



SEMICONDUCTOR
TECHNICAL DATA

MMBT2222/A

NPN EPITAXIAL SILICON TRANSISTOR

DATA GENERAL PURPOSE TRANSISTOR

- * Complement to MMBT2907/ALT1
- * Collector Dissipation: $P_c(\max)=225\text{mW}$

Package: SOT-23



ABSOLUTE MAXIMUM RATINGS at $T_a=25^\circ\text{C}$

Characteristic	Symbol	Rating		Unit
		2222	2222A	
Collector-Base Voltage	V_{cb0}	60	75	V
Collector-Emitter Voltage	V_{ce0}	30	40	V
Emitter-Base Voltage	V_{eb0}	5	6	V
Collector Current	I_c	600		mA
Collector Dissipation $T_a=25^\circ\text{C}$ *	P_D	225		mW
Junction Temperature	T_j	150		$^\circ\text{C}$
Storage Temperature	T_{stg}	-55-150		$^\circ\text{C}$

PIN:	1	2	3
STYLE			
NO.1	B	E	C

ELECTRICAL CHARACTERISTICS at $T_a=25^\circ\text{C}$

Characteristic	Symbol	Min	Max	Unit	Test Conditions
Collector-Base Breakdown Voltage MMBT2222 MMBT2222A	BV_{cb0}	60 75		V	$I_c=10\mu\text{A}$ $I_e=0$
Collector-Emitter Breakdown Voltage MMBT2222 MMBT2222A	BV_{ce0}	30 40		V	$I_c=10\text{mA}$ $I_b=0$
Emitter-Base Breakdown Voltage MMBT2222 MMBT2222A	BV_{eb0}	5 6		V	$I_c=10\mu\text{A}$ $I_c=0$
Emitter Cutoff Current MMBT2222A	I_{cex}		10	nA	$V_{ce}=60\text{V}$ $V_{eb}=3\text{V}$
Collect Cutoff Current MMBT2222 MMBT2222A	I_{cbo}		10	nA	$V_{cb}=50\text{V}$ $I_e=0$ $V_{cb}=60\text{V}$ $I_e=0$
Collect Cutoff Current MMBT2222 MMBT2222A	I_{cbo}		10	μA	$V_{cb}=50\text{V}$ $I_e=0$ $T_a=125^\circ\text{C}$ $V_{cb}=60\text{V}$ $I_e=0$ $T_a=125^\circ\text{C}$
Collect Cutoff Current MMBT2222A	I_{ebo}		100	nA	$V_{cb}=3\text{V}$ $I_c=0$
DC Current Gain	H_{fe}	100	300		$V_{ce}=10\text{V}$ $I_c=150\text{mA}$



ELECTRICAL CHARACTERISTICS at Ta=25°C (continued)

Characteristic	Symbol	Min	Max	Unit	Test Conditions
Collector-Emitter Saturation Voltage MMBT2222 MMBT2222A	V _{ce(sat)}		0.4 0.3	V	I _c =150mA I _b = 15mA
Base-Emitter Saturation Voltage MMBT2222 MMBT2222A	V _{be(sat)}	0.6	1.3 1.2	V	I _c =150mA I _b = 15mA
Input Base Capacitance MMBT2222 MMBT2222A	C _{ibo}		30 25	PF	V _{EB} = 0.5 V _{dc} , I _C = 0, f = 1.0 MHz
Output Base Capacitance	C _{obo}		8	PF	V _{cb} =10V I _e =0 f=1MHz
Noise Figure	NF		10	dB	V _{ce} = 10V I _c = 0.1mA f=1KHz R _s =2KΩ
Current Gain-Bandwidth Product MMBT2222 MMBT2222A	f _T	250 300		MHz	V _{ce} = 20V I _c = 20mA f=100MHz

SWITCHING CHARACTERISTICS

Characteristic	Symbol	Min	Max	Unit	Test Conditions
Delay Time	t _d		10	ns	(V _{CC} = 30 V _{dc} , V _{EB} (off) = - 0.5 V _{dc} I _C = 150 mA _{dc} , I _{B1} = 15 mA _{dc})
Rise Time	t _r		25	ns	
Storage Time	t _s		225	ns	(V _{CC} = 30 V _{dc} , I _C = 150 mA _{dc} I _{B1} = I _{B2} = 15 mA _{dc})
Fall Time	t _f		60	ns	

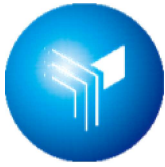
* Total Device Dissipation : FR=1x0.75x0.062in Board, Derate 25°C.

Pulse Test : Pulse Width ≤300μs, Duty cycle ≤2%

DEVICE MARKING:

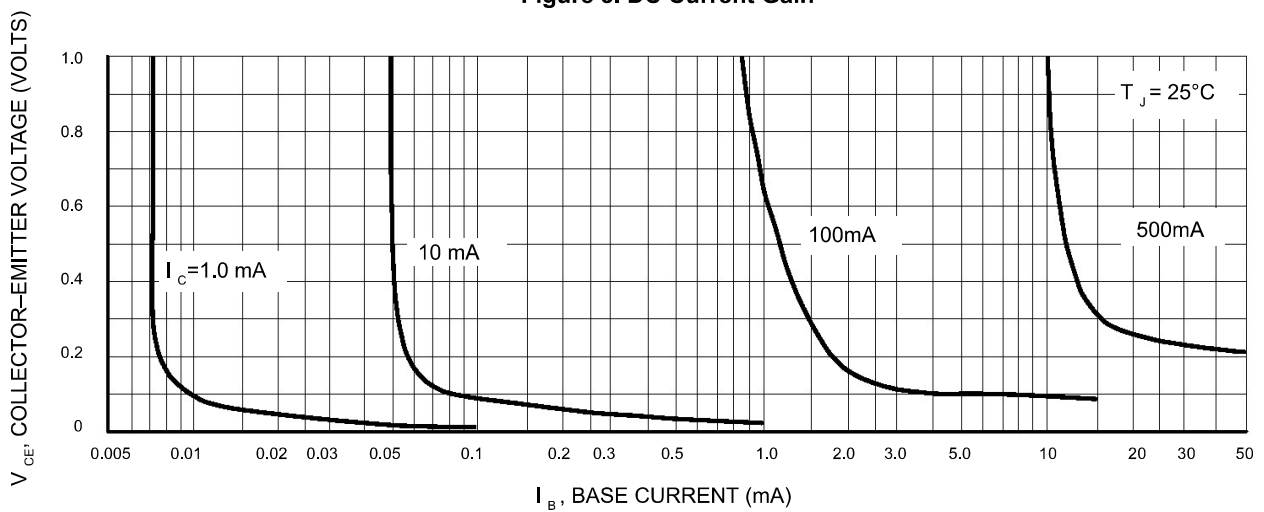
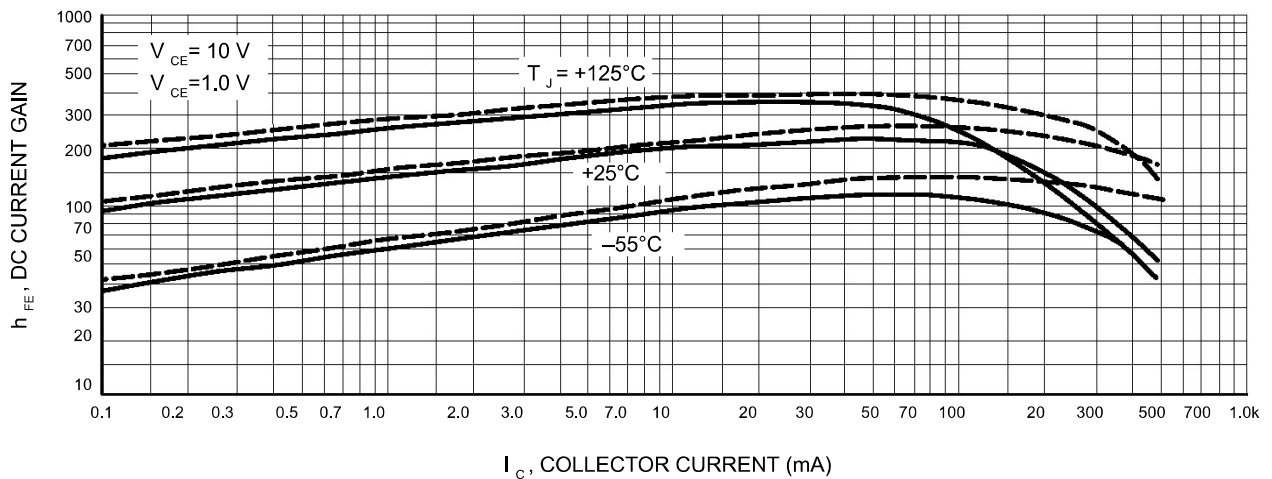
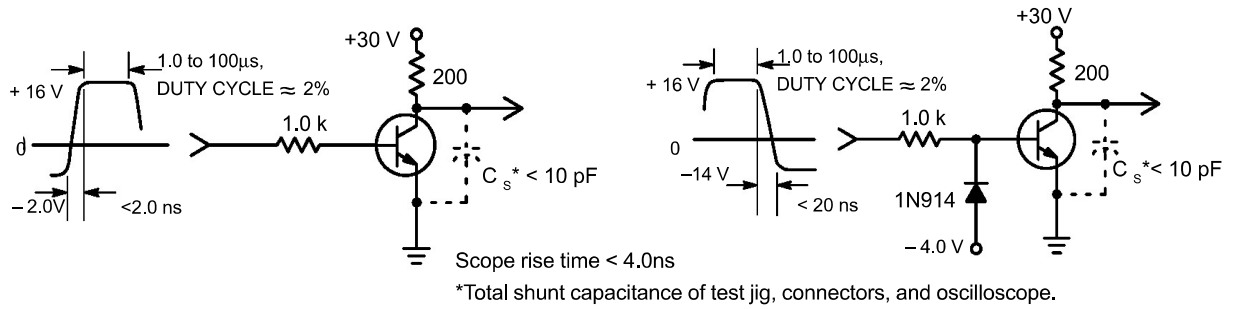
MMBT2222=M1B

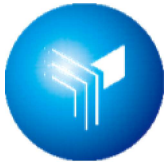
MMBT2222A=1P



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SWITCHING TIME EQUIVALENT TEST CIRCUITS





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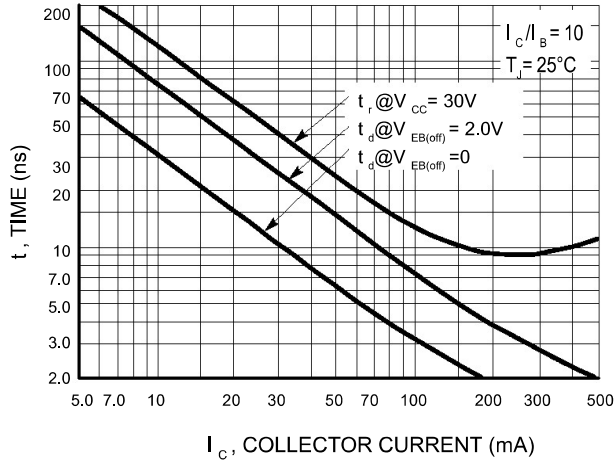


Figure 5. Turn-On Time

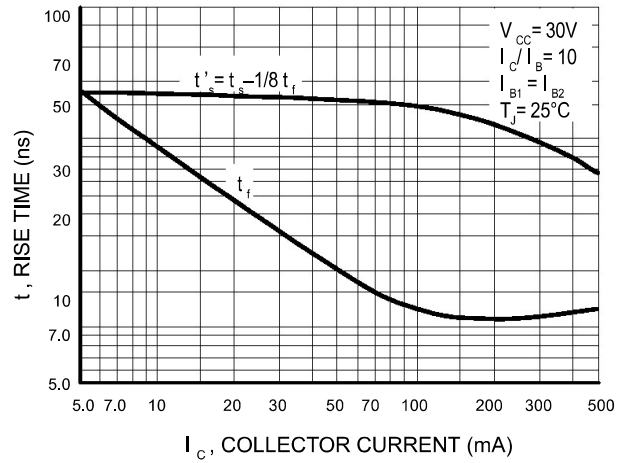


Figure 6. Turn - Off Time

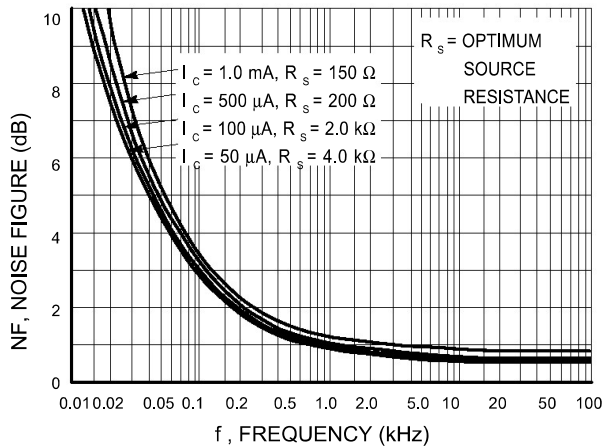


Figure 7. Frequency Effects

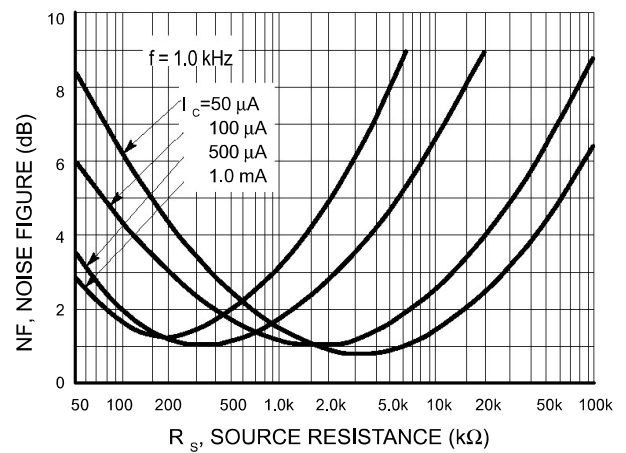


Figure 8. Source Resistance Effects

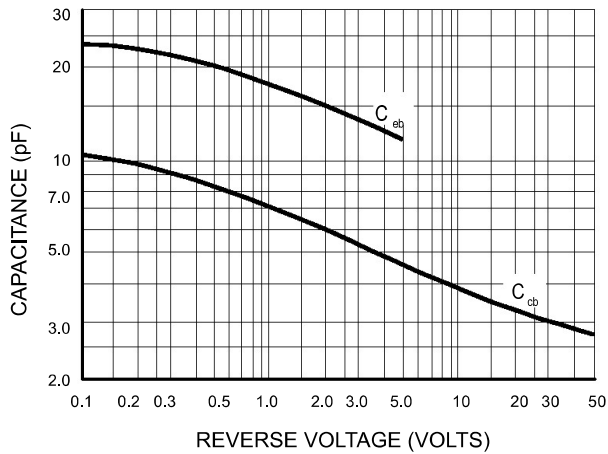


Figure 9. Capacitance

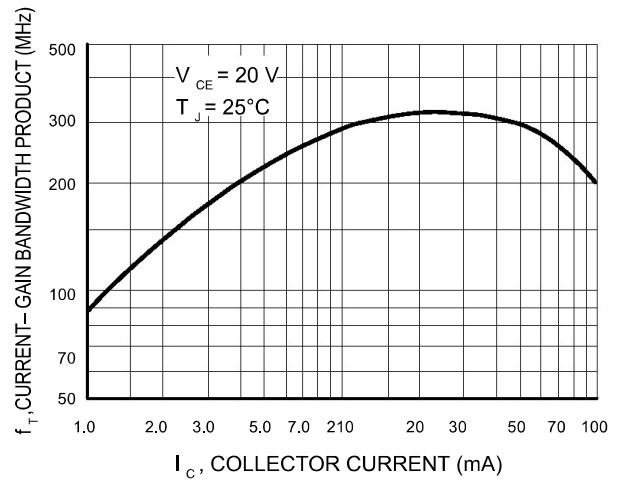


Figure 10. Current-Gain Bandwidth Product



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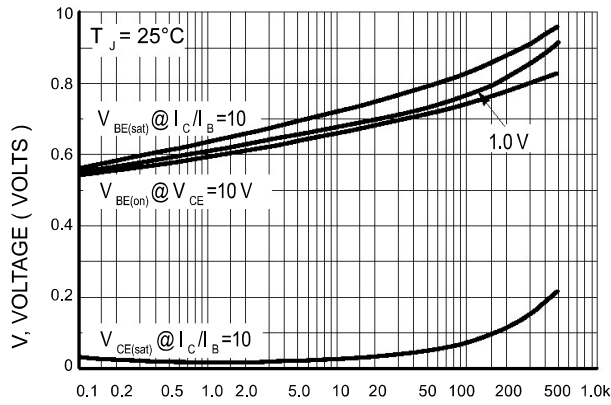


Figure 11. "On" Voltages

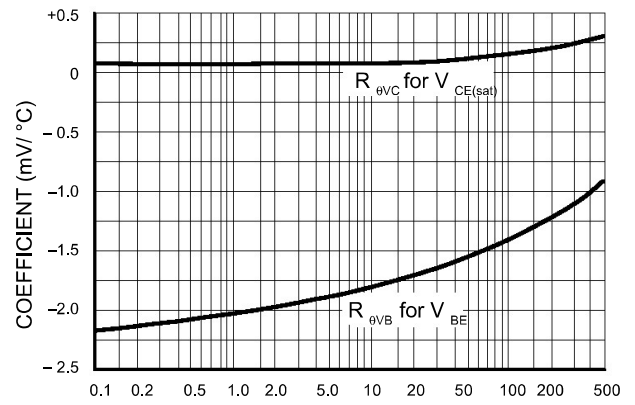
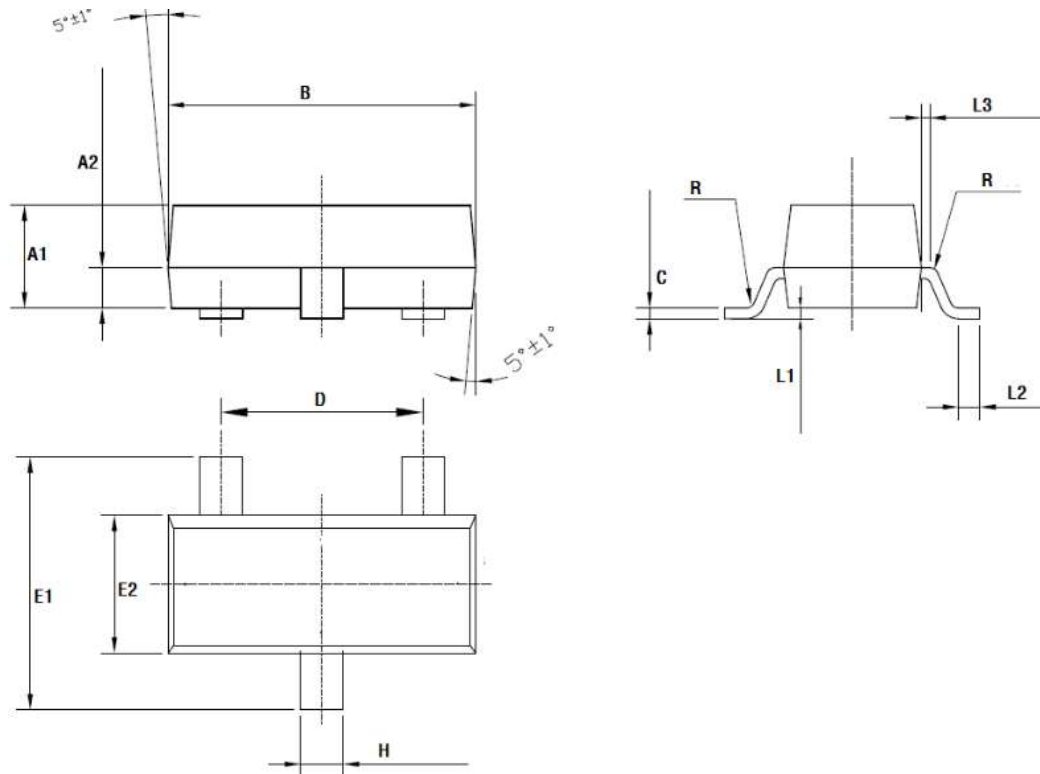
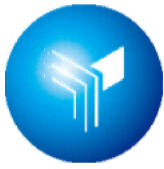


Figure 12. Temperature Coefficients



Symbol	Dimensions in Millimeters			内部结构 STYLS	管脚 PIN		
	Min	Nominal	Max		1 脚	2 脚	3 脚
A1	0.900	0.950	1.000	6	基极 BASE	发射极 EMITTER	集电极 COLLCTOR
A2	0.350	0.380	0.410				
B	2.800	2.900	3.000	8	阳极 ANODE	不连接 NO- CONNECTION	阴极 CATHODE
C	0.080	0.100	0.150				
D	1.800	1.900	2.000	9	阳极 ANODE	阳极 ANODE	阴极 CATHODE
E1	2.200	2.400	2.600				
E2	1.200	1.300	1.400	11	阳极 ANODE	阴极 CATHODE	阳极-阴极 ANODE-CATHODE
H	0.300	0.400	0.500				
L1	0.000		0.100	12	阴极 CATHODE	阴极 CATHODE	阳极 ANODE
L2	0.200						
L3	0.030	0.080	0.130	18	不连接 NO- CONNECTION	阴极 CATHODE	阳极 ANODE
R	0.080TYP						
				19	阴极 CATHODE	阳极 ANODE	阴极-阳极 CATHODE-ANODE