

RELIABILITY REPORT
FOR
MAX22191AUT+
PLASTIC ENCAPSULATED DEVICES

May 15, 2018

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134



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Conclusion

The MAX22191 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 MAX22191 is an IEC 61131-2 compliant, industrial digital input (DI) device that translates a 24V digital industrial input to a 2.4mA (typ) current for driving optical isolators. Voltage thresholds and current levels in the MAX22191 are compliant with Type 1 and Type 3 inputs, while minimizing power dissipation. The MAX22191 is also compliant with 48V inputs, with the addition of external resistors.

II. Manufacturing Information

A. Description/Function:	Parasitically Powered Digital Input
B. Process:	S18
C. Device Count:	956
D. Fabrication Location:	Japan
E. Assembly Location:	Thailand, Malaysia
F. Date of Initial Production:	May 8, 2018

III. Packaging Information

A. Package Type:	SOT23
B. Lead Frame:	CU194
C. Lead Finish:	Matte Tin
D. Die Attach:	Ablebond 84-1LMISR4
E. Bondwire:	1 mil Au
F. Mold Material:	CEL9220HF13, G600
G. Flammability Rating:	UL-94 (V-0 Rating)
H. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
I. Single Layer Theta Ja:	N/A
J. Single Layer Theta Jc:	80 °C/W
K. Multi Layer Theta Ja:	115 °C/W
L. Multi Layer Theta Jc:	80 °C/W

IV. Die Information

A. Dimensions:	31.9x34.6 mils
B. Passivation:	40nm SiN 18KA SiO2

V. Quality Assurance Information

- | | |
|-----------------------------------|--|
| A. Quality Assurance Contacts: | Ryan Wall (MTS, Reliability)
Brian Standley (Manager, 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>.

S18 Quarterly Process FIT from Q4FY17

$$\lambda = 0.3 \text{ FITs (60\% confidence level @25°C)}$$

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

The MAX22191AUT+ 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

MAX22191AUT+

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

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