

### 1.0 SCOPE

This specification documents the detail requirements for space qualified product manufactured on Analog Devices, Inc.'s QML certified line per MIL-PRF-38535 Level V except as modified herein. The manufacturing flow described in the STANDARD SPACE LEVEL PRODUCTS PROGRAM brochure is to be considered a part of this specification. <http://www.analog.com/aerospace>. This data sheet specifically details the space grade version of this product. A more detailed operational description and a complete data sheet for commercial product grades can be found at [www.analog.com/AD847](http://www.analog.com/AD847).

### 2.0 Part Number. The complete part number(s) of this specification follow:

Part Number	Description
AD847-703Q	High speed, low power, operational amplifier

### 2.1 Case Outline.

Letter	Descriptive designator	Case Outline (Lead Finish per MIL-PRF-38535)
Q	GDIP1-T8	8-Lead ceramic dual-in-line package (CERDIP)

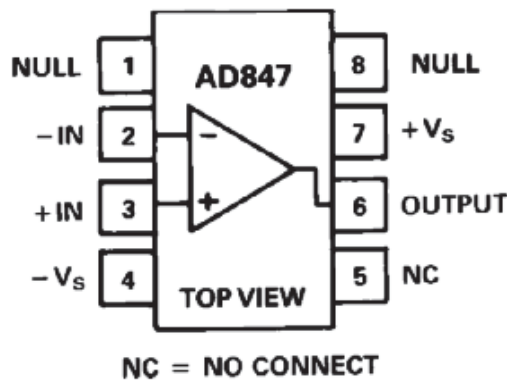


Figure 1 - Terminal connections.

# AD847S\* PRODUCT PAGE QUICK LINKS

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## COMPARABLE PARTS

View a parametric search of comparable parts.

## DOCUMENTATION

### Data Sheet

- AD847S: High Speed, Low Power, Operational Amplifier Aerospace Data Sheet

## DESIGN RESOURCES

- AD847S Material Declaration
- PCN-PDN Information
- Quality And Reliability
- Symbols and Footprints

## DISCUSSIONS

View all AD847S EngineerZone Discussions.

## SAMPLE AND BUY

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## TECHNICAL SUPPORT

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## DOCUMENT FEEDBACK

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**3.0 Absolute Maximum Ratings.** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)

Supply voltage.....	$\pm 18\text{V}$
Differential input voltage.....	$\pm 6\text{V}$
Input common mode voltage.....	$\pm V_S$
Operating temperature range.....	$-55^\circ\text{C}$ to $+125^\circ\text{C}$
Storage temperature range .....	$-65^\circ\text{C}$ to $+150^\circ\text{C}$
Power dissipation ( $P_D$ ) .....	1.1W
Lead temperature (soldering, 10 seconds) .....	$+300^\circ\text{C}$
Thermal resistance, junction-to-case ( $\Theta_{JC}$ ) .....	See MIL-STD-1835
Thermal resistance, junction-to-ambient ( $\Theta_{JA}$ ) .....	$110^\circ\text{C/W}$
Junction temperature ( $T_J$ ) .....	$+175^\circ\text{C}$

**4.0 Electrical Table:** See notes at end of table

Table I						
Parameter	Symbol	Conditions 1/	Sub-group	2/ Min	2/ Max	Units
Input offset voltage	$V_{IO}$		1		$\pm 1.0$	mV
			2, 3		$\pm 4.0$	
Input bias current	$I_B$	$V_S = \pm 5\text{V}, \pm 15\text{V}$	1		5.0	$\mu\text{A}$
			2, 3		7.5	
Input offset current	$I_{IO}$		1		$\pm 300$	nA
			2, 3		$\pm 400$	
Common mode input voltage range 3/	IVR	$V_S = \pm 15\text{V}$	1, 2, 3		$\pm 2.5$	V
			1, 2, 3		$\pm 12$	
Open loop gain	AVO	$V_{OUT} = \pm 2.5\text{V}, R_L = 500\Omega$	1	2.0		V/mV
			2, 3	1.0		
		$V_{OUT} = \pm 10\text{V}, R_L = 1\text{k}\Omega, V_S = \pm 15\text{V}$	1	3.0		
			2, 3	1.5		
Common mode rejection ratio	CMRR	$V_{CM} = \pm 2.5\text{V}$ $V_{CM} = \pm 12\text{V}, V_S = \pm 15\text{V}$	1	80		dB
			1	80		
			2, 3	75		
Output current 4/	$I_{OUT}$	$V_{OUT} = \pm 2.5\text{V}$ $V_{OUT} = \pm 10\text{V}, V_S = \pm 15\text{V}$	4	13		mA
			4	20		
Output voltage swing	+ $V_{OUT}$	$R_L = 500\Omega$	1	3.0		V
			2, 3	2.5		
		$R_L = 150\Omega$	1	2.5		
		$V_S = \pm 15\text{V}, R_L = 1\text{k}\Omega$	1, 2, 3	12		
		$V_S = \pm 15\text{V}, R_L = 500\Omega$	1	10		
	- $V_{OUT}$	$R_L = 500\Omega$	1	-3.0		
			2, 3	-2.5		
		$R_L = 150\Omega$	1	-2.5		
		$V_S = \pm 15\text{V}, R_L = 1\text{k}\Omega$	1, 2, 3	-12		
		$V_S = \pm 15\text{V}, R_L = 500\Omega$	1	-10		
Quiescent power supply current	$I_{CC}$		1		5.7	mA
			2, 3		7.8	
			1		6.3	
			2, 3		8.4	
Power supply rejection ratio	PSRR	$V_S = \pm 5\text{V}$ to $\pm 15\text{V}$	1	75		dB
			2, 3	72		
Differential input resistance 4/	$R_{IN}$	$V_S = \pm 5\text{V}, \pm 15\text{V}$	4	80		$\text{k}\Omega$
Slew rate 6/ 4/	+SR	$V_{OUT} = -2.5\text{V}$ to $+2.5\text{V}, R_L = 500\text{k}\Omega,$ $A_V = 1\text{V/V}$ Measured from 10% to 90%	4	120		$\text{V}/\mu\text{S}$
			5, 6	90		
	-SR	$V_{OUT} = +2.5\text{V}$ to $-2.5\text{V}, R_L = 500\text{k}\Omega,$ $A_V = 1\text{V/V}$ Measured from 10% to 90%	4	90		
			5, 6	65		

Table I						
Parameter	Symbol	Conditions <u>1/</u>	Sub-group	<u>2/</u> Min	<u>2/</u> Max	Units
	+SR	$V_{OUT} = -5V \text{ to } +5V, R_L = 1K\Omega, V_S = \pm 15V$	4	200		
		Measured from 10% to 90%	5, 6	130		
	-SR	$V_{OUT} = +5V \text{ to } -5V, R_L = 1K\Omega, V_S = \pm 15V$	4	145		
		Measured from 10% to 90%	5, 6	120		
Gain bandwidth product <u>4/</u>	GBWP	$V_{OUT} = \pm 100mV, R_L = 500\Omega$	4	25		MHz
		$V_{OUT} = \pm 100mV, R_L = 1K\Omega, V_S = \pm 15V$		40		
Full power bandwidth <u>4/</u>	FPBW	$V_{PK} = 2.5V, R_L = 500\Omega$	4	5.7		
		$V_{PK} = 10V, R_L = 1K\Omega, V_S = \pm 15V$		2.8		
Closed loop stable gain <u>4/</u>	CLSG	$R_L = 1K\Omega, V_S = \pm 5V, \pm 15V$	4, 5, 6	1.0		V/V
Rise time <u>4/</u> <u>8/</u>	$r_r$	$V_{OUT} = 0V \text{ to } +200mV, A_V = +1, R_L = 1K\Omega, V_S = \pm 15V$	4, 5, 6		10	nS
	$t_f$	$V_{OUT} = 0V \text{ to } -200mV, A_V = +1, R_L = 1K\Omega, V_S = \pm 15V$	4, 5, 6		10	
Settling time <u>4/</u>	$t_s$	$A_V = -1V/V, 10V \text{ step at } 0.1\% \text{ of the fixed value, } R_L = 1K\Omega$			150	
		$A_V = -1V/V, 10V \text{ step at } 0.01\% \text{ of the fixed value, } R_L = 1K\Omega$			200	
Overshoot <u>4/</u>	+OS	$V_{OUT} = 0V \text{ to } +200mV, A_V = +1, R_L = 1K\Omega, V_S = \pm 15V$	4		30	%
	-OS	$V_{OUT} = 0V \text{ to } -200mV, A_V = +1, R_L = 1K\Omega, V_S = \pm 15V$	4		30	

## TABLE I NOTES:

- 1/ Unless otherwise specified for dc tests,  $V_S = \pm 5V, R_S < 100\Omega, R_L > 100k\Omega, V_{OUT} = 0V$ , and  $C_L \leq 10pF$ . Unless otherwise specified for ac tests,  $A_V = \pm 1 V/V, R_L = 1k\Omega$ , and  $C_L = 10pF$ .
- 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 parameter is guaranteed by CMRR test.
- 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 =  $SR/(2\pi V_{PK})$ .
- 8/ Rise and fall times measured between 10% and 90% point.

**4.1 Electrical Test Requirements:**

Table II	
Test Requirements	Subgroups (in accordance with MIL-PRF-38535, Table III)
Interim Electrical Parameters	1
Final Electrical Parameters	1, 2, 3, 4, 5, 6 <u>1/</u> <u>2/</u>
Group A Test Requirements	1, 2, 3, 4, 5, 6
Group C end-point electrical parameters	1 <u>2/</u>
Group D end-point electrical parameters	1
Group E end-point electrical parameters	1

1/ PDA applies to Subgroup 1. Delta's excluded from PDA.  
2/ See Table III for delta parameters. See table I for conditions.

**4.1 Table III. Burn-in test delta limits.**

Table III				
TEST TITLE	BURN-IN ENDPOINT	LIFETEST ENDPOINT	DELTA LIMIT	UNITS
V <sub>OS</sub>	±1	±1.5	±0.5	mV
±I <sub>B</sub>	5	7.5	2.5	uA
I <sub>IO</sub>	±300	±500	±200	nA

**5.0 Life Test/Burn-In Circuit:**

- 5.1 HTRB is not applicable for this drawing.
- 5.2 Burn-in is per MIL-STD-883 Method 1015 test condition B.
- 5.3 Steady state life test is per MIL-STD-883 Method 1005.

Rev	Description of Change	Date
A	Initiate	7/20/2000
B	Update web address	2/7/2002
C	Update web address. Delete Burn-In circuit.	6/20/2003
D	Update header/footer & add to 1.0 scope description.	2/25/2008
E	Remove obsolete product and update ASD to Analog Standard	11/30/2011
F	Correct typo in Table 3 section 4.1 *A to uA.	06/29/2012

