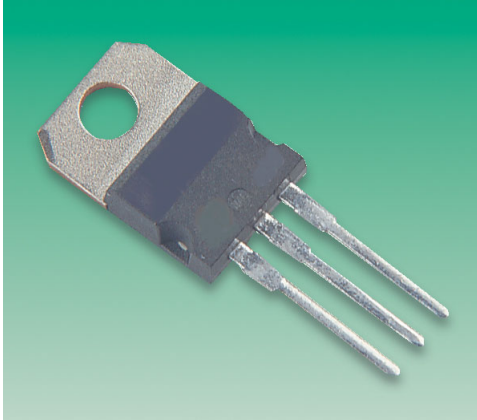


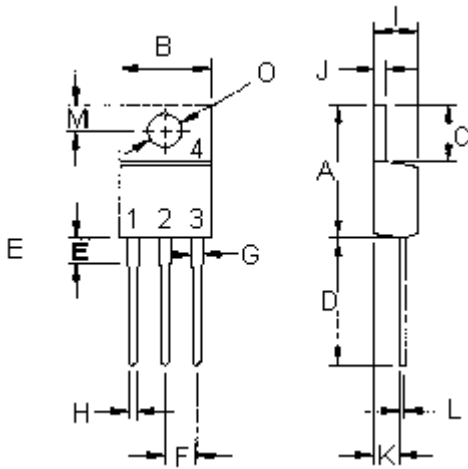
# 2N6109, 6290

## Complementary Power Transistors



### Features:

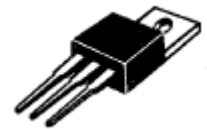
- Collector-Emitter sustaining voltage-  
 $V_{CEO(sus)} = 50V$  (Minimum) - 2N6109, 2N6290.
- DC current gain specified to 7.0 Amperes  
 $h_{FE} = 2.3$  (Minimum) at  $I_C = 7.0A$  - 2N6109, 2N6290.
- Complementary Silicon Plastic Power Transistors.



Dimensions	Minimum	Maximum
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

Dimensions : Millimetres

PNP 2N6109	NPN 2N6290
7 Ampere Complementary Silicon Power Transistors 50 Volts 40 Watts	



**TO-220**

- Pin 1. Base  
 2. Collector  
 3. Emitter  
 4. Collector (Case).



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## Complementary Power Transistors



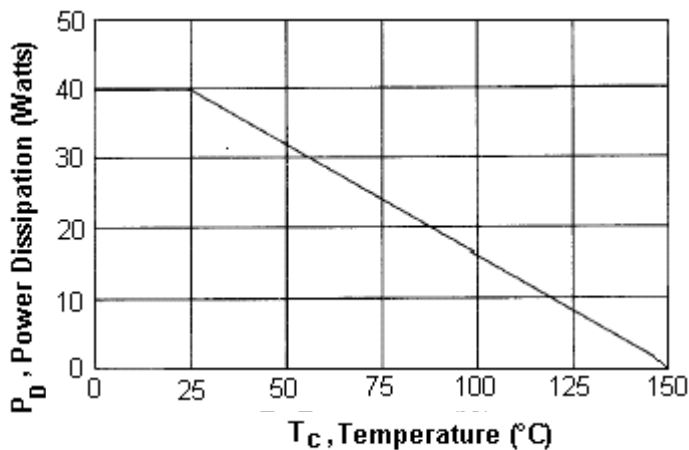
### Maximum Ratings

Parameter	Symbol	2N6109 2N6290	Unit
Collector-Emitter Voltage	$V_{CEO}$	50	V
Collector-Base Voltage	$V_{CBO}$	60	
Emitter-Base Voltage	$V_{EBO}$	5.0	
Collector Current-Continuous -Peak	$I_C$	7.0 10	A
Base Current	$I_B$	3.0	
Total Power Dissipation at $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	40 0.32	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-65 to +150	$^\circ\text{C}$

### Thermal Characteristic

Characteristic	Symbol	Maximum	Unit
Thermal Resistance Junction to Case	$R_{\theta jc}$	3.125	$^\circ\text{C}/\text{W}$

Figure 1 - Power Derating



# 2N6109, 6290

## Complementary Power Transistors



### Electrical Characteristics ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Minimum	Maximum	Unit
<b>Off Characteristics</b>				
Collector-Emitter Sustaining Voltage (1) ( $I_C = 100\text{mA}$ , $I_B = 0$ )	$V_{CEO(sus)}$	50	-	V
Collector Cut off Current ( $V_{CE} = 40\text{V}$ , $I_B = 0$ )	$I_{CEO}$	-	1.0	mA
Collector Cut off Current ( $V_{CE} = 60\text{V}$ , $V_{BE(off)} = 1.5\text{V}$ ) ( $V_{CE} = 50\text{V}$ , $V_{BE(off)} = 1.5\text{V}$ , $T_C = 125^\circ\text{C}$ )	$I_{CEX}$	-	0.1 2.0	
Emitter Cut off Current ( $V_{EB} = 5.0\text{V}$ , $I_C = 0$ )	$I_{EBO}$	-	1.0	

### On Characteristics (1)

DC Current Gain ( $I_C = 2.5\text{A}$ , $V_{CE} = 4.0\text{V}$ ) ( $I_C = 7.0\text{A}$ , $V_{CE} = 4.0\text{V}$ )	$h_{FE}$	30 2.3	150	-
Collector-Emitter Saturation Voltage ( $I_C = 7.0\text{A}$ , $I_B = 3.0\text{A}$ )	$V_{CE(sat)}$	-	3.5	V
Base-Emitter On Voltage ( $I_C = 7.0\text{A}$ , $V_{CE} = 4.0\text{V}$ )	$V_{BE(on)}$	-	3.0	

### Dynamic Characteristics

Current Gain-Bandwidth Product (2) ( $I_C = 0.5\text{A}$ , $V_{CE} = 4.0\text{V}$ , $f = 1.0\text{MHz}$ )	$f_T$	2.5 10	-	MHz
Small Signal Current Gain ( $I_C = 0.5\text{A}$ , $V_{CE} = 4.0\text{V}$ , $f = 50\text{kHz}$ )	$h_{fe}$	20	-	-

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

$$(2) f_T = |h_{fe}| \cdot f_{test}$$

# 2N6109, 6290

## Complementary Power Transistors



Figure 2 - Switching Time Test Circuit

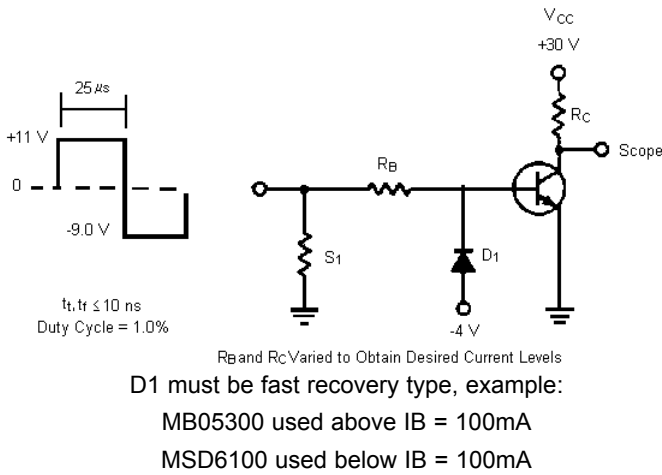


Figure 3 - Turn-Off Time

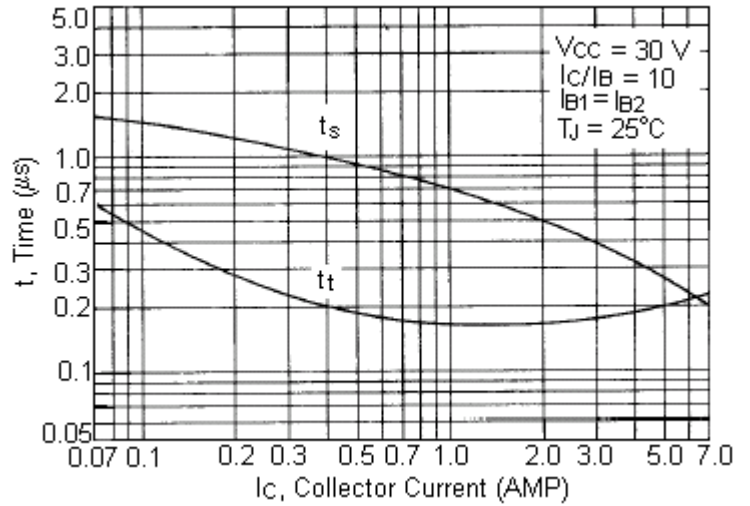


Figure 4 - DC Current Gain

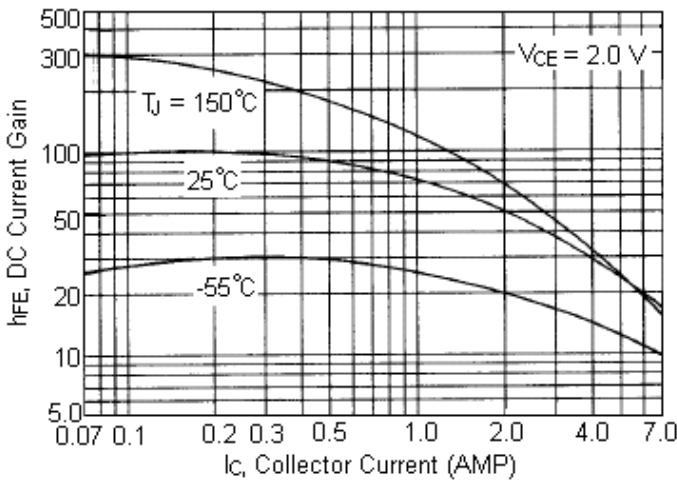


Figure 5 - Turn-On Time

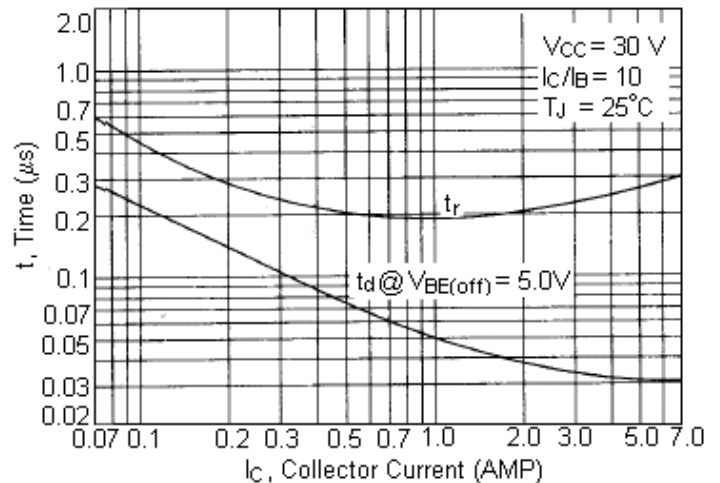
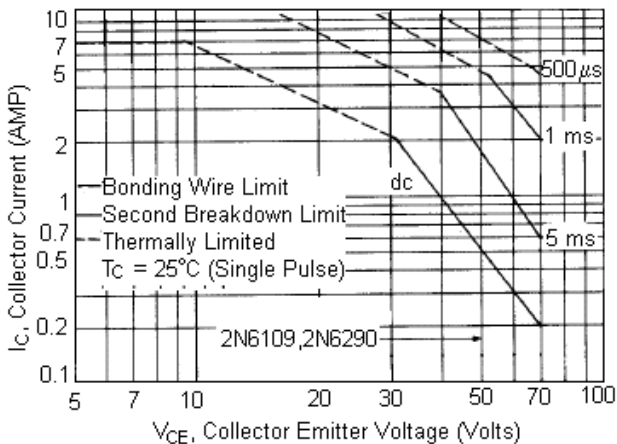


Figure - 6 Active Region Safe Operating Area



There are two limitations 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 the curves indicate.

The data of Figure - 6 curve is based on  $T_{J(PK)} = 150^\circ\text{C}$ ;  $T_C$  is variable depending on the power level. 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.



# 2N6109, 6290

## Complementary Power Transistors



Figure 7 - Collector Saturation Region

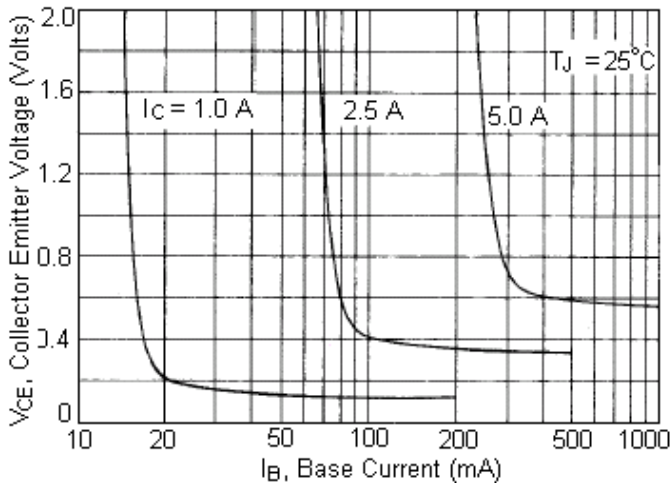


Figure 8 - Capacitances

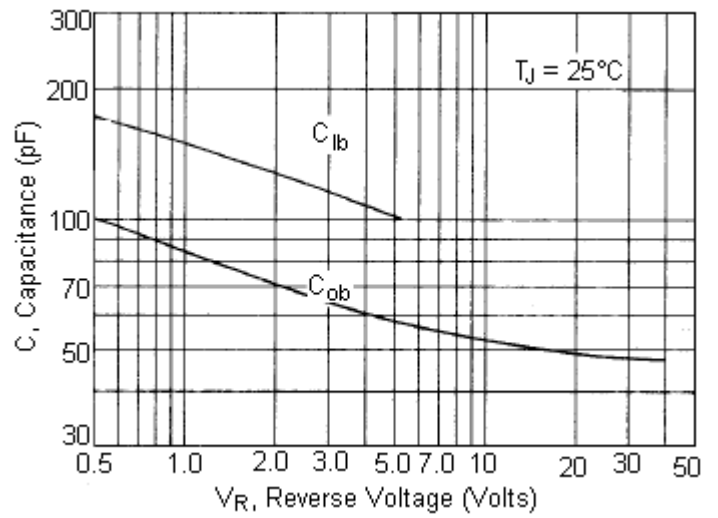


Figure 9 - "ON" Voltage

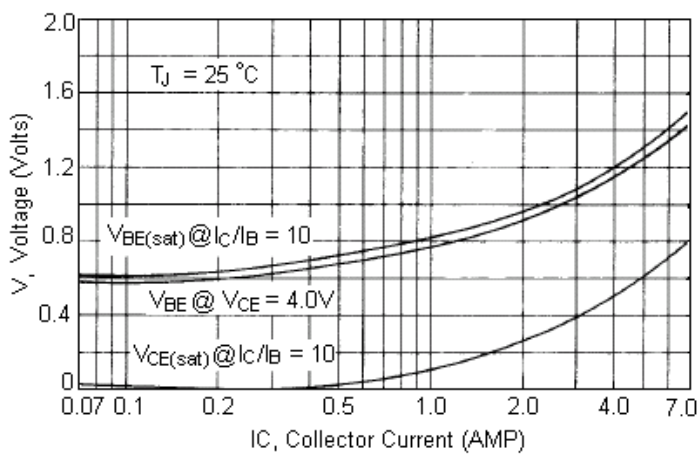
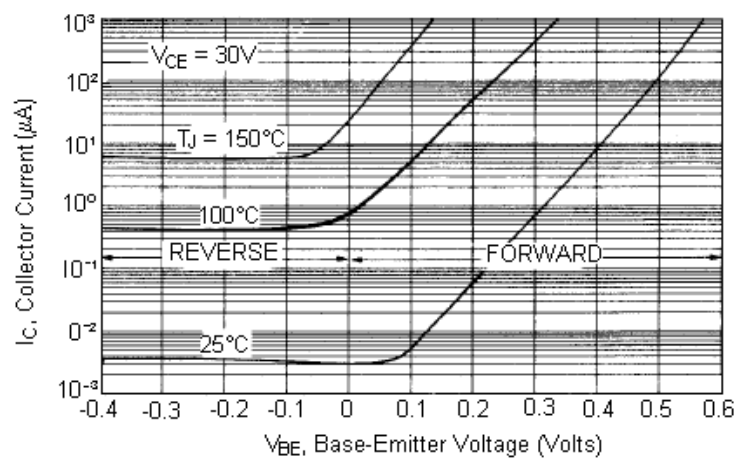


Figure 10 - Collector Cut-Off Region



### Specifications

$I_{C(av)}$ maximum (A)	$V_{CEO}$ maximum (V)	$h_{FE}$ minimum at $I_C = 2.5A$	$P_{tot}$ at 25°C (W)	Type	Part Number
7	50	30	40	PNP	2N6109
				NPN	2N6290



# 2N6109, 6290

## Complementary Power Transistors

### Notes:

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