JM38510/10106

JAN DUAL LOW-INPUT-CURRENT OPERATIONAL AMPLIFIER (EXTERNALLY COMPENSATED)

Precision Monolithics Inc.

GENERAL DESCRIPTION

This data sheet covers the electrical requirements for a dual low input-current, externally-compensated operational amplifier as specified in MIL-M-38510/101 for device type 06.

Devices supplied to this data sheet are manufactured and tested at PMI's MIL-M-38510 certified facility and are listed in QPL-38510.

Complete device requirements will be found in MIL-M-38510 and MIL-M-38510/101 for Class B processed devices.

GENERIC CROSS-REFERENCE INFORMATION

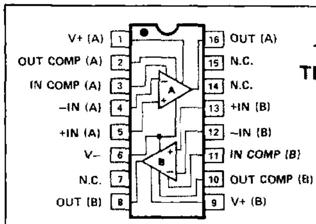
This cross-reference information is presented for the convenience of the user. The generic industry types listed may *not have identical operational performance characteristics* across the military temperature range or reliability factors equivalent to the MIL-M-38510 device.

Military Device Type	Generic Industry Type
06	LM2108A

CASE OUTLINE

Per MIL-M-38510, Appendix C, Case Outline D-2 (16-pin DIP). Package Type Designator "E".

PIN CONNECTIONS



16-PIN HERMETIC DIP TIN REFLOW LEAD TYPE (Q2-Suffix)

SOLDER DIPPED LEAD TYPE (Q5-Suffix)

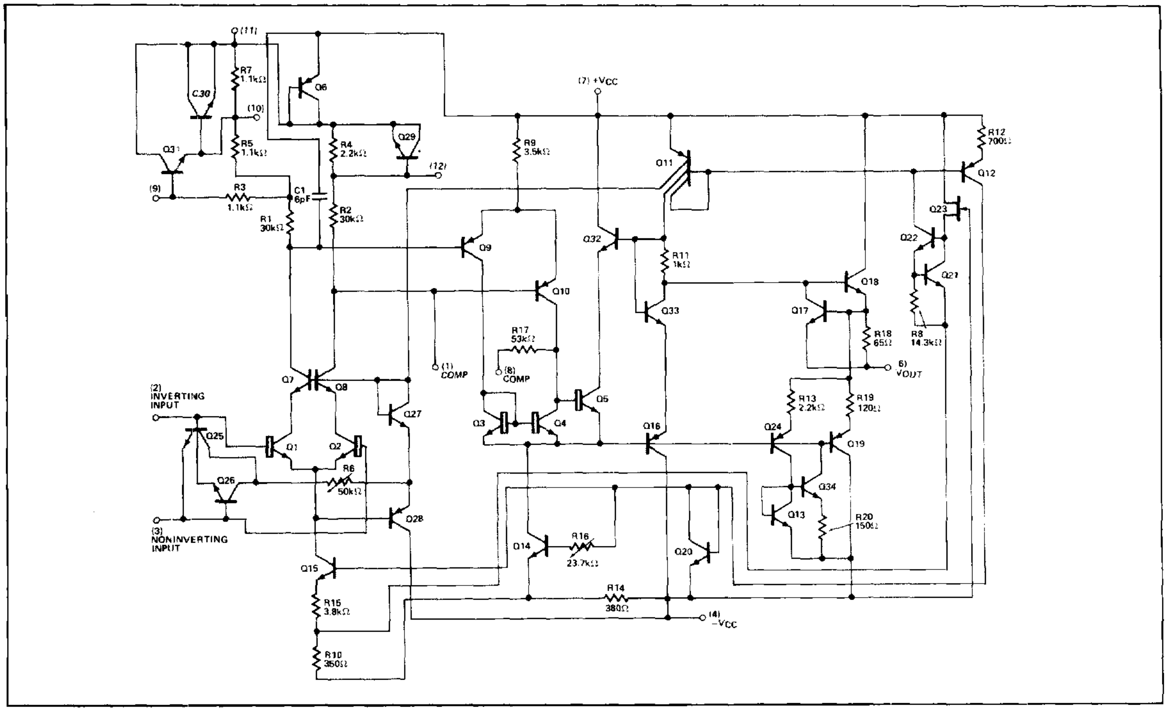
ORDERING INFORMATION

Jan Device Type	PMI Device Type
JM38510/10106BEB	PM2108AQ2/38510
JM38510/10106BEA	PM2108AQ5/38510

POWER AND THERMAL CHARACTERISTICS

Package	Case outline	Maximum allowable power dissipation	Maximum θJ—C	Maximum θJ—A
Dual-in-line	E	400mW at $T_A = 125°C$	35°C/W	120°C/W

SIMPLIFIED SCHEMATIC (Each Amplifier)



8/87, Rev. B1

ELECTRICAL CHARACTERISTICS at $5V \leq \pm V_{CC} \leq 20V$ and $-55°C \leq T_A \leq +125°C$, unless otherwise noted.

PARAMETER	SYMBOL	CONDITIONS	MIN	MAX	UNITS
Input Offset Voltage	V_{IO}	(Note 2) $R_S = 50\Omega$, $T_A = 25°C$	−0.5	+0.5	mV
		(Note 2) $R_S = 50\Omega$, $-55°C \leq T_A \leq 125°C$	−1.0	+1.0	
Input Offset Voltage Temperature Sensitivity	$\frac{\Delta V_{IO}}{\Delta T}$	ΔT_A from −55°C to +25°C	−5.0	+5.0	μV/°C
		ΔT_A from +25°C to +125°C	−5.0	+5.0	
Input Offset Current	I_{IO}	(Note 2) $T_A = 25°C$	−0.2	+0.2	nA
		(Note 2) $-55°C \leq T_A \leq 125°C$	−0.4	+0.4	
Input Offset Current Temperature Sensitivity	$\frac{\Delta I_{IO}}{\Delta T}$	ΔT_A from −55°C to +25°C	−2.5	+2.5	pA/°C
		ΔT_A from +25°C to +125°C	−2.5	+2.5	
Input Bias Current	$+I_{IB}$	(Note 2) $25°C \leq T_A \leq 125°C$	−1.0	+2.0	nA
		(Note 2) $-55°C \leq T_A \leq +25°C$	−0.1	+3.0	
	$-I_{IB}$	(Note 2) $25°C \leq T_A \leq 125°C$	−1.0	+2.0	nA
		(Note 2) $-55°C \leq T_A \leq +25°C$	−0.1	+3.0	
Power Supply Rejection Ratio	+PSRR	$+V_{CC} = 10V$, $-V_{CC} = -20V$, $R_S = 50\Omega$, $T_A = 25°C$	−16	+16	μV/V
		$+V_{CC} = 10V$, $-V_{CC} = -20V$, $R_S = 50\Omega$, $-55°C \leq T_A \leq 125°C$	−16	+16	
Power Supply Rejection Ratio	−PSRR	$+V_{CC} = 20V$, $-V_{CC} = -10V$, $R_S = 50\Omega$, $T_A = 25°C$	−16	+16	μV/V
		$+V_{CC} = 20V$, $-V_{CC} = -10V$, $R_S = 50\Omega$, $-55°C \leq T_A \leq 125°C$	−16	+16	
Input Voltage Common-Mode Rejection	CMR	$\pm V_{CC} = 20V$, $V_{IN} = \pm 15V$, $R_S = 50\Omega$	96	—	dB
Adjustment For Input Offset Voltage	V_{IO} ADJ (+)	$\pm V_{CC} = 20V$	No External Adjustment		mV
Adjustment For Input Offset Voltage	V_{IO} ADJ (−)	$\pm V_{CC} = 20V$	No External Adjustment		mV
Output Short-Circuit Current (For Positive Output)	$I_{OS(+)}$	$\pm V_{CC} = 15V$, $t \leq 25ms$ (Note 3)	15	—	mA
Output Short-Circuit Current (For Negative Output)	$I_{OS(-)}$	$\pm V_{CC} = 15V$, $t \leq 25ms$ (Note 3)	—	15	mA
Supply Current	I_{CC}	$\pm V_{CC} = 15V$, $T_A = -55°C$	—	0.8	mA
		$\pm V_{CC} = 15V$, $T_A = +25°C$	—	0.6	
		$\pm V_{CC} = 15V$, $T_A = +125°C$	—	0.6	
Output Voltage Swing (Maximum)	V_{OP}	$\pm V_{CC} = 20V$, $R_L = 10k\Omega$	±16	—	V
		$\pm V_{CC} = 20V$, $R_L = 2k\Omega$	—	—	
Open-Loop Voltage Gain (Single Ended) (Note 1)	$A_{VS(\pm)}$	$\pm V_{CC} = 20V$, $R_L = 10k\Omega$, $V_{OUT} = \pm 15V$, $T_A = 25°C$	80	—	V/mV
		$\pm V_{CC} = 20V$, $R_L = 10k\Omega$, $V_{OUT} = \pm 15V$, $-55°C \leq T_A \leq 125°C$	40	—	
Open-Loop Voltage Gain (Single Ended) (Note 1)	A_{VS}	$\pm V_{CC} = 5V$, $R_L = 10k\Omega$, $V_{OUT} = \pm 2V$	20	—	V/mV
Transient Response Rise Time	$TR_{(tr)}$	$C_F = 10pF$	—	1000	nsec
Transient Response Overshoot	$TR_{(OS)}$	$C_F = 10pF$	—	50	%
Noise (Referred to Input) Broadband	N_I (BB)	$V_{CC} = 20V$, Bandwidth = 5kHz, $T_A = 25°C$	—	15	μV rms
Noise (Referred to Input) Popcorn	N_I (PC)	$\pm V_{CC} = 20V$, Bandwidth = 5kHz, $T_A = 25°C$	—	40	μV peak

NOTES:

1. Note that gain is not specified at $V_{IO(ADJ)}$ extremes. Some gain reduction is usually seen at $V_{IO(ADJ)}$ extremes. For closed-loop applications (closed-loop gain less than 1,000), the open-loop tests (A_{VS}) prescribed herein should guarantee a positive, reasonably linear, transfer characteristic. They do not, however, guarantee that the open-loop gain is linear, or even positive, over the operating range. If either of these requirements exist (positive open-loop gain or open-loop gain linearity), they should be specified in the individual procurement document as additional requirements.
2. Tests at common-mode $V_{CM} = 0$, $V_{CM} = -15V$, and $V_{CM} = +15V$.
3. Continuous short-circuit limits will be considerably less than the indicated test limits. Continuous I_{OS} at $T_A \leq 75°C$ will cause T_j to exceed the maximum of 175°C. For dual devices, I_{OS} is measured one channel at a time.

ELECTRICAL CHARACTERISTICS at $5V \le \pm V_{CC} \le 20V$ and $-55°C \le T_A \le +125°C$, unless otherwise noted. (Continued)

PARAMETER	SYMBOL	CONDITIONS		MIN	MAX	UNITS
Slew Rate	SR (+)	$A_V = 1$	$-55°C \le T_A \le 25°C$	0.05	—	V/μsec
		$V_{IN} = +5V$	$T_A = 125°C$	0.05	—	
Slew Rate	SR (−)	$A_V = 1$	$-55°C \le T_A \le 25°C$	0.05	—	V/μsec
		$V_{IN} = \pm 5V$	$T_A = 125°C$	0.05	—	
Settling Time	t_S (+)	$T_A = 25°C$		—	—	ns
		$-55°C \le T_A \le 125°C$		—	—	
	t_S (−)	$T_A = 25°C$		—	—	ns
		$-55°C \le T_A \le 125°C$		—	—	
Channel Separation	CS	$\pm V_{CC} = 20V$		80	—	dB
		$T_A = 25°C$				

NOTES:

1. Note that gain is not specified at $V_{IO\,(ADJ)}$ extremes. Some gain reduction is usually seen at $V_{IO\,(ADJ)}$ extremes. For closed-loop applications (closed-loop gain is less than 1,000), the open-loop tests (A_{VS}) prescribed herein should guarantee a positive, reasonably linear, transfer characteristic. They do not, however, guarantee that the open-loop gain is linear, or even positive, over the operating range. If either of these requirements exist (positive open-loop gain or open-loop gain linearity), they should be specified in the individual procurement document as additional requirements.
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For other Test Circuit Diagrams, See MIL-M-38510/101

BURN-IN CIRCUIT