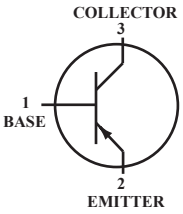
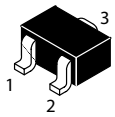
# WEITRON

# MMBT3906W

## General Purpose Transistor
## PNP Silicon

**Lead(Pb)-Free**




**SOT-323(SC-70)**

## Maximum Ratings

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Emitter Voltage | $V_{CEO}$ | -40 | Vdc |
| Collector-Base Voltage | $V_{CBO}$ | -40 | Vdc |
| Emitter-Base VOltage | $V_{EBO}$ | -5.0 | Vdc |
| Collector Current-Continuous | $I_C$ | -200 | mAdc |

## Thermal Characteristics

| Characteristics | Symbol | Max | Unit |
|---|---|---|---|
| Total Device Dissipation $T_A$=25°C | $P_D$ | 150 | mW |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 833 | °C/W |
| Junction and Storage, Temperature | $T_{J,Tstg}$ | -55 to +150 | °C |

## Device Marking

MMBT3906W=2A

## Electrical Characteristics ($T_A$=25°C Unless Otherwise noted)

| Characteristics | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| **Off Characteristics** | | | | |
| Collector-Emitter Breakdown Voltage(2) ($I_C$=-1.0mAdc.$I_B$=0) | V(BR)CEO | -40 | - | Vdc |
| Collector-Base Breakdown Voltage ($I_C$=-10 μAdc, $I_E$=0) | V(BR)CBO | -40 | - | Vdc |
| Emitter-Base Breakdown Voltage ($I_E$=-10 μAdc, $I_C$=0) | V(BR)EBO | -5.0 | - | Vdc |
| Base Cutoff Current ($V_{CE}$=-30 Vdc, $V_{EB}$ =-3.0 Vdc) | IBL | - | -50 | nAdc |
| Collector Cutoff Current ($V_{CE}$=-30Vdc, $V_{EB}$=-3.0Vdc) | ICEX | - | -50 | nAdc |

1. Device mounted FR4 glass epoxy printed circuit board suing the minimun recommended footprint.
2. Pulse Test:Pulse Width ≦300 μS, Duty Cycle ≦2.0%.

## Electrical Characteristics ($T_A$=25°C unless otherwise noted) (Countinued)

| Characteristics | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| **On Characteristics (2)** | | | | |
| DC Current Gain<br>($I_C$= -0.1 mAdc, $V_{CE}$= -1.0Vdc)<br>($I_C$= -1.0 mAdc, $V_{CE}$= -1.0 Vdc)<br>($I_C$= -10 mAdc, $V_{CE}$= -1.0Vdc)<br>($I_C$= -50 mAdc, $V_{CE}$= -1.0Vdc)<br>($I_C$= -100 mAdc, $V_{CE}$= -1.0Vdc) | $H_{FE}$ | <br>60<br>80<br>100<br>60<br>30 | <br>-<br>-<br>300<br>-<br>- | - |
| Collector-Emitter Saturation Voltage (2)<br>($I_C$= -10 mAdc, $I_B$= -1.0mAdc)<br>($I_C$= -50 mAdc, $I_B$= -5.0mAdc) | $V_{CE(sat)}$ | <br>-<br>- | <br>-0.25<br>-0.4 | Vdc |
| Base-Emitter Saturation Voltage (2)<br>($I_C$= -10 mAdc, $I_B$= -1.0 mAdc)<br>($I_C$= -50 mAdc, $I_B$= -5.0 mAdc) | $V_{BE(sat)}$ | -0.65<br>- | -0.85<br>-0.95 | Vdc |
| **Small-signal Characteristics** | | | | |
| Current-Gain-Bandwidth Product<br>($I_C$= -10 mAdc, $V_{CE}$= -20 Vdc, f=100MHz) | $f_T$ | 250 | - | MHz |
| Output Capacitance<br>($V_{CB}$= -5.0 Vdc, $I_E$=0, f=1.0MHz) | $C_{obo}$ | - | 4.5 | pF |
| Input Capacitance<br>($V_{EB}$= -0.5 Vdc, $I_C$=0, f=1.0MHz) | $C_{ibo}$ | - | 10 | pF |
| Input Impedance<br>(VCE= -10 Vdc IC=-1.0 mAdc, f=1.0 kHz) | $h_{ie}$ | 2.0 | 12 | k ohms |
| Voltage Feeback Radio<br>($V_{CE}$= -10Vdc $I_C$=1.0 mAdc, f=1.0 kHz) | $h_{re}$ | 0.1 | 10 | x $10^{-4}$ |
| Small-Signal Current Gain<br>(VCE= -10Vdc $I_C$=1.0 mAdc, , f=1.0 kHz) | $h_{fe}$ | 100 | 400 | . |
| Output Admittance<br>($V_{CE}$= -10Vdc $I_C$=1.0 mAdc, f=-1.0kHz) | $h_{oe}$ | 3.0 | 60 | µmhos |
| Noise Figure<br>($V_{CE}$= -5.0Vdc $I_C$= -100 µAdc, , $R_S$=1.0k ohms, f=1.0kHz) | NF | - | 4.0 | dB |
| **Switching Characteristics** | | | | |
| Delay Time | (Vcc= -3.0 Vdc, $V_{BE}$= 0.5 Vdc<br>Ic= -10 mAdc, $I_{B1}$= -1.0 mAdc) | td | - | 35 | ns |
| Rise Time | | tr | - | 35 | |
| Storage Time | (Vcc= -3.0 Vdc,<br>Ic= -10 mAdc, $I_{B1}$=$I_{B2}$= -1.0 mAdc) | ts | - | 225 | ns |
| Fall Time | | tf | - | 75 | |

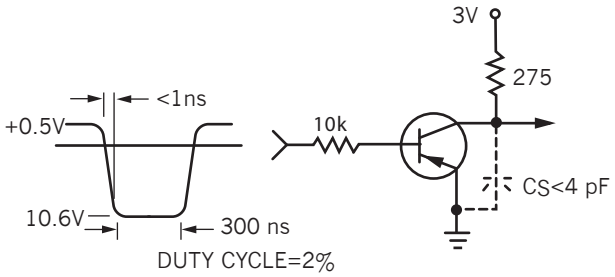
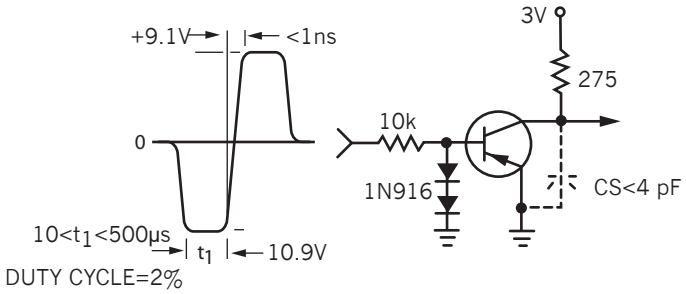



**Figure 1. Delay and Rise Time Equivalent Test Circuit**




*Total shunt capacitance of test jig and connectors

**Figure . Storage and Fall Time Equivalent Test Circuit**

## TYPICAL TRANSIENT CHARACTERISTICS

——— $T_J$=25°C ·- - - - $T_J$=125°C

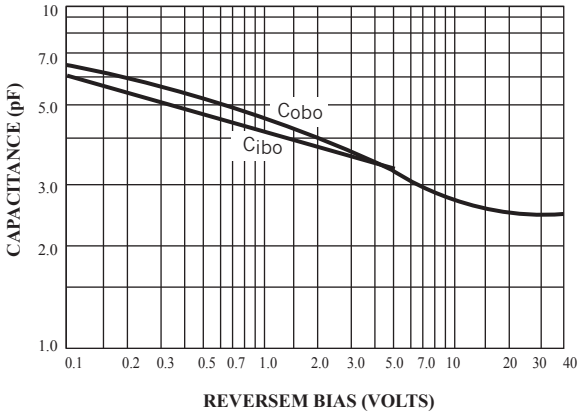



**Figure 3. Capacitance**

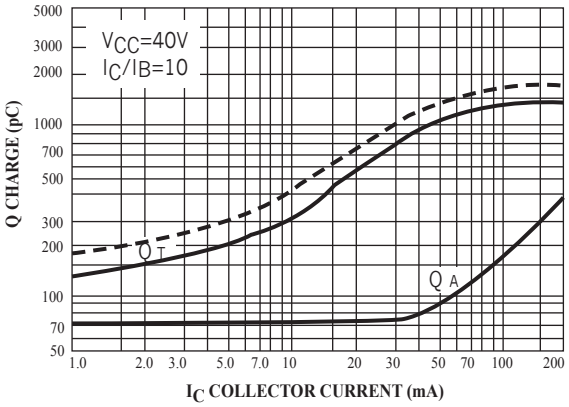



**Figure 4. Charge Data**

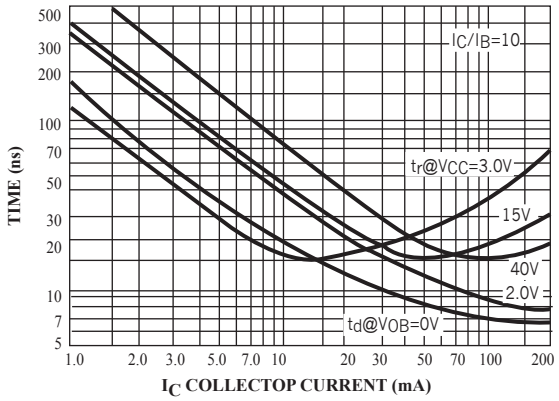



**Figure 5. Turn-On Time**

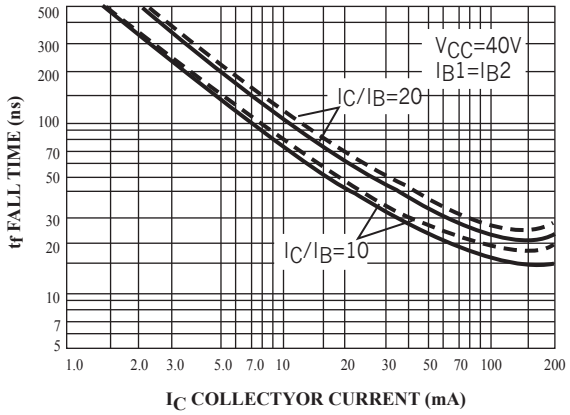



**Figure 6.Fall Time**

## TYPICAL AUDIO SMALL-SIGNAL CHARACTERISTICS NOISE FIGURE VARIATIONS

($V_{CE}$= -5.0 Vdc, $T_A$= 25°C, Bandwidth= 1.0Hz)

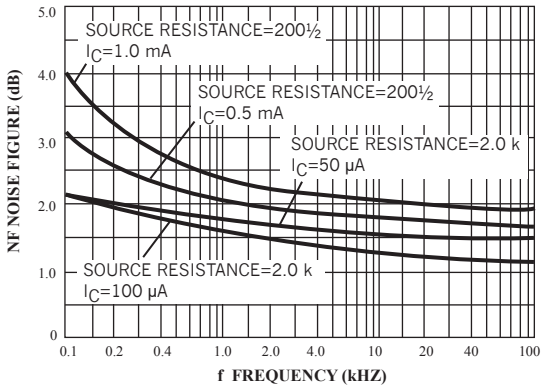



Figure 7.

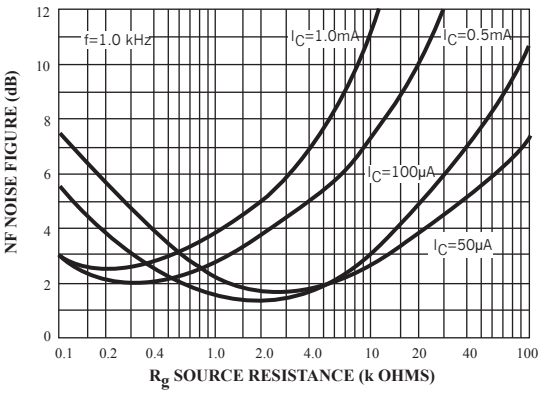



Figure 8.

## h PARAMETERS ($V_{CE}$= -10 Vdc, f= 1.0 kHz, $T_A$= 25°C)

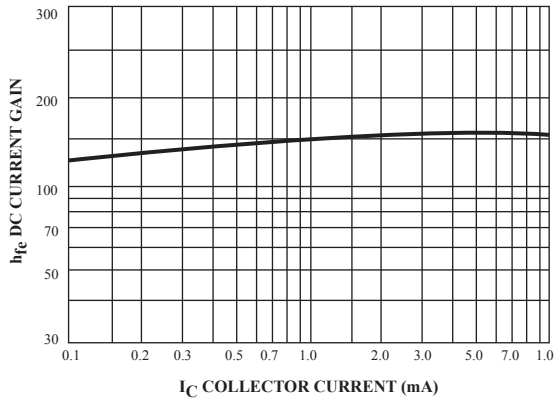



Figure 9. Current Gain

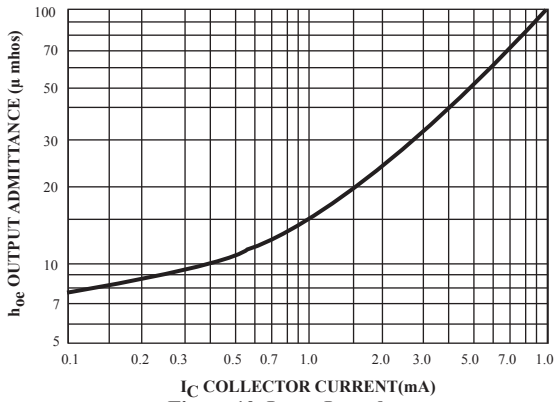



Figure 10. Input Impedance

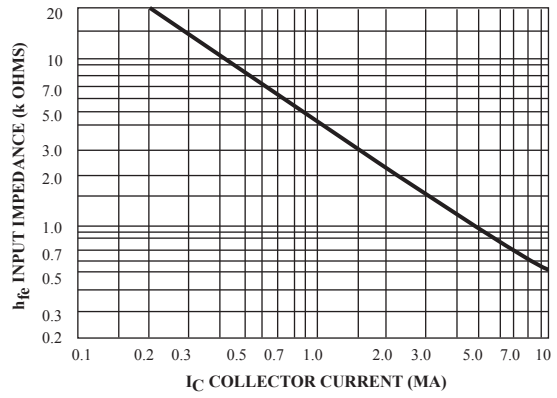



Figure .11 Input Impedance

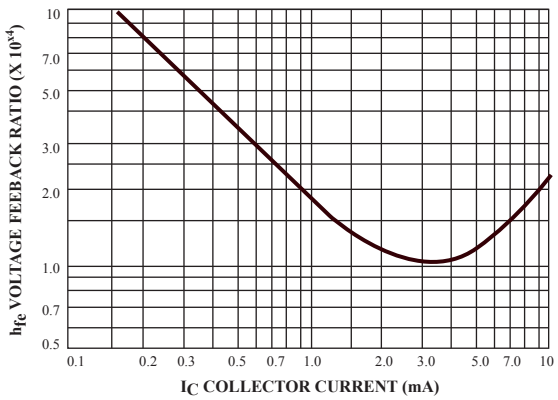
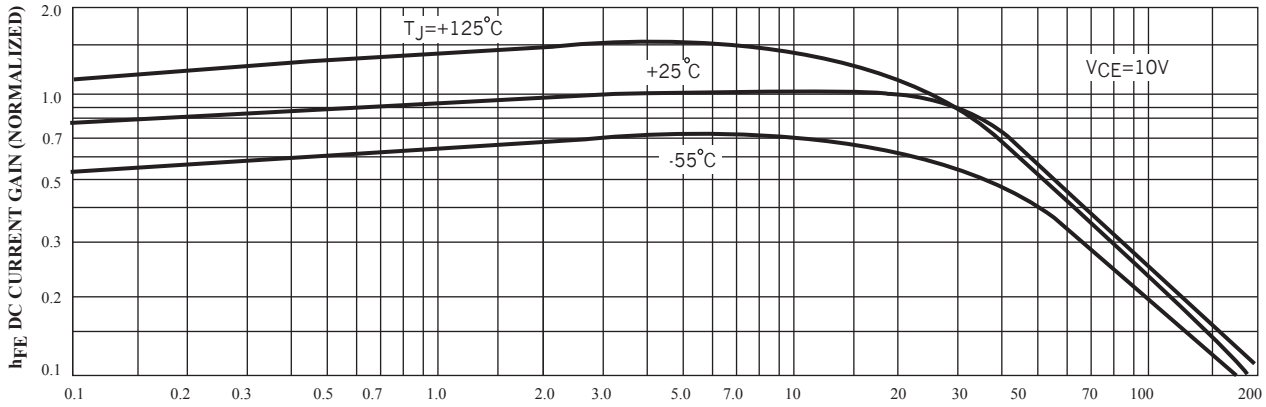



Figure 12. Votage Feeback Ratio

## TYPICAL STATIC CHARACTERISTICS




**Figurer 13. DC Current Gain**

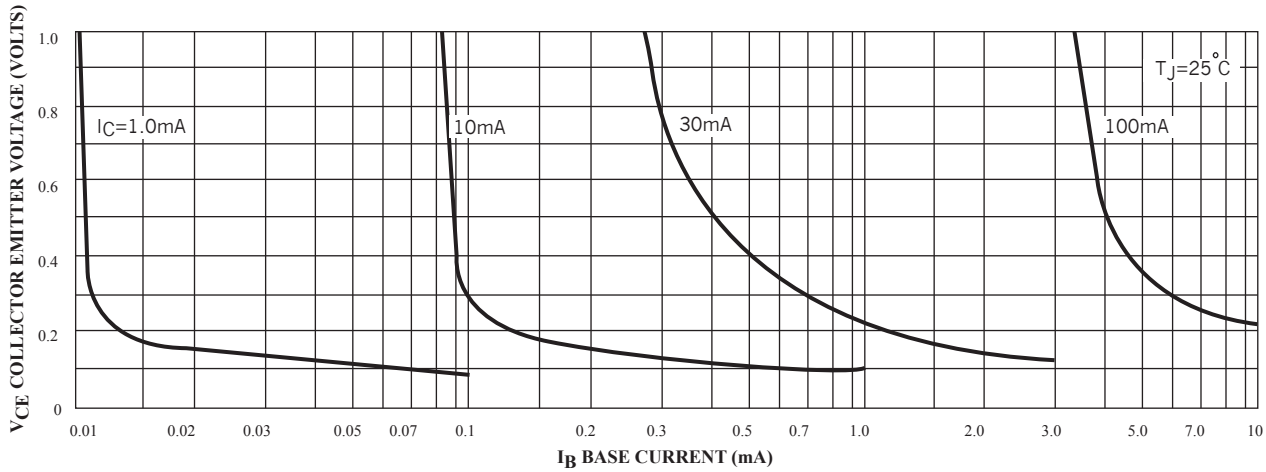



**Figure 14. Collector Saturation Region**

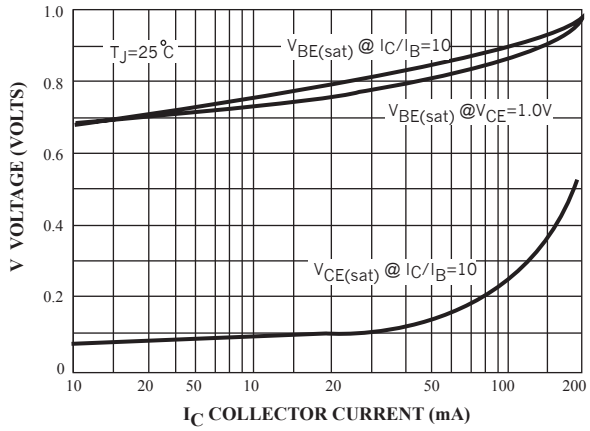



**Figure 15. "ON" Voltages**

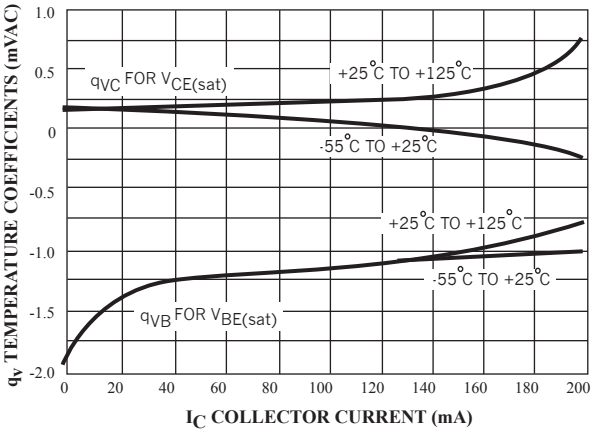
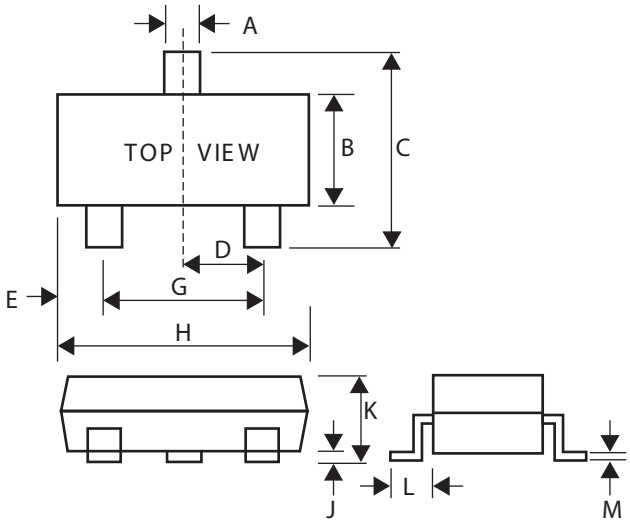



**Figure 16.Temperature Coefficients**

## SOT-323 Outline Demensions

Unit:mm




| SOT-323 | | |
|---|---|---|
| **Dim** | **Min** | **Max** |
| **A** | 0.30 | 0.40 |
| **B** | 1.15 | 1.35 |
| **C** | 2.00 | 2.40 |
| **D** | - | 0.65 |
| **E** | 0.30 | 0.40 |
| **G** | 1.20 | 1.40 |
| **H** | 1.80 | 2.20 |
| **J** | 0.00 | 0.10 |
| **K** | 0.80 | 1.00 |
| **L** | 0.42 | 0.53 |
| **M** | 0.10 | 0.25 |