



MICROCIRCUIT DATA SHEET

MJLM747A-X REV OBL

Original Creation Date: 08/07/95
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DUAL OPERATIONAL AMPLIFIER

Industry Part Number

LM747A

Prime Die

LM747

NS Part Numbers

JL747BCA
JL747BDA
JL747BIA
JL747SCA
JL747SDA
JL747SIA

Controlling Document

38510/10102, AMEND. 2 REV G

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (°C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55

Electrical Characteristics

DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
 DC: $V_{cc} = \pm 20V$, $V_{cm} = 0$, $R_s = 0$

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS		
Vio	Input Offset Voltage	$+V_{cc} = 35V$, $-V_{cc} = -5V$, $V_{cm} = -15V$			-3	3	mV	1		
					-4	4	mV	2, 3		
		$+V_{cc} = 5V$, $-V_{cc} = -35V$, $V_{cm} = +15V$			-3	3	mV	1		
					-4	4	mV	2, 3		
					-3	3	mV	1		
					-4	4	mV	2, 3		
		$+V_{cc} = 5V$, $-V_{cc} = -5V$			-3	3	mV	1		
					-4	4	mV	2, 3		
		Iio	Input Offset Current	$+V_{cc} = 35V$, $-V_{cc} = -5V$, $V_{cm} = -15V$, $R_s = 100K$ Ohms	1		-30	30	nA	1, 2
					1		-70	70	nA	3
$+V_{cc} = 5V$, $-V_{cc} = -35V$, $V_{cm} = 15V$, $R_s = 100K$ Ohms	1				-30	30	nA	1, 2		
	1				-70	70	nA	3		
$R_s = 100K$ Ohms	1				-30	30	nA	1, 2		
	1				-70	70	nA	3		
$+V_{cc} = 5V$, $-V_{cc} = -5V$, $R_s = 100K$ Ohms	1				-30	30	nA	1, 2		
	1				-70	70	nA	3		
+Iib	Input Bias Current			$+V_{cc} = 35V$, $-V_{cc} = -5V$, $V_{cm} = -15V$, $R_s = 100K$ Ohms	1, 2		-0.1	110	nA	1, 2
					1, 2		-0.1	265	nA	3
		$+V_{cc} = 5V$, $-V_{cc} = -35V$, $V_{cm} = 15V$, $R_s = 100K$ Ohms	1, 2		-0.1	110	nA	1, 2		
			1, 2		-0.1	265	nA	3		
		$R_s = 100K$ Ohms	1, 2		-0.1	110	nA	1, 2		
			1, 2		-0.1	265	nA	3		
		$+V_{cc} = 5V$, $-V_{cc} = -5V$, $R_s = 100K$ Ohms	1, 2		-0.1	110	nA	1, 2		
			1, 2		-0.1	265	nA	3		

Electrical Characteristics

DC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: $V_{cc} = \pm 20V$, $V_{cm} = 0$, $R_s = 0$

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
-I _{ib}	Input Bias Current	+V _{cc} = 35V, -V _{cc} = -5V, V _{cm} = -15V, R _s = 100K Ohms	1, 2		-0.1	110	nA	1, 2
			1, 2		-0.1	265	nA	3
		+V _{cc} = 5V, -V _{cc} = -35V, V _{cm} = 15V, R _s = 100K Ohms	1, 2		-0.1	110	nA	1, 2
			1, 2		-0.1	265	nA	3
		R _s = 100K Ohms	1, 2		-0.1	110	nA	1, 2
			1, 2		-0.1	265	nA	3
+V _{cc} = 5V, -V _{cc} = -5V, R _s = 100K Ohms	1, 2		-0.1	110	nA	1, 2		
	1, 2		-0.1	265	nA	3		
+PSRR	Power Supply Rejection Ratio	+V _{cc} = 10V, -V _{cc} = -20V			-50	50	uV/V	1
					-100	100	uV/V	2, 3
-PSRR	Power Supply Rejection Ratio	+V _{cc} = 20V, -V _{cc} = -10V			-50	50	uV/V	1
					-100	100	uV/V	2, 3
CMR	Common Mode Rejection Ratio	V _{cm} = -15V to +15V, ±V _{cc} = ±5V to ±35V			80		dB	1, 2, 3
V _{io} (adj+)	Adjustment for Input Offset Voltage		7		5		mV	1, 2, 3
V _{io} (adj-)	Adjustment for Input Offset Voltage		7			-5	mV	1, 2, 3
I _{os} +	Output Short Circuit Current	+V _{cc} = 15V, -V _{cc} = -15V, t ≤ 25mS			-60		mA	1, 2, 3
I _{os} -	Output Short Circuit Current	+V _{cc} = 15V, -V _{cc} = -15V, t ≤ 25mS				60	mA	1, 2, 3
I _{cc}	Supply Current	+V _{cc} = 15V, -V _{cc} = -15V				7.6	mA	1
						6.8	mA	2
						8.4	mA	3
Delta V _{io} /Delta T	Temperature Coefficient of Input Offset Voltage	+25 C ≤ TA ≤ 125 C	3		-15	15	uV/°C	2
		-55 C ≤ TA ≤ 25 C	3		-15	15	uV/°C	3
Delta I _{io} /Delta T	Temperature Coefficient of Input Offset Current	+25 C ≤ TA ≤ 125 C	3		-200	200	pA/°C	2
		-55 C ≤ TA ≤ 25 C	3		-500	500	pA/°C	3

Electrical Characteristics

DC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: $V_{cc} = \pm 20V$, $V_{cm} = 0$, $R_s = 0$

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
+Vop	Output Voltage Swing	$R_l = 10K \text{ Ohms}$, $V_{cm} = -20V$			16		V	4, 5, 6
		$R_l = 2K \text{ Ohms}$, $V_{cm} = -20V$			15		V	4, 5, 6
-Vop	Output Voltage Swing	$R_l = 10K \text{ Ohms}$, $V_{cm} = 20V$				-16	V	4, 5, 6
		$R_l = 2K \text{ Ohms}$, $V_{cm} = 20V$				-15	V	4, 5, 6
+Avs	Large Signal (Open Loop) Voltage Gain	$R_l = 2K \text{ Ohms}$, $V_{out} = +15V$	4		50		V/mV	4
			4		25		V/mV	5, 6
		$R_l = 10K \text{ Ohms}$, $V_{out} = +15V$	4		50		V/mV	4
			4		25		V/mV	5, 6
-Avs	Large Signal (Open Loop) Voltage Gain	$R_l = 2K \text{ Ohms}$, $V_{out} = -15V$	4		50		V/mV	4
			4		25		V/mV	5, 6
		$R_l = 10K \text{ Ohms}$, $V_{out} = -15V$	4		50		V/mV	4
			4		25		V/mV	5, 6
Avs	Large Signal (Open Loop) Voltage Gain	$+V_{cc} = 5V$, $-V_{cc} = -5V$, $R_l = 2K \text{ Ohms}$, $V_{out} = \pm 2V$	4		10		V/mV	4, 5, 6
		$+V_{cc} = 5V$, $-V_{cc} = -5V$, $R_l = 10K \text{ Ohms}$, $V_{out} = \pm 2V$	4		10		V/mV	4, 5, 6
Vio	Temperature Coefficient Screen		8			1.9	mV	
Iio	Temperature Coefficient Screen		8			50	nA	
+Iib(a)	Temperature Coefficient Screen		8			43	nA	
+Iib(b)	Temperature Coefficient Screen		8			33	nA	
+Iib(c)	Temperature Coefficient Screen		8			38	nA	
+Iib(d)	Temperature Coefficient Screen		8			34	nA	

Electrical Characteristics

DC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: $V_{cc} = \pm 20V$, $V_{cm} = 0$, $R_s = 0$

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
-Iib(a)	Temperature Coefficient Screen		8			43	nA	
-Iib(b)	Temperature Coefficient Screen		8			33	nA	
-Iib(c)	Temperature Coefficient Screen		8			38	nA	
-Iib(d)	Temperature Coefficient Screen		8			34	nA	
+PSRR	Temperature Coefficient Screen		8			18	uV	
-PSRR	Temperature Coefficient Screen		8			18	uV	

AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: $V_{cc} = \pm 20V$, $V_{cm} = 0$, $R_s = 0$

TR(tr)	Transient Response: Rise Time	$A_v = 1$, $V_{in} = 50mV$	5			800	nS	7, 8A, 8B
TR(os)	Transient Response: Overshoot	$A_v = 1$, $V_{in} = 50mV$	5			25	%	7, 8A, 8B
Sr(+)	Slew Rate: Rise Time	$A_v = 1$, $V_{in} = -5V$ to $+5V$			0.3		V/uS	7, 8A, 8B
Sr(-)	Slew Rate: Fall Time	$A_v = 1$, $V_{in} = +5V$ to $-5V$			0.3		V/uS	7, 8A, 8B
Cs	Channel Separation		6		80		dB	7
NI(BB)	Noise Broadband	$B_w = 10Hz$ to $5KHz$, $R_s = 0$ Ohms	6			15	uVrms	7
NI(PC)	Noise Popcorn	$B_w = 10Hz$ to $5KHz$, $R_s = 20K$ Ohms	6			40	uVpk	7

Electrical Characteristics

DC PARAMETERS: DRIFT VALUES

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: $V_{cc} = \pm 20V$, $V_{cm} = 0$, $R_s = 0$. "Delta calculations performed on JAN S and QMLV devices at group B, subgroup 5 only".

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Vio	Input Offset Voltage				-0.5	0.5	mV	1
+Iib	Input Bias Current	$R_s = 100K$ Ohms			-12	12	nA	1
-Iib	Input Bias Current	$R_s = 100K$ Ohms			-12	12	nA	1

Note 1: S/S $R_s = 20K$ Ohms, tested at $R_s = 100K$ Ohms for better resolution.

Note 2: Room & Hot limits exceed S/S limits of 110nA MAX. Change made to improve system accuracy at lower Iib measurements.

Note 3: Calculated parameter.

Note 4: Datalog reading in K = V/mV.

Note 5: Bench test.

Note 6: Test on A360, J273 AC or bench test.

Note 7: Tested for DIPS and FLATS only.

Note 8: Temp. Co. Screen will datalog only in MODE 2 = 1.