# MOSPEC

## PNP SILICON POWER TRANSISTORS

**PNP**
**2SA1011**

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

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

1.5 AMPERE
POWER
TRANASISTORS
160 VOLTS
25 WATTS

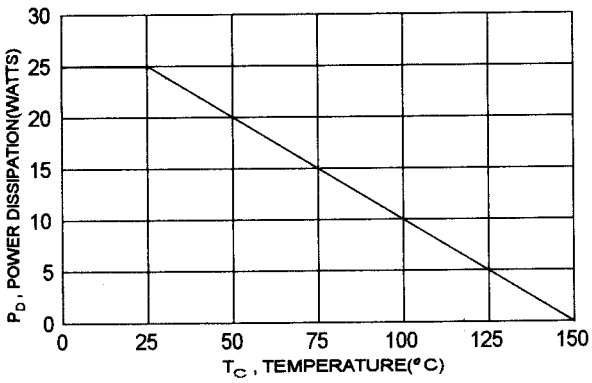
## MAXIMUM RATINGS

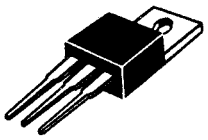
| Characteristic | Symbol | 2SA1011 | Unit |
|---|---|---|---|
| Collector-Emitter Voltage | $V_{CEO}$ | 160 | V |
| Collector-Base Voltage | $V_{CBO}$ | 180 | V |
| Emitter-Base Voltage | $V_{EBO}$ | 6.0 | V |
| Collector Current - Continuous<br>- Peak | $I_C$<br>$I_{CM}$ | 1.5<br>3.0 | A |
| Total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

## THERMAL CHARACTERISTICS

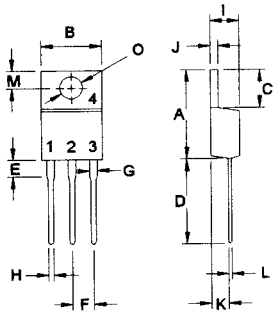
| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance Junction to Case | Rθjc | 5.0 | °C/W |

FIGURE -1 POWER DERATING



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°C unless otherwise noted )

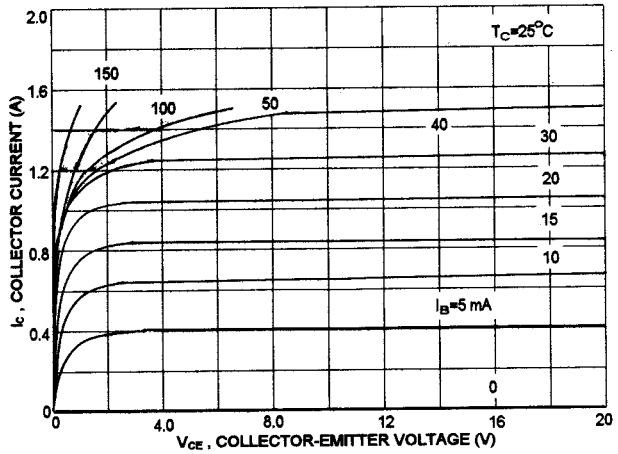
| Characteristic | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | |
| Collector-Base Voltage ( $I_C$= 1.0 mA, $I_B$= 0 ) | $V_{CBO}$ | 180 | | V |
| Collector-Emitter Voltage ( $I_C$= 1.0 mA, $I_B$= 0 ) | $V_{CEO}$ | 140 | | V |
| Emitter-Base Voltage ( $I_B$= 1.0 mA, $I_C$= 0 ) | $V_{EBO}$ | 6.0 | | V |
| Collector Cutoff Current ( $V_{CB}$= 120 V, $I_E$= 0 ) | $I_{CBO}$ | | 10 | uA |
| Emitter Cutoff Current ( $V_{EB}$= 4.0 V, $I_C$= 0 ) | $I_{EBO}$ | | 10 | uA |
| **ON CHARACTERISTICS (1)** | | | | |
| DC Current Gain ** ( $I_C$= 0.3 A, $V_{CE}$= 5.0 V ) | hFE | 60 | 200 | |
| Collector-Emitter Saturation Voltage ( $I_C$= 0.5 A, $I_B$= 50 mA ) | $V_{CE(sat)}$ | | 0.5 | V |
| Base-Emitter On Voltage ( $I_C$= 10 mA, $V_{CE}$= 5V ) | $V_{BE(on)}$ | | 1.5 | V |
| **SWITCHING CHARATERISTICS** | | | | |
| Turn-on Time | $V_{CC}$= 20V, $I_C$= 0.5 A<br>$I_{B1}$= -$I_{B2}$= 50 mA<br>PW= 20μs | $t_{on}$ | 0.3 | μs |
| Storage Time | | $t_s$ | 0.5 | μs |
| Fall Time | | $t_f$ | 0.2 | μs |

(1) Pulse Test: Pulse Width =300μs,Duty Cycle ≦ 2.0%

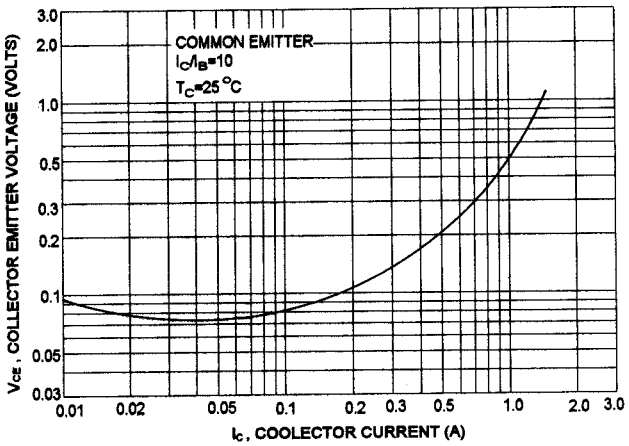
** The 2SA1011 is Classified by 300mA hFE as Follows:

| | |
|---|---|
| 60 D 120 | 100 E 200 |

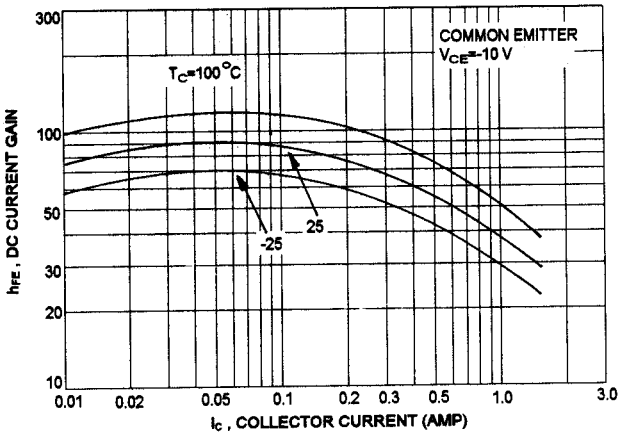
Ic - Vce



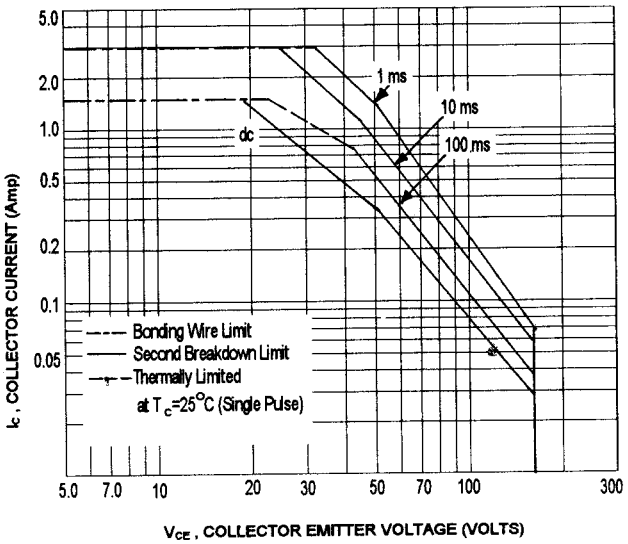

VCE(sat) - Ic




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 °C;$T_C$ is variable depending on conditions. second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(PK)}$≤150°C,At high case temperatures, thermal limita - tion will reduce the power that can be handled to values less than the limitations imposed by second breakdown.