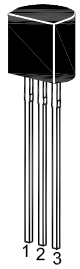
# 2SD965

## NPN Silicon Epitaxial Planar Transistor

for low-frequency power and stroboscope applications.

The transistor is subdivided into three groups P, Q and R, according to its DC current gain.

On special request, these transistors can be manufactured in different pin configurations.



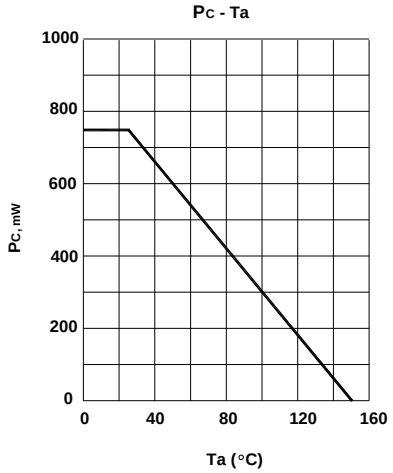

1. Emitter 2. Collector 3. Base
TO-92 Plastic Package

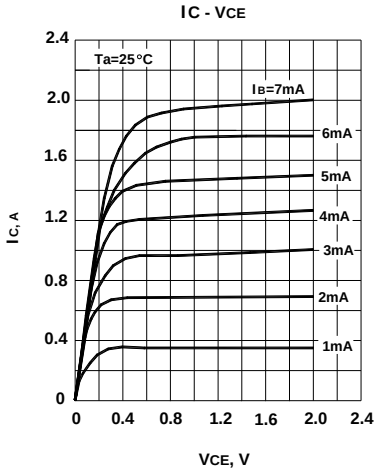
**Absolute Maximum Ratings ($T_a$ = 25℃)**

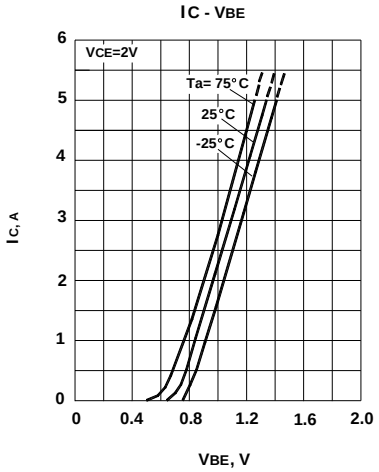
| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Collector Base Voltage | $V_{CBO}$ | 40 | V |
| Collector Emitter Voltage | $V_{CEO}$ | 20 | V |
| Emitter Base Voltage | $V_{EBO}$ | 7 | V |
| Collector Current | $I_C$ | 5 | A |
| Peak Collector Current | $I_{CP}$ | 8 | A |
| Power Dissipation | $P_{tot}$ | 750 | mW |
| Junction Temperature | $T_j$ | 150 | ℃ |
| Storage Temperature Range | $T_{stg}$ | - 55 to + 150 | ℃ |

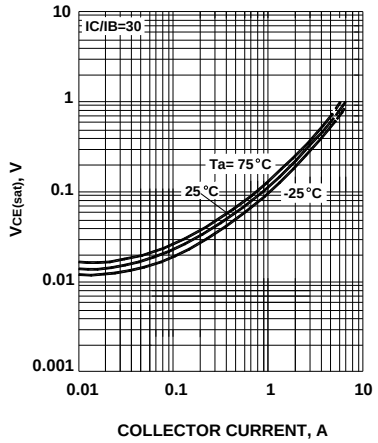
**Characteristics at $T_a$ = 25℃**

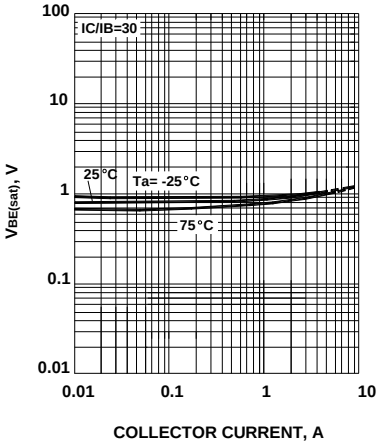
| Parameter | | | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| DC Current Gain | | | | | | | |
| at $V_{CE}$ = 2 V, $I_C$ = 0.5 A | Current Gain Group | P | $h_{FE}$ | 120 | - | 250 | - |
| | | Q | $h_{FE}$ | 230 | - | 380 | - |
| | | R | $h_{FE}$ | 340 | - | 600 | - |
| at $V_{CE}$ = 2 V, $I_C$ = 1 A | | | $h_{FE}$ | 150 | - | - | - |
| Collector Base Cutoff Current at $V_{CB}$ = 10 V | | | $I_{CBO}$ | - | - | 0.1 | µA |
| Collector Emitter Cutoff Current at $V_{CE}$ = 10 V | | | $I_{CEO}$ | - | - | 1.0 | µA |
| Emitter Base Cutoff Current at $V_{EB}$ = 7 V | | | $I_{EBO}$ | - | - | 0.1 | µA |
| Collector Emitter Breakdown Voltage at $I_C$ = 1 mA | | | $V_{CEO}$ | 20 | - | - | V |
| Emitter Base Breakdown Voltage at $I_E$ = 10 µA | | | $V_{EBO}$ | 7 | - | - | V |
| Collector Emitter Saturation Voltage at $I_C$ = 3 A, $I_B$ = 0.1 A | | | $V_{CE(sat)}$ | - | - | 1 | V |
| Current Gain Bandwidth Product at $V_{CB}$ = 6 V, $I_E$ = -50 mA, f = 200 MHz | | | $f_T$ | - | 150 | - | MHz |
| Collector Output Capacitance at $V_{CB}$ = 20 V, f = 1 MHz (Common base, input open circuited) | | | $C_{ob}$ | - | - | 50 | pF |

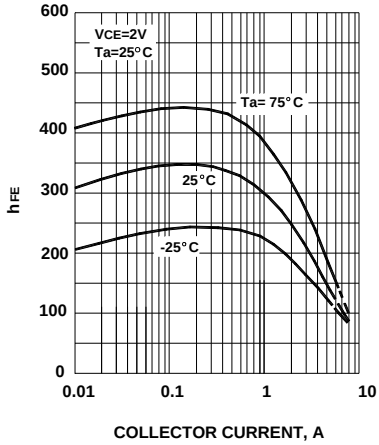

PC - Ta
PC, mW
1000
800
600
400
200
0
0
40
80
120
160
Ta (°C)

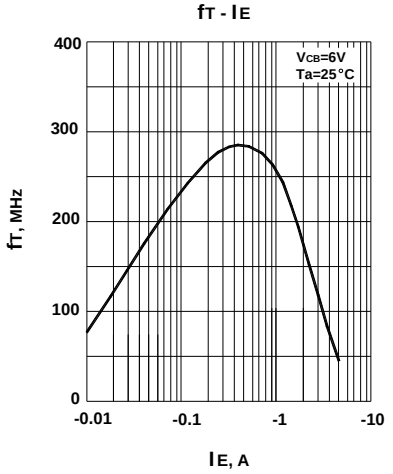

IC - VCE
Ta=25°C
IB=7mA
6mA
5mA
4mA
3mA
2mA
1mA
IC, A
2.4
2.0
1.6
1.2
0.8
0.4
0
0
0.4
0.8
1.2
1.6
2.0
2.4
VCE, V

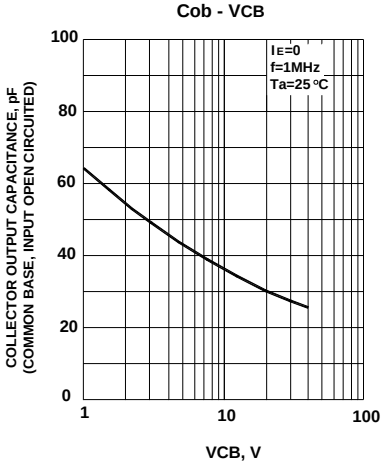

IC - VBE
VCE=2V
Ta= 75°C
25°C
-25°C
IC, A
6
5
4
3
2
1
0
0
0.4
0.8
1.2
1.6
2.0
VBE, V

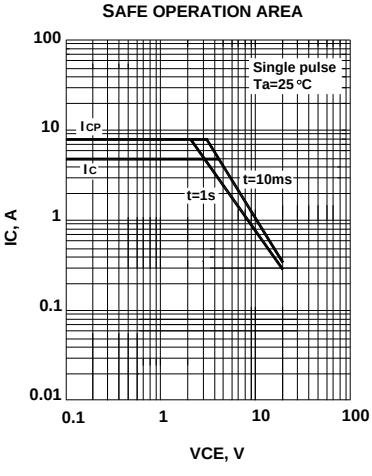

VCE(sat) - IC
IC/IB=30
Ta= 75°C
25°C
-25°C
VCE(sat), V
10
1
0.1
0.01
0.001
0.01
0.1
1
10
COLLECTOR CURRENT, A


VBE(sat) - IC
IC/IB=30
25°C
Ta= -25°C
75°C
VBE(sat), V
100
10
1
0.1
0.01
0.01
0.1
1
10
COLLECTOR CURRENT, A


hFE - IC
VCE=2V
Ta=25°C
Ta= 75°C
25°C
-25°C
hFE
600
500
400
300
200
100
0
0.01
0.1
1
10
COLLECTOR CURRENT, A


fT - IE
VCB=6V
Ta=25°C
fT, MHz
400
300
200
100
0
-0.01
-0.1
-1
-10
IE, A


Cob - VCB
IE=0
f=1MHz
Ta=25°C
COLLECTOR OUTPUT CAPACITANCE, pF
(COMMON BASE, INPUT OPEN CIRCUITED)
100
80
60
40
20
0
1
10
100
VCB, V


SAFE OPERATION AREA
Single pulse
Ta=25°C
ICP
IC
t=10ms
t=1s
IC, A
100
10
1
0.1
0.01
0.1
1
10
100
VCE, V