![Texas Instruments]

LM107QML

LM107QML Operational Amplifier

Check for Samples: LM107QML

FEATURES

- **Offset voltage 3 mV maximum over temperature**

- **Input current 100 nA maximum over temperature**
- **Offset current 20 nA maximum over temperature**

DESCRIPTION

The LM107 is a complete, general purpose operational amplifier, with the necessary frequency compensation built into the chip. Advanced processing techniques make the input currents a factor of ten lower than industry standards such as the 709. Yet, they are a direct, plug-in replacement for the 709, LM101A and 741. The LM107 offers the features of the LM101A, which makes its application nearly foolproof. In addition, the device provides better accuracy and lower noise in high impedance circuitry. The low input currents also make it particularly well suited for long interval integrators or timers, sample and hold circuits and low frequency waveform generators. Further, replacing circuits where matched transistor pairs buffer the inputs of conventional IC op amps, it can give lower offset voltage and drift at a lower cost.
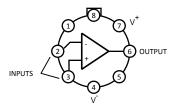
Connection Diagram

Metal Can Package

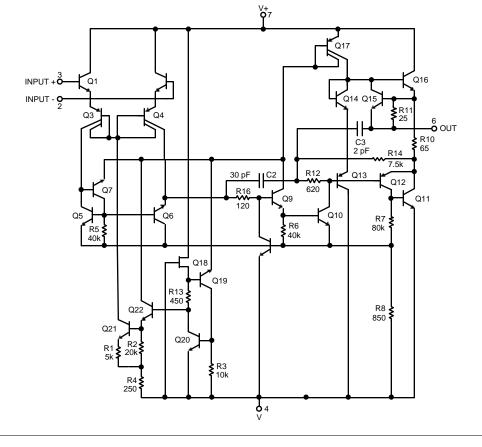
Figure 1. Top View

NOTE

Pin 4 connected to case.

Schematic Diagram

(Pin connections shown are for metal can.)

NOTE
For Performance Characteristics or Typical Applications graphs, Refer to Commercial Data Sheet.

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

Absolute Maximum Ratings [1]

Supply Voltage	±22V
Power Dissipation [2] [3]	500 mW
Differential Input Voltage	±30V
Input Voltage [3]	±15V
Output Short Circuit Duration	Continuous
Operating Temperature Range (T_A)	-55°C ≤ T_A ≤ +125° C
Storage Temperature Range	-65°C ≤ T_A ≤ +150°C
Lead Temperature (Soldering, 10 seconds)	260°C
ESD Tolerance [4]	1000V

(1)   Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not guarantee specific performance limit s. For guaranteed specifications and test conditions, see the Electrical Characteristics. The guaranteed specifications apply only for the test conditions listed. Some performance characteristics may degrade when the device is not operated under the listed test conditions.

(2)   The maximum power dissipation must be derated at elevated temperatures and is dictated by T_{Jmax} (maximum junction temperature), θ_{JA} (package junction to ambient thermal resistance), and T_A (ambient temperature). The maximum allowable power dissipation at any temperature is $P_{Dmax} = (T_{Jmax} - T_A)/\theta_{JA}$ or the number given in the Absolute Maximum Ratings, whichever is lower.

(3)   For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

(4)   Human body model, 1.5 KΩ in series with 100 pF.

Quality Conformance Inspection

MIL-STD-883, Method 5005 - Group A

Subgroup	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

Product Folder Links: *LM107QML*

LM107 Electrical Characteristics DC Parameters

The following conditions apply, unless otherwise specified. $V_{CC} = \pm20V$, $V_{CM} = 0V$, $R_S = 50\Omega$

Symbol	Parameter	Conditions	Notes	Min	Max	Unit	Sub-groups
V_{IO}	Input Offset Voltage	$V_{CM} = \pm15V$		-2	2	mV	1
				-3	3	mV	2, 3
				-2	2	mV	1
				-3	3	mV	2, 3
		$V_{CC} = \pm5V$		-2	2	mV	1
				-3	3	mV	2, 3
I_{IO}	Input Offset Current	$V_{CM} = \pm15V$		-10	10	nA	1
				-20	20	nA	2, 3
				-10	10	nA	1
				-20	20	nA	2, 3
		$V_{CC} = \pm5V$		-10	10	nA	1
				-20	20	nA	2, 3
$\pm I_{IB}$	Input Bias Current	$V_{CM} = \pm15V$		1	75	nA	1
				1	100	nA	2, 3
				1	75	nA	1
				1	100	nA	2, 3
		$V_{CC} = \pm5V$		1	75	nA	1
				1	100	nA	2, 3
I_{CC}	Supply Current				3	mA	1
					2.5	mA	2
					3.5	mA	3
$-I_{OS}$	Short Circuit Current			7	45	mA	1
				5	45	mA	2
				7	50	mA	3
$+I_{OS}$	Short Circuit Current			-45	-7	mA	1
				-45	-5	mA	2
				-50	-7	mA	3
+PSRR	Supply Voltage Rejection Ratio	$+V_{CC} = 20V$ to $5V$, $-V_{CC} = -20V$		80		dB	1, 2, 3
-PSRR	Supply Voltage Rejection Ratio	$-V_{CC} = -20V$ to $-5V$, $+V_{CC} = 20V$		80		dB	1, 2, 3
CMRR	Common Mode rejection Ratio	$-15V <= V_{CM} <= +15V$		80		dB	1, 2, 3
R_{IN}	Input Resistance			1.5		$M\Omega$	1
V_{IR}	Input Voltage Range		(1)	-15	+15	V	1, 2, 3
$-A_{VS}$	Large Signal Voltage Gain	$V_{CC} = \pm15V$, $V_{OUT} = 0$ to $-12V$, $R_L = 10K\Omega$		50		V/mV	4
		$V_{CC} = \pm15V$, $V_{OUT} = 0$ to $-12V$, $R_L = 10K\Omega$		25		V/mV	5, 6
		$V_{CC} = \pm15V$, $V_{OUT} = 0$ to $-10V$, $R_L = 2K\Omega$		50		V/mV	4
		$V_{CC} = \pm15V$, $V_{OUT} = 0$ to $-10V$, $R_L = 2K\Omega$		25		V/mV	5, 6

(1) Guaranteed by CMRR.

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LM107 Electrical Characteristics DC Parameters (continued)

The following conditions apply, unless otherwise specified. V_{CC} = ±20V, V_{CM} = 0V, R_S = 50Ω

Symbol	Parameter	Conditions	Notes	Min	Max	Unit	Sub-groups
+A_{VS}	Large Signal Voltage Gain	V_{CC} = ±15V, V_{OUT} = 0 to 12V, R_L = 10KΩ		50		V/mV	4
		V_{CC} = ±15V, V_{OUT} = 0 to 12V, R_L = 10KΩ		25		V/mV	5, 6
		V_{CC} = ±15V, V_{OUT} = 0 to 10V, R_L = 2KΩ		50		V/mV	4
		V_{CC} = ±15V, V_{OUT} = 0 to 10V, R_L = 2KΩ		25		V/mV	5, 6
+V_{OP}	Output Voltage Swing	V_{CC} = ±15V, R_L = 10KΩ		12		V	4, 5, 6
		V_{CC} = ±15V, R_L = 2KΩ		10		V	4, 5, 6
		R_L = 10KΩ		16		V	4, 5, 6
		R_L = 2KΩ		15		V	4, 5, 6
-V_{OP}	Output Voltage Swing	V_{CC} = ±15V, R_L = 10KΩ			-12	V	4, 5, 6
		VCC = ±15V, R_L = 2KΩ			-10	V	4, 5, 6
		R_L = 10KΩ			-16	V	4, 5, 6
		R_L = 2KΩ			-15	V	4, 5, 6

LM107QML

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LM107 Electrical Characteristics AC Parameters

The following conditions apply, unless otherwise specified. $V_{CC} = \pm20V$, $V_{CM} = 0V$, $R_S = 50K\Omega$

Symbol	Parameter	Conditions	Notes	Min	Max	Unit	Sub-groups
+S_R	Slew Rate	V_{IN} = -5V to +5V, A_V = 1, R_L = 2KΩ		0.2		V/µS	7
-S_R	Slew Rate	V_{IN} = +5V to -5V, A_V = 1, R_L = 2KΩ		0.2		V/µS	7
GBW	Gain Bandwidth	V_{IN} = 50mV$_{RMS}$, f = 20K$_{HZ}$, R_L = 2KΩ		250		K$_{HZ}$	7

Revision History

Date Released	Revision	Section	Originator	Changes
05/09/05	A	New Release, Corporate format	R. Malone	New Release, Corporate format. 1 MDS data sheet converted into a Corp. data sheet format. Following MDS data sheets will be Archived MNLM107-X, Rev. 0CL
	B	Obsolete Data Sheet	Cullum	End Of Life on Product/NSID Dec. 2005

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IMPORTANT NOTICE

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