MJ11015 (PNP); MJ11012, MJ11016 (NPN)

MJ11016 is a Preferred Device

High-Current Complementary Silicon Transistors

. . . 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

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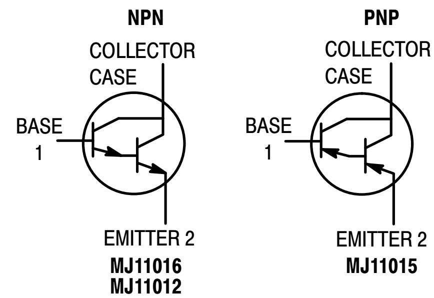
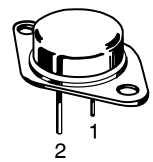
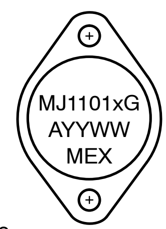
30 AMPERE DARLINGTON POWER TRANSISTORS COMPLEMENTARY SILICON 60 − 120 VOLTS, 200 WATTS





TO−204AA (TO−3)
CASE 1−07
STYLE 1

MARKING DIAGRAM



MJ1101x	=	Device Code x = 2, 5 or 6
G	=	Pb−Free Package
A	=	Location Code
YY	=	Year
WW	=	Work Week
MEX	=	Country of Orgin

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector−Emitter Voltage MJ11012 MJ11015/6	V_{CEO}	 60 120	Vdc
Collector−Base Voltage MJ11012 MJ11015/6	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	W 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

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

ORDERING INFORMATION

Device	Package	Shipping
MJ11012	TO−3	100 Units/Tray
MJ11012G	TO−3 (Pb−Free)	100 Units/Tray
MJ11015	TO−3	100 Units/Tray
MJ11015G	TO−3 (Pb−Free)	100 Units/Tray
MJ11016	TO−3	100 Units/Tray
MJ11016G	TO−3 (Pb−Free)	100 Units/Tray

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

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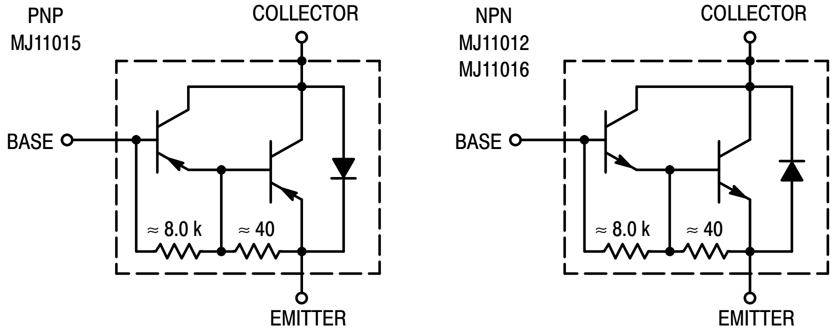


Figure 1. Darlington Circuit Schematic

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

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

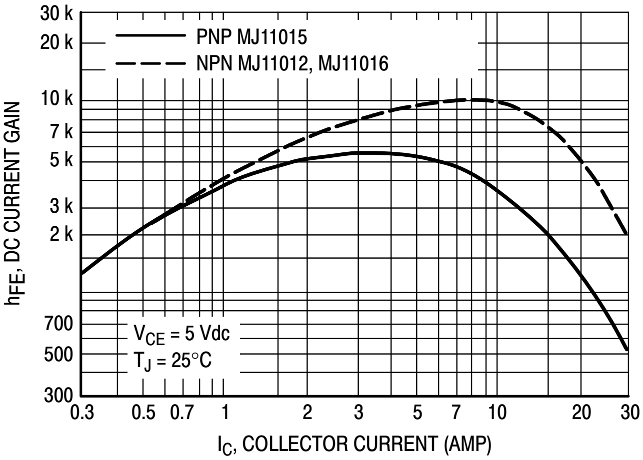


Figure 2. DC Current Gain (1)

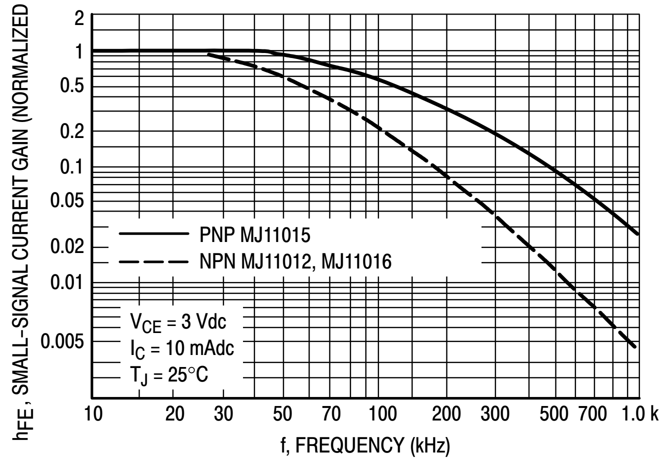


Figure 3. Small−Signal Current Gain

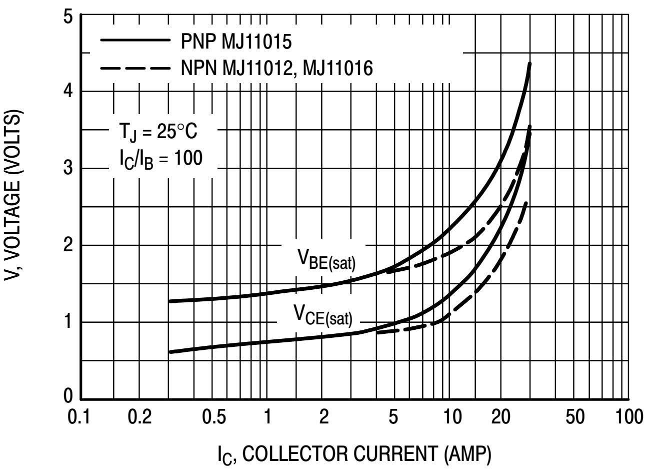


Figure 4. “On” Voltages (1)

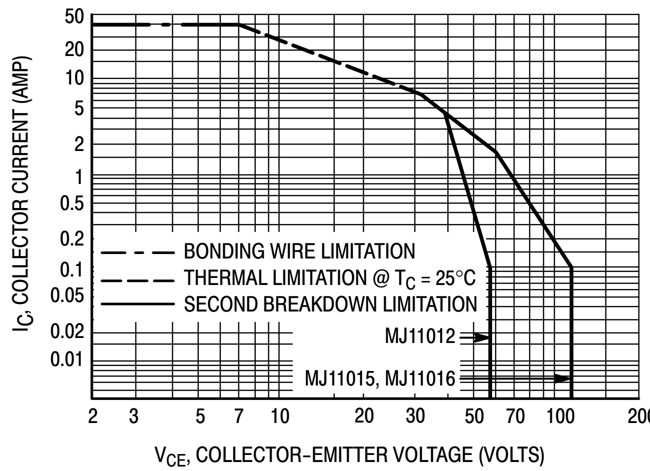
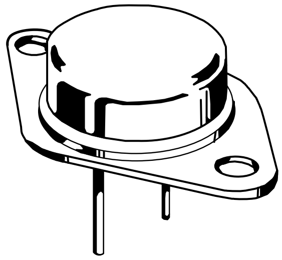


Figure 5. Active Region DC Safe Operating Area

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.

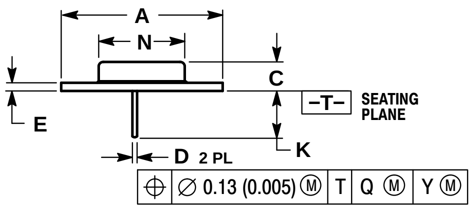
At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by secondary breakdown.

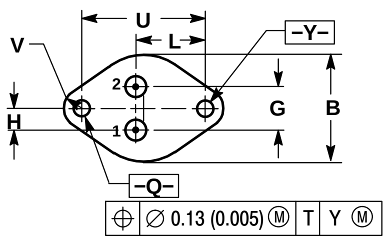


TO−204 (TO−3)
CASE 1−07
ISSUE Z

DATE 05/18/1988

SCALE 1:1





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

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

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

STYLE 4:
PIN 1. GROUND
2. INPUT
CASE: OUTPUT

STYLE 5:
PIN 1. CATHODE
2. EXTERNAL TRIP/DELAY
CASE: ANODE

STYLE 6:
PIN 1. GATE
2. EMITTER
CASE: COLLECTOR

STYLE 7:
PIN 1. ANODE
2. OPEN
CASE: CATHODE

STYLE 8:
PIN 1. CATHODE #1
2. CATHODE #2
CASE: ANODE

STYLE 9:
PIN 1. ANODE #1
2. ANODE #2
CASE: CATHODE

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