

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)

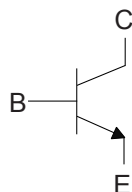
Maximum Ratings @ 25°C Unless Otherwise Specified

- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 200°C/W Junction to Ambient

Parameter	Symbol	Rating	Unit
Collector-Base Voltage	V_{CBO}	40	V
Collector-Emitter Voltage	V_{CEO}	25	V
Emitter-Base Voltage	V_{EBO}	5	V
Continuous Collector Current	I_C	0.5	A
Power Dissipation@ $T_A=25^\circ\text{C}$	P_D	625	mW

Marking: S9013

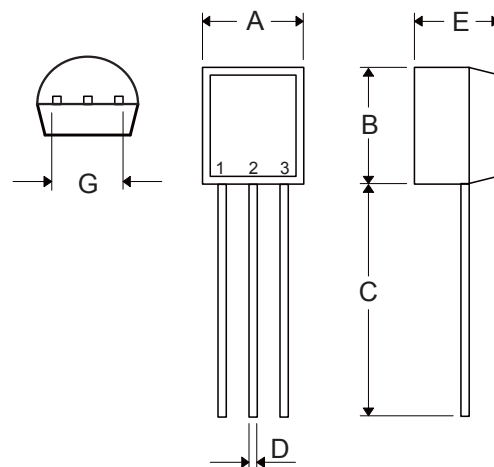
Internal Structure



1.EMITTER
2.BASE
3.COLLECTOR

NPN Silicon Transistors

TO-92



DIM	DIMENSIONS				NOTE
	INCHES		MM		
	MIN	MAX	MIN	MAX	
A	0.169	0.185	4.30	4.70	
B	0.169	0.185	4.30	4.70	
C	0.500	-----	12.70	-----	
D	0.015	0.022	0.38	0.55	
E	0.130	0.146	3.30	3.70	
G	0.095	0.105	2.42	2.67	Straight Lead
	0.173	0.220	4.40	5.60	Bent

Electrical Characteristics @ $T_A=25^\circ\text{C}$ Unless Otherwise Specified

Parameter	Symbol	Min	Typ	Max	Units	Conditions
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	40			V	$I_C=100\mu\text{A}, I_E=0$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	25			V	$I_C=0.1\text{mA}, I_B=0$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5			V	$I_E=100\mu\text{A}, I_C=0$
Collector Cut-off Current	I_{CBO}			0.1	μA	$V_{CB}=40\text{V}, I_E=0$
Collector Cut-off Current	I_{CEO}			0.1	μA	$V_{CE}=20\text{V}, I_B=0$
Emitter Cut-off Current	I_{EBO}			0.1	μA	$V_{EB}=5\text{V}, I_C=0$
DC Current Gain	$h_{FE(1)}$	112		300		$V_{CE}=1\text{V}, I_C=50\text{mA}$
	$h_{FE(2)}$	40				$V_{CE}=1\text{V}, I_C=500\text{mA}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			0.6	V	$I_C=500\text{mA}, I_B=50\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$			1.2	V	$I_C=500\text{mA}, I_B=50\text{mA}$
Base-Emitter Voltage	V_{EB}			1.4	V	$I_E=100\text{mA}$
Transition Frequency	f_T	150			MHz	$V_{CE}=6\text{V}, I_C=20\text{mA}, f=30\text{MHz}$

Classification of h_{FE}

Rank	G	H	I
Range	112-166	144-202	190-300

Curve Characteristics

Fig. 1 - Static Characteristics

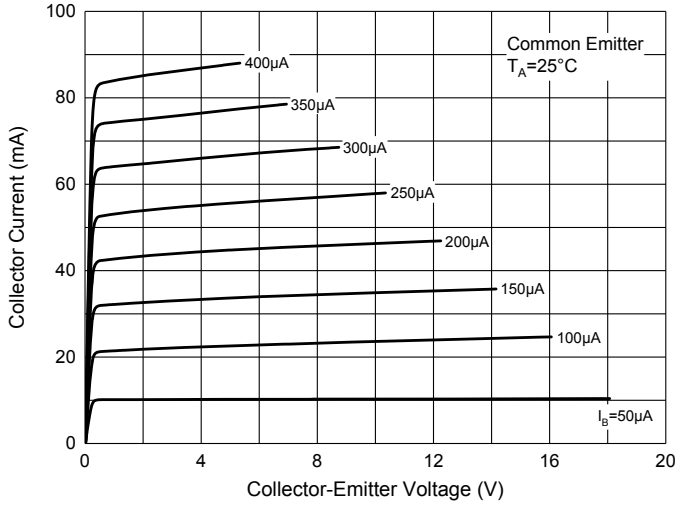


Fig. 2 - DC Current Gain Characteristics

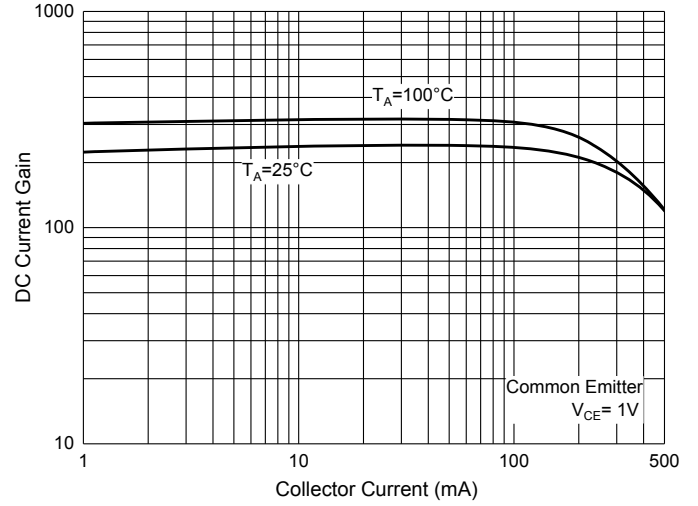


Fig. 3 - Collector-Emitter Saturation Voltage Characteristics

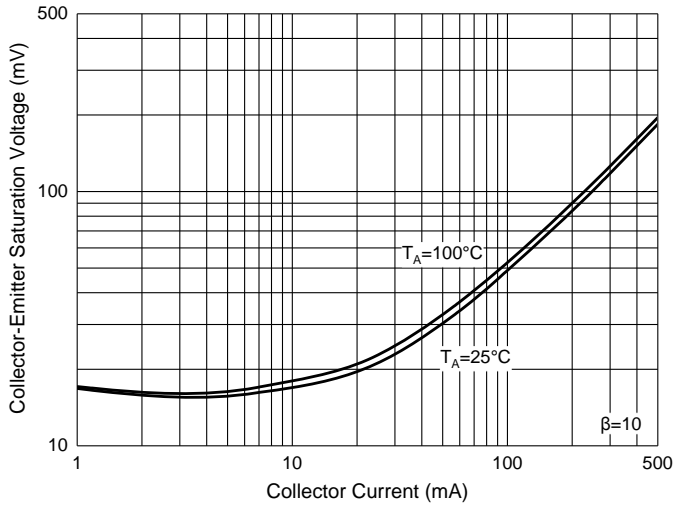


Fig. 4 - Base-Emitter Saturation Voltage Characteristics

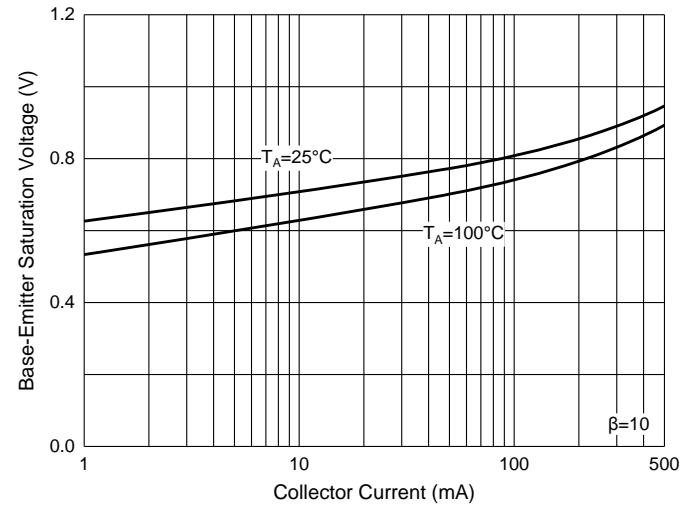


Fig. 5 - Base-Emitter Voltage Characteristics

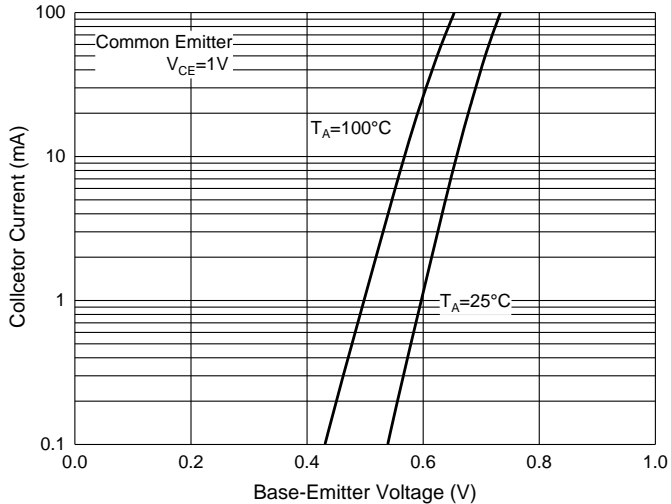
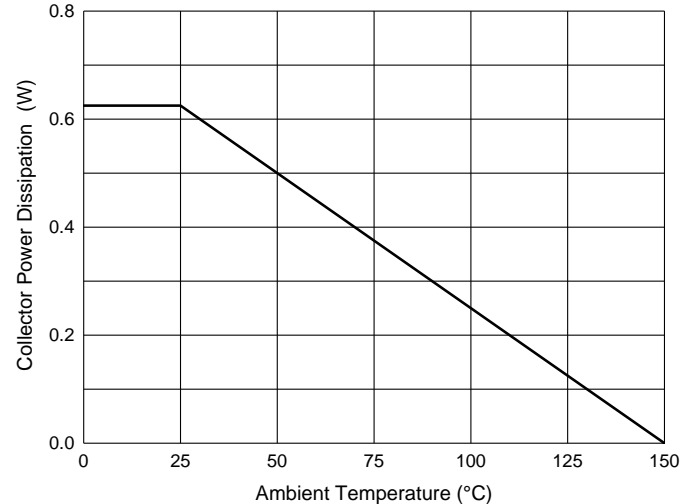


Fig. 6 - Collector Power Derating Curve



Ordering Information

Device	Packing
Part Number-AP	Ammo Packing: 20Kpcs/Carton
Part Number-BP	Bulk: 100Kpcs/Carton

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

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