Elektronische Bauelemente

MMBT2222AT

NPN Silicon
General Purpose Transistors

RoHS Compliant Product
A suffix of "-C" specifies halogen & lead-free

FEATURES

- Epitaxial Planar Die Construction
- Complementary PNP Type Available(MMBT2907FW)
- Ideal for Medium Power Amplification and Switching

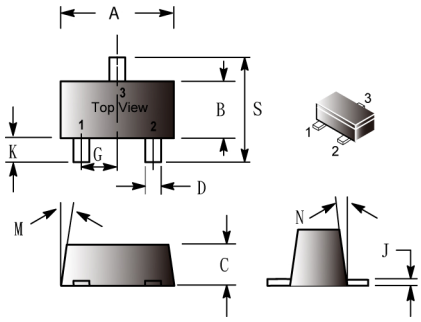
MARKING CODE

1P

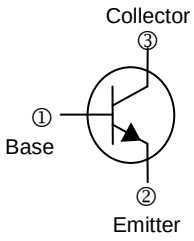
PACKAGE INFORMATION

Package	MPQ	Leader Size
SOT-523	3K	7 inch

SOT-523



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	1.50	1.70	K	0.30	0.50
B	0.75	0.95	M	---	10°
C	0.60	0.80	N	---	10°
D	0.23	0.33	S	1.50	1.70
G	0.50BSC				
J	0.10	0.20			



MAXIMUM RATINGS (T_A=25°C unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Collector - Emitter Voltage	V_{CEO}	40	V
Collector - Base Voltage	V_{CBO}	75	V
Emitter - Base Voltage	V_{EBO}	6	V
Collector Current - Continuous	I_C	600	mA
Total Device Dissipation FR-4 Board @ T_A=25°C [1]	P_D	150	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	833	°C / W
Junction & Storage Temperature	T_J, T_{STG}	-55~150	°C

Note:
1. Device mounted on FR4 glass epoxy printed circuit board using the minimum recommended footprint.

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

Characteristic	Symbol	Min.	Max.	Unit	Test Conditions
Off Characteristics					
Collector-Emitter Breakdown Voltage [1]	$V_{(BR)CEO}$	40	-	V	I_C=10 mA, I_B=0
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	75	-	V	I_C=10μA, I_E=0
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	6	-	V	I_E= -10 μA, I_C=0
Collector Cut-Off Current	I_{BL}	-	20	nA	V_{CE}=60V, V_{EB}=3V
Emitter Cut-Off Current	I_{CEX}	-	100	nA	V_{CE}=60V, V_{BE}=3V
On Characteristics[1]					
DC Current Gain[1]	h_{FE}	35	-		I_C=0.1mA, V_{CE}=10V
		50	-		I_C=1mA, V_{CE}=10V
		75	-		I_C=10mA, V_{CE}=10V
		100	-		I_C=150mA, V_{CE}=10V
		40	-		I_C=500mA, V_{CE}=10V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	-	0.3	V	I_C=150mA, I_B=15mA
		-	1		I_C=500mA, I_B=50mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	0.6	1.2	V	I_C=150mA, I_B=15mA
		-	2		I_C=500mA, I_B=50mA
Small-Signal Characteristics					
Curren-Gain-Bandwidth Product	f_T	250	-	MHz	V_{CE}=20V, I_C=20mA, f=100MHz
Output Capacitance	C_{obo}	-	8	pF	V_{CB}=10V, I_E=0, f =1.0 MHz
Input Capacitance	C_{ibo}	-	30	pF	V_{BE}=0.5V, I_E=0, f =1.0 MHz
Input Impedancen	h_{ie}	0.25	1.25	KΩ	V_{CE}=10V, I_C=10mA, f=1.0kHz
Voltage Feedback Ratio	h_{re}	-	4	$X10^{-4}$	V_{CE}=10V, I_C=10mA, f=1.0kHz
Small-Signal Current Gain	h_{fe}	75	375		V_{CE}=10V, I_C=10mAdc, f=1.0kHz
Output Admittance	h_{oe}	25	200	μmhos	V_{CE}=10V, I_C=10mAdc, f=1.0kHz
Noise Figure	NF	-	4.0	dB	V_{CE}=10V, I_C=100μA, R_S=1KΩ, f=1.0kHz
Switching Characteristics					
Delay Time	T_d	-	10	nS	V_{CC}=3V, V_{BE}= -0.5 V, I_C=150mA, I_{B1}=15mA
Rise Time	T_r	-	25		
Storage Time	T_S	-	225	nS	V_{CC}=30V, I_C=150mA, I_{B1}=I_{B2}=15mA
Fall Time	T_F	-	60		

Note:
1. Pulse Test: Pulse Width ≤ 300s, Duty Cycle ≤ 2.0%.

CHARACTERISTIC CURVES

SWITCHING TIME EQUIVALENT TEST CIRCUITS

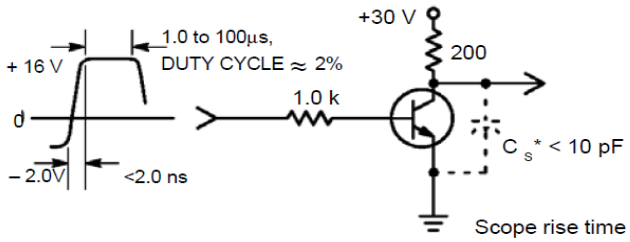
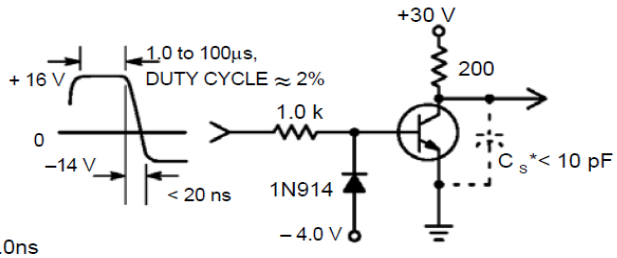


Figure 1. Turn–On Time



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

Figure 2. Turn–Off Time

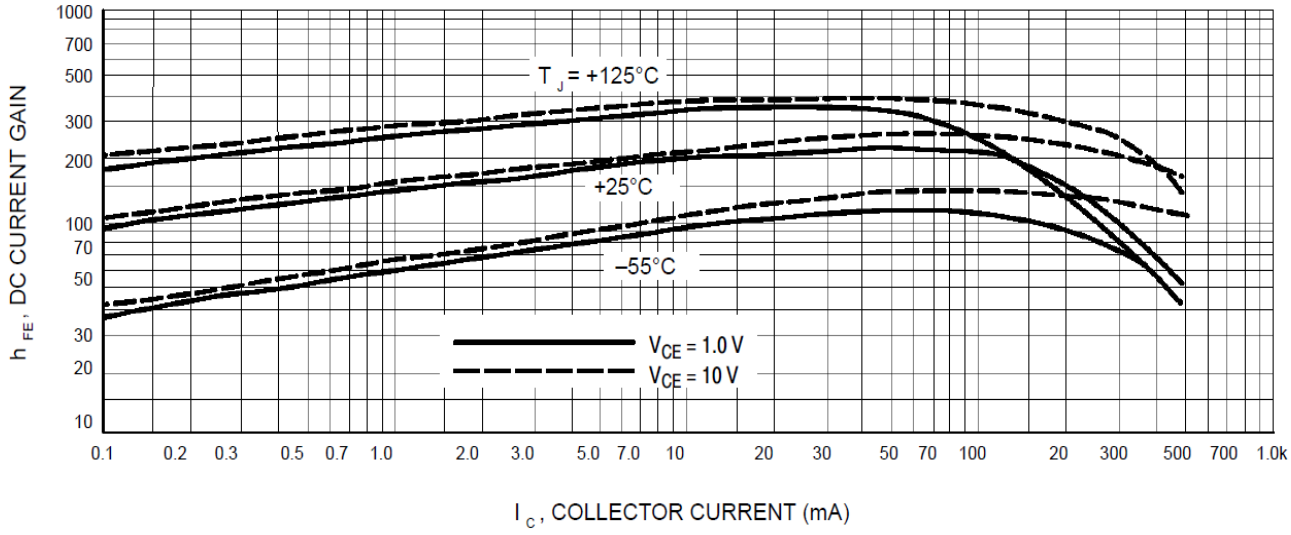


Figure 3. DC Current Gain

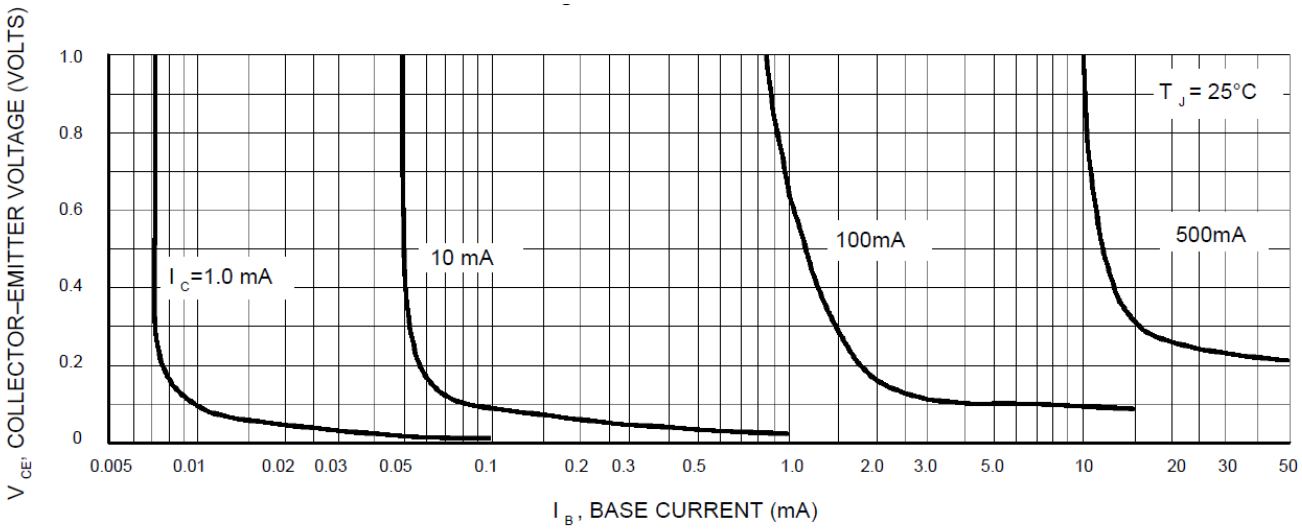


Figure 4. Collector Saturation Region

CHARACTERISTIC CURVES

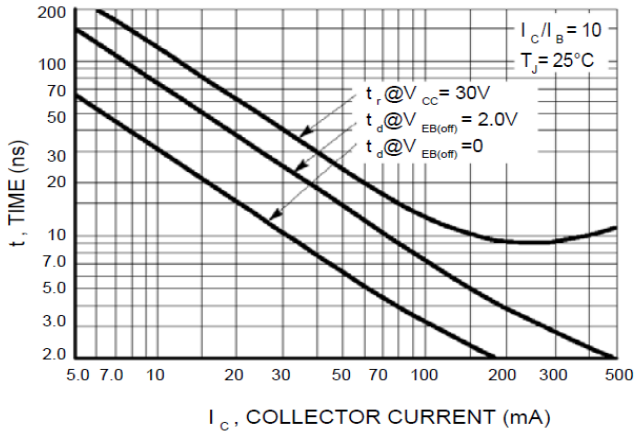


Figure 5. Turn–On Time

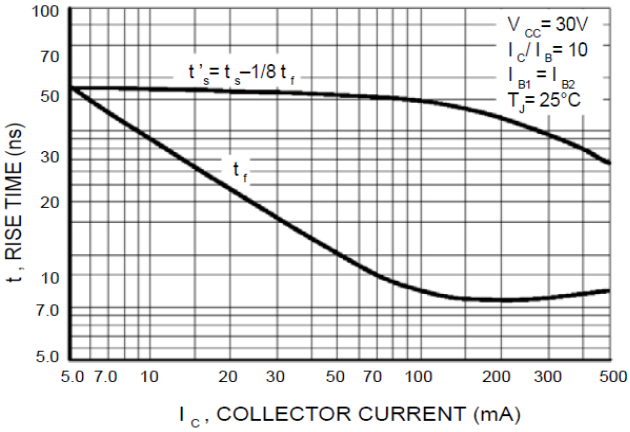


Figure 6. Turn - Off Time

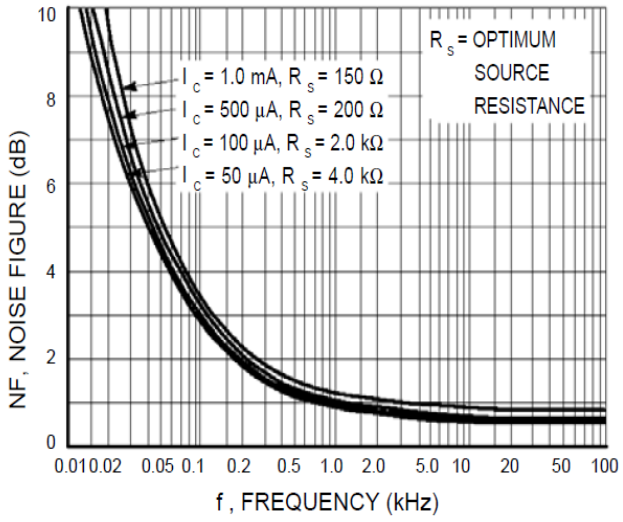


Figure 7. Frequency Effects

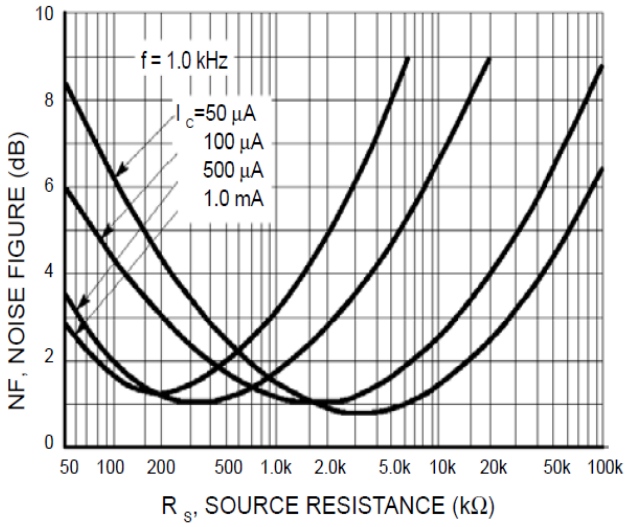


Figure 8. Source Resistance Effects

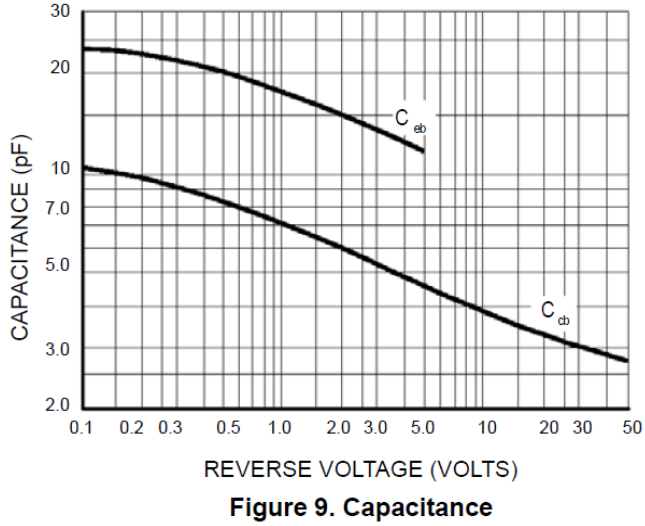


Figure 9. Capacitance

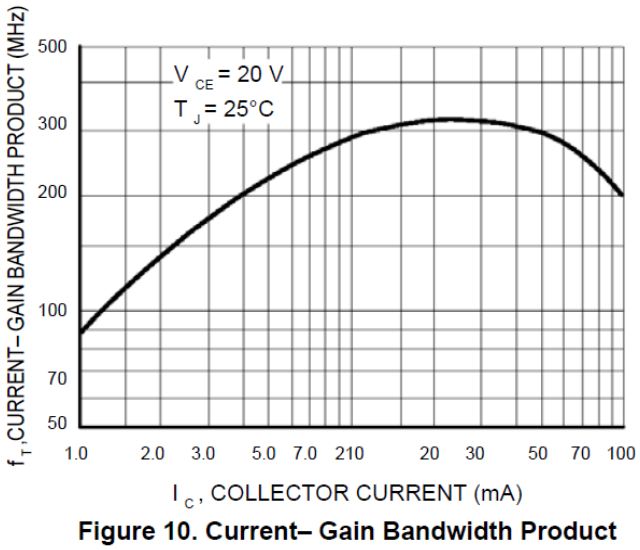


Figure 10. Current– Gain Bandwidth Product

CHARACTERISTIC CURVES

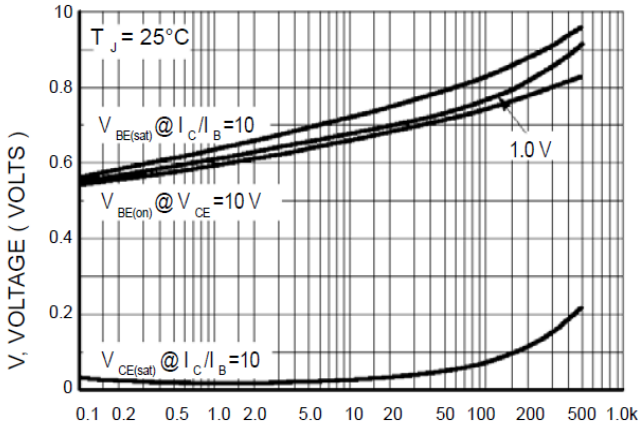


Figure 11. "On" Voltages

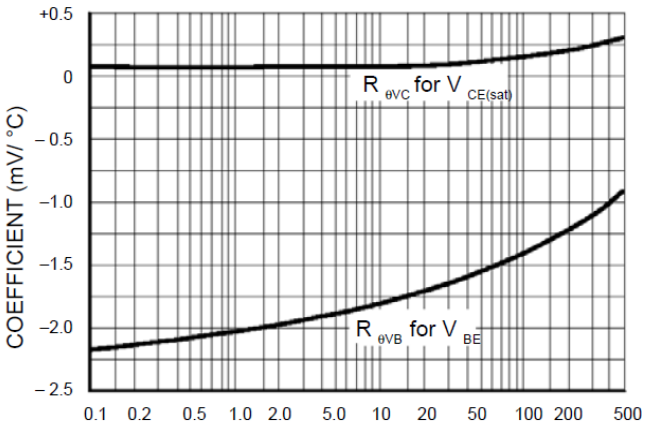


Figure 12. Temperature Coefficients