pm5$ V, ±15 V	4	01	80		kΩ

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits 2/		Unit
					Min	Max	
Slew rate 4/ 6/	+SR	V_{OUT} = -2.5 V to +2.5 V, R_L = 500 Ω, A_V = 1 V/V, V_S = ±5 V, measured from 10 % to 90 % point, rising edge	4	01	120		V/µs
			5,6		90		
	-SR	V_{OUT} = +2.5 V to -2.5 V, R_L = 500 Ω, A_V = 1 V/V, V_S = ±5 V, measured from 90 % to 10 % point, falling edge	4		90		
			5,6		65		
	+SR	V_{OUT} = -5 V to +5 V, R_L = 1 kΩ, A_V = 1 V/V, V_S = ±15 V, measured from 10 % to 90 % point, rising edge	4		200		
			5,6		130		
	-SR	V_{OUT} = +5 V to -5 V, R_L = 1 kΩ, A_V = 1 V/V, V_S = ±15 V, measured from 90 % to 10 % point, falling edge	4		145		
			5,6		120		
Gain bandwidth product 4/	GBWP	V_{OUT} = ±100 mV, R_L = 500 Ω, V_S = ±5 V, T_A = +25°C	4	01	25		MHz
		V_{OUT} = ±100 mV, R_L = 1 kΩ, V_S = ±15 V, T_A = +25°C			40		
Full power bandwidth 4/ 7/	FPBW	V_{PK} = 2.5 V, R_L = 500 Ω, V_S = ±5 V, T_A = +25°C	4	01	5.7		MHz
		V_{PK} = 10 V, R_L = 1 kΩ, V_S = ±15 V, T_A = +25°C			2.8		
Closed loop stable gain 4/	CLSG	V_S = ±5 V, ±15 V, R_L = 1 kΩ	4,5,6	01	1.0		V/V

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions 1/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits 2/		Unit
					Min	Max	
Rise time 4/ 8/	t_r	V_{OUT} = 0 V to +200 mV, A_V = +1, R_L = 1 kΩ, V_S = ±15 V	4,5,6	01		10	ns
Fall time 4/ 8/	t_f	V_{OUT} = 0 V to -200 mV, A_V = +1, R_L = 1 kΩ, V_S = ±15 V	4,5,6	01		10	ns
Settling time 4/	t_s	A_V = -1 V/V, R_L = 1 kΩ, V_S = ±15 V, T_A = +25°C, 10 V step at 0.1% of the fixed value	4	01		150	ns
		A_V = -1 V/V, R_L = 1 kΩ, V_S = ±15 V, T_A = +25°C, 10 V step at 0.01% of the fixed value				200	
Overshoot 4/	+OS	V_{OUT} = 0 V to +200 mV, A_V = +1, R_L = 1 kΩ, V_S = ±15 V, T_A = +25°C	4	01		30	%
	-OS	V_{OUT} = 0 V to -200 mV, A_V = +1, R_L = 1 kΩ, V_S = ±15 V, T_A = +25°C				30	

1/ Unless otherwise specified, for dc tests, $R_S < 100\ \Omega$, $R_L > 100$ kΩ, V_{OUT} = 0 V, and $C_L \le 10$ pF.
Unless otherwise specified, for ac tests, A_V = ±1 V/V, R_L = 1 kΩ, and $C_L \le 10$ pF.

2/ The limiting terms "min" (minimum) and "max" (maximum) shall be considered to apply to magnitudes only. Negative current shall be defined as conventional current flow out of a device terminal.

3/ This test is guaranteed by testing CMRR.

4/ If not tested, shall be guaranteed to the limits specified in table I herein.

5/ Quiescent power consumption is based on quiescent supply current test maximum (no load at the output).

6/ Slew rate test limits are guarantee after 5 minutes of warm-up.

7/ Full power bandwidth = SR / (2 x π x V_{PK}).

8/ Rise and fall times measured between 10 percent and 90 percent point.

Device type	01
Case outline	P
Terminal number	Terminal symbol
1	NULL
2	-INPUT
3	+INPUT
4	$-V_S$
5	NC
6	OUTPUT
7	$+V_S$
8	NULL

NC = No connection

FIGURE 1. Terminal connections.

3.6 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-HDBK-103 (see 6.6 herein). The certificate of compliance submitted to DSCC-VA prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-PRF-38535, appendix A and the requirements herein.

3.7 Certificate of conformance. A certificate of conformance as required in MIL-PRF-38535, appendix A shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change. Notification of change to DSCC-VA shall be required for any change that affects this drawing.

3.9 Verification and review. DSCC, DSCC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38535, appendix A.

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition B. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1015 of MIL-STD-883.

(2) T_A = +125°C, minimum.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

a. Tests shall be as specified in table II herein.

b. Subgroups 7, 8, 9, 10, and 11 in table I, method 5005 of MIL-STD-883 shall be omitted.

4.3.2 Groups C and D inspections.

a. End-point electrical parameters shall be as specified in table II herein.

b. Steady-state life test conditions, method 1005 of MIL-STD-883.

(1) Test condition B. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1005 of MIL-STD-883.

(2) T_A = +125°C, minimum.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (in accordance with MIL-STD-883, method 5005, table I)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004)	1*,2,3,4,5,6
Group A test requirements (method 5005)	1,2,3,4,5,6
Groups C and D end-point electrical parameters (method 5005)	1,2,3

* PDA applies to subgroup 1.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38535, appendix A.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished using DD Form 1692, Engineering Change Proposal.

6.4 Record of users. Military and industrial users shall inform Defense Supply Center Columbus (DSCC) when a system application requires configuration control and the applicable SMD. DSCC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronics devices (FSC 5962) should contact DSCC-VA, telephone (614) 692-0544.

6.5 Comments. Comments on this drawing should be directed to DSCC-VA, Columbus, Ohio 43218-3990, or telephone (614) 692-0547

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-HDBK-103. The vendors listed in MIL-HDBK-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DSCC-VA.

STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 09-05-18

Approved sources of supply for SMD 5962-89647 are listed below for immediate acquisition information only and shall be added to MIL-HDBK-103 and QML-38535 during the next revision. MIL-HDBK-103 and QML-38535 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DSCC-VA. This information bulletin is superseded by the next dated revision of MIL-HDBK-103 and QML-38535. DSCC maintains an online database of all current sources of supply at http://www.dscc.dla.mil/Programs/Smcr/ .

Standard microcircuit drawing PIN 1/	Vendor CAGE number	Vendor similar PIN 2/
5962-8964701PA	24355	AD847SQ/883

1/ The lead finish shown for each PIN representing a hermetic package is the most readily available from the manufacturer listed for that part. If the desired lead finish is not listed contact the vendor to determine its availability.

2/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

Vendor CAGE number	Vendor name and address
24355	Analog Devices Route 1 Industrial Park P.O. Box 9106 Norwood, MA 02062 Point of contact: 804 Woburn Street Wilmington, MA 01887-3462

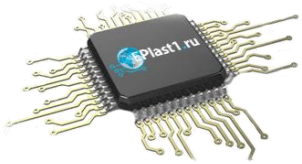
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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Электронная почта: org@eplast1.ru
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.