High-Current Complementary Silicon Transistors

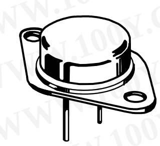
PNP
MJ11015
NPN
MJ11012
MJ11016*

*ON Semiconductor Preferred Device

. . . for use as output devices in complementary general purpose amplifier applications.

- High DC Current Gain — h_{FE} = 1000 (Min) @ I_C – 20 Adc
- Monolithic Construction with Built–in Base Emitter Shunt Resistor
- Junction Temperature to +200°C

30 AMPERE DARLINGTON POWER TRANSISTORS COMPLEMENTARY SILICON 60–120 VOLTS 200 WATTS



CASE 1–07
TO–204AA
(TO–3)

MAXIMUM RATINGS

Rating	Symbol	MJ11012	MJ11015 MJ11016	Unit
Collector–Emitter Voltage	V_{CEO}	60	120	Vdc
Collector–Base Voltage	V_{CB}	60	120	Vdc
Emitter–Base Voltage	V_{EB}	5		Vdc
Collector Current	I_C	30		Adc
Base Current	I_B	1		Adc
Total Device Dissipation @T_C = 25°C Derate above 25°C @ T_C = 100°C	P_D	200 1.15		Watts W/°C
Operating Storage Junction Temperature Range	T_J, T_{stg}	–55 to +200		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.87	°C/W
Maximum Lead Temperature for Soldering Purposes for ≤ 10 Seconds.	T_L	275	°C

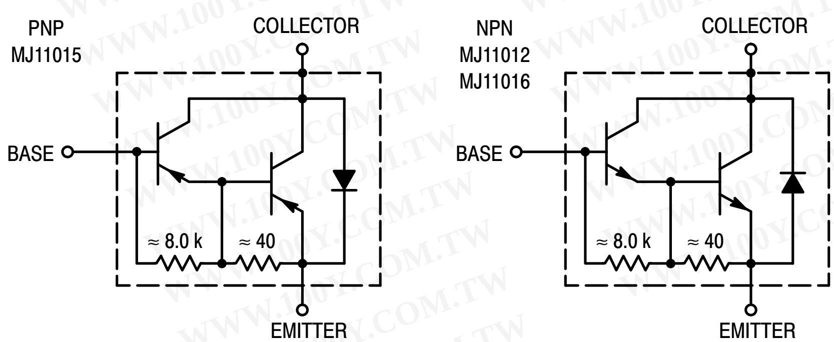


Figure 1. Darlington Circuit Schematic

Preferred devices are ON Semiconductor recommended choices for future use and best overall value.

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

Characteristics		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage(1) (I_C = 100 mAdc, I_B = 0)	 MJ11012 MJ11015, MJ11016	$V_{(BR)CEO}$	 60 120	 — —	Vdc
Collector–Emitter Leakage Current (V_{CE} = 60 Vdc, R_{BE} = 1k ohm) (V_{CE} = 120 Vdc, R_{BE} = 1k ohm) (V_{CE} = 60 Vdc, R_{BE} = 1k ohm, T_C = 150°C) (V_{CE} = 120 Vdc, R_{BE} = 1k ohm, T_C = 150°C)	 MJ11012 MJ11015, MJ11016 MJ11012 MJ11015, MJ11016	I_{CER}	 — — — —	 1 1 5 5	mAdc
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}	—	1	mAdc
ON CHARACTERISTICS(1)					
DC Current Gain (I_C = 20 Adc,V_{CE} = 5 Vdc) (I_C = 30 Adc, V_{CE} = 5 Vdc)		h_{FE}	 1000 200	 — —	—
Collector–Emitter Saturation Voltage (I_C = 20 Adc, I_B = 200 mAdc) (I_C = 30 Adc, I_B = 300 mAdc)		$V_{CE(sat)}$	 — —	 3 4	Vdc
Base–Emitter Saturation Voltage (I_C = 20 A, I_B = 200 mAdc) (I_C = 30 A, I_B = 300 mAdc)		$V_{BE(sat)}$	 — —	 3.5 5	Vdc
DYNAMIC CHARACTERISTICS					
Current–Gain Bandwidth Product (I_C = 10 A, V_{CE} = 3 Vdc, f = 1 MHz)		h_{fe}	4	—	MHz

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

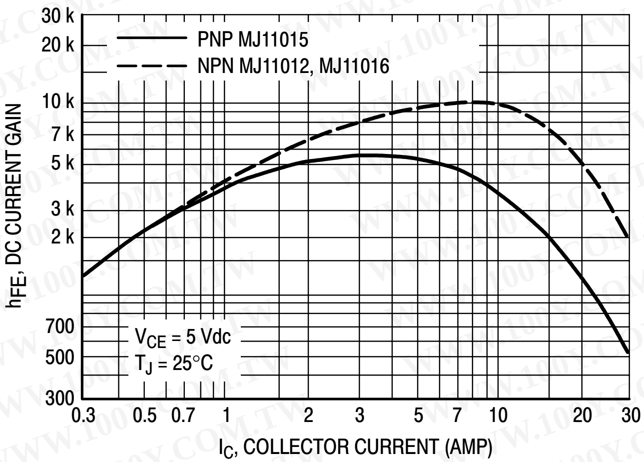


Figure 2. DC Current Gain (1)

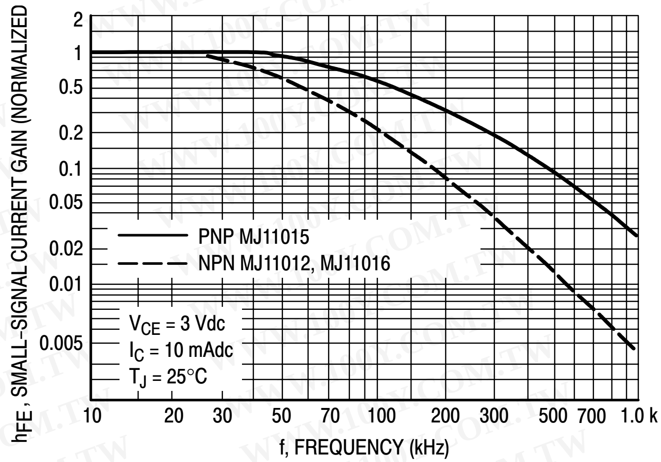


Figure 3. Small–Signal Current Gain

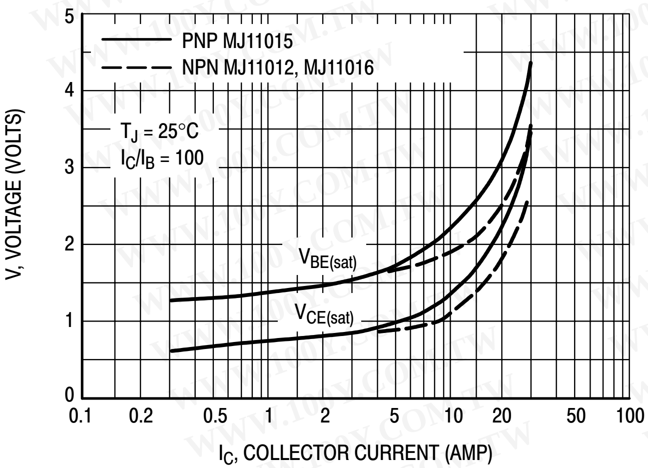


Figure 4. “On” Voltages (1)

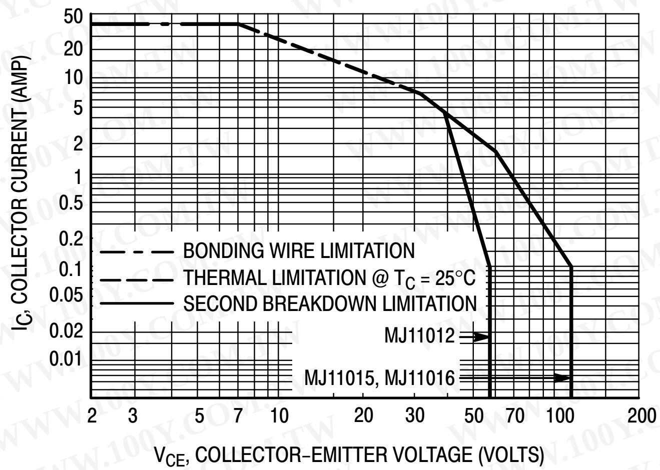


Figure 5. Active Region DC Safe Operating Area

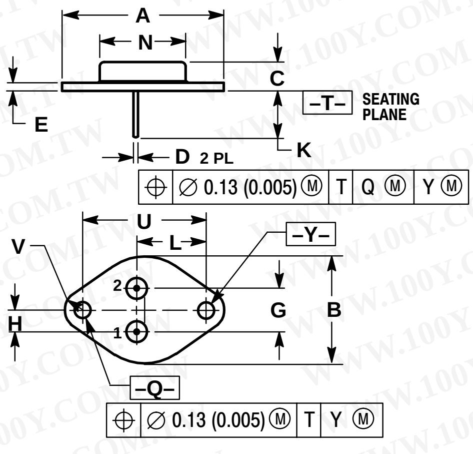
There are two limitations on the power handling ability of a transistor average junction temperature and secondary breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operations e.g., the transistor must not be subjected to greater dissipation than the curves indicate.

At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by secondary breakdown.

MJ11015 MJ11012 MJ11016

PACKAGE DIMENSIONS

CASE 1–07
TO–204AA (TO–3)
ISSUE Z



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. ALL RULES AND NOTES ASSOCIATED WITH REFERENCED TO–204AA OUTLINE SHALL APPLY.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	1.550 REF		39.37 REF	
B	---	1.050	---	26.67
C	0.250	0.335	6.35	8.51
D	0.038	0.043	0.97	1.09
E	0.055	0.070	1.40	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	---	0.830	---	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