

RELIABILITY REPORT
FOR
MAX41470GTC+
MAX41470GTC+T

October 15, 2020

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134



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Conclusion

The MAX41470 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 MAX41470 is a high-performance, low-power receiver that is ideal for amplitude shift-keyed (ASK) and frequency shift-keyed (FSK) data. The receiver can be configured for three popular sub-1GHz bands while using a single low-cost 16MHz crystal: 287MHz to 320MHz, 425MHz to 480MHz, and 860MHz to 960MHz.

The MAX41470 is capable of both ASK and FSK reception and is also fully programmable through an SPI interface.

The receiver has excellent RF sensitivity and allows input signals up to 0dBm of power at the RF input. With an integrated IF filter, a few external components, and low operating/power-down currents, the MAX41470 receiver is ideal for cost- and power-sensitive applications. The chip also includes a low-noise amplifier (LNA), fully differential image-rejection mixer, on-chip phase-locked loop (PLL) with integrated voltage-controlled oscillator (VCO), received signal strength indicator (RSSI), and digital demodulation.

The device operates in the 1.8V to 3.6V supply voltage range and also features a power-saving, fully programmable, self-polling (duty cycling) mode with preamble detection and interrupt output to wake up an external microcontroller unit (MCU).

The parts are available in a 12-pin thin QFN (TQFN) package and are specified for the -40°C to +105°C extended temperature range.

II. Manufacturing Information

A. Description/Function:	290MHz to 960MHz ASK/FSK Receiver with SPI Interface
B. Process:	TS18
C. Device Count:	338212
D. Fabrication Location:	Taiwan
E. Assembly Location:	Thailand, Taiwan
F. Date of Initial Production:	June 7, 2020

III. Packaging Information

A. Package Type:	TQFN
B. Lead Frame:	CU194
C. Lead Finish:	Matte Tin
D. Die Attach:	AB8200T/EN4900G
E. Bondwire:	1 mil Au
F. Mold Material:	G770HCD/G770HJ
G. Assembly Diagram:	05-101479
H. Flammability Rating:	UL-94 (V-0 Rating)
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Ja:	59.30 °C/W
K. Single Layer Theta Jc:	6 °C/W
L. Multi Layer Theta Ja:	41 °C/W
M. Multi Layer Theta Jc:	6 °C/W

IV. Die Information

A. Dimensions:	77.5X69 mils
B. Passivation:	SiO/SiN

V. Quality Assurance Information

A. Quality Assurance Contacts:	Ryan Wall (Manager, Reliability) Michael Cairnes (Executive Director, Reliability) Bryan Preeshl (SVP 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 125C biased (static) life test are shown in Table 1. Using these results, the Failure Rate λ is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 2454 \times 80 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

(where 2454 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$$\lambda = 24.3 \times 10^{-9}$$

$$\lambda = 24.3 \text{ FITs (60\% confidence level @25°C)}$$

Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <https://www.maximintegrated.com/en/support/qa-reliability/reliability/reliability-monitor-program.html>.

TS18 cumulative process Fit

$$\lambda = 0.03 \text{ FITs (60\% confidence level @25°C)}$$

$$\lambda = 0.35 \text{ FITs (60\% confidence level @55°C)}$$

B. ESD and Latch-Up Testing

The MAX41470 has been found to have all pins able to withstand an HBM transient pulse of ± 2500 V per JEDEC / ESDA JS-001. Latch-Up testing has shown that this device withstands ± 250 mA current injection and supply overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results
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TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 125°C Biased Time = 192 hrs.	DC parameters & functionality	80	0	

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