



PRODUCT/PROCESS CHANGE NOTIFICATION
Generic Copy

24-JUL-2001

SUBJECT: ON Semiconductor Product/Process Change Notification #11590

TITLE: Wafer Capacity Expansion Of General Purpose Bipolar Small Signal Transistors

EFFECTIVE DATE: 22-Sep-2001

AFFECTED CHANGE CATEGORY: On Semiconductor Fab Site

AFFECTED PRODUCT DIVISION: Bipolar Discretes Products

ADDITIONAL RELIABILITY DATA: Available

Contact your local ON Semiconductor Sales Office or Laura Rivers <S20636@onsemi.com >

SAMPLES: Contact Below

Contact your local ON Semiconductor Sales Office or Monica Griffin <R39205@onsemi.com>

FOR ANY QUESTIONS CONCERNING THIS NOTIFICATION:

Contact Sales Office or Monica Griffin <R39205@onsemi.com>

DISCLAIMER:

Initial Product/Process Change Notification (IPCN) - First Notification distributed to customers.
Distributed at least 120 days from the effective date of the change.

Final Product/Process Change Notification (FPCN) - Final Notification completing the notification process. Distributed at least 60 days from the effective date of the change. ON Semiconductor will consider this change approved unless specific conditions of acceptance are provided in writing within 30 days of receipt of this notice. To do so, contact your local ON Semiconductor Sales Office.

DESCRIPTION AND PURPOSE:

In order to prepare for the growing unit demands on General Purpose BiPolar Small Signal Transistors, we have qualified a 2nd wafer fab for production. In addition to ISMF, these transistors are now qualified for production in our foundry: Primarion, in Tempe, AZ, USA. Primarion has been a BiPolar Small Signal Products fabrication supplier for ON Semiconductor for over 2 years and currently produces General Purpose High Voltage, High Frequency, and RF transistors, JFETs, and Tuning, Switching, and Signal Schottky Diodes. This is a notification of a 2nd source. ISMF will continue to supply a portion of these wafers. Traceability of fabrication location will be maintained in internal documentation.



Product/Process Change Notification #11590

QUALIFICATION PLAN:

See Reliability Data.

RELIABILITY DATA SUMMARY:

Qualification by similarity to MMBT2369ALT1
(Same Wafer Technology: GNPT)

ON Semiconductor Reliability Report: #PDBA008C
Reliability Tests and Results:

Autoclave (121C, 60%RH, 15psig) 96hr - 0/84, 0/84, 0/84
Temp Cycle (-65C to 150C) 1000 cycle - 0/84, 0/84, 0/83
External Visual (all devices) - No Rejects
Die Bond (Bond Shear) - 0/5, 0/5, 0/5
Bond Strength (Wire Pull) - 0/5, 0/5, 0/5
H3TRB (85C, 85%RH) 1008 hrs - 0/84, 0/84, 0/84
HTRB (150C) 1008 hrs - 0/84, 0/84, 0/84
IOL (3min on, 3min off) 10000 cycle - 0/84, 0/84, 0/83
ESD (HBM >= 16kV, MM >= 2kV, Class "N") - 0/14, 0/14, 0/14

Additional Reliability Data:
(96hour Reliability Audit Process)

MMBT3904LT1:

H3TRB - 0/56
HTRB - 0/56
HAST - 0/56
IOL - 0/56
T/C - 0/56
AC - 0/56
HTSL - 0/56
SD - 0/22
SH - 0/22

MMBT2222ALT1:

H3TRB - 0/56, 0/56, 0/56
HTRB - 0/56, 0/56, 0/56
HAST - 0/56, 0/56, 0/56
IOL - 0/56, 0/56, 0/56
T/C - 0/56, 0/56, 0/56
AC - 0/56, 0/56, 0/56
HTSL - 0/56, 0/56, 0/56
SD - 0/22, 0/22, 0/22
SH - 0/22, 0/22, 0/22



Product/Process Change Notification #11590

**ELECTRICAL CHARACTERISTIC SUMMARY:
MMBT2222ALT1 Electrical Characterization**

| Symbol | Cond1 | Cond2 | Limit | Unit | Min/Max |
|---------------|--------------|--------------|--------------|-------------|----------------|
| ICBO | 60V | 0A | 0.00000001 | A | Max |
| ICEX | 60V | 3V | 0.00000001 | A | Max |
| IEBO | 3V | 0A | 0.00000001 | A | Max |
| BVCEO | 0.01A | 0A | 40 | V | Min |
| BVCBO | 0.00001A | 0A | 75 | V | Min |
| BVEBO | 0.00001A | 0A | 6 | V | Min |
| HFE | 0V | 0.0001A | 35 | - | Min |
| HFE | 10V | 0.001A | 50 | - | Min |
| HFE | 10V | 0.01A | 75 | - | Min |
| HFE | 10V | 0.15A | 100-300 | - | Min-Max |
| HFE | 1V | 0.15A | 50 | - | Min |
| HFE | 10V | 0.5A | 40 | - | Min |
| VCESAT | 0.15A | 0.015A | 0.3 | V | Max |
| VCESAT | 0.5A | 0.05A | 1.0 | V | Max |
| VBESAT | 0.5A | 0.05A | 2 | V | Max |
| VBESAT | 0.15A | 0.015A | 0.6-1.2 | V | Min-Max |
| fT | 20V | 0.02A | 300 | MHz | Min |
| cibo | 0.5V | 0A | 25 | pF | Max |
| cobo | 10V | 0A | 8 | pF | Max |
| td | 30V | 0.15A | 10 | ns | Max |
| tr | 30V | 0.15A | 25 | ns | Max |
| ts | 30V | 0.15A | 225 | ns | Max |
| tf | 30V | 0.15A | 60 | ns | Max |

| Symbol | ISMF Average | ISMF Std Dev | Primarion Average | Primarion Std Dev |
|---------------|-------------------------|-------------------------|------------------------------|------------------------------|
| ICBO | 5.31E-11 | 4.01005E-11 | 8.44E-11 | 5.40207E-11 |
| ICEX | 9.36E-11 | 5.06218E-11 | 8.84E-11 | 4.33898E-11 |
| IEBO | 2.73E-10 | 4.17893E-10 | 5.41E-10 | 4.60212E-10 |
| BVCEO | 51.5 | 1.54 | 52.3 | 1.57 |
| BVCBO | 108 | 11.0 | 114 | 10.2 |
| BVEBO | 7.23 | 0.14 | 7.37 | 0.26 |
| HFE | 197 | 22.4 | 189 | 19.1 |
| HFE | 201 | 22.5 | 197 | 20.3 |
| HFE | 204 | 22.5 | 204 | 22.8 |
| HFE | 196 | 18.8 | 197 | 19.9 |
| HFE | 135 | 10.8 | 133 | 11.4 |
| HFE | 96.2 | 5.33 | 92.8 | 5.62 |
| VCESAT | 0.0993 | 0.008 | 0.0978 | 0.012 |
| VCESAT | 0.267 | 0.020 | 0.265 | 0.028 |
| VBESAT | 0.992 | 0.005 | 0.985 | 0.006 |
| VBESAT | 0.866 | 0.003 | 0.863 | 0.003 |
| fT | 347.8 | 13.4 | 372.1 | 9.6 |
| cibo | 17.1 | 0.68 | 16.9 | 1.08 |
| cobo | 3.21 | 0.03 | 3.07 | 0.15 |
| td | 4.6 | 0.1 | 4.4 | 0.1 |
| tr | 6.9 | 0.3 | 7.0 | 0.1 |
| ts | 162.7 | 29.1 | 194.7 | 3.1 |
| tf | 13.8 | 0.3 | 17.3 | 0.3 |



Product/Process Change Notification #11590

MMBT3904LT1 Electrical Characterization

| <u>Symbol</u> | <u>Cond1</u> | <u>Cond2</u> | <u>Limit</u> | <u>Unit</u> | <u>Min/Max</u> |
|---------------|--------------|--------------|--------------|-------------|----------------|
| ICEX | 30V | 3V | 5.00E-08 | A | Max |
| BVCEO | 0.001A | 0A | 40 | V | Min |
| BVCBO | 0.00001A | 0A | 60 | V | Min |
| BVEBO | 0.00001A | 0A | 6.0 | V | Min |
| HFE | 1.0V | 0.0001A | 40 | - | Min |
| HFE | 1.0V | 0.001A | 70 | - | Min |
| HFE | 1.0V | 0.01A | 100-300 | - | Min-Max |
| HFE | 1.0V | 0.05A | 60 | - | Min |
| HFE | 1.0V | 0.1A | 30 | - | Min |
| VCESAT | 0.01A | 0.001A | 0.2 | V | Max |
| VCESAT | 0.05A | 0.005A | 0.3 | V | Max |
| VBESAT | 0.01A | 0.001A | 0.65-0.85 | V | Min-Max |
| VBESAT | 0.05A | 0.005A | 0.95 | V | Max |
| fT | 20V | 0.010A | 300 | MHz | Min |
| cibo | 0.5V | 0A | 8.0 | pF | Max |
| cobo | 5.0V | 0A | 4.0 | pF | Max |

| <u>Symbol</u> | <u>ISMF</u> <u>Average</u> | <u>ISMF</u> <u>Std Dev</u> | <u>Primarion</u> <u>Average</u> | <u>Primarion</u> <u>Std Dev</u> |
|---------------|-------------------------------|-------------------------------|------------------------------------|------------------------------------|
| ICEX | 1.70E-10 | 1.93E-10 | 1.03E-10 | 1.05E-10 |
| BVCEO | 54.5 | 0.82 | 58.2 | 1.4 |
| BVCBO | 100.5 | 0.53 | 97.1 | 1.0 |
| BVEBO | 7.30 | 0.021 | 7.96 | 0.012 |
| HFE | 153.7 | 8.4 | 139.2 | 10.0 |
| HFE | 154.2 | 8.4 | 146.0 | 10.2 |
| HFE | 148.7 | 7.9 | 144.8 | 9.8 |
| HFE | 115.5 | 5.9 | 98.7 | 6.6 |
| HFE | 63.3 | 3.0 | 48.8 | 2.0 |
| VCESAT | 0.066 | 0.0031 | 0.051 | 0.0013 |
| VCESAT | 0.103 | 0.0022 | 0.093 | 0.0009 |
| VBESAT | 0.761 | 0.0006 | 0.764 | 0.0006 |
| VBESAT | 0.851 | 0.0005 | 0.854 | 0.0007 |
| fT | 325.2 | 10.9 | 352.7 | 13.9 |
| cibo | 6.3 | 0.10 | 5.8 | 0.08 |
| cobo | 2.0 | 0.04 | 2.0 | 0.03 |

CHANGED PART IDENTIFICATION:

There are no physical changes to the part or marking. Date code of change will be 6/2001 (month code only). Traceability will be maintained in factory by assembly lot number..

AFFECTED DEVICE LIST (WITHOUT SPECIALS)

PART

- MMBT2222ALT1
- MMBT2222LT1
- MMBT3904LT1