

RELIABILITY REPORT FOR MAX2769CETI+T

PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

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Approved by		
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Conclusion

The MAX2769CETI+T 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.

IV.Die Information

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- I. Device Description
 - A. General

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The MAX2769C is a next-generation Global Navigation Satellite System (GNSS) receiver covering L1/E1, B1, G1 bands for GPS, Galileo, BeiDou, and GLONASS satellite systems on a single chip. This single-conversion GNSS receiver is designed to provide high performance for industrial and wide range of consumer applications, including mobile handsets. Designed on Maxim's advanced, low-power SiGe BiCMOS process technology, the MAX2769C offers the highest performance and integration at a low cost. Incorporated on the chip is the complete receiver chain, including a dual-input LNA and mixer, followed by the image-rejection filter, Programmable Gain Amplifier (PGA) and a multibit ADC. The total cascaded noise figure of this receiver is as low as 1.4dB. In addition, the device includes an integrated VCO, a crystal oscillator, a fractional-N frequency synthesizer to program the LO frequency using different reference frequencies. The MAX2769C has the option to select one of the two LNAs for seperate Active and Passive Antenna inputs. LNA1 can be used with Passive Antenna input and LNA2 can be used for Active antenna input. Also, the MAX2769C completely eliminates the need for external IF filters by implementing on-chip monolithic filters and requires only a few external components to form a complete low-cost GPS RF receiver solution. Moreover, the device has the flexibility to configure the IF filter for various center frequencies and bandwidths using the SPI Interface. The device is the most flexible receiver on the market. The integrated delta-sigma fractional-N frequency synthesizer allows programming of the IF frequency within a \pm 30Hz (When f_{XTAL} \leq 32MHz) accuracy while operating with any reference or crystal frequencies that are available in the host system. The ADC outputs CMOS logic levels with 1 or 2 quantized bits for both I and Q channels, or up to 3 quantized bits for the I channel. I and Q analog outputs are also available which will bypass the on-chip ADCs. The MAX2769C is packaged in a 5mm x 5mm, 28-pin

II. Manufacturing Information



A. Description/Function:	Universal GNSS Receiver
B. Process:	MB3
C. Number of Device Transistors:	68846
D. Fabrication Location:	USA
E. Assembly Location:	Taiwan, China, Thailand
F. Date of Initial Production:	September 23, 2016

III. Packaging Information

Α.	Package Type:	28-pin TQFN 5x5
В.	Lead Frame:	Copper
C.	Lead Finish:	100% matte Tin
D.	Die Attach:	Conductive
Ε.	Bondwire:	Au (1 mil dia.)
F.	Mold Material:	Epoxy with silica filler
G.	Assembly Diagram:	#05-9000-2197
Н.	Flammability Rating:	Class UL94-V0
I. (Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J.	Single Layer Theta Ja:	47°C/W
K.	Single Layer Theta Jc:	2.1°C/W
L.	Multi Layer Theta Ja:	29°C/W
M.	Multi Layer Theta Jc:	2.1°C/W

IV. Die Information

Α.	Dimensions:	91.7323X84.6457 mils
В.	Passivation:	BCB
C.	Interconnect:	Al with top layer 100% Cu
D.	Backside Metallization:	None
E.	Minimum Metal Width:	0.23 microns (as drawn)
F.	Minimum Metal Spacing:	0.23 microns (as drawn)
G.	Bondpad Dimensions:	
Н.	Isolation Dielectric:	SiO ₂
I.	Die Separation Method:	Wafer Saw



V. Quality Assurance Information

Α.	Quality Assurance Contacts:	Eric Wright (Reliability Engineering) Bryan Preeshl (Vice President of QA)
В.	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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (\mathfrak{X}) is calculated as follows:

$$\lambda = \underbrace{1}_{\text{MTTF}} = \underbrace{1.83}_{192 \text{ x} 4340 \text{ x} 80 \text{ x} 2}$$
(Chi square value for MTTF upper limit)
(where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)
$$\lambda = 13.7 \text{ x} 10^{-9}$$
$$\lambda = 13.7 \text{ F.I.T.} (60\% \text{ confidence level @ 25°C})$$

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 MB3 Process results in a FIT Rate of 0.08 @ 25C and 1.33 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing

The WV10-0 die type has been found to have all pins able to withstand an HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-100mA and overvoltage per JEDEC JESD78.



Table 1 Reliability Evaluation Test Results

MAX2769CETI+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS	
Static Life Test (Note 1)						
	Ta = 135C	DC Parameters	80	0		
	Biased	& functionality				
	Time = 192 hrs.					

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