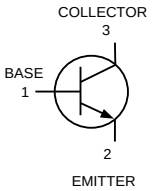
Zowie Technology Corporation

General Purpose Transistor
NPN Silicon
Halogen-free type
Lead free product

MMBT2222AGH

SOT-23



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	40	Vdc
Collector-Base Voltage	V_{CBO}	75	Vdc
Emitter-Base Voltage	V_{EBO}	6.0	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 (I_C=10mAdc, $I_{B=0}$)	$V_{(BR)CEO}$	40	-	Vdc
Collector-Emitter Breakdowe Voltage (I_C=10uAdc, $I_{E=0}$)	$V_{(BR)CBO}$	75	-	Vdc
Emitter - Base Breakdowe Voltage (I_E=10 uAdc, I_C=0)	$V_{(BR)EBO}$	6.0	-	Vdc
Collector Cutoff Current (V_{CE}=60 Vdc, $V_{EB\ (off)}$=3.0 Vdc)	I_{CEX}	-	10	nAdc
Collector Cutoff Current (V_{CB}=60 Vdc, I_E=0) (V_{CB}=60 Vdc, I_E=0, T_A=125°C)	I_{CBO}	- -	0.01 10	uAdc
Emitter Cutoff Current (V_{EB}=3.0 Vdc, I_C=0)	I_{EBO}	-	100	nAdc
Base Cutoff Current (V_{CE}=60 V, $V_{EB\ (off)}$=3.0 Vdc)	I_{BL}	-	20	nAdc

(1) FR-5=1.0 x 0.75 x 0.062in.
(2) Alumina=0.4 x 0.3 x 0.024in. 99.5% alumina.

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}=10 Vdc) (I_C=1.0 mAdc, V_{CE}=10 Vdc) (I_C=10 mAdc, V_{CE}=10 Vdc) (I_C=10 mAdc, V_{CE}=10 Vdc, T_A=-55°C) (I_C=150 mAdc, V_{CE}=10 Vdc)(3) (I_C=150 mAdc, V_{CE}=1.0 Vdc)(3) (I_C=500 mAdc, V_{CE}=10 Vdc)(3)	H_{FE}	 35 50 75 35 100 50 40	 - - - - 300 - -	-
Collector-Emitter Saturation Voltage(3) (I_C=150 mAdc, I_B=15 mAdc) (I_C=500 mAdc, I_B=50 mAdc)	V_{CE}(sat)	 - -	 0.3 1.0	Vdc
Base-Emitter Saturation Voltage(3) (I_C=150 mAdc, I_B=15 mAdc) (I_C=500 mAdc, I_B=50 mAdc)	V_{BE}(sat)	0.6 -	1.2 2.0	Vdc
SMALL-SIGNAL CHARACTERISTIC				
Current-Gain-Bandwidth Product(4) (I_C=20 mAdc, V_{CE}=20 Vdc, f=100 MHz)	f_T	300	-	MHz
Output Capacitance (V_{CB}=10 Vdc, I_E=0, f=1.0 MHz)	Cobo	-	8.0	pF
Input Capacitance (V_{EB}=0.5 Vdc, I_C=0, f=1.0 MHz)	Cibo	-	25	pF
Input Impedance (V_{CE}=10 Vdc, I_C=1.0 mAdc, f=1.0 kHz) (V_{CE}=10 Vdc, I_C=10 mAdc, f=1.0 kHz)	hie	2.0 0.25	8.0 1.25	k ohms
Voltage Feedback Ratio (V_{CE}=10 Vdc, I_C=1.0 mAdc, f=1.0 kHz) (V_{CE}=10 Vdc, I_C=10 mAdc, f=1.0 kHz)	hre	- -	8.0 4.0	X 10^{-4}
Small-Signal Current Gain (V_{CE}=10 Vdc, I_C=1.0 mAdc, f=1.0 kHz) (V_{CE}=10 Vdc, I_C=10 mAdc, f=1.0 kHz)	hfe	50 75	300 375	-
Output Admittance (V_{CE}=10 Vdc, I_C=1.0 mAdc, f=1.0 kHz) (V_{CE}=10 Vdc, I_C=10 mAdc, f=1.0 kHz)	hoe	5.0 25	35 200	u mhos
Collector Base Time Constant (V_{CB}=10 Vdc, I_C=100 uAdc, R_S = 1.0 k ohms, f=1.0 kHz)	rb, Cc	-	150	ps
Noise Figure (V_{CE}=10 Vdc, I_C=100 uAdc, R_S=1.0 k ohm, f=1.0 kHz)	NF	-	4.0	dB

SWITCHING CHARACTERISTICS

Delay Time	(V_{CC}=30 Vdc, $V_{BE\ (off)}$ = -0.5 Vdc, I_C =150 mAdc, I_{B1} = 15 mAdc)	td	-	10	nS
Rise Time		tr	-	25	
Storage Time	(V_{CC}=30 Vdc, I_C = 150 mAdc, I_{B1} =I_{B2} = 15 mAdc)	ts	-	225	nS
Fall Time		tf	-	60	

(3) Pulse Test : Pulse Width ≦ 300 uS, Duty Cycle ≦ 2.0%.
(2) fT is defined as the frequency at which hfe extrapolates to unity.

SWITCHING TIME EQUIVALENT TEST CIRCUITS

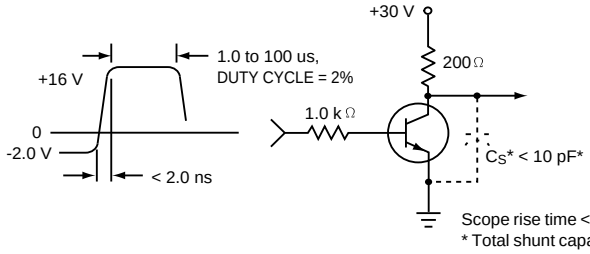


Figure 1. Turn-On Time

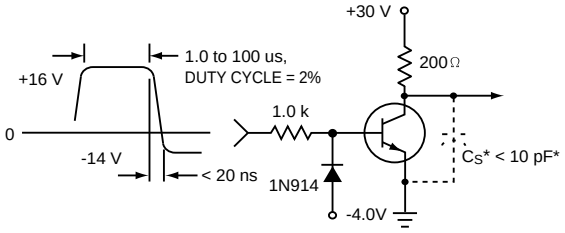


Figure 2. Turn-Off Time

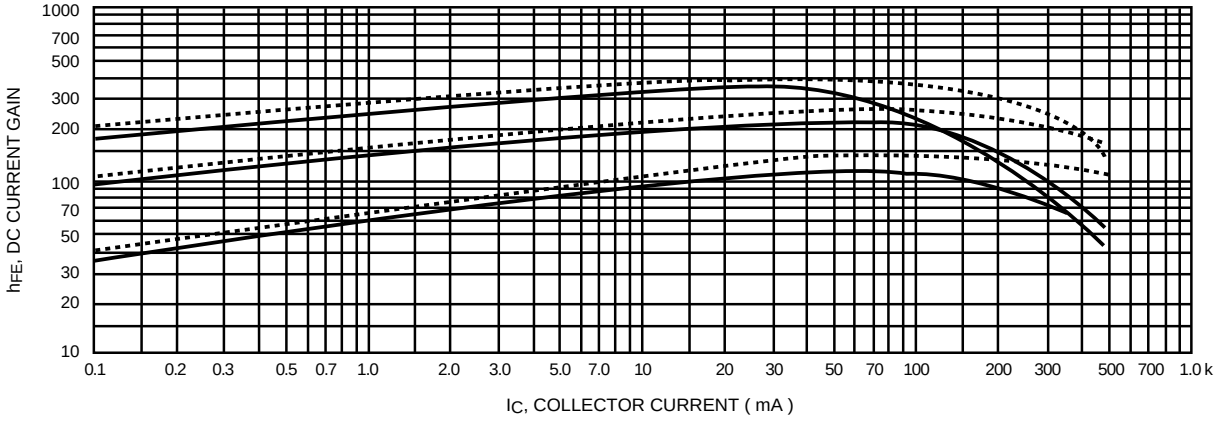


Figure 3. DC Current Gain

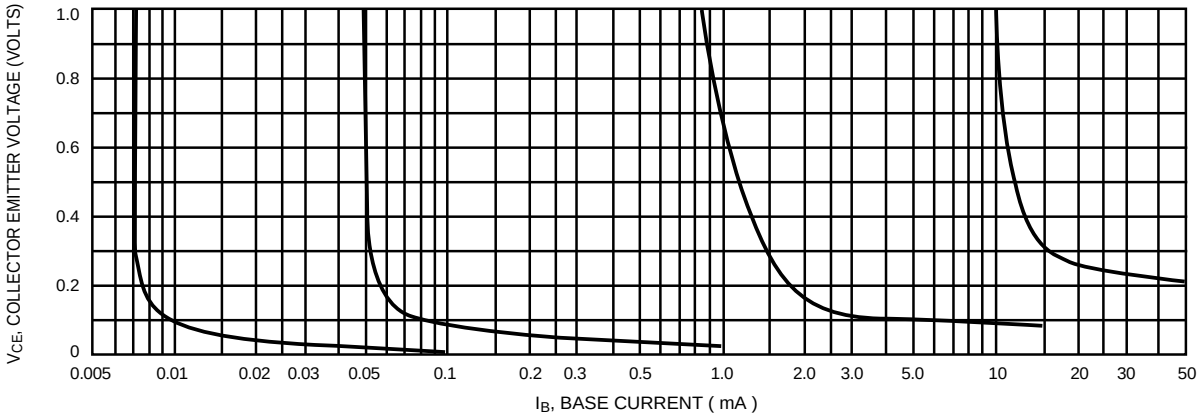


Figure 4. Collector Saturation Region

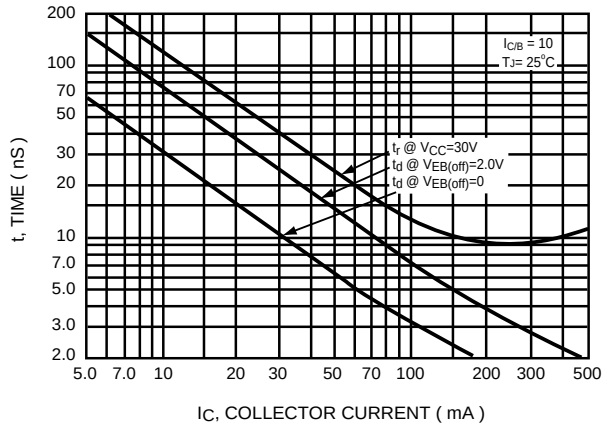


Figure 5. Turn - On Time

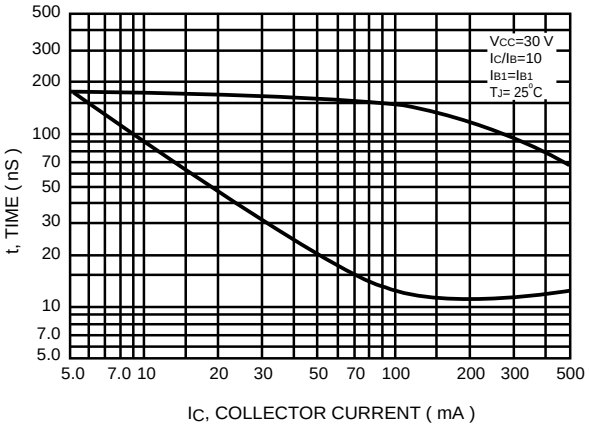


Figure 6. Turn - Off Time

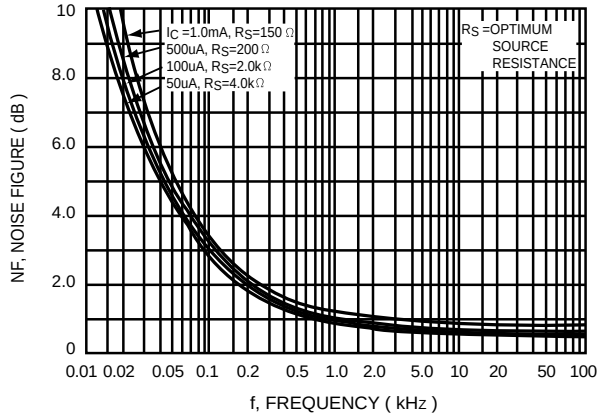


Figure 7. Frequency Effects

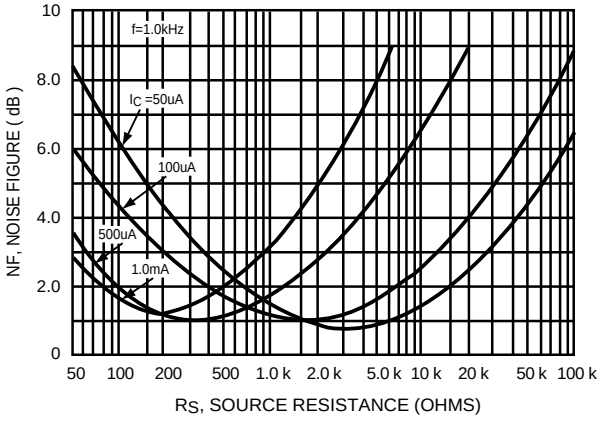


Figure 8. Source Resistance Effects

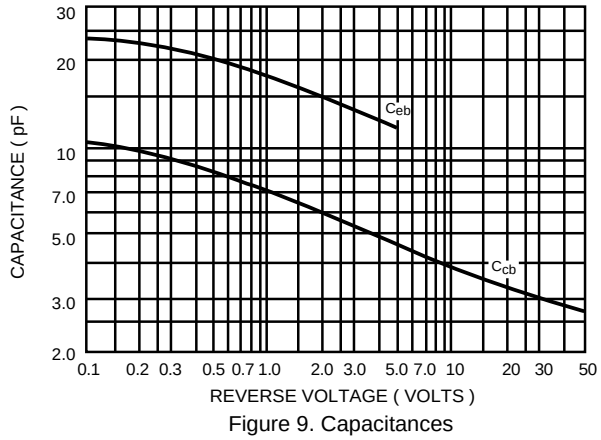


Figure 9. Capacitances

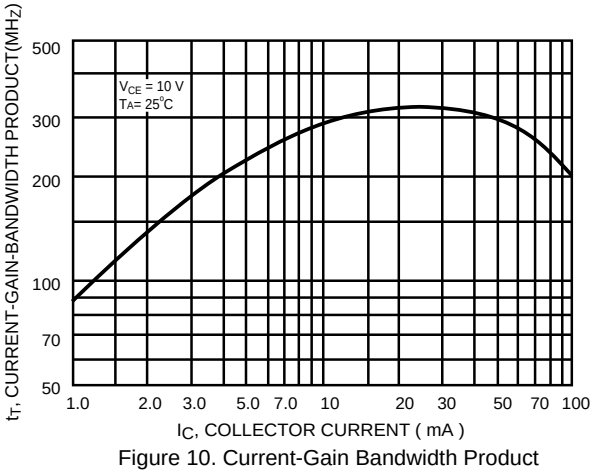


Figure 10. Current-Gain Bandwidth Product

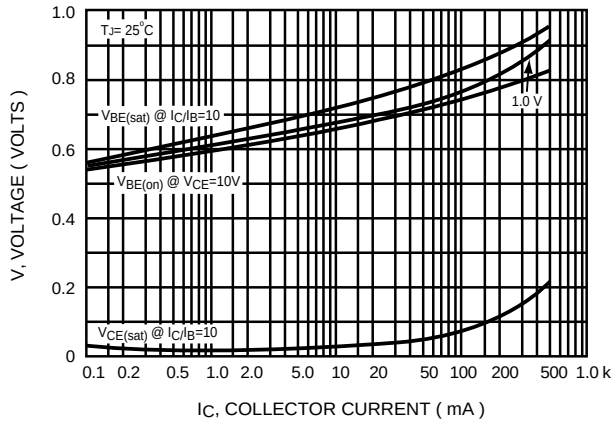


Figure 11. " On " Voltage

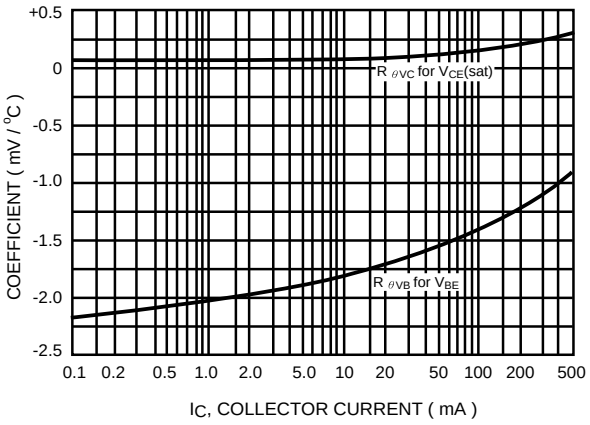


Figure 12. Temperature Coefficients