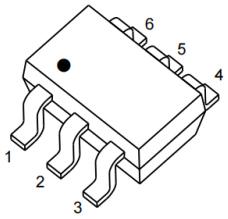
MMBT3946DE

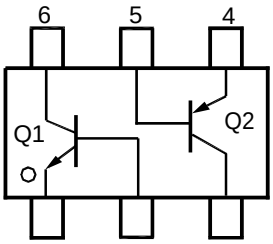
Plastic-Encapsulate Transistors

MMBT3946DE Dual Transistor(NPN+PNP)

SOT-563



1. Emitter 2. Base
3. Collector 4. Emitter
5. Base 6. Collector



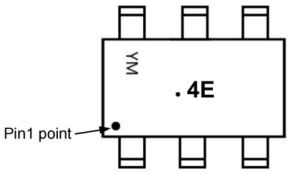
Application

- For Switching and Amplifier Applications

Features

- Halogen and Antimony Free(HAF)
- RoHS Compliant

Marking:



.4E=Part No.

YM：Date Code Marking

MAXIMUM RATINGS (T_A=25℃ unless otherwise noted)

Parameter	Symbol	Value		Unit
		NPN	PNP	
Collector-Base Voltage	V_{CBO}	60	-40	V
Collector-Emitter Voltage	V_{CEO}	40	-40	V
Emitter-Base Voltage	V_{EBO}	6	-5	V
Collector Current -Continuous	I_C	0.2	-0.2	A
Power Dissipation	P_d	357		mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	350		℃/W
Junction Temperature	T_J	-55~ +150		℃
Storage Temperature	T_{STG}	-55~ +150		℃

ELECTRICAL CHARACTERISTICS(NPN,T_A=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Max	Unit
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=10μA ,I_E=0	60		V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=1mA , I_B=0	40		V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E=10μA,I_C=0	6		V
Collector Cut-Off Current	I_{CBO}	V_{CB}=30V, I_E=0		0.05	μA
Emitter Cut-Off Current	I_{EBO}	V_{EB}=6V, I_C=0		0.05	μA
DC Current Gain	h_{FE1}	V_{CE}=1V, I_C=1mA	70		
	h_{FE2}	V_{CE}=1V, I_C=10mA	100	300	
	h_{FE3}	V_{CE}=1V, I_C=50mA	60		
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=10mA, I_B=1mA		0.2	V
		I_C=50mA, I_B=5mA		0.3	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	I_C=10mA, I_B=1mA	0.65	0.85	V
		I_C=50mA, I_B=5mA		0.95	V
Transition Frequency	f_T	V_{CE}= 20V, I_C=10mA,f=100M_{Hz}	300		MH_Z
Collector Output Capacitance	C_{ob}	V_{CB}= 5V, f=1MHz		4	pF
Delay Time	t_d	V_{CC}=3V,V_{BE}=0.5V,I_C=10mA,I_B=1mA		35	ns
Rise Time	t_r	V_{CC}=3V,V_{BE}=0.5V,I_C=10mA,I_B=1mA		35	ns
Storage Time	t_s	V_{CC}=3V I_C=10mA,I_B=1mA		200	ns
Fall Time	t_f	V_{CC}=3V I_C=10mA,I_B=1mA		50	ns

ELECTRICAL CHARACTERISTICS(PNP,T_A=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Max	Unit
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=-10μA ,I_E=0	-40		V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=-1mA , I_B=0	-40		V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E=-10μA,I_C=0	-5		V
Collector Cut-Off Current	I_{CBO}	V_{CB}=-30V, I_E=0		50	nA
Emitter Cut-Off Current	I_{EBO}	V_{EB}=-6V， I_C=0		50	nA
DC Current Gain	h_{FE1}	V_{CE}=-1V, I_C=-1mA	80		
	h_{FE2}	V_{CE}=-1V, I_C=-10mA	100	300	
	h_{FE3}	V_{CE}=-1V, I_C=-50mA	60		
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=-10mA, I_B= -1mA		0.25	V
		I_C=-50mA, I_B= -5mA		0.4	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	I_C=-10mA, I_B= -1mA	0.65	0.85	V
		I_C=-50mA, I_B= -5mA		0.95	V
Transition frequency	f_T	V_{CE}= -20V, I_C=-10mA,f =100MHz	250		MH_Z
Output Capacitance	C_{ob}	V_{CB} =-5V, f = 1.0MHz		4.5	pF
Delay Time	t_d	V_{CC}=-3V,V_{BE}=-0.5V		35	ns
Rise Time	t_r	I_C=-10mA,I_B=-1mA		35	ns
Storage Time	t_s	V_{CC}=-3V I_C=-10mA,I_B=-1mA		225	ns
Fall Time	t_f	V_{CC}=-3V I_C=-10mA,I_B=-1mA		75	ns

Typical Characteristics

Fig. 1 Output Characteristics Curve

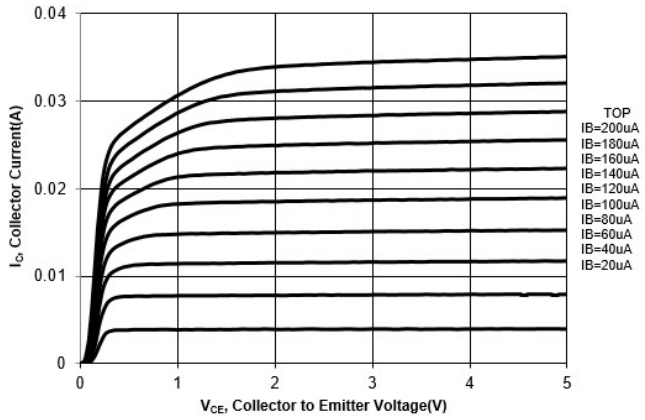


Fig. 2 Collector Current vs. Base to Emitter Voltage

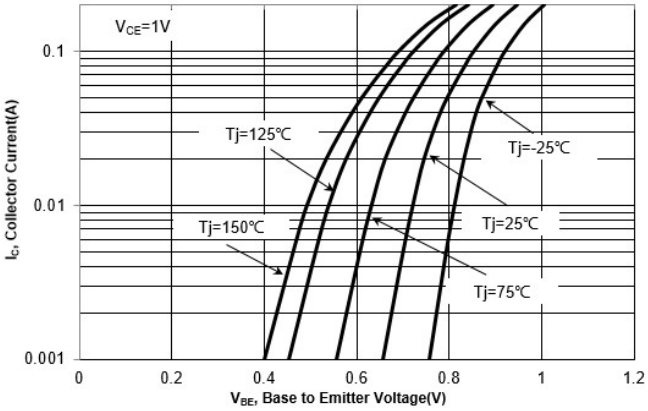


Fig. 3 DC Current Gain vs. Collector Current

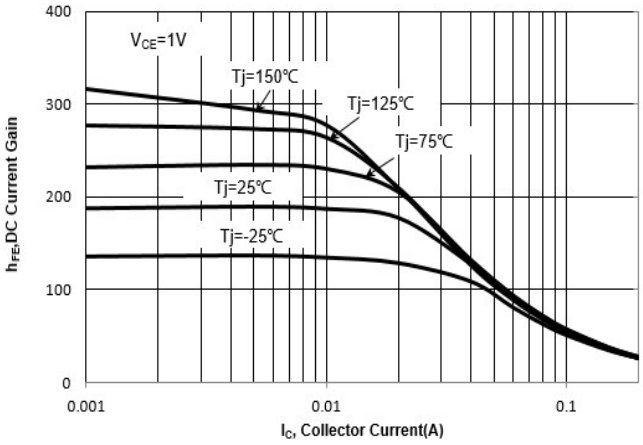


Fig. 4 V_{BESAT} vs. Collector Current

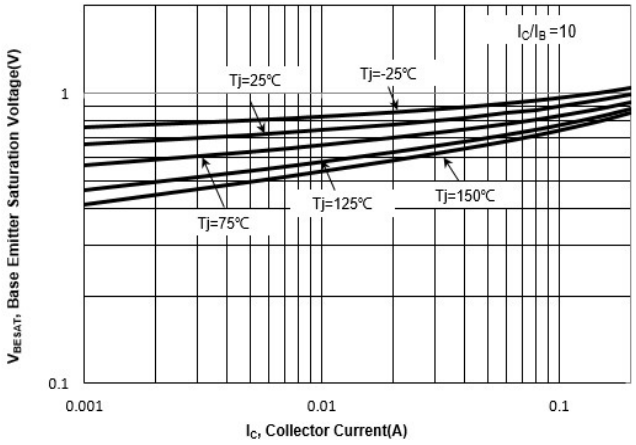


Fig. 5 V_{CESAT} vs. Collector Current

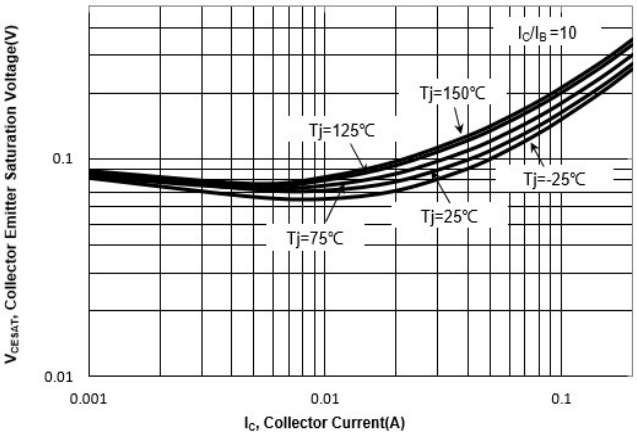
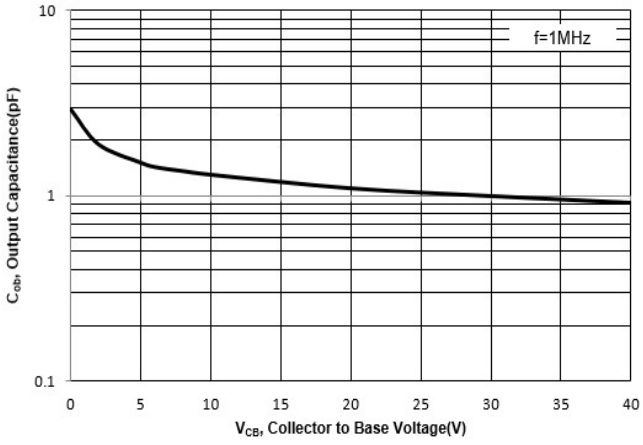


Fig. 6 Output Capacitance



Typical Characteristics

Fig. 1 Output Characteristics Curve

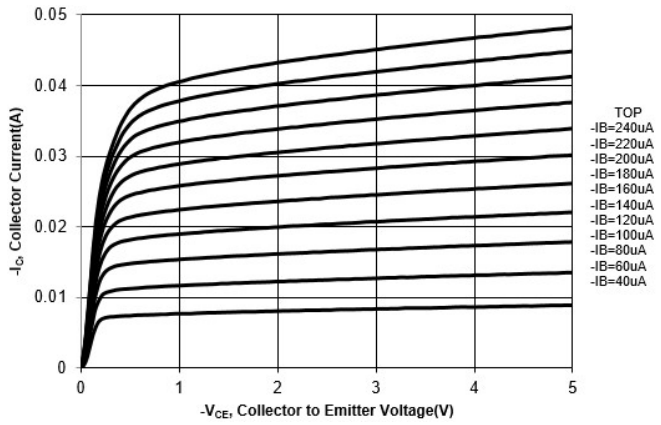


Fig. 2 Collector Current vs. Base to Emitter Voltage

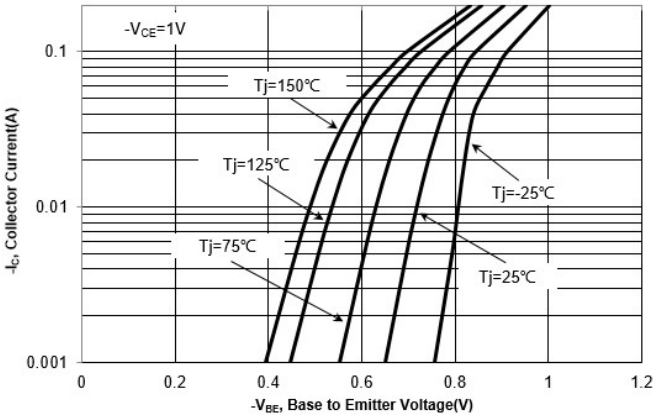


Fig. 3 DC Current Gain vs. Collector Current

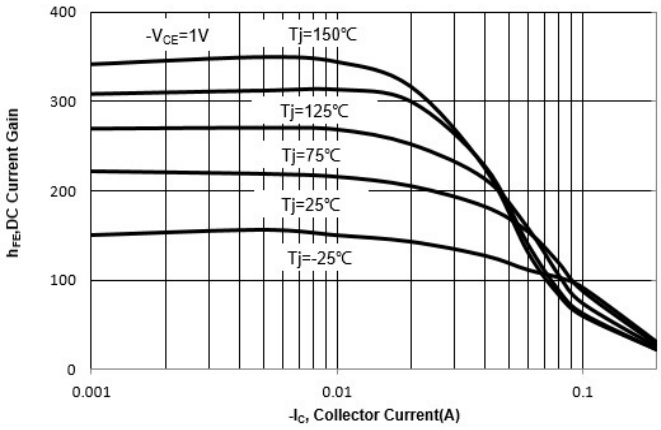


Fig. 4 V_{BESAT} vs. Collector Current

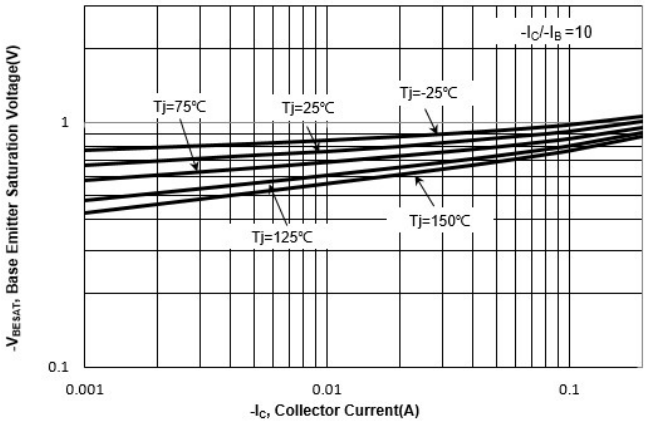


Fig. 5 V_{CESAT} vs. Collector Current

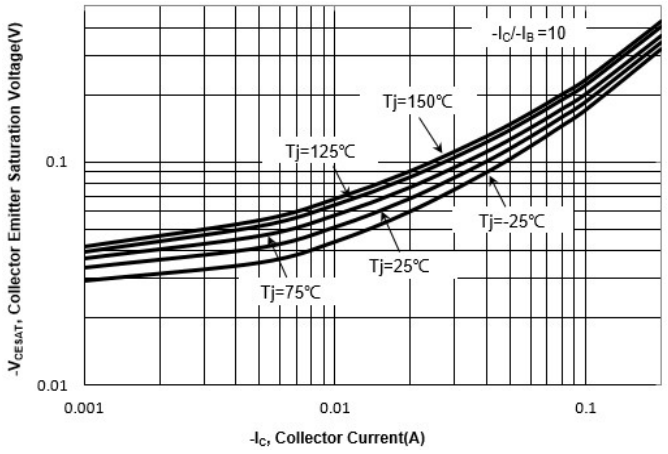
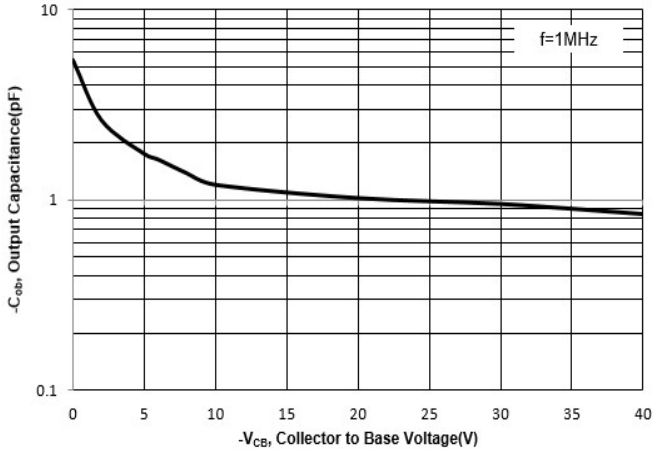
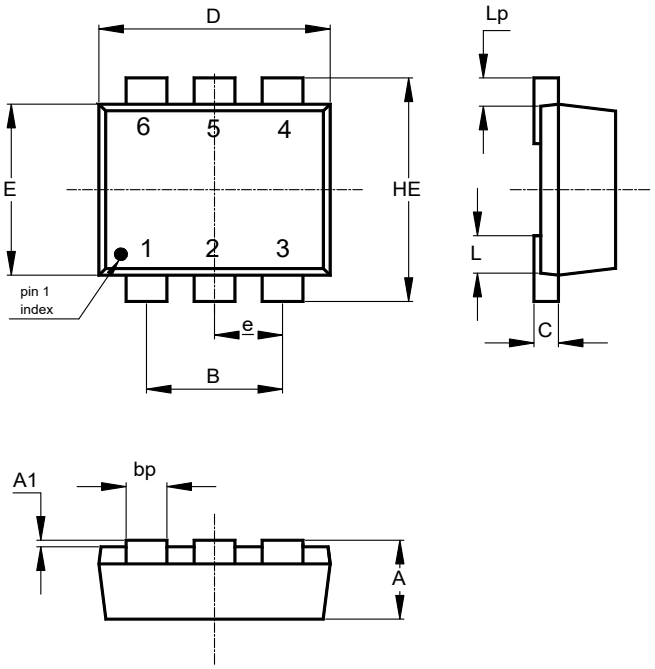


Fig. 6 Output Capacitance



SOT-563 Package Information



Unit	Dimensions In Millimeters	
	Min.	Max.
A	0.5	0.6
A1	0	0.05
B	1.0typ	
C	0.1	0.18
D	1.5	1.7
E	1.1	1.25
HE	1.55	1.7
e	0.5typ	
L	0.02	0.15
Lp	0.1	0.3
bp	0.15	0.3

Attention：

- GreenPower Electronics reserves the right to improve product design function and reliability without notice.
- Any and all semiconductor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are solely responsible for providing adequate safe measures when design their systems.
- GreenPower Electronics products belong to consumer electronics or other civilian electronic products.