

## 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)

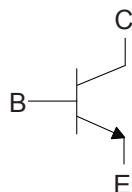
## Maximum Ratings @ 25°C Unless Otherwise Specified

- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 208°C/W Junction to Ambient

Parameter	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	75	V
Collector-Emitter Voltage	$V_{CEO}$	40	V
Emitter-Base Voltage	$V_{EBO}$	6	V
Continuous Collector Current	$I_C$	600	mA
Power Dissipation	$P_D$	625	mW

**Marking:**Type Number

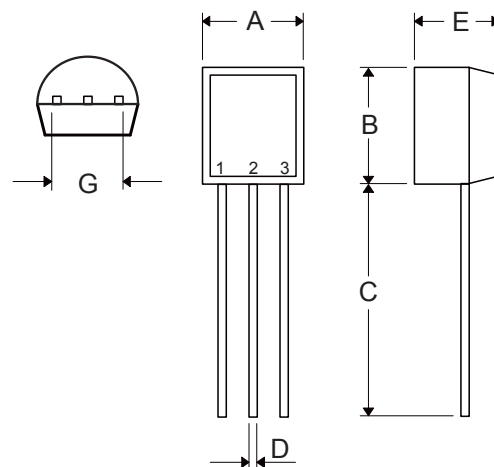
**Internal Structure**



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	$V_{(BR)CBO}$	75			V	$I_C=10\mu\text{A}, I_E=0$
Collector-Emitter Breakdown Voltage*	$V_{(BR)CEO}$	40			V	$I_C=10\text{mA}, I_B=0$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	6			V	$I_E=10\mu\text{A}, I_C=0$
Base Cutoff Current	$I_{BL}$			0.02	$\mu\text{A}$	$V_{CE}=60\text{V}, V_{BE}=3\text{V}$
Collector Cut-off Current	$I_{CEX}$			0.01	$\mu\text{A}$	$V_{CE}=60\text{V}, V_{BE}=3\text{V}$
DC Current Gain*	$h_{FE(1)}$	35				$V_{CE}=10\text{V}, I_C=0.1\text{mA}$
	$h_{FE(2)}$	50				$V_{CE}=10\text{V}, I_C=1\text{mA}$
	$h_{FE(3)}$	75				$V_{CE}=10\text{V}, I_C=10\text{mA}$
	$h_{FE(4)}$	100		300		$V_{CE}=10\text{V}, I_C=150\text{mA}$
	$h_{FE(5)}$	50				$V_{CE}=1\text{V}, I_C=150\text{mA}$
	$h_{FE(6)}$	40				$V_{CE}=10\text{V}, I_C=500\text{mA}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			0.3	V	$I_C=150\text{mA}, I_B=15\text{mA}$
				1	V	$I_C=500\text{mA}, I_B=50\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	0.6		1.2	V	$I_C=150\text{mA}, I_B=15\text{mA}$
				2	V	$I_C=500\text{mA}, I_B=50\text{mA}$
Transition Frequency	$f_T$	300			MHz	$V_{CE}=20\text{V}, I_C=20\text{mA}, f=100\text{MHz}$
Delay Time	$t_d$			10	ns	$V_{CC}=30\text{V}, V_{BE}=0.5\text{V}, I_C=150\text{mA}, I_{B1}=15\text{mA}$
Rise Time	$t_r$			25	ns	
Storage Time	$t_s$			225	ns	$V_{CC}=30\text{V}, I_C=150\text{mA}, I_{B1}=I_{B2}=15\text{mA}$
Fall Time	$t_f$			60	ns	
Output Capacitance	$C_{cbo}$			8	pF	$V_{CB}=10\text{V}, I_E=0, f=100\text{Hz}$
Input Capacitance	$C_{ibo}$			25	pF	$V_{BE}=0.5\text{V}, I_C=0, f=100\text{Hz}$
Noise Figure	$N_F$			4	dB	$V_{CE}=10\text{V}, I_C=0.1\text{mA}, f=1\text{KHz}, R_S=1\text{K}\Omega$

\*.Pulse test: Pulse Width $\leq 300\mu\text{s}$ , Duty Cycle $\leq 2.0\%$ .

## Curve Characteristics

Fig. 1 - Static Characteristics

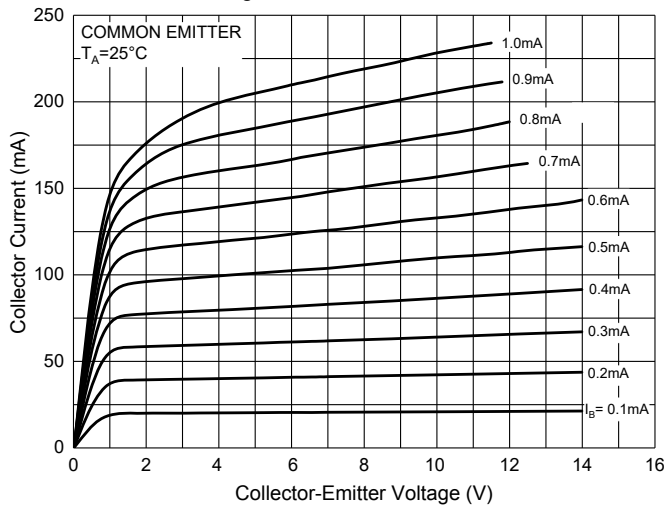


Fig. 2 - DC Current Gain Characteristics

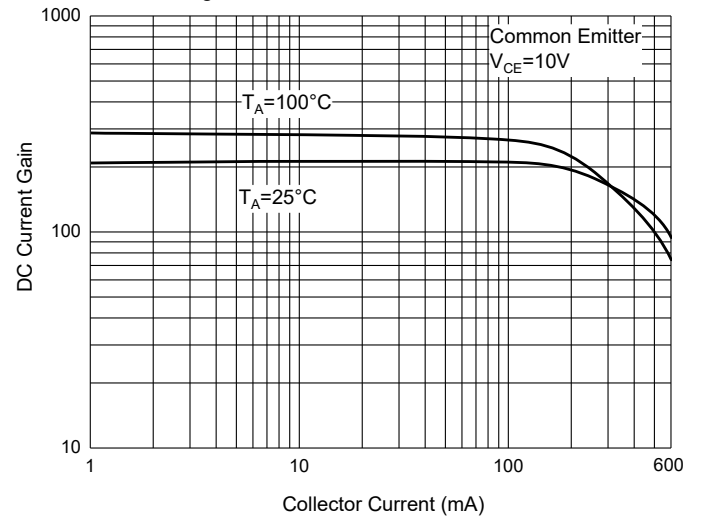


Fig. 3 - Collector-Emitter Saturation Voltage Characteristics

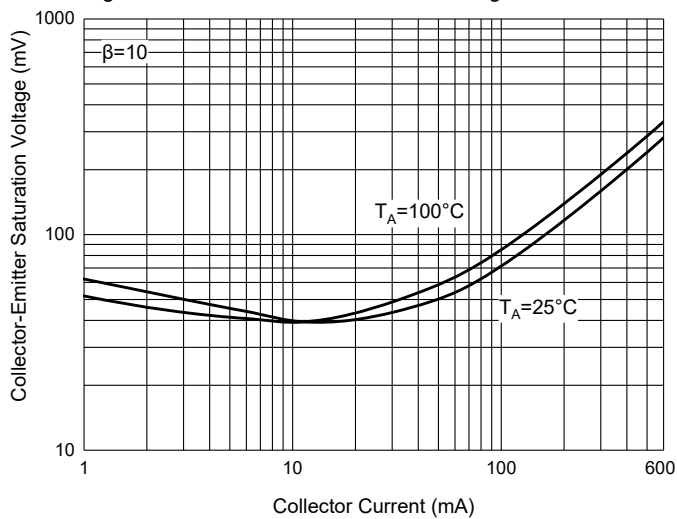


Fig. 4 - Base-Emitter Saturation Voltage Characteristics

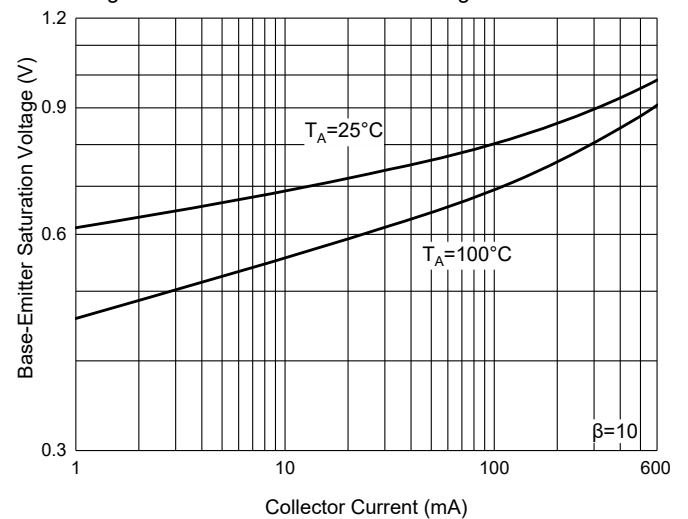


Fig. 5 - Base-Emitter Voltage Characteristics

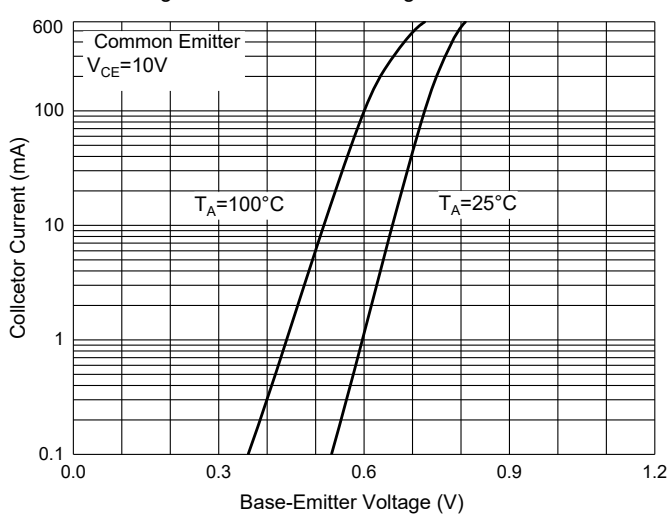
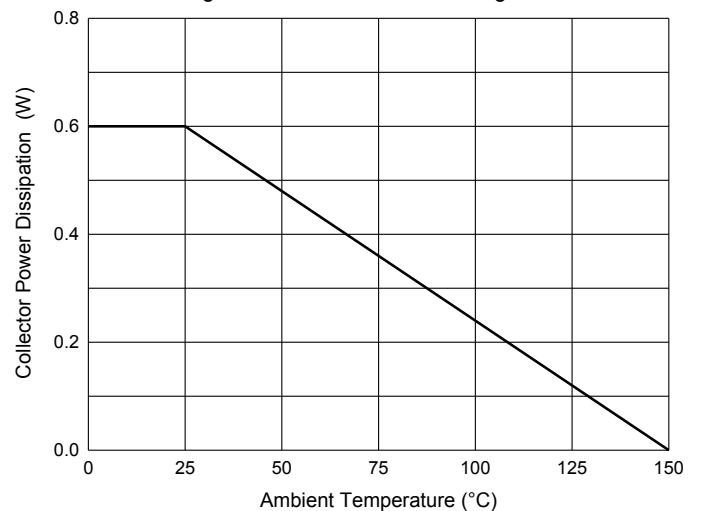


Fig. 6 - Collector Power Derating Curve



## 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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