

# NJD35N04G, NJVNJD35N04G, NJVNJD35N04T4G

## 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
- NJV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- 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 Peak	$I_C$ $I_{CM}$	4.0 8.0	Adc
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 0.36	W 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.

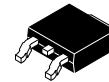
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



ON Semiconductor®

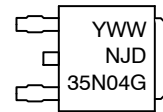
<http://onsemi.com>

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



**DPAK**  
**CASE 369C**  
**STYLE 1**

### MARKING DIAGRAM



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

### ORDERING INFORMATION

Device	Package	Shipping†
NJD35N04G	DPAK (Pb-Free)	75 Units / Rail
NJVNJD35N04G	DPAK (Pb-Free)	75 Units / Rail
NJD35N04T4G	DPAK (Pb-Free)	2,500 / Tape & Reel
NJVNJD35N04T4G	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.

# NJD35N04G, NJVNJD35N04G, NJVNJD35N04T4G

## 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	

## 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 ( $I_C = 10\text{ mA}$ , $L = 10\text{ mH}$ )	$V_{CEO(sus)}$	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 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 2.0	V
Base-Emitter On Voltage ( $I_C = 2.0\text{ A}$ , $V_{CE} = 2.0\text{ V}$ ) ( $I_C = 2.0\text{ A}$ , $V_{CE} = 2.0\text{ V}$ ] $25^{\circ}\text{C}$ )	$V_{BE(on)}$	-	-	2.0 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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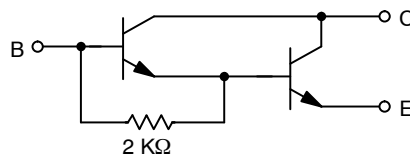


Figure 1. Darlington Circuit Schematic

TYPICAL CHARACTERISTICS

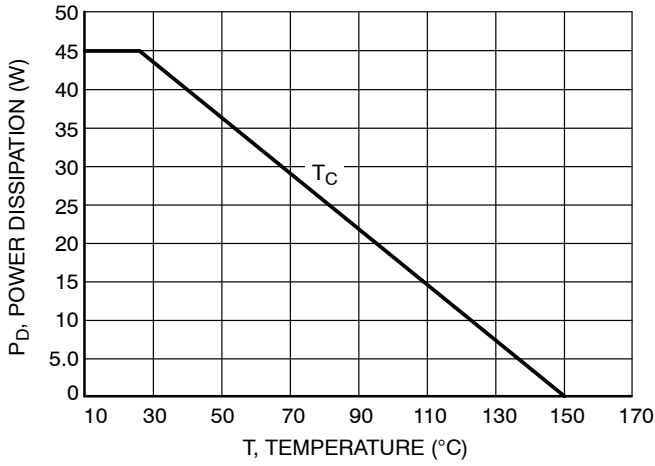


Figure 2. Power Derating

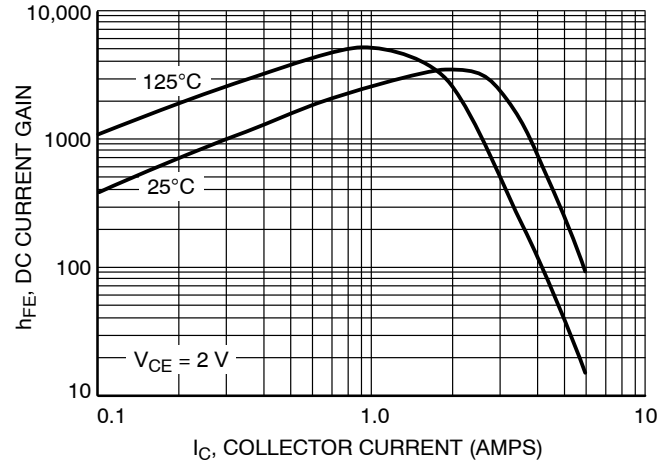


Figure 3. DC Current Gain

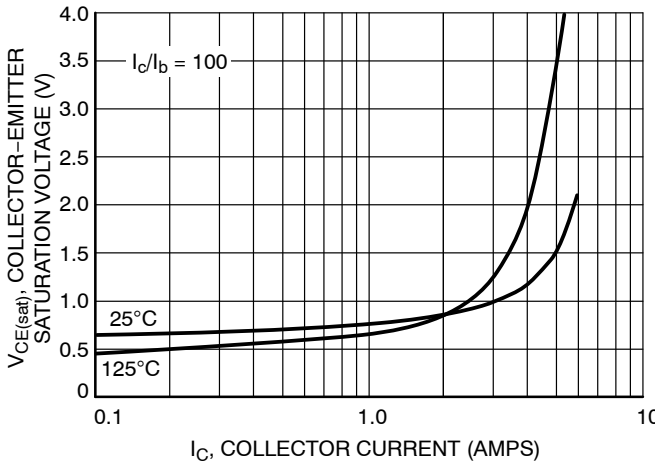


Figure 4. Collector-Emitter Saturation Voltage

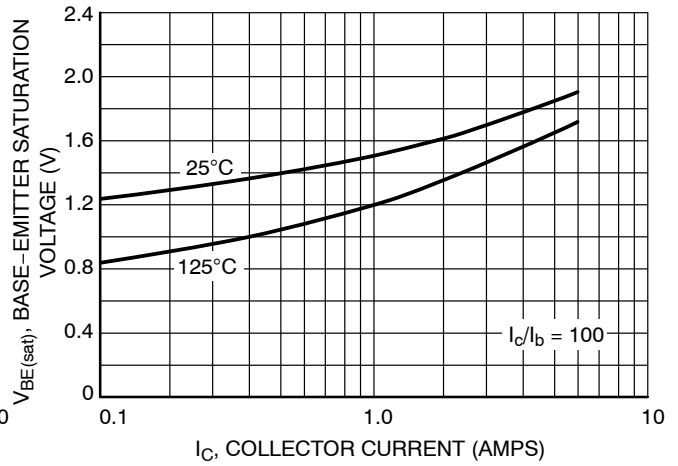


Figure 5. Base-Emitter Saturation Voltage

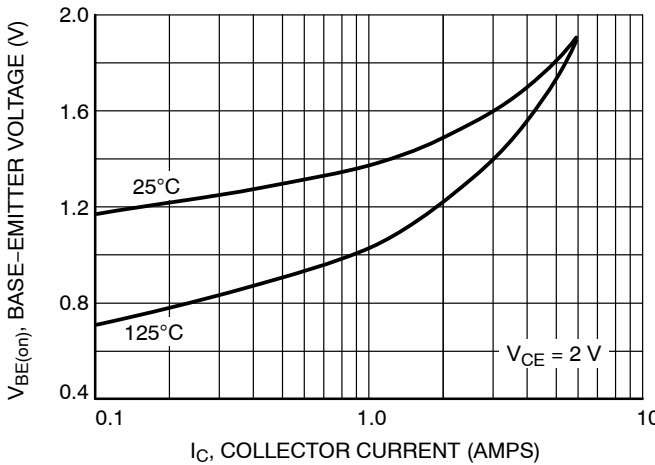


Figure 6. Base-Emitter Voltage

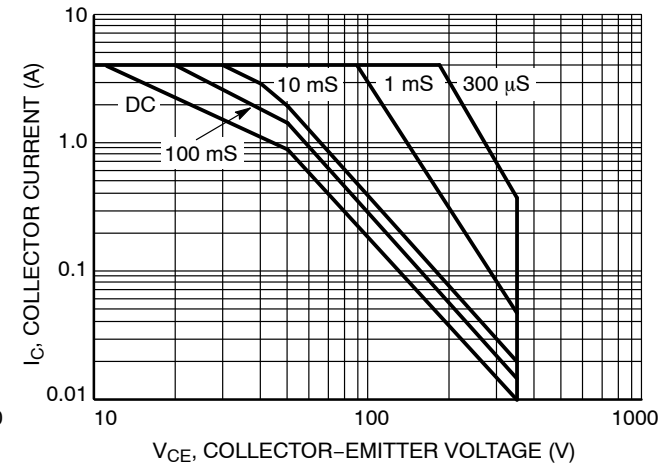


Figure 7. Forward Bias Safe Operating Area (FBSOA)

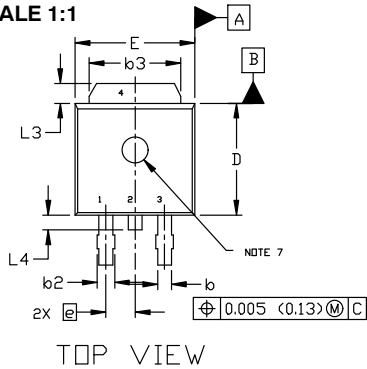
# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



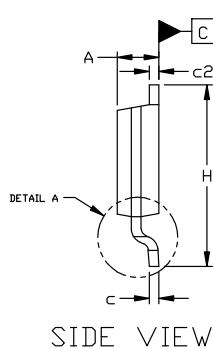
## DPAK (SINGLE GAUGE) CASE 369C ISSUE G

DATE 31 MAY 2023

SCALE 1:1



TOP VIEW

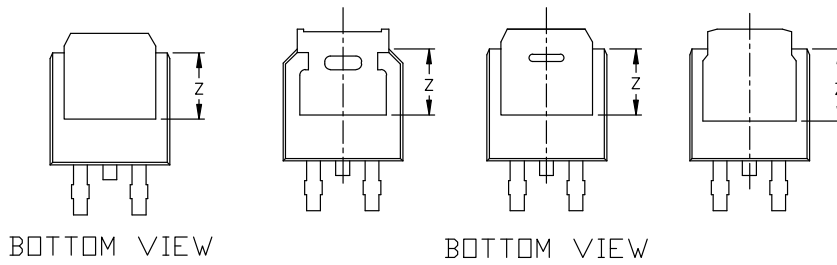


SIDE VIEW

NOTES:

1. DIMENSIONING AND TOLERANCING 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.
7. OPTIONAL MOLD FEATURE.

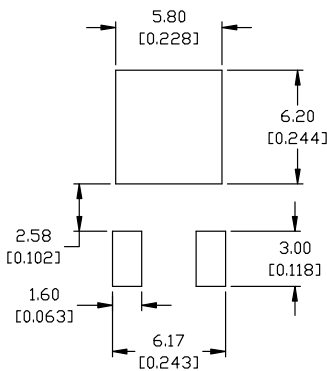
DIM	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.028	0.045	0.72	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090	BSC	2.29	BSC
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.114	REF	2.90	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	---



BOTTOM VIEW

BOTTOM VIEW

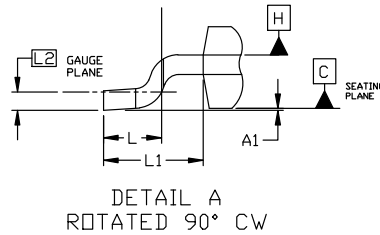
ALTERNATE CONSTRUCTIONS



### RECOMMENDED MOUNTING FOOTPRINT\*

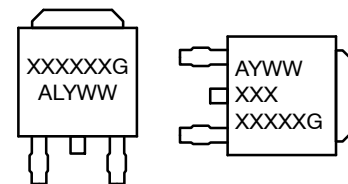
\*FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERM/D.

- |  |  |   |   |  |
|--|--|---|---|--|
| <p>STYLE 1:<br/>PIN 1. BASE<br/>2. COLLECTOR<br/>3. EMITTER<br/>4. COLLECTOR</p> | <p>STYLE 2:<br/>PIN 1. GATE<br/>2. DRAIN<br/>3. SOURCE<br/>4. DRAIN</p>          | <p>STYLE 3:<br/>PIN 1. ANODE<br/>2. CATHODE<br/>3. ANODE<br/>4. CATHODE</p> | <p>STYLE 4:<br/>PIN 1. CATHODE<br/>2. ANODE<br/>3. GATE<br/>4. ANODE</p>              | <p>STYLE 5:<br/>PIN 1. GATE<br/>2. ANODE<br/>3. CATHODE<br/>4. ANODE</p>     |
| <p>STYLE 6:<br/>PIN 1. MT1<br/>2. MT2<br/>3. GATE<br/>4. MT2</p>                 | <p>STYLE 7:<br/>PIN 1. GATE<br/>2. COLLECTOR<br/>3. EMITTER<br/>4. COLLECTOR</p> | <p>STYLE 8:<br/>PIN 1. N/C<br/>2. CATHODE<br/>3. ANODE<br/>4. CATHODE</p>   | <p>STYLE 9:<br/>PIN 1. ANODE<br/>2. CATHODE<br/>3. RESISTOR ADJUST<br/>4. CATHODE</p> | <p>STYLE 10:<br/>PIN 1. CATHODE<br/>2. ANODE<br/>3. CATHODE<br/>4. ANODE</p> |



DETAIL A  
ROTATED 90° CW

### GENERIC MARKING DIAGRAM\*



IC

Discrete

- XXXXXX = Device Code
- A = Assembly Location
- L = Wafer Lot
- Y = Year
- WW = Work Week
- G = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

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