Quad Low-Power Voltage Comparator

PM139

1.0 SCOPE

This specification documents the detailed requirements for Analog Devices space qualified die including die qualification as described for Class K in MIL-PRF-38534, Appendix C, Table C-II except as modified herein.

The manufacturing flow described in the STANDARD DIE PRODUCTS PROGRAM brochure at http://www.analog.com/marketSolutions/militaryAerospace/pdf/Die_Broc.pdf is to be considered a part of this specification.

This data sheet specifically details the space grade version of this product. A more detailed operational description and a complete data sheet for commercial product grades can be found at www.analog.com/PM139

2.0 Part Number.

The complete part number(s) of this specification follow:

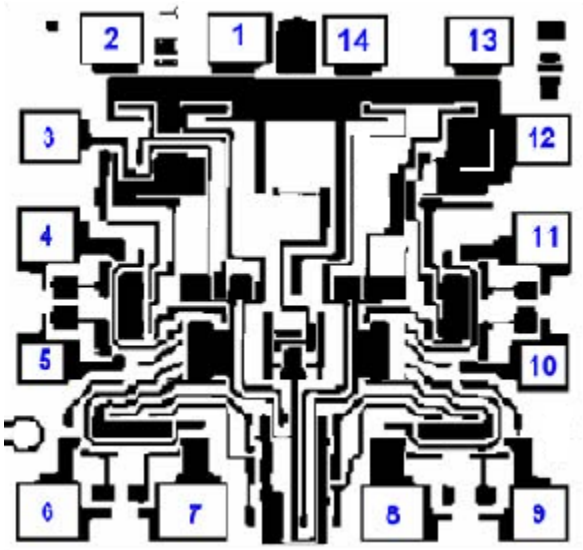
Part Number	Description
PM139-000C	Quad Low-Power Voltage Comparator
PM139R000C	Quad Low-Power Voltage Comparator with Radiation Guarantee

3.0 Die Information

3.1 Die Dimensions

Die Size	Die Thickness	Bond Pad Metalization
51 mil x 48 mil	19 mil ± 2 mil	Al/Cu

3.2 Die Picture



1. OUT 2
2. OUT 1
3. V+
4. IN 1-
5. IN 1+
6. IN 2-
7. IN 2+
8. IN 3-
9. IN 3+
10. IN 4-
11. IN 4+
12. GND
13. OUT 4
14. OUT 3

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3.3 Absolute Maximum Ratings 1/

Supply Voltage Range ..... 36V dc or ±18V dc
Input Voltage Range ..... -0.3V dc to 36V dc
Input Current (V_{IN} < -0.3V) 50mA
Sink Current ..... 20mA approximately
Storage Temperature ..... -65°C to +150°C
Ambient Operating Temperature Range ..... -55°C to +125°C
Junction Temperature (T_J).....150°C

Absolute Maximum Ratings Notes:
1/ Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.

4.0 Die Qualification

In accordance with class-K version of MIL-PRF-38534, Appendix C, Table C-II, except as modified herein.
(a) Qual Samples Size and Qual Acceptance Criteria – 25/2
(b) Qual Sample Package – DIP
(c) Pre-screen electrical test over temperature performed post-assembly prior to die qualification.

Table I - Dice Electrical Characteristics

Parameter	Symbol	Conditions 1/	Limit Min	Limit Max	Units
Input Offset Voltage	V_{IO}			±2	mV
Input Offset Current	I_{IO}	I_{IN+} - I_{IN-} with output in the linear range		25	nA
Input Bias Current	I_{IB}	I_{IN+} - I_{IN-} with output in the linear range		100	nA
Output Sink Current	I_{SINK}	$V_{IN-} \geq 1V, V_{IN+} = 0V,$ $V_O \leq 1.5V$	6		mA
Saturation Voltage	V_{SAT}	$V_{IN-} \geq 1V, V_{IN+} = 0V,$ $I_{SINK} \leq 4mA$		400	mV
Output Leakage Current	I_{LEAK}	$V_{IN-} = 0V, V_{IN+} \geq 1V$ dc $V_O = 30V$		0.5	µA
Supply Current	I_{CC}	$R_L = \infty, V+ = 30V$		3	mA
Input Voltage Common Mode Rejection Ratio	CMRR	$V+ = 15V, V_{CM} = 0V$ to 13.5V, $R_L \geq 15k\Omega$	60.5		dB

Table I Notes:
1/ V+ = +5V, V- = 0V, V_O = 1.4V, V_{IN} = 0V, and T_A = 25°C, unless otherwise specified.

Table II - Electrical Characteristics for Qual Samples						
Parameter	**Symbol**	**Conditions 1/**	**Sub-groups**	**Limit Min**	**Limit Max**	**Units**
Input Offset Voltage	V_{IO}		1		±2	mV
			2, 3		±4	
		2/	1		3	
Input Offset Current	I_{IO}	I_{IN+} - I_{IN-} with output in the linear range	1		±25	nA
			2, 3		±100	
		2/	1		±25	
Input Bias Current	I_{IB}	I_{IN+} - I_{IN-} with output in the linear range	1		±100	
			2, 3		±300	
		2/	1		±100	
Output Sink Current	I_{SINK}	$V_{IN-} \geq 1V$, $V_{IN+} = 0V$, $V_O \leq 1.5V$ 3/	1	6		mA
Saturation Voltage	V_{SAT}	$V_{IN-} \geq 1V$, $V_{IN+} = 0V$, $I_{SINK} \leq 4mA$	1		400	mV
			2, 3		700	
		2/	1		400	
Output Leakage Current	I_{LEAK}	$V_{IN-} = 0V$, $V_{IN+} \geq 1V$ dc, $V_O = 30V$	1		0.5	µA
			2, 3		1	
		2/			0.5	
Supply Current	I_{CC}	$R_L = \infty$, V+ = 30V	1, 2, 3		3	mA
		2/	1		2	
Input Voltage Common Mode Rejection Ratio	CMRR	V+ = 15V, $R_L \geq$ 15kΩ 3/ V_{CM} = 0V to 13.5V	1	60.5		dB
		V_{CM} = 0V to 13V	2, 3			

Table II Notes:

1/ V+ = +5V, V- = 0V, V_O = 1.4V, and V_{IN} = 0V, unless otherwise specified.

2/ Post 100Krad limit

3/ Not tested post irradiation.

Table III - Life Test Endpoint and Delta Parameter (Product is tested in accordance with Table II with the following exceptions)								
Parameter	**Symbol**	**Sub-groups**	**Post Burn In Limit**		**Post Life Test Limit**		**Life Test Delta**	**Units**
			Min	**Max**	**Min**	**Max**		
Input Offset Voltage	V_{IO}	1		±3.5		±5	±1.5	mV
		2, 3				±7		
Input Bias Current	I_{IB}	1		±115		±130	±15	nA
		2, 3				±330		
Input Offset Current	I_{IO}	1		±30		±35		nA
		2, 3				±100		

5.0 Life Test/Burn-In Information

5.1 HTRB is not applicable for this drawing.

5.2 Burn-in is per MIL-STD-883 Method 1015 test condition B or C.

5.3 Steady state life test is per MIL-STD-883 Method 1005.

Rev	Description of Change	Date
A	Initiate	07-Feb-02
B	Add CMVR for temperature different than subgroup 1. (0V to 13V)	10-Apr-02
C	Add 100Krad irradiation limits to table II. Update web address.	6-Jan-03
D	Correct die picture. Changed from LCC die picture to DIP die picture.	17-Feb-05
E	Update the 1.0 Scope Description	13-Jul-07
F	Update header/footer and add to 1.0 scope description.	Feb. 13,2008
G	Added Junction Temperature (T_J) 150°C to 3.3- Absolute Maximum Ratings	March 31, 2008
H	Updated Section 4.0c note to indicate pre-screen temp testing being performed.	6-JUN-2009
I	Updated fonts and font sizes to ADI standards and updated Die picture	1-OCT-2011

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