Low Power Video Difference Amplifier

DESCRIPTION

The LT1187M/883 is a difference amplifier optimized for operation on ±5V, or a single 5V supply, and gain ≥2. This versatile amplifier features uncommitted high input impedance (+) and (–) inputs, and can be used in differential or single-ended configurations. Additionally, a second set of inputs give gain adjustment and DC control to the difference amplifier.

The LT1187M/883's high slew rate, 165V/µs, wide bandwidth, 50MHz, and ±20mA output current require only 13mA of supply current. The shutdown feature reduces the power dissipation to a mere 15mW, and allows multiple amplifiers to drive the same cable.

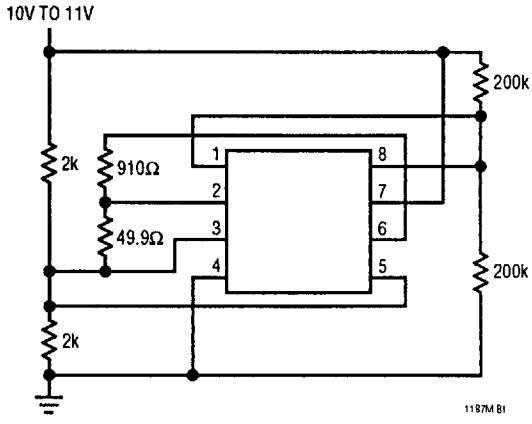
The LT1187M/883 is a low power version of the popular LT1193. For applications with gains of 10 or more, see the LT1189 data sheet.

The device is processed to the requirements of MIL-STD-883 Class B to yield circuits usable in precision military applications.

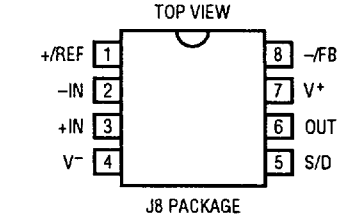
ABSOLUTE MAXIMUM RATINGS

Total Supply Voltage (V^+ to V^-) 18V
Differential Input Voltage ..... ±6V
Input Voltage ..... $\pm V_S$
Output Short Circuit Duration (Note 1) ..... Continuous
Operating Temperature Range ..... –55°C to 150°C
Junction Temperature (Note 2) ..... 175°C
Storage Temperature Range ..... –65°C to 150°C
Lead Temperature (Soldering, 10 sec) ..... 300°C

BURN-IN CIRCUIT



PACKAGE/ORDER INFORMATION



J8 PACKAGE
8-LEAD HERMETIC DIP

T_{JMAX} = 175°C, θ_{JA} = 100°C/W

ORDER PART NUMBER
LT1187MJ8/883
PART MARKINGS†
LT1187MJ8/883C

† The suffix letter "C" of the part mark indicates compliance per MIL-STD-883, para 1.2.1.1.

TABLE 1: ELECTRICAL CHARACTERISTICS

$V_S = \pm 5V$, $V_{REF} = 0V$, $R_{FB1} = 900\Omega$ from pins 6 to 8, $R_{FB2} = 100\Omega$ from pin 8 to ground, $R_L = R_{FB1} + R_{FB2} = 1k$, $C_L \leq 10pF$, pin 5 open, unless otherwise noted. (Note 3)

SYMBOL	PARAMETER	CONDITIONS	NOTES	$T_A = 25°C$ MIN	$T_A = 25°C$ MAX	SUB-GROUP	$-55°C \leq T_A \leq 125°C$ MIN	$-55°C \leq T_A \leq 125°C$ MAX	SUB-GROUP	UNITS
V_{OS}	Input Offset Voltage	Either Input	4		10	1		15	2,3	mV
I_{OS}	Input Offset Current	Either Input			1.0	1		1.5	2,3	µA
I_B	Input Bias Current	Either Input			±2.0	1		±3.5	2,3	µA
CMRR	Common-Mode Rejection Ratio	$V_{CM} = -2.5V$ to 3.5V		70		1	70		2,3	dB
PSRR	Power Supply Rejection Ratio	$V_S = \pm 2.375V$ to ±8V		70		1	60		2,3	dB
V_{OUT}	Output Voltage Swing	$V_S = \pm 5V$, $R_L = 1k$, $A_V = 50$		±3.8		4	±3.7		5,6	V
		$V_S = \pm 8V$, $R_L = 1k$, $A_V = 50$		±6.7		4	±6.6		5,6	V
		$V_S = \pm 8V$, $R_L = 300\Omega$, $A_V = 50$	3	±6.4		4	±6.4		5,6	V
G_E	Gain Error	$V_O = \pm 1V$, $A_V = 10$, RL = 1k			1.0	4		1.0	5,6	%
SR	Slew Rate	$A_V = -1$, $R_L = 1k$	6,10	100		7				V/µs
t_r, t_f	Rise Time, Fall Time	$A_V = 50$, $V_{OUT} = \pm 1.5V$, 20% to 80%	10	150	325	10				ns
I_S	Supply Current				16	1		17	2,3	mA
	Shutdown Supply Current	Pin 5 at V^-			1.5	1		1.5	2,3	mA
$I_{S/D}$	Shutdown Pin Current	Pin 5 at V^-			25	1		25	2,3	µA

$V_S^+ = 5V$, $V_S^- = 0V$, $V_{REF} = 2.5V$, $R_{FB1} = 900\Omega$ from pins 6 to 8, $R_{FB2} = 100\Omega$ from pin 8 to V_{REF}, $R_L = R_{FB1} + R_{FB2} = 1k$, $C_L \leq 10pF$, pin 5 open, unless otherwise noted. (Note 3)

SYMBOL	PARAMETER	CONDITIONS	NOTES	$T_A = 25°C$ MIN	$T_A = 25°C$ MAX	SUB-GROUP	UNITS
V_{OS}	Input Offset Voltage	Either Input	4		10	1	mV
I_{OS}	Input Offset Current	Either Input			1.0	1	µA
I_B	Input Bias Current	Either Input			±2.0	1	µA
CMRR	Common-Mode Rejection Ratio	$V_{CM} = 2V$ to 3.5V		70		1	dB
V_{OUT}	Output Voltage Swing	$R_L = 300\Omega$ to Ground					
		V_{OUT} High	3	3.6		4	V
		V_{OUT} Loo	3		0.4	4	V
I_S	Supply Current				15	1	mA
	Shutdown Supply Current	Pin 5 at V^-			1.5	1	mA
$I_{S/D}$	Shutdown Pin Current	Pin 5 at V^-			25	1	µA

TABLE 1: ELECTRICAL CHARACTERISTICS

Note 1: A heat sink may be required to keep the junction temperature below absolute maximum when the output is shorted continuously.

Note 2: T_J is calculated from the ambient temperature T_A and power dissipation P_D according to the following formula:

$$T_J = T_A + (P_D \times 100°C/W)$$

Note 3: When R_L = 1k is specified, the load resistor is $R_{FB1} + R_{FB2}$, but when R_L = 300Ω is specified, then an additional 430Ω is added to the output such that ($R_{FB1} + R_{FB2}$) in parallel with 430Ω is R_L = 300Ω.

Note 4: V_{OS} measured at the output (pin 6) is the contribution from both input pair, and is input referred.

Note 5: $V_{IN\ LIM}$ is the maximum voltage between $-V_{IN}$ and $+V_{IN}$ (pin 2 and pin 3) for which the output can respond.

Note 6: Slew rate is measured between ±0.5V on the output, with a V_{IN} step of ±0.75V, A_V = 3 and R_L = 1k.

Note 7: Full power bandwidth is calculated from the slew rate measurement: FPBW = SR/2πVp.

Note 8: Settling time measurement techniques are shown in "Take the Guesswork Out of Settling Time Measurements," *EDN*, September 19, 1985.

Note 9: NTSC (3.58MHz).

Note 10: AC parameters are 100% tested.

Note 11: See Application section in the standard data sheet for shutdown at elevated temperatures. Do not operate shutdown above T_J > 125°C.

TABLE 2: ELECTRICAL TEST REQUIREMENTS

MIL-STD-883 TEST REQUIREMENTS	SUBGROUP
Final Electrical Test Requirements (Method 5004)	1*,2,3,4,5,6,7,10
Group A Test Requirements (Method 5005)	1,2,3,4,5,6,7,10
Group C and D End Point Electrical Parameters (Method 5005)	1,2,3,4,5,6,7,10

* PDA Applies to subgroup 1. See PDA Test Notes.

PDA Test Notes

The PDA is specified as 5% based on failures from group A, subgroup 1, tests after cooldown as the final electrical test in accordance with method 5004 of MIL-STD-883 Class B. The verified failures of group A, subgroup 1, after burn-in divided by the total number of devices submitted for burn-in in that lot shall be used to determine the percent for the lot.

Linear Technology Corporation reserves the right to test to tighter limits than those given.