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# MMBT4401

## Features

- Halogen free available upon request by adding suffix "-HF"
- Surface Mount SOT-23 Package
- Capable of 350mWatts of Power Dissipation
- Operating and Storage Junction Temperatures: -55°C to 150°C
- I<sub>C</sub>=600mA
- Marking:2X/M4A
- Lead Free Finish/RoHS Compliant ("P" Suffix designates RoHS Compliant. See ordering information)
- Epoxy meets UL 94 V-0 flammability rating
- Moisture Sensitivity Level 1

## NPN General Purpose Amplifier

### Electrical Characteristics @ 25°C Unless Otherwise Specified

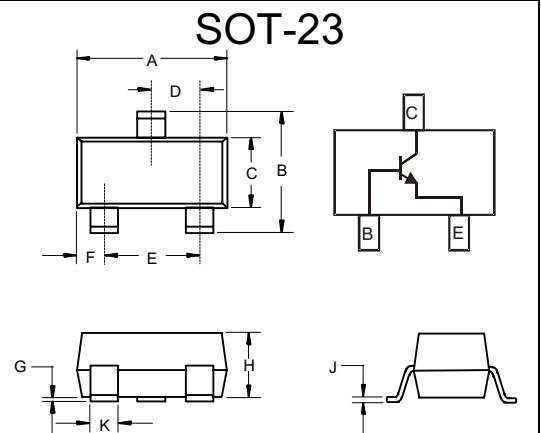
| Symbol                     | Parameter  | Min | Max | Units |
|----------------------------|--|-----|-----|-------|
| <b>OFF CHARACTERISTICS</b> |  |     |     |       |
| V <sub>(BR)CEO</sub>       | Collector-Emitter Breakdown Voltage*<br>(I <sub>C</sub> =1.0mA, I <sub>B</sub> =0) | 40  |     | Vdc   |
| V <sub>(BR)CBO</sub>       | Collector-Base Breakdown Voltage<br>(I <sub>C</sub> =10mA, I <sub>E</sub> =0)      | 60  |     | Vdc   |
| V <sub>(BR)EBO</sub>       | Emitter-Base Breakdown Voltage<br>(I <sub>E</sub> =0.1mA, I <sub>C</sub> =0)       | 6.0 |     | Vdc   |
| I <sub>BL</sub>            | Base Cutoff Current<br>(V <sub>CE</sub> =35Vdc, V <sub>BE</sub> =0.4Vdc)           |     | 0.1 | µAdc  |
| I <sub>CEX</sub>           | Collector Cutoff Current<br>(V <sub>CE</sub> =35Vdc, V <sub>BE</sub> =0.4Vdc)      |     | 0.1 | µAdc  |

| <b>ON CHARACTERISTICS</b> |   |      |             |     |
|---------------------------|---|------|-------------|-----|
| h <sub>FE</sub>           | DC Current Gain*<br>(I <sub>C</sub> =0.1mA, V <sub>CE</sub> =1.0Vdc)<br>(I <sub>C</sub> =1.0mA, V <sub>CE</sub> =1.0Vdc)<br>(I <sub>C</sub> =10mA, V <sub>CE</sub> =1.0Vdc)<br>(I <sub>C</sub> =150mA, V <sub>CE</sub> =1.0Vdc)<br>(I <sub>C</sub> =500mA, V <sub>CE</sub> =1.0Vdc) | 20   |             |     |
|                           |   | 40   |             |     |
|                           |   | 80   | 300         |     |
|                           |   | 100  | 300         |     |
| V <sub>CE(sat)</sub>      | Collector-Emitter Saturation Voltage<br>(I <sub>C</sub> =150mA, I <sub>B</sub> =15mA)<br>(I <sub>C</sub> =500mA, I <sub>B</sub> =50mA)  |      | 0.4<br>0.75 | Vdc |
| V <sub>BE(sat)</sub>      | Base-Emitter Saturation Voltage<br>(I <sub>C</sub> =150mA, I <sub>B</sub> =15mA)<br>(I <sub>C</sub> =500mA, I <sub>B</sub> =50mA)   | 0.75 | 0.95<br>1.2 | Vdc |

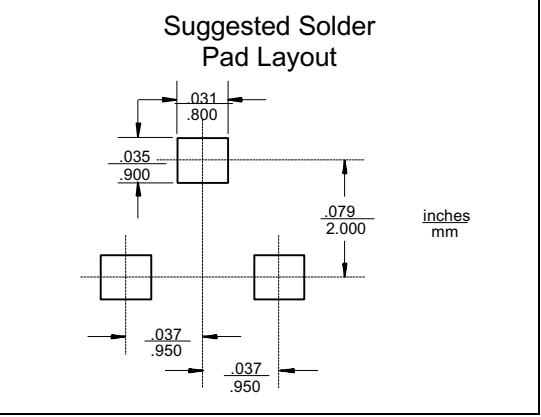
| <b>SMALL-SIGNAL CHARACTERISTICS</b> |  |     |      |     |
|-------------------------------------|--|-----|------|-----|
| f <sub>T</sub>                      | Current Gain-Bandwidth Product<br>(I <sub>C</sub> =20mA, V <sub>CE</sub> =10Vdc, f=100MHz) | 250 |      | MHz |
| C <sub>cb</sub>                     | Collector-Base Capacitance<br>(V <sub>CB</sub> =5.0Vdc, I <sub>E</sub> =0, f=1.0MHz)       |     | 6.5  | pF  |
| C <sub>eb</sub>                     | Emitter-Base Capacitance<br>(V <sub>BE</sub> =0.5Vdc, I <sub>C</sub> =0, f=1.0MHz)         |     | 30.0 | pF  |

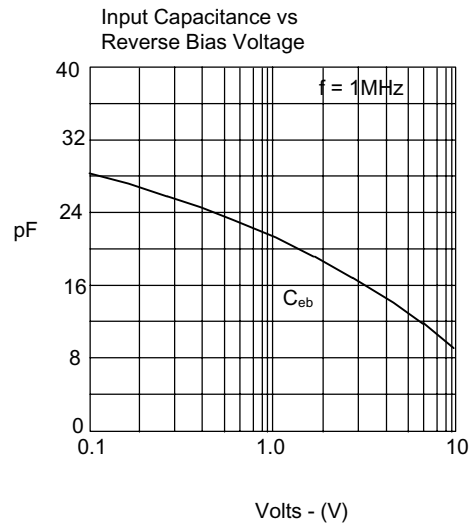
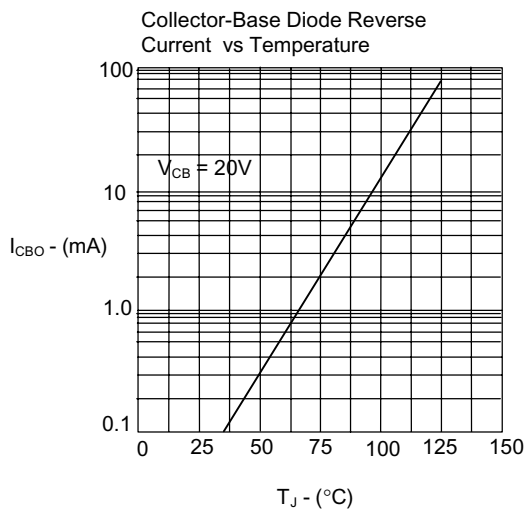
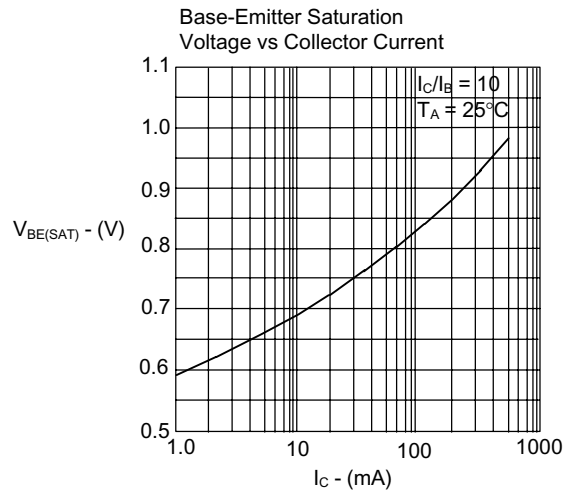
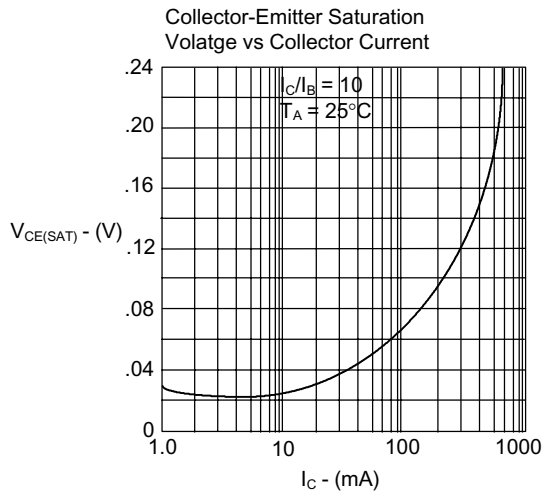
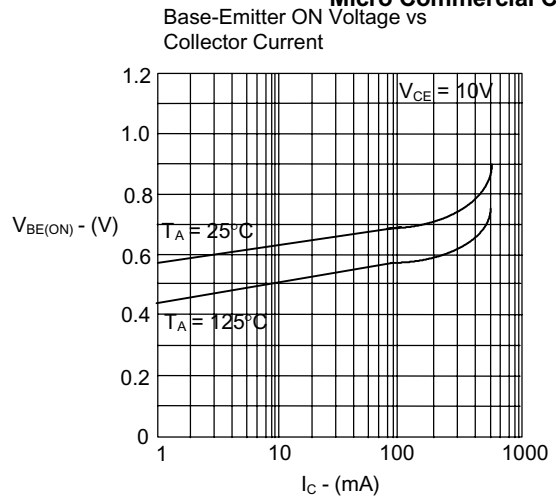
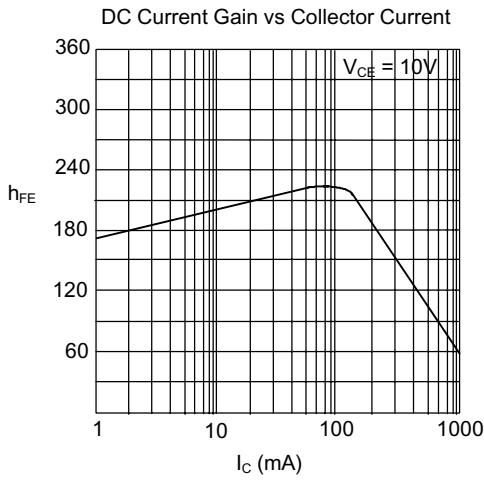
| <b>SWITCHING CHARACTERISTICS</b> |   |     |  |    |
|----------------------------------|---|-----|--|----|
| t <sub>d</sub>                   | Delay Time<br>(V <sub>CC</sub> =30Vdc, V <sub>BE</sub> =0.2Vdc) | 15  |  | ns |
| t <sub>r</sub>                   | Rise Time<br>(I <sub>C</sub> =150mA, I <sub>B1</sub> =15mA)     | 20  |  | ns |
| t <sub>s</sub>                   | Storage Time<br>(V <sub>CC</sub> =30Vdc, I <sub>C</sub> =150mA) | 225 |  | ns |
| t <sub>f</sub>                   | Fall Time<br>(I <sub>B1</sub> =I <sub>B2</sub> =15mA)           | 30  |  | ns |

\*Pulse Width ≤ 300µs, Duty Cycle ≤ 2.0%



| DIM | DIMENSIONS |       |      |      | NOTE |
|-----|------------|-------|------|------|------|
|     | INCHES     |       | MM   |      |      |
| A   | .110       | .120  | 2.80 | 3.04 |      |
| B   | .083       | .104  | 2.10 | 2.64 |      |
| C   | .047       | .055  | 1.20 | 1.40 |      |
| D   | .035       | .041  | .89  | 1.03 |      |
| E   | .070       | .081  | 1.78 | 2.05 |      |
| F   | .018       | .024  | .45  | .60  |      |
| G   | .0005      | .0039 | .013 | .100 |      |
| H   | .035       | .044  | .89  | 1.12 |      |
| J   | .003       | .007  | .085 | .180 |      |
| K   | .015       | .020  | .37  | .51  |      |

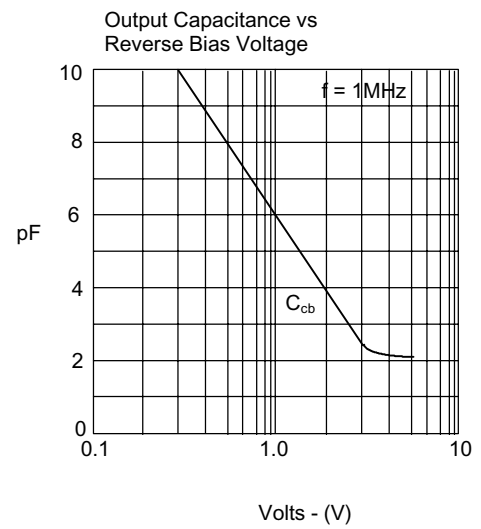
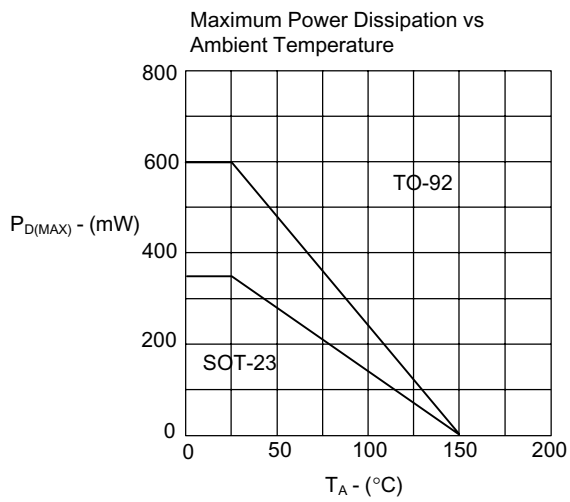




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### Ordering Information :

| Device         | Packing                  |
|----------------|--------------------------|
| Part Number-TP | Tape & Reel; 3 Kpcs/Reel |

Note : Adding "-HF" suffix for halogen free, eg. Part Number-TP-HF

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