Quad Low-Power Voltage Comparator

PM-139

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°C, unless otherwise noted)

Supply Voltage, V+ ..... 36V or ±18V
Power Dissipation Hermetic DIP 500mW
Derate Above 100°C ..... 10mW/°C
Differential Input Voltage 36V
Input Voltage ..... -0.3V to +36V
Output Short-Circuit to Ground ..... Continuous
Storage Temperature Range ..... -65°C to +150°C
Operating Temperature Range ..... -55°C to +125°C
Lead Temperature (Soldering, 60 sec) ..... +300°C
Input Current (V_{IN} < -0.3V) 50mA

1.5 Thermal Characteristics:

Thermal Resistance, CERDIP (Y) package:
Junction-to-Case (Θ_{JC}) = 29°C/W MAX
Junction-to Ambient (Θ_{JA}) = 100°C/W MAX

Thermal Resistance, LCC (RC) package:
Junction-to-Case (Θ_{JC}) = 35°C/W MAX
Junction-to Ambient (Θ_{JA}) = 110°C/W MAX

TABLE 1

V+ = 5V, V- = 0V; T_A = 25°C unless otherwise specified.

Characteristics	Symbol	Special Conditions	PM-139/883 LIMITS A Min	LIMITS A Max	LIMITS X Min	LIMITS X Max	Units
Supply Current	I_{SY}	V+ = 30V, R_L = ∞	–	2.0	–	2.0	mA
(All 4 Comparators)		-55°C ≤ T_A ≤ +125°C	–	3.0	–	3.0	mA
Input Offset	V_{OS}	R_S = 0Ω, V_O = 1.4V	–	2.0	–	5.0	mV
Voltage		-55°C ≤ T_A ≤ +125°C	–	4.0	–	9.0	mV
Input Offset	I_{OS}	$I_{IN}(+) - I_{IN}(-)$	–	25	–	25	nA
Current		-55°C ≤ T_A ≤ +125°C	–	100	–	100	nA
Input Bias	I_B	$I_{IN}(+)$ or $I_{IN}(-)$	–	±100	–	±100	nA
Current		-55°C ≤ T_A ≤ +125°C	–	±300	–	±300	nA
Common-Mode		R_L ≥ 15kΩ, V+ = 15V V_{CM} = 1.5V to 13.5V	60.5	–	60.5	–	dB
Rejection	CMR	R_L ≥ 15kΩ, V+ = 15V V_{CM} = 1.5V to 13.0V -55°C ≤ T_A ≤ +125°C	60.5	–	60.5	–	dB
Power Supply		V_S = +5V to +18V	60.5	–	60.5	–	dB
Rejection	PSR	V_S = +5V to +18V -55°C ≤ T_A ≤ +125°C	60.5	–	60.5	–	dB
Output Sink		V_{IN}^+ = 0V, V_{IN}^- ≥ 1V V_O ≤ 1.5V	6.0	–	6.0	–	mA
Current	I_{SINK}	V_{IN}^+ = 0V, V_{IN}^- ≥ 1V V_O ≤ 1.5V -55°C ≤ T_A ≤ +125°C	5.0	–	5.0	–	mA
Saturation		V_{IN}^+ = 0V, V_{IN}^- ≥ 1V I_{SINK} ≤ 4mA	–	400	–	400	mV
Voltage	V_{OL}	V_{IN}^+ = 0V, V_{IN}^- ≥ 1V I_{SINK} ≤ 4mA -55°C ≤ T_A ≤ +125°C	–	700	–	700	mV

TABLE 1 (Continued)

V+ = 5V, V- = 0V; T_A = 25°C unless otherwise specified.

Characteristics	Symbol	Special Conditions	PM-139/883 LIMITS A Min	LIMITS A Max	LIMITS X Min	LIMITS X Max	Units
Output Leakage Current	I_{LEAK}	$V_{IN}^+ \geq 1V$, $V_{IN}^- = 0V$ $V_O = 30V$	–	500	–	500	nA
		$V_{IN}^+ \geq 1V$, $V_{IN}^- = 0V$ $V_O = 30V$ $-55°C \leq T_A \leq +125°C$	–	1000	–	1000	nA
Large Signal Response Time (Note 2)	t_r Large Signal	V_{IN} = 0V to 5V V_{REF} = 1.4V, V_{RL} = 5V R_L = 5.1kΩ	–	700	–	700	ns
Small Signal Response Time (Note 2)	t_r Small Signal	Low to High Transition V_{RL} = 5V, R_L = 5.1kΩ 100mV Input Step, 5mV Overdrive	–	5.0	–	5.0	µs
		High to Low Transition V_{RL} = 5V, R_L = 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 $-55°C \leq T_A \leq +125°C$	0 to 13.0	–	0 to 13.0	–	V

NOTES:
1. CMVR is guaranteed by V_{OS} 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

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 LIMITS A Min	LIMITS A Max	LIMITS X Min	LIMITS X Max	Units
Subgroup 1	I_{SY}	V+ = 30V, R_L = ∞ (Note 1)	–	2.0	–	2.0	mA
T_A = +25°C	V_{OS}	R_S = 0Ω, V_O = 1.4V	–	2.0	–	5.0	mV
	I_{OS}		–	25	–	25	nA
	I_B		–	±100	–	±100	nA
	CMR	V+ = 15V, R_L = 15kΩ V_{CM} = 1.5V, 13.5V	60.5	–	60.5	–	dB
	PSR	V+ = +5V, +18V	60.5	–	60.5	–	dB
	I_{SINK}	V_{IN}^+ = 0V, V_{IN}^- = 1V V_O = 1.5V	6.0	–	6.0	–	mA
	V_{OL}	I_{SINK} = 4mA V_{IN}^+ = 0V, V_{IN}^- = 1V	–	400	–	400	mV
	I_{LEAK}	V_{IN}^+ = 1V, V_{IN}^- = 0V V_O = 30V	–	500	–	500	nA
Subgroup 2	I_{SY}	V+ = 30V, R_L = ∞ (Note 1)	–	3.0	–	3.0	mA
T_A = +125°C	V_{OS}	R_S = 0Ω, V_O = 1.4V	–	4.0	–	9.0	mV
	I_{OS}		–	100	–	100	nA
	I_B		–	±300	–	±300	nA

TABLE 3

Group A Inspection (Continued)

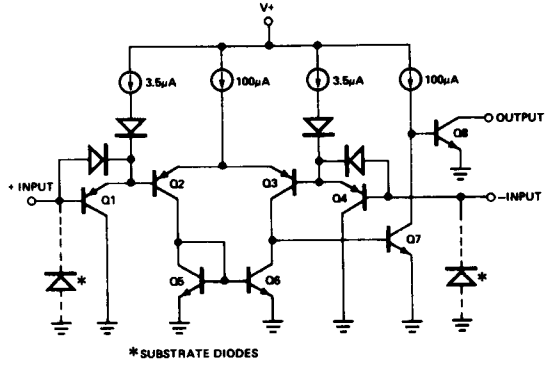
V+ = 5V, V- = 0V unless otherwise specified.

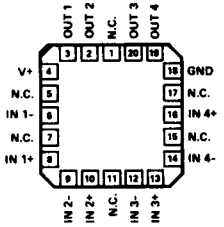
Subgroup	Symbol	Special Conditions	PM-139/883 LIMITS A Min	LIMITS A Max	LIMITS X Min	LIMITS X Max	Units
Subgroup 2 T_A = +125°C (Continued)	CMR	V+ = 15V, R_L = 15kΩ V_{CM} = 1.5V, 13V	60.5	–	60.5	–	dB
	PSR	V+ = +5V, +18V	60.5	–	60.5	–	dB
	I_{SINK}	V_{IN}^+ = 0V, V_{IN}^- = 1V V_O = 1.5V	5	–	5	–	mA
	V_{OL}	I_{SINK} = 4mA V_{IN}^+ = 0V, V_{IN}^- = 1V	–	700	–	700	mV
	I_{LEAK}	V_{IN}^+ = 0V, V_{IN}^- = 0V V_O = 30V	–	1000	–	1000	nA
Subgroup 3 T_A = -55°C		All Tests, Limits and Conditions are the same as for Subgroup 2.					
Subgroup 9 T_A = +25°C	t_r Large Signal	V_{IN} = 0V, 5V V_{REF} = 1.4V, V_{RL} = 5V R_L = 5.1kΩ	–	700	–	700	ns
	t_r Small Signal	Low to High Transition V_{RL} = 5V, R_L = 5.1kΩ 100mV Input Step 5mV Overdrive	–	5.0	–	5.0	µs
		High to Low Transition V_{RL} = 5V, R_L = 5.1kΩ 100mV Input Step 5mV Overdrive	–	2.5	–	2.5	µs

NOTES:
1. Total all four comparators.

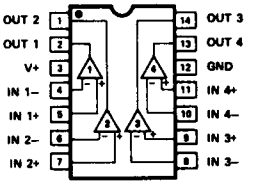
3.2.1 Simplified Schematic and Pin Connections.

(ONE COMPARATOR)





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



14-PIN HERMETIC DIP
(Y-Suffix)

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

4.2 Life Test/Burn-In Circuit.