



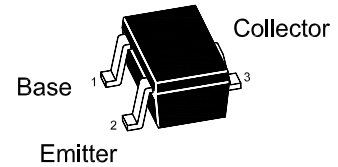
MMBT2222E/AE NPN Silicon Epitaxial Planar Medium Power Transistor

for switching and amplifier applications

Marking :

MMBT2222E : M1B

MMBT2222AE :1P



SOT-523

Absolute Maximum Ratings ($T_a = 25\text{ }^\circ\text{C}$)

Parameter	Symbol	Value		Unit
		MMBT2222E	MMBT2222AE	
Collector Base Voltage	V_{CBO}	60	75	V
Collector Emitter Voltage	V_{CEO}	30	40	V
Emitter Base Voltage	V_{EBO}	5	6	V
Collector Current	I_C	600		mA
Total Power Dissipation	P_{tot}	200		mW
Junction Temperature	T_j	150		$^\circ\text{C}$
Storage Temperature Range	T_S	-55 to +150		$^\circ\text{C}$



Characteristics at T_a = 25 °C

Parameter	Symbol	Min.	Max.	Unit
DC Current Gain				
at V _{CE} = 10 V, I _C = 0.1 mA	h _{FE}	35	-	-
at V _{CE} = 10 V, I _C = 1 mA	h _{FE}	50	-	-
at V _{CE} = 10 V, I _C = 10 mA	h _{FE}	75	-	-
at V _{CE} = 1 V, I _C = 150 mA	h _{FE}	50	-	-
at V _{CE} = 10 V, I _C = 150 mA	h _{FE}	100	300	-
at V _{CE} = 10 V, I _C = 500 mA	h _{FE}	30	-	-
	MMBT2222E			
	MMBT2222AE	40	-	-
Collector Base Voltage				
at I _C = 10 μA	V _{CBO}	60	-	V
	MMBT2222E			
	MMBT2222AE	75	-	
Collector Emitter Voltage				
at I _C = 10 mA	V _{CEO}	30	-	V
	MMBT2222E			
	MMBT2222AE	40	-	
Emitter Base Voltage				
at I _E = 10 μA	V _{EBO}	5	-	V
	MMBT2222E			
	MMBT2222AE	6	-	
Collector Base Cutoff Current				
at V _{CB} = 50 V	I _{CBO}	-	100	nA
at V _{CB} = 60 V	I _{CBO}	-	100	
	MMBT2222E			
	MMBT2222AE			
Emitter Base Cutoff Current				
at V _{EB} = 3 V	I _{EBO}	-	100	nA
Collector Emitter Saturation Voltage				
at I _C = 150 mA, I _B = 15 mA	V _{CE(sat)}	-	0.4	V
	MMBT2222E			
	MMBT2222AE	-	0.3	
at I _C = 500 mA, I _B = 50 mA	V _{CE(sat)}	-	1.6	
	MMBT2222E			
	MMBT2222AE	-	1	
Base Emitter Saturation Voltage				
at I _C = 150 mA, I _B = 15 mA	V _{BE(sat)}	-	1.3	V
	MMBT2222E			
	MMBT2222AE	0.6	1.2	
at I _C = 500 mA, I _B = 50 mA	V _{BE(sat)}	-	2.6	
	MMBT2222E			
	MMBT2222AE	-	2	
Transition Frequency				
at V _{CE} = 20 V, -I _E = 20 mA, f = 100 MHz	f _T	300	-	MHz
Collector Output Capacitance				
at V _{CB} = 10 V, f = 100 KHz	C _{ob}	-	8	pF
Emitter Input Capacitance				
at V _{EB} = 0.5 V, f = 100 KHz	C _{ib}	-	25	pF
Delay Time				
at V _{CC} = 30 V, V _{BE(OFF)} = 0.5 V, I _C = 150 mA, I _{B1} = 15 mA	t _d	-	10	ns
Rise Time				
at V _{CC} = 30 V, V _{BE(OFF)} = 0.5 V, I _C = 150 mA, I _{B1} = 15 mA	t _r	-	25	ns
Storage Time				
at V _{CC} = 30 V, I _C = 150 mA, I _{B1} = -I _{B2} = 15 mA	t _{stg}	-	225	ns
Fall Time				
at V _{CC} = 30 V, I _C = 150 mA, I _{B1} = -I _{B2} = 15 mA	t _f	-	60	ns

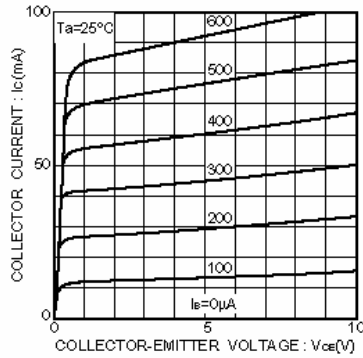


Fig.1 Grounded emitter output characteristics

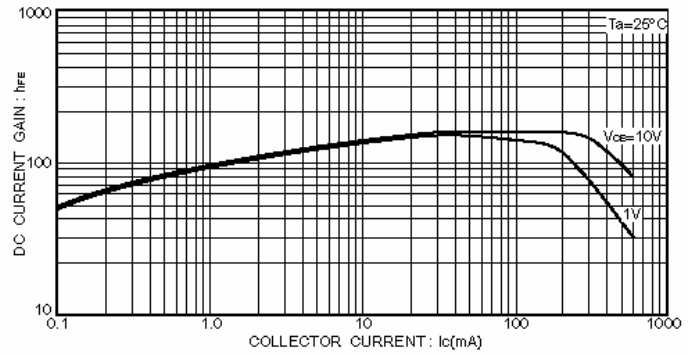


Fig.3 DC current gain vs. collector current(I)

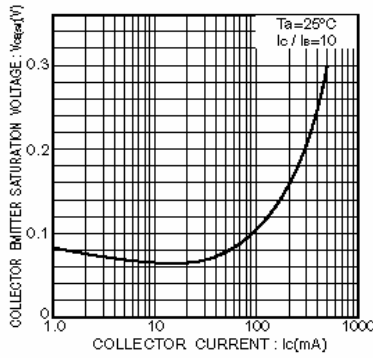


Fig.2 Collector-emitter saturation voltage vs. collector current

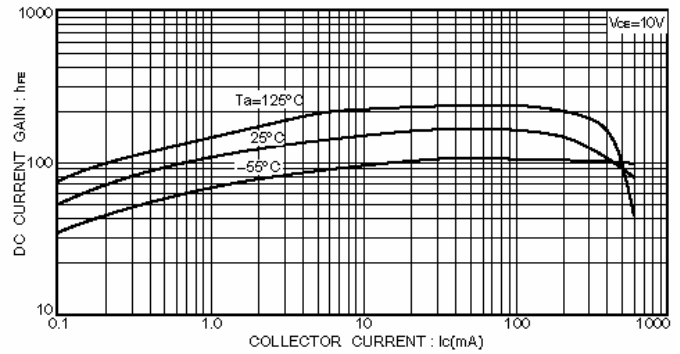


Fig.4 DC current gain vs. collector current(II)

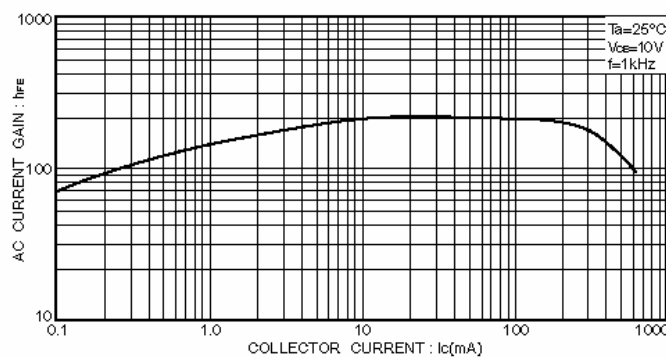


Fig.5 AC current gain vs. collector current

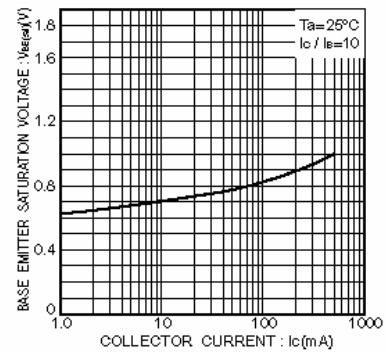


Fig.6 Base-emitter saturation voltage vs. collector current

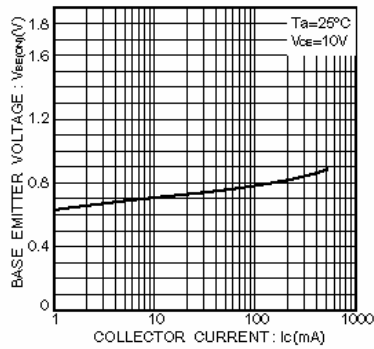


Fig.7 Grounded emitter propagation characteristics

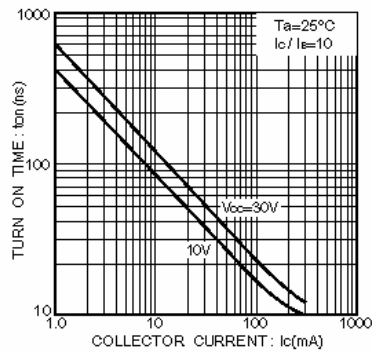


Fig.8 Turn-on time vs. collector current

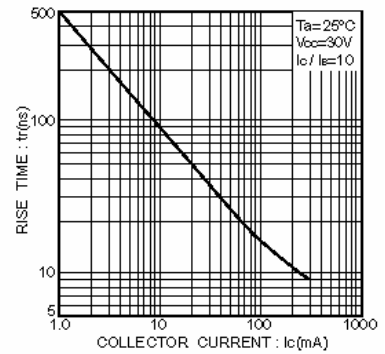


Fig.9 Rise time vs. collector current

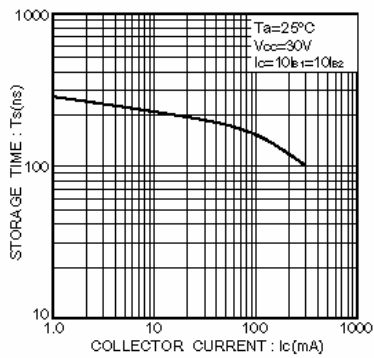


Fig.10 Storage time vs. collector current

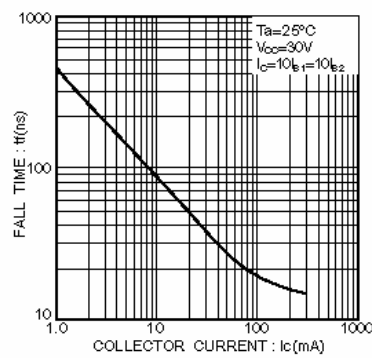


Fig.11 Fall time vs. collector current

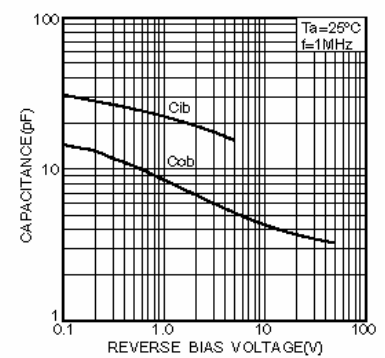


Fig.12 Input / output capacitance vs. voltage

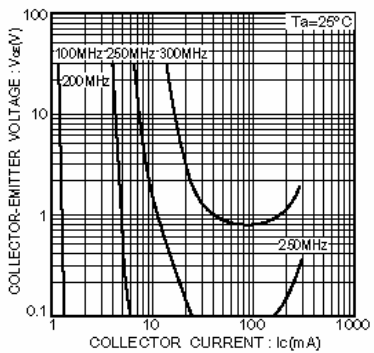


Fig.13 Gain bandwidth product

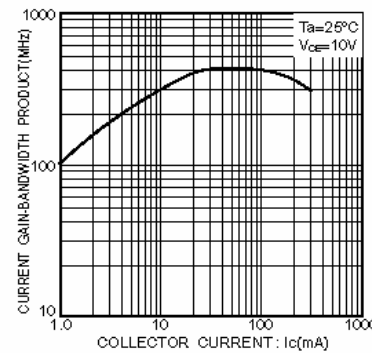
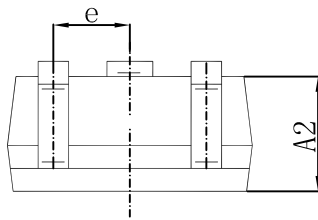
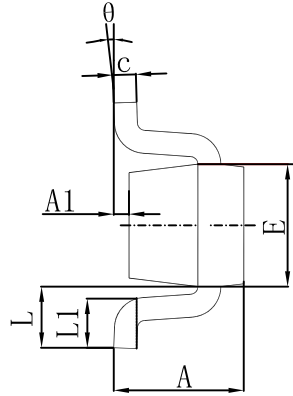
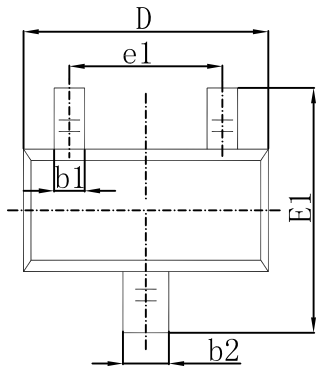


Fig.14 Gain bandwidth product vs. collector current

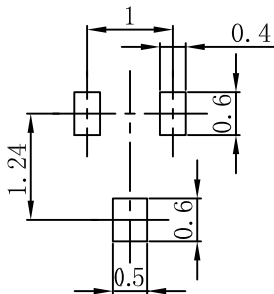


SOT-523 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.900	0.028	0.035
A1	0.000	0.100	0.000	0.004
A2	0.700	0.800	0.028	0.031
b1	0.150	0.250	0.006	0.010
b2	0.250	0.350	0.010	0.014
c	0.100	0.200	0.004	0.008
D	1.500	1.700	0.059	0.067
E	0.700	0.900	0.028	0.035
E1	1.450	1.750	0.057	0.069
e	0.500 TYP.		0.020 TYP.	
e1	0.900	1.100	0.035	0.043
L	0.400 REF.		0.016 REF.	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

SOT-523 Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.