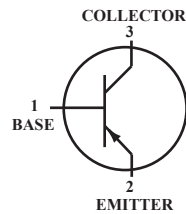


Switching Transistor PNP Silicon

(Pb) Lead(Pb)-Free



Maximum Ratings

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEO}	-40	V _{dc}
Collector-Base Voltage	V _{CBO}	-40	V _{dc}
Emitter-Base Voltage	V _{EBO}	-5.0	V _{dc}
Collector Current-Continuous	I _C	-600	mAdc

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Total Device Dissipation FR-5 Board ⁽¹⁾ TA=25°C Derate above 25°C	P _D	225	mW
Thermal Resistance, Junction to Ambient	R _{θJA}	556	°C/W
Total Device Dissipation Alumina Substrate, ⁽²⁾ TA=25°C Derate above 25°C	P _D	300	mW
Thermal Resistance, Junction to Ambient	R _{θJA}	417	°C/W
Junction and Storage, Temperature	T _{J, Tstg}	-55 to +150	°C

Device Marking

MMBT4403=2T

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

Characteristics	Symbol	Min	Max	Unit
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Off Characteristics

Collector-Emitter Breakdown Voltage ⁽³⁾ (I _C =-1.0mAdc, I _B =0)	V(BR)CEO	-40	-	V _{dc}
Collector-Base Breakdown Voltage (I _C =-0.1mAdc, I _E =0)	V(BR)CBO	-40	-	V _{dc}
Emitter-Base Breakdown Voltage (I _E =-0.1mAdc, I _C =0)	V(BR)EBO	-5.0	-	V _{dc}
Base Cutoff Current (V _{CE} =-35 V _{dc} , V _{EB} =-0.4 V _{dc})	I _{BEV}	-	-0.1	uAdc
Collector Cutoff Current (V _{CE} =-35V _{dc} , V _{EB} =-0.4V _{dc})	I _{CEX}	-	-0.1	uAdc

1.FR-5=1.0 x 0.75 x 0.062 in.

2.Alumina=0.4 x 0.3 x 0.024 in. 99.5% alumina.

3.Pulse Test:Pulse Width ≤300 μS, Duty Cycle ≤2.0%.

Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted) (Continued)

Characteristics	Symbol	Min	Max	Unit
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On Characteristics ⁽³⁾

DC Current Gain ($I_C = -0.1 \text{ mAdc}$, $V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -1.0 \text{ mAdc}$, $V_{CE} = -1.0 \text{ Vdc}$) ($I_C = -10 \text{ mAdc}$, $V_{CE} = -1.0 \text{ Vdc}$) ($I_C = 150 \text{ mAdc}$, $V_{CE} = -2.0 \text{ Vdc}$) ⁽³⁾ ($I_C = -500 \text{ mAdc}$, $V_{CE} = -2.0 \text{ Vdc}$) ⁽³⁾	H_{FE}	30 60 100 100 20	. . 300 .	-
Collector-Emitter Saturation Voltage ⁽³⁾ ($I_C = -150 \text{ mAdc}$, $I_B = -15 \text{ mAdc}$) ($I_C = -500 \text{ mAdc}$, $I_B = -50 \text{ mAdc}$)	$V_{CE(sat)}$. .	-0.4 -0.75	Vdc
Base-Emitter Saturation Voltage ⁽³⁾ ($I_C = -150 \text{ mAdc}$, $I_B = -15 \text{ mAdc}$) ($I_C = -500 \text{ mAdc}$, $I_B = -50 \text{ mAdc}$)	$V_{BE(sat)}$	-0.75	-0.95 -1.3	Vdc

Small-signal Characteristics

Current-Gain-Bandwidth Product ⁽⁴⁾ ($I_C = -20 \text{ mAdc}$, $V_{CE} = -10 \text{ Vdc}$, $f = 100 \text{ MHz}$)	f_T	200	-	MHz
Collector-Base Capacitance ($V_{CB} = -10 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{cb}	-	8.5	pF
Emitter-Base Capacitance ($V_{EB} = -0.5 \text{ Vdc}$, $I_C = 0$, $f = 1.0 \text{ MHz}$)	C_{eb}	-	30	pF
Input Impedance ($V_{CE} = -10 \text{ Vdc}$, $I_C = -1.0 \text{ mAdc}$, $f = 1.0 \text{ kHz}$)	h_{ie}	1.5	15	k ohms
Voltage Feedback Ratio ($V_{CE} = -10 \text{ Vdc}$, $I_C = -1.0 \text{ mAdc}$, $f = 1.0 \text{ kHz}$)	h_{re}	0.1	8	$\times 10^{-4}$
Small-Signal Current Gain ($V_{CE} = -10 \text{ Vdc}$, $I_C = -1.0 \text{ mAdc}$, $f = 1.0 \text{ kHz}$)	h_{fe}	60	500	.
Output Admittance ($V_{CE} = -10 \text{ Vdc}$, $I_C = -1.0 \text{ mAdc}$, $f = 1.0 \text{ kHz}$)	h_{oe}	1.0	100	μmhos

Switching Characteristics

Delay Time	(Vcc = -30 Vdc, VEB = -2.0 Vdc Ic = -150 mAdc, IB1 = -15 mAdc)	td	-	15	ns
Rise Time		tr	-	20	
Storage Time	(Vcc = -30 Vdc, Ic = -150 mAdc, IB1 = IB2 = -15 mAdc)	ts	-	225	ns
Fall Time		tf	-	30	

SWITCHING TIME EQUIVALENT TEST CIRCUIT

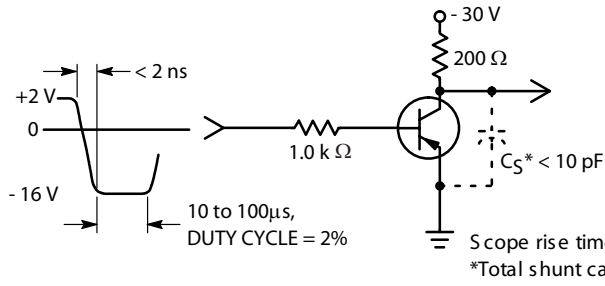


Figure 1. Turn-On Time

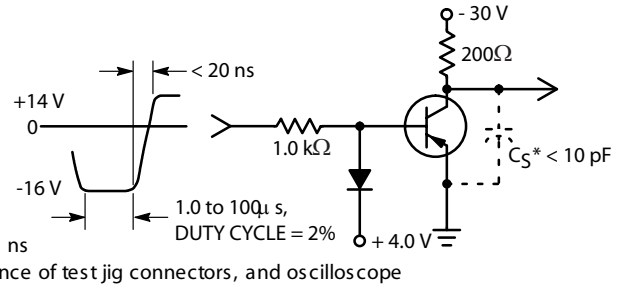


Figure 2. Turn-Off Time

TRANSIENT CHARACTERISTICS

— 25 °C - - - 105 °C

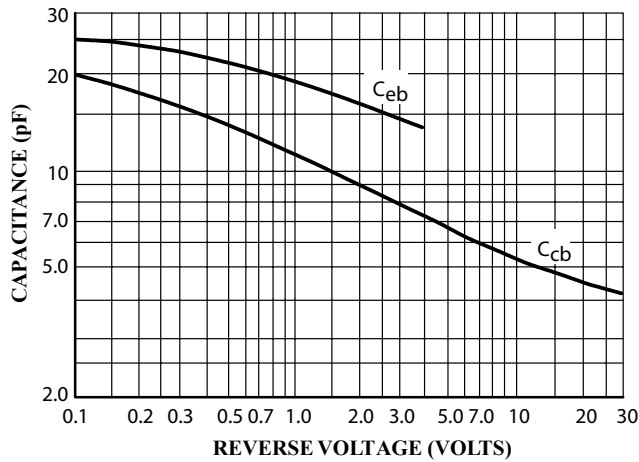


Figure 3. Capacitances

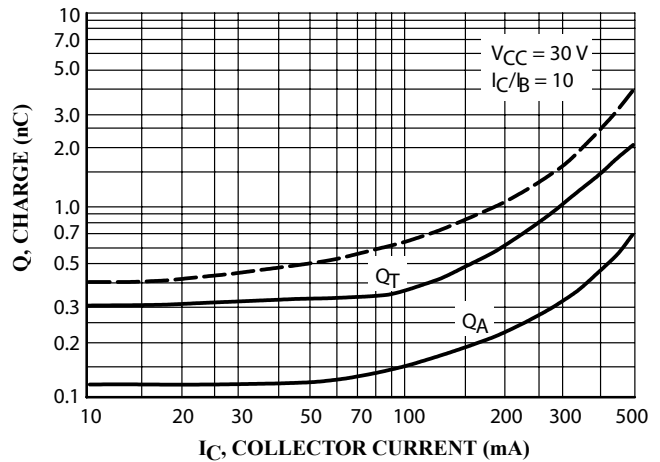


Figure 4. Charge Data

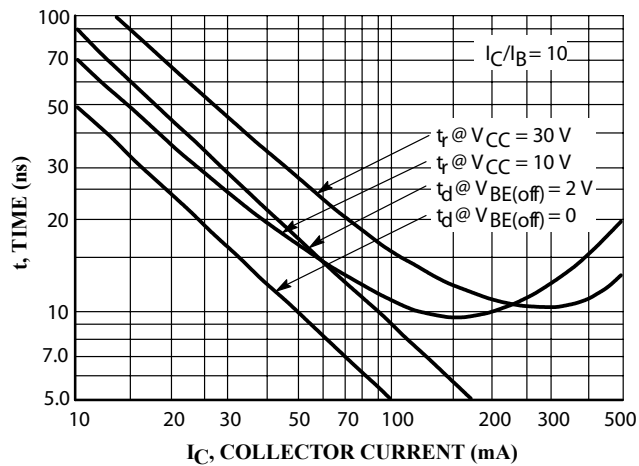


Figure 5. Turn-On Time

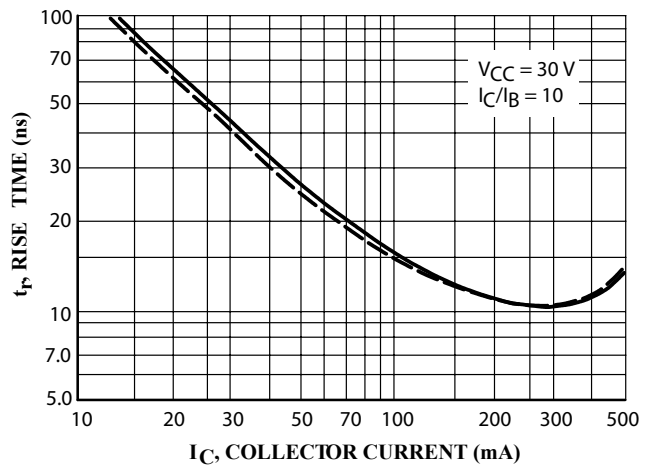


Figure 6. Rise Time

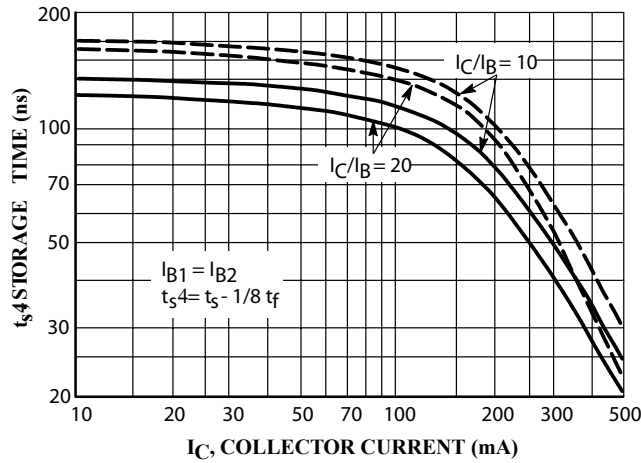


Figure 7. Storage Time

h P PARAMETERS

$V_{CE} = \pm 10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$, $T_A = 25^\circ \text{C}$

This group of graphs illustrates the relationship between h_{fe} and other "h" parameters for this series of transistors. To

obtain these curves, a high-gain and a low-gain unit were selected from the MMBT4403LT1 lines, and the same units were used to develop the correspondingly-numbered curves on each graph.

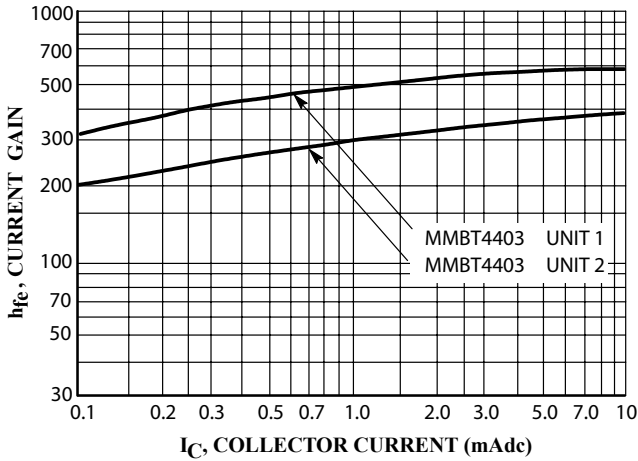


Figure 10. Current Gain

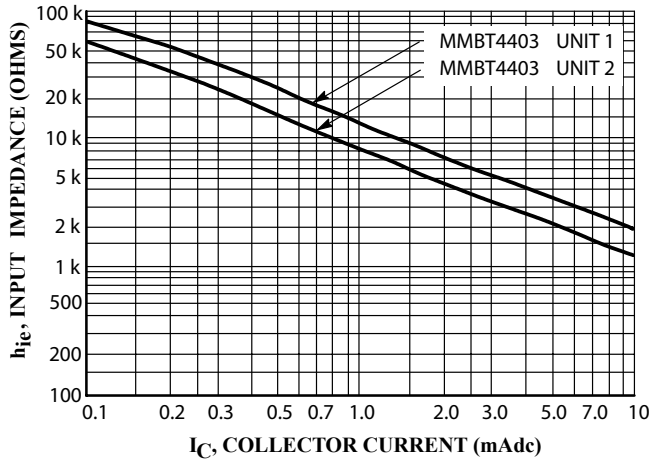


Figure 11. Input Impedance

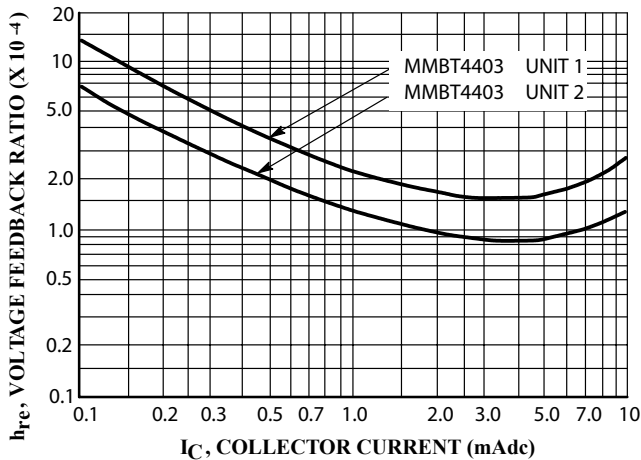


Figure 12. Voltage Feedback Ratio

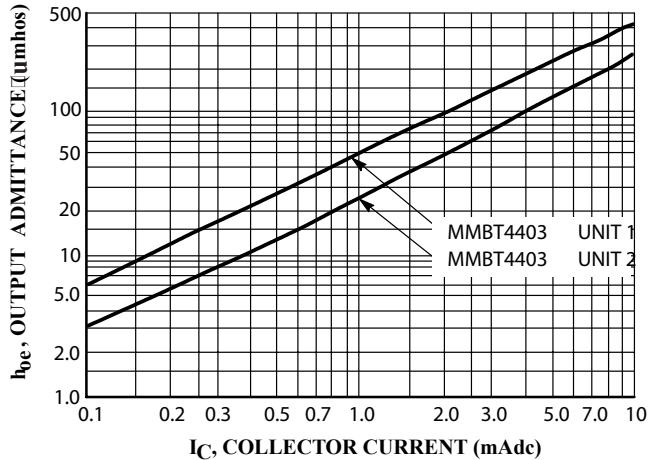


Figure 13. Output Admittance

STATIC CHARACTERISTICS

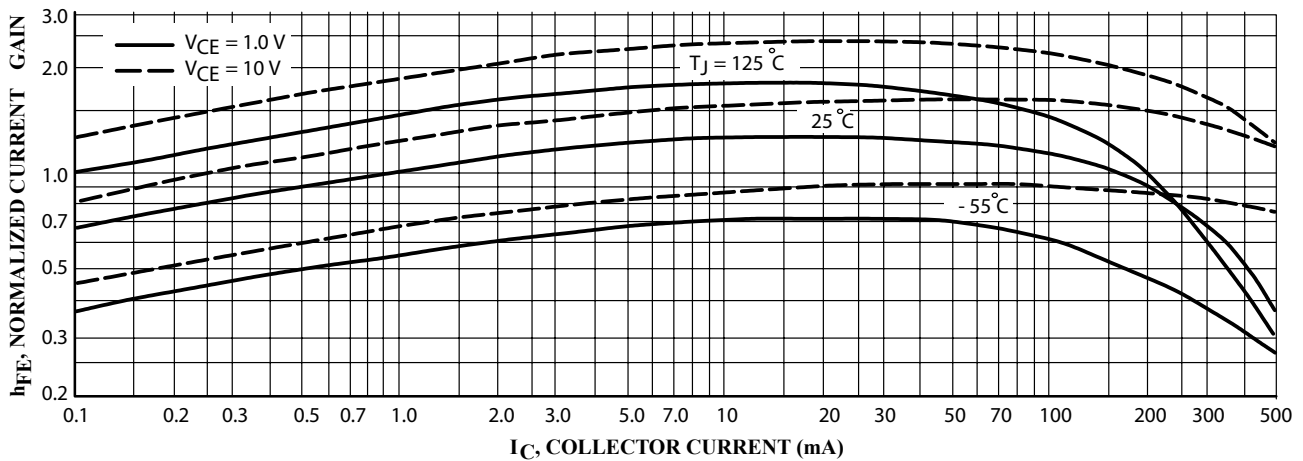


Figure 14. DC Current Gain

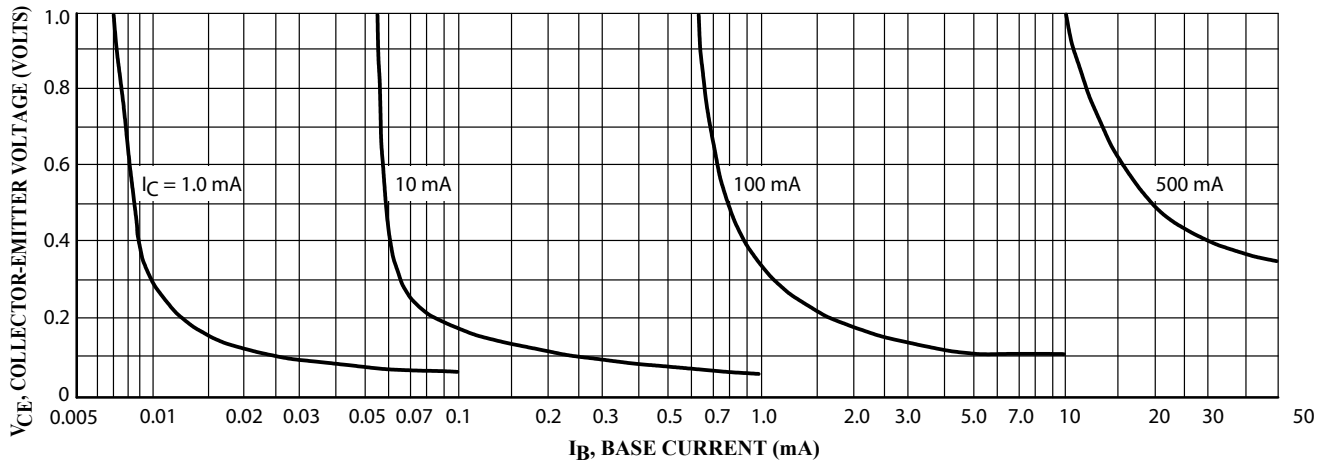


Figure 15. Collector Saturation Region

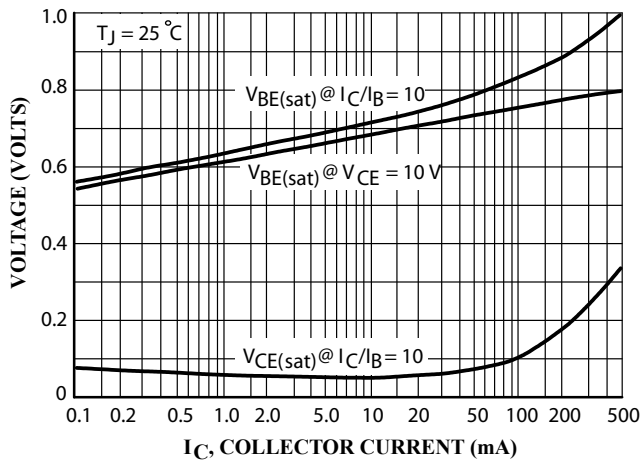


Figure 16. "On" Voltages

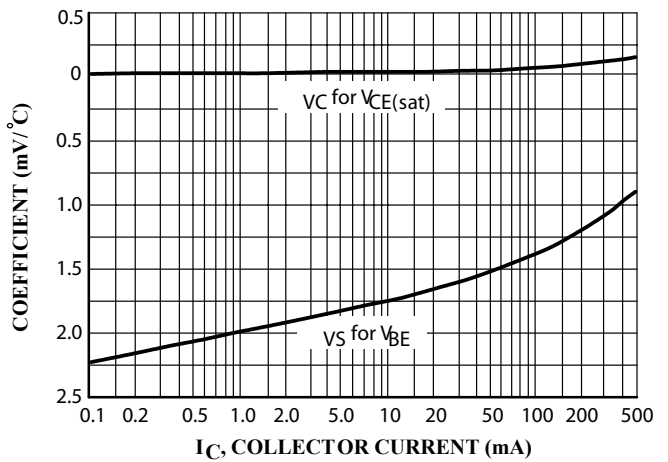
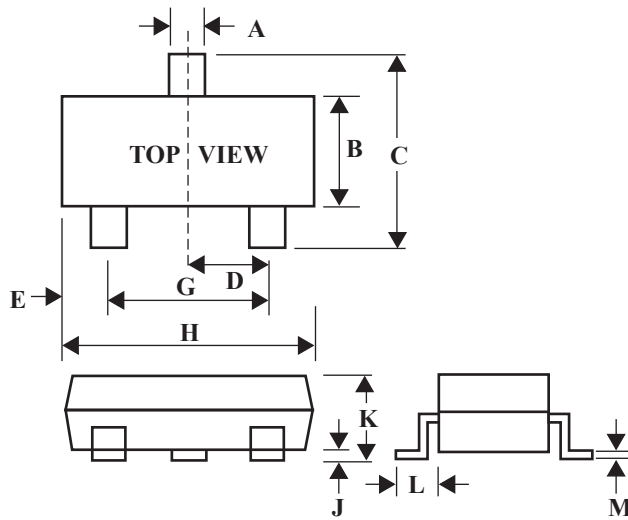


Figure 17. Temperature Coefficients

SOT-23 Package Outline Dimensions

Unit:mm



Dim	Min	Max
A	0.35	0.51
B	1.19	1.40
C	2.10	3.00
D	0.85	1.05
E	0.46	1.00
G	1.70	2.10
H	2.70	3.10
J	0.01	0.13
K	0.89	1.10
L	0.30	0.61
M	0.076	0.25