



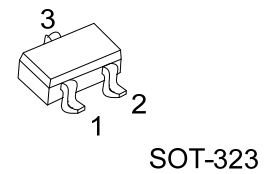
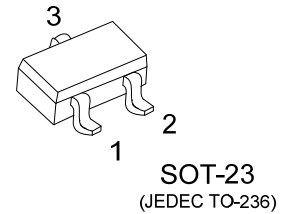
## MMBT2907A

### PNP SILICON TRANSISTOR

## PNP GENERAL PURPOSE AMPLIFIER

### DESCRIPTION

This UTC **MMBT2907A** is designed for use as a general purpose amplifier and switch requiring collector currents to 600 mA.



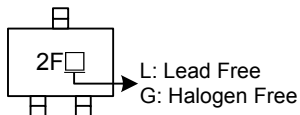
### ORDERING INFORMATION

| Ordering Number  |                  | Package | Pin Assignment |   |   | Packing   |
|------------------|------------------|---------|----------------|---|---|-----------|
| Lead Free        | Halogen Free     |         | 1              | 2 | 3 |           |
| MMBT2907AL-AE3-R | MMBT2907AG-AE3-R | SOT-23  | B              | E | C | Tape Reel |
| MMBT2907AL-AL3-R | MMBT2907AG-AL3-R | SOT-323 | B              | E | C | Tape Reel |

Note: Pin assignment: B: Base E: Emitter C: Collector

|                  |                                                           |                                                                                                      |
|------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| MMBT2907AG-AE3-R | (1) Packing Type<br>(2) Package Type<br>(3) Green Package | (1) R: Tape Reel<br>(2) AE3: SOT-23, AL3: SOT-323<br>(3) G: Halogen Free and Lead Free, L: Lead Free |
|------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------|

### MARKING



■ **ABSOLUTE MAXIMUM RATING** ( $T_A=25^{\circ}\text{C}$  unless otherwise specified)

| PARAMETER                    |         | SYMBOL    | RATINGS    | UNIT               |
|------------------------------|---------|-----------|------------|--------------------|
| Collector-Emitter Voltage    |         | $V_{CEO}$ | -60        | V                  |
| Collector-Base Voltage       |         | $V_{CBO}$ | -60        | V                  |
| Emitter-Base Voltage         |         | $V_{EBO}$ | -5         | V                  |
| Collector Current Continuous |         | $I_C$     | -600       | mA                 |
| Power Dissipation            | SOT-23  | $P_D$     | 350        | mW                 |
|                              | SOT-323 |           | 275        | mW                 |
| Junction Temperature         |         | $T_J$     | +150       | $^{\circ}\text{C}$ |
| Operating Temperature        |         | $T_{OPR}$ | -40 ~ +150 | $^{\circ}\text{C}$ |
| Storage Temperature          |         | $T_{STG}$ | -55 ~ +150 | $^{\circ}\text{C}$ |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.  
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ **THERMAL CHARACTERISTICS**

| PARAMETER        |         | SYMBOL        | RATINGS | UNIT                 |
|------------------|---------|---------------|---------|----------------------|
| Junction to Case | SOT-23  | $\theta_{JA}$ | 357     | $^{\circ}\text{C/W}$ |
|                  | SOT-323 |               | 455     | $^{\circ}\text{C/W}$ |

■ **ELECTRICAL CHARACTERISTICS** ( $T_A=25^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER                                   | SYMBOL               | TEST CONDITIONS                                                                          | MIN | TYP | MAX   | UNIT |
|---------------------------------------------|----------------------|------------------------------------------------------------------------------------------|-----|-----|-------|------|
| OFF CHARACTERISTICS                         |                      |                                                                                          |     |     |       |      |
| Collector-Emitter Breakdown Voltage (Note)  | BV <sub>CEO</sub>    | I <sub>C</sub> =-10mA, I <sub>B</sub> =0                                                 | -60 |     |       | V    |
| Collector-Base Breakdown Voltage            | BV <sub>CBO</sub>    | I <sub>C</sub> =-10μA, I <sub>E</sub> =0                                                 | -60 |     |       | V    |
| Emitter-Base Breakdown Voltage              | BV <sub>EBO</sub>    | I <sub>E</sub> =-10μA, I <sub>C</sub> =0                                                 | -5  |     |       | V    |
| Base Cutoff Current                         | I <sub>B</sub>       | V <sub>CB</sub> =-30V, V <sub>EB</sub> =-0.5V                                            |     |     | -50   | nA   |
| Collector Cutoff Current                    | I <sub>CEX</sub>     | V <sub>CE</sub> =-30V, V <sub>BE</sub> =-0.5V                                            |     |     | -50   | nA   |
| Collector Cutoff Current                    | I <sub>CBO</sub>     | V <sub>CB</sub> =-50V, I <sub>E</sub> =0                                                 |     |     | -0.02 | μA   |
|                                             |                      | V <sub>CB</sub> =-50V, I <sub>E</sub> =0, T <sub>A</sub> =150°C                          |     |     | -20   | μA   |
| ON CHARACTERISTICS                          |                      |                                                                                          |     |     |       |      |
| DC Current Gain                             | h <sub>FE</sub>      | I <sub>C</sub> =-0.1mA, V <sub>CE</sub> =-10V                                            | 75  |     |       |      |
|                                             |                      | I <sub>C</sub> =-1.0 mA, V <sub>CE</sub> =-10V                                           | 100 |     |       |      |
|                                             |                      | I <sub>C</sub> =-10 mA, V <sub>CE</sub> =-10V                                            | 100 |     |       |      |
|                                             |                      | I <sub>C</sub> =-150 mA, V <sub>CE</sub> =-10V (Note)                                    | 100 |     | 300   |      |
|                                             |                      | I <sub>C</sub> =-500 mA, V <sub>CE</sub> =-10V (Note)                                    | 50  |     |       |      |
| Collector-Emitter Saturation Voltage (Note) | V <sub>CE(SAT)</sub> | I <sub>C</sub> =-150 mA, I <sub>B</sub> =-15mA                                           |     |     | -0.4  | V    |
|                                             |                      | I <sub>C</sub> =-500 mA, I <sub>B</sub> =-50mA                                           |     |     | -1.6  | V    |
| Base-Emitter Saturation Voltage             | V <sub>BE(SAT)</sub> | I <sub>C</sub> =-150 mA, I <sub>B</sub> =-15mA (Note)                                    |     |     | -1.3  | V    |
|                                             |                      | I <sub>C</sub> =-500 mA, I <sub>B</sub> =-50mA                                           |     |     | -2.6  | V    |
| SMALL SIGNAL CHARACTERISTICS                |                      |                                                                                          |     |     |       |      |
| Current Gain – Bandwidth Product            | f <sub>T</sub>       | I <sub>C</sub> =-50mA, V <sub>CE</sub> =-20V, f=100MHz                                   | 200 |     |       | MHz  |
| Output Capacitance                          | C <sub>ob</sub>      | V <sub>CB</sub> =-10V, I <sub>E</sub> =0, f=100kHz                                       |     |     | 8     | pF   |
| Input Capacitance                           | C <sub>ib</sub>      | V <sub>EB</sub> =-2V, I <sub>C</sub> =0, f=100kHz                                        |     |     | 30    | pF   |
| SWITCHING CHARACTERISTICS                   |                      |                                                                                          |     |     |       |      |
| Turn-on Time                                | t <sub>ON</sub>      | V <sub>CC</sub> =30V, I <sub>C</sub> =-150mA,<br>I <sub>B1</sub> =-15mA                  |     |     | 45    | ns   |
| Delay Time                                  | t <sub>DLY</sub>     |                                                                                          |     |     | 10    | ns   |
| Rise Time                                   | t <sub>R</sub>       |                                                                                          |     |     | 40    | ns   |
| Turn-off Time                               | t <sub>OFF</sub>     | V <sub>CC</sub> =6V, I <sub>C</sub> =-150mA,<br>I <sub>B1</sub> = I <sub>B2</sub> =-15mA |     |     | 100   | ns   |
| Storage Time                                | t <sub>S</sub>       |                                                                                          |     |     | 80    | ns   |
| Fall Time                                   | t <sub>F</sub>       |                                                                                          |     |     | 30    | ns   |

Note: Pulse Test: Pulse Width  $\leq 300\text{ms}$ , Duty Cycle  $\leq 2.0\%$

## ■ TEST CIRCUITS

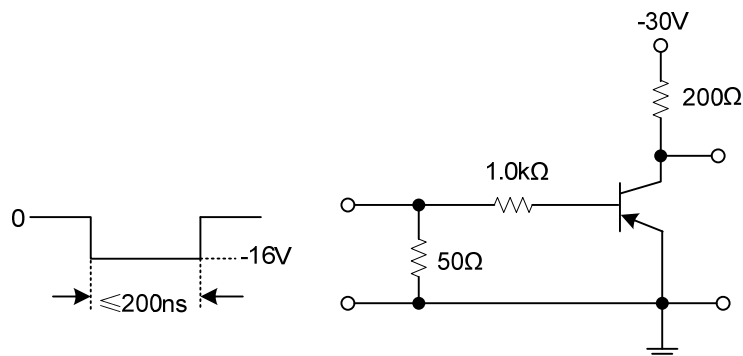


Fig 1. Saturated Turn-On Switching Time Test Circuit

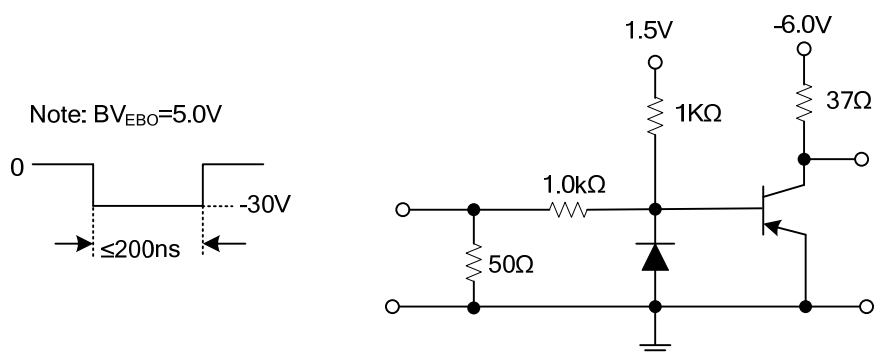
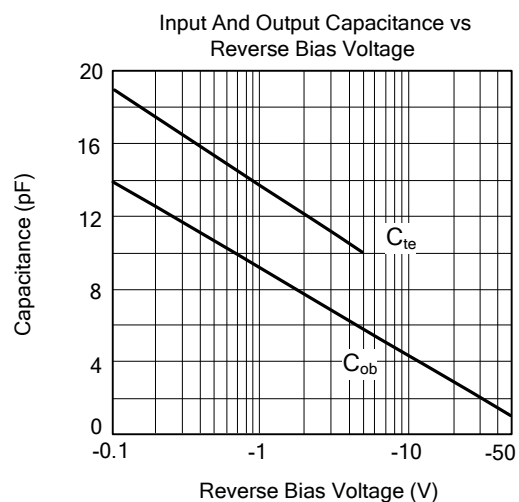
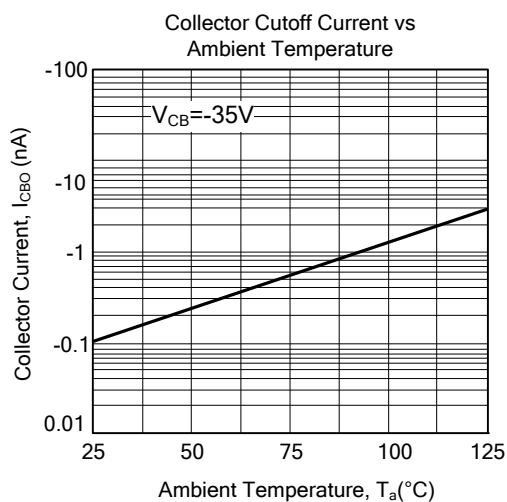
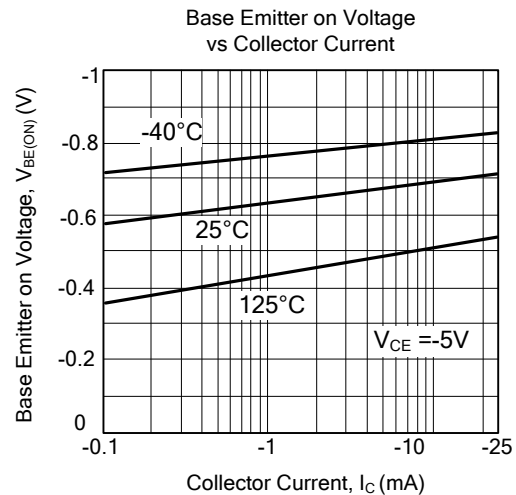
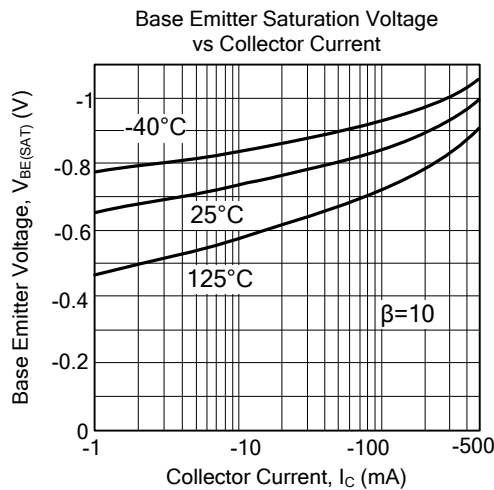
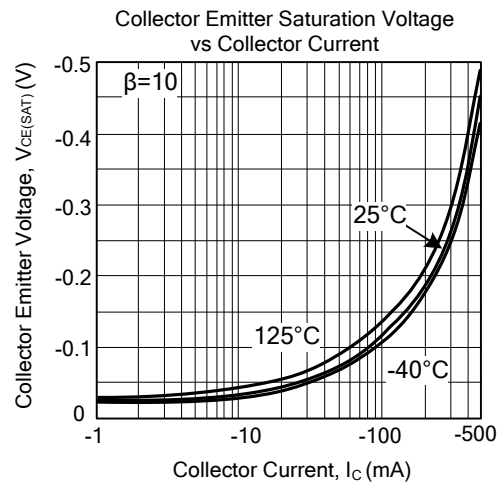
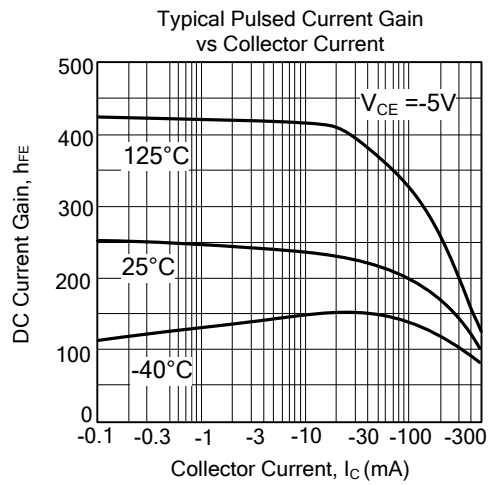
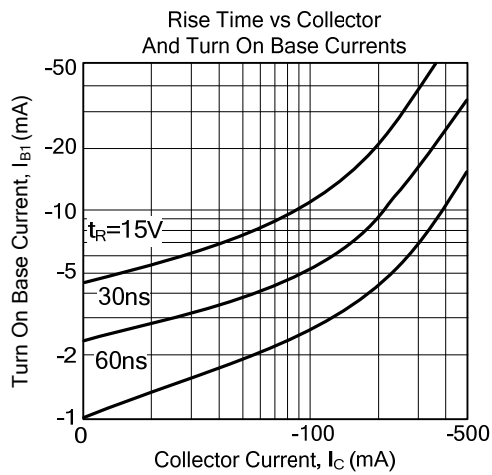
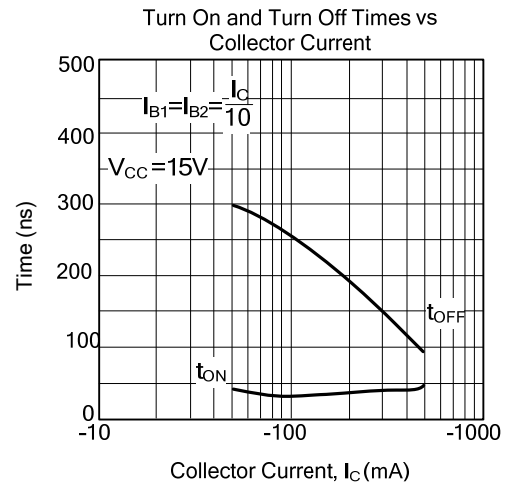
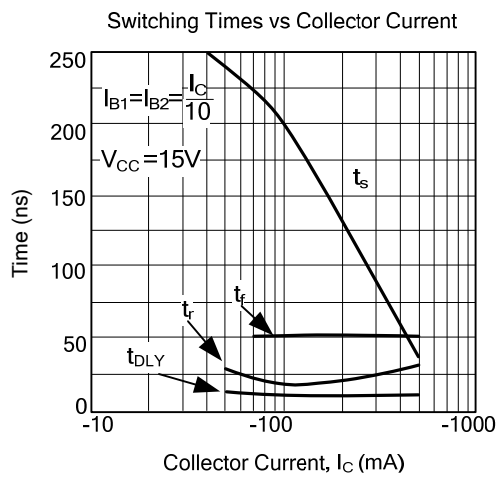


Fig 2. Saturated Turn-Off Switching Time Test Circuit

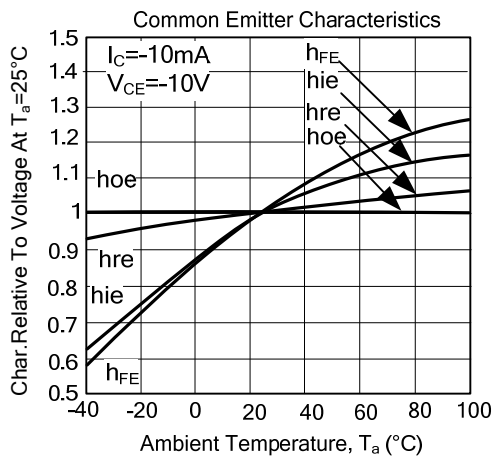
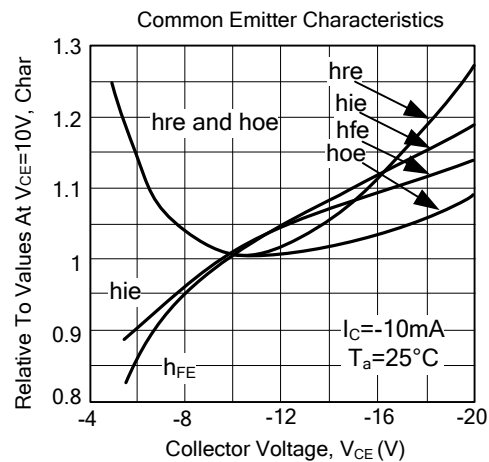
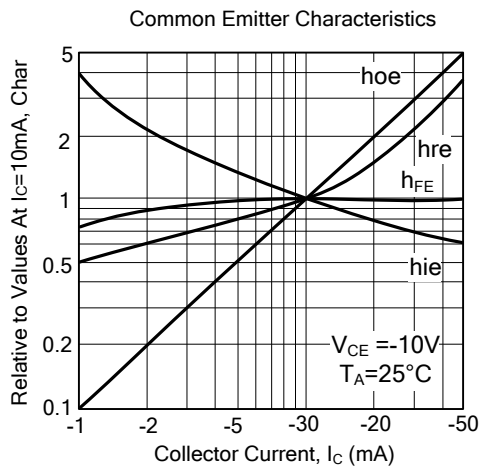
### ■ TYPICAL CHARACTERISTICS



### ■ TYPICAL CHARACTERISTICS (Cont.)



### ■ TYPICAL COMMON EMITTER CHARACTERISTICS (f=1kHz)



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