

RoHS Compliant Product  
A suffix of "-C" specifies halogen & lead-free

## FEATURES

- Epitaxial Planar Die Construction
- Complementary PNP Type Available (MMBT2907FW)
- Ideal for Medium Power Amplification and Switching

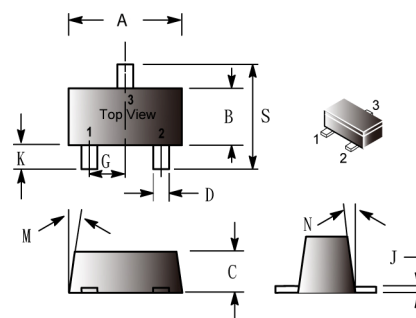
## MARKING CODE

1P

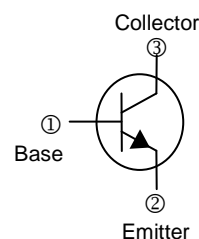
## PACKAGE INFORMATION

| Package | MPQ | Leader Size |
|---------|-----|-------------|
| SOT-523 | 3K  | 7 inch      |

## SOT-523



| REF. | Millimeter |      | REF. | Millimeter |      |
|------|------------|------|------|------------|------|
|      | Min.       | Max. |      | Min.       | Max. |
| A    | 1.50       | 1.70 | K    | 0.30       | 0.50 |
| B    | 0.75       | 0.95 | M    | ---        | 10°  |
| C    | 0.60       | 0.80 | N    | ---        | 10°  |
| D    | 0.23       | 0.33 | S    | 1.50       | 1.70 |
| G    | 0.50BSC    |      |      |            |      |
| J    | 0.10       | 0.20 |      |            |      |



## MAXIMUM RATINGS (T<sub>A</sub>=25°C unless otherwise specified)

| Parameter   | Symbol                            | Ratings | Unit   |
|---|-----------------------------------|---------|--------|
| Collector - Emitter Voltage   | V <sub>CEO</sub>                  | 40      | V      |
| Collector - Base Voltage  | V <sub>CBO</sub>                  | 75      | V      |
| Emitter - Base Voltage  | V <sub>EBO</sub>                  | 6       | V      |
| Collector Current - Continuous  | I <sub>C</sub>                    | 600     | mA     |
| Total Device Dissipation FR-4 Board @ T <sub>A</sub> =25°C <sup>1</sup> | P <sub>D</sub>                    | 150     | mW     |
| Thermal Resistance, Junction to Ambient                                 | R <sub>θJA</sub>                  | 833     | °C / W |
| Junction & Storage Temperature  | T <sub>J</sub> , T <sub>STG</sub> | -55~150 | °C     |

Note:

1. Device mounted on FR4 glass epoxy printed circuit board using the minimum recommended footprint.

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

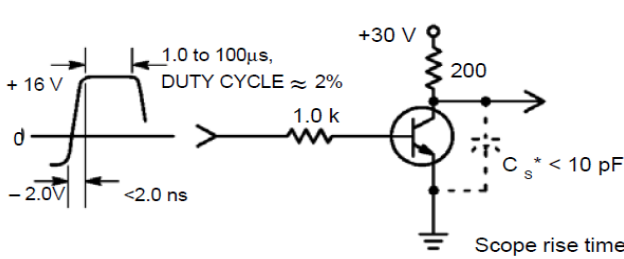
| Characteristic                                   | Symbol        | Min. | Max. | Unit             | Test Conditions  |
|--|---------------|------|------|------------------|--|
| <b>Off Characteristics</b>                       |               |      |      |                  |  |
| Collector-Emitter Breakdown Voltage <sup>1</sup> | $V_{(BR)CEO}$ | 40   | -    | V                | $I_C=10\text{ mA}, I_B=0$  |
| Collector-Base Breakdown Voltage                 | $V_{(BR)CBO}$ | 75   | -    | V                | $I_C=10\mu\text{A}, I_E=0$   |
| Emitter-Base Breakdown Voltage                   | $V_{(BR)EBO}$ | 6    | -    | V                | $I_E=-10\mu\text{A}, I_C=0$  |
| Collector Cut-Off Current                        | $I_{BL}$      | -    | 20   | nA               | $V_{CE}=60\text{V}, V_{EB}=3\text{V}$  |
| Emitter Cut-Off Current                          | $I_{CEX}$     | -    | 100  | nA               | $V_{CE}=60\text{V}, V_{BE}=3\text{V}$  |
| <b>On Characteristics<sup>1</sup></b>            |               |      |      |                  |  |
| DC Current Gain <sup>1</sup>                     | $h_{FE}$      | 35   | -    |                  | $I_C=0.1\text{ mA}, V_{CE}=10\text{V}$   |
|  |               | 50   | -    |                  | $I_C=1\text{ mA}, V_{CE}=10\text{V}$   |
|  |               | 75   | -    |                  | $I_C=10\text{ mA}, V_{CE}=10\text{V}$  |
|  |               | 100  | -    |                  | $I_C=150\text{ mA}, V_{CE}=10\text{V}$   |
|  |               | 40   | -    |                  | $I_C=500\text{ mA}, V_{CE}=10\text{V}$   |
| Collector-Emitter Saturation Voltage             | $V_{CE(sat)}$ | -    | 0.3  | V                | $I_C=150\text{ mA}, I_B=15\text{ mA}$  |
|  |               | -    | 1    |                  | $I_C=500\text{ mA}, I_B=50\text{ mA}$  |
| Base-Emitter Saturation Voltage                  | $V_{BE(sat)}$ | 0.6  | 1.2  | V                | $I_C=150\text{ mA}, I_B=15\text{ mA}$  |
|  |               | -    | 2    |                  | $I_C=500\text{ mA}, I_B=50\text{ mA}$  |
| <b>Small-Signal Characteristics</b>              |               |      |      |                  |  |
| Curren-Gain-Bandwidth Product                    | $f_T$         | 250  | -    | MHz              | $V_{CE}=20\text{V}, I_C=20\text{ mA}, f=100\text{ MHz}$                          |
| Output Capacitance                               | $C_{obo}$     | -    | 8    | pF               | $V_{CB}=10\text{V}, I_E=0, f=1.0\text{ MHz}$                                     |
| Input Capacitance                                | $C_{ibo}$     | -    | 30   | pF               | $V_{BE}=0.5\text{V}, I_E=0, f=1.0\text{ MHz}$                                    |
| Input Impedancen                                 | $h_{ie}$      | 0.25 | 1.25 | K $\Omega$       | $V_{CE}=10\text{V}, I_C=10\text{ mA}, f=1.0\text{ kHz}$                          |
| Voltage Feedback Ratio                           | $h_{re}$      | -    | 4    | $\times 10^{-4}$ | $V_{CE}=10\text{V}, I_C=10\text{ mA}, f=1.0\text{ kHz}$                          |
| Small-Signal Current Gain                        | $h_{fe}$      | 75   | 375  |                  | $V_{CE}=10\text{V}, I_C=10\text{ mA dc}, f=1.0\text{ kHz}$                       |
| Output Admittance                                | $h_{oe}$      | 25   | 200  | $\mu\text{mhos}$ | $V_{CE}=10\text{V}, I_C=10\text{ mA dc}, f=1.0\text{ kHz}$                       |
| Noise Figure                                     | NF            | -    | 4.0  | dB               | $V_{CE}=10\text{V}, I_C=100\mu\text{A}, R_S=1\text{ K}\Omega, f=1.0\text{ kHz}$  |
| <b>Switching Characteristics</b>                 |               |      |      |                  |  |
| Delay Time                                       | $T_d$         | -    | 10   | nS               | $V_{CC}=3\text{V}, V_{BE}=-0.5\text{ V}, I_C=150\text{ mA}, I_{B1}=15\text{ mA}$ |
| Rise Time  | $T_r$         | -    | 25   |                  |  |
| Storage Time                                     | $T_s$         | -    | 225  | nS               | $V_{CC}=30\text{V}, I_C=150\text{ mA}, I_{B1}=I_{B2}=15\text{ mA}$               |
| Fall Time  | $T_f$         | -    | 60   |                  |  |

Note:

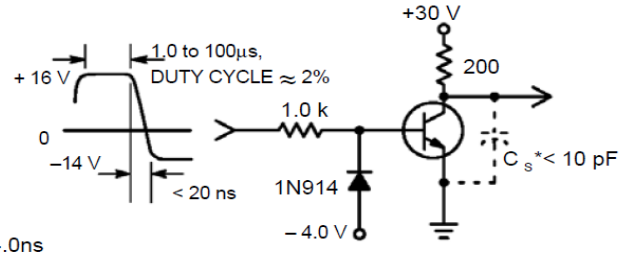
1. Pulse Test: Pulse Width  $\leq 300\text{ s}$ , Duty Cycle  $\leq 2.0\%$ .

**CHARACTERISTIC CURVES**

**SWITCHING TIME EQUIVALENT TEST CIRCUITS**

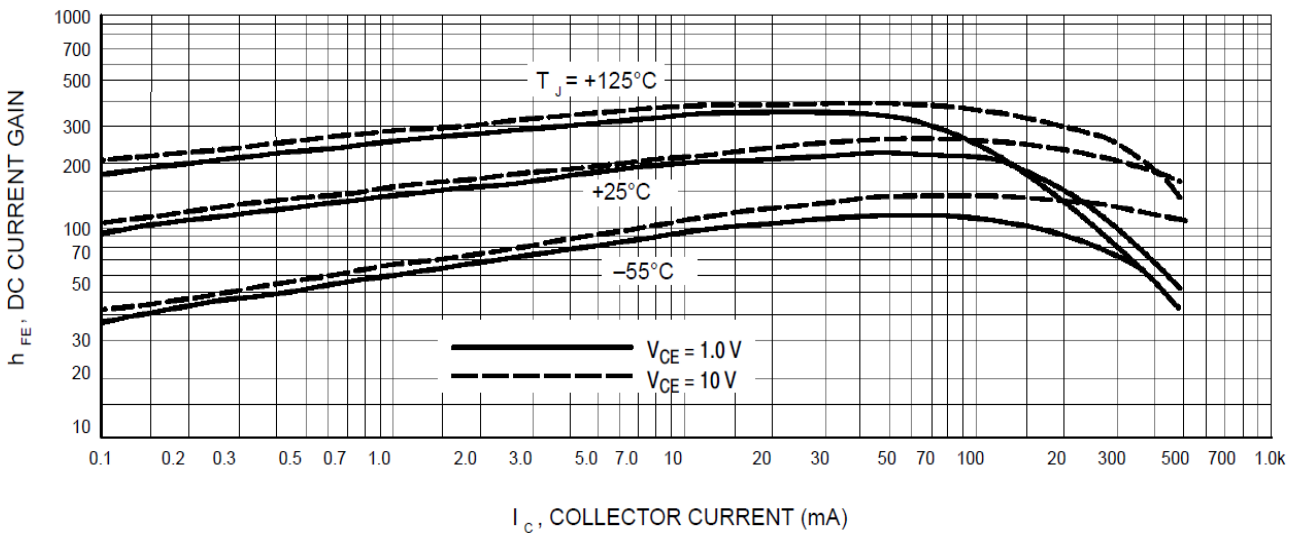


**Figure 1. Turn-On Time**

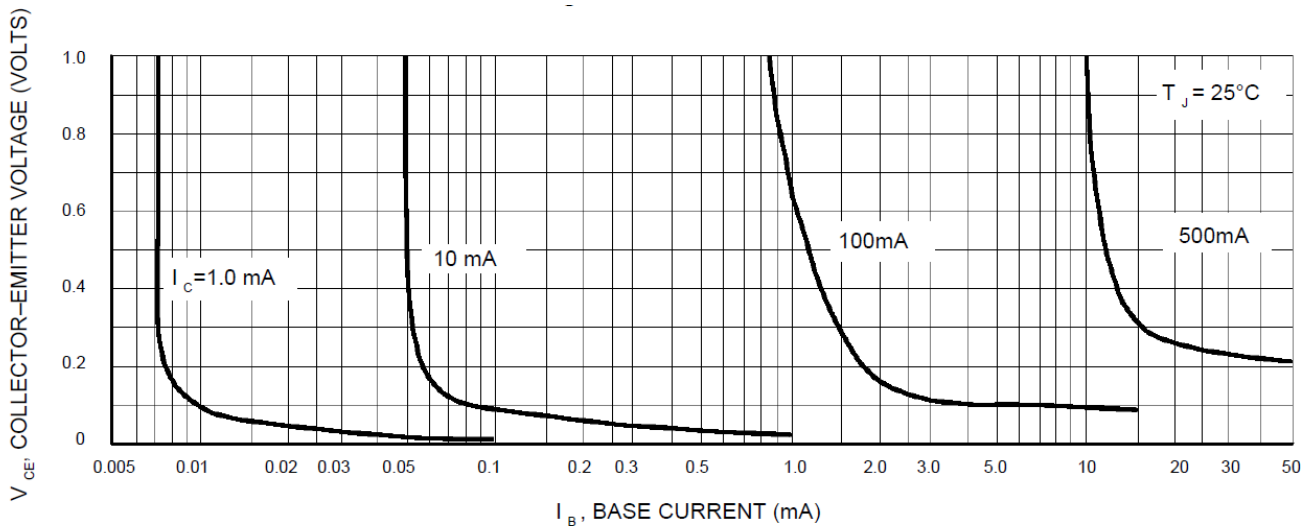


**Figure 2. Turn-Off Time**

Scope rise time  $< 4.0\text{ ns}$   
\*Total shunt capacitance of test jig, connectors, and oscilloscope.

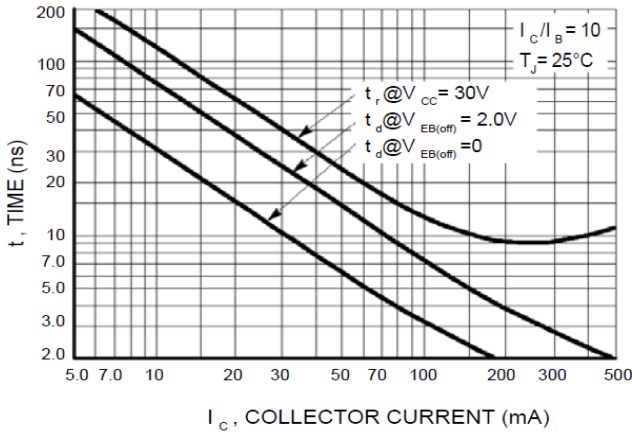


**Figure 3. DC Current Gain**

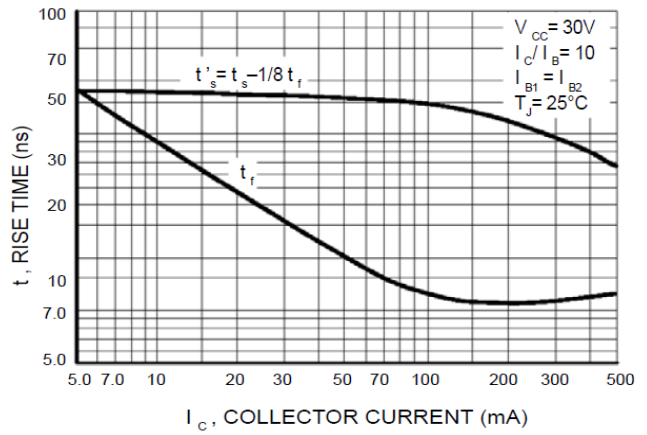


**Figure 4. Collector Saturation Region**

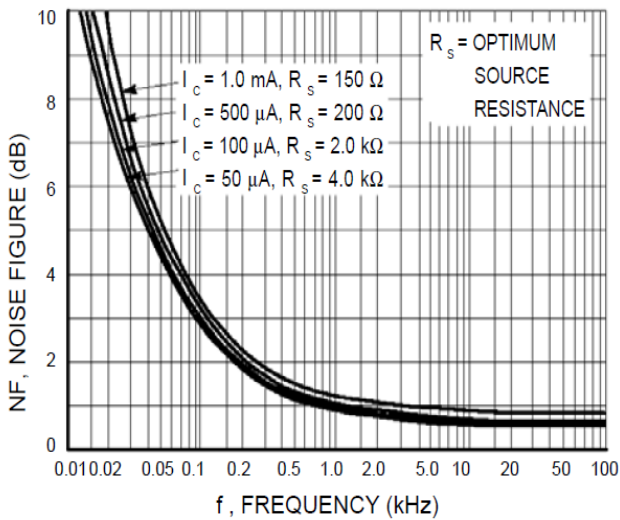
**CHARACTERISTIC CURVES**



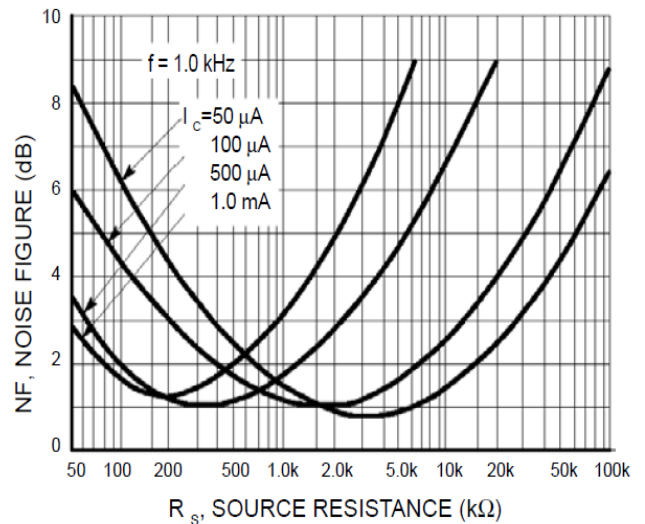
**Figure 5. Turn-On Time**



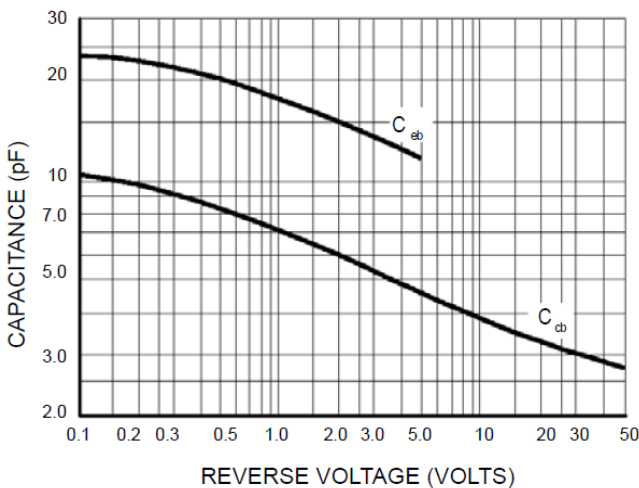
**Figure 6. Turn - Off Time**



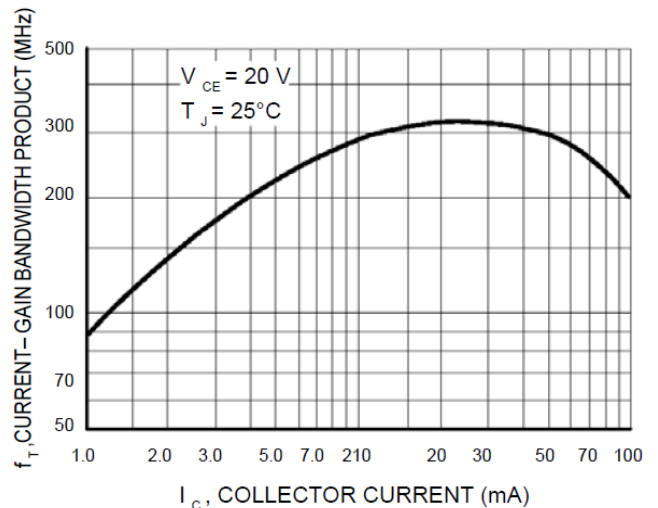
**Figure 7. Frequency Effects**



**Figure 8. Source Resistance Effects**

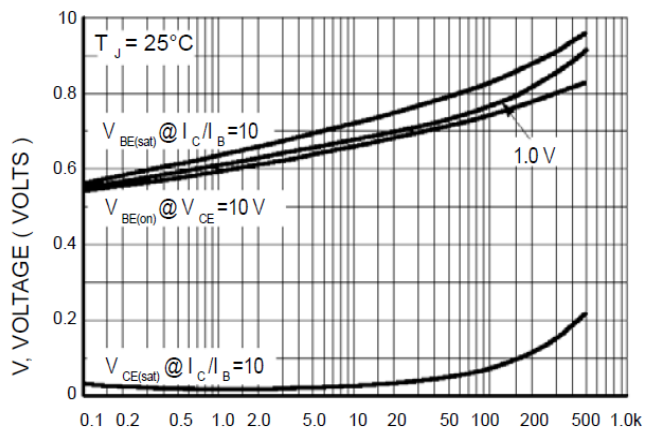


**Figure 9. Capacitance**

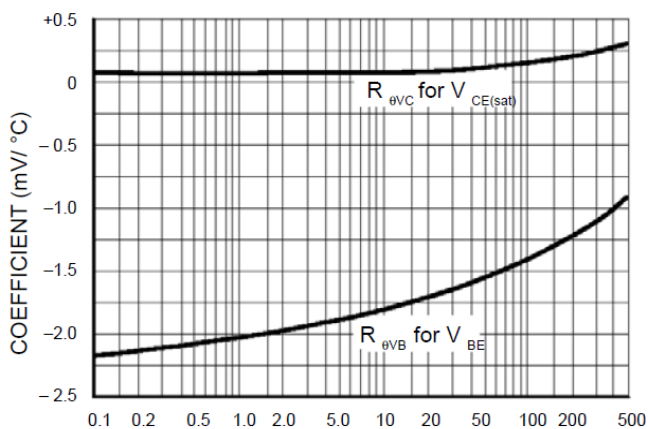


**Figure 10. Current- Gain Bandwidth Product**

**CHARACTERISTIC CURVES**



$I_C$ , COLLECTOR CURRENT (mA)  
**Figure 11. "On" Voltages**



$I_C$ , COLLECTOR CURRENT (mA)  
**Figure 12. Temperature Coefficients**