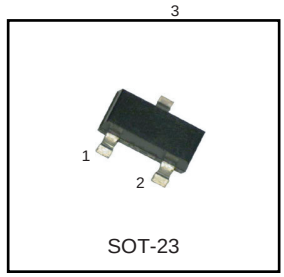
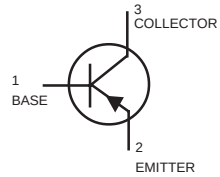
Zowie Technology Corporation

Switching Transistor
PNP Silicon
Lead free product
Halogen-free type

MMBT4403GH





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	- 600	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max.	Unit
Total Device Dissipation FR-5 Board(1) T_A=25°C Derate above 25°C	P_D	225 1.8	mW mW / °C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	556	°C / W
Total Device Dissipation Alumina Substrate,(2) T_A=25°C Derate above 25°C	P_D	300 2.4	mW mW / °C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	417	°C / W
Junction and Storage Temperature	T_J,T_{STG}	-55 to +150	°C

ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise noted)

Characteristic	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdowe Voltage(3) (I_C= -1.0mAdc, I_B=0)	$V_{(BR)CEO}$	-40	-	Vdc
Collector-Base Breakdowe Voltage (I_C= -0.1 mAdc, I_E=0)	$V_{(BR)CBO}$	-40	-	Vdc
Emitter-Base Breakdowe Voltage (I_E= -0.1 mAdc, I_C=0)	$V_{(BR)EBO}$	-5.0	-	Vdc
Base Cutoff Current (V_{CE}= -35 Vdc, V_{EB}= -0.4 Vdc)	I_{BEV}	-	-0.1	Adc
Collector Cutoff Current (V_{CE}= -35 Vdc, V_{EB}= -0.4 Vdc)	I_{CEX}	-	-0.1	Adc

(1) FR-5=1.0 x 0.75 x 0.062in.
(2) Alumina=0.4 x 0.3 x 0.024in. 99.5% alumina.
(3) Pulse Test : Pulse Width≦300uS, Duty Cycle≦2.0%.

ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise noted) (Continued)

Characteristic	Symbol	Min.	Max.	Unit
ON CHARACTERISTICS(3)				
DC Current Gain				
(I_C=-0.1 mAdc, V_{CE}=-1.0 Vdc)	H_{FE}	30	-	-
(I_C=-1.0 mAdc, V_{CE}=-1.0 Vdc)		60	-	
(I_C=-10 mAdc, V_{CE}=-1.0 Vdc)		100	-	
(I_C=-150 mAdc, V_{CE}=-2.0 Vdc)(3)		100	300	
(I_C=-500 mAdc, V_{CE}=-2.0 Vdc)(3)		20	-	
Collector-Emitter Saturation Voltage(3)				
(I_C=-150 mAdc, I_B=-15 mAdc)	V_{CE}(sat)	-	-0.4	Vdc
(I_C=-500 mAdc, I_B=-50 mAdc)		-	-0.75	
Base-Emitter Saturation Voltage(3)				
(I_C=-150 mAdc, I_B=-15 mAdc)	V_{BE}(sat)	-0.75	-0.95	Vdc
(I_C=-500 mAdc, I_B=-50 mAdc)		-	-1.3	
SMALL-SIGNAL CHARACTERISTIC				
Current-Gain-Bandwidth Product (I_C=-20 mAdc, V_{CE}=-10 Vdc, f=100 MHz)	f_T	200	-	MHz
Collector-Base Capacitance (V_{CB}=-10Vdc, I_E=0, f=1.0 MHz)	Ccb	-	8.5	pF
Emitter-Base Capacitance (V_{BE}=-0.5 Vdc, I_C=0, f=1.0 MHz)	Ceb	-	30	pF
Input Impedance (V_{CE}=-10 Vdc, I_C=-1.0 mAdc, f=1.0 kHz)	hie	1.5	15	k ohms
Voltage Feedback Ratio (V_{CE}=-10 Vdc, I_C=-1.0 mAdc, f=1.0 kHz)	hre	0.1	8.0	X 10^{-4}
Small-Signal Current Gain (V_{CE}=-10 Vdc, I_C=-1.0 mAdc, f=1.0 kHz)	hfe	60	500	-
Output Admittance (V_{CE}=-10 Vdc, I_C=-1.0 mAdc, f=1.0 kHz)	hoe	1.0	100	mhos

SWITCHING CHARACTERISTICS

Delay Time	(V_{CC}=-30 Vdc, V_{EB}=-2.0 Vdc, I_C=-150 mAdc, I_{B1}=-15 mAdc)	td	-	15	nS
Rise Time		tr	-	20	
Storage Time	(V_{CC}=-30 Vdc, I_C=-150 mAdc, I_{B1}=I_{B2}=-15 mAdc)	ts	-	225	nS
Fall Time		tf	-	30	

(3) Pulse Test : Pulse Width ≦ 300uS, Duty Cycle ≦ 2.0%.

SWITCHING TIME EQUIVALENT TEST CIRCUITS

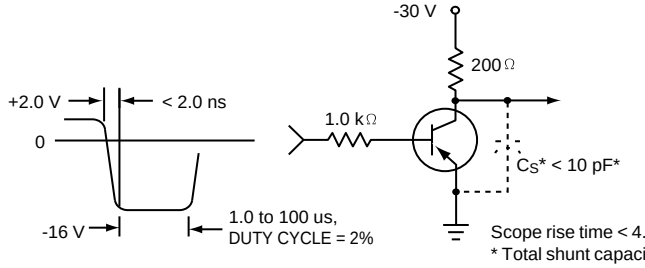
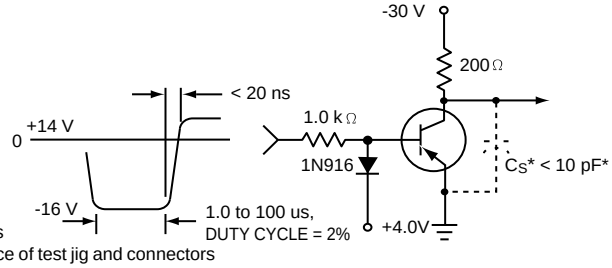


Figure 1. Turn-On Time



Scope rise time < 4.0 ns
* Total shunt capacitance of test jig and connectors

Figure 2. Turn-Off Time

TYPICAL TRANSIENT CHARACTERISTICS

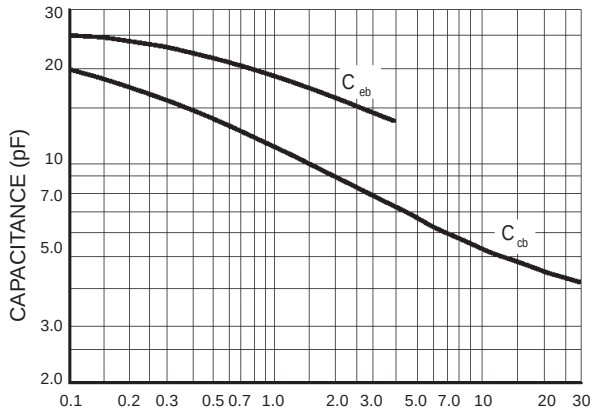


Figure 3. Capacitance

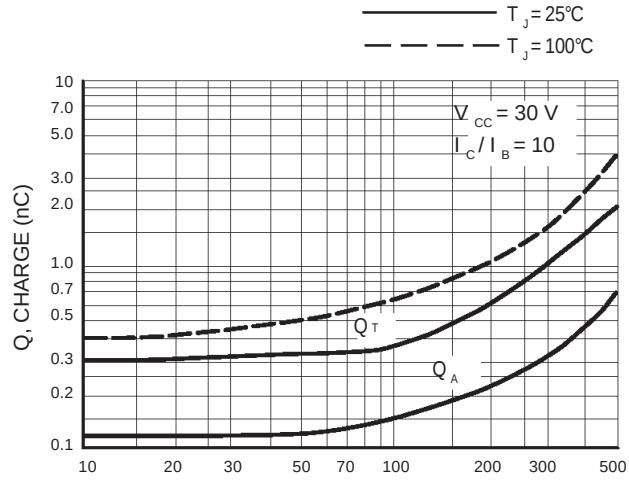


Figure 4. Charge Data

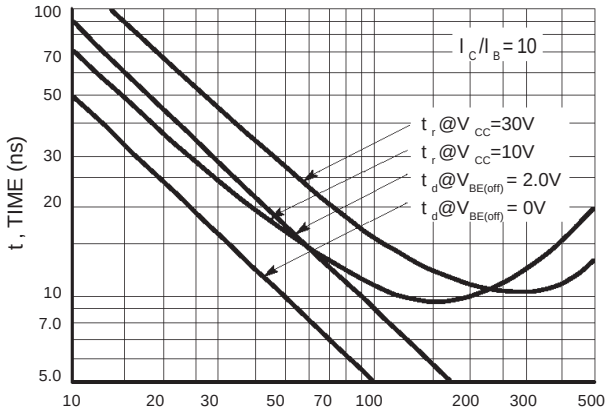


Figure 5. Turn–On Time

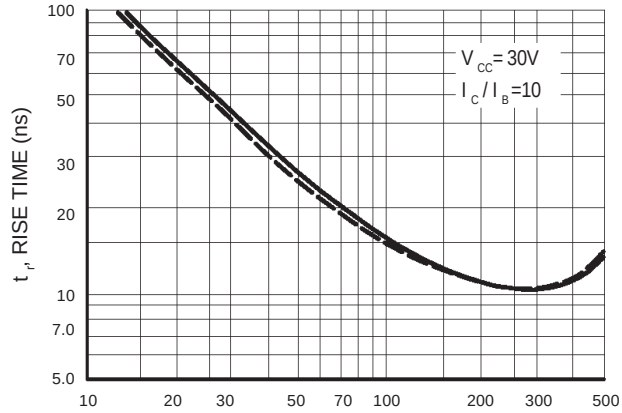


Figure 6. Rise Time

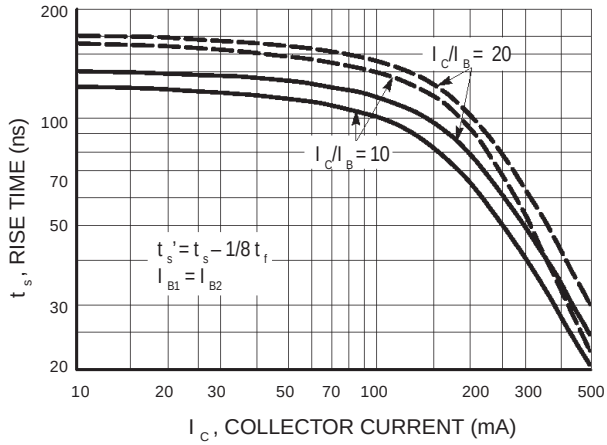


Figure 7. Storage Time

SMALL–SIGNAL CHARACTERISTICS

NOISE FIGURE

V_{CE} = –10 Vdc, T_A = 25°C

Bandwidth = 1.0 Hz

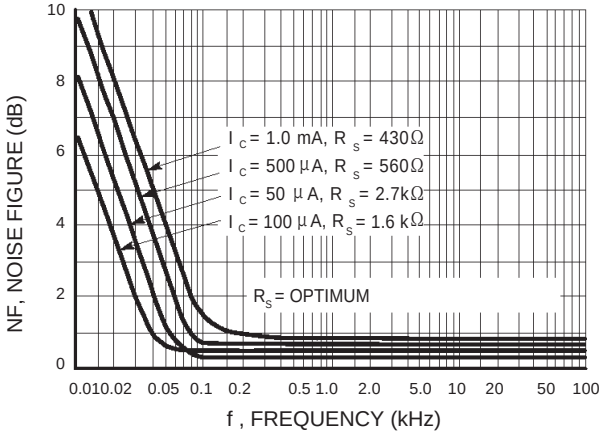


Figure 8. Frequency Effects

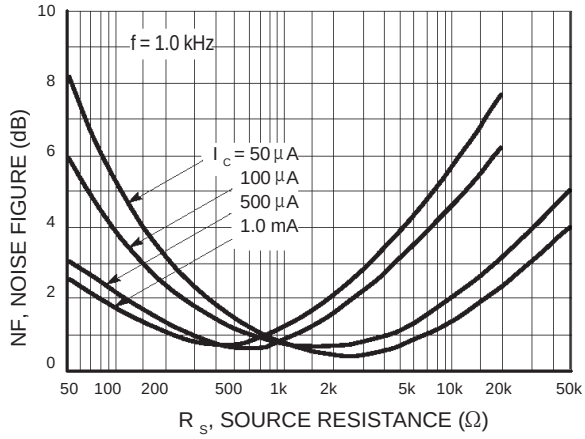


Figure 9. Source Resistance Effects

h PARAMETERS

(V_{CE} = –10 Vdc, f = 1.0 kHz, T_A = 25°C)

This group of graphs illustrates the relationship between h fe and other “h” parameters for this series of ransistors. To obtain these curves, a high–gain and a low–gain unit were selected from the MMBT4401LT1 lines, and the same units were used to develop the correspondingly numbered curves on each graph.

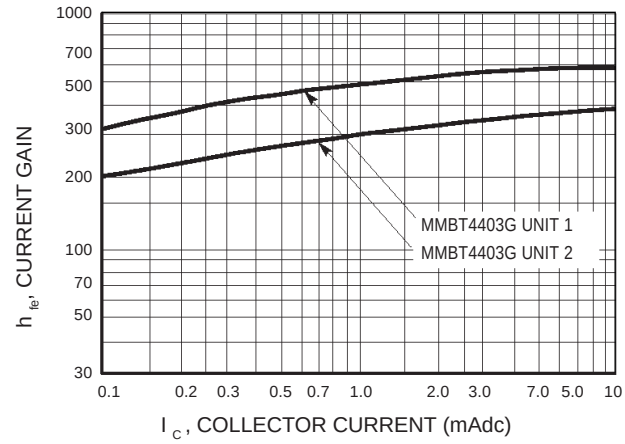


Figure 10. Current Gain

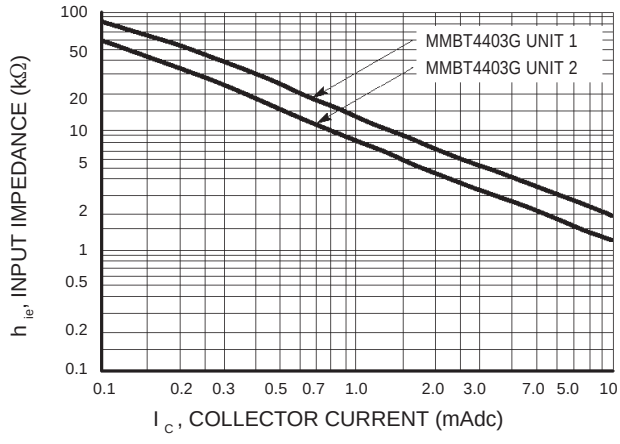


Figure 11. Input Impedance

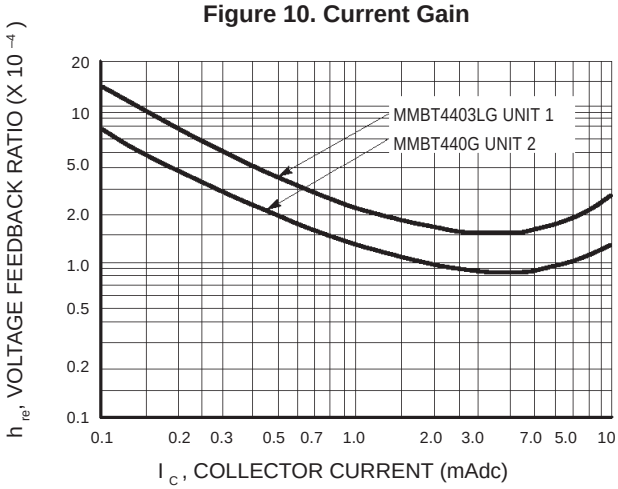


Figure 12. Voltage Feedback Ratio

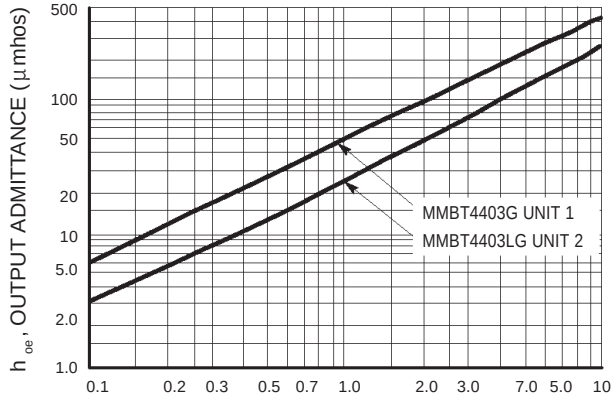


Figure 13. Output Admittance

STATIC CHARACTERISTICS

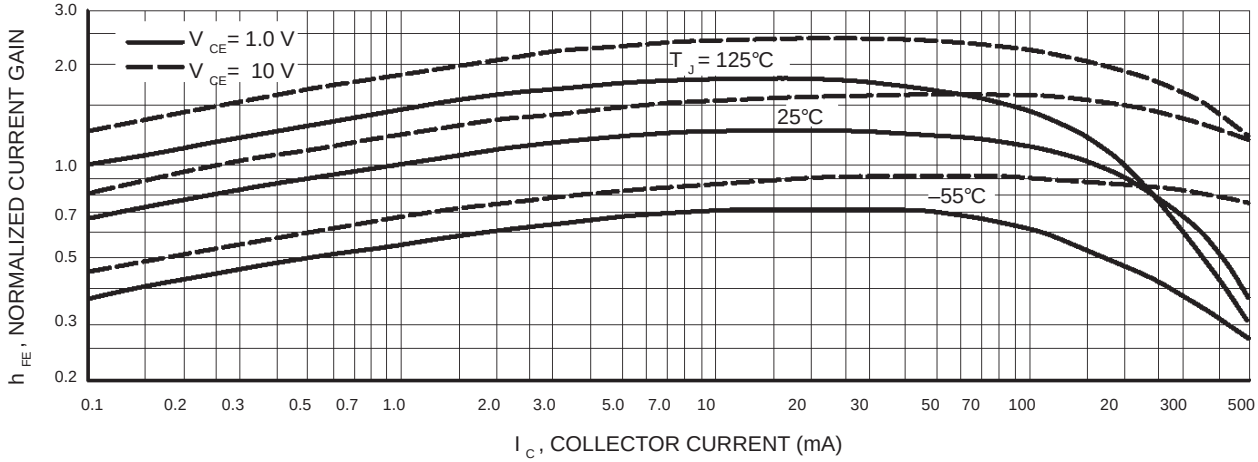


Figure 14. DC Current Gain

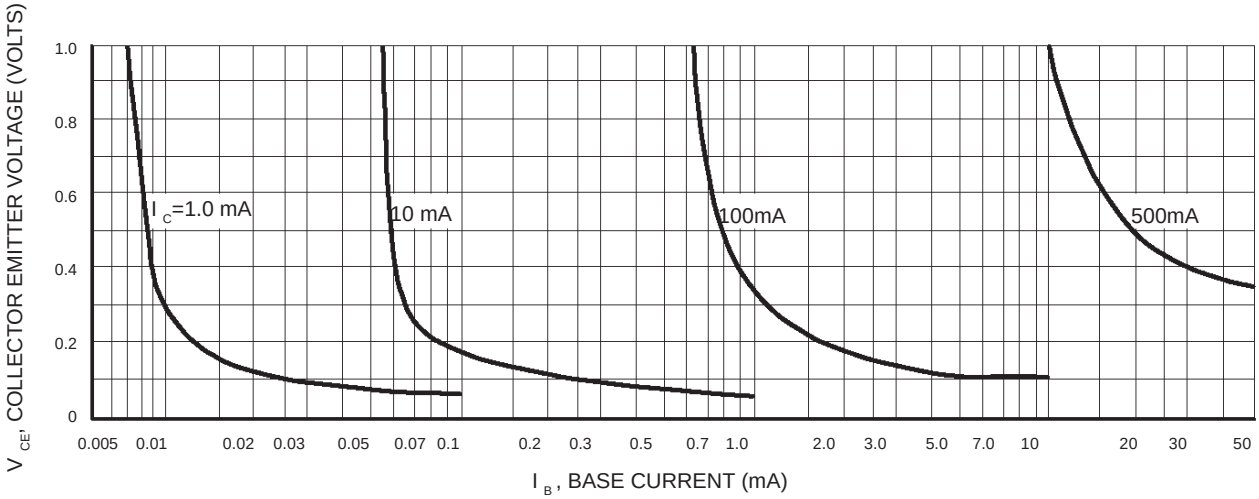


Figure 15. Collector Saturation Region

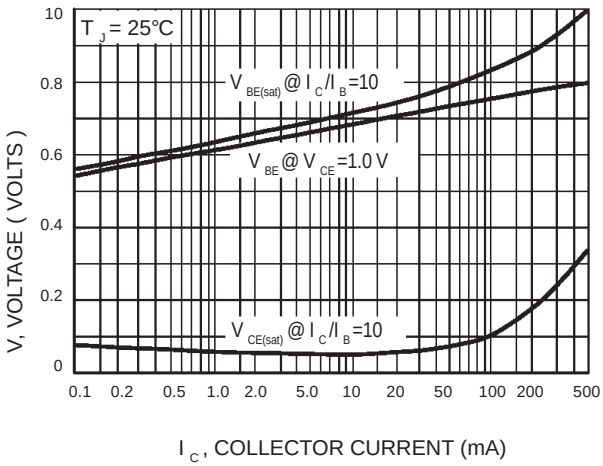


Figure 16. "On" Voltages

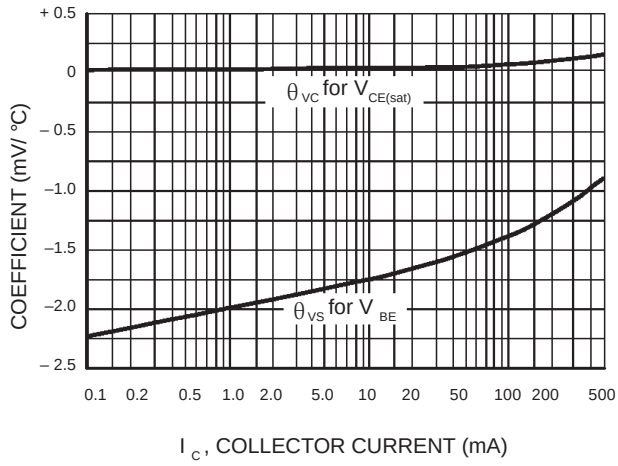


Figure 17. Temperature Coefficients