

# NJD35N04G

## NPN Darlington Power Transistor

This high voltage power Darlington has been specifically designed for inductive applications such as Electronic Ignition, Switching Regulators and Motor Control.

### Features

- Exceptional Safe Operating Area
- High  $V_{CE}$ ; High Current Gain
- These are Pb-Free Devices

### Benefits

- Reliable Performance at Higher Powers
- Designed for Inductive Loads
- Very Low Current Requirements

### Applications

- Internal Combustion Engine Ignition Control
- Switching Regulators
- Motor Controls
- Light Ballast
- Photo Flash

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit	
Collector-Emitter Sustaining Voltage	$V_{CEO}$	350	Vdc	
Collector-Base Breakdown Voltage	$V_{CBO}$	700	Vdc	
Collector-Emitter Breakdown Voltage	$V_{CES}$	700	Vdc	
Emitter-Base Voltage	$V_{EBO}$	5.0	Vdc	
Collector Current	Continuous	$I_C$	4.0	Adc
	Peak	$I_{CM}$	8.0	
Base Current	$I_B$	0.5	Adc	
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	45	W	
		0.36	W/ $^\circ\text{C}$	
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +150	$^\circ\text{C}$	

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	Value	Unit	
Thermal Resistance	Junction-to-Case	$R_{\theta JC}$	2.78	$^\circ\text{C}/\text{W}$
	Junction-to-Ambient	$R_{\theta JA}$	71.4	

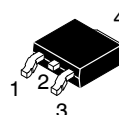


ON Semiconductor®

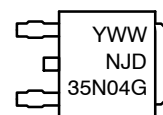
<http://onsemi.com>

**DARLINGTON  
POWER TRANSISTORS  
4 AMPERES  
350 VOLTS  
45 WATTS**

### MARKING DIAGRAM



DPAK  
CASE 369C  
STYLE 1



Y = Year  
WW = Work Week  
NJD35N04 = Device Code  
G = Pb-Free Device

### ORDERING INFORMATION

Device	Package	Shipping†
NJD35N04G	DPAK (Pb-Free)	75 Units / Rail
NJD35N04T4G	DPAK (Pb-Free)	2500/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.

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## ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Collector-Emitter Sustaining Voltage ( $I_C = 10\text{ mA}$ , $L = 10\text{ mH}$ )	$V_{CE(sus)}$	350	-	-	V
Collector Cutoff Current ( $V_{CE} = 500\text{ V}$ ) ( $I_B = 0$ ) ( $V_{CE} = 500\text{ V}$ , $T_C = 125^\circ\text{C}$ )	$I_{CES}$	-	-	50 250	$\mu\text{A}$
Collector Cutoff Current ( $V_{CE} = 250\text{ V}$ ) ( $I_B = 0$ ) ( $V_{CE} = 200\text{ V}$ , $T_C = 125^\circ\text{C}$ )	$I_{CEO}$	-	-	50 250	$\mu\text{A}$
Emitter Cutoff Current ( $V_{BE} = 5.0\text{ Vdc}$ )	$I_{EBO}$	-	-	5.0	$\mu\text{A}$

### ON CHARACTERISTICS

Collector-Emitter Saturation Voltage ( $I_C = 2.0\text{ A}$ , $I_B = 20\text{ mA}$ ) ( $I_C = 2.0\text{ A}$ , $I_B = 20\text{ mA}$ $125^\circ\text{C}$ )	$V_{CE(sat)}$	-	-	1.5	V
Base-Emitter Saturation Voltage ( $I_C = 2.0\text{ A}$ , $I_B = 20\text{ mA}$ ) ( $I_C = 2.0\text{ A}$ , $I_B = 20\text{ mA}$ $125^\circ\text{C}$ )	$V_{BE(sat)}$	-	-	2.0	V
Base-Emitter On Voltage ( $I_C = 2.0\text{ A}$ , $V_{CE} = 2.0\text{ V}$ ) ( $I_C = 2.0\text{ A}$ , $V_{CE} = 2.0\text{ V}$ $125^\circ\text{C}$ )	$V_{BE(on)}$	-	-	2.0	V
DC Current Gain ( $I_C = 2.0\text{ A}$ , $V_{CE} = 2.0\text{ V}$ ) ( $I_C = 4.0\text{ A}$ , $V_{CE} = 2.0\text{ Vdc}$ )	$h_{FE}$	2000 300	- -	- -	-

### DYNAMIC CHARACTERISTICS

Current-Gain - Bandwidth Product ( $I_C = 2.0\text{ A}$ , $V_{CE} = 10\text{ V}$ , $f = 1.0\text{ MHz}$ )	$f_T$	90	-	-	MHz
Output Capacitance ( $V_{CB} = 10\text{ V}$ , $I_E = 0$ , $f = 0.1\text{ MHz}$ )	$C_{ob}$	-	60	-	pF

### SWITCHING CHARACTERISTICS

$V_{CC} = 12\text{ V}$ , $V_{clamp} = 250\text{ V}$ , $L = 4\text{ mH}$ $I_C = 2\text{ A}$ , $I_{B1} = 20\text{ mA}$ , $I_{B2} = -20\text{ mA}$	$t_s$ $t_f$	- -	18 0.8	- -	$\mu\text{Sec}$
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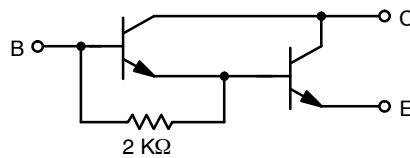


Figure 1. Darlington Circuit Schematic

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## TYPICAL CHARACTERISTICS

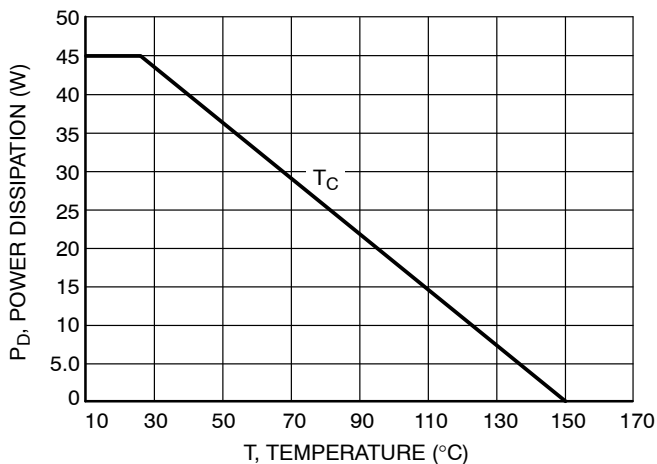


Figure 2. Power Derating

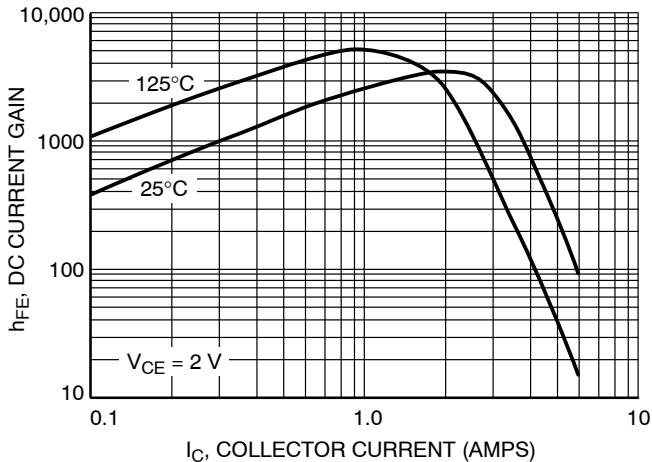


Figure 3. DC Current Gain

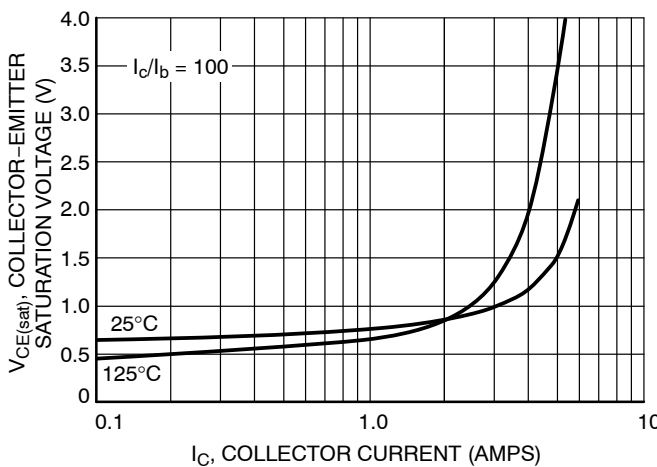


Figure 4. Collector-Emitter Saturation Voltage

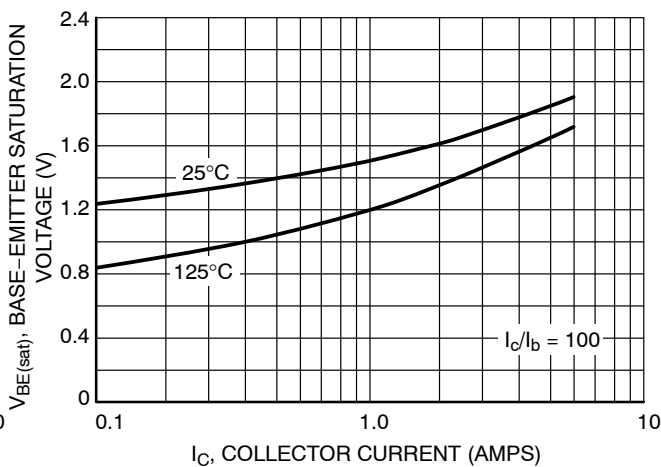


Figure 5. Base-Emitter Saturation Voltage

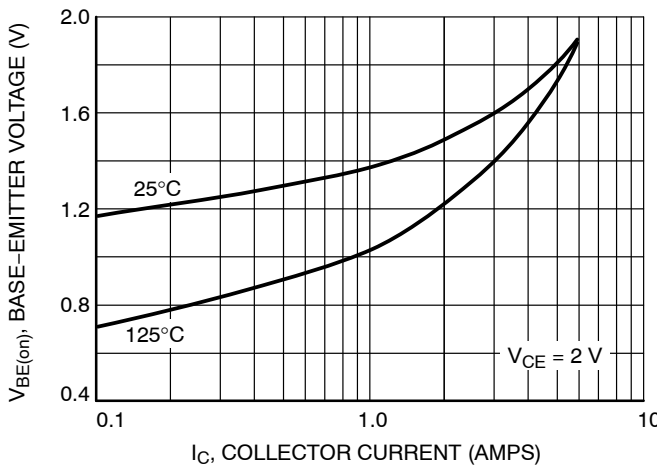


Figure 6. Base-Emitter Voltage

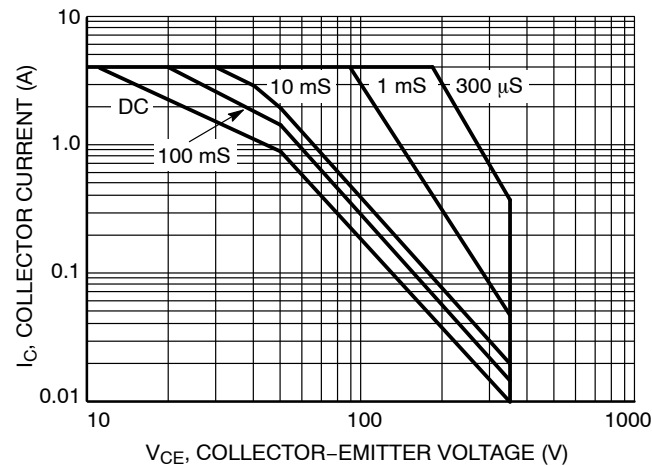
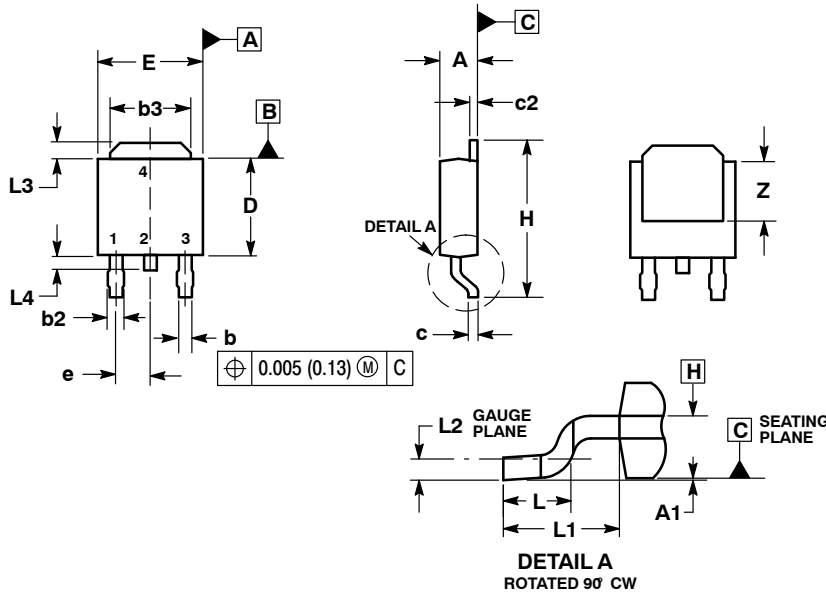


Figure 7. Forward Bias Safe Operating Area (FBSOA)

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## PACKAGE DIMENSIONS

DPAK  
CASE 369C-01  
ISSUE D

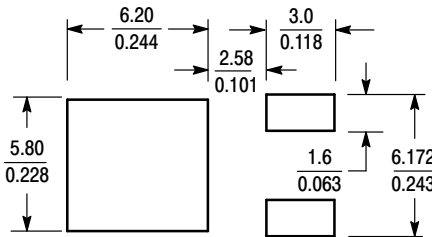


**NOTES:**

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.

DIM	INCHES		MILLIMETERS	
	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	---

### SOLDERING FOOTPRINT\*



SCALE 3:1  $\left(\frac{\text{mm}}{\text{inches}}\right)$

**STYLE 1:**

- PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

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

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