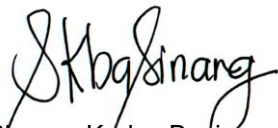


RELIABILITY REPORT
FOR
MAX33250EELC+, MAX33250EELC+T

July 11, 2022

Analog Devices

160 RIO ROBLES
SAN JOSE, CA 95134



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Conclusion

The MAX33250E successfully meets the quality and reliability standards required of all Analog Devices products. In addition, Analog Devices' continuous reliability monitoring program ensures that all outgoing product will continue to meet Analog Devices' quality and reliability standards.

Table of Contents

I.Device Description	IV.Die Information
II.Manufacturing Information	V.Quality Assurance Information
III.Packaging Information	VI.Reliability Evaluation
.....Attachments	

I. Device Description

A. General

The MAX33250E and MAX33251E are isolated 2Tx/2Rx and 1Tx/1Rx RS-232 transceivers, respectively, with a galvanic isolation of 600VRMS (60sec) between the logic UART side and field side. The isolation barrier protects the logic UART side from electrical transient strikes from the field side. It also breaks ground loops and large differences in ground potentials between the two sides that can potentially corrupt the receiving and sending of data. The MAX33250E and MAX33251E conform to the EIA/ TIA-232E standard and operate at data rates up to 1Mbps.

The isolated RS-232 transceivers have integrated charge pumps and an inverter to eliminate the need for a high positive and negative voltage supply. Both devices also have integrated charge pump and inverter capacitors to help further reduce PCB space. The supply pin VCCA on the UART logic side operates from a dual voltage supply from +3V to +5.5V. VCCB also operates from +3V to +5.5V, simplifying power requirements and enabling level translation between the two voltages. The transmitters and receivers on the field side of these devices are rated for ±15kV of ESD HBM protection, suitable for applications where RS-232 cables are frequently worked on.

Both are available in a 12-pin, 6mm x 6mm LGA package and operate over the -40°C to +85°C temperature range.

II. Manufacturing Information

A. Description/Function:	600V Isolated 2Tx/2Rx and 1Tx/1Rx RS-232 Transceiver with ±15kV ESD and Integrated Capacitors
B. Process:	N/A (Hybrid)
C. Device Count:	N/A
D. Fabrication Location:	USA
E. Assembly Location:	China
F. Date of Initial Production:	October 10, 2018

III. Packaging Information

A. Package Type:	12L Thin LGA
B. Lead Frame:	N/A
C. Lead Finish:	AuNi
D. Die Attach:	EM760L2-P
E. Bondwire:	1 mil Au
F. Mold Material:	GE100-LFCS
G. Flammability Rating:	UL-94 (V-0 Rating)
H. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 3
I. Single Layer Theta Ja:	114 °C/W
J. Single Layer Theta Jc:	31 °C/W
K. Multi Layer Theta Ja:	N/A
L. Multi Layer Theta Jc:	N/A

IV. Die Information

A. Dimensions:	61.81 x 109.84 mils
B. Passivation:	N/A

V. Quality Assurance Information

A. Quality Assurance Contacts:	Ryan Wall (Manager, Reliability) Mike McCullar (VP 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{1000 \times 2454 \times 240 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 1.55 \times 10^{-9}$$

$$\lambda = 1.55 \text{ FITs (60\% confidence level @25°C)}$$

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

B. ESD and Latch-Up Testing

The MAX33250E 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
MAX33250EELC+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 125°C Biased Time = 1000 hrs.	DC parameters & functionality	80	0	
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Note 1: Life Test Data may represent plastic DIP qualification lots.