NPN Transistor with Zener Diode

Features

- Halogen Free Available Upon Request By Adding Suffix "-HF"
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

Maximum Ratings @ 25°C Unless Otherwise Specified

- Operating Junction Temperature Range: -55℃ to +150℃
- Storage Temperature Range: -55℃ to +150℃
- Thermal Resistance: 328℃/W Junction to Ambient

NPN Transistor

Parameter	Symbol	Rating	Unit
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	6	V
Continuous Collector Current	I_C	600	mA

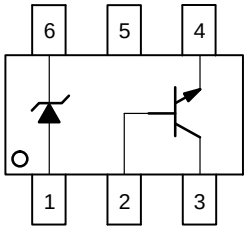
Zener Diode

Parameter	Symbol	Rating	Unit
Maximum Forward Voltage @I_F=10mA	V_F	0.9	V

Total Device Dissipation

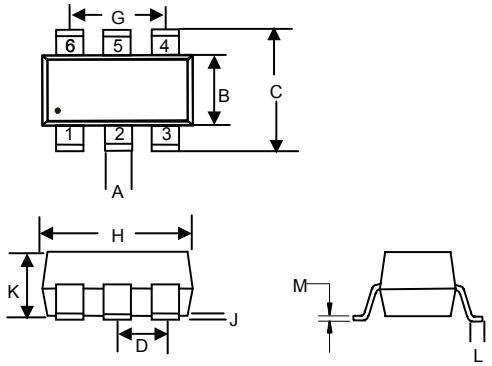
Parameter	Symbol	Rating	Unit
Total Device Dissipation	P_D	380	mW

Internal Structure



2.BASE
3.COLLECTOR
4.EMITTER

SOT23-6L



DIMENSIONS					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.012	0.020	0.30	0.50	
B	0.051	0.070	1.30	1.80	
C	0.087	0.126	2.20	3.20	
D	0.037		0.95		TYP.
G	0.074		1.90		TYP.
H	0.106	0.122	2.70	3.10	
J	0.002	0.006	0.05	0.15	
K	0.030	0.051	0.75	1.30	
L	0.012	0.024	0.30	0.60	
M	0.003	0.008	0.08	0.22	

NPN Transistor---Electrical Characteristics @ T_A=25°C Unless Otherwise Specified

Parameter	Symbol	Min	Typ	Max	Units	Conditions
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	60			V	I_C=100μA, I_E=0
Collector-Emitter Breakdown Voltage*	$V_{(BR)CEO}$	40			V	I_C=1mA, I_B=0
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	6			V	I_E=100μA, I_C=0
Base Cutoff Current	I_{BL}			0.1	μA	V_{CE}=35V, V_{BE}=0.4V
Collector Cutoff Current	I_{CEX}			0.1	μA	V_{CE}=35V, V_{BE}=0.4V
DC Current Gain*	$h_{FE(1)}$	20				V_{CE}=1V, I_C=0.1mA
	$h_{FE(2)}$	40				V_{CE}=1V, I_C=1mA
	$h_{FE(3)}$	80				V_{CE}=1V, I_C=10mA
	$h_{FE(4)}$	100		300		V_{CE}=1V, I_C=150mA
	$h_{FE(5)}$	40				V_{CE}=2V, I_C=500mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			0.4	V	I_C=150mA, I_B=15mA
				0.75	V	I_C=500mA, I_B=50mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		0.75	0.95	V	I_C=150mA, I_B=15mA
				1.2	V	I_C=500mA, I_B=50mA
Transition Frequency	f_T	250			MHz	V_{CE}=10V, I_C=20mA, f=100MHz
Delay Time	t_d			15	ns	V_{CC}=30V, V_{BE}=0.2V, I_C=150mA, I_{B1}=15mA
Rise Time	t_r			20	ns	
Storage Time	t_s			225	ns	V_{CC}=30V, I_C=150mA, I_{B1}=I_{B2}=15mA
Fall Time	t_f			30	ns	
Collector-Base Capacitance	C_{cb}			6.5	pF	V_{CB}=5V, I_E=0,f=1MHz
Emitter-Base Capacitance	C_{eb}			30	pF	V_{EB}=0.5V, I_C=0, f=1MHz

*.Pulse test: Pulse Width≤300μs,Duty Cycle≤2.0%.

Zener Diode---Electrical Characteristics @ 25°C Unless Otherwise Specified

MCC Part Number	Zener Voltage			Maximum Zener Impedance				Reverse Current	
	V_Z @ I_{ZT}			Z_{ZT}	I_{ZT}	Z_{ZK}	I_{ZK}	I_R(Max)	V_R
	Min.(V)	Nom(V)	Max.(V)	Ω	mA	Ω	mA	μA	V
SMBT445V6	5.49	5.6	5.71	40	5	400	1	0.1	2.0

NPN Transistor---Curve Characteristics

Fig. 1 - Static Characteristics

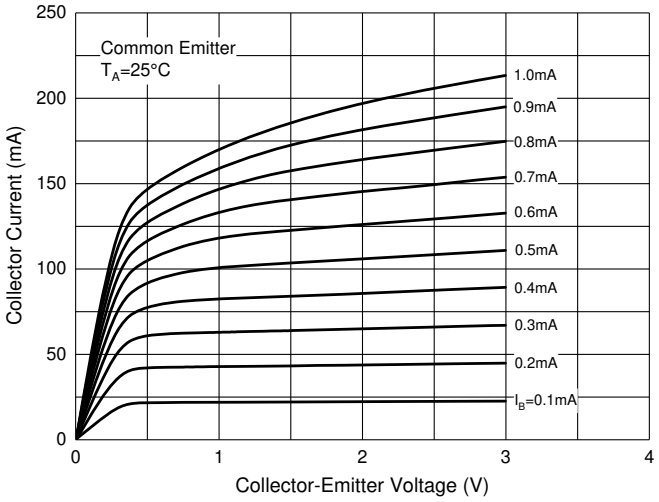


Fig. 2 - DC Current Gain Characteristics

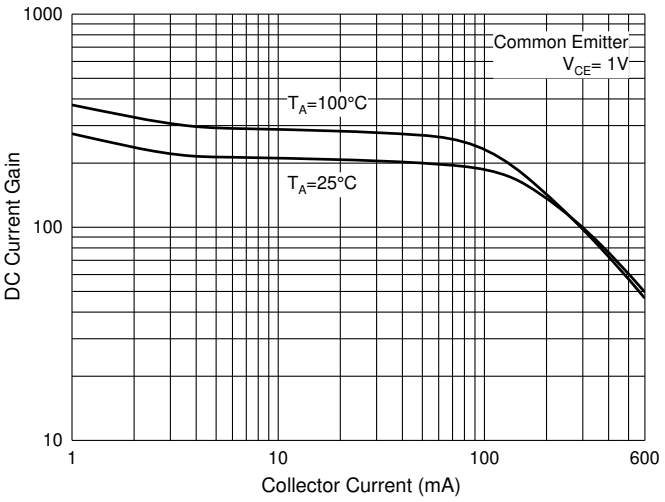


Fig. 3 - Base-Emitter Saturation Voltage Characteristics

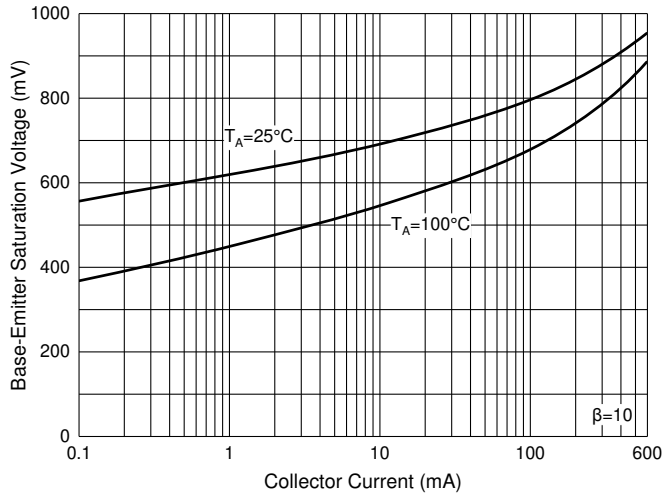
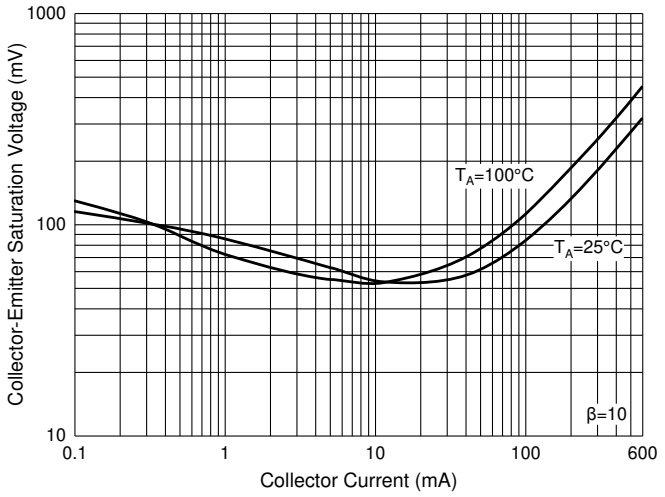
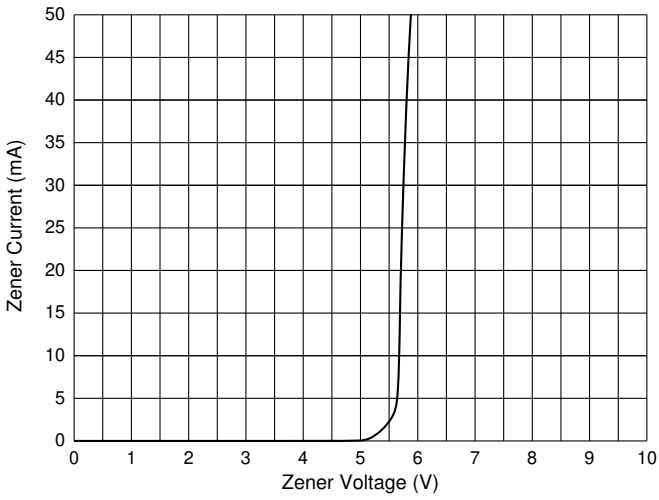


Fig. 4 - Collector-Emitter Saturation Voltage Characteristics



Zener Diode---Curve Characteristics

Fig. 5 - Typical Zener Breakdown Characteristics



Ordering Information

Device	Packing
Part Number-TP	Tape&Reel: 3Kpcs/Reel

Note : Adding "-HF" Suffix for Halogen Free, eg. Part Number-TP-HF

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