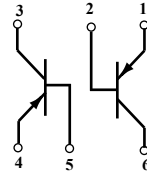
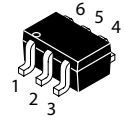


## General Purpose Transistor PNP Silicon



PNP+PNP



SOT-363(SC-88)

### Maximum Ratings

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V <sub>CEO</sub>	-40	Vdc
Collector-Base Voltage	V <sub>CBO</sub>	-40	Vdc
Emitter-Base Voltage	V <sub>EBO</sub>	-5.0	Vdc
Collector Current-Continuous	I <sub>C</sub>	-200	mAdc

### Thermal Characteristics

Characteristics	Symbol	Max	Unit
Total Device Dissipation TA=25°C <sup>(1)</sup>	P <sub>D</sub>	150	mW
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	833	°C/W
Junction and Storage, Temperature	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C

### Device Marking

MBT3906DW=A2

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

Characteristics	Symbol	Min	Max	Unit
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### Off Characteristics

Collector-Emitter Breakdown Voltage <sup>(2)</sup> (I <sub>C</sub> =-1.0mAdc, I <sub>B</sub> =0)	V(BR)CEO	-40	-	Vdc
Collector-Base Breakdown Voltage (I <sub>C</sub> =-10 uAdc, I <sub>E</sub> =0)	V(BR)CBO	-40	-	Vdc
Emitter-Base Breakdown Voltage (I <sub>E</sub> =-10 uAdc, I <sub>C</sub> =0)	V(BR)EBO	-5.0	-	Vdc
Base Cutoff Current (V <sub>CE</sub> =-30 Vdc, V <sub>EB</sub> =-3.0 Vdc)	I <sub>BL</sub>	-	-50	nAdc
Collector Cutoff Current (V <sub>CE</sub> =-30Vdc, V <sub>EB</sub> =-3.0Vdc)	I <sub>C</sub> EX	-	-50	nAdc

1. Decice Mounted on FR4 glass epoxy printed circuit board using the minimum recommended foot print.

2. Pulse Test: Pluse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

## Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted) (Continued)

Characteristics	Symbol	Min	Max	Unit
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### On Characteristics (2)

DC Current Gain (I <sub>C</sub> = -0.1 mA <sub>dc</sub> , V <sub>CE</sub> = -1.0V <sub>dc</sub> ) (I <sub>C</sub> = -1.0 mA <sub>dc</sub> , V <sub>CE</sub> = -1.0 V <sub>dc</sub> ) (I <sub>C</sub> = -10 mA <sub>dc</sub> , V <sub>CE</sub> = -1.0V <sub>dc</sub> ) (I <sub>C</sub> = -50 mA <sub>dc</sub> , V <sub>CE</sub> = -1.0V <sub>dc</sub> ) (I <sub>C</sub> = -100 mA <sub>dc</sub> , V <sub>CE</sub> = -1.0V <sub>dc</sub> )	H <sub>FE</sub>	60 80 100 60 30	. . 300 . .	-
Collector-Emitter Saturation Voltage (2) (I <sub>C</sub> = -10 mA <sub>dc</sub> , I <sub>B</sub> = -1.0mA <sub>dc</sub> ) (I <sub>C</sub> = -50 mA <sub>dc</sub> , I <sub>B</sub> = -5.0mA <sub>dc</sub> )	V <sub>CE(sat)</sub>	. .	-0.25 -0.4	V <sub>dc</sub>
Base-Emitter Saturation Voltage (2) (I <sub>C</sub> = -10 mA <sub>dc</sub> , I <sub>B</sub> = -1.0 mA <sub>dc</sub> ) (I <sub>C</sub> = -50 mA <sub>dc</sub> , I <sub>B</sub> = -5.0 mA <sub>dc</sub> )	V <sub>BE(sat)</sub>	-0.65 .	-0.85 -0.95	V <sub>dc</sub>

### Small-signal Characteristics

Current-Gain-Bandwidth Product (1) (I <sub>C</sub> = -10 mA <sub>dc</sub> , V <sub>CE</sub> = -20 V <sub>dc</sub> , f=100MHz)	f <sub>T</sub>	250	-	MHz
Output Capacitance (V <sub>CB</sub> = -5.0 V <sub>dc</sub> , I <sub>E</sub> =0, f=1.0MHz)	C <sub>obo</sub>	-	4.5	pF
Input Capacitance (V <sub>EB</sub> = -0.5 V <sub>dc</sub> , I <sub>C</sub> =0, f=1.0MHz)	C <sub>ibo</sub>	-	10	pF
Input Impedance (V <sub>CE</sub> = -10 V <sub>dc</sub> I <sub>C</sub> =-1.0 mA <sub>dc</sub> , f=1.0 kHz)	h <sub>ie</sub>	2.0	12	k ohms
Voltage Feedback Ratio (V <sub>CE</sub> = -10V <sub>dc</sub> I <sub>C</sub> =1.0 mA <sub>dc</sub> , f=1.0 kHz)	h <sub>re</sub>	0.1	10	x 10 <sup>-4</sup>
Small-Signal Current Gain (V <sub>CE</sub> = -10V <sub>dc</sub> I <sub>C</sub> =1.0 mA <sub>dc</sub> , , f=1.0 kHz)	h <sub>fe</sub>	100	400	.
Output Admittance (V <sub>CE</sub> = -10V <sub>dc</sub> I <sub>C</sub> =1.0 mA <sub>dc</sub> , f=-1.0kHz)	h <sub>oe</sub>	3.0	60	μmhos
Noise Figure (V <sub>CE</sub> = -5.0V <sub>dc</sub> I <sub>C</sub> = -100 μA <sub>dc</sub> , , R <sub>S</sub> =1.0k ohms, f=1.0kHz)	NF	-	4.0	dB

### Switching Characteristics

Delay Time	(V <sub>cc</sub> = -3.0 V <sub>dc</sub> , V <sub>BE</sub> = 0.5 V <sub>dc</sub> I <sub>c</sub> = -10 mA <sub>dc</sub> , I <sub>B1</sub> = -1.0 mA <sub>dc</sub> )	t <sub>d</sub>	-	35	ns
Rise Time		t <sub>r</sub>	-	35	
Storage Time	(V <sub>cc</sub> = -3.0 V <sub>dc</sub> , I <sub>c</sub> = -10 mA <sub>dc</sub> , I <sub>B1</sub> =I <sub>B2</sub> = -1.0 mA <sub>dc</sub> )	t <sub>s</sub>	-	225	ns
Fall Time		t <sub>f</sub>	-	75	

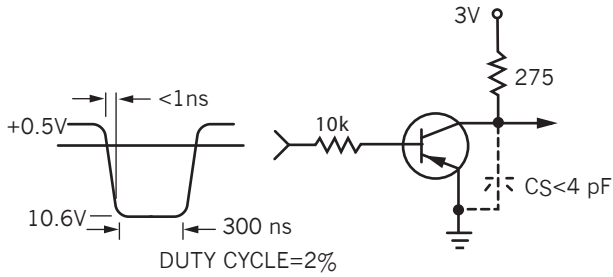


Figure 1. Delay and Rise Time Equivalent Test Circuit

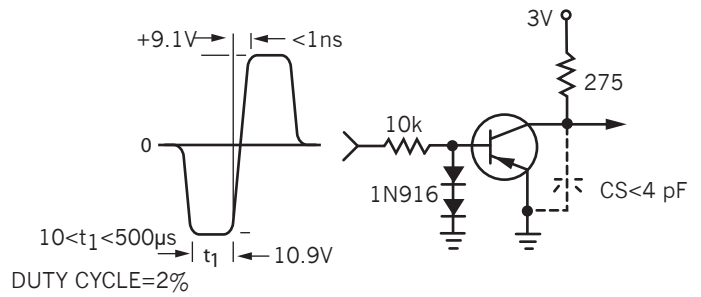


Figure 2. Storage and Fall Time Equivalent Test Circuit

\*Total shunt capacitance of test jig and connectors

## TYPICAL TRANSIENT CHARACTERISTICS

——  $T_J=25^\circ\text{C}$     - - - -  $T_J=125^\circ\text{C}$

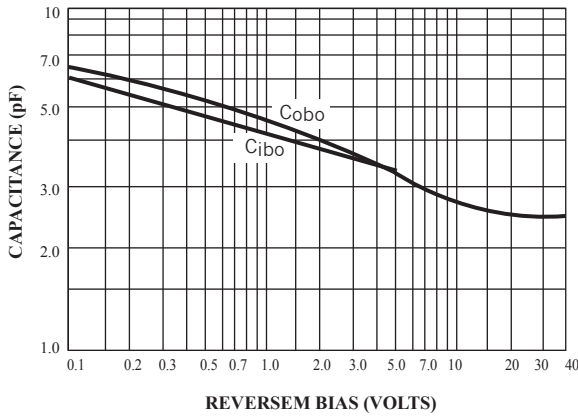


Figure 3. Capacitance

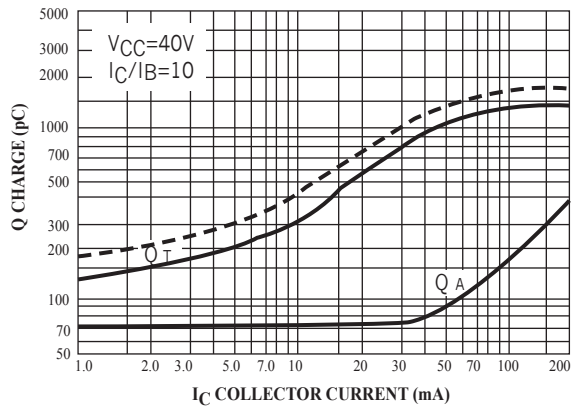


Figure 4. Charge Data

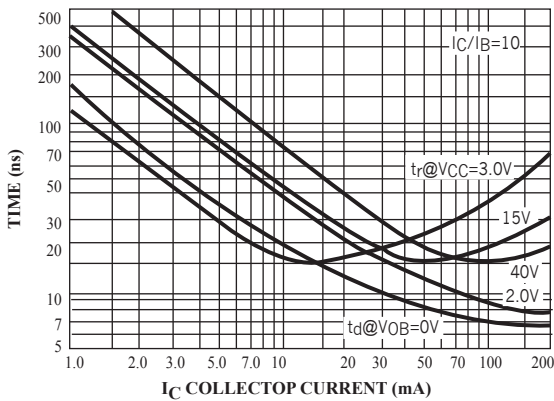


Figure 5. Turn-On Time

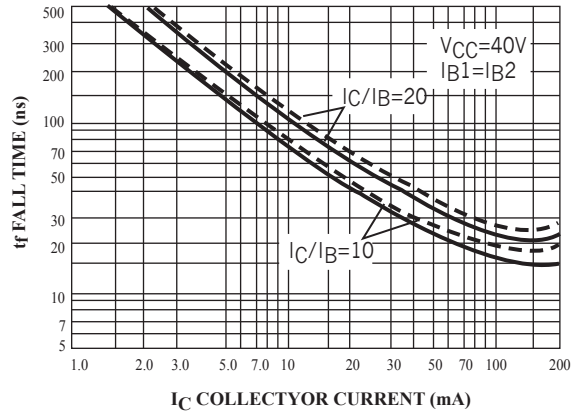


Figure 6. Fall Time

**TYPICAL AUDIO SMALL-SIGNAL CHARACTERISTICS NOISE FIGURE VARIATIONS**

( $V_{CE} = -5.0$  Vdc,  $T_A = 25^\circ\text{C}$ , Bandwidth= 1.0Hz)

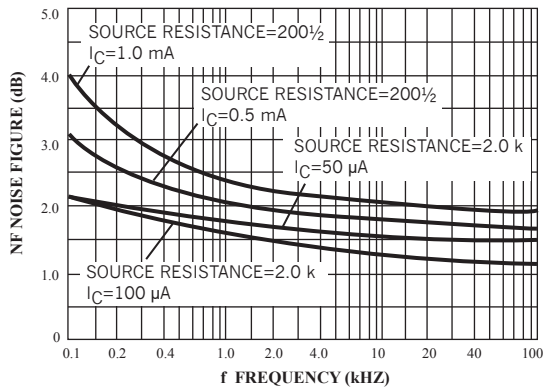


Figure 7.

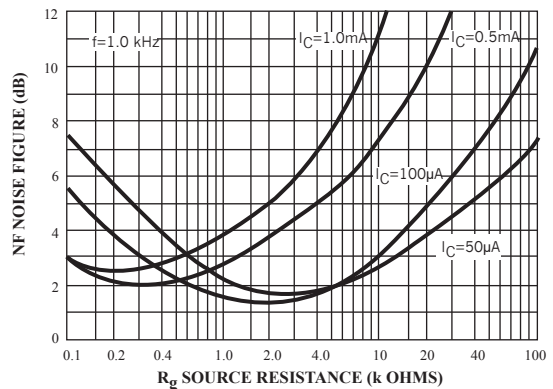


Figure 8.

**h PARAMETERS** ( $V_{CE} = -10$  Vdc,  $f = 1.0$  kHz,  $T_A = 25^\circ\text{C}$ )

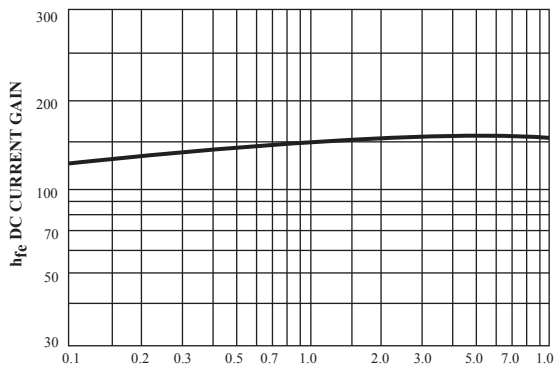


Figure 9. Current Gain

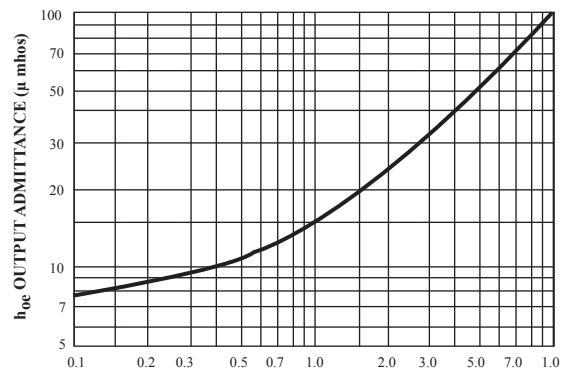


Figure 10. Input Impedance

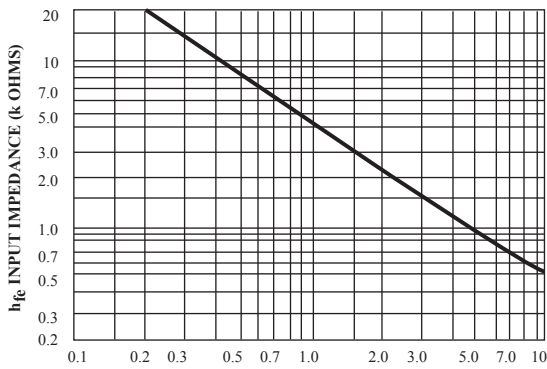


Figure .11 Input Impedance

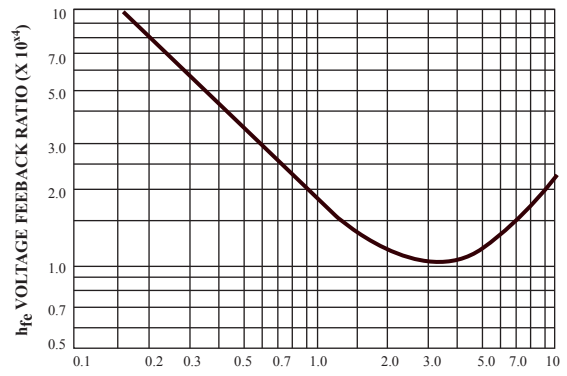
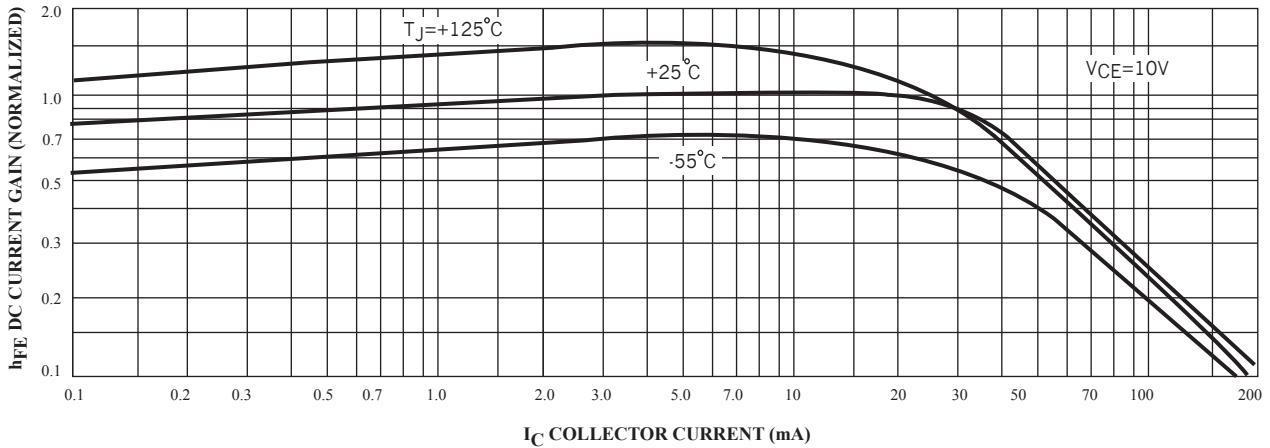
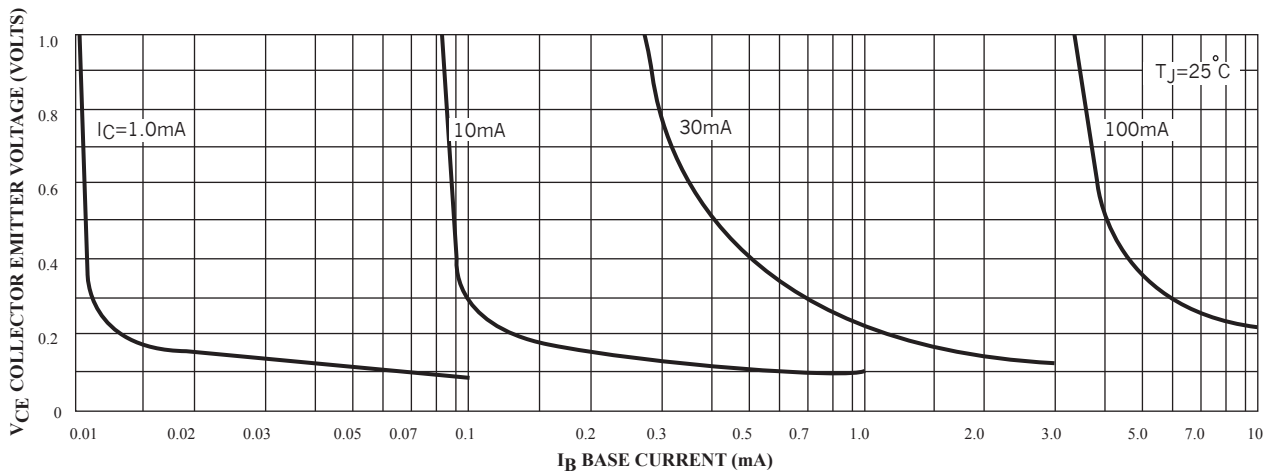


Figure 12. Votage Feedback Ratio

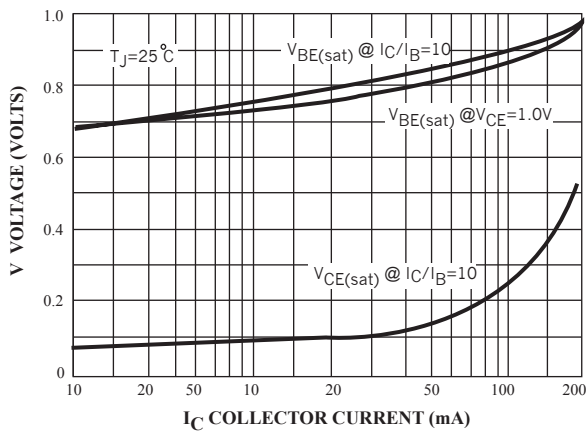
**TYPICAL STATIC CHARACTERISTICS**



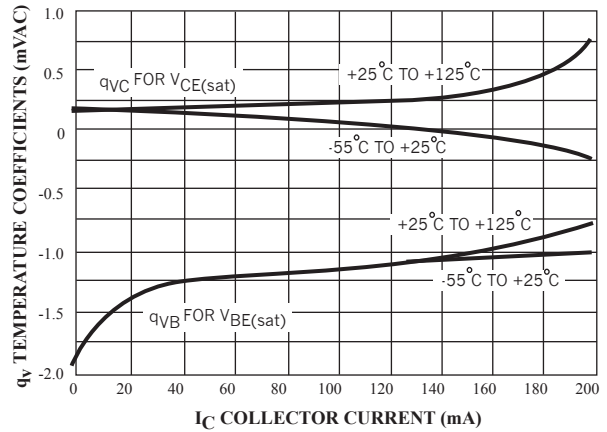
**Figure 13. DC Current Gain**



**Figure 14. Collector Saturation Region**



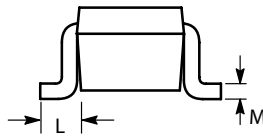
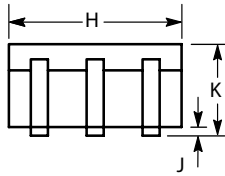
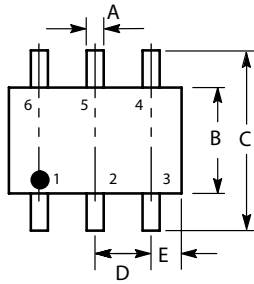
**Figure 15. "ON" Voltages**



**Figure 16. Temperature Coefficients**

**SOT-363 Package Outline Dimensions**

Unit:mm



SOT-363		
Dim	Min	Max
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 REF	
E	0.30	0.40
H	1.80	2.20
J	-	0.10
K	0.80	1.10
L	0.25	0.40
M	0.10	0.25