



# CMP-04/883

QUAD LOW-POWER  
PRECISION COMPARATOR

Precision Monolithics Inc.

## 1.0 SCOPE

This specification covers the detail requirements for a quad low-power precision comparator.

It is highly recommended that this data sheet be used as a baseline for new military or aerospace spec control drawings.

## 1.2 Part Number. The complete part numbers per Table I of this specification follow:

<u>Device</u>	<u>Part Number</u>	<u>Package</u>
B	CMP-04BY/883	Y

### 1.2.3 Case Outline.

<u>Letter</u>	<u>Case Outline (Lead finish per MIL-M-38510)</u>
Y	14-pin ceramic dual-in-line package (CERDIP)

## 1.3 Absolute Maximum Ratings. ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)

Supply Voltage.....	36V or $\pm 18\text{V}$
Power Dissipation (Note 1).....	500mW
Differential Input Voltage.....	36V
Input Voltage.....	-0.3V to +36V
Output Short-Circuit to Ground.....	Continuous
Storage Temperature Range.....	$-65^\circ\text{C}$ to $+150^\circ\text{C}$
Operating Temperature Range.....	$-55^\circ\text{C}$ to $+125^\circ\text{C}$
Lead Temperature (Soldering, 60 sec).....	$+300^\circ\text{C}$
DICE Junction Temperature Range ( $T_J$ ).....	$-65^\circ\text{C}$ to $+150^\circ\text{C}$
Input Current ( $V_{IN} < -0.3\text{V}$ ).....	50mA

#### NOTES:

1. Derate above  $T_A = 100^\circ\text{C}$  at  $10\text{mW}/^\circ\text{C}$ .

## 1.5 Thermal Characteristics:

Thermal Resistance, CERDIP (Y) package:

Junction-to-Case ( $\theta_{JC}$ ) =  $29^\circ\text{C}/\text{W}$  MAX

Junction-to Ambient ( $\theta_{JA}$ ) =  $100^\circ\text{C}/\text{W}$  MAX

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**TABLE 1**

$V_+ = 5V, V_- = 0V; T_A = 25^\circ C$  unless otherwise specified.

Characteristics	Symbol	Special Conditions	CMP-04/883		Units
			LIMITS B		
			Min	Max	
Input Offset Voltage	$V_{OS}$	$V_O = 1.4V, R_S = 0\Omega$ $R_L = 5.1k\Omega$	-	1.0	mV
		$V_O = 1.4V, R_S = 0\Omega$ $R_L = 5.1k\Omega$ $-55^\circ C \leq T_A \leq +125^\circ C$	-	2.0	mV
Input Offset Current	$I_{OS}$	$V_O = 1.4V, R_L = 5.1k\Omega$	-	10	nA
		$V_O = 1.4V, R_L = 5.1k\Omega$ $-55^\circ C \leq T_A \leq +125^\circ C$	-	20	nA
Input Bias Current	$I_B$	$-55^\circ C \leq T_A \leq +125^\circ C$	-	100	nA
			-	200	nA
Supply Current (All Comparators)	$I_+$	$V_+ = 30V, R_L = \infty$	-	2.0	mA
		$V_+ = 30V, R_L = \infty$ $-55^\circ C \leq T_A \leq +125^\circ C$	-	3.0	mA
Common-Mode Rejection	CMR	$V_+ = 15V, R_L = 15k\Omega$ $V_{CM} = 1.5V$ to 13.5V	80	-	dB
		$V_+ = 15V, R_L = 15k\Omega$ $V_{CM} = 1.5V$ to 13V $-55^\circ C \leq T_A \leq +125^\circ C$	60.5	-	dB
Power Supply Rejection	PSR	$V_+ = 5V$ to 18V $-55^\circ C \leq T_A \leq +125^\circ C$	80	-	dB
Common-Mode Voltage Range (Note 1)	CMVR	$V_+ = 15V$	0 to 13.5	-	V
		$V_+ = 15V$ $-55^\circ C \leq T_A \leq +125^\circ C$	0 to 13	-	V

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**TABLE 1 (Continued)**

V+ = 5V, V- = 0V; T<sub>A</sub> = 25°C unless otherwise specified.

Characteristics	Symbol	Special Conditions	CMP-04/883		Units
			LIMITS B		
			Min	Max	
Output Sink Current	I <sub>SINK</sub>	V <sub>IN+</sub> = 0V, V <sub>IN-</sub> ≥ 1V V <sub>O</sub> ≤ 1.5V	6	–	mA
		V <sub>IN+</sub> = 0V, V <sub>IN-</sub> ≥ 1V V <sub>O</sub> ≤ 1.5V –55°C ≤ T <sub>A</sub> ≤ +125°C	5	–	mA
Saturation Voltage	V <sub>OL</sub>	V <sub>IN+</sub> = 0, V <sub>IN-</sub> ≥ 1V I <sub>SINK</sub> ≤ 4mA	–	400	mV
		V <sub>IN+</sub> = 0, V <sub>IN-</sub> ≥ 1V I <sub>SINK</sub> ≤ 4mA –55°C ≤ T <sub>A</sub> ≤ +125°C	–	700	mV
Output Leakage Current	I <sub>LEAK</sub>	V <sub>IN+</sub> ≥ 1V, V <sub>IN-</sub> = 0V V <sub>O</sub> = 30V	–	100	nA
		V <sub>IN+</sub> ≥ 1V, V <sub>IN-</sub> = 0V V <sub>O</sub> = 30V –55°C ≤ T <sub>A</sub> ≤ +125°C	–	200	nA
Large-Signal Response Time (Note 2)	t <sub>r</sub>	5V Input Step V <sub>REF</sub> = 1.4V, V <sub>RL</sub> = 5V R <sub>L</sub> = 5.1kΩ	–	700	ns
Small-Signal Response Time (Note 2)	t <sub>r</sub>	Low to High Transition V <sub>RL</sub> = 5V, R <sub>L</sub> = 5.1kΩ 100mV Input Step, 5mV Overdrive	–	5.0	μs
		High to Low Transition V <sub>RL</sub> = 5V, R <sub>L</sub> = 5.1kΩ 100mV Input Step, 5mV Overdrive	–	2.5	μs

**NOTES:**

1. CMVR is guaranteed by V<sub>OS</sub> and CMR conditions. The input common-mode voltage, or either input signal voltage should not be allowed to go negative by more than 0.3V. The upper end of the common-mode voltage range is V+ – 1.5V, but either or both inputs can go to 30V without damage.
2. Sample tested.



**TABLE 2**

**CMP-04/883**

**Electrical Test Requirements  
For Class B Devices**

MIL-STD-883 Test Requirements	Subgroups (see Table 3)
Interim Electrical Parameters (pre Burn-In)	1
Final Electrical Test Parameters	1*, 2, 3
Group A Test Requirements	1, 2, 3, 9

\* PDA applies to Subgroup 1 only.  
No other Subgroups are included in PDA.



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**TABLE 3**

**Group A Inspection**

V+ = 5V, V- = 0V unless otherwise specified.

Subgroup	Symbol	Special Conditions	CMP-04/883		Units
			LIMITS B		
			Min	Max	
Subgroup 1  T <sub>A</sub> = +25°C	V <sub>OS</sub>	V <sub>O</sub> = 1.4V, R <sub>S</sub> = 0Ω R <sub>L</sub> = 5.1kΩ	--	1.0	mV
	I <sub>OS</sub>	V <sub>O</sub> = 1.4V, R <sub>L</sub> = 5.1kΩ	--	10	nA
	I <sub>B</sub>		--	100	nA
	I <sub>I+</sub>	V+ = 30V, R <sub>L</sub> = ∞	--	2.0	mA
	CMR	V+ = 15V, R <sub>L</sub> = 15kΩ V <sub>CM</sub> = 1.5V, 13.5V (Note 1)	80	--	dB
	PSR	V+ = 5V, 18V	80	--	dB
	I <sub>SINK</sub>	V <sub>IN+</sub> = 0V, V <sub>IN-</sub> = 1V V <sub>O</sub> = 1.5V	6	--	mA
	V <sub>OL</sub>	V <sub>IN+</sub> = 0V, V <sub>IN-</sub> = 1V I <sub>SINK</sub> = 4mA	--	400	mV
I <sub>LEAK</sub>	V <sub>IN+</sub> = 1V, V <sub>IN-</sub> = 0V V <sub>O</sub> = 30V	--	100	nA	
Subgroup 2  T <sub>A</sub> = +125°C	V <sub>OS</sub>	V <sub>O</sub> = 1.4V, R <sub>S</sub> = 0Ω R <sub>L</sub> = 5.1kΩ	--	2.0	mV
	I <sub>OS</sub>	V <sub>O</sub> = 1.4V, R <sub>L</sub> = 5.1kΩ	--	20	nA
	I <sub>B</sub>		--	200	nA
	I <sub>I+</sub>	V+ = 30V, R <sub>L</sub> = ∞	--	3.0	mA
	CMR	V+ = 15V, R <sub>L</sub> = 15kΩ V <sub>CM</sub> = 1.5V, 13V (Note 1)	60.5	--	dB
	PSR	V+ = 5V, 18V	80	--	dB



**TABLE 3**

**Group A Inspection (Continued)**

V+ = 5V, V- = 0V unless otherwise specified.

Subgroup	Symbol	Special Conditions	CMP-04/883		Units
			LIMITS B		
			Min	Max	
Subgroup 2  T <sub>A</sub> = +125°C  (Continued)	I <sub>SINK</sub>	V <sub>IN+</sub> = 0V, V <sub>IN-</sub> = 1V V <sub>O</sub> = 1.5V	5	--	mA
	V <sub>OL</sub>	V <sub>IN+</sub> = 0V, V <sub>IN-</sub> = 1V I <sub>SINK</sub> = 4mA	--	700	mV
	I <sub>LEAK</sub>	V <sub>IN+</sub> = 1V, V <sub>IN-</sub> = 0V V <sub>O</sub> = 30V	--	200	nA
Subgroup 3 T <sub>A</sub> = -55°C	All Tests, Limits and Conditions are the same as for Subgroup 2.				
Subgroup 9  T <sub>A</sub> = +25°C	t <sub>r</sub> Large Signal	5V Input Step V <sub>REF</sub> = 1.4V, V <sub>RL</sub> = 5V R <sub>L</sub> = 5.1kΩ	--	700	ns
	t <sub>r</sub> Small Signal	Low to High Transition V <sub>RL</sub> = 5V, R <sub>L</sub> = 5.1kΩ 100mV Input Step, 5mV Overdrive High to Low Transition V <sub>RL</sub> = 5V, R <sub>L</sub> = 5.1kΩ 100mV Input Step, 5mV Overdrive	--	5.0	μs
			--	2.5	μs

**NOTES:**

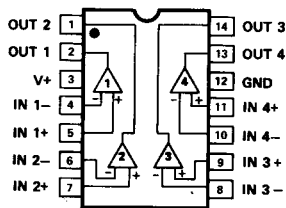
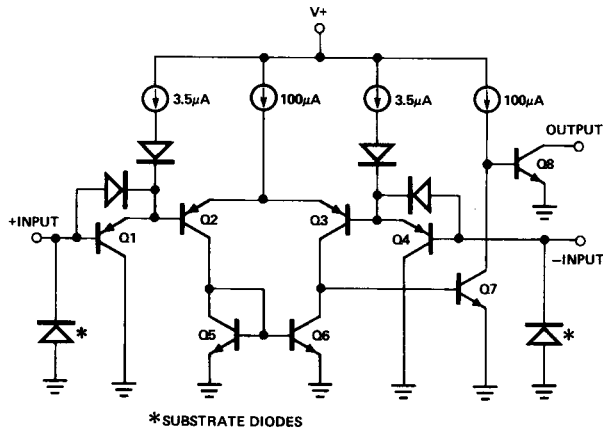
1. CMVR is guaranteed by V<sub>OS</sub> and CMR conditions. The input common-mode voltage, or either input signal voltage should not be allowed to go negative by more than 0.3V. The upper end of the common-mode voltage range is V+ - 1.5V, but either or both inputs can go to 30V without damage.

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**3.2.1 Simplified Schematic and Pin Connections.**

(1/4 OF CMP-04)



**14-PIN HERMETIC DIP  
(Y-Suffix)**

**3.2.4 Microcircuit Group Assignment.** This microcircuit is covered by microcircuit group 50.

**4.2 Life Test/Burn-In Circuit.**

