

### 1.0 SCOPE

This specification covers the detail requirements for a quad low-power voltage 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:

Device	Part Number	Package
A	PM-139AY/883	Y
X	PM-139Y/883	Y
A	PM-139ARC/883	RC

### 1.2.3 Case Outline.

Letter	Case Outline (Lead finish per MIL-M-38510)
Y	14-pin ceramic dual-in-line package (CERDIP)
RC	20-contact hermetic leadless chip carrier (LCC)

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

Supply Voltage, $V_+$ .....	36V or $\pm 18\text{V}$
Power Dissipation Hermetic DIP .....	500mW
Derate Above $100^\circ\text{C}$ .....	10mW/ $^\circ\text{C}$
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).....	$+300^\circ\text{C}$
Input Current ( $V_{IN} < -0.3\text{V}$ ).....	50mA

### 1.5 Thermal Characteristics:

Thermal Resistance, CERDIP (Y) package:

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

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

Thermal Resistance, LCC (RC) package:

Junction-to-Case ( $\theta_{JC}$ ) =  $35^\circ\text{C/W MAX}$

Junction-to-Ambient ( $\theta_{JA}$ ) =  $110^\circ\text{C/W MAX}$

**TABLE 1**
 $V_+ = 5V, V_- = 0V; T_A = 25^\circ C$  unless otherwise specified.

Characteristics	Symbol	Special Conditions	PM-139/883				Units
			LIMITS A		LIMITS X		
			Min	Max	Min	Max	
Supply Current (All 4 Comparators)	$I_{SY}$	$V_+ = 30V, R_L = \infty$	-	2.0	-	2.0	mA
		$-55^\circ C \leq T_A \leq +125^\circ C$	-	3.0	-	3.0	mA
Input Offset Voltage	$V_{OS}$	$R_S = 0\Omega, V_O = 1.4V$	-	2.0	-	5.0	mV
		$-55^\circ C \leq T_A \leq +125^\circ C$	-	4.0	-	9.0	mV
Input Offset Current	$I_{OS}$	$I_{IN(+)} - I_{IN(-)}$	-	25	-	25	nA
		$-55^\circ C \leq T_A \leq +125^\circ C$	-	100	-	100	nA
Input Bias Current	$I_B$	$I_{IN(+)} \text{ or } I_{IN(-)}$	-	$\pm 100$	-	$\pm 100$	nA
		$-55^\circ C \leq T_A \leq +125^\circ C$	-	$\pm 300$	-	$\pm 300$	nA
Common-Mode Rejection	CMR	$R_L \geq 15k\Omega, V_+ = 15V$	60.5	-	60.5	-	dB
		$V_{CM} = 1.5V \text{ to } 13.5V$					
Power Supply Rejection	PSR	$R_L \geq 15k\Omega, V_+ = 15V$	60.5	-	60.5	-	dB
		$V_{CM} = 1.5V \text{ to } 13.0V$					
Output Sink Current	$I_{SINK}$	$V_{IN+} = 0V, V_{IN-} \geq 1V$	6.0	-	6.0	-	mA
		$V_O \leq 1.5V$					
Saturation Voltage	$V_{OL}$	$V_{IN+} = 0V, V_{IN-} \geq 1V$	-	400	-	400	mV
		$I_{SINK} \leq 4mA$					
Saturation Voltage	$V_{OL}$	$V_{IN+} = 0V, V_{IN-} \geq 1V$	-	700	-	700	mV
		$I_{SINK} \leq 4mA$					
		$-55^\circ C \leq T_A \leq +125^\circ C$					

TABLE 1 (Continued)

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

Characteristics	Symbol	Special Conditions	PM-139/883				Units
			LIMITS A		LIMITS X		
			Min	Max	Min	Max	
Output Leakage Current	I <sub>LEAK</sub>	V <sub>IN+</sub> ≥ 1V, V <sub>IN-</sub> = 0V V <sub>O</sub> = 30V	–	500	–	500	nA
		V <sub>IN+</sub> ≥ 1V, V <sub>IN-</sub> = 0V V <sub>O</sub> = 30V –55 °C ≤ T <sub>A</sub> ≤ +125 °C	–	1000	–	1000	nA
Large Signal Response Time (Note 2)	t <sub>r</sub> Large Signal	V <sub>IN</sub> = 0V to 5V V <sub>REF</sub> = 1.4V, V <sub>RL</sub> = 5V R <sub>L</sub> = 5.1kΩ	–	700	–	700	ns
Small Signal Response Time (Note 2)	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	–	5.0	–	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	–	2.5	μs
Common-Mode Voltage Range (Note 1)	CMVR	V+ = 15V	0 to 13.5	–	0 to 13.5	–	V
		V+ = 15V –55 °C ≤ T <sub>A</sub> ≤ +125 °C	0 to 13.0	–	0 to 13.0	–	V

NOTES:

- 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.
- Sample tested.

7  
COMPARATORS

## TABLE 2

PM-139/883

### 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.

**TABLE 3**

**Group A Inspection**

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

Subgroup	Symbol	Special Conditions	PM-139/883				Units
			LIMITS A		LIMITS X		
			Min	Max	Min	Max	
Subgroup 1  T <sub>A</sub> = +25°C	I <sub>SY</sub>	V+ = 30V, R <sub>L</sub> = ∞ (Note 1)	--	2.0	--	2.0	mA
	V <sub>OS</sub>	R <sub>S</sub> = 0Ω, V <sub>O</sub> = 1.4V	--	2.0	--	5.0	mV
	I <sub>OS</sub>		--	25	--	25	nA
	I <sub>B</sub>		--	±100	--	±100	nA
	CMR	V+ = 15V, R <sub>L</sub> = 15kΩ V <sub>CM</sub> = 1.5V, 13.5V	60.5	--	60.5	--	dB
	PSR	V+ = +5V, +18V	60.5	--	60.5	--	dB
	I <sub>SINK</sub>	V <sub>IN+</sub> = 0V, V <sub>IN-</sub> = 1V V <sub>O</sub> = 1.5V	6.0	--	6.0	--	mA
	V <sub>OL</sub>	I <sub>SINK</sub> = 4mA V <sub>IN+</sub> = 0V, V <sub>IN-</sub> = 1V	--	400	--	400	mV
I <sub>LEAK</sub>	V <sub>IN+</sub> = 1V, V <sub>IN-</sub> = 0V V <sub>O</sub> = 30V	--	500	--	500	nA	
Subgroup 2  T <sub>A</sub> = +125°C	I <sub>SY</sub>	V+ = 30V, R <sub>L</sub> = ∞ (Note 1)	--	3.0	--	3.0	mA
	V <sub>OS</sub>	R <sub>S</sub> = 0Ω, V <sub>O</sub> = 1.4V	--	4.0	--	9.0	mV
	I <sub>OS</sub>		--	100	--	100	nA
	I <sub>B</sub>		--	±300	--	±300	nA

7  
COMPARATORS

**TABLE 3**

**Group A Inspection (Continued)**

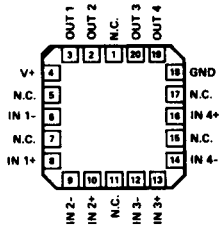
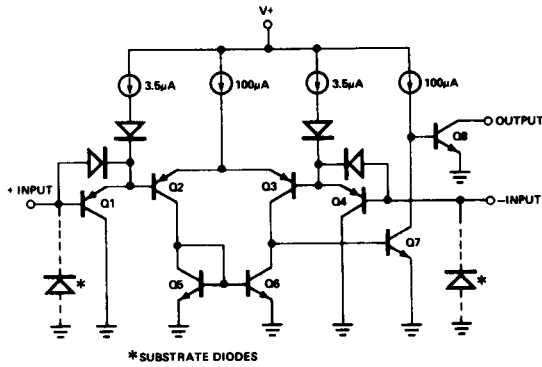
V+ = 5V, V- = 0V unless otherwise specified.

Subgroup	Symbol	Special Conditions	PM-139/883				Units
			LIMITS A		LIMITS X		
			Min	Max	Min	Max	
Subgroup 2  T <sub>A</sub> = +125°C  (Continued)	CMR	V+ = 15V, R <sub>L</sub> = 15kΩ V <sub>CM</sub> = 1.5V, 13V	60.5	–	60.5	–	dB
	PSR	V+ = +5V, +18V	60.5	–	60.5	–	dB
	I <sub>SINK</sub>	V <sub>IN+</sub> = 0V, V <sub>IN-</sub> = 1V V <sub>O</sub> = 1.5V	5	–	5	–	mA
	V <sub>OL</sub>	I <sub>SINK</sub> = 4mA V <sub>IN+</sub> = 0V, V <sub>IN-</sub> = 1V	–	700	–	700	mV
	I <sub>LEAK</sub>	V <sub>IN+</sub> = 0V, V <sub>IN-</sub> = 0V V <sub>O</sub> = 30V	–	1000	–	1000	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	V <sub>IN</sub> = 0V, 5V V <sub>REF</sub> = 1.4V, V <sub>RL</sub> = 5V R <sub>L</sub> = 5.1kΩ	–	700	–	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	–	5.0	–	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	–	2.5	μs

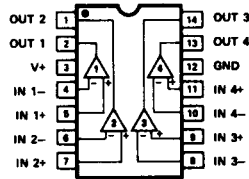
**NOTES:**

1. Total all four comparators.

**3.2.1 Simplified Schematic and Pin Connections.  
(ONE COMPARATOR)**



**PM-139ARC/883  
LCC-PACKAGE  
(RC-Suffix)**



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

7  
COMPARATORS

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

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

