MJD122, NJVMJD122T4G (NPN), MJD127 (PNP)

Complementary Darlington Power Transistor

DPAK For Surface Mount Applications

Designed for general purpose amplifier and low speed switching applications.

Features

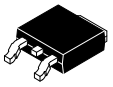
- Lead Formed for Surface Mount Applications in Plastic Sleeves
- Surface Mount Replacements for 2N6040–2N6045 Series, TIP120–TIP122 Series, and TIP125–TIP127 Series
- Monolithic Construction With Built−in Base−Emitter Shunt Resistors
- High DC Current Gain: h_{FE} = 2500 (Typ) @ I_C = 4.0 Adc
- Epoxy Meets UL 94 V−0 @ 0.125 in
- ESD Ratings:
  - Human Body Model, 3B > 8000 V
  - Machine Model, C > 400 V
- NJV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- Pb−Free Packages are Available*

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

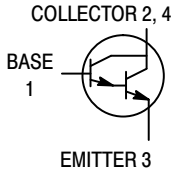
ON Semiconductor®

http://onsemi.com

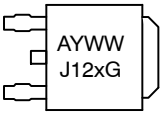
SILICON POWER TRANSISTOR 8 AMPERES 100 VOLTS, 20 WATTS



DPAK
CASE 369C
STYLE 1



MARKING DIAGRAM



A	= Assembly Location
Y	= Year
WW	= Work Week
x	= 2 or 7
G	= Pb−Free Package

ORDERING INFORMATION

Device	Package	Shipping†
MJD122	DPAK	75 Units/Rail
MJD122G	DPAK (Pb−Free)	75 Units/Rail
MJD122T4	DPAK	2,500/Tape & Reel
MJD122T4G	DPAK (Pb−Free)	2,500/Tape & Reel
NJVMJD122T4G	DPAK (Pb−Free)	2,500/Tape & Reel
MJD127	DPAK	75 Units/Rail
MJD127G	DPAK (Pb−Free)	75 Units/Rail
MJD127T4	DPAK	2,500/Tape & Reel
MJD127T4G	DPAK (Pb−Free)	2,500/Tape & Reel

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

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector−Emitter Voltage	V_{CEO}	100	Vdc
Collector−Base Voltage	V_{CB}	100	Vdc
Emitter−Base Voltage	V_{EB}	5	Vdc
Collector Current Continuous Peak	I_C	 8 16	Adc
Base Current	I_B	120	mAdc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	 20 0.16	W W/°C
Total Power Dissipation (Note 1) @ 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

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.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction−to−Case	$R_{\theta JC}$	 6.25	°C/W
Thermal Resistance Junction−to−Ambient (Note1)	$R_{\theta JA}$	 71.4	°C/W

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

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)	$V_{CEO(sus)}$	100	–	Vdc
Collector Cutoff Current (V_{CE} = 50 Vdc, I_B = 0)	I_{CEO}	–	10	μAdc
Collector Cutoff Current (V_{CB} = 100 Vdc, I_E = 0)	I_{CBO}	–	10	μAdc
Emitter Cutoff Current (V_{BE} = 5 Vdc, I_C = 0)	I_{EBO}	–	2	mAdc
ON CHARACTERISTICS				
DC Current Gain (I_C = 4 Adc, V_{CE} = 4 Vdc) (I_C = 8 Adc, V_{CE} = 4 Vdc)	h_{FE}	1000 100	12,000 –	–
Collector−Emitter Saturation Voltage (I_C = 4 Adc, I_B = 16 mAdc) (I_C = 8 Adc, I_B = 80 mAdc)	$V_{CE(sat)}$	– –	2 4	Vdc
Base−Emitter Saturation Voltage (Note 2) (I_C = 8 Adc, I_B = 80 mAdc)	$V_{BE(sat)}$	–	4.5	Vdc
Base−Emitter On Voltage (I_C = 4 Adc, V_{CE} = 4 Vdc)	$V_{BE(on)}$	–	2.8	Vdc
DYNAMIC CHARACTERISTICS				
Current−Gain−Bandwidth Product (I_C = 3 Adc, V_{CE} = 4 Vdc, f = 1 MHz)	$\|h_{fe}\|$	4	–	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 0.1 MHz) MJD127 MJD122, NJVMJD122T4G	C_{ob}	– –	300 200	pF
Small−Signal Current Gain (I_C = 3 Adc, V_{CE} = 4 Vdc, f = 1 kHz)	h_{fe}	300	–	–

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

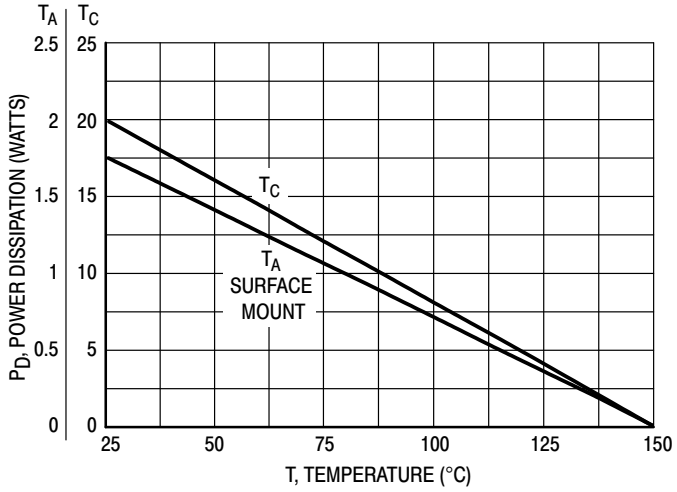


Figure 1. Power Derating

TYPICAL ELECTRICAL CHARACTERISTICS

PNP MJD127 **NPN MJD122**

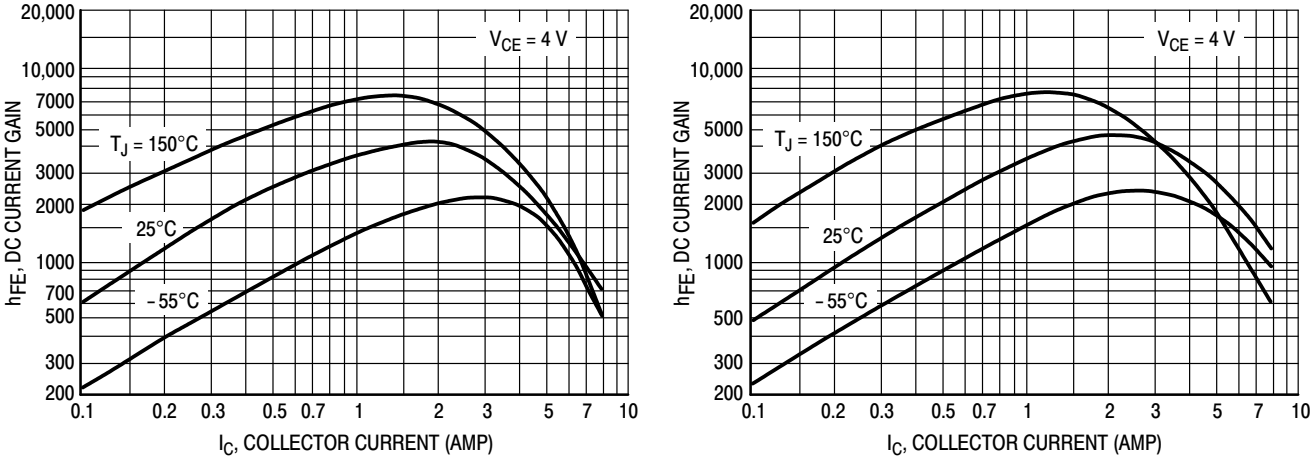


Figure 2. DC Current Gain

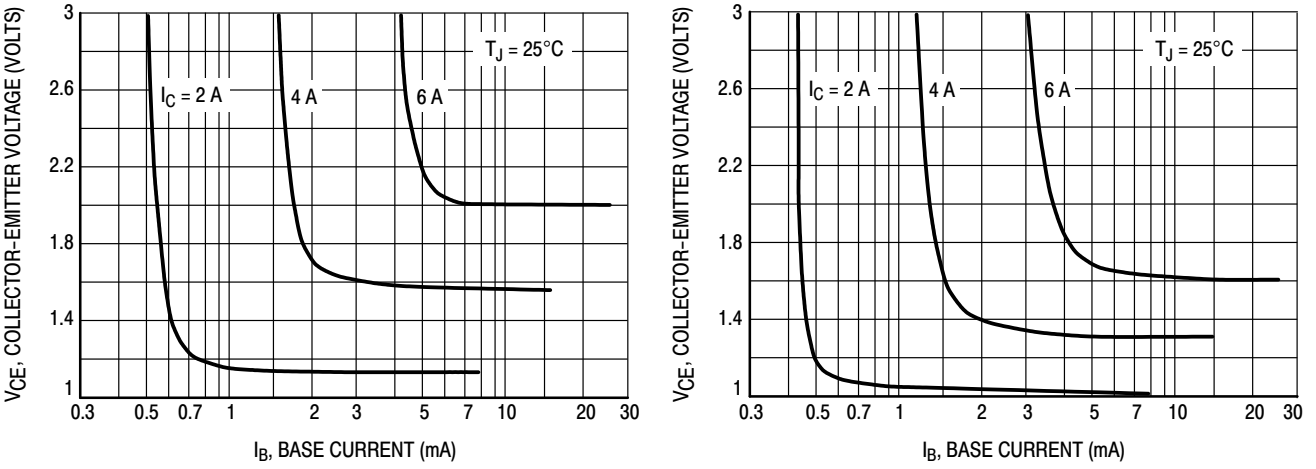


Figure 3. Collector Saturation Region

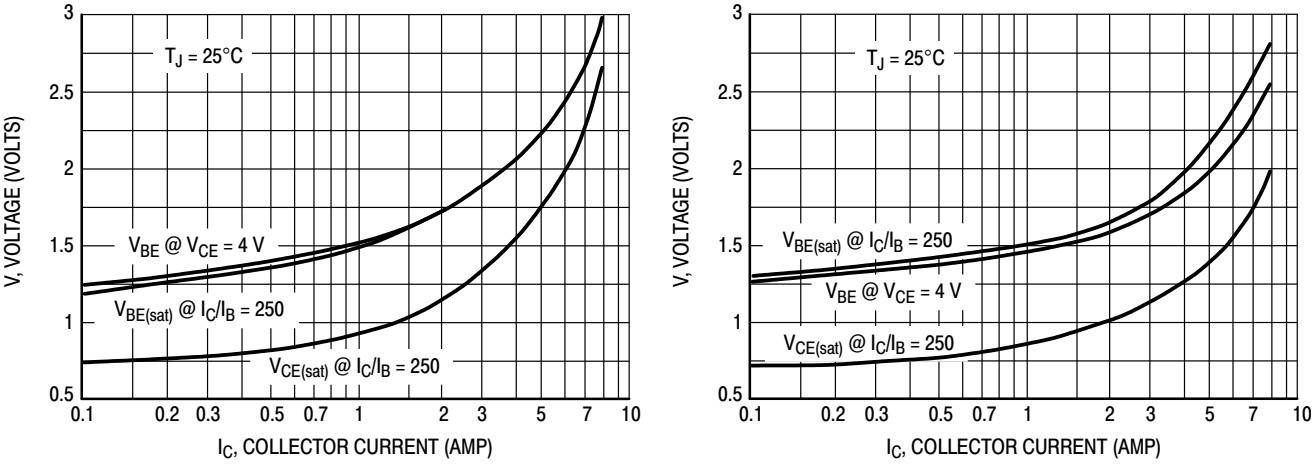


Figure 4. “On” Voltages

TYPICAL ELECTRICAL CHARACTERISTICS

PNP MJD127 **NPN MJD122**

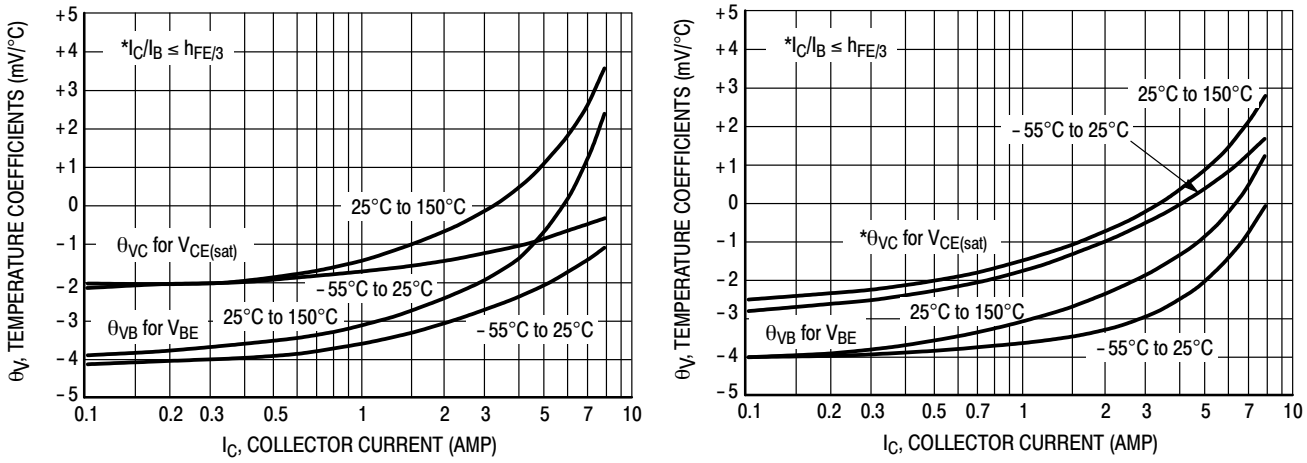


Figure 5. Temperature Coefficients

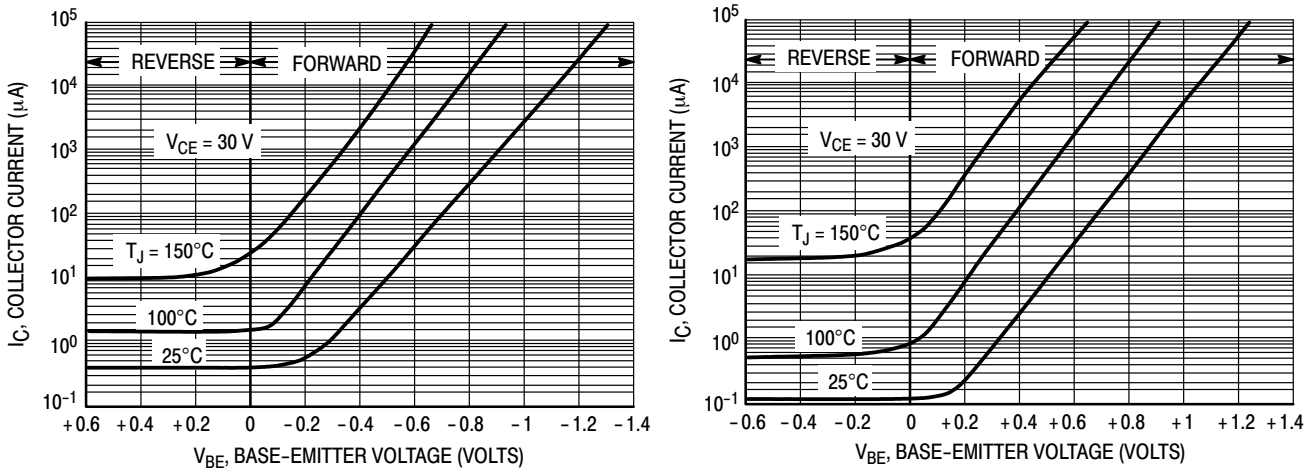


Figure 6. Collector Cut−Off Region

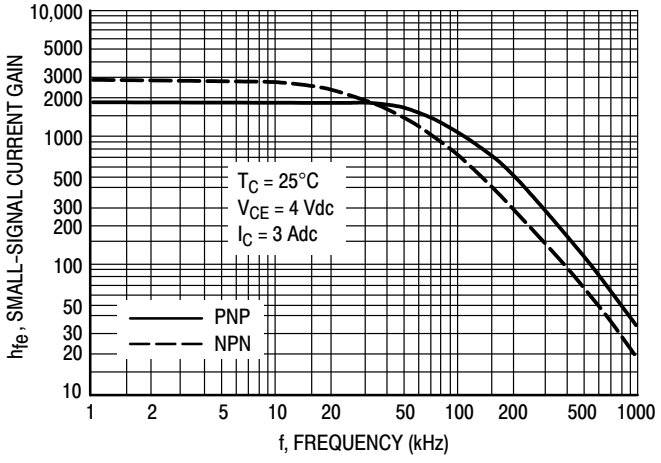


Figure 7. Small−Signal Current Gain

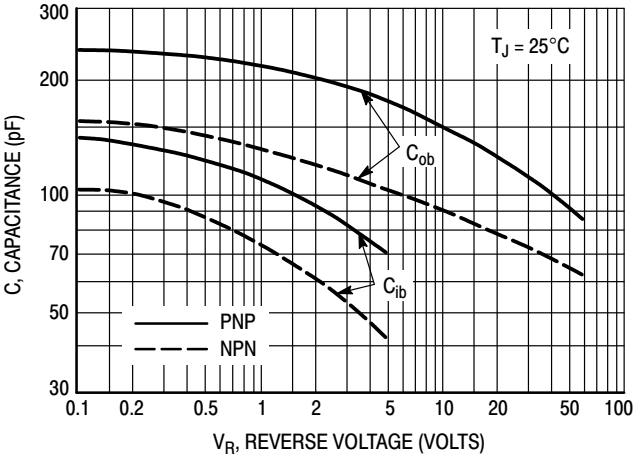


Figure 8. Capacitance

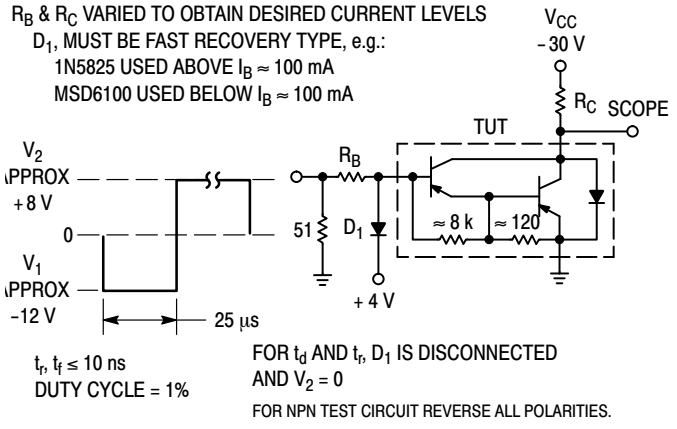


Figure 9. Switching Times Test Circuit

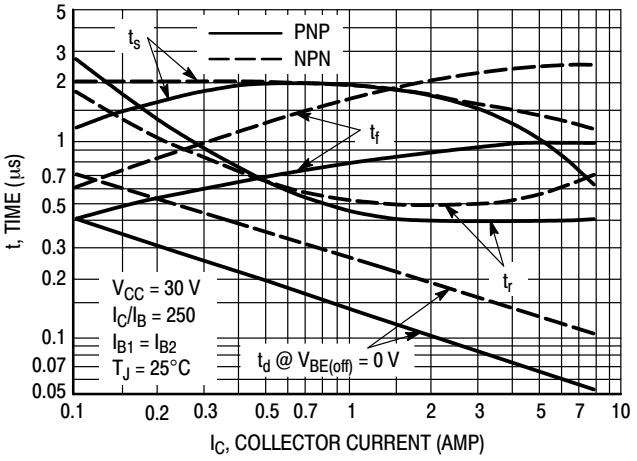


Figure 10. Switching Times

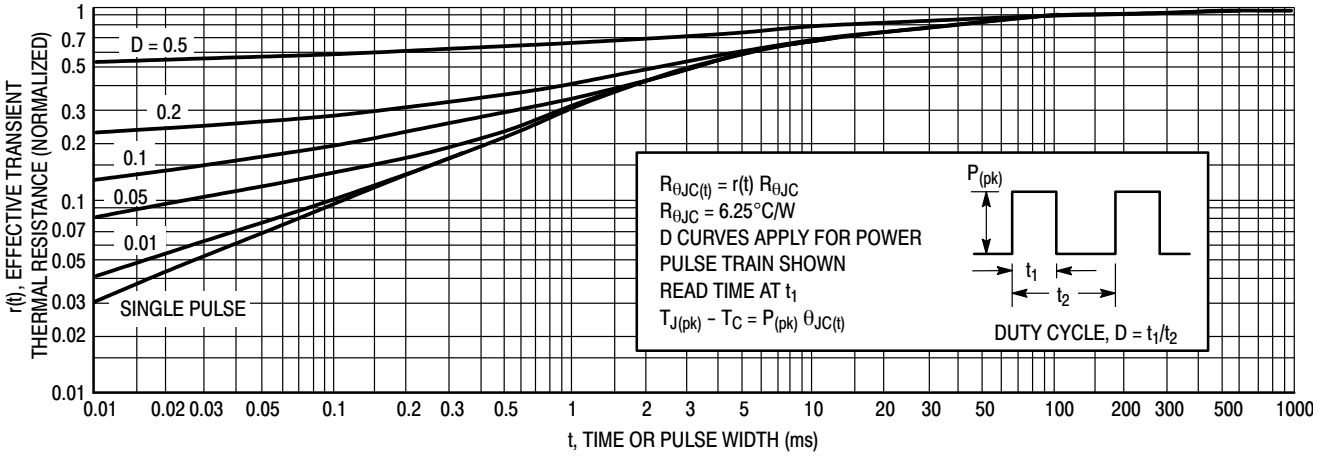


Figure 11. Thermal Response

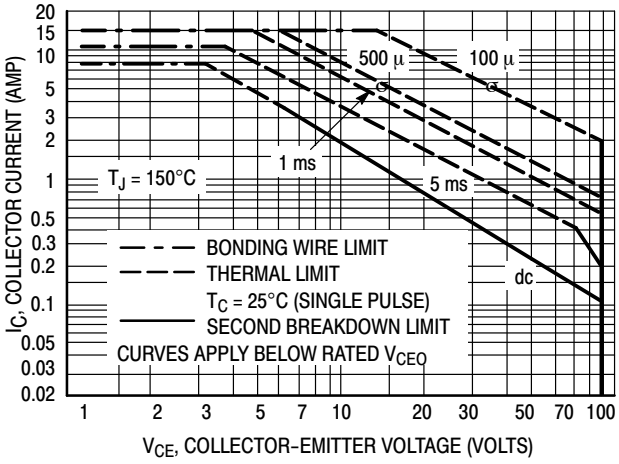


Figure 12. Maximum Forward Bias Safe Operating rea

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

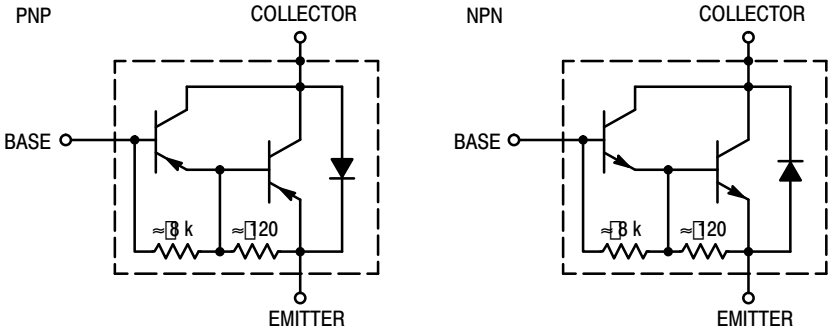
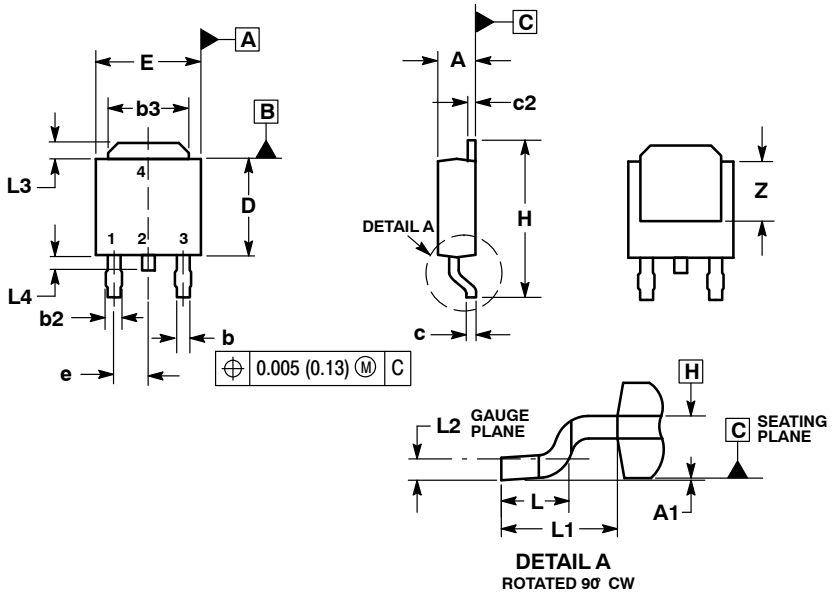


Figure 13. Darlington Schematic

PACKAGE DIMENSIONS

DPAK
CASE 369C−01
ISSUE D

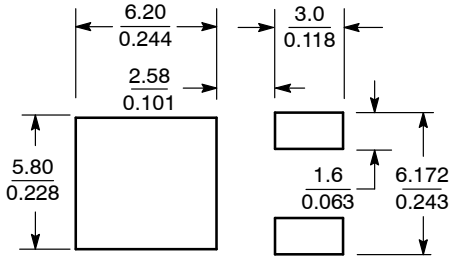


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3 and Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.030	0.045	0.76	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090 BSC		2.29 BSC	
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.108 REF		2.74 REF	
L2	0.020 BSC		0.51 BSC	
L3	0.035	0.050	0.89	1.27
L4	−−−	0.040	−−−	1.01
Z	0.155	−−−	3.93	−−−

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

SOLDERING FOOTPRINT*



SCALE 3:1 (mm / inches)

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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
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Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

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