

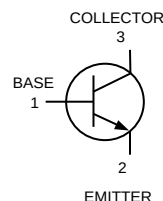
General Purpose Transistor

NPN Silicon

Halogen-free type

Lead free product

MMBT2222AGH



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

ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min.	Max.	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdowe Voltage ($I_C=10\text{mAdc}$, $I_B=0$)	$V_{(BR)CEO}$	40	-	Vdc
Collector-Emitter Breakdowe Voltage ($I_C=10\text{uAdc}$, $I_E=0$)	$V_{(BR)CBO}$	75	-	Vdc
Emitter - Base Breakdowe Voltage ($I_E=10\text{uAdc}$, $I_C=0$)	$V_{(BR)EBO}$	6.0	-	Vdc
Collector Cutoff Current ($V_{CE}=60\text{ Vdc}$, $V_{EB}(\text{off})=3.0\text{ Vdc}$)	I_{CEX}	-	10	nAdc
Collector Cutoff Current ($V_{CB}=60\text{ Vdc}$, $I_E=0$) ($V_{CB}=60\text{ Vdc}$, $I_E=0$, $T_A=125^{\circ}\text{C}$)	I_{CBO}	- -	0.01 10	uAdc
Emitter Cutoff Current ($V_{EB}=3.0\text{ Vdc}$, $I_C=0$)	I_{EBO}	-	100	nAdc
Base Cutoff Current ($V_{CE}=60\text{ V}$, $V_{EB}(\text{off})=3.0\text{ Vdc}$)	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 (TA=25°C unless otherwise noted) (Continued)

Characteristic	Symbol	Min.	Max.	Unit
ON CHARACTERISTICS⁽³⁾				
DC Current Gain (IC=0.1 mAdc, VCE=10 Vdc) (IC=1.0 mAdc, VCE=10 Vdc) (IC=10 mAdc, VCE=10 Vdc) (IC=10 mAdc, VCE=10 Vdc, TA=-55°C) (IC=150 mAdc, VCE=10 Vdc) ⁽³⁾ (IC=150 mAdc, VCE=1.0 Vdc) ⁽³⁾ (IC=500 mAdc, VCE=10 Vdc) ⁽³⁾	HFE	35 50 75 35 100 50 40	- - - - 300 - -	-
Collector-Emitter Saturation Voltage ⁽³⁾ (IC=150 mAdc, IB=15 mAdc) (IC=500 mAdc, IB=50 mAdc)	VCE(sat)	- -	0.3 1.0	Vdc
Base-Emitter Saturation Voltage ⁽³⁾ (IC=150 mAdc, IB=15 mAdc) (IC=500 mAdc, IB=50 mAdc)	VBE(sat)	0.6 -	1.2 2.0	Vdc

SMALL-SIGNAL CHARACTERISTIC

Current-Gain-Bandwidth Product ⁽⁴⁾ (IC=20 mAdc, VCE=20 Vdc, f=100 MHz)	fT	300	-	MHz
Output Capacitance (VCB=10 Vdc, IE=0, f=1.0 MHz)	Cobo	-	8.0	pF
Input Capacitance (VEB=0.5 Vdc, IC=0, f=1.0 MHz)	Cibo	-	25	pF
Input Impedance (VCE=10 Vdc, IC=1.0 mAdc, f=1.0 kHz) (VCE=10 Vdc, IC=10 mAdc, f=1.0 kHz)	hie	2.0 0.25	8.0 1.25	k ohms
Voltage Feedback Ratio (VCE=10 Vdc, IC=1.0 mAdc, f=1.0 kHz) (VCE=10 Vdc, IC=10 mAdc, f=1.0 kHz)	hre	- -	8.0 4.0	X 10 ⁻⁴
Small-Signal Current Gain (VCE=10 Vdc, IC=1.0 mAdc, f=1.0 kHz) (VCE=10 Vdc, IC=10 mAdc, f=1.0 kHz)	hfe	50 75	300 375	-
Output Admittance (VCE=10 Vdc, IC=1.0 mAdc, f=1.0 kHz) (VCE=10 Vdc, IC=10 mAdc, f=1.0 kHz)	hoe	5.0 25	35 200	u mhos
Collector Base Time Constant (VCB=10 Vdc, IC=100 uAdc, RS = 1.0 k ohms, f=1.0 kHz)	rb, Cc	-	150	ps
Noise Figure (VCE=10 Vdc, IC=100 uAdc, RS=1.0 k ohm, f=1.0 kHz)	NF	-	4.0	dB

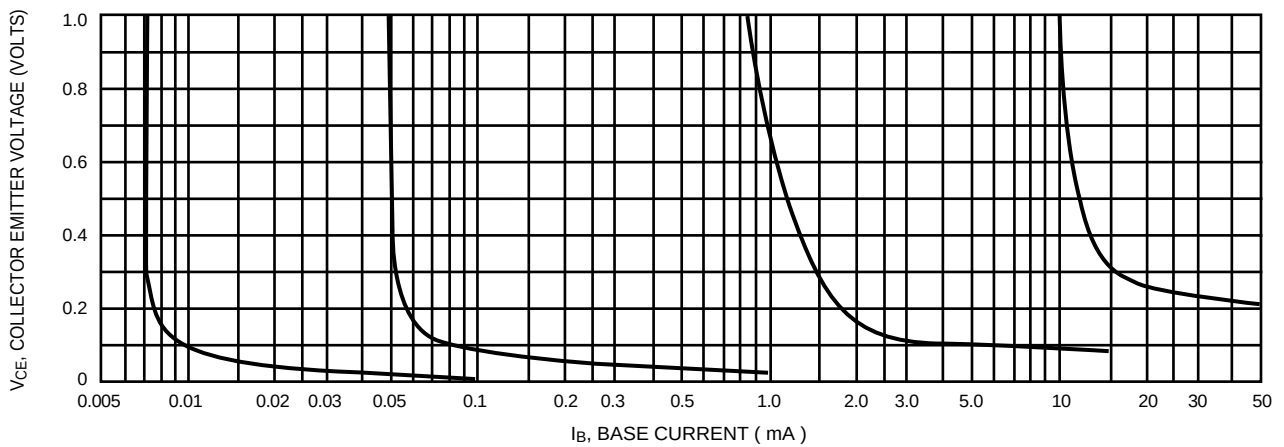
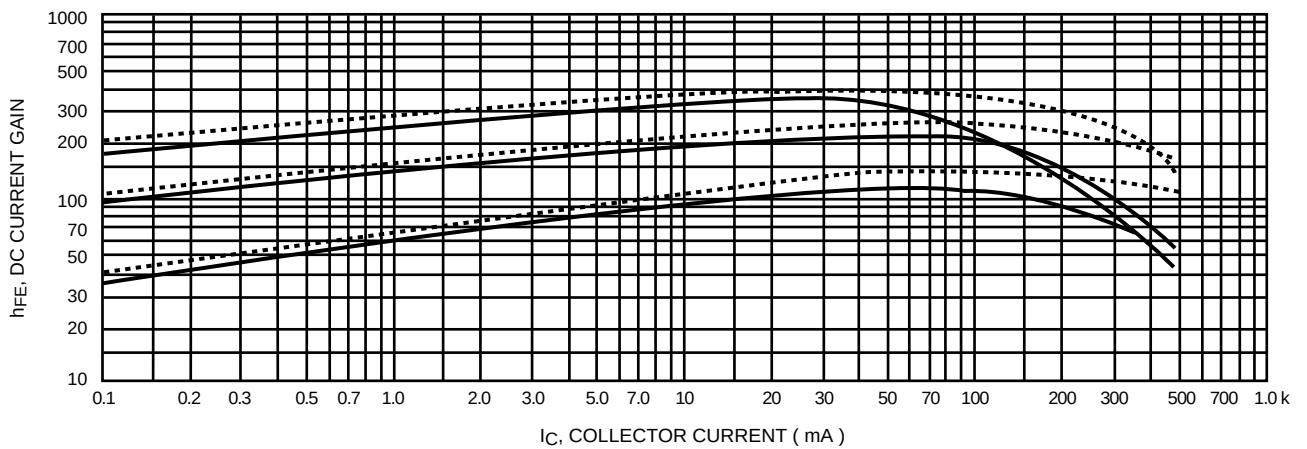
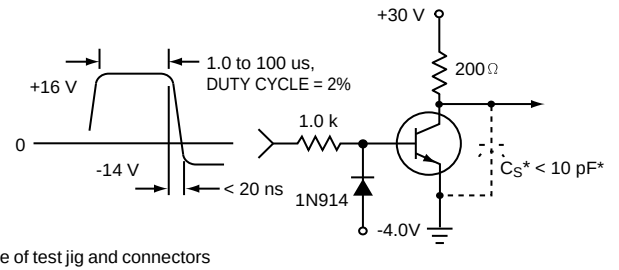
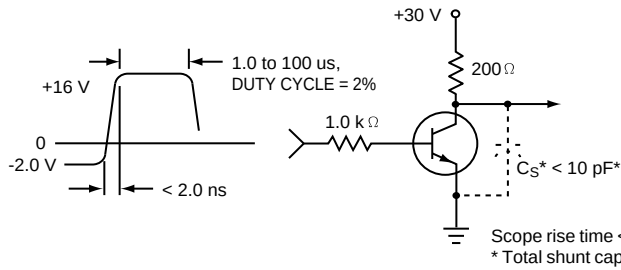
SWITCHING CHARACTERISTICS

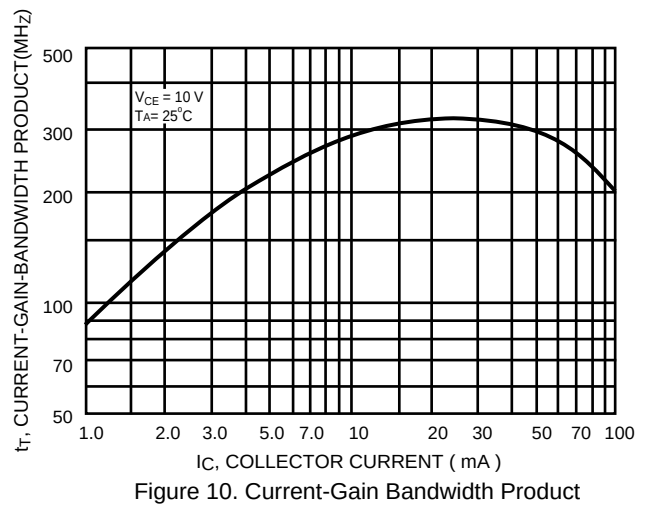
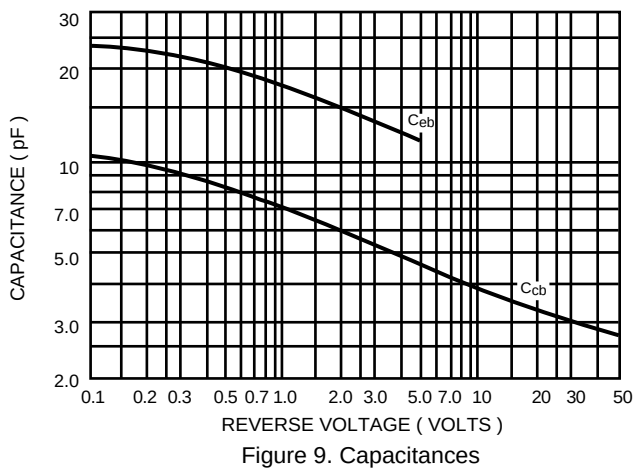
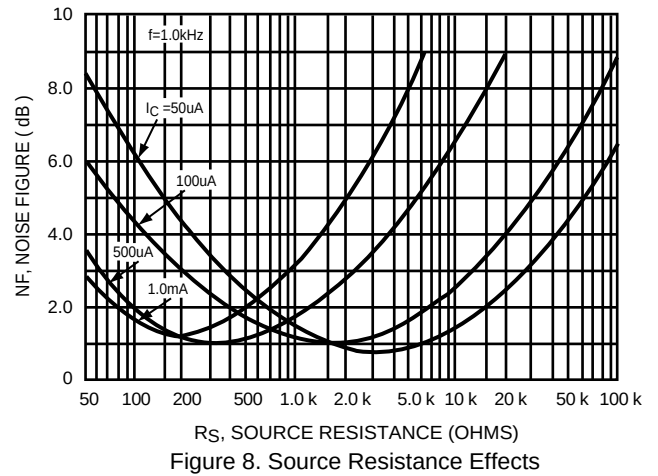
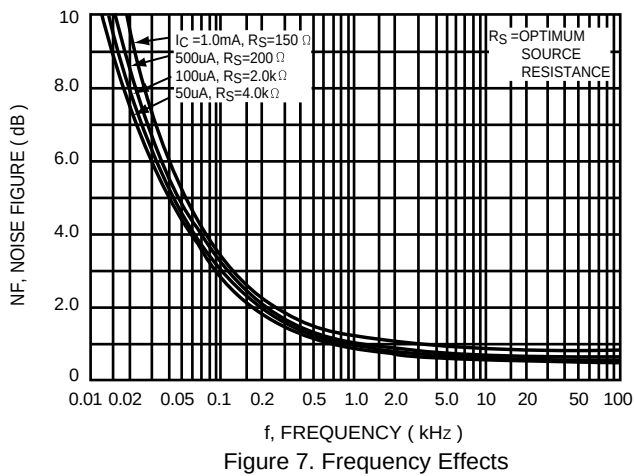
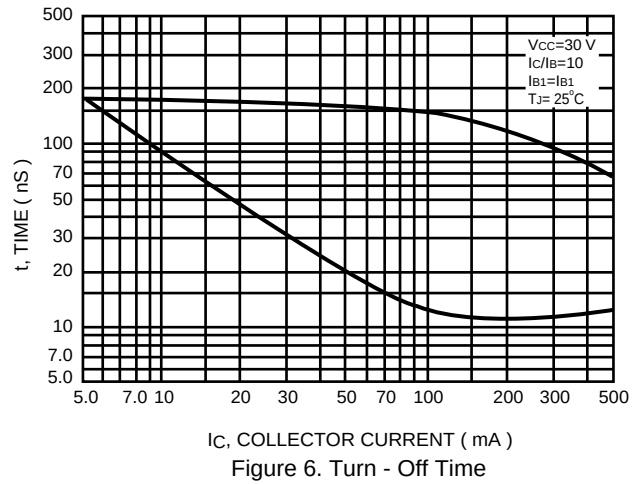
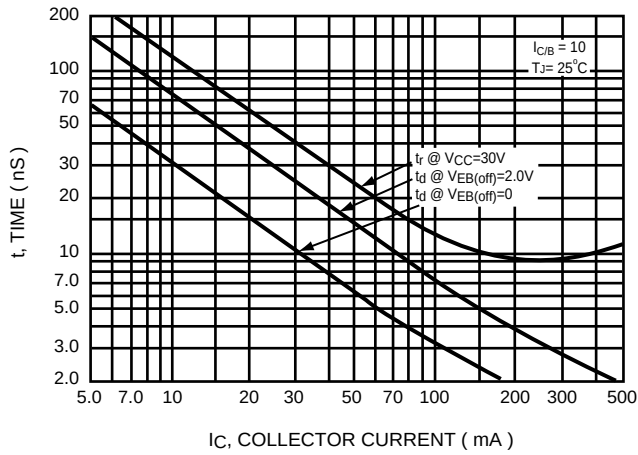
Delay Time	(VCC=30 Vdc, VBE (off) = -0.5 Vdc, IC =150 mAdc, IB1 = 15 mAdc)	td	-	10	nS
Rise Time		tr	-	25	
Storage Time	(VCC=30 Vdc, IC = 150 mAdc, IB1 =IB2 = 15 mAdc)	ts	-	225	nS
Fall Time		tf	-	60	

(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





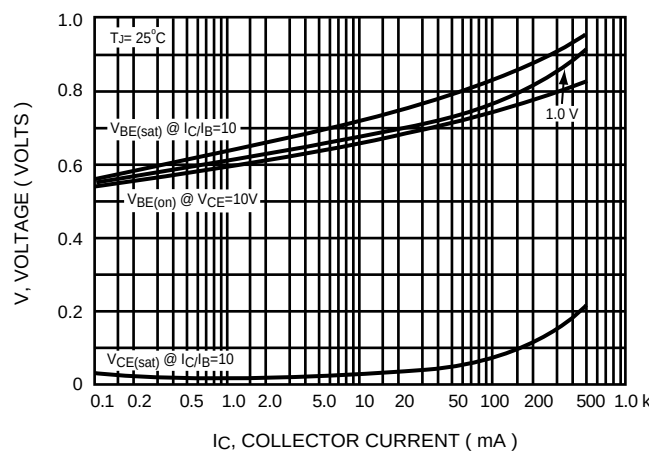


Figure 11. " On " Voltage

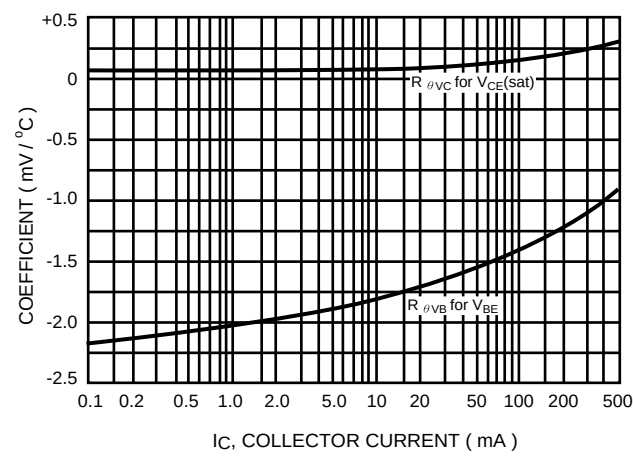


Figure 12. Temperature Coefficients