MJ11028, MJ11030, MJ11032 (NPN) MJ11029, MJ11033 (PNP)

High-Current Complementary Silicon Power Transistors

High−Current Complementary Silicon Power Transistors are for use as output devices in complementary general purpose amplifier applications.

Features

- High DC Current Gain − h_{FE} = 1000 (Min) @ I_C = 25 Adc
  h_{FE} = 400 (Min) @ I_C = 50 Adc
- Curves to 100 A (Pulsed)
- Diode Protection to Rated I_C
- Monolithic Construction with Built−In Base−Emitter Shunt Resistor
- Junction Temperature to +200°C
- Pb−Free Packages are Available*

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating		Symbol	Value	Unit
Collector−Emitter Voltage	MJ11028/29 MJ11030 MJ11032/33	V_{CEO}	60 90 120	Vdc
Collector−Base Voltage	MJ11028/29 MJ11030 MJ11032/33	V_{CBO}	60 90 120	Vdc
Emitter−Base Voltage		V_{EBO}	5.0	Vdc
Collector Current − Continuous − Peak (Note 1)		I_C	50 100	Adc
Base Current − Continuous		I_B	2.0	Adc
Total Power Dissipation @ T_C = 25°C Derate Above 25°C @ T_C = 100°C		P_D	300 1.71	W W/°C
Operating and Storage Junction Temperature Range		T_J, T_{stg}	−55 to +200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Maximum Lead Temperature for Soldering Purposes for ≤ 10 seconds	T_L	275	°C
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	0.58	°C/W

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. Pulse Test: Pulse Width = 5 μs, Duty Cycle ≤ 10%.

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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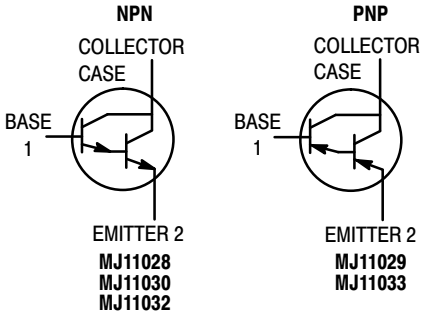
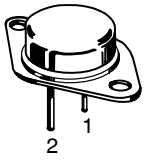
50 AMPERE COMPLEMENTARY DARLINGTON POWER TRANSISTORS 60 – 120 VOLTS 300 WATTS





TO−204 (TO−3)
CASE 197A
STYLE 1

MARKING DIAGRAM

MJ110xx = Device Code
xx = 28, 29, 30, 32, 33
G = Pb−Free Package
A = Location Code
YY = Year
WW = Work Week
MEX = Country of Origin

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 3 of this data sheet.

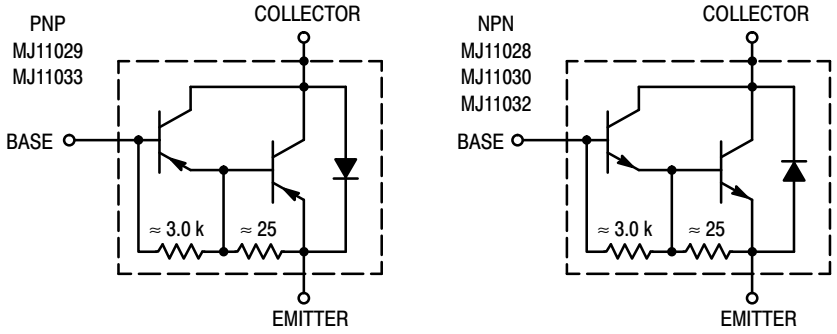


Figure 1. Darlington Circuit Schematic

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector−Emitter Breakdown Voltage (Note 1) (I_C = 1 00 mAdc, I_B = 0)	MJ11028, MJ11029 MJ11030 MJ11032, MJ11033	$V_{(BR)CEO}$	60 90 120	– – –	Vdc
Collector−Emitter Leakage Current		I_{CER}			mAdc
(V_{CE} = 60 Vdc, R_{BE} = 1 kΩ)	MJ11028, MJ11029		–	2	
(V_{CE} = 90 Vdc, R_{BE} = 1 kΩ)	MJ11030		–	2	
(V_{CE} = 120 Vdc, R_{BE} = 1 kΩ)	MJ11032, MJ11033		–	2	
(V_{CE} = 60 Vdc, R_{BE} = 1 kΩ, T_C = 150°C)	MJ11028, MJ11029		–	10	
(V_{CE} = 120 Vdc, R_{BE} = 1 kΩ, T_C = 150°C)	MJ11032, MJ11033		–	10	
Emitter Cutoff Current (V_{BE} = 5 Vdc, I_C = 0)		I_{EBO}	–	5	mAdc
Collector−Emitter Leakage Current (V_{CE} = 50 Vdc, I_B = 0)		I_{CEO}	–	2	mAdc
ON CHARACTERISTICS (Note 1)					
DC Current Gain		h_{FE}			–
(I_C = 25 Adc, V_{CE} = 5 Vdc)			1 k	18 k	
(I_C = 50 Adc, V_{CE} = 5 Vdc)			400	–	
Collector−Emitter Saturation Voltage		$V_{CE(sat)}$			Vdc
(I_C = 25 Adc, I_B = 250 mAdc)			–	2.5	
(I_C = 50 Adc, I_B = 500 mAdc)			–	3.5	
Base−Emitter Saturation Voltage		$V_{BE(sat)}$			Vdc
(I_C = 25 Adc, I_B = 200 mAdc)			–	3.0	
(I_C = 50 Adc, I_B = 300 mAdc)			–	4.5	

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

ORDERING INFORMATION

Device	Package	Shipping
MJ11028	TO−204	100 Units / Tray
MJ11028G	TO−204 (Pb−Free)	
MJ11029	TO−204	
MJ11029G	TO−204 (Pb−Free)	
MJ11030	TO−204	
MJ11030G	TO−204 (Pb−Free)	
MJ11032	TO−204	
MJ11032G	TO−204 (Pb−Free)	
MJ11033	TO−204	
MJ11033G	TO−204 (Pb−Free)	

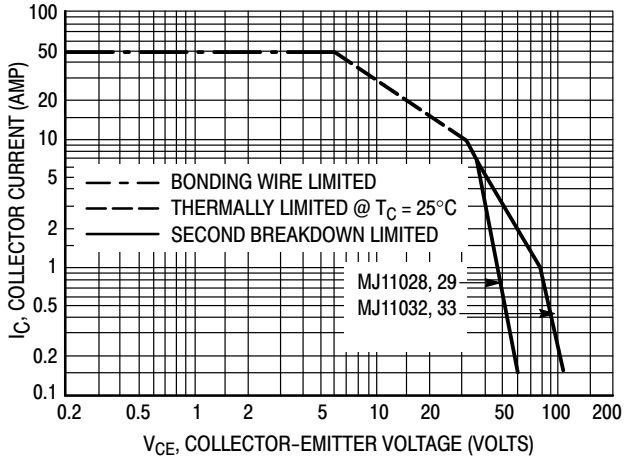


Figure 2. DC Safe Operating Area

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 2 is based on $T_{J(pk)}$ = 200°C; T_C is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

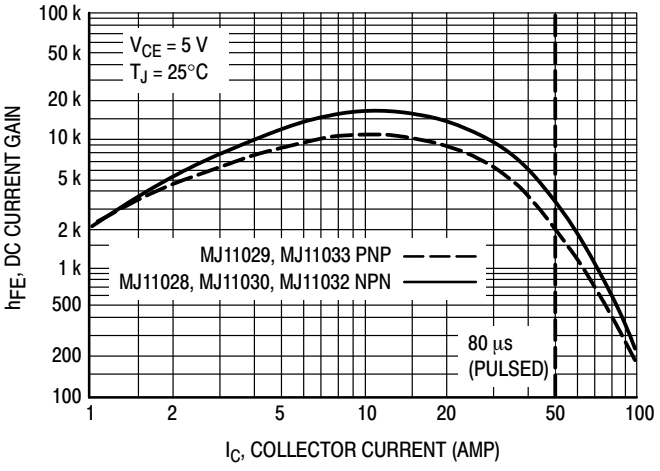


Figure 3. DC Current Gain

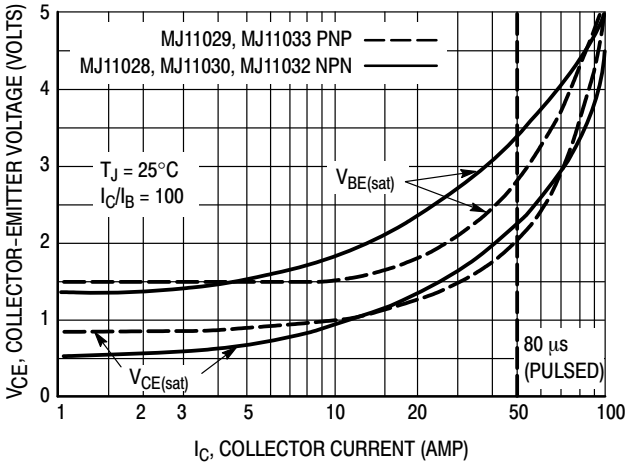
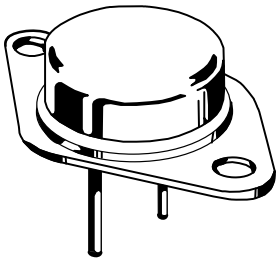


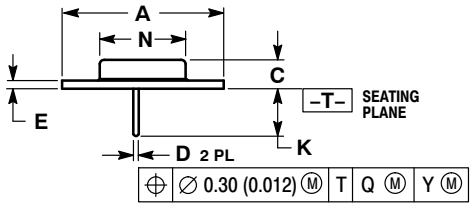
Figure 4. “On” Voltage

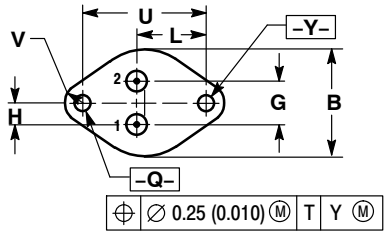


SCALE 1:1

TO−204 (TO−3)
CASE 197A−05
ISSUE K

DATE 21 FEB 2000





NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	1.530 REF		38.86 REF	
B	0.990	1.050	25.15	26.67
C	0.250	0.335	6.35	8.51
D	0.057	0.063	1.45	1.60
E	0.060	0.070	1.53	1.77
G	0.430 BSC		10.92 BSC	
H	0.215 BSC		5.46 BSC	
K	0.440	0.480	11.18	12.19
L	0.665 BSC		16.89 BSC	
N	0.760	0.830	19.31	21.08
Q	0.151	0.165	3.84	4.19
U	1.187 BSC		30.15 BSC	
V	0.131	0.188	3.33	4.77

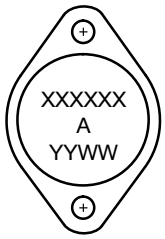
STYLE 1:
PIN 1. BASE
2. EMITTER
CASE: COLLECTOR

STYLE 2:
PIN 1. EMITTER
2. BASE
CASE: COLLECTOR

STYLE 3:
PIN 1. GATE
2. SOURCE
CASE: DRAIN

STYLE 4:
PIN 1. ANODE = 1
2. ANODE = 2
CASE: CATHODES

GENERIC MARKING DIAGRAM*



XXXXX = Specific Device Code
A = Assembly Locationa
YY = Year
WW = Work Week

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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DESCRIPTION:	**TO−204 (TO−3)**	**PAGE 1 OF 1**

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