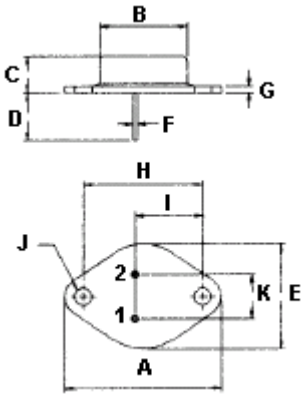
Darlington Power Transistors

Features:

- High Gain Darlington performance
- High DC Current Gain: h_{FE} = 1,000 (Minimum) at I_C = 25 A,
  h_{FE} = 400 (Minimum) at I_C = 50 A
- Monolithic construction with built-in Base-Emitter Shunt Resistor

Complementary Silicon Power Darlington Transistors are designed for use as output devices in complementary general purpose amplifier applications



Pin 1. Base
2. Emitter
Collector (Case)

Dimensions	Minimum	Maximum
A	38.75	39.96
B	19.28	22.23
C	7.96	9.28
D	11.18	12.19
E	25.2	26.67
F	0.92	1.09
G	1.38	1.62
H	29.9	30.4
I	16.64	17.3
J	3.88	4.36
K	10.67	11.18

Dimensions : Millimetres

NPN **PNP**
MJ11032 **MJ11033**

50 Amperes
Complementary
Silicon Power
Darlington Transistors
120 V
300 W

TO-3

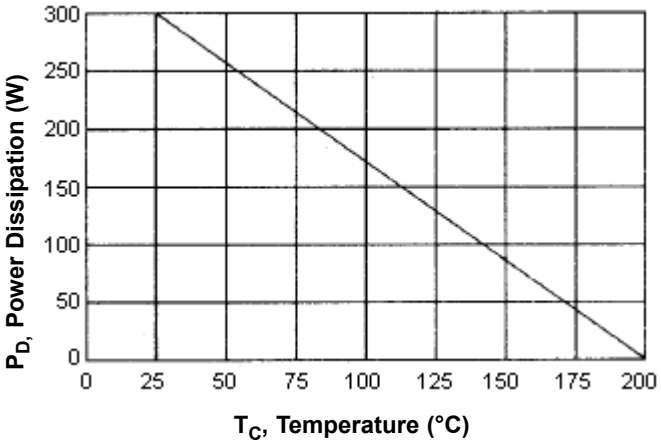
Maximum Ratings

Characteristic	Symbol	Rating	Unit
Collector - Emitter Voltage	V_{CEO}	120	V
Collector - Base Voltage	V_{CBO}		
Emitter - Base Voltage	V_{EBO}	5	
Collector Current - Continuous - Peak	I_C I_{CM}	50 100	A
Base Current	I_B	2	
Total Power Dissipation at T_C = 25 °C Derate above 25 °C	P_D	300 1.71	W W / °C
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-65 to +200	°C

Thermal Characteristics

Characteristic	Symbol	Maximum	Unit
Thermal Resistance Junction to Case	Rθjc	0.584	°C / W

Figure - 1 Power Derating



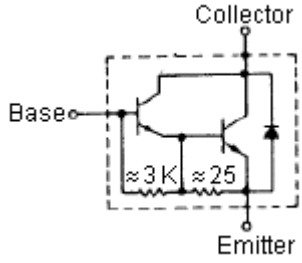
Electrical Characteristics (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Minimum	Maximum	Unit
OFF Characteristics				
Collector - Emitter Sustaining Voltage (1) (I_C = 100 mA, I_B = 0)	$V_{CEO\ (sus)}$	120	-	V
Collector Cut off Current (V_{CE} = 50 V, I_B = 0)	I_{CEO}	-	2	mA
Collector - Emitter Leakage Current (V_{CE} = 120 V, R_{BE} = 1 kΩ) (V_{CE} = 120 V, R_{BE} = 1 kΩ, T_C = 125 °C)	I_{CER}	-	2 10	
Emitter Cut off Current (V_{EB} = 5 V, I_C = 0)	I_{EBO}	-	5	
ON Characteristics (1)				
DC Current Gain (I_C = 25 A, V_{CE} = 5 V) (I_C = 50 A, V_{CE} = 5 V)	h_{FE}	1,000 400	18,000	-
Collector - Emitter Saturation Voltage (I_C = 25 A, I_B = 250 mA) (I_C = 50 A, I_B = 500 mA)	$V_{CE\ (sat)}$	-	2.5 3.5	V
Base - Emitter Saturation Voltage (I_C = 25 A, I_B = 200 mA) (I_C = 50 A, I_B = 300 mA)	$V_{BE\ (sat)}$	-	3 4.5	
Dynamic Characterisitics				
Small - Signal Current Gain (I_C = 10 A, V_{CE} = 3 V, f = 1 MHz)	$\|h_{fe}\|$	4	-	-

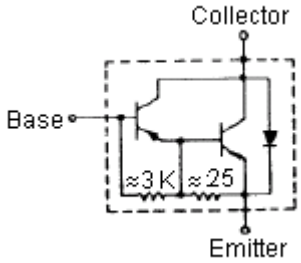
(1) Pulse Test: Pulse Width = 300 μs, Duty Cycle ≤2%
(2) $f_T = |h_{fe}| \bullet f_{test}$

Internal Schematic Diagram

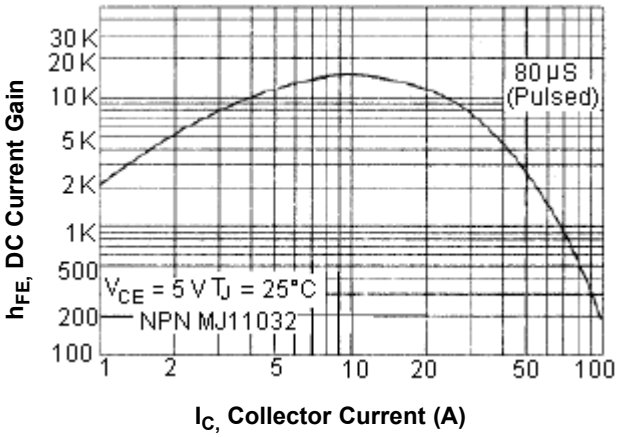
NPN
MJ11032



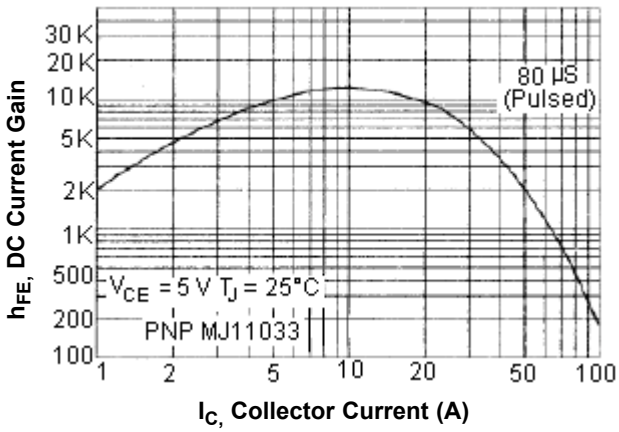
PNP
MJ11033



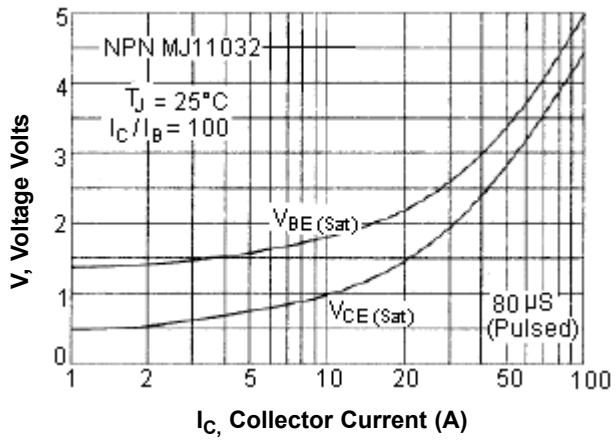
DC Current Gain



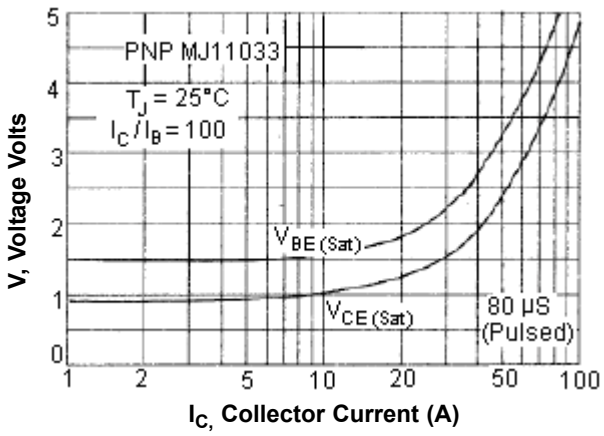
DC Current Gain



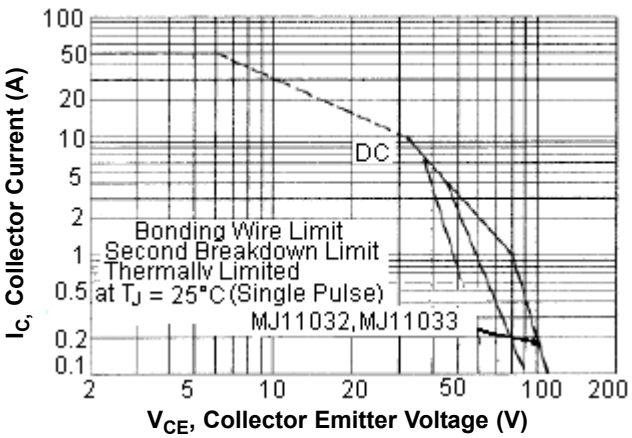
"ON" Voltages



"ON" Voltages



Active-Region Safe Operating Area (SOA)



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 SOA curve is based on $T_{J(PK)}$ = 200°C; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(PK)}$ ≤200°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

Specification Table

$I_{C\ (av)}$ maximum (A)	V_{CEO} maximum (V)	h_{FE} minimum at I_C = 25 A	P_{tot} at 25°C (W)	Package	Type	Part Number
50	120	1,000	300	TO-3	NPN	MJ11032
					PNP	MJ11033