PMI

JM38510/11004

JAN QUAD 741-TYPE
OPERATIONAL AMPLIFIER

Precision Monolithics Inc.

T-79-05-40

FEATURES

- Low Broadband Noise ..... $5\mu V_{rms}$ Max
- RM-4136 Direct Replacement
- Silicon-Nitride Passivation
- Low Crossover Distortion
- Continuous Short-Circuit Protection
- MIL-M-38510 Processed

ORDERING INFORMATION

JAN SLASH SHEET	PMI DEVICE
JM38510/11004BCB	PM-4136Y2/38510
JM38510/11004BCA	PM-4136Y5/38510

GENERAL DESCRIPTION

The PM-4136Y2/38510 provides four matched 741-type operational amplifiers in a 14-pin hermetic dual-in-line package. The device is manufactured to meet or exceed all terms and conditions of the MIL-M-38510/110A slash sheet, under the requirements of the MIL-M-38510 general microcircuit specifications. Complete device specifications, test configurations, and manufacturing requirements are found in the slash sheet and general specifications.

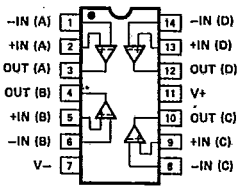
GENERIC CROSS-REFERENCE INFORMATION

The PM-4136Y2/38510 is PMI's product name for the JM38510/11004BCB. The PM-4136Y2/38510 is a 38510-processed version of the industry-standard RM4136.

The generic industry device may not have identical operational performance characteristics across the Military temperature range, or reliability factors equivalent to the 38510 device.

For an 883-processed device with improved electrical specifications, review the OP-09 data sheet.

PIN CONNECTIONS



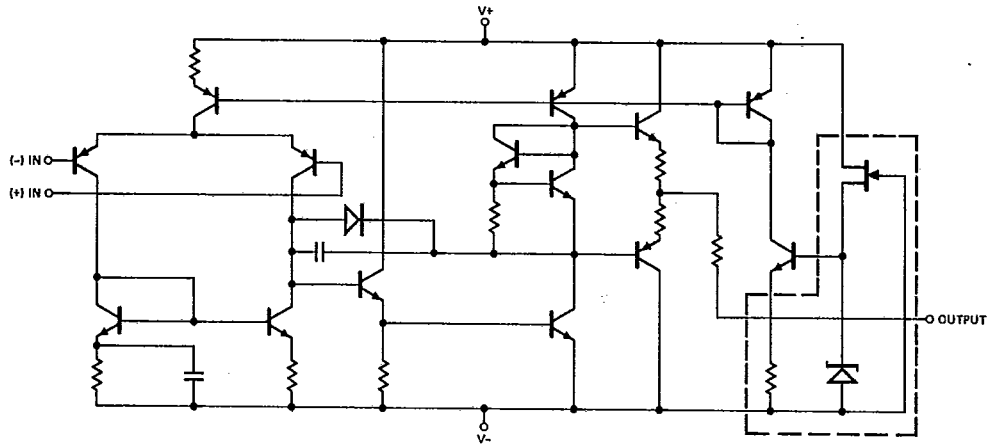
14-PIN HERMETIC DIP
TIN REFLOW LEAD TYPE
(Y2-Suffix)

SOLDER DIPPED LEAD TYPE
(Y5-Suffix)

POWER AND THERMAL CHARACTERISTICS

Case Outline	Package	Maximum Allowable Power Dissipation	Maximum θ_{JC}	Maximum θ_{JA}
Y	Dual-In-Line	400mW @ T_A = 125°C	35°C/W	120°C/W

SIMPLIFIED SCHEMATIC (One of Four Amplifiers Is Shown)



NOTE: BIAS CIRCUIT SHOWN IN DASHED BOX IS COMMON TO ALL DEVICES.

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OPERATIONAL AMPLIFIERS/BUFFERS

T-79-05-40

ABSOLUTE MAXIMUM RATINGS

Supply Voltage Range (Note 1) ..... ±22V
Input Voltage Range (Note 2) ..... ±22V
Differential Input Voltage Range (Note 3) ..... ±30V
Input Current Range ..... 10 to 0.1mA
Storage Temperature Range ..... -65°C to +150°C
Output Short-Circuit Duration (Note 4) ..... Unlimited
Lead Temperature (Soldering, 60 sec) ..... 300°C
Junction Temperature (T_j) (Note 5) ..... 175°C

NOTES:
1. Voltages in excess of these may be applied for short-term tests if voltage difference does not exceed 44 volts.
2. For supply voltages less than ±20V, the absolute maximum input voltage is equal to the supply voltage.
3. The differential input voltage range shall not exceed the supply voltage range.
4. Short circuit may be to ground or either supply. Rating applies to +125°C case temperature or +75°C ambient temperature.
5. For short-term test (in the specific burn-in and life-test configuration where required and up to 168 hours maximum) $T_j = 275°C$.

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range ..... ±5V to ±20V
Ambient Temperature Range ..... -55° to +125°C

ELECTRICAL CHARACTERISTICS at $\pm5V \le V_{CC} \le \pm20V$ and $-55°C \le T_A \le +125°C$, $R_S = 50\Omega$, unless otherwise noted.

PARAMETER	SYMBOL	CONDITIONS	04 LIMITS MIN	04 LIMITS MAX	UNITS
Input Offset Voltage	V_{IO}	$T_A = 25°C$	-5	5	mV
		$-55°C \le T_A \le 125°C$ (Note 1)	-6	6	
Input Offset Voltage Temperature Sensitivity	$\Delta V_{IO}/\Delta T$	$-55°C \le T_A \le 125°C$	-25	25	µV/C°
Input Offset Current	I_{IO}	$25°C \le T_A \le 125°C$, $R_S = 20k\Omega$ (Note 1)	-75	75	nA
		$T_A = -55°C$, $R_S = 20\Omega$ (Note 1)	-150	150	
Input Offset Current Temperature Sensitivity	$\Delta I_{IO}/\Delta T$	$-55°C \le T_A \le 25°C$	-1000	1000	pA/°C
		$25°C \le T_A \le 125°C$	-500	500	
Input Bias Current	$+I_{IB}$	$R_S = 20k\Omega$, $25°C \le T_A \le 125°C$	-250	-1	nA
		$T_A = -55°C$ (Note 1)	-400	-1	
	$-I_{IB}$	$R_S = 20k\Omega$, $25°C \le T_A \le 125°C$	-250	-1	
		$T_A = -55°C$ (Note 1)	-400	-1	
Power Supply Rejection Ratio	+PSRR	$+V_{CC} = 10V$, $-V_{CC} = -20V$	-100	100	µV/V
	-PSRR	$+V_{CC} = 20V$, $-V_{CC} = -10V$	-100	100	
Input Voltage Common-Mode Rejection	CMR	Common-Mode Range = 30V (Note 2)	76	—	dB
Output Short Circuit Current	$I_{OS(+)}$, $I_{OS(-)}$	$\pm V_{CC} = \pm15V$, $-55°C \le T_A \le 125°C$ (Note 3)	-80	80	mA
Supply Current	I_{CC}	$V_{CC} = \pm15V$ (Note 4), $T_A = -55°C$	—	13	mA
		$T_A = 25°C$	—	11	
		$T_A = 125°C$	—	11	
Output Voltage Swing (Maximum)	$+V_{OP}$	$V_{CC} = \pm20V$, $R_L = 10k\Omega$	+16	—	V
		$R_L = 2k\Omega$	+15	—	
	$-V_{OP}$	$V_{CC} = \pm20V$, $R_L = 10k\Omega$	—	-16	
		$R_L = 2k\Omega$	—	-15	

ELECTRICAL CHARACTERISTICS at $\pm5V \leq V_{CC} \leq \pm20V$ and $-55°C \leq T_A \leq 125°C$, $R_S = 50\Omega$, unless otherwise noted. (Continued)

PARAMETER	SYMBOL	CONDITIONS	04 LIMITS MIN	04 LIMITS MAX	UNITS
Open-Loop Voltage Gain (Single Ended)	$A_{VS(+)}$	$R_L = 10k\Omega$, $\pm V_O = \pm15V$, $T_A = 25°C$	50	—	V/mV
		$-55°C \leq T_A \leq 125°C$	25	—	
	$A_{VS(-)}$	$R_L = 2k\Omega$, $\pm V_O = \pm15V$, $T_A = 25°C$	50	—	
		$-55°C \leq T_A \leq 125°C$	25	—	
	A_{VS}	$R_L = 10k\Omega$, $T_A = 25°C$	10	—	
		$R_L = 2k\Omega$, $\pm V_{CC} = \pm5V$, $-55°C \leq T_A \leq 125°C$	10	—	
Transient Response Rise Time	$TR_{(tr)}$	$\pm V_{CC} = \pm20V$, $A_V = 1$	—	0.3	μs
Transient Response Overshoot	$TR_{(OS)}$	$\pm V_{CC} = \pm20V$	—	50	%
Slew Rate	SR(+)	$\pm V_{CC} = \pm20V$, $A_V = 1$	0.6	—	$V/\mu s$
Noise (Broadband)	$N_I(BB)$	$T_A = 25°C$, $\pm V_{CC} = \pm20V$, $R_S = 50\Omega$	—	5	μV_{rms}
Noise (Popcorn)	$N_I(PC)$	$T_A = 25°C$, $\pm V_{CC} = \pm20V$, $R_S = 20k\Omega$	—	50	μV_{pk}
Channel Separation	CS	$T_A = 25°C$	80	—	dB

NOTES:
1. Tested at $V_{CM} = 0$, +15V and −15V with $\pm V_{CC} = \pm20V$; and at $V_{CM} = 0V$ with $\pm V_{CC} = \pm5V$.
2. CMR is determined by measuring input offset voltage as follows:

OFFSET VOLTAGE CONDITION	$+V_{CC}$	$-V_{CC}$	V_O
1	35V	-5V	15V
2	5V	-35V	-15V

3. Only one amplifier shorted to ground at one time, $0 \leq t \leq 25ms$. Continuous limits will be considerably lower and apply for $-55°C \leq T_A \leq 25°C$.
4. I_{CC} limits are the total for all four amplifiers at no load, connected as followers with the noninverting inputs grounded.

BURN-IN CIRCUIT