

## SILICON NPN POWER TRANSISTORS

... designed for medium-speed switching and amplifier applications

### FEATURES

- \* Gain Ranged Specified at 1A and 3A.
- \* Low  $V_{CE(sat)}$  : typically 0.5 V @  $I_C=5 A, I_B=0.5A$
- \* Excellent Safe Operating Areas
- \* Complementary PNP Types Available 2N3789 thru 2N3792

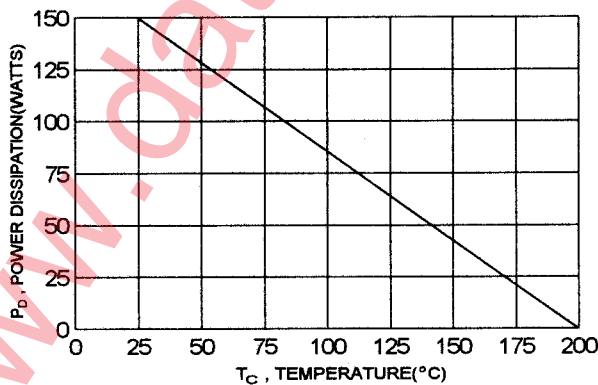
### MAXIMUM RATINGS

Characteristic	Symbol	2N3713 2N3715	2N3714 2N3716	Unit
Collector-Base Voltage	$V_{CBO}$	80	100	V
Collector-Emitter Voltage	$V_{CEO}$	60	80	V
Emitter-Base Voltage	$V_{EBO}$	7		V
Collector Current - Continuous	$I_C$	10		A
Base Current-Continuous	$I_B$	4		A
Total Power Dissipation @ $T_C=25^\circ C$ Derate above $25^\circ C$	$P_D$	150 0.857		W W/ $^\circ C$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-65 to +200		$^\circ C$

### THERMAL CHARACTERISTICS

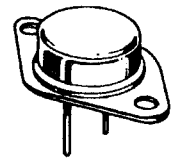
Characteristic	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	1.17	$^\circ C/W$

FIGURE -1 POWER DERATING

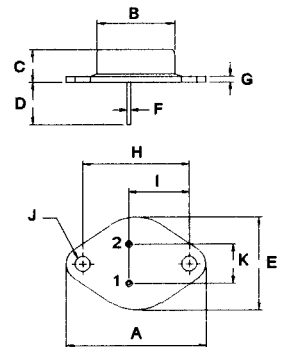


**NPN  
2N3713  
Thru  
2N3716**

**10 AMPERE  
POWER TRANSISTORS  
NPN SILICON  
60-80 VOLTS  
150 WATTS**



**TO-3**



PIN 1.BASE  
2.EMITTER  
COLLECTOR(CASE)

DIM	MILLIMETERS	
	MIN	MAX
A	38.75	39.96
B	19.28	22.23
C	7.96	9.28
D	11.18	12.19
E	25.20	26.67
F	0.92	1.09
G	1.38	1.62
H	29.90	30.40
I	16.64	17.30
J	3.88	4.36
K	10.67	11.18

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

Characteristic	Symbol	Min	Max	Unit
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**OFF CHARACTERISTICS**

Collector-Emitter Sustaining Voltage (1) ( $I_C = 200\text{ mA}$ , $I_B = 0$ )	2N3713, 2N3715 2N3714, 2N3716	$V_{CEO(sus)}$	60 80	V
Collector -Emitter Cutoff Current ( $V_{CE} = 80\text{ V}$ , $V_{BE(off)} = -1.5\text{ V}$ ) ( $V_{CE} = 100\text{ V}$ , $V_{BE(off)} = -1.5\text{ V}$ ) ( $V_{CE} = 60\text{ V}$ , $V_{BE(off)} = -1.5\text{ V}$ , $T_c = 150^\circ\text{C}$ ) ( $V_{CE} = 80\text{ V}$ , $V_{BE(off)} = -1.5\text{ V}$ , $T_c = 150^\circ\text{C}$ )	2N3713, 2N3715 2N3714, 2N3716 2N3713, 2N3715 2N3714, 2N3716	$I_{CEX}$		1.0 1.0 10 10
Emitter Cutoff Current ( $V_{EB} = 7.0\text{ V}$ , $I_C = 0$ )	All Types	$I_{EBO}$		5.0

**ON CHARACTERISTICS (1)**

DC Current Gain ( $I_C = 1.0\text{ A}$ , $V_{CE} = 2.0\text{ V}$ ) ( $I_C = 3.0\text{ A}$ , $V_{CE} = 2.0\text{ V}$ )	2N3713, 2N3714 2N3715, 2N3716 2N3713, 2N3714 2N3715, 2N3716	hFE	25 50 15 30	90 180
Collector-Emitter Saturation Voltage ( $I_C = 5.0\text{ A}$ , $I_B = 0.5\text{ A}$ )	2N3713, 2N3714 2N3715, 2N3716	$V_{CE(sat)}$		1.0 0.8
Base-Emitter Saturation Voltage ( $I_C = 5.0\text{ A}$ , $I_B = 0.5\text{ A}$ )	2N3713, 2N3714 2N3715, 2N3716	$V_{BE(sat)}$		2.0 1.5
Base-Emitter On Voltage ( $I_C = 3.0\text{ A}$ , $V_{CE} = 2.0\text{ V}$ )	All Types	$V_{BE(on)}$		1.5

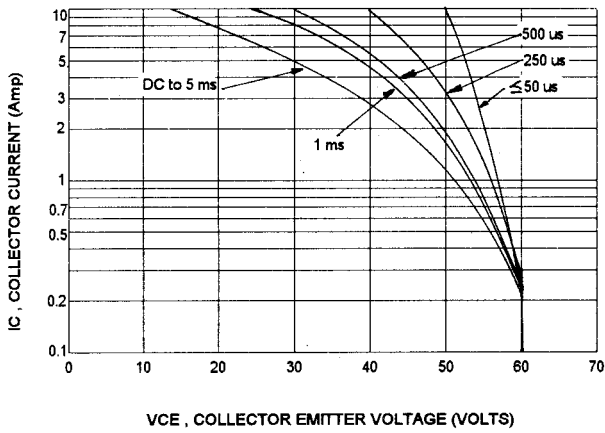
**DYNAMIC CHARACTERISTICS**

Current-Gain Bandwidth Product ( $I_C = 500\text{ mA}$ , $V_{CE} = 10\text{ V}$ , $f = 1\text{ MHz}$ )	$f_T$	4.0		MHz
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(1) Pulse Test: Pulse width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ (2)  $f_T = |h_{fe}| \cdot f_{test}$

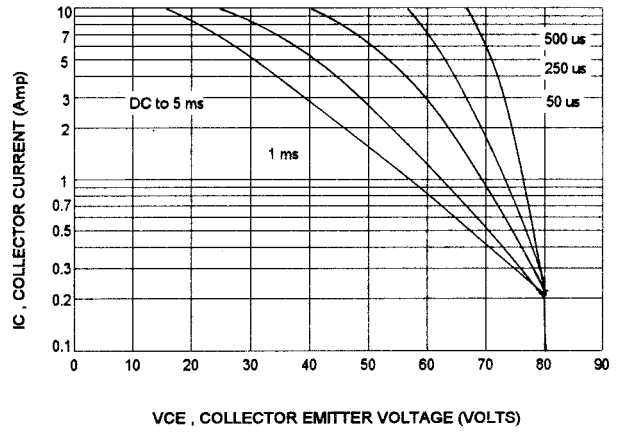
2N3713,2N3715

ACTIVE REGION SAFE OPERATING AREA

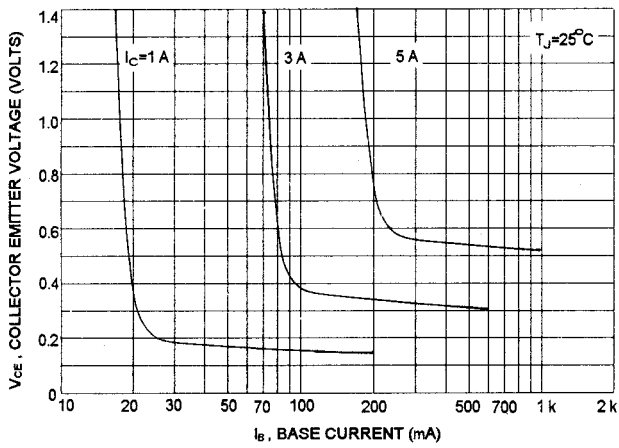


2N3714,2N3716

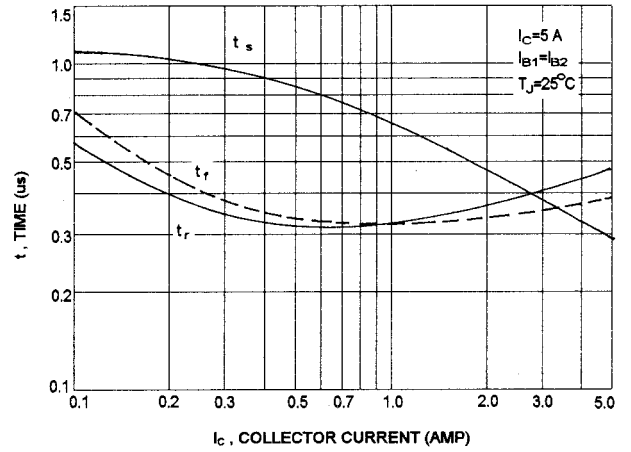
ACTIVE REGION SAFE OPERATING AREA



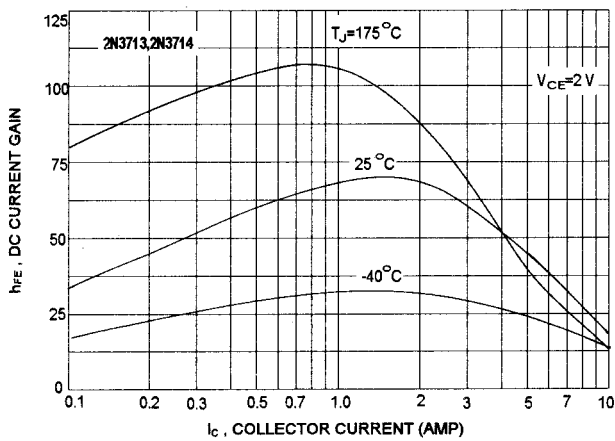
COLLECTOR SATURATION REGION



TYPICAL SWITCHING TIME



DC CURRENT GAIN



DC CURRENT GAIN

