RECTRON SEMICONDUCTOR
TECHNICAL SPECIFICATION

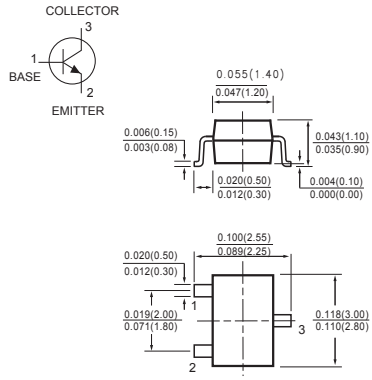
MMBT2222A

SOT-23 BIPOLAR TRANSISTORS
TRANSISTOR(NPN)

FEATURES
* Epitaxial planar die construction
* Complementary PNP Type available(MMBT2907A)

MECHANICAL DATA
* Case: Molded plastic
* Epoxy: UL 94V-O rate flame retardant
* Lead: MIL-STD-202E method 208C guaranteed
* Mounting position: Any
* Weight: 0.008 gram

SOT-23



Dimensions in inches and (millimeters)

MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS
Ratings at 25 °C ambient temperature unless otherwise specified.
Single phase, half wave, 60 Hz, resistive or inductive load.
For capacitive load, derate current by 20%.

MAXIMUM RATINGES (@ T_A = 25°C unless otherwise noted)

RATINGS	SYMBOL	VALUE	UNITS
Max. Steady State Power Dissipation (1) @T_A=25°C Derate above 25°C	P_D	300	mW
Max. Operating Temperature Range	T_J	150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

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

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	-	-	417	°C/W

Notes: 1. Alumina=0.4*0.3*0.024in. 99.5% alumina.
2. " Fully ROHS Compliant ", "100% Sn plating (Pb-free)".

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ELECTRICAL CHARACTERISTICS (@TA=25°C unless otherwise noted)

Chatacteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I_C= 10mAdc, I_B= 0)	$V_{(BR)CEO}$	40	-	Vdc
Collector-Base Breakdown Voltage (I_C= 10mAdc, I_E= 0)	$V_{(BR)CBO}$	75	-	Vdc
Emitter-Base Breakdown Voltage (I_E= 10mAdc, I_C= 0)	$V_{(BR)EBO}$	6.0	-	Vdc
Collector Cutoff Current (V_{CE}= 60Vdc,$V_{EB(off)}$= 3.0Vdc	I_{CEX}	-	0.1	uAdc
Collector Cutoff Current (V_{CB}= 60Vdc, I_E= 0) (V_{CB}= 60Vdc, I_E= 0, TA= 125°C)	I_{CBO}	- -	0.01 10	uAdc
Emitter Cutoff Current (V_{EB}= 3.0Vdc, I_C= 0)	I_{EBO}	-	0.1	uAdc
Base Cutoff Current (V_{CE}= 60Vdc, $V_{EB(off)}$= 3.0Vdc	I_{BL}	-	20	nAdc
ON CHARACTERISTICS				
DC Current Gain (I_C= 10mAdc, V_{CE}= 10Vdc, TA= -55°C) (I_C= 500mAdc, V_{CE}= 10Vdc) (1)	hFE	35 40	- -	-
Collector-Emitter Saturation Voltage (1) (I_C= 150mAdc, I_B= 15mAdc) (I_C= 500mAdc, I_B= 50mAdc)	$V_{CE(sat)}$	- -	0.3 1.0	Vdc
Base-Emitter Saturation Voltage (1) (I_C= 150mAdc, I_B= 15mAdc) (I_C= 500mAdc, I_B= 50mAdc)	$V_{BE(sat)}$	0.6 -	1.2 2.0	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain-Bandwidth Product (2) (I_C= 20mAdc, V_{CE}= 20Vdc, f= 100MHz)	f_T	300	-	MHz
Input Capacitance (V_{EB}=0.5Vdc, I_C= 0, f= 1.0MHz)	C_{ibo}	-	25	pF
Input Impedance (I_C= 1.0mAdc, V_{CE}=10Vdc, f=1.0kHz) (I_C= 10mAdc, V_{CE}=10Vdc, f=1.0kHz)	h_{ie}	2.0 0.25	8.0 1.25	kW
Voltage Feedback Ratio (I_C= 1.0mAdc, V_{CE}= 10Vdc, f= 1.0kHz) (I_C= 10mAdc, V_{CE}=10Vdc, f= 1.0kHz)	h_{re}	- -	8.0 4.0	X 10^{-4}
Small-Signal Current Gain (I_C= 1.0mAdc, V_{CE}= 10Vdc, f= 1.0kHz) (I_C= 10mAdc, V_{CE}= 10Vdc, f= 1.0kHz)	h_{fe}	50 75	300 375	-
Output Admittance (I_C= 1.0mAdc, V_{CE}= 10Vdc, f= 1.0kHz) (I_C= 10mAdc, V_{CE}= 10Vdc, f= 1.0kHz)	h_{oe}	5.0 25	35 200	umhos
Collector Base Time Constant (I_E= 20mAdc, V_{CB}= 20Vdc, f= 31.8MHz)	rb,Cc	-	150	ps
Noise Figure (I_C= 100mAdc, V_{CE}= 10Vdc, R_S= 1.0kW, f= 1.0kHz)	NF	-	4.0	dB
SWITCHING CHARACTERISTICS				
Delay Time Rise Time	(V_{CC}= 30Vdc, $V_{BE(off)}$= -0.5Vdc, I_C= 150mAdc, I_{B1}= 15mAdc)	t_d t_r	- -	10 25	ns
Storage Time Fall Time	(V_{CC}= 30Vdc, I_C= 150mAdc, I_{B1}= I_{B2}= 15mAdc)	t_s t_f	- -	225 60	ns

NOTES : 1. Pulse Test: Pulse Width≤300ms,Duty Cycle≤2.0%
2. f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity

RATING AND CHARACTERISTICS CURVES (MMBT2222A)

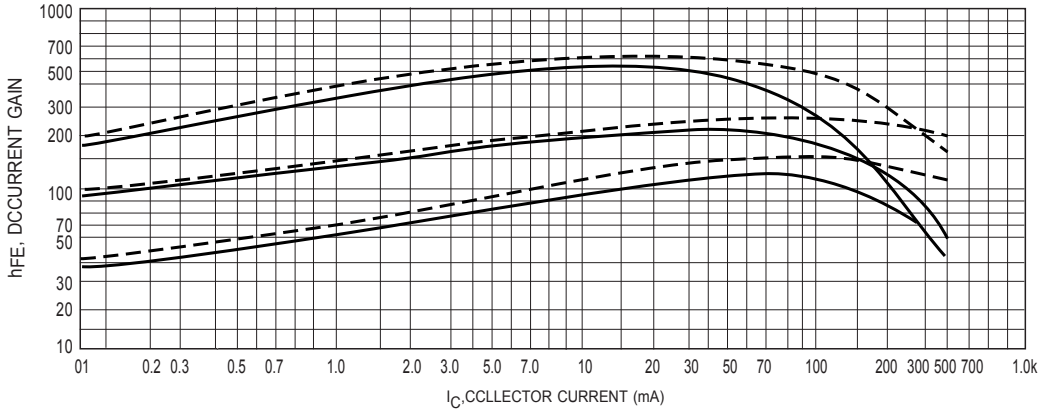

Figure 1. DC Current Gain

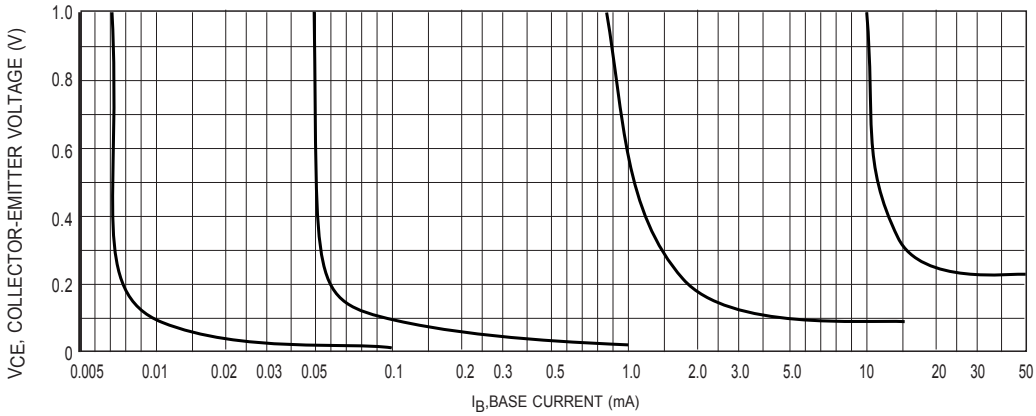

Figure 2. Collector Saturation Region

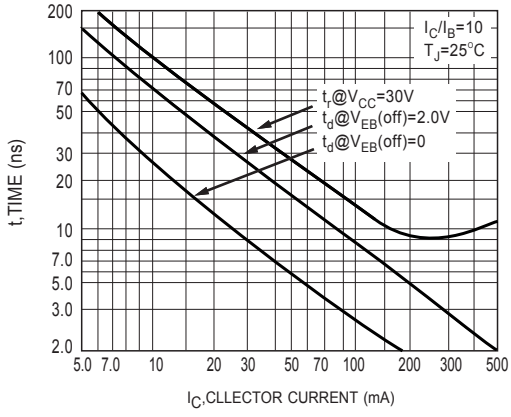

Figure 3.Turn-On Time

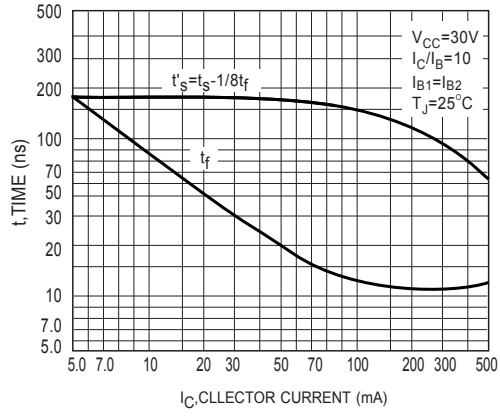

Figure 4.Turn-Off Time

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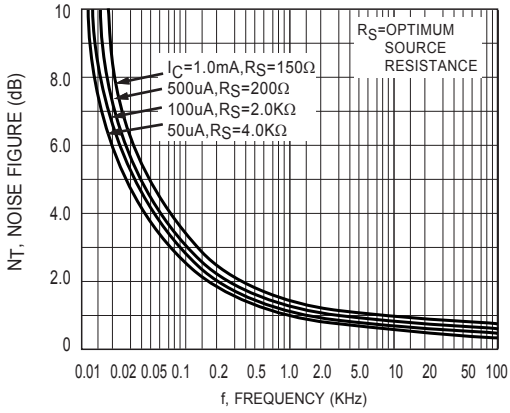

Figure 5.Frequency Effects

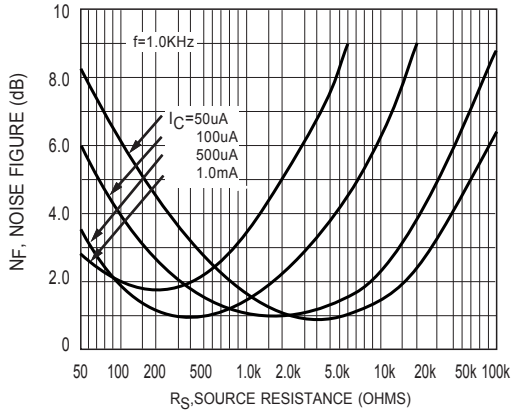

Figure 6.Source Resistance Effects

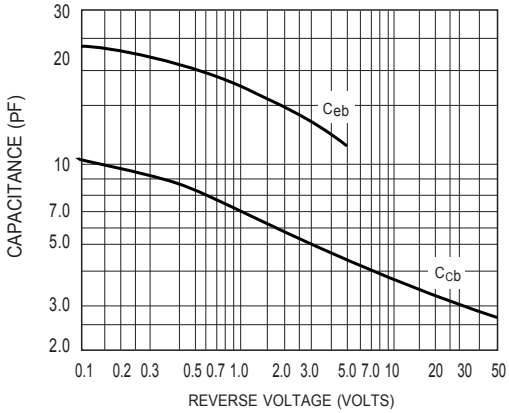

Figure 7.Capacitances

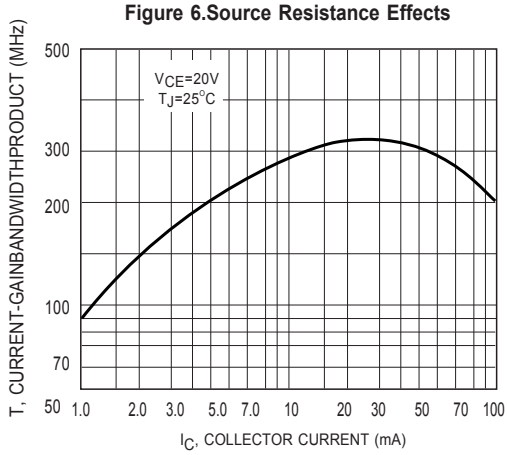

Figure 8.Currunt-Gain Bandwidth Product

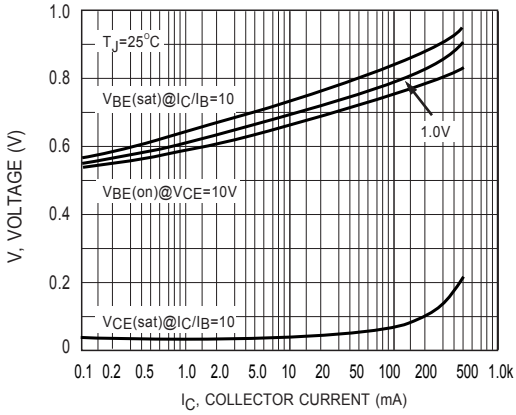

Figure 9."On" Voltages

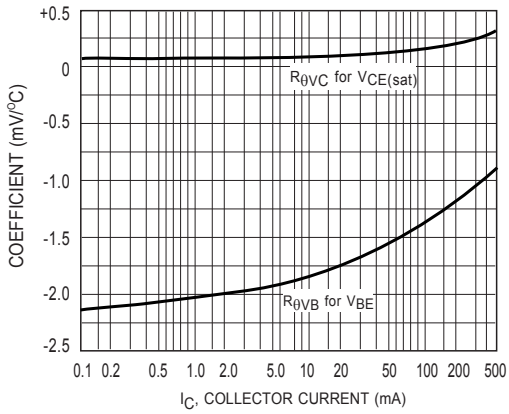

Figure 10.Temperature Coefficients

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