

# NJX1675PDR2G

## Complementary 30 V, 6.0 A, Transistor

These devices are designed for use in low voltage, high speed switching applications where affordable efficient energy control is important.

Typical applications are low voltage motor controls in mass storage products such as disc drives and tape drives. In the automotive industry they can be used in air bag deployment and in the instrument cluster.

### Features

- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

Rating		Symbol	Max	Unit
Collector-Emitter Voltage	NPN PNP	V <sub>CEO</sub>	30 -30	Vdc
Collector-Base Voltage	NPN PNP	V <sub>CBO</sub>	30 -30	Vdc
Emitter-Base Voltage	NPN PNP	V <sub>EBO</sub>	6.0 -7.0	Vdc
Collector Current - Continuous	NPN PNP	I <sub>C</sub>	3.0 -3.0	A
Collector Current - Peak	NPN PNP	I <sub>CM</sub>	6.0 -6.0	A
Electrostatic Discharge		ESD	HBM Class 3B MM Class C	

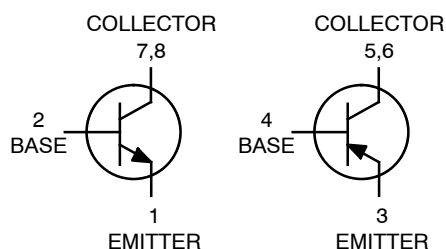
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.



**ON Semiconductor**®

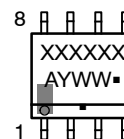
<http://onsemi.com>

**30 VOLTS, 6.0 AMPS  
COMPLEMENTARY  
TRANSISTOR  
EQUIVALENT R<sub>DS(on)</sub> 80 mΩ**



**SOIC-8  
CASE 751  
STYLE 16**

### DEVICE MARKING



XXXXXX = Specific Device Code  
 A = Assembly Location  
 Y = Year  
 WW = Work Week  
 ■ = Pb-Free Package  
 (Note: Microdot may be in either location)

### ORDERING INFORMATION

Device	Package	Shipping†
NJX1675PDR2G	SOIC-8 (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.

# NJX1675PDR2G

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation (Note 1) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	2.0 16	W mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient (Note 1)	$R_{\theta JA}$	62	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

- FR-4 @ 100 mm<sup>2</sup>, 1 oz. copper traces, still air,  $t \leq 10$  sec.
- Dual heated values assume total power is the sum of two equally powered devices.

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

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Collector - Emitter Breakdown Voltage ( $I_C = 10$ mA, $I_B = 0$ )	$V_{(BR)CEO}$	30	-	-	Vdc
Collector - Base Breakdown Voltage ( $I_C = 0.1$ mA, $I_E = 0$ )	$V_{(BR)CBO}$	30	-	-	Vdc
Emitter - Base Breakdown Voltage ( $I_E = 1.0$ mA, $I_C = 0$ )	$V_{(BR)EBO}$	6.0	-	-	Vdc
Collector Cutoff Current ( $V_{CB} = 30$ Vdc, $I_E = 0$ )	$I_{CBO}$	-	-	0.1	$\mu\text{A}$
Emitter Cutoff Current ( $V_{EB} = 5.0$ Vdc)	$I_{EBO}$	-	-	0.1	$\mu\text{A}$

### ON CHARACTERISTICS

DC Current Gain (Note 4) ( $I_C = 10$ mA, $V_{CE} = 2.0$ V) ( $I_C = 500$ mA, $V_{CE} = 2.0$ V) ( $I_C = 1.0$ A, $V_{CE} = 2.0$ V) ( $I_C = 2.0$ A, $V_{CE} = 2.0$ V)	$h_{FE}$	100 100 180 180	400 350 340 320	- - - -	
Collector - Emitter Saturation Voltage (Note 4) ( $I_C = 0.1$ A, $I_B = 0.010$ A) ( $I_C = 1.0$ A, $I_B = 0.100$ A) ( $I_C = 1.0$ A, $I_B = 0.010$ A) ( $I_C = 2.0$ A, $I_B = 0.200$ A)	$V_{CE(sat)}$	- - - -	0.008 0.044 0.080 0.082	0.011 0.060 0.115 0.115	V
Base - Emitter Saturation Voltage (Note 4) ( $I_C = 1.0$ A, $I_B = 0.01$ A)	$V_{BE(sat)}$	-	0.780	0.900	V
Base - Emitter Turn-on Voltage (Note 4) ( $I_C = 0.1$ A, $V_{CE} = 2.0$ V)	$V_{BE(on)}$	-	0.650	0.750	V
Cutoff Frequency ( $I_C = 100$ mA, $V_{CE} = 5.0$ V, $f = 100$ MHz)	$f_T$	100	-	-	MHz
Input Capacitance ( $V_{EB} = 0.5$ V, $f = 1.0$ MHz)	$C_{ibo}$	-	320	450	pF
Output Capacitance ( $V_{CB} = 3.0$ V, $f = 1.0$ MHz)	$C_{obo}$	-	40	-	pF

### SWITCHING CHARACTERISTICS

Delay ( $V_{CC} = 30$ V, $I_C = 750$ mA, $I_{B1} = 15$ mA)	$t_d$	-	-	100	ns
Rise ( $V_{CC} = 30$ V, $I_C = 750$ mA, $I_{B1} = 15$ mA)	$t_r$	-	-	100	ns
Storage ( $V_{CC} = 30$ V, $I_C = 750$ mA, $I_{B1} = 15$ mA)	$t_s$	-	-	780	ns
Fall ( $V_{CC} = 30$ V, $I_C = 750$ mA, $I_{B1} = 15$ mA)	$t_f$	-	-	110	ns

- Pulsed Condition: Pulse Width = 300  $\mu\text{sec}$ , Duty Cycle  $\leq 2\%$ .

# NJX1675PDR2G

## PNP ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Collector - Emitter Breakdown Voltage (I <sub>C</sub> = -10 mA, I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	-30	-	-	Vdc
Collector - Base Breakdown Voltage (I <sub>C</sub> = -0.1 mA, I <sub>E</sub> = 0)	V <sub>(BR)CBO</sub>	-30	-	-	Vdc
Emitter - Base Breakdown Voltage (I <sub>E</sub> = -1.0 mA, I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	-7.0	-	-	Vdc
Collector Cutoff Current (V <sub>CB</sub> = -30 Vdc, I <sub>E</sub> = 0)	I <sub>CBO</sub>	-	-	-0.1	μA <sub>dc</sub>
Emitter Cutoff Current (V <sub>EB</sub> = -5.0 Vdc)	I <sub>EBO</sub>	-	-	-0.1	μA <sub>dc</sub>

### ON CHARACTERISTICS

DC Current Gain (Note 4) (I <sub>C</sub> = -10 mA, V <sub>CE</sub> = -2.0 V) (I <sub>C</sub> = -500 mA, V <sub>CE</sub> = -2.0 V) (I <sub>C</sub> = -1.0 A, V <sub>CE</sub> = -2.0 V) (I <sub>C</sub> = -2.0 A, V <sub>CE</sub> = -2.0 V)	h <sub>FE</sub>	100	380	-	
		100	340	-	
		180	300	-	
		150	230	-	
Collector - Emitter Saturation Voltage (Note 4) (I <sub>C</sub> = -0.1 A, I <sub>B</sub> = -0.010 A) (I <sub>C</sub> = -1.0 A, I <sub>B</sub> = -0.100 A) (I <sub>C</sub> = -1.0 A, I <sub>B</sub> = -0.010 A) (I <sub>C</sub> = -2.0 A, I <sub>B</sub> = -0.200 A)	V <sub>CE(sat)</sub>	-	-0.013	-0.017	V
		-	-0.075	-0.095	
		-	-0.130	-0.170	
		-	-0.135	-0.170	
Base - Emitter Saturation Voltage (Note 4) (I <sub>C</sub> = -1.0 A, I <sub>B</sub> = -0.01 A)	V <sub>BE(sat)</sub>	-	-0.780	-0.900	V
Base - Emitter Turn-on Voltage (Note 4) (I <sub>C</sub> = -0.1 A, V <sub>CE</sub> = -2.0 V)	V <sub>BE(on)</sub>	-	-0.660	-0.750	V
Cutoff Frequency (I <sub>C</sub> = -100 mA, V <sub>CE</sub> = -5.0 V, f = 100 MHz)	f <sub>T</sub>	100	120	-	MHz
Input Capacitance (V <sub>EB</sub> = -0.5 V, f = 1.0 MHz)	C <sub>ibo</sub>	-	250	300	pF
Output Capacitance (V <sub>CB</sub> = -3.0 V, f = 1.0 MHz)	C <sub>obo</sub>	-	50	-	pF

### SWITCHING CHARACTERISTICS

Delay (V <sub>CC</sub> = -30 V, I <sub>C</sub> = -750 mA, I <sub>B1</sub> = -15 mA)	t <sub>d</sub>	-	-	60	ns
Rise (V <sub>CC</sub> = -30 V, I <sub>C</sub> = -750 mA, I <sub>B1</sub> = -15 mA)	t <sub>r</sub>	-	-	120	ns
Storage (V <sub>CC</sub> = -30 V, I <sub>C</sub> = -750 mA, I <sub>B1</sub> = -15 mA)	t <sub>s</sub>	-	-	400	ns
Fall (V <sub>CC</sub> = -30 V, I <sub>C</sub> = -750 mA, I <sub>B1</sub> = -15 mA)	t <sub>f</sub>	-	-	130	ns

4. Pulsed Condition: Pulse Width = 300 μsec, Duty Cycle ≤ 2%.

NPN TYPICAL CHARACTERISTICS

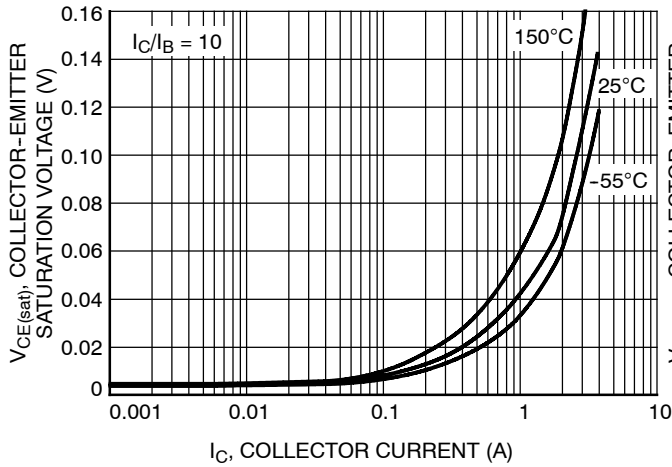


Figure 1. Collector Emitter Saturation Voltage vs. Collector Current

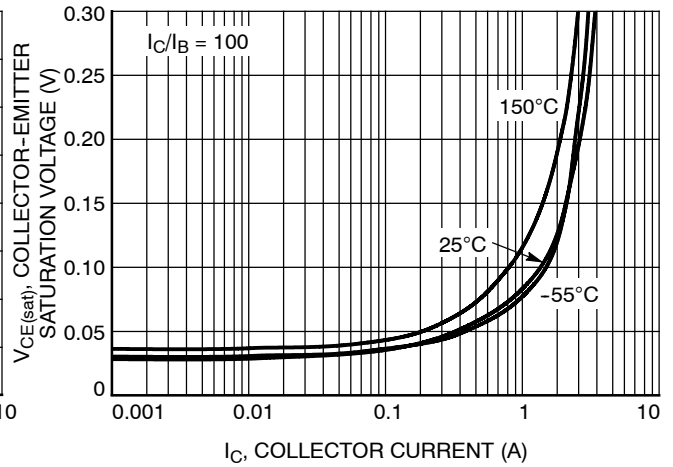


Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

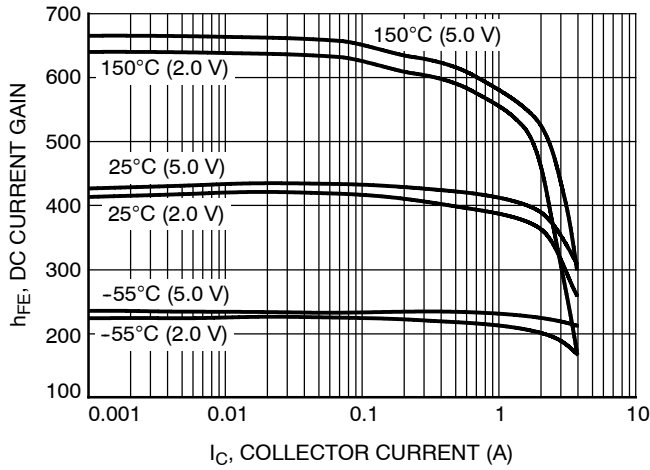


Figure 3. DC Current Gain vs. Collector Current

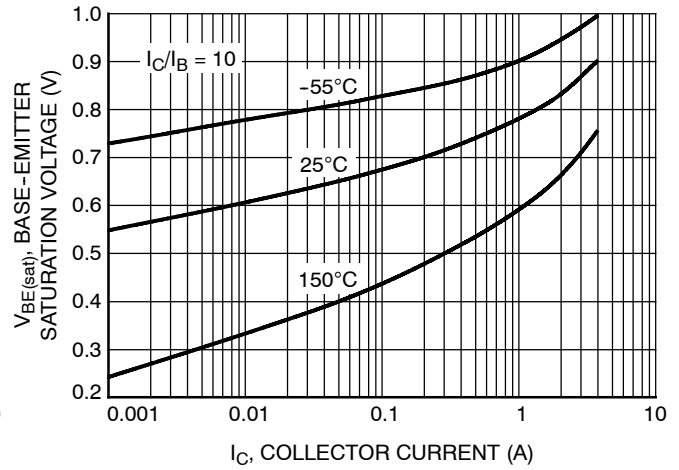


Figure 4. Base Emitter Saturation Voltage vs. Collector Current

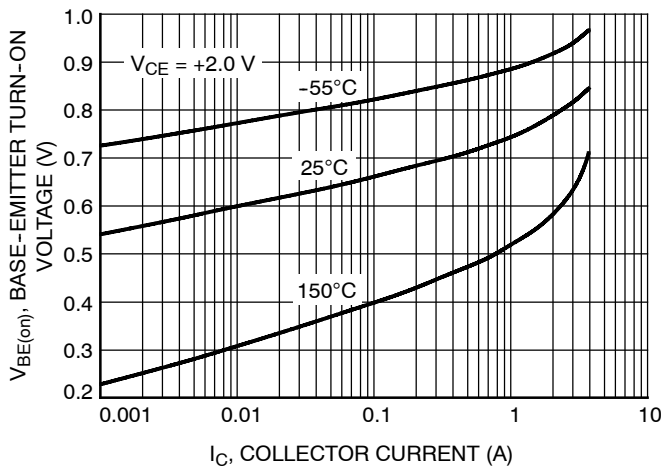


Figure 5. Base Emitter Turn-On Voltage vs. Collector Current

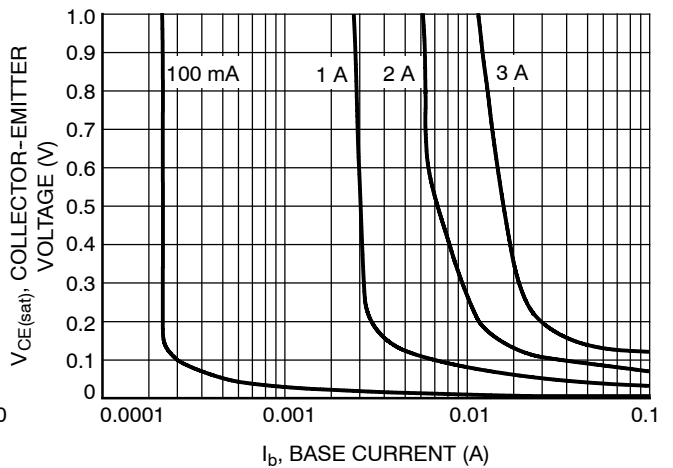


Figure 6. Saturation Region

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## NPN TYPICAL CHARACTERISTICS

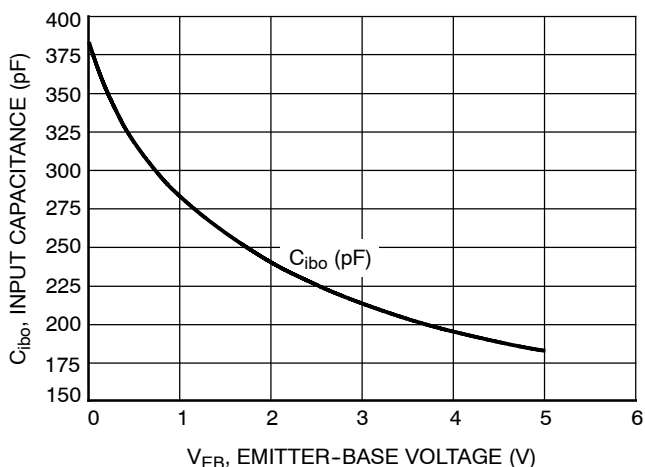


Figure 7. Input Capacitance

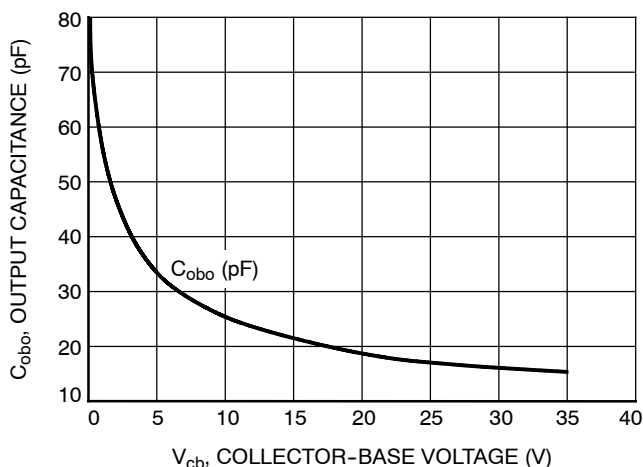


Figure 8. Output Capacitance

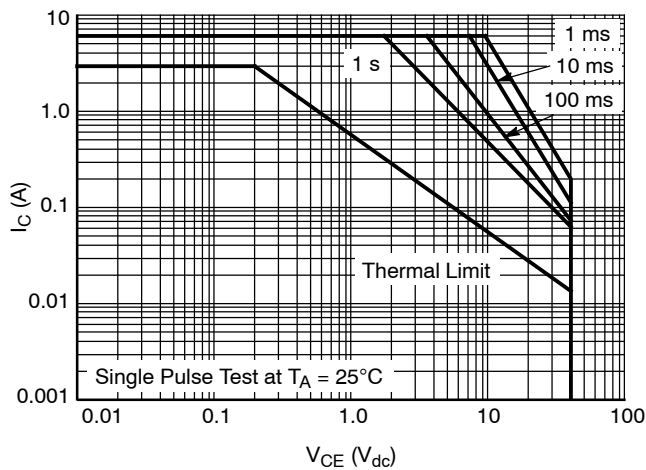


Figure 9. Safe Operating Area

PNP TYPICAL CHARACTERISTICS

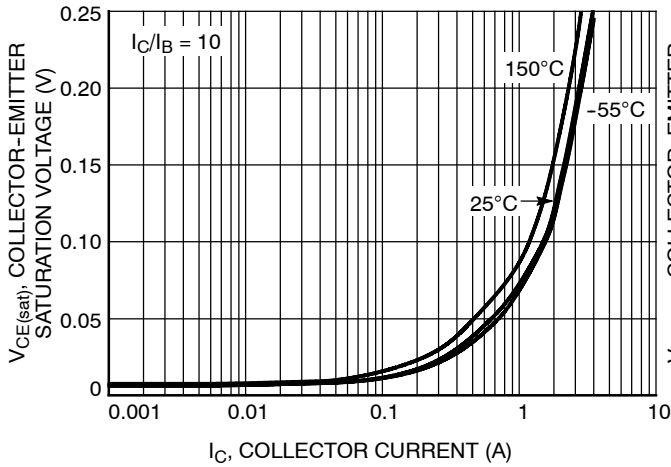


Figure 10. Collector Emitter Saturation Voltage vs. Collector Current

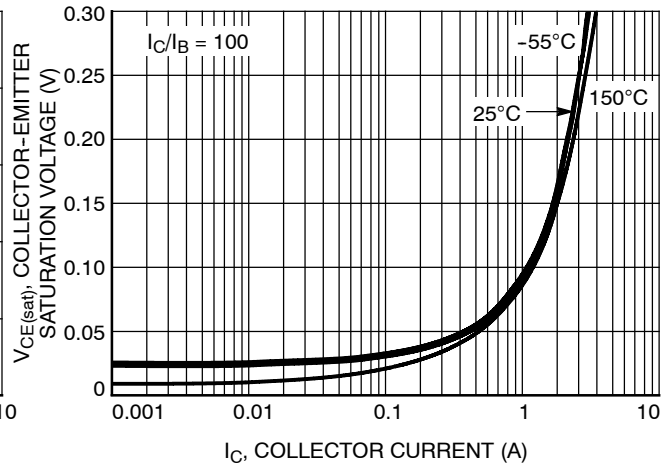


Figure 11. Collector Emitter Saturation Voltage vs. Collector Current

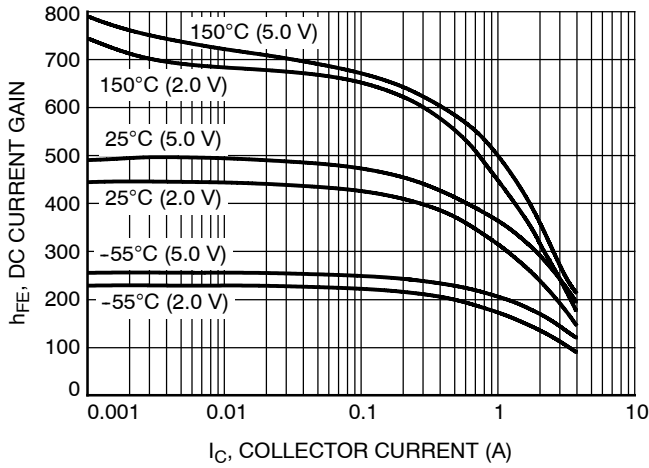


Figure 12. DC Current Gain vs. Collector Current

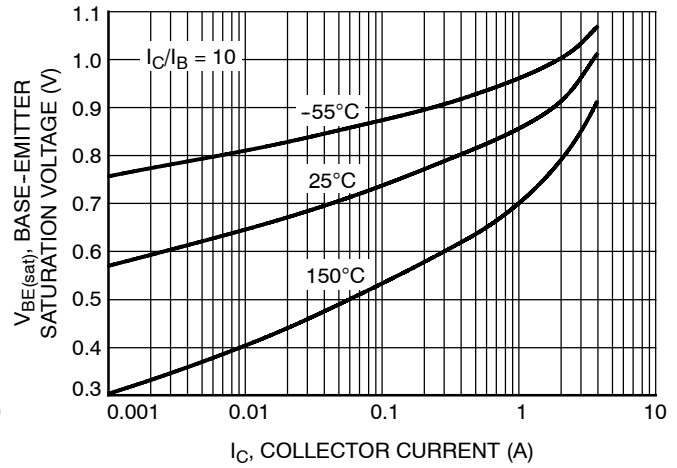


Figure 13. Base Emitter Saturation Voltage vs. Collector Current

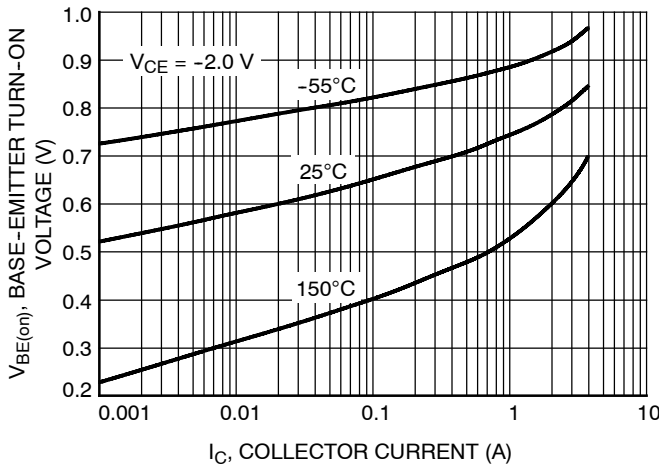


Figure 14. Base Emitter Turn-On Voltage vs. Collector Current

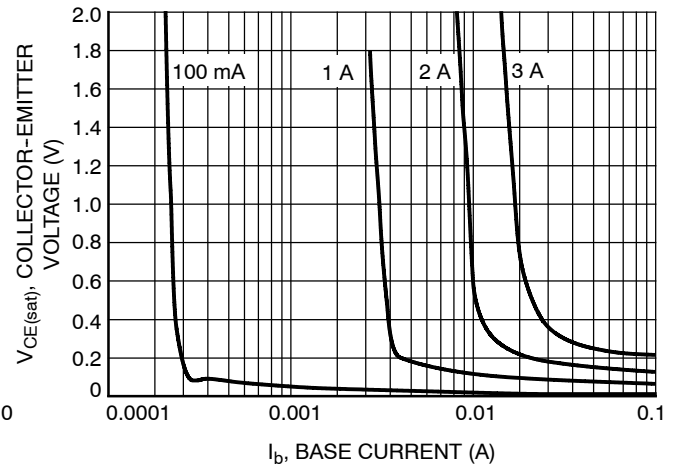


Figure 15. Saturation Region

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## PNP TYPICAL CHARACTERISTICS

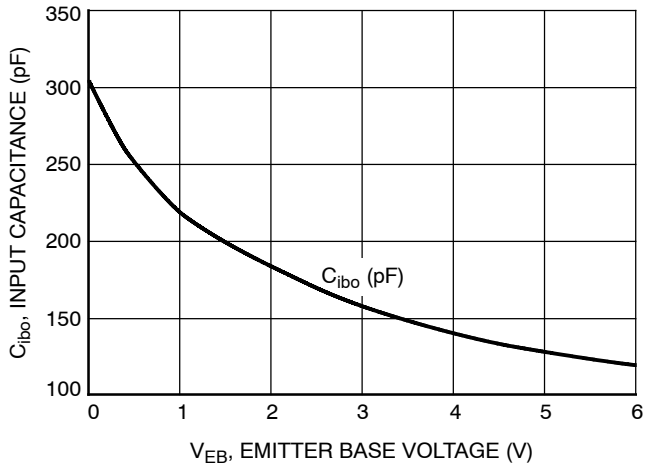


Figure 16. Input Capacitance

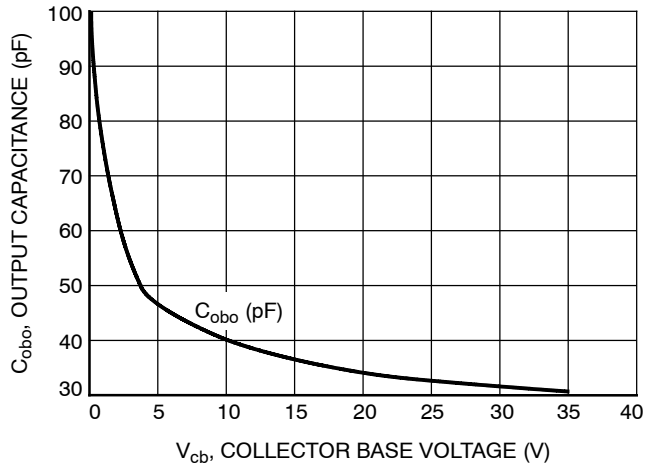


Figure 17. Output Capacitance

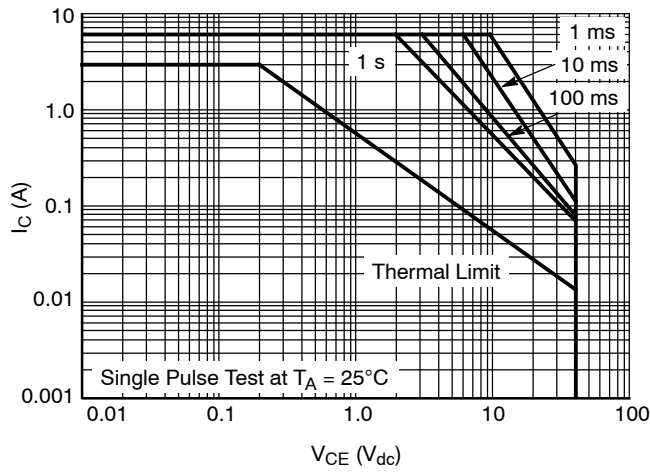


Figure 18. Safe Operating Area

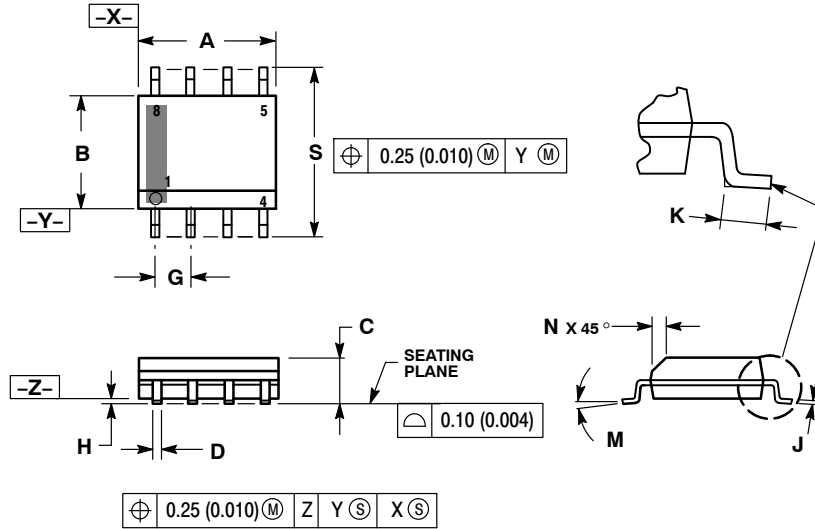
# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 1:1

SOIC-8 NB  
CASE 751-07  
ISSUE AK

DATE 16 FEB 2011



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
  4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
  5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
  6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

## GENERIC MARKING DIAGRAM\*

### SOLDERING FOOTPRINT\*



XXXXX = Specific Device Code  
A = Assembly Location  
L = Wafer Lot  
Y = Year  
W = Work Week  
▪ = Pb-Free Package

XXXXXX = Specific Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
▪ = 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.

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

## STYLES ON PAGE 2

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DESCRIPTION:	SOIC-8 NB	PAGE 1 OF 2

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**SOIC-8 NB**  
**CASE 751-07**  
**ISSUE AK**

DATE 16 FEB 2011

- |   |  |  |  |
|---|--|--|--|
| <p>STYLE 1:<br/>         PIN 1. EMITTER<br/>         2. COLLECTOR<br/>         3. COLLECTOR<br/>         4. EMITTER<br/>         5. EMITTER<br/>         6. BASE<br/>         7. BASE<br/>         8. EMITTER</p>   | <p>STYLE 2:<br/>         PIN 1. COLLECTOR, DIE, #1<br/>         2. COLLECTOR, #1<br/>         3. COLLECTOR, #2<br/>         4. COLLECTOR, #2<br/>         5. BASE, #2<br/>         6. EMITTER, #2<br/>         7. BASE, #1<br/>         8. EMITTER, #1</p>               | <p>STYLE 3:<br/>         PIN 1. DRAIN, DIE #1<br/>         2. DRAIN, #1<br/>         3. DRAIN, #2<br/>         4. DRAIN, #2<br/>         5. GATE, #2<br/>         6. SOURCE, #2<br/>         7. GATE, #1<br/>         8. SOURCE, #1</p>                            | <p>STYLE 4:<br/>         PIN 1. ANODE<br/>         2. ANODE<br/>         3. ANODE<br/>         4. ANODE<br/>         5. ANODE<br/>         6. ANODE<br/>         7. ANODE<br/>         8. COMMON CATHODE</p>   |
| <p>STYLE 5:<br/>         PIN 1. DRAIN<br/>         2. DRAIN<br/>         3. DRAIN<br/>         4. DRAIN<br/>         5. GATE<br/>         6. GATE<br/>         7. SOURCE<br/>         8. SOURCE</p>   | <p>STYLE 6:<br/>         PIN 1. SOURCE<br/>         2. DRAIN<br/>         3. DRAIN<br/>         4. SOURCE<br/>         5. SOURCE<br/>         6. GATE<br/>         7. GATE<br/>         8. SOURCE</p>  | <p>STYLE 7:<br/>         PIN 1. INPUT<br/>         2. EXTERNAL BYPASS<br/>         3. THIRD STAGE SOURCE<br/>         4. GROUND<br/>         5. DRAIN<br/>         6. GATE 3<br/>         7. SECOND STAGE Vd<br/>         8. FIRST STAGE Vd</p>                    | <p>STYLE 8:<br/>         PIN 1. COLLECTOR, DIE #1<br/>         2. BASE, #1<br/>         3. BASE, #2<br/>         4. COLLECTOR, #2<br/>         5. COLLECTOR, #2<br/>         6. EMITTER, #2<br/>         7. EMITTER, #1<br/>         8. COLLECTOR, #1</p>                              |
| <p>STYLE 9:<br/>         PIN 1. EMITTER, COMMON<br/>         2. COLLECTOR, DIE #1<br/>         3. COLLECTOR, DIE #2<br/>         4. EMITTER, COMMON<br/>         5. EMITTER, COMMON<br/>         6. BASE, DIE #2<br/>         7. BASE, DIE #1<br/>         8. EMITTER, COMMON</p> | <p>STYLE 10:<br/>         PIN 1. GROUND<br/>         2. BIAS 1<br/>         3. OUTPUT<br/>         4. GROUND<br/>         5. GROUND<br/>         6. BIAS 2<br/>         7. INPUT<br/>         8. GROUND</p>  | <p>STYLE 11:<br/>         PIN 1. SOURCE 1<br/>         2. GATE 1<br/>         3. SOURCE 2<br/>         4. GATE 2<br/>         5. DRAIN 2<br/>         6. DRAIN 2<br/>         7. DRAIN 1<br/>         8. DRAIN 1</p>   | <p>STYLE 12:<br/>         PIN 1. SOURCE<br/>         2. SOURCE<br/>         3. SOURCE<br/>         4. GATE<br/>         5. DRAIN<br/>         6. DRAIN<br/>         7. DRAIN<br/>         8. DRAIN</p>   |
| <p>STYLE 13:<br/>         PIN 1. N.C.<br/>         2. SOURCE<br/>         3. SOURCE<br/>         4. GATE<br/>         5. DRAIN<br/>         6. DRAIN<br/>         7. DRAIN<br/>         8. DRAIN</p>  | <p>STYLE 14:<br/>         PIN 1. N-SOURCE<br/>         2. N-GATE<br/>         3. P-SOURCE<br/>         4. P-GATE<br/>         5. P-DRAIN<br/>         6. P-DRAIN<br/>         7. N-DRAIN<br/>         8. N-DRAIN</p>   | <p>STYLE 15:<br/>         PIN 1. ANODE 1<br/>         2. ANODE 1<br/>         3. ANODE 1<br/>         4. ANODE 1<br/>         5. CATHODE, COMMON<br/>         6. CATHODE, COMMON<br/>         7. CATHODE, COMMON<br/>         8. CATHODE, COMMON</p>               | <p>STYLE 16:<br/>         PIN 1. EMITTER, DIE #1<br/>         2. BASE, DIE #1<br/>         3. EMITTER, DIE #2<br/>         4. BASE, DIE #2<br/>         5. COLLECTOR, DIE #2<br/>         6. COLLECTOR, DIE #2<br/>         7. COLLECTOR, DIE #1<br/>         8. COLLECTOR, DIE #1</p> |
| <p>STYLE 17:<br/>         PIN 1. VCC<br/>         2. V2OUT<br/>         3. V1OUT<br/>         4. TXE<br/>         5. RXE<br/>         6. VEE<br/>         7. GND<br/>         8. ACC</p>  | <p>STYLE 18:<br/>         PIN 1. ANODE<br/>         2. ANODE<br/>         3. SOURCE<br/>         4. GATE<br/>         5. DRAIN<br/>         6. DRAIN<br/>         7. CATHODE<br/>         8. CATHODE</p>   | <p>STYLE 19:<br/>         PIN 1. SOURCE 1<br/>         2. GATE 1<br/>         3. SOURCE 2<br/>         4. GATE 2<br/>         5. DRAIN 2<br/>         6. MIRROR 2<br/>         7. DRAIN 1<br/>         8. MIRROR 1</p>   | <p>STYLE 20:<br/>         PIN 1. SOURCE (N)<br/>         2. GATE (N)<br/>         3. SOURCE (P)<br/>         4. GATE (P)<br/>         5. DRAIN<br/>         6. DRAIN<br/>         7. DRAIN<br/>         8. DRAIN</p>   |
| <p>STYLE 21:<br/>         PIN 1. CATHODE 1<br/>         2. CATHODE 2<br/>         3. CATHODE 3<br/>         4. CATHODE 4<br/>         5. CATHODE 5<br/>         6. COMMON ANODE<br/>         7. COMMON ANODE<br/>         8. CATHODE 6</p>  | <p>STYLE 22:<br/>         PIN 1. I/O LINE 1<br/>         2. COMMON CATHODE/VCC<br/>         3. COMMON CATHODE/VCC<br/>         4. I/O LINE 3<br/>         5. COMMON ANODE/GND<br/>         6. I/O LINE 4<br/>         7. I/O LINE 5<br/>         8. COMMON ANODE/GND</p> | <p>STYLE 23:<br/>         PIN 1. LINE 1 IN<br/>         2. COMMON ANODE/GND<br/>         3. COMMON ANODE/GND<br/>         4. LINE 2 IN<br/>         5. LINE 2 OUT<br/>         6. COMMON ANODE/GND<br/>         7. COMMON ANODE/GND<br/>         8. LINE 1 OUT</p> | <p>STYLE 24:<br/>         PIN 1. BASE<br/>         2. EMITTER<br/>         3. COLLECTOR/ANODE<br/>         4. COLLECTOR/ANODE<br/>         5. CATHODE<br/>         6. CATHODE<br/>         7. COLLECTOR/ANODE<br/>         8. COLLECTOR/ANODE</p>                                      |
| <p>STYLE 25:<br/>         PIN 1. VIN<br/>         2. N/C<br/>         3. REXT<br/>         4. GND<br/>         5. IOUT<br/>         6. IOUT<br/>         7. IOUT<br/>         8. IOUT</p>   | <p>STYLE 26:<br/>         PIN 1. GND<br/>         2. dv/dt<br/>         3. ENABLE<br/>         4. ILIMIT<br/>         5. SOURCE<br/>         6. SOURCE<br/>         7. SOURCE<br/>         8. VCC</p>  | <p>STYLE 27:<br/>         PIN 1. ILIMIT<br/>         2. OVLO<br/>         3. UVLO<br/>         4. INPUT+<br/>         5. SOURCE<br/>         6. SOURCE<br/>         7. SOURCE<br/>         8. DRAIN</p>  | <p>STYLE 28:<br/>         PIN 1. SW_TO_GND<br/>         2. DASIC_OFF<br/>         3. DASIC_SW_DET<br/>         4. GND<br/>         5. V_MON<br/>         6. VBULK<br/>         7. VBULK<br/>         8. VIN</p>  |
| <p>STYLE 29:<br/>         PIN 1. BASE, DIE #1<br/>         2. EMITTER, #1<br/>         3. BASE, #2<br/>         4. EMITTER, #2<br/>         5. COLLECTOR, #2<br/>         6. COLLECTOR, #2<br/>         7. COLLECTOR, #1<br/>         8. COLLECTOR, #1</p>                        | <p>STYLE 30:<br/>         PIN 1. DRAIN 1<br/>         2. DRAIN 1<br/>         3. GATE 2<br/>         4. SOURCE 2<br/>         5. SOURCE 1/DRAIN 2<br/>         6. SOURCE 1/DRAIN 2<br/>         7. SOURCE 1/DRAIN 2<br/>         8. GATE 1</p>                           |  |  |

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