

## PNP SILICON POWER TRANSISTORS

2SA1011 transistor is designed for use in general purpose Power amplifier, vertical output application

### FEATURES:

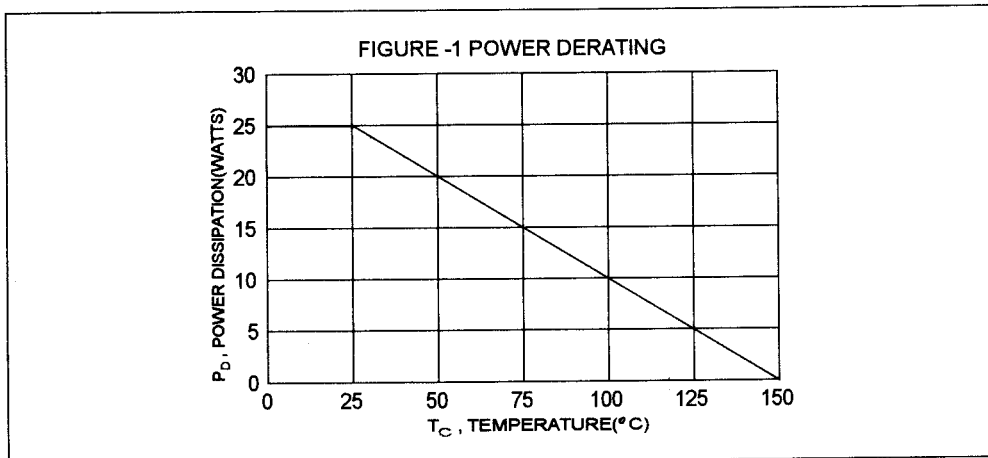
- \* Collector-Emitter Voltage  
 $V_{CEO} = 160V(\text{Min})$
- \* DC Current Gain  
 $hFE = 60-200 @ I_C = 300mA$

### MAXIMUM RATINGS

Characteristic	Symbol	2SA1011	Unit
Collector-Emitter Voltage	$V_{CEO}$	160	V
Collector-Base Voltage	$V_{CBO}$	180	V
Emitter-Base Voltage	$V_{EBO}$	6.0	V
Collector Current - Continuous - Peak	$I_C$ $I_{CM}$	1.5 3.0	A
Total Power Dissipation @ $T_C = 25^\circ C$ Derate above $25^\circ C$	$P_D$	25 0.2	W W/ $^\circ C$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ C$

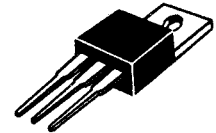
### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	5.0	$^\circ C/W$

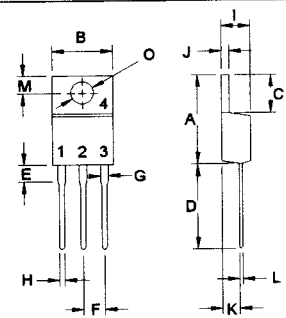


## PNP 2SA1011

1.5 AMPERE  
POWER  
TRANSISTORS  
160 VOLTS  
25 WATTS



TO-220



PIN 1.BASE  
2.COLLECTOR  
3.EMITTER  
4.COLLECTOR(CASE)

DIM	MILLIMETERS	
	MIN	MAX
A	14.68	15.31
B	9.78	10.42
C	5.01	6.52
D	13.06	14.62
E	3.57	4.07
F	2.42	3.66
G	1.12	1.36
H	0.72	0.96
I	4.22	4.98
J	1.14	1.38
K	2.20	2.97
L	0.33	0.55
M	2.48	2.98
O	3.70	3.90

**ELECTRICAL CHARACTERISTICS (  $T_c = 25^\circ\text{C}$  unless otherwise noted )**

Characteristic	Symbol	Min	Max	Unit
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**OFF CHARACTERISTICS**

Collector-Base Voltage ( $I_C = 1.0 \text{ mA}$ , $I_B = 0$ )	$V_{CBO}$	180		V
Collector-Emitter Voltage ( $I_C = 1.0 \text{ mA}$ , $I_B = 0$ )	$V_{CEO}$	140		V
Emitter-Base Voltage ( $I_B = 1.0 \text{ mA}$ , $I_C = 0$ )	$V_{EBO}$	6.0		V
Collector Cutoff Current ( $V_{CB} = 120 \text{ V}$ , $I_E = 0$ )	$I_{CBO}$		10	$\mu\text{A}$
Emitter Cutoff Current ( $V_{EB} = 4.0 \text{ V}$ , $I_C = 0$ )	$I_{EBO}$		10	$\mu\text{A}$

**ON CHARACTERISTICS (1)**

DC Current Gain ** ( $I_C = 0.3 \text{ A}$ , $V_{CE} = 5.0 \text{ V}$ )	hFE	60	200	
Collector-Emitter Saturation Voltage ( $I_C = 0.5 \text{ A}$ , $I_B = 50 \text{ mA}$ )	$V_{CE(sat)}$		0.5	V
Base-Emitter On Voltage ( $I_C = 10 \text{ mA}$ , $V_{CE} = 5 \text{ V}$ )	$V_{BE(on)}$		1.5	V

**SWITCHING CHARACTERISTICS**

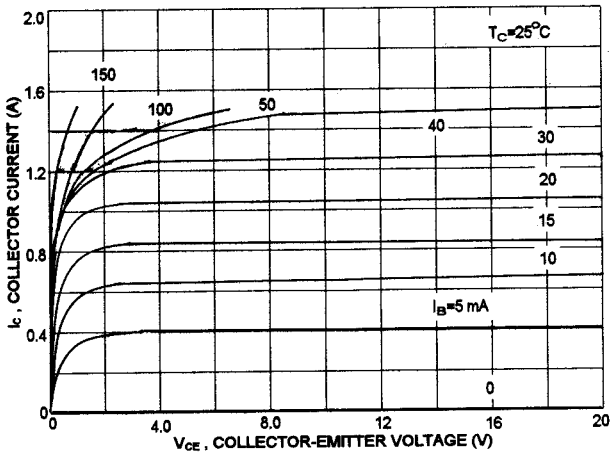
Turn-on Time	$V_{CC} = 20 \text{ V}$ , $I_C = 0.5 \text{ A}$ $I_{B1} = -I_{B2} = 50 \text{ mA}$ $PW = 20 \mu\text{s}$	$t_{on}$	0.3	$\mu\text{s}$
Storage Time		$t_s$	0.5	$\mu\text{s}$
Fall Time		$t_f$	0.2	$\mu\text{s}$

(1) Pulse Test: Pulse Width = 300 $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ 

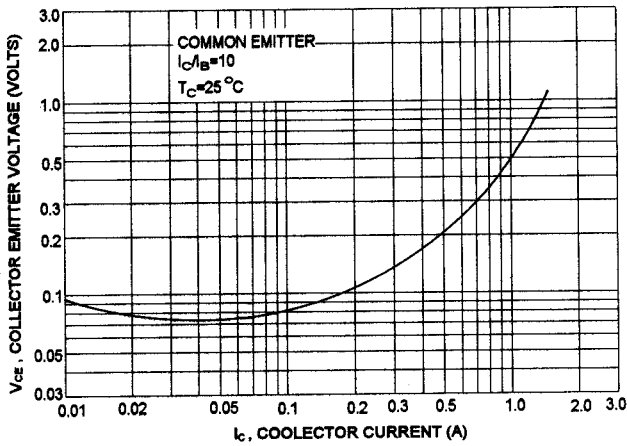
\*\* The 2SA1011 is Classified by 300mA hFE as Follows:

60	D	120	100	E	200
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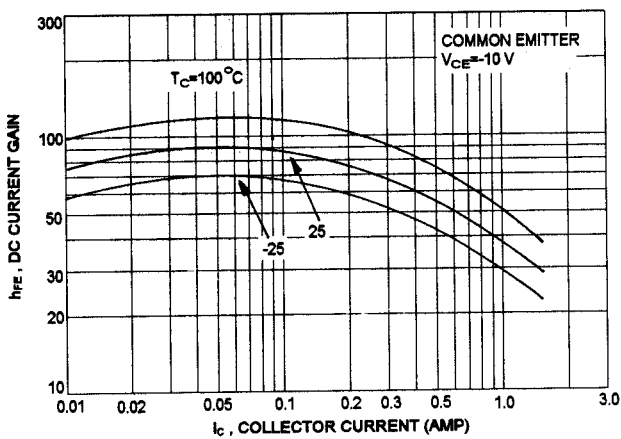
$I_c - V_{ce}$



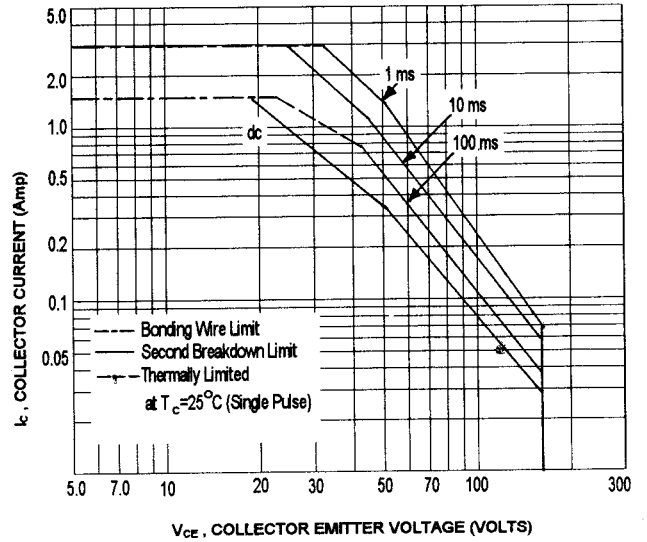
$V_{ce(sat)} - I_c$



DC CURRENT GAIN



ACTIVE-REGION SAFE OPERATING AREA (SOA)



There are two limitation on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate  $I_c - V_{ce}$  limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation than curves indicate.

The data of SOA curve is base on  $T_{j(pk)} = 150^\circ\text{C}$ ;  $T_c$  is variable depending on conditions. second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{j(pk)} \leq 150^\circ\text{C}$ . At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.