

# NGTB30N65IHL2WG

## IGBT

This Insulated Gate Bipolar Transistor (IGBT) features a robust and cost effective Field Stop (FS) Trench construction, and provides superior performance in demanding switching applications, offering both low on state voltage and minimal switching loss. The IGBT is well suited for half bridge resonant applications. Incorporated into the device is a soft and fast co-packaged free wheeling diode with a low forward voltage.

### Features

- Extremely Efficient Trench with Fieldstop Technology
- Low Switching Loss Reduces System Power Dissipation
- Optimized for Low Losses in IH Cooker Application
- $T_{Jmax} = 175^{\circ}C$
- Soft, Fast Free Wheeling Diode
- This is a Pb-Free Device

### Typical Applications

- Inductive Heating
- Soft Switching

### ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-emitter voltage	$V_{CES}$	650	V
Collector current @ $T_C = 25^{\circ}C$ @ $T_C = 100^{\circ}C$	$I_C$	60 30	A
Pulsed collector current, $T_{pulse}$ limited by $T_{Jmax}$	$I_{CM}$	120	A
Diode forward current @ $T_C = 25^{\circ}C$ @ $T_C = 100^{\circ}C$	$I_F$	60 30	A
Diode pulsed current, $T_{pulse}$ limited by $T_{Jmax}$	$I_{FM}$	120	A
Gate-emitter voltage	$V_{GE}$	$\pm 20$	V
Power Dissipation @ $T_C = 25^{\circ}C$ @ $T_C = 100^{\circ}C$	$P_D$	300 150	W
Operating junction temperature range	$T_J$	-55 to +175	$^{\circ}C$
Storage temperature range	$T_{stg}$	-55 to +175	$^{\circ}C$
Lead temperature for soldering, 1/8" from case for 5 seconds	$T_{SLD}$	260	$^{\circ}C$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



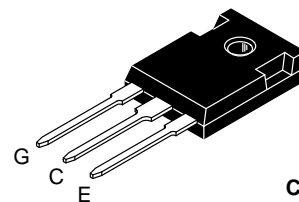
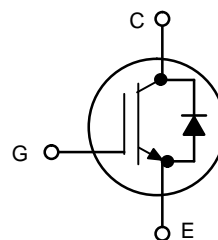
**ON Semiconductor®**

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**30 A, 650 V**

**$V_{CEsat} = 1.6 V$**

**$E_{off} = 0.2 mJ$**



**TO-247  
CASE 340AL**

### MARKING DIAGRAM



- A = Assembly Location
- Y = Year
- WW = Work Week
- G = Pb-Free Package

### ORDERING INFORMATION

Device	Package	Shipping
NGTB30N65IHL2WG	TO-247 (Pb-Free)	30 Units / Rail

# NGTB30N65IHL2WG

## THERMAL CHARACTERISTICS

Rating	Symbol	Value	Unit
Thermal resistance junction-to-case, for IGBT	$R_{\theta JC}$	0.50	$^{\circ}\text{C}/\text{W}$
Thermal resistance junction-to-case, for Diode	$R_{\theta JC}$	1.46	$^{\circ}\text{C}/\text{W}$
Thermal resistance junction-to-ambient	$R_{\theta JA}$	40	$^{\circ}\text{C}/\text{W}$

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

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
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### STATIC CHARACTERISTIC

Collector-emitter breakdown voltage, gate-emitter short-circuited	$V_{GE} = 0\text{ V}, I_C = 500\ \mu\text{A}$	$V_{(BR)CES}$	650	–	–	V
Collector-emitter saturation voltage	$V_{GE} = 15\text{ V}, I_C = 30\text{ A}$ $V_{GE} = 15\text{ V}, I_C = 30\text{ A}, T_J = 175^{\circ}\text{C}$	$V_{CEsat}$	–	1.6 2.0	2.2 –	V
Gate-emitter threshold voltage	$V_{GE} = V_{CE}, I_C = 150\ \mu\text{A}$	$V_{GE(th)}$	4.5	5.5	6.5	V
Collector-emitter cut-off current, gate-emitter short-circuited	$V_{GE} = 0\text{ V}, V_{CE} = 650\text{ V}$ $V_{GE} = 0\text{ V}, V_{CE} = 650\text{ V}, T_J = 175^{\circ}\text{C}$	$I_{CES}$	–	–	0.2 2	mA
Gate leakage current, collector-emitter short-circuited	$V_{GE} = 20\text{ V}, V_{CE} = 0\text{ V}$	$I_{GES}$	–	–	100	nA

### DYNAMIC CHARACTERISTIC

Input capacitance	$V_{CE} = 20\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$	$C_{ies}$	–	3200	–	pF
Output capacitance		$C_{oes}$	–	130	–	
Reverse transfer capacitance		$C_{res}$	–	85	–	
Gate charge total	$V_{CE} = 480\text{ V}, I_C = 30\text{ A}, V_{GE} = 15\text{ V}$	$Q_g$		135		nC
Gate to emitter charge		$Q_{ge}$		26		
Gate to collector charge		$Q_{gc}$		66		

### SWITCHING CHARACTERISTIC, INDUCTIVE LOAD

Turn-off delay time	$T_J = 25^{\circ}\text{C}$ $V_{CC} = 400\text{ V}, I_C = 30\text{ A}$ $R_g = 10\ \Omega$ $V_{GE} = 0\text{ V}/15\text{ V}$	$t_{d(off)}$		145		ns
Fall time		$t_f$		71		
Turn-off switching loss		$E_{off}$		0.2		
Turn-off delay time	$T_J = 150^{\circ}\text{C}$ $V_{CC} = 400\text{ V}, I_C = 30\text{ A}$ $R_g = 10\ \Omega$ $V_{GE} = 0\text{ V}/15\text{ V}$	$t_{d(off)}$		151		ns
Fall time		$t_f$		94		
Turn-off switching loss		$E_{off}$		0.41		

### DIODE CHARACTERISTIC

Forward voltage	$V_{GE} = 0\text{ V}, I_F = 30\text{ A}$ $V_{GE} = 0\text{ V}, I_F = 30\text{ A}, T_J = 175^{\circ}\text{C}$	$V_F$		1.1 1.0	1.3	V
Reverse recovery time	$T_J = 25^{\circ}\text{C}$ $I_F = 30\text{ A}, V_R = 200\text{ V}$ $di_F/dt = 200\text{ A}/\mu\text{s}$	$t_{rr}$		430		ns
Reverse recovery charge		$Q_{rr}$		7700		nc
Reverse recovery current		$I_{rrm}$		35		A

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

# NGTB30N65IHL2WG

## TYPICAL CHARACTERISTICS

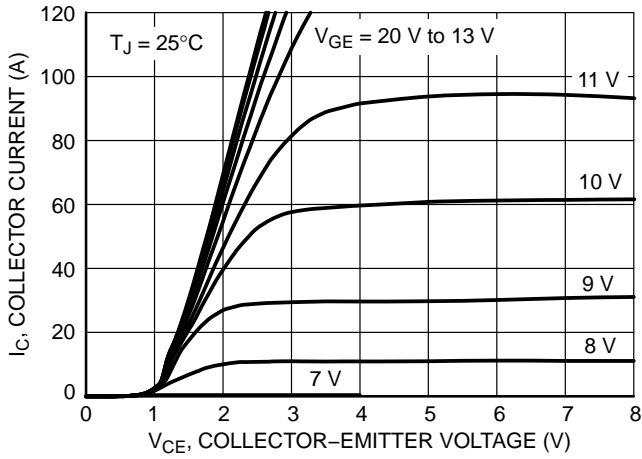


Figure 1. Output Characteristics

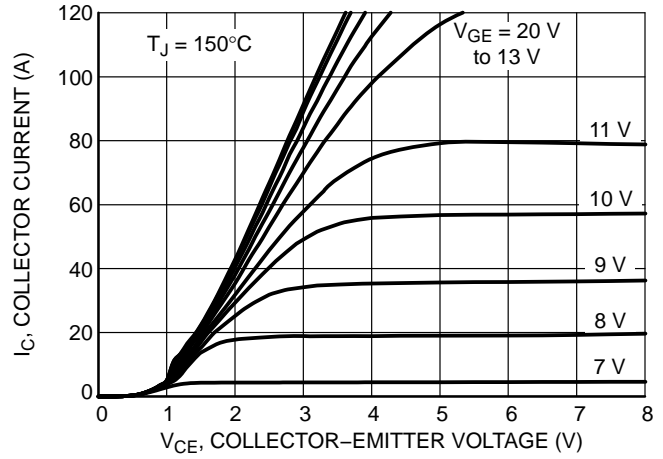


Figure 2. Output Characteristics

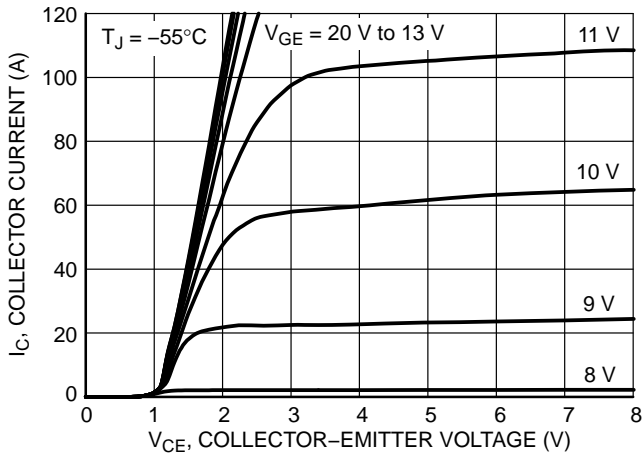


Figure 3. Output Characteristics

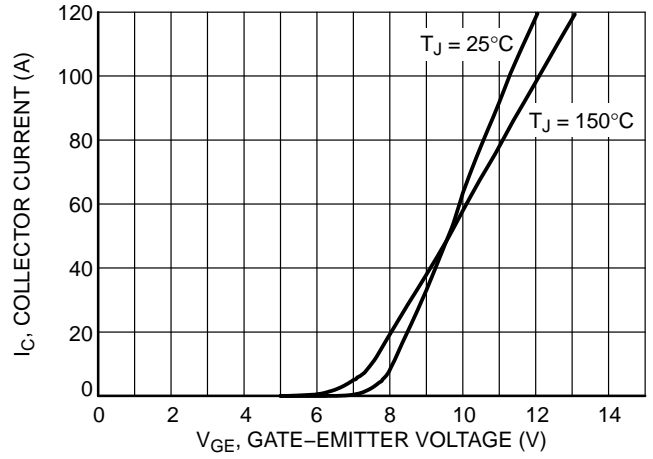


Figure 4. Typical Transfer Characteristics

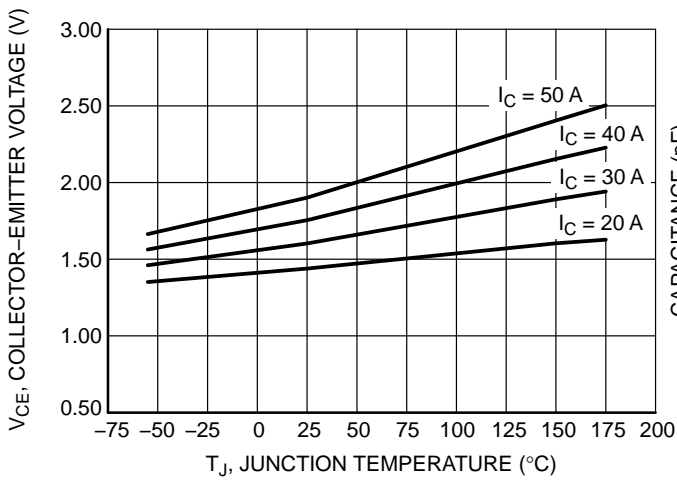


Figure 5.  $V_{CE(sat)}$  vs.  $T_J$

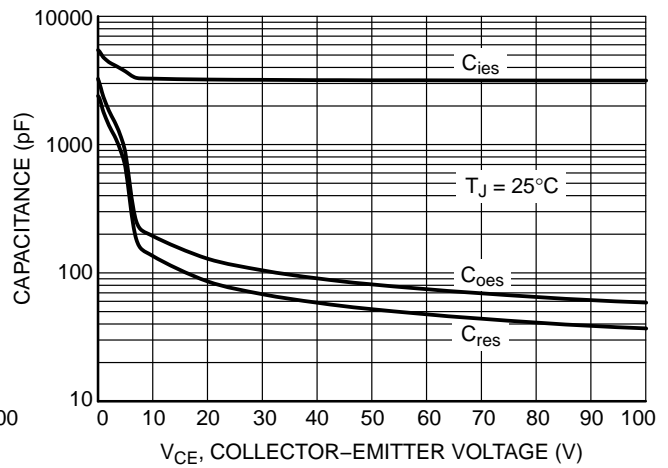


Figure 6. Typical Capacitance

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## TYPICAL CHARACTERISTICS

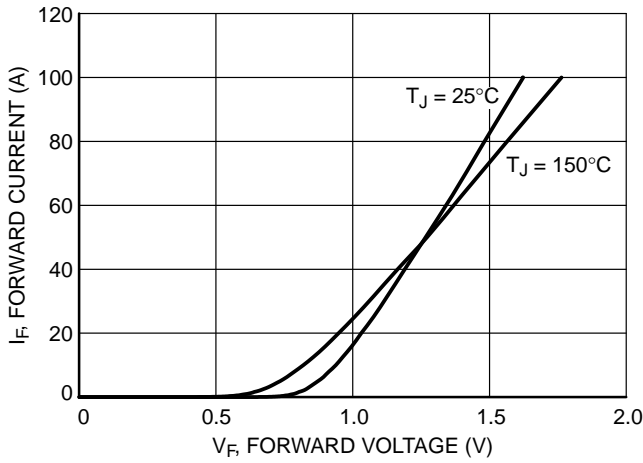


Figure 7. Diode Forward Characteristics

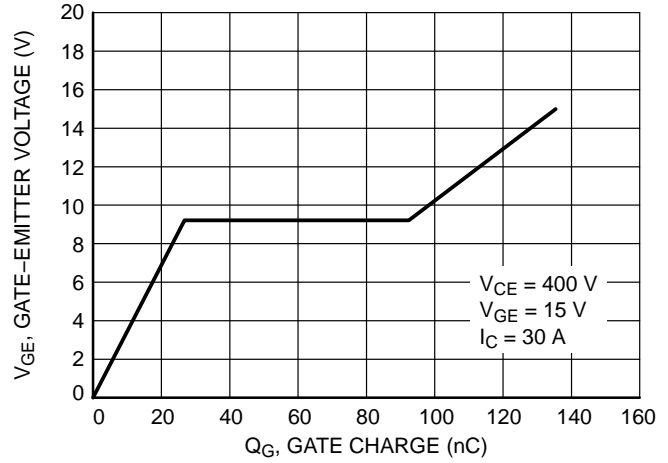


Figure 8. Typical Gate Charge

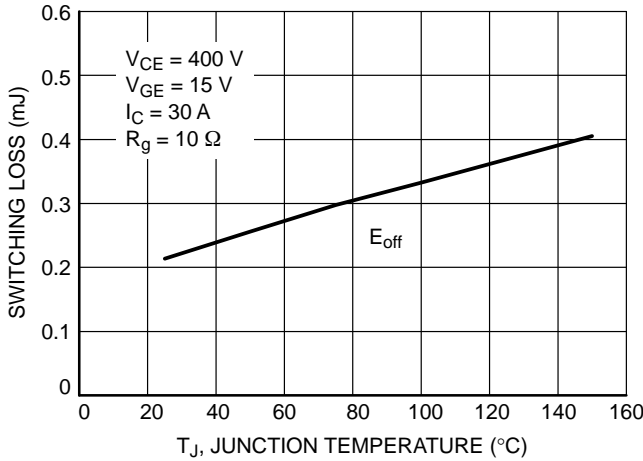


Figure 9. Switching Loss vs. Temperature

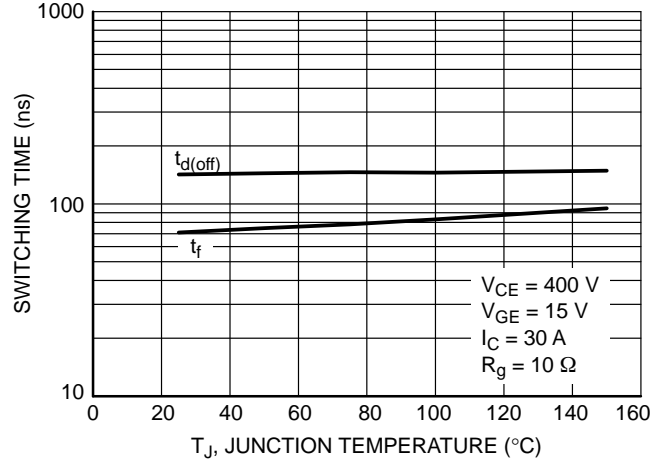


Figure 10. Switching Time vs. Temperature

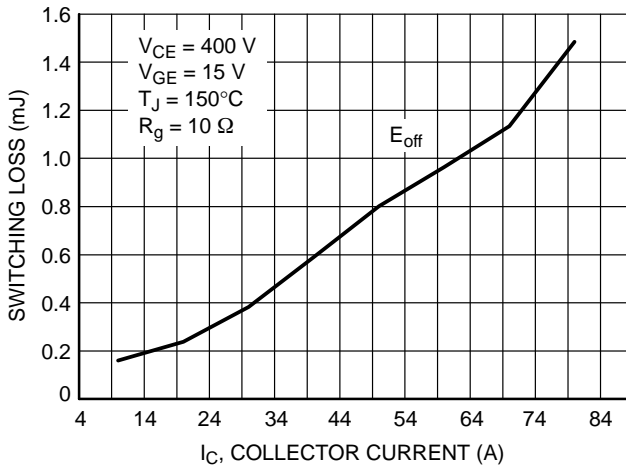


Figure 11. Switching Loss vs.  $I_C$

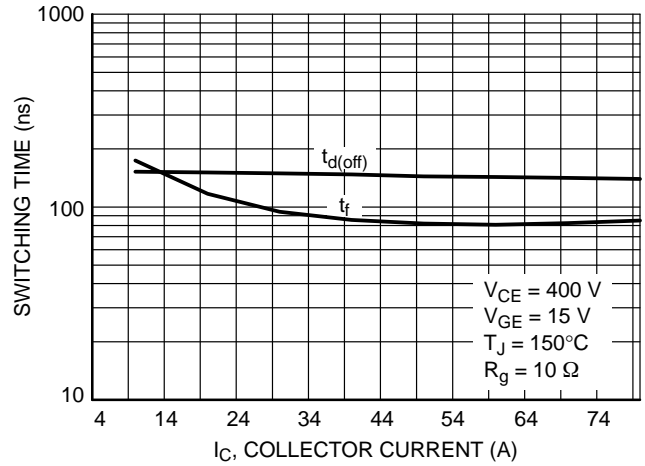


Figure 12. Switching Time vs.  $I_C$

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## TYPICAL CHARACTERISTICS

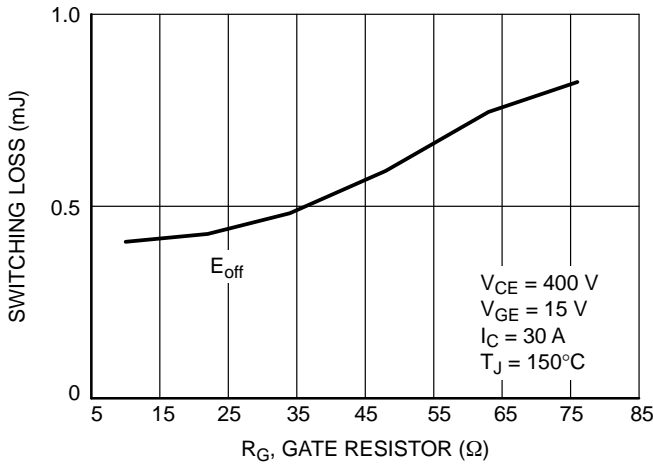


Figure 13. Switching Loss vs.  $R_G$

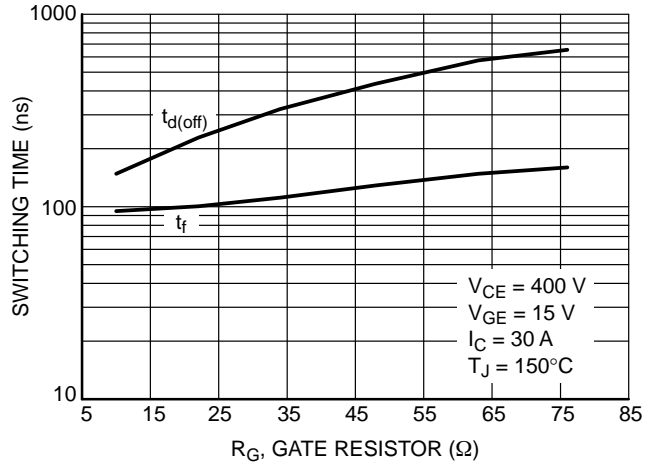


Figure 14. Switching Time vs.  $R_G$

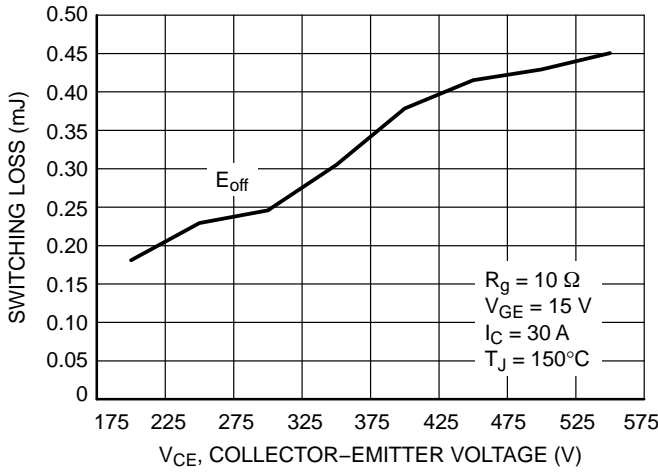


Figure 15. Switching Loss vs.  $V_{CE}$

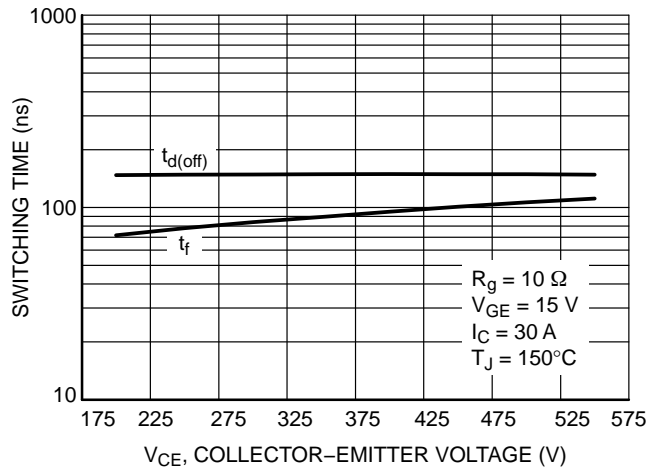


Figure 16. Switching Time vs.  $V_{CE}$

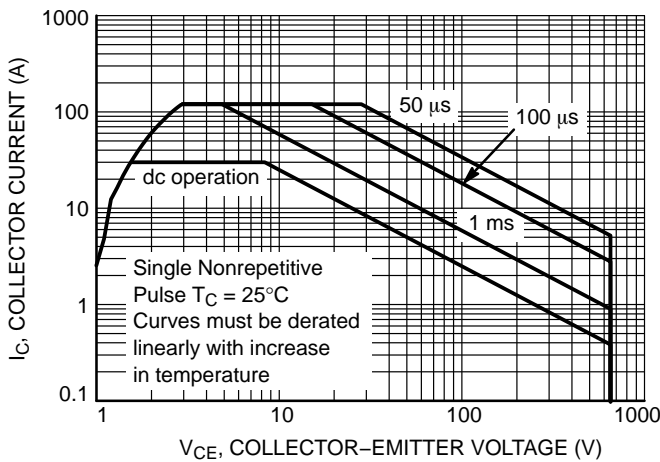


Figure 17. Safe Operating Area

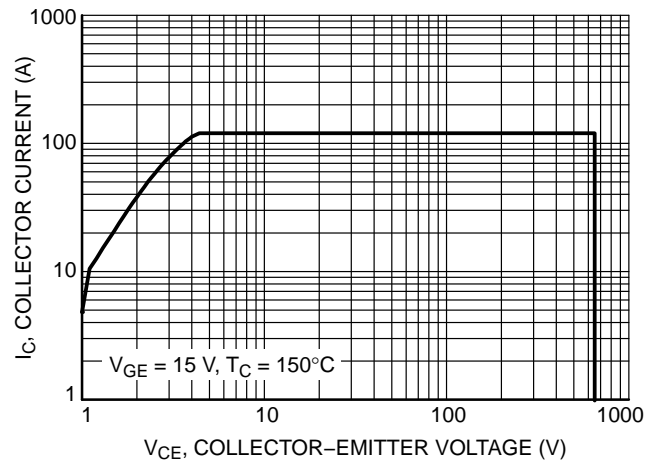


Figure 18. Reverse Bias Safe Operating Area

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## TYPICAL CHARACTERISTICS

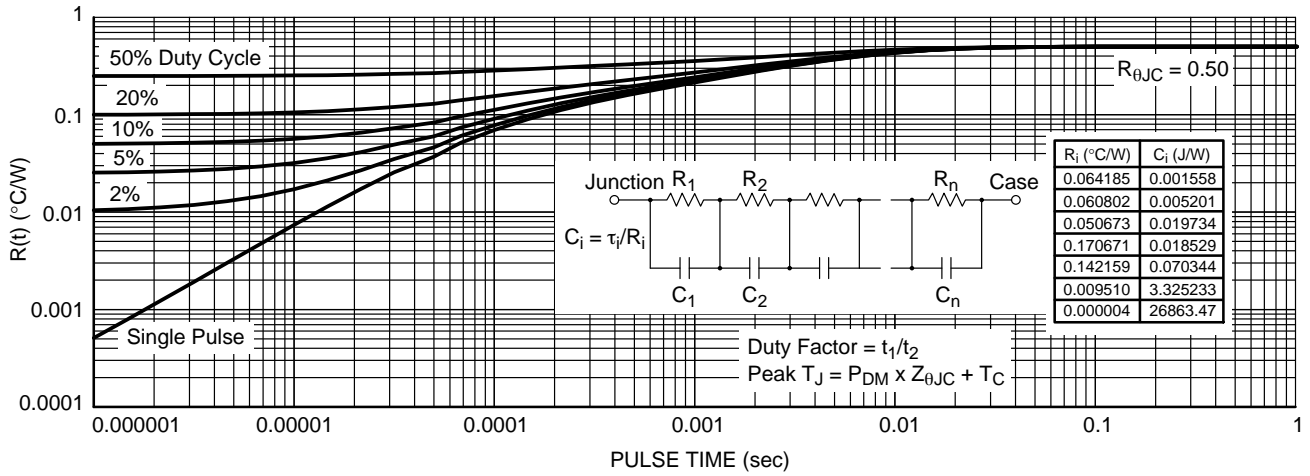


Figure 19. IGBT Transient Thermal Impedance

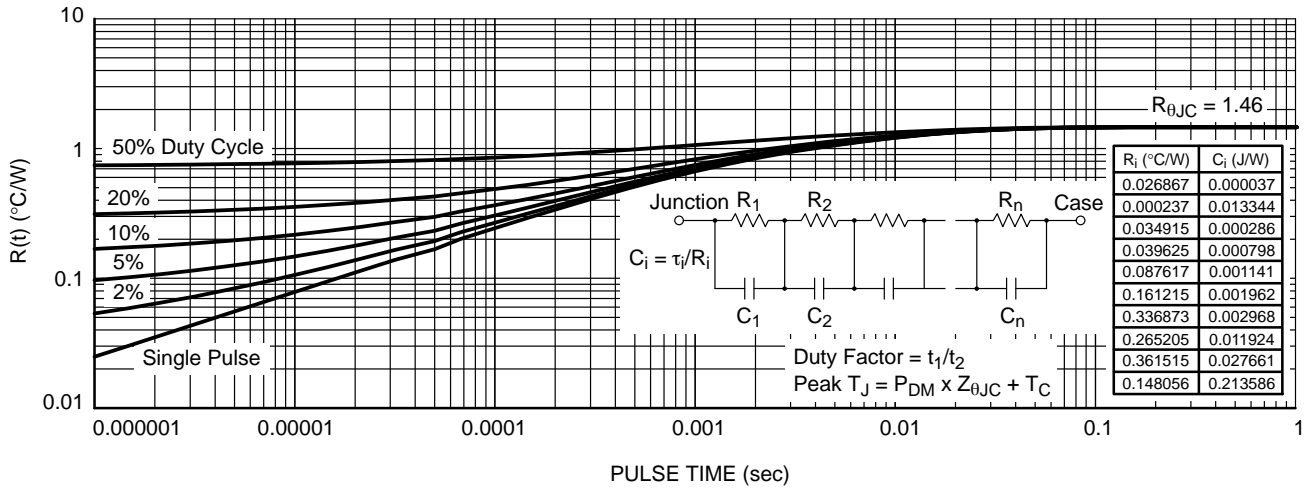
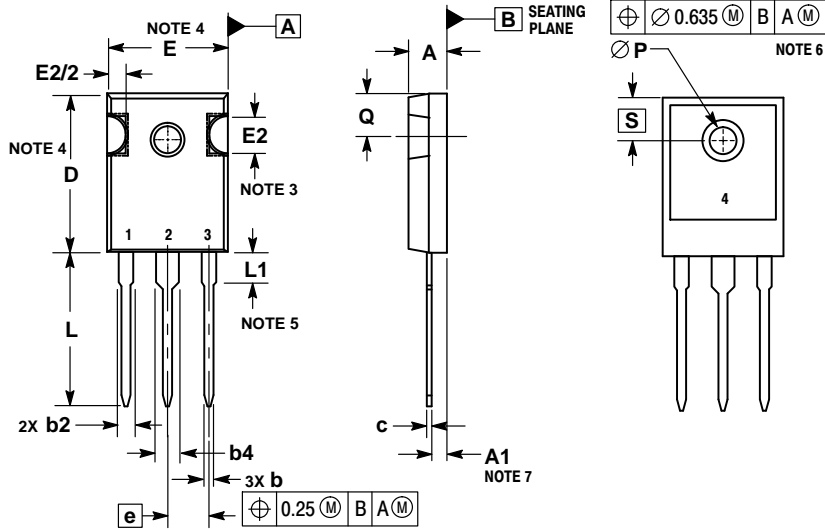


Figure 20. Diode Transient Thermal Impedance

# NGTB30N65IHL2WG

## PACKAGE DIMENSIONS

### TO-247 CASE 340AL ISSUE A



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. SLOT REQUIRED, NOTCH MAY BE ROUNDED.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.13 PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREME OF THE PLASTIC BODY.
5. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.
6.  $\varnothing P$  SHALL HAVE A MAXIMUM DRAFT ANGLE OF 1.5° TO THE TOP OF THE PART WITH A MAXIMUM DIAMETER OF 3.91.
7. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.

DIM	MILLIMETERS	
	MIN	MAX
A	4.70	5.30
A1	2.20	2.60
b	1.00	1.40
b2	1.65	2.35
b4	2.60	3.40
c	0.40	0.80
D	20.30	21.40
E	15.50	16.25
E2	4.32	5.49
e	5.45 BSC	
L	19.80	20.80
L1	3.50	4.50
P	3.55	3.65
Q	5.40	6.20
S	6.15 BSC	

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