

RELIABILITY REPORT
FOR
MAX19790ETX+
PLASTIC ENCAPSULATED DEVICES

November 12, 2012

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX19790ETX+ successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

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I. Device Description

A. General

The MAX19790 is a dual, general-purpose analog voltage variable attenuator (VVA) designed to interface with 50 systems operating in the 250MHz to 4000MHz frequency range. Each attenuator includes a control circuit that provides 22dB of attenuation range with a linear control slope of 10dB/V. Both attenuators share a common analog control and can be cascaded together to yield 44dB of total dynamic range, with a combined linear control slope of 20dB/V. The IC is a monolithic device designed on one of Maxim's proprietary SiGe BiCMOS processes. The device operates from a single +5.0V supply and is available in a compact, 36-pin thin QFN package (6mm x 6mm x 0.8mm) with an exposed pad. Electrical performance is guaranteed over the extended -40°C to +85°C temperature range.

II. Manufacturing Information

A. Description/Function:	250MHz to 4000MHz Dual, Analog Voltage Variable Attenuator
B. Process:	G4
C. Number of Device Transistors:	51914
D. Fabrication Location:	Oregon
E. Assembly Location:	China, Thailand
F. Date of Initial Production:	March 11, 2010

III. Packaging Information

A. Package Type:	36-pin TQFN 6x6
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-1375
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:	38°C/W
K. Single Layer Theta Jc:	1.0°C/W
L. Multi Layer Theta Ja:	28°C/W
M. Multi Layer Theta Jc:	1.0°C/W

IV. Die Information

A. Dimensions:	130 X 130 mils
B. Passivation:	Si ₃ N ₄
C. Interconnect:	Au
D. Backside Metallization:	None
E. Minimum Metal Width:	1.2 microns (as drawn) Metal 1, 2 & 3 5.6 microns (as drawn) Metal 4
F. Minimum Metal Spacing:	1.6 microns (as drawn) Metal 1, 2 & 3, 4.2 microns (as drawn) Metal 4
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO ₂
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

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|-----------------------------------|--|
| A. Quality Assurance Contacts: | Richard Aburano (Manager, Reliability Engineering)
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. Sampling Plan: | Mil-Std-105D |

VI. Reliability Evaluation

A. Accelerated Life Test

The results of the 150°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 96 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 11.4 \times 10^{-9}$$

$$\lambda = 11.4 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maximintegrated.com/qa/reliability/monitor>. Cumulative monitor data for the G4 Process results in a FIT Rate of 0.02 @ 25C and 0.37 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot NRE0BA041A D/C 1004)

The CR27 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX19790ETX+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C	DC Parameters	48	0	NRE0BA041A, D/C 1004
	Biased	& functionality	48	0	NRE0BQ001F, D/C 0438
	Time = 192 hrs.				

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