RELIABILITY REPORT

FOR

MAX31341BEWC+
MAX31341BEWC+T

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MAXIM INTEGRATED

160 RIO ROBLES

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Conclusion

The MAX31341B 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.

Table of Contents

I. Device Description

A. General

The MAX31341B low-current, real-time clock (RTC) is a time-keeping device that provides nanoamperes timekeeping current, extending battery life. The MAX31341B supports 6pF high-ESR crystals, which broaden the pool of usable crystals for the devices. This device is accessed through an I2C serial interface. The device features one digital Schmitt trigger input and one programmable threshold analog input. The device generates an interrupt output on a falling or rising edge of the digital input (D1), or when the analog input (AIN) voltage crosses a programmed threshold in either direction. An integrated power-on reset function ensures deterministic default register status upon power-up. Other features include two time-of-day alarms, interrupt outputs, a programmable square-wave output, a serial bus timeout mechanism, and a 64-byte RAM for user data storage. The clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The date at the end of the month is automatically adjusted for months with fewer than 31 days, including corrections for leap year. The clock operates in 24-hour format. The MAX31341B also includes an input for synchronization. When a reference clock (e.g., 32kHz, 50Hz/60Hz Power Line, GPS 1PPS) is present at the CLKIN pin and the enable external clock input bit (ECLK) is set to 1, the MAX31341B RTC is frequency-locked to the external clock and the clock accuracy is determined by the external source.

II. Manufacturing Information

A. Description/Function:	Low-Current, Real-Time Clock with I2C Interface and Power Management
B. Process:	S18
C. Device Count:	91592
D. Fabrication Location:	USA
E. Assembly Location:	China
F. Date of Initial Production:	June 2019

III. Packaging Information

A. Package Type:	12-bump WLP
B. Lead Frame:	N/A
C. Lead Finish:	N/A
D. Die Attach:	N/A
E. Bondwire:	N/A
F. Mold Material:	N/A
G. Assembly Diagram:	05-100608
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:	N/A
K. Single Layer Theta Jc:	N/A
L. Multi Layer Theta Ja:	61.89 °C/W
M. Multi Layer Theta Jc:	N/A

IV. Die Information

A. Dimensions:	78.7401X59.0551 mils
B. Passivation:	Si_3N_4/SiO_2

V. Quality Assurance Information

A. Quality Assurance Contacts:	Norbert Gerena (Engineer, 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:

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

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

$$\lambda = 24.31\ x\ 10^{-9}$$

$$\lambda = 24.31\ FITs\ (60\%\ confidence\ level\ @25°C)$$

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.

MFN S18 Quarterly Process FIT from Q2CY19

$$\lambda = 0.2\ FITs\ (60\%\ confidence\ level\ @25°C)$$

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

The MAX31341B has been found 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

MAX31341B

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.