

TEXAS INSTRUMENTS

Qualification Notification for the SN74CBT16209A, Die Revision E and SN74CBT16212A, Die Revision D

April 1, 1998

Abstract

Texas Instruments has qualified a device revision for the CBT16212A, die revision 'D' and the SN74CBT16209A, die revision 'E'. These devices were redesigned in order to incorporate improved ESD protection circuitry. Revision to the 'A' device is necessary because of the changes to propagation delay values and input/output capacitance values.

Data sheet changes are attached and in underlined bold italics. Device nomenclature has changed due to data sheet adjustments. This change is not expected to adversely affect customers.

Analysis

Changes included an all-level change in design to incorporate improved ESD protection circuitry. ESD data for these devices is listed with the reliability test results.

Table 1 lists the device and die nomenclature change. Table 2 summarizes the construction details for the test devices. Table 3 shows reliability test results for the test devices. Tables 4 and 5 show the data sheet changes, which are in underlined bold italics.

Table 1: Nomenclature Change

| Old Device | Old Die | New Device | New Die |
|--------------|---------|---------------|---------|
| SN74CBT16209 | B | SN74CBT16209A | E |
| SN74CBT16212 | B | SN74CBT16212A | D |

Conversion Schedule

The Freising Fabrication Facility will begin manufacture of the affected device immediately. The 'A' device was production released due to immediate chip support needs. Customers may continue to order the old CBT16212 and CBT16209 devices for 100 days after the date of this notification.

Sample Devices

Sample devices are available on request. Availability of some package types may be limited. Please contact your local Field Sales Office.

* Note: For package drawing, please reference Semiconductor Packaging information

(www.ti.com/sc/docs/psheets/mechanic.htm)

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Contact

If you should have questions or wish additional information, please contact your local Field Sales Office or the contacts listed below.

| Contact | Location | Organization | Telephone | E-Mail |
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Table 2: CBT16212A (Die Revision D) Tested Device Information

Reason for Qualification: Product Redesign

Group Attributes

| Grp | Relcode | Die Lot Number | Assembly Lot Number | DateCode /Lot Trace Code |
|-----|--------------------|---------------------------|---------------------|---------------------------|
| A | 95.CBT.03004 | 5029106 | N/A | 53A091S, 53A08YS, 53A093S |
| B | 94.CBT.10006 | 4225312, 4215852, 4229402 | N/A | RB A014, RB A015, RB A016 |
| C | 97.CBT.08029/08030 | 7161315 | 7159819 | 78A7HHM |
| D | 97.CBT.05014/06019 | 7070312 | 7128002 | 75A0072 |

| ATTRIBUTES | EPIC-1ZS Process Qualification | | Device Qualification | Device Qualification |
|-----------------------------|--------------------------------|-------------------|----------------------|----------------------|
| | Group A | Group B | Group C | Group D |
| Device Specific Info | | | | |
| Device Name | SN74CBT3384 | SN74CBT16209 | SN74CBT16209A | SN74CBT16212A |
| Die Revision | B | B | E | D |
| Die Master | SN74CBT3384 | SN74CBT16209 | SN74CBT16209 | SN74CBT16209 |
| Die Dimension | 062 X 076 mils | 062 X 205 mils | 202 X 056 mils | 202 X 056 mils |
| Shrink | 100 | 100 | 100 | 100 |
| Wafer Fab Info | | | | |
| Fab Site | Freising, Germany | Freising, Germany | Freising, Germany | Freising, Germany |
| Fab Technology | CMOS 0.8u | CMOS 0.8u | CMOS 0.8 u | CMOS 0.8u |
| Fab Process | EPIC-1ZS | EPIC-1ZS | EPIC-1ZS | EPIC-1ZS |
| Process Code | None | None | None | None |
| Metal 1 | TiW/AICu2% | TiW/AICu2% | TiW/AICu2% | TiW/AICu2% |
| Metal 2 | TiW/AICu2% | TiW/AICu2% | TiW/AICu2% | TiW/AICu2% |
| Passivation | 10KA CN | 10KA CN | 10KA CN | 10KA CN |
| Assy/Test Info | | | | |
| Assy Site | Sherman | Sherman | Mexico | Sherman |
| Mold | Plaskon 7060 | Plaskon 7060 | HYS 9AS | Plaskon 7060 |
| Mount Comp | Hit EN-4088Z | Hit EN-4088Z | Hit EN-4088Z | Hit EN-4088Z |
| Bond Type/Matl | TS-1.2 Au | TS-1.2 Au | TS-0.95 Au | TS-1.2 Au |
| Package Info | | | | |
| Package Type | DW | DL | DL | DL |
| Pin Count | 24 | 48 | 48 | 56 |
| Leadframe Finish | Pd Plate | Pd Plate | Pd Plate | Pd Plate |
| Leadframe Comp | Cu | Cu | Cu | Cu |
| Leadframe P/N | | | 4081594-0001 | 1031410-006 |

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Table 3: Reliability Test Results

| Qualification Results | EPIC-1ZS Process Qualification | | Device Qualification | Device Qualification |
|-----------------------------------------------------|--------------------------------|-----------------|----------------------|----------------------|
| | Group A | Group B | Group C | Group D |
| | SN74CBT3384DW | SN74CBT16209DL | SN74CBT16209ADL | SN74CBT16212ADL |
| | Act. SS/ #Fails | Act. SS/ #Fails | Act. SS/ #Fails | Act. SS/ #Fails |
| *Operating Life Static Test (150°C 5.0V ,300 Hours) | | 348/0 | 116/3 <a> | |
| *THB 85%/85RH (1000 hours) | 348/0 | | | |
| *Autoclave (121°C, 96 hours) | 228/0 | | | |
| *Temperature Cycle Test (-65°C to 150°C, 1000 Cyc) | 348/0 | | 116/0 | |
| E-Ray | | | 5/0 | |
| Latch-up | | | 5/0 | |
| Electrical Characterization | Pass | Pass | Pass | Pass |
| Manufacturability | Pass | Pass | Pass | Pass |

* Preconditioning sequence: Level 1

** Electrical Characterization data available upon request.

Notes:

- Storage at 125°C for 24 hours, then
- 85°C/85 % relative humidity for 168 hours with no bias, then
- Board mount (DGG, PH, PM, PN, PZ and RC packages only), then
- 3 cycles of a 215° C IR solder reflow simulation and a 5 minute room temp delay, then
- Device clean-up with an isopropyl alcohol rinse, a de-ionized water rinse and one hour 25°C drying period.

Qualification Devices ESD Data

| | SN74CBT16209A | SN74CBT16212A |
|-----------|---------------|---------------|
| ESD - MM | 150V | 200V |
| ESD - HBM | 2000V | 2000V |

Thermal Comprehensive Data Table

| Pin Count | Package Design | JEDEC SPEC | Pad Size (mils) | Chip Size (mils) | T _{ja} (°C/W) airflow in Lfm | | | | Data Source | T _{jc} (°C/W) |
|-----------|----------------|------------|-----------------|------------------|---------------------------------------|------|------|------|-------------|------------------------|
| | | | | | | | | | | |
| 48 | DL | MS-118 | 120X180 | 73X128 | 93.5 | 69.9 | 63.8 | 57.1 | Model | 26 |
| 56 | DL | MS-118 | 150X220 | 120X120 | 73.5 | 62.3 | 59 | 54.6 | Actual | 27.3 |
| 48 | DGG | MS-153 | 4.6X3.2mm | 120X120 | 89.1 | 78.5 | 75.1 | 69.4 | Actual | 25.2 |
| 48 | DGV | MS-194 | 100X240 | 62X186 | 92.9 | 80.9 | 77.1 | 71 | Actual | 27.2 |

Failure Analysis:

<a> SSLT 150°C, 5.0V - parametric - S01-07039 - device failures were due to electrical overstress (EOS) damage to the input structure of data sheet pin S0 (pin 1).

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Table 4: CBT16209A, 'E' die revision (replacing the CBT16209, 'B' die revision)

| PAR. | FROM (INPUT) | TO (OUTPUT) | $V_{CC} = 4 V$ $T_a = \text{MIN TO MAX}$ | | | | | | unit |
|------|--------------|-------------|---------------------------------------------|-----|------|-----------|-----|-------------|------|
| | | | CBT16209 | | | CBT16209A | | | |
| | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| tpd | S | A or B | | | 11.3 | | | 9.9 | ns |
| ten | S | A or B | | | 11.5 | | | 10.3 | ns |
| tdis | S | A or B | | | 12.1 | | | 9.3 | ns |

| PAR. | FROM (INPUT) | TO (OUTPUT) | $V_{CC} = 4.5 V \text{ to } 5.5 V$ $T_a = \text{MIN TO MAX}$ | | | | unit |
|------|--------------|-------------|-----------------------------------------------------------------|------|------------|------------|------|
| | | | CBT16209 | | CBT16209A | | |
| | | | MIN | MAX | MIN | MAX | |
| tpd | S | A or B | 2.6 | 10.2 | 1.5 | 9.0 | ns |
| ten | S | A or B | 2.7 | 10.6 | 1.5 | 9.8 | ns |
| tdis | S | A or B | 1.2 | 11.3 | 1.5 | 8.8 | ns |

Table 5: CBT16212A, 'D' die revision (replacing the CBT16212, 'B' die revision)

| PAR. | FROM (INPUT) | TO (OUTPUT) | $V_{CC} = 4 V$ $T_a = \text{MIN TO MAX}$ | | | | | | unit |
|------|--------------|-------------|---------------------------------------------|-----|------|-----------|-----|-------------|------|
| | | | CBT16212 | | | CBT16212A | | | |
| | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| tpd | S | A or B | | | 11.3 | | | 10 | ns |
| ten | S | A or B | | | 11.5 | | | 10.4 | ns |
| tdis | S | A or B | | | 12.1 | | | 9.2 | ns |

| PAR. | FROM (INPUT) | TO (OUTPUT) | $V_{CC} = 4.5 V \text{ to } 5.5 V$ $T_a = \text{MIN TO MAX}$ | | | | unit |
|------|--------------|-------------|-----------------------------------------------------------------|------|------------|------------|------|
| | | | CBT16212 | | CBT16212A | | |
| | | | MIN | MAX | MIN | MAX | |
| tpd | S | A or B | 2.6 | 10.2 | 1.5 | 9.1 | ns |
| ten | S | A or B | 2.7 | 10.6 | 1.5 | 9.7 | ns |
| tdis | S | A or B | 1.2 | 11.3 | 1.5 | 8.8 | ns |

| Ci | Control inputs | $V_{CC} = 5.5 V$ $T_a = \text{MIN TO MAX}$ | | | | | | unit |
|----|----------------|-----------------------------------------------|-----|-----|-----------|-----|------------|------|
| | | CBT16212 | | | CBT16212A | | | |
| | | MIN | TYP | MAX | MIN | TYP | MAX | |
| | | | | 4 | | | 2.5 | pF |