

RELIABILITY REPORT

FOR

MAX20342EWG+  
MAX20342EWG+T

November 4, 2020

**MAXIM INTEGRATED**

160 RIO ROBLES  
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## Conclusion

The MAX20342 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 MAX20342 is a USB Type-C® charger detector that is also capable of detecting chargers compliant with the USB Battery Charging Specification Revision 1.2. The USB Type-C charger detection circuitry functions as a UFP or DRP depending on factory configuration.

The device implements USB Type-C detection logic and enables systems to support charging based on USB Type-C ports. The device also includes charger detection capability for BC1.2 compatible chargers and detects USB standard downstream ports (SDPs), USB charging downstream ports (CDPs), dedicated charger ports (DCPs), and other proprietary chargers. GPIO outputs allow the MAX20342 to control an external lithium-ion (Li+) battery charger based on charger detection results.

The MAX20342 integrates a resistance detection block that can be used to automatically configure factory configuration states based upon attached resistors. Additionally, the resistance measurement can be configured to detect the presence of moisture in the USB Type-C connector.

The MAX20342 also features an integrated low onresistance, low-capacitance double-pole double-throw (DPDT) USB switch that can pass Hi-Speed USB, fullspeed USB, low-speed USB, and UART signals. The switch position can be automatically configured by the USB detection logic or manually controlled.

The MAX20342 features high-ESD protection up to  $\pm 15\text{kV}$  human-body model (HBM) on CC1, CC2, SBU1, and SBU2 pins. The CDP and CDN pins are protected against ESD up to  $\pm 6\text{kV}$ . The MAX20342 is specified for  $\pm 15\text{kV}$  Air-Gap and  $\pm 8\text{kV}$  Contact Discharge IEC 61000- 4-2 on the CC1, CC2, SBU1, and SBU2 pins. The MAX20342 is available in a 24-bump, 0.4mm pitch, 2.62mm x 2.02mm wafer-level package (WLP) and operates over the  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  extended temperature range.

**II. Manufacturing Information**

A. Description/Function:	USB Type-C Charger Detector with Integrated OVP
B. Process:	P90
C. Device Count:	370806
D. Fabrication Location:	Japan
E. Assembly Location:	Taiwan
F. Date of Initial Production:	July 8, 2020

**III. Packaging Information**

A. Package Type:	WLP
B. Lead Frame:	N/A
C. Lead Finish:	SAC125Ni
D. Die Attach:	N/A
E. Bondwire:	N/A
F. Mold Material:	N/A
G. Assembly Diagram:	05-101471
H. Flammability Rating:	N/A
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Ja:	N/A
K. Single Layer Theta Jc:	N/A
L. Multi Layer Theta Ja:	53.04 °C/W
M. Multi Layer Theta Jc:	N/A

**IV. Die Information**

A. Dimensions:	104.3307X80.7086 mils
B. Passivation:	SiO <sub>2</sub> /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  $\lambda$  is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 2454 \times 79 \times 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$$\lambda = 24.61 \times 10^{-9}$$

$$\lambda = 24.61 \text{ FITs (60\% confidence level @25°C)}$$

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>.

P90 cumulative process Fit

$$\lambda = 0.11 \text{ FITs (60\% confidence level @25°C)}$$

$$\lambda = 1.28 \text{ FITs (60\% confidence level @55°C)}$$

### B. ESD and Latch-Up Testing

The MAX20342 has been found to have all pins able to withstand an HBM transient pulse of  $\pm 1500$  V per JEDEC / ESDA JS-001. Latch-Up testing has shown that this device withstands  $\pm 250$  mA current injection and supply overvoltage per JEDEC JESD78.

**Table 1**  
Reliability Evaluation Test Results  
**MAX20342EWG+**

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	79	0	

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