



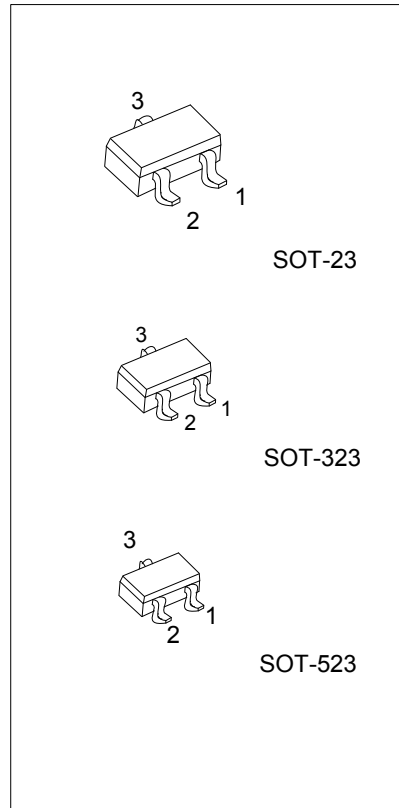
MMBT2222A

NPN SILICON TRANSISTOR

NPN GENERAL PURPOSE AMPLIFIER

FEATURES

* This device is for use as a medium power amplifier and switch requiring collector currents up to 500mA.

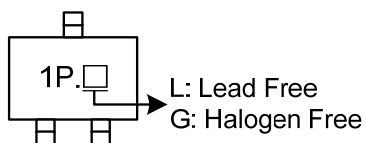


ORDERING INFORMATION

Ordering Number			Package	Pin Assignment			Packing
Normal	Lead Free	Halogen Free		1	2	3	
MMBT2222A-AE3-R	MMBT2222AL-AE3-R	MMBT2222AG-AE3-R	SOT-23	E	B	C	Tape Reel
MMBT2222A-AL3-R	MMBT2222AL-AL3-R	MMBT2222AG-AL3-R	SOT-323	E	B	C	Tape Reel
MMBT2222A-AN3-R	MMBT2222AL-AN3-R	MMBT2222AG-AN3-R	SOT-523	E	B	C	Tape Reel

<p>MMBT2222AL-AE3-R</p> <p>(1) Packing Type (2) Package Type (3) Lead Plating</p>	<p>(1) R: Tape Reel (2) AE3: SOT-23, AL3: SOT-323, AN3: SOT-523 (3) G: Halogen Free, L: Lead Free, Blank: Pb/Sn</p>
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MARKING



MMBT2222A

NPN SILICON TRANSISTOR

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C, unless otherwise specified.)

PARAMETER		SYMBOL	RATINGS	UNIT
Collector-Base Voltage		V _{CBO}	75	V
Collector-Emitter Voltage		V _{CEO}	40	V
Emitter-Base Voltage		V _{EBO}	6	V
Collector Current		I _C	600	mA
Collector Dissipation	SOT-23	P _C	350	mW
	SOT-323		200	
	SOT-523		150	
Junction Temperature		T _J	+150	°C
Storage Temperature		T _{STG}	-55 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-23	θ _{JA}	357	°C/W
	SOT-323		625	
	SOT-523		833	

■ ELECTRICAL CHARACTERISTICS (Ta=25°C, unless otherwise specified.)

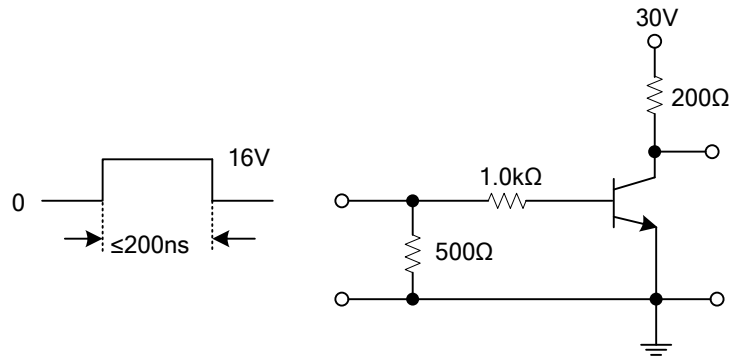
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV _{CBO}	I _C =10μA, I _E =0	75			V
Collector-Emitter Breakdown Voltage	BV _{CEO}	I _C =10mA, I _B =0	40			V
Emitter-Base Breakdown Voltage	BV _{EBO}	I _E =10μA, I _C =0	6			V
Collector Cutoff Current	I _{CBO}	V _{CB} =60V, I _E =0			0.01	μA
		V _{CB} =60V, I _E =0, Ta=150°C			10	μA
Emitter Cutoff Current	I _{EBO}	V _{EB} =3.0V, I _C =0			10	nA
Base Cutoff Current	I _{BL}	V _{CE} =60V, V _{EB(OFF)} =3.0V			20	nA
Collector Cutoff Current	I _{CEO}	V _{CE} =60V, V _{EB(OFF)} =3.0V			10	nA
ON CHARACTERISTICS						
DC Current Gain	h _{FE}	I _C =0.1mA, V _{CE} =10V	35			
		I _C =1.0mA, V _{CE} =10V	50			
		I _C =10mA, V _{CE} =10V	75			
		I _C =10mA, V _{CE} =10V, Ta= -55°C	35			
		I _C =150mA, V _{CE} =10V(Note)	100		300	
		I _C =150mA, V _{CE} =1.0V(Note)	50			
Collector-Emitter Saturation Voltage(Note)	V _{CE(SAT)}	I _C =150mA, I _B =15mA			0.3	V
		I _C =500mA, I _B =50mA			1.0	V
Base-Emitter Saturation Voltage(Note)	V _{BE(SAT)}	I _C =150mA, I _B =15mA	0.6		1.2	V
		I _C =500mA, I _B =50mA			2.0	V
SMALL SIGNAL CHARACTERISTICS						
Real Part of Common-Emitter High Frequency Input Impedance	Re(h _{je})	I _C =20mA, V _{CB} =20V, f=300MHz			60	Ω
Transition Frequency	f _T	I _C =20mA, V _{CE} =20V, f=100MHz	300			MHz
Output Capacitance	C _{obo}	V _{CB} =10V, I _E =0, f=100kHz			8.0	pF
Input Capacitance	C _{ibo}	V _{EB} =0.5V, I _C =0, f=100kHz			25	pF
Collector Base Time Constant	rb'C _c	I _C =20mA, V _{CB} =20V, f=31.8MHz			150	pS
Noise Figure	NF	I _C =100μA, V _{CE} =10V, R _s =1.0kΩ f=1.0kHz			4.0	dB

■ ELECTRICAL CHARACTERISTICS(Cont.)

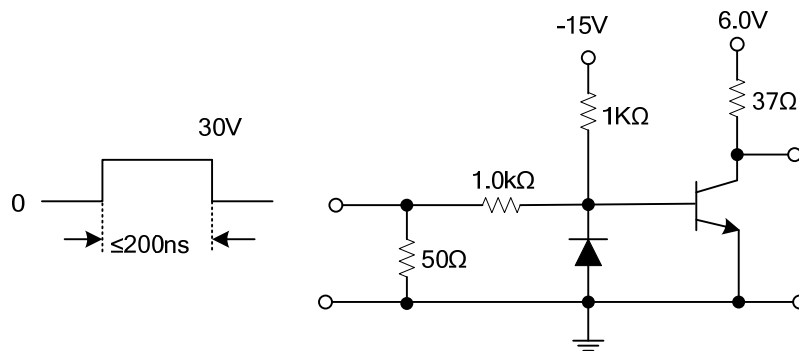
SWITCHING CHARACTERISTICS						
Delay Time	t_D	$V_{CC}=30V, V_{BE(OFF)}=0.5V,$			10	ns
Rise Time	t_R	$I_C=150mA, I_{B1}=15mA$			25	ns
Storage Time	t_S	$V_{CC}=30V, I_C=150mA$			225	ns
Fall Time	t_F	$I_{B1}= I_{B2}=15mA$			60	ns

Note: Pulse test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2.0\%$

■ TEST CIRCUITS

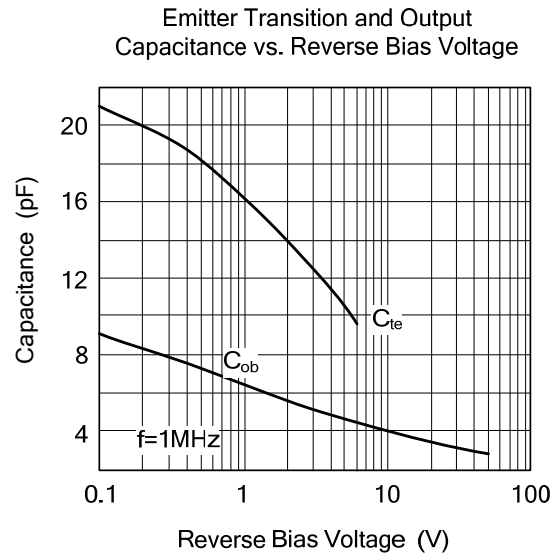
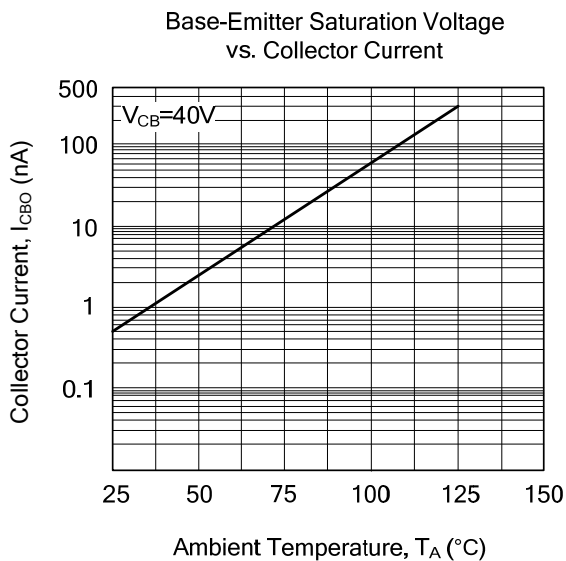
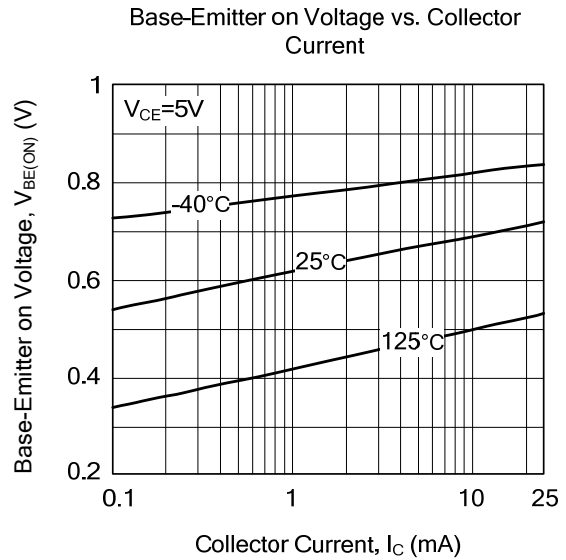
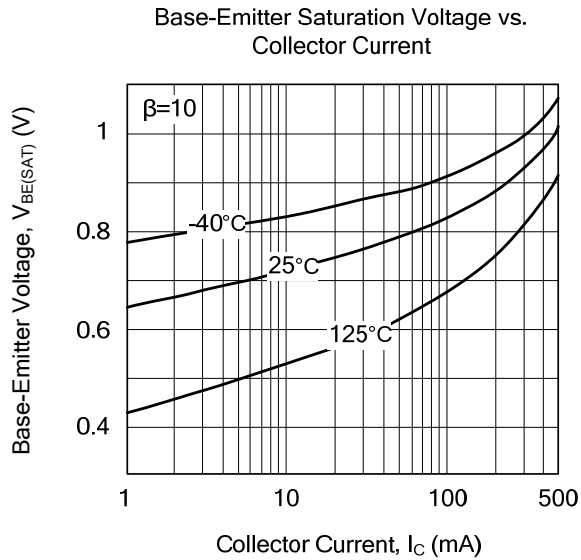
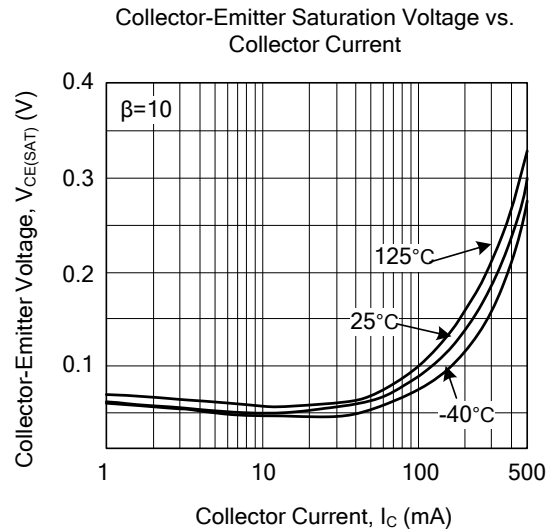
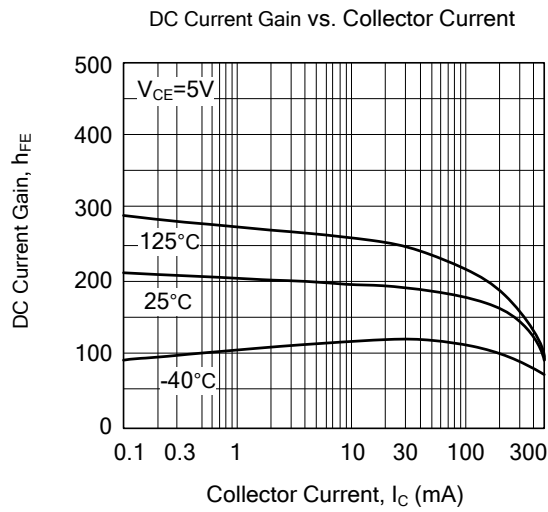


Saturated Turn-On Switching Time

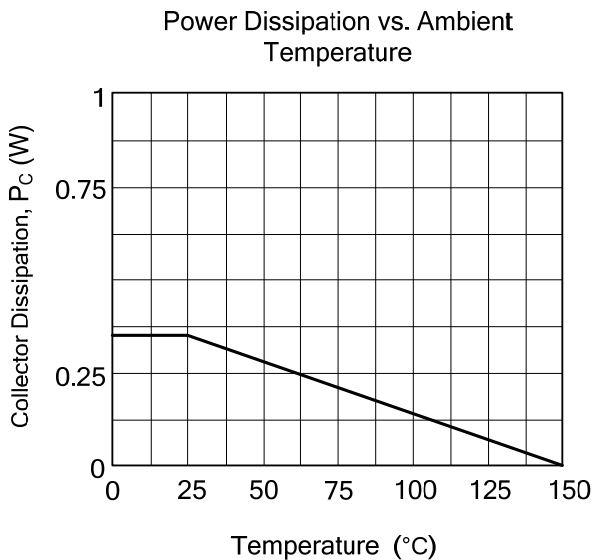
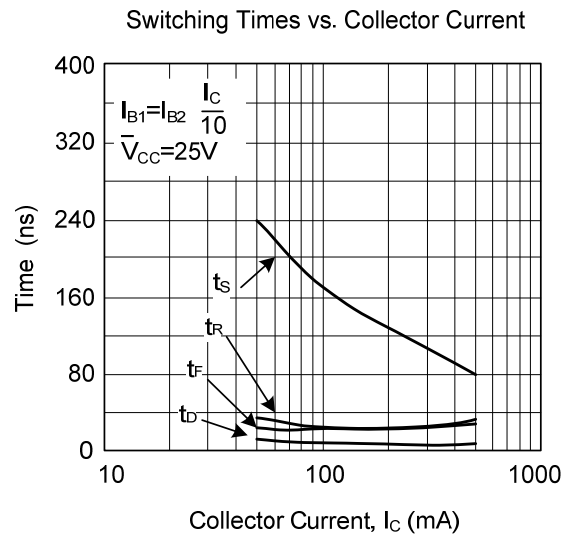
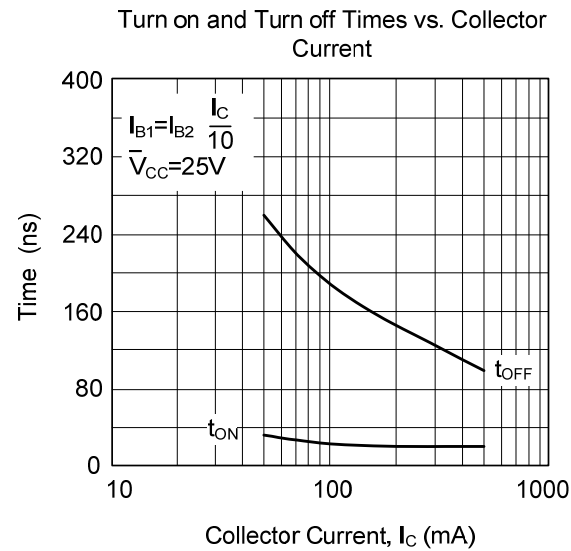


Saturated Turn-Off Switching Time

TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



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