Darlington Complementary Silicon Power Transistors

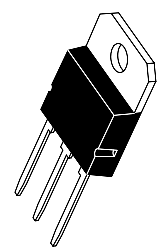
NPN
MJH6284
PNP
MJH6287

ON Semiconductor Preferred Devices

. . . designed for general–purpose amplifier and low–speed switching motor control applications.

- Similar to the Popular NPN 2N6284 and the PNP 2N6287
- Rugged RBSOA Characteristics
- Monolithic Construction with Built–in Collector–Emitter Diode

DARLINGTON
20 AMPERE
COMPLEMENTARY SILICON
POWER TRANSISTORS
100 VOLTS
160 WATTS



CASE 340D–02

MAXIMUM RATINGS

Rating	Symbol	Max	Unit
Collector–Emitter Voltage	V_{CEO}	100	Vdc
Collector–Base Voltage	V_{CB}	100	Vdc
Emitter–Base Voltage	V_{EB}	5.0	Vdc
Collector Current — Continuous Peak	I_C	20 40	Adc
Base Current	I_B	0.5	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	 160 1.28	Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.78	°C/W

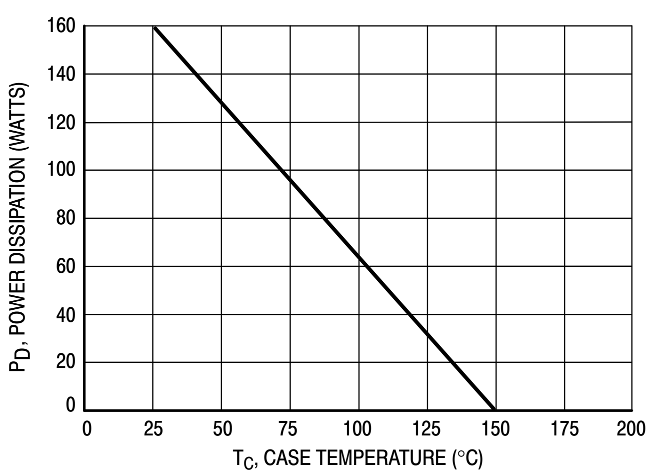


Figure 1. Power Derating

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

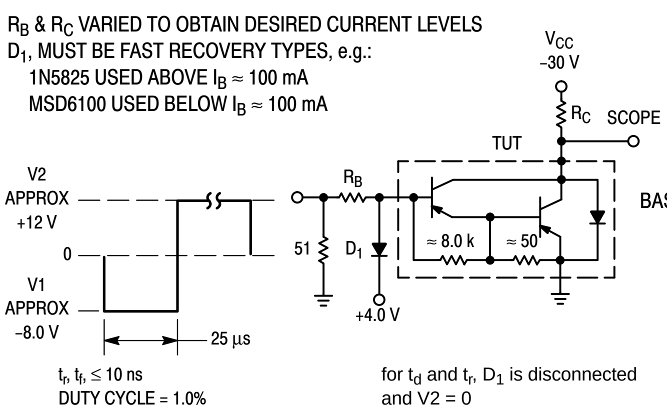
ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Sustaining Voltage (I_C = 0.1 Adc, I_B = 0)	$V_{CEO(sus)}$	100	—	Vdc
Collector Cutoff Current (V_{CE} = 50 Vdc, I_B = 0)	I_{CEO}	—	1.0	mAdc
Collector Cutoff Current (V_{CE} = Rated V_{CB}, $V_{BE(off)}$ = 1.5 Vdc) (V_{CE} = Rated V_{CB}, $V_{BE(off)}$ = 1.5 Vdc, T_C = 150°C)	I_{CEX}	— —	0.5 5.0	mAdc
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)	I_{EBO}	—	2.0	mAdc
ON CHARACTERISTICS (1)				
DC Current Gain (I_C = 10 Adc, V_{CE} = 3.0 Vdc) (I_C = 20 Adc, V_{CE} = 3.0 Vdc)	h_{FE}	750 100	18,000 —	—
Collector–Emitter Saturation Voltage (I_C = 10 Adc, I_B = 40 mAdc) (I_C = 20 Adc, I_B = 200 mAdc)	$V_{CE(sat)}$	— —	2.0 3.0	Vdc
Base–Emitter On Voltage (I_C = 10 Adc, V_{CE} = 3.0 Vdc)	$V_{BE(on)}$	—	2.8	Vdc
Base–Emitter Saturation Voltage (I_C = 20 Adc, I_B = 200 mAdc)	$V_{BE(sat)}$	—	4.0	Vdc
DYNAMIC CHARACTERISTICS				
Current–Gain Bandwidth Product (I_C = 10 Adc, V_{CE} = 3.0 Vdc, f = 1.0 MHz)	f_T	4.0	—	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 0.1 MHz) MJH6284 MJH6287	C_{ob}	— —	400 600	pF
Small–Signal Current Gain (I_C = 10 Adc, V_{CE} = 3.0 Vdc, f = 1.0 kHz)	h_{fe}	300	—	—

SWITCHING CHARACTERISTICS

Resistive Load		Symbol	Typical NPN	Typical PNP	Unit
Delay Time	V_{CC} = 30 Vdc, I_C = 10 Adc I_{B1} = I_{B2} = 100 mA Duty Cycle = 1.0%	t_d	0.1	0.1	μs
Rise Time		t_r	0.3	0.3	
Storage Time		t_s	1.0	1.0	
Fall Time		t_f	3.5	2.0	

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



For NPN test circuit reverse diode and voltage polarities.

Figure 2. Switching Times Test Circuit

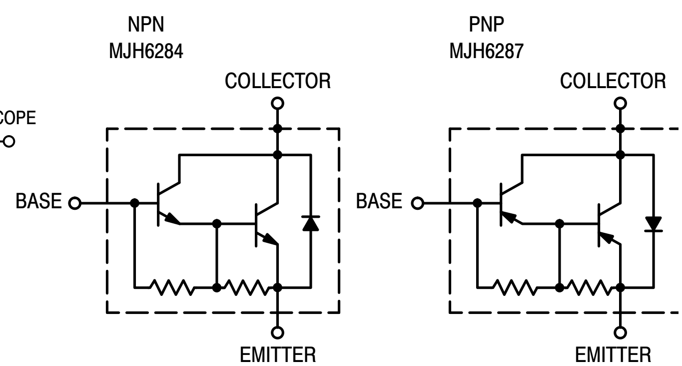


Figure 3. Darlington Schematic

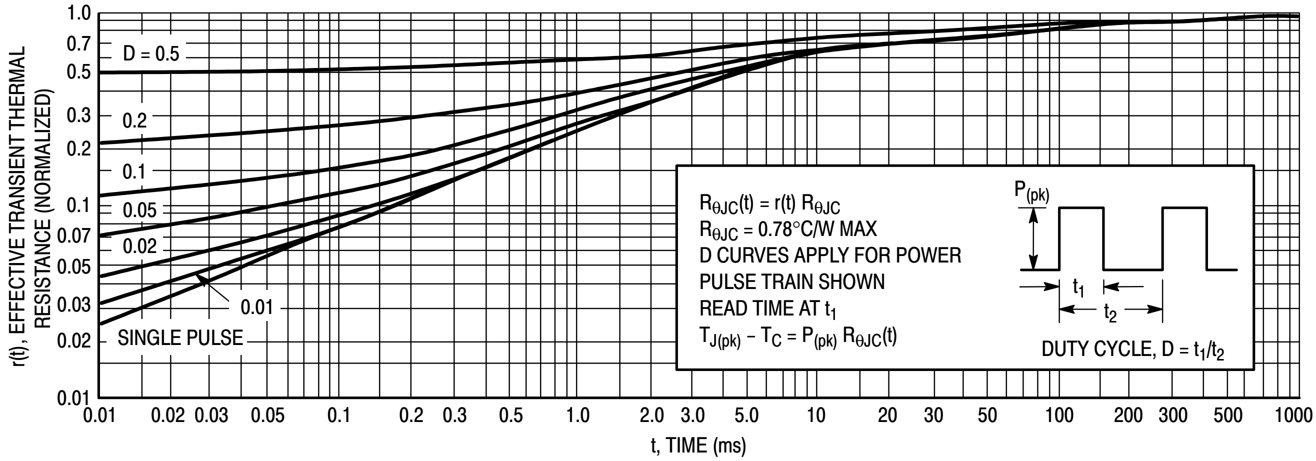


Figure 4. Thermal Response

FBSOA, FORWARD BIAS SAFE OPERATING AREA

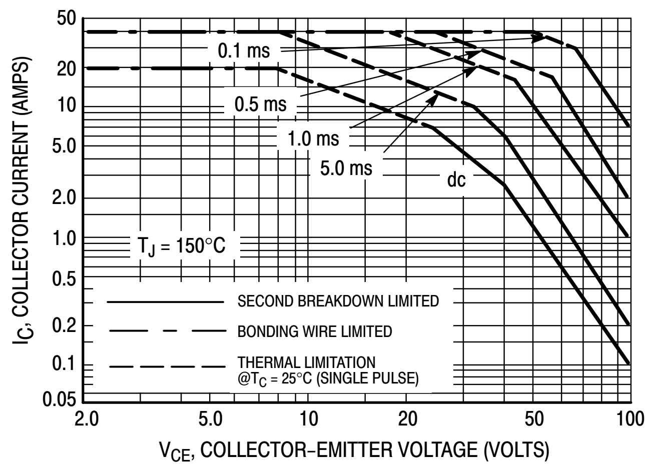


Figure 5. MJH6284, MJH6287

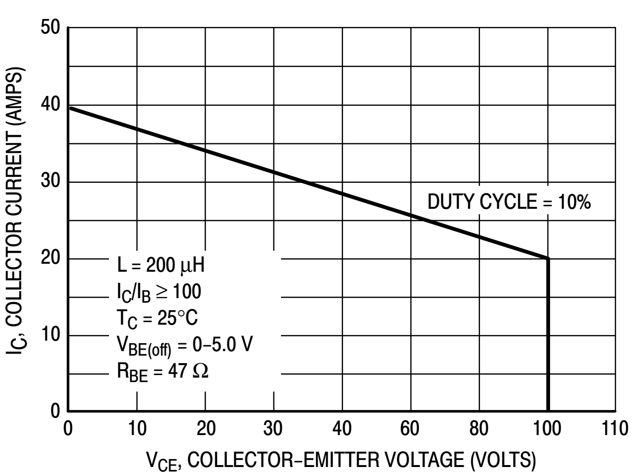


Figure 6. Maximum RBSOA, Reverse Bias Safe Operating Area

FORWARD BIAS

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 5 is based on $T_{J(pk)} = 150°C$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150°C$. $T_{J(pk)}$ may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

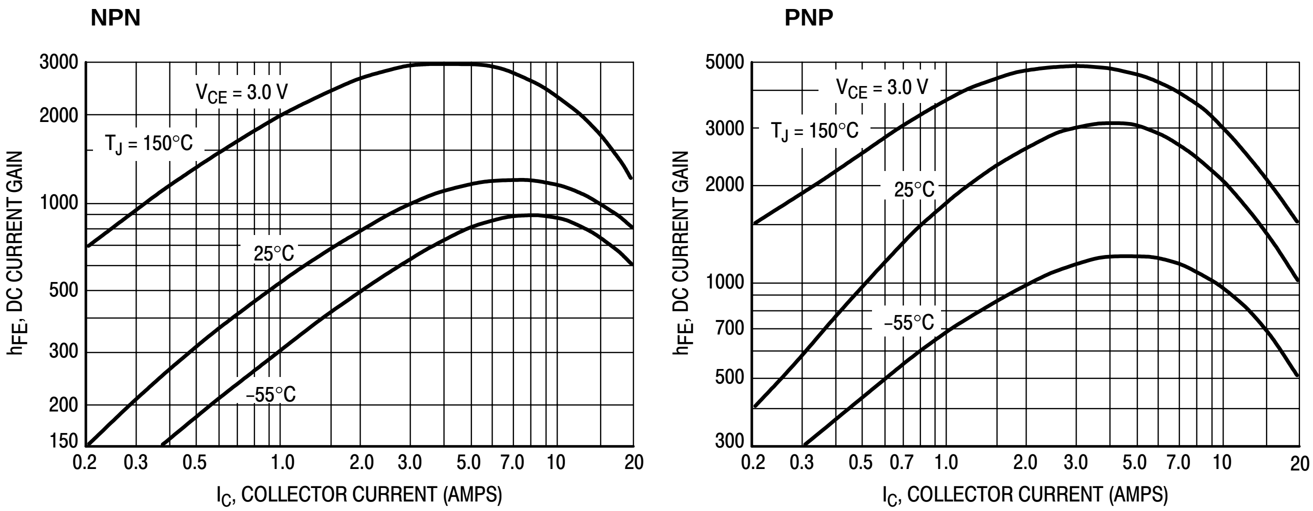


Figure 7. DC Current Gain

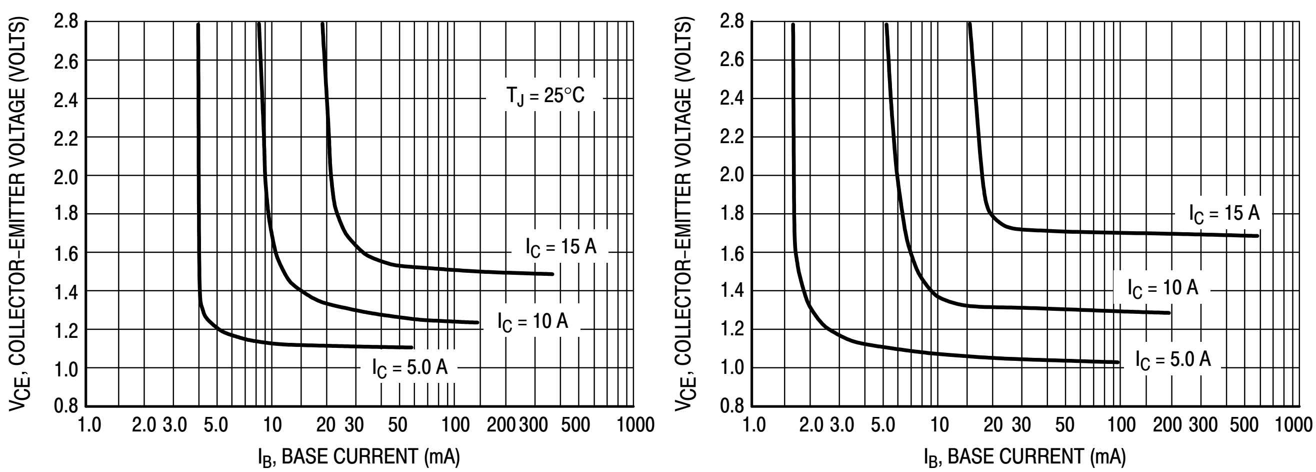


Figure 8. Collector Saturation Region

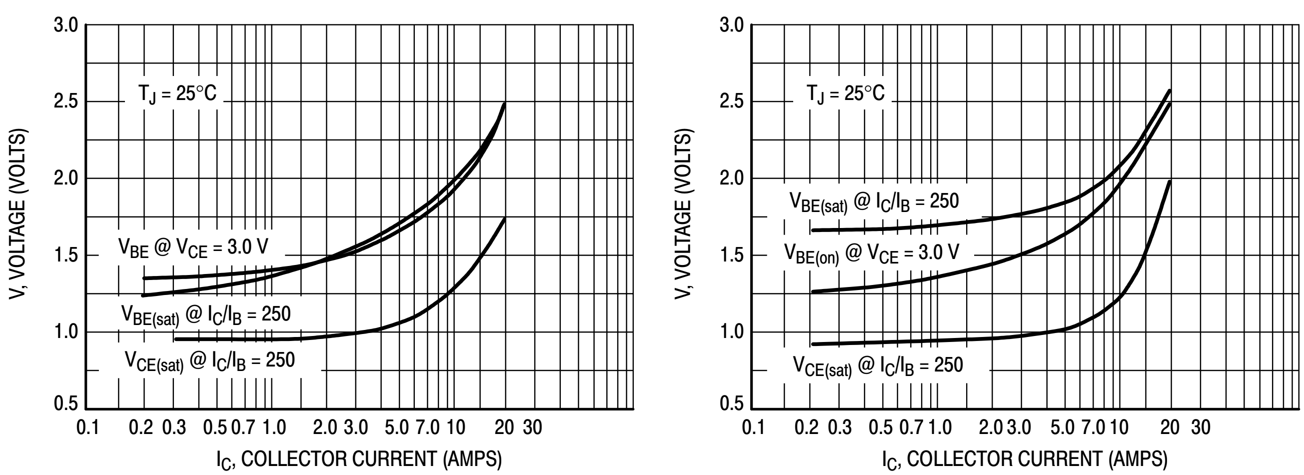
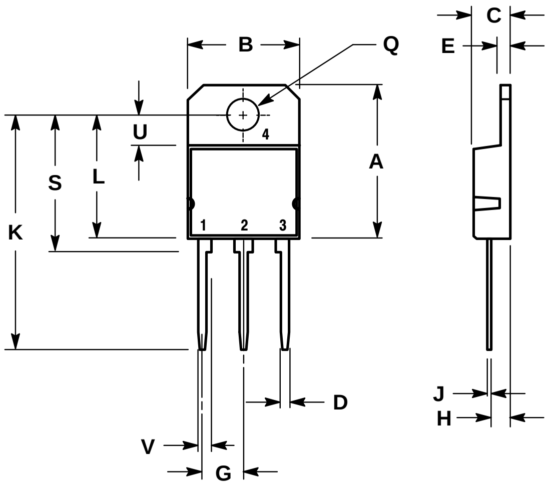


Figure 9. “On” Voltages

PACKAGE DIMENSIONS

CASE 340D–02
ISSUE E



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

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	---	20.35	---	0.801
B	14.70	15.20	0.579	0.598
C	4.70	4.90	0.185	0.193
D	1.10	1.30	0.043	0.051
E	1.17	1.37	0.046	0.054
G	5.40	5.55	0.213	0.219
H	2.00	3.00	0.079	0.118
J	0.50	0.78	0.020	0.031
K	31.00 REF		1.220 REF	
L	---	16.20	---	0.638
Q	4.00	4.10	0.158	0.161
S	17.80	18.20	0.701	0.717
U	4.00 REF		0.157 REF	
V	1.75 REF		0.069	

STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

Notes

Notes

PUBLICATION ORDERING INFORMATION

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