RELIABILITY REPORT

FOR

MAX5489ETE+

PLASTIC ENCAPSULATED DEVICES

January 28, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX5489ETE+ successfully meets the quality and reliability standards required of all Maxim products. In addition, Maxim's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim's quality and reliability standards.

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I. Device Description

A. General

The MAX5487/MAX5488/MAX5489 dual, linear-taper, digital potentiometers function as mechanical potentiometers with a simple 3-wire SPI(tm)-compatible digital interface that programs the wipers to any one of 256 tap positions. These digital potentiometers feature a nonvolatile memory (EEPROM) to return the wipers to their previously stored positions upon power-up. The MAX5487 has an end-to-end resistance of 10k , while the MAX5488 and MAX5489 have resistances of 50k and 100k , respectively. These devices have a low 35ppm/°C end-to-end temperature coefficient, and operate from a single +2.7V to +5.25V supply. The MAX5487/MAX5488/MAX5489 are available in 16-pin 3mm x 3mm x 0.8mm thin QFN or 14-pin TSSOP packages. Each device is guaranteed over the extended -40°C to +85°C temperature range.

II. Manufacturing Information

A. Description/Function:	Dual, 256-Tap, Nonvolatile, SPI-Interface, Linear-Taper Digital Potentiometers
B. Process:	E35
C. Number of Device Transistors:	
D. Fa brication Location:	Texas
E. Assembly Location:	Malaysia, Thailand
F. Date of Initial Production:	January 22, 2005

III. Packaging Information

A. Package Type:	16-pin TQFN 3x3 FLIP CHIP
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	None
E. Bondwire:	0.005HL
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-1182
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Ja:	N/A
K. Single Layer Theta Jc:	N/A
L. Multi Layer Theta Ja:	57.2°C/W
M. Multi Layer Theta Jc:	40°C/W

IV. Die Information

A. Dimensions:	91 X 94 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. B ackside Metallization:	None
E. Minimum Metal Width:	0.35µm
F. Minimum Metal Spacing:	0.35µm
G. Bondpad Dimensions:	5 mil. Sq.
H. Is olation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

A. Quality Assurance Contacts:	Don Lipps (Manager, Reliability Engineering) Bryan Preeshl (Vice President of QA)
B. Outgoing Inspection Level:	0.1% for all electrical parameters guaranteed by the Datasheet. 0.1% For all Visual Defects.
C. Observed Outgoing Defect Rate:	< 50 ppm
D. S ampling Plan:	Mil-Std-105D

VI. Reliability Evaluation

A. Accelerated Life Test

The results of the 125°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 192 \times 2}$$ (Chi square value for MTTF upper limit)

(where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$\lambda = 5.7 \times 10^{-9}$

λ = 5.7 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim"s reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maxim-ic.com/qa/reliability/monitor. Cumulative monitor data for the E35 Process results in a FIT Rate of 0.68 @ 25C and 11.68 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot CSE2AQ002 D/C 0438)

The DP21-2 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1
Reliability Evaluation Test Results

MAX5489ETE+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C	DC Parameters	48	0	DSE0BQ001A, D/C 0547
	Biased	& functionality	48	0	DSE0CA001C, D/C 0640
	Time = 192 hrs.		48	0	DSE0D3046A, D/C 0906
			48	0	CSE1AQ002B, D/C 0438

Note 1: Life Test Data may represent plastic DIP qualification lots.