

RELIABILITY REPORT
FOR
MAX13342EETD+
PLASTIC ENCAPSULATED DEVICES

February 2, 2012

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX13342EETD+ successfully meets the quality and reliability standards required of all Maxim products. In addition, Maxim's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim's quality and reliability standards.

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I. Device Description

A. General

The MAX13342E/MAX13345E USB-compliant transceivers are designed to minimize the area and external components required to interface low-voltage ASICs to USB. The devices comply with USB 2.0 specification for full-speed-only (12Mbps) operation. The transceivers include an internal 3.3V regulator, an internal 1.5k Ω D+ pullup resistor, and built-in ± 15 kV ESD protection circuitry to protect the USB I/O ports (D+, D-). The MAX13345E also has internal series resistors, allowing these components to be wired directly to a USB connector. These devices operate with logic-supply voltages as low as +2.3V, ensuring compatibility with low-voltage ASICs. A low power mode reduces current consumption to less than 45 μ A. An enumerate function allow devices to logically disconnect while remaining plugged in. The MAX13342E has controlled output impedance of 2 Ω (max) on D+/D-, allowing the use of external switches to multiplex two different USB devices onto a single USB connector. The MAX13345E had 43.5 Ω (max) internal resistors on D+/D- for direct connection to the USB connector. The MAX13342E/MAX13345E are equipped with DAT and SE0 interface signals. These transceivers provide a USB detection function that monitors the presence of USB VBUS and signals the event. These devices operate over the extended -40°C to +85°C temperature range and are available in UCSP(tm) 2.0mm x 1.5mm and 14-pin TDFN (3mm x 3mm) packages.

II. Manufacturing Information

A. Description/Function:	3-Wire Interface Full-Speed USB Transceiver With/Without Internal Series Resistors
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	Texas
E. Assembly Location:	China
F. Date of Initial Production:	October 21, 2006

III. Packaging Information

A. Package Type:	14L TDFN 3x3
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-2530 / A
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	1
J. Single Layer Theta Ja:	54°C/W
K. Single Layer Theta Jc:	8°C/W
L. Multi Layer Theta Ja:	41°C/W
M. Multi Layer Theta Jc:	8°C/W

IV. Die Information

A. Dimensions:	84 X 61 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.8 microns (as drawn)
F. Minimum Metal Spacing:	0.8 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO ₂
I. Die Separation Method:	Wafer Saw

V. Quality Assurance Information

- A. Quality Assurance Contacts: Richard Aburano (Manager, Reliability Engineering)
Don Lipps (Manager, Reliability Engineering)
Bryan Preeshl (Vice President 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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 48 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

(where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$$\lambda = 22.9 \times 10^{-9}$$

$$\lambda = 22.9 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maxim-ic.com/qa/reliability/monitor>. Cumulative monitor data for the B8 Process results in a FIT Rate of 0.06 @ 25C and 0.99 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot TQM CBQ001 D/C 0627)

The RU02-2 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1
Reliability Evaluation Test Results

MAX13342EETD+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	N/A

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