MJD6039

Darlington Power Transistors

DPAK For Surface Mount Applications

Designed for general purpose power and switching such as output or driver stages in applications such as switching regulators, convertors, and power amplifiers.

Features

- Lead Formed for Surface Mount Applications in Plastic Sleeves (No Suffix)
- Straight Lead Version in Plastic Sleeves ("–1" Suffix)
- Available on 16 mm Tape and Reel for Automatic Handling ("T4" Suffix)
- Monolithic Construction With Built–in Base–Emitter Shunt Resistors
- High DC Current Gain – h_{FE} = 2500 (Typ) @ I_C = 4.0 Adc
- Epoxy Meets UL 94, V–0 @ 0.125 in
- ESD Ratings: Human Body Model, 3B > 8000 V
  Machine Model, C > 400 V

MAXIMUM RATINGS

Rating	Symbol	Max	Unit
Collector–Emitter Voltage	V_{CEO}	80	Vdc
Collector–Base Voltage	V_{CB}	80	Vdc
Emitter–Base Voltage	V_{EB}	5	Vdc
Collector Current – Continuous – Peak	I_C	4 8	Adc
Base Current	I_B	100	mAdc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	20 0.16	W W/°C
Total Power Dissipation* @ T_A = 25°C Derate above 25°C	P_D	1.75 0.014	W W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–65 to +150	°C

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.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction–to–Case	$R_{\theta JC}$	6.25	°C/W
Thermal Resistance, Junction–to–Ambient*	$R_{\theta JA}$	71.4	°C/W

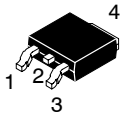
*These ratings are applicable when surface mounted on the minimum pad sizes recommended.

ON Semiconductor®

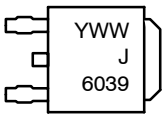
http://onsemi.com

SILICON
POWER TRANSISTORS
4 AMPERES
80 VOLTS
20 WATTS

MARKING DIAGRAM



DPAK
CASE 369C
STYLE 1



Y = Year
WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping†
MJD6039T4	DPAK	2500 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector−Emitter Sustaining Voltage (I_C = 30 mAdc, I_B = 0)	$V_{CEO(sus)}$	80	–	Vdc
Collector−Cutoff Current (V_{CE} = 40 Vdc, I_B = 0)	I_{CEO}	–	10	μAdc
ON CHARACTERISTICS (Note 1)				
DC Current Gain (I_C = 1 Adc, V_{CE} = 4 Vdc) (I_C = 2 Adc, V_{CE} = 4 Vdc)	h_{FE}	1000 500	– –	–
Collector−Emitter Saturation Voltage (I_C = 2 Adc, I_B = 8 mAdc)	$V_{CE(sat)}$	–	2.5	Vdc
Base−Emitter On Voltage (I_C = 2 Adc, V_{CE} = 4 Vdc)	$V_{BE(on)}$	–	2.8	Vdc
DYNAMIC CHARACTERISTICS				
Small−Signal Current Gain (I_C = 0.75 Adc, V_{CE} = 10 Vdc, f = 1 kHz)	h_{fe}	25	–	–
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 0.1 MHz)	C_{ob}	–	100	pF

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

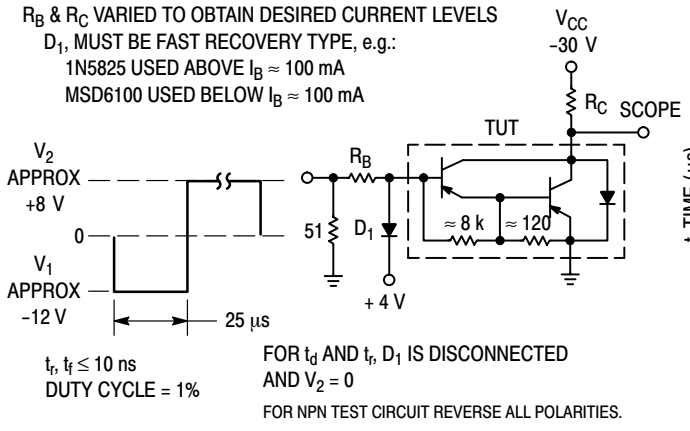


Figure 1. Switching Times Test Circuit

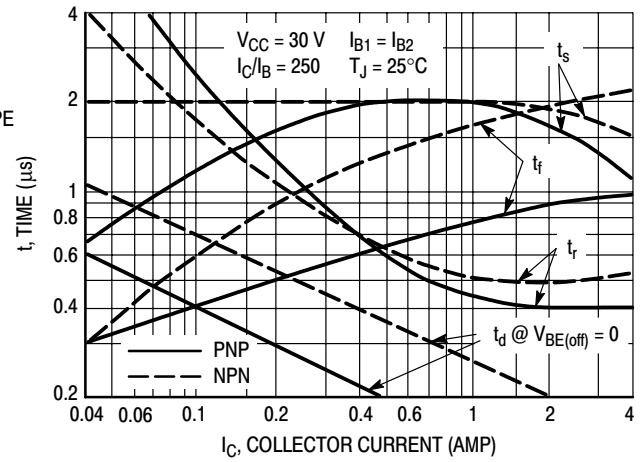


Figure 2. Switching Times

TYPICAL ELECTRICAL CHARACTERISTICS

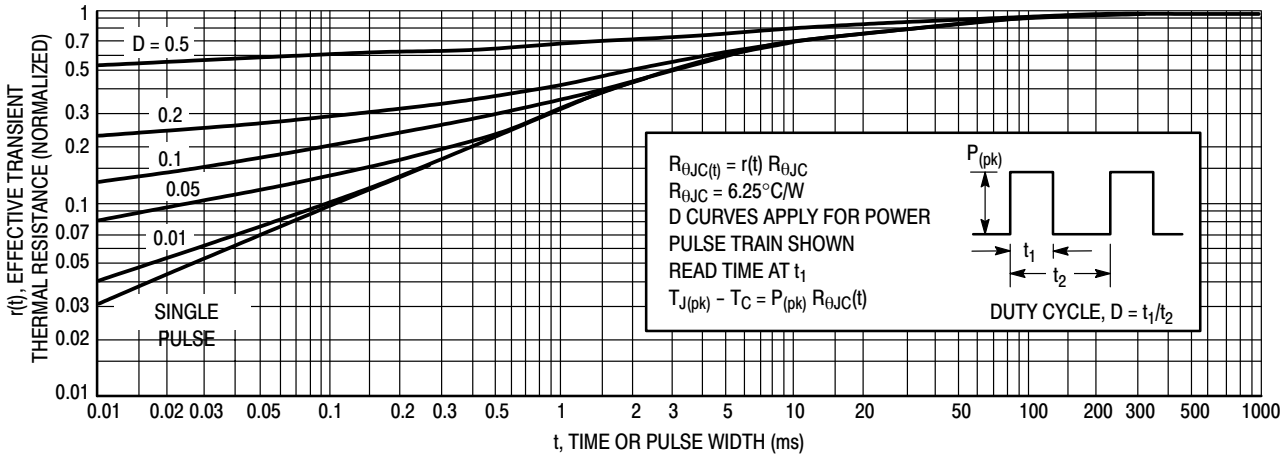


Figure 3. Thermal Response

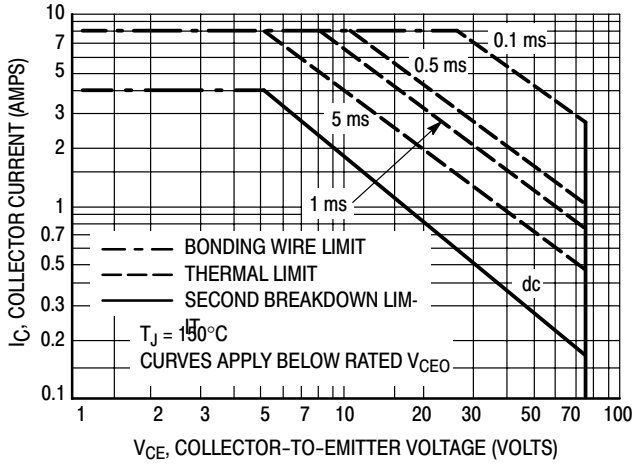


Figure 4. Maximum Rated Forward Biased Safe Operating Area

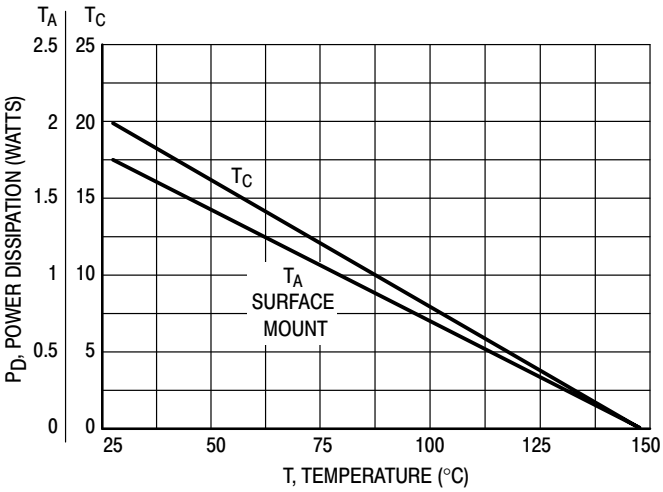


Figure 5. Power Derating

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 Figures 6 and 7 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 $T_{J(pk)} < 150°C$. $T_{J(pk)}$ may be calculated from the data in Figure 5. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

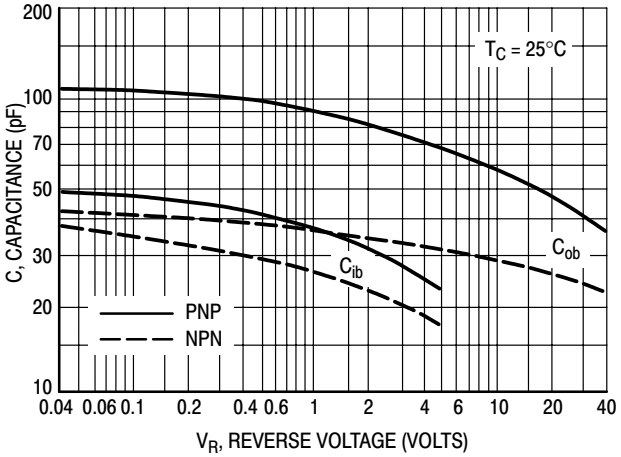


Figure 6. Capacitance

TYPICAL ELECTRICAL CHARACTERISTICS

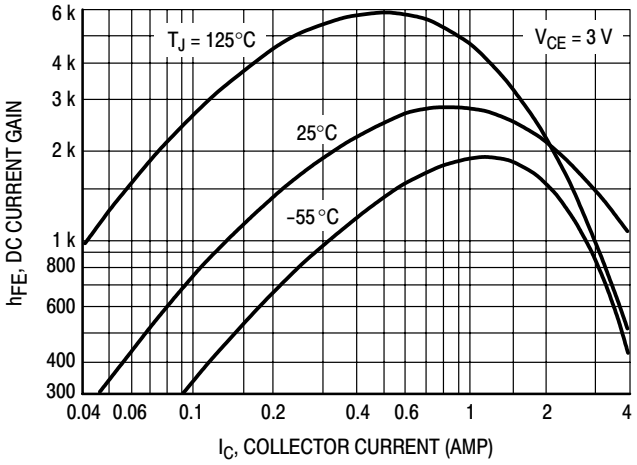


Figure 7. DC Current Gain

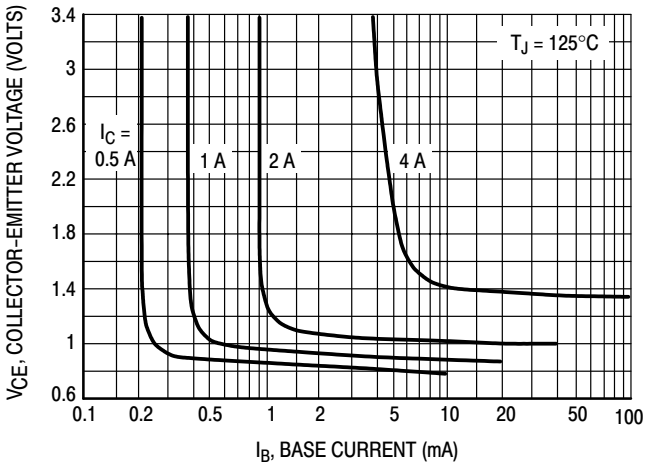


Figure 8. Collector Saturation Region

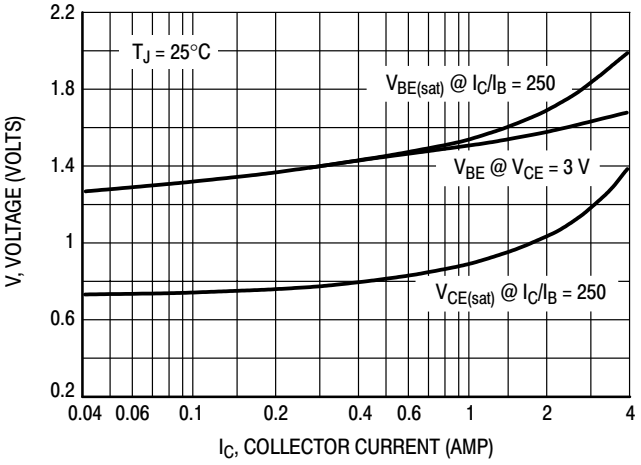


Figure 9. “On” Voltages

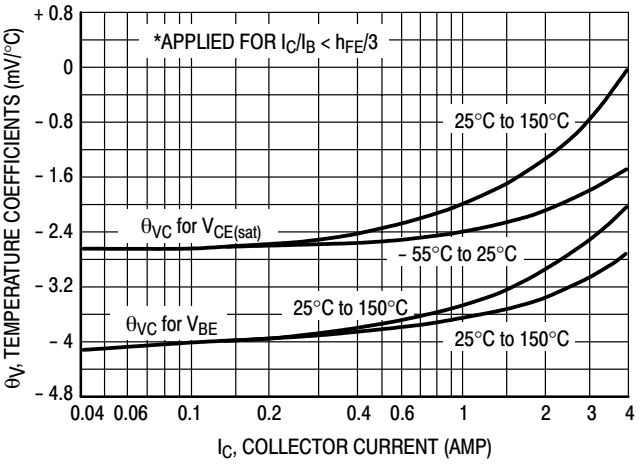


Figure 10. Temperature Coefficients

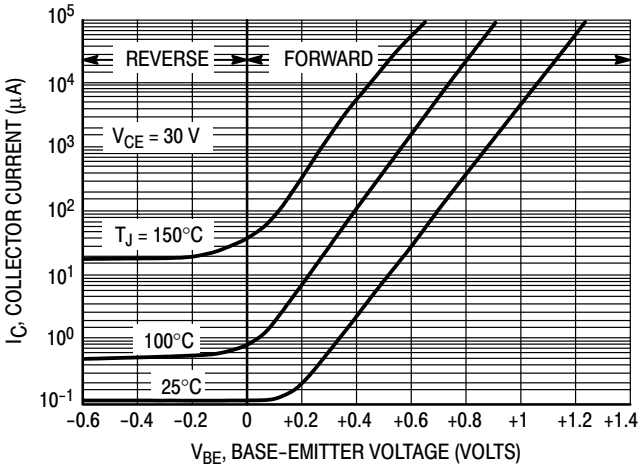


Figure 11. Collector Cut−Off Region

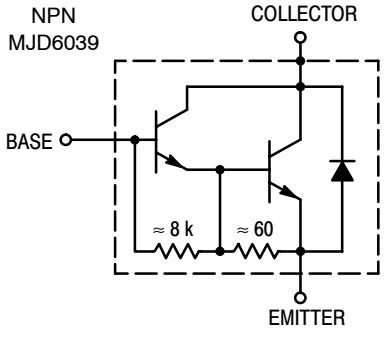
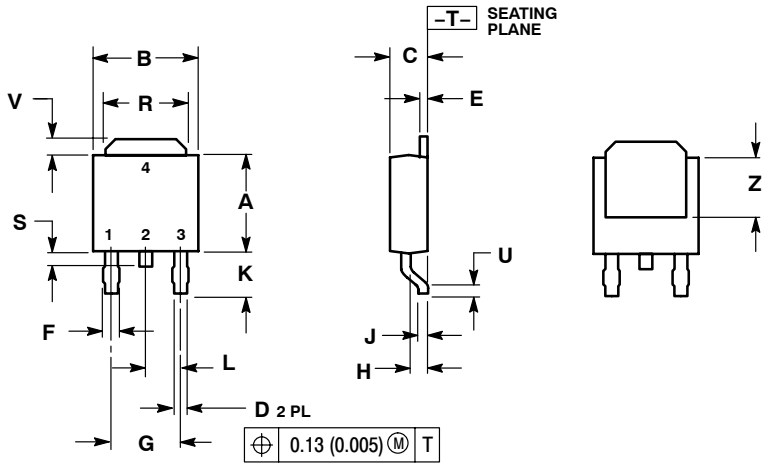


Figure 12. Darlington Schematic

PACKAGE DIMENSIONS

DPAK
CASE 369C−01
ISSUE O

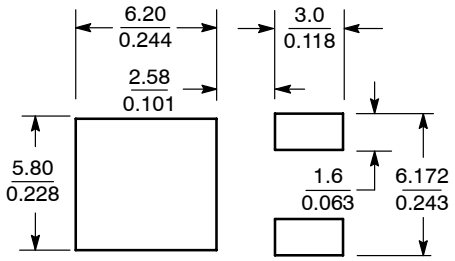


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.235	0.245	5.97	6.22
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
G	0.180 BSC		4.58 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.102	0.114	2.60	2.89
L	0.090 BSC		2.29 BSC	
R	0.180	0.215	4.57	5.45
S	0.025	0.040	0.63	1.01
U	0.020	−−−	0.51	−−−
V	0.035	0.050	0.89	1.27
Z	0.155	−−−	3.93	−−−

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

SOLDERING FOOTPRINT



SCALE 3:1 (mm / inches)

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 61312, Phoenix, Arizona 85082−1312 USA
Phone: 480−829−7710 or 800−344−3860 Toll Free USA/Canada
Fax: 480−829−7709 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center
2−9−1 Kamimeguro, Meguro−ku, Tokyo, Japan 153−0051
Phone: 81−3−5773−3850

ON Semiconductor Website: http://onsemi.com

Order Literature: http://www.onsemi.com/litorder

For additional information, please contact your local Sales Representative.

MJD6039/D