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NGTG35N65FL2WG

IGBT − Field Stop II

This Insulated Gate Bipolar Transistor (IGBT) features a robust and cost effective Field Stop II 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 UPS and solar applications.

Features

- Extremely Efficient Trench with Field Stop Technology
- T_{Jmax} = 175°C
- Optimized for High Speed Switching
- 5 μs Short−Circuit Capability
- These are Pb−Free Devices

Typical Applications

- Solar Inverters
- Uninterruptible Power Supplies (UPS)
- Welding

ABSOLUTE MAXIMUM RATINGS

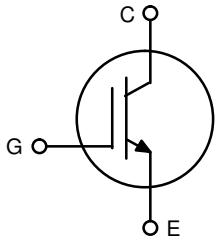
Rating	Symbol	Value	Unit
Collector−emitter voltage	V_{CES}	650	V
Collector current @ T_C = 25°C @ T_C = 100°C	I_C	 70 35	A
Pulsed collector current, T_{pulse} limited by T_{Jmax}	I_{CM}	120	A
Short−circuit withstand time V_{GE} = 15 V, V_{CE} = 400 V, $T_J \leq$ +150°C	t_{SC}	5	μs
Gate−emitter voltage	V_{GE}	±20	V
Transient gate−emitter voltage (T_{PULSE} = 5 μs, D < 0.10)		±30	V
Power Dissipation @ T_C = 25°C @ T_C = 100°C	P_D	 300 150	W
Operating junction temperature range	T_J	−55 to +175	°C
Storage temperature range	T_{stg}	−55 to +175	°C
Lead temperature for soldering, 1/8” from case for 5 seconds	T_{SLD}	260	°C

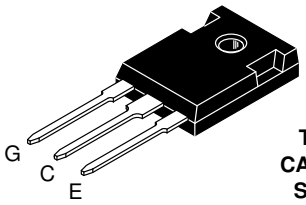
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

ON Semiconductor®

www.onsemi.com

35 A, 650 V
V_{CEsat} = 1.70 V
E_{OFF} = 0.28 mJ





TO−247
CASE 340L
STYLE 4

MARKING DIAGRAM

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

ORDERING INFORMATION

Device	Package	Shipping
NGTG35N65FL2WG	TO−247 (Pb−Free)	30 Units / Rail

THERMAL CHARACTERISTICS

Rating	Symbol	Value	Unit
Thermal resistance junction−to−case, for IGBT	$R_{\theta JC}$	0.50	°C/W
Thermal resistance junction−to−ambient	$R_{\theta JA}$	40	°C/W

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
STATIC CHARACTERISTIC						
Collector−emitter breakdown voltage, gate−emitter short−circuited	V_{GE} = 0 V, I_C = 500 μA	$V_{(BR)CES}$	650	–	–	V
Collector−emitter saturation voltage	V_{GE} = 15 V, I_C = 35 A V_{GE} = 15 V, I_C = 35 A, T_J = 175°C	V_{CEsat}	1.50 –	1.70 2.20	2.00 –	V
Gate−emitter threshold voltage	V_{GE} = V_{CE}, I_C = 350 μA	$V_{GE(th)}$	4.5	5.5	6.5	V
Collector−emitter cut−off current, gate−emitter short−circuited	V_{GE} = 0 V, V_{CE} = 650 V V_{GE} = 0 V, V_{CE} = 650 V, T_J = 175°C	I_{CES}	– –	– –	0.5 4.0	mA
Gate leakage current, collector−emitter short−circuited	V_{GE} = 20 V , V_{CE} = 0 V	I_{GES}	–	–	200	nA
DYNAMIC CHARACTERISTIC						
Input capacitance	V_{CE} = 20 V, V_{GE} = 0 V, f = 1 MHz	C_{ies}	–	3115	–	pF
Output capacitance		C_{oes}	–	149	–	
Reverse transfer capacitance		C_{res}	–	88	–	
Gate charge total	V_{CE} = 480 V, I_C = 35 A, V_{GE} = 15 V	Q_g	–	125	–	nC
Gate to emitter charge		Q_{ge}	–	30	–	
Gate to collector charge		Q_{gc}	–	63	–	
SWITCHING CHARACTERISTIC, INDUCTIVE LOAD						
Turn−on delay time	T_J = 25°C V_{CC} = 400 V, I_C = 35 A R_g = 10 Ω V_{GE} = 0 V/ 15 V*	$t_{d(on)}$	–	72	–	ns
Rise time		t_r	–	40	–	
Turn−off delay time		$t_{d(off)}$	–	132	–	
Fall time		t_f	–	75	–	
Turn−on switching loss		E_{on}	–	0.84	–	mJ
Turn−off switching loss		E_{off}	–	0.28	–	
Total switching loss		E_{ts}	–	1.12	–	
Turn−on delay time	T_J = 150°C V_{CC} = 400 V, I_C = 35 A R_g = 10 Ω V_{GE} = 0 V/ 15 V*	$t_{d(on)}$	–	70	–	ns
Rise time		t_r	–	38	–	
Turn−off delay time		$t_{d(off)}$	–	135	–	
Fall time		t_f	–	96	–	
Turn−on switching loss		E_{on}	–	1.05	–	mJ
Turn−off switching loss		E_{off}	–	0.50	–	
Total switching loss		E_{ts}	–	1.55	–	

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.
*Includes diode reverse recovery loss using NGTG35N65FL2WG.

TYPICAL CHARACTERISTICS

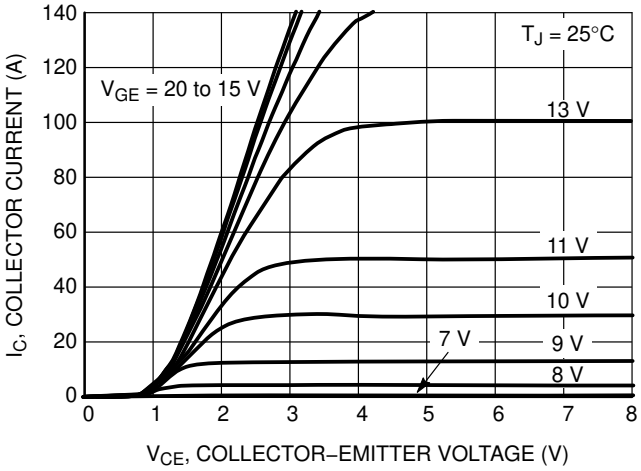


Figure 1. Output Characteristics

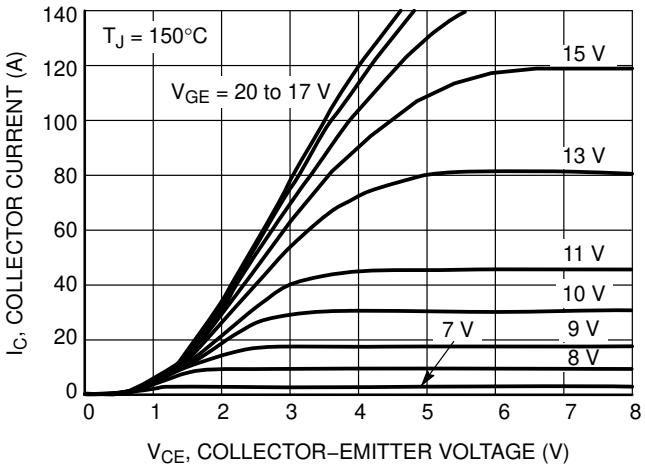


Figure 2. Output Characteristics

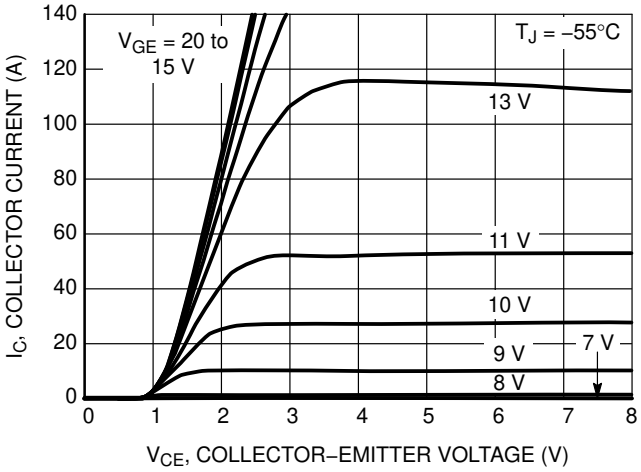


Figure 3. Output Characteristics

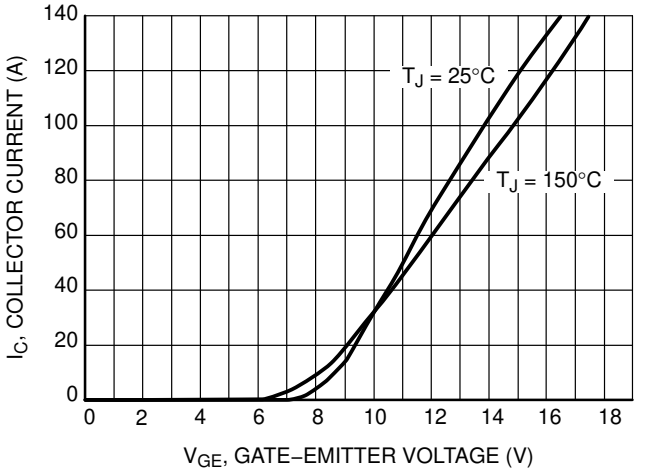


Figure 4. Typical Transfer Characteristics

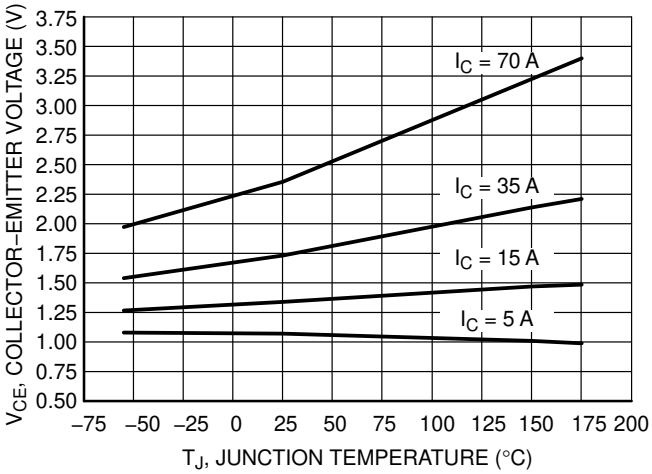


Figure 5. $V_{CE(sat)}$ vs. T_J

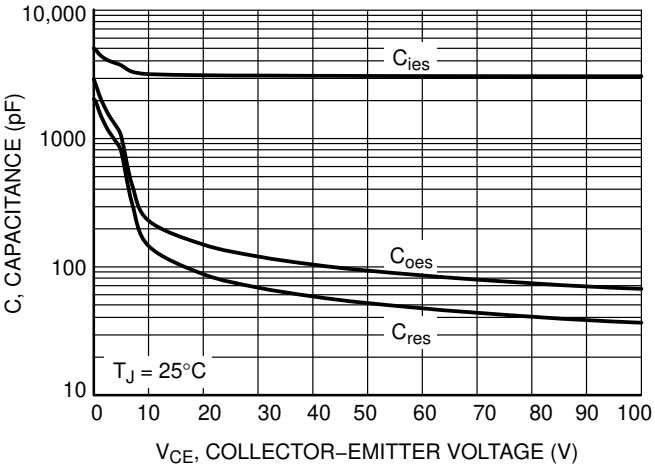


Figure 6. Typical Capacitance

TYPICAL CHARACTERISTICS

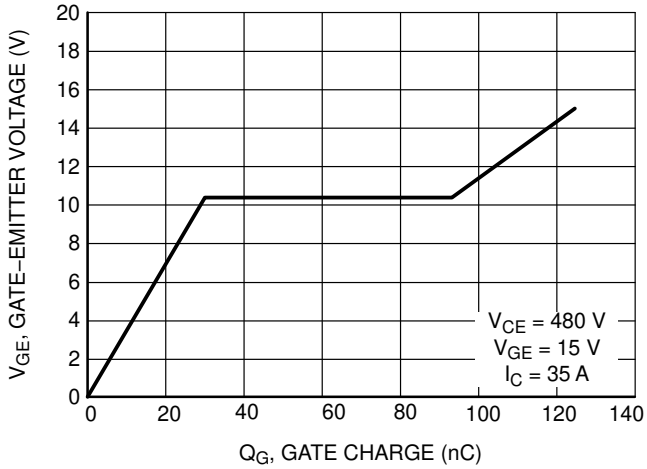


Figure 7. Typical Gate Charge

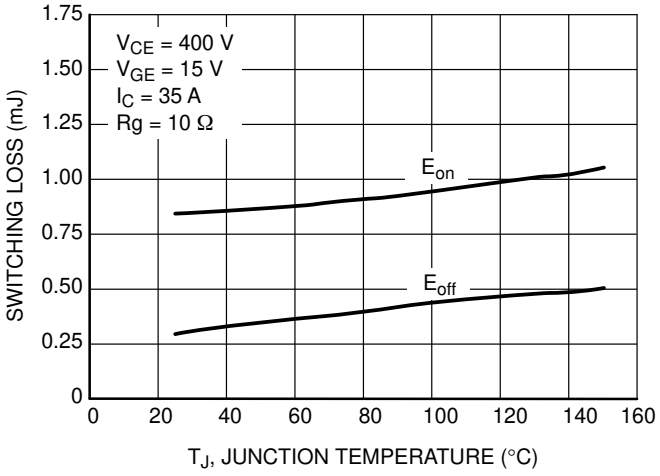


Figure 8. Switching Loss vs. Temperature

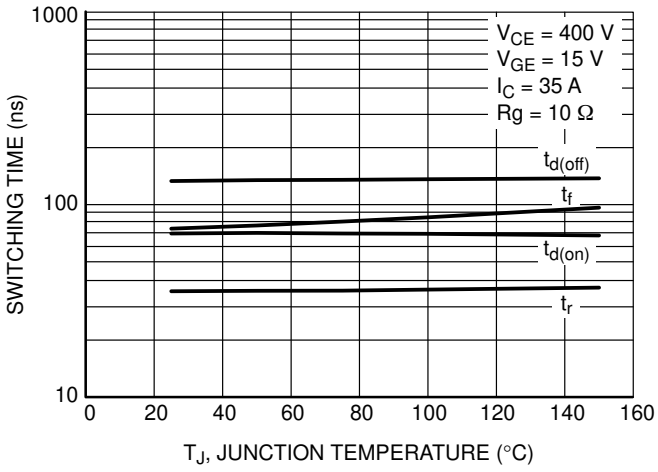


Figure 9. Switching Time vs. Temperature

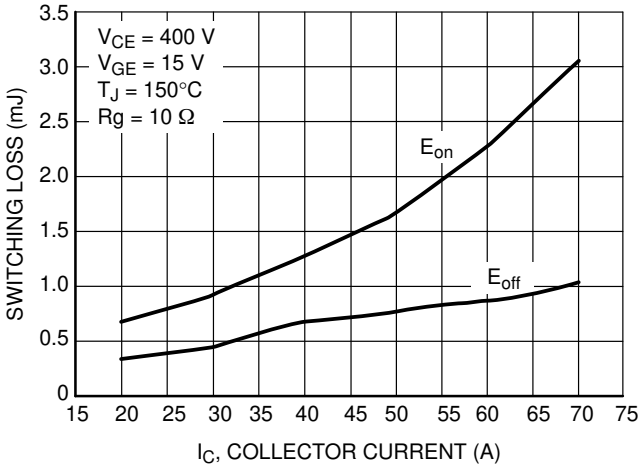


Figure 10. Switching Loss vs. I_C

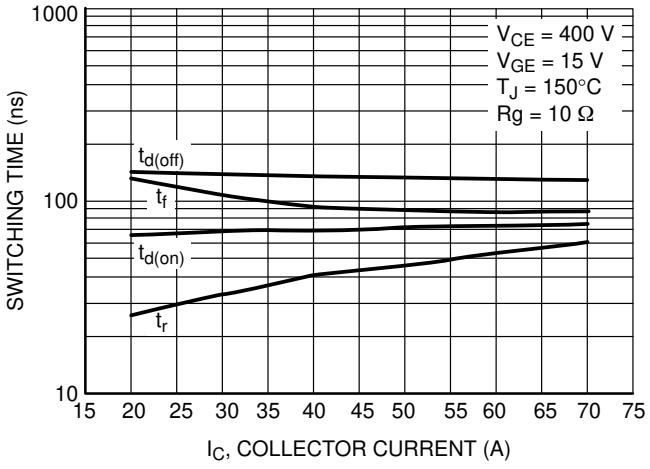


Figure 11. Switching Time vs. I_C

TYPICAL CHARACTERISTICS

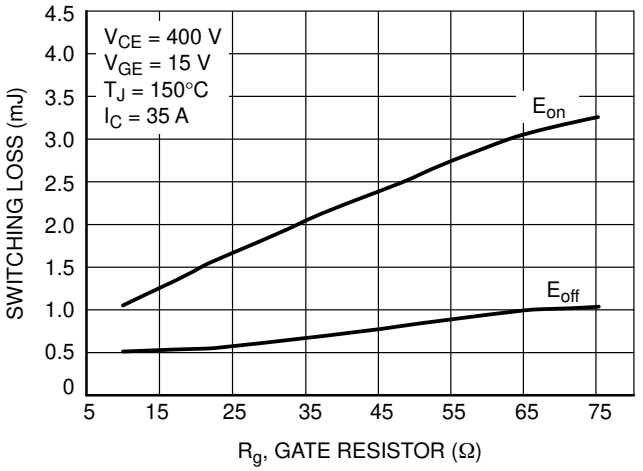


Figure 12. Switching Loss vs. R_g

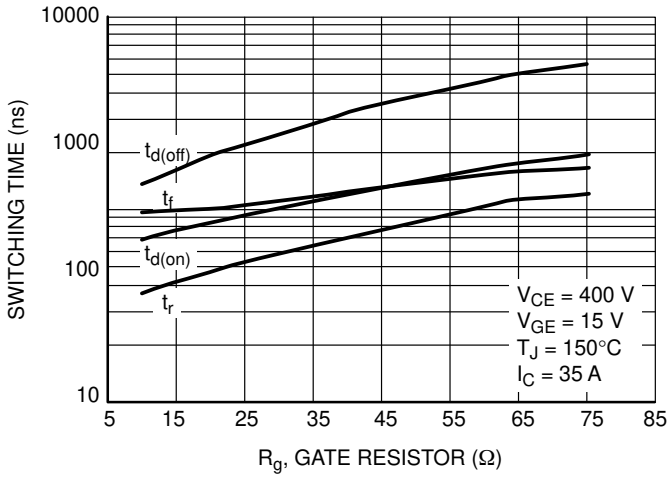


Figure 13. Switching Time vs. R_g

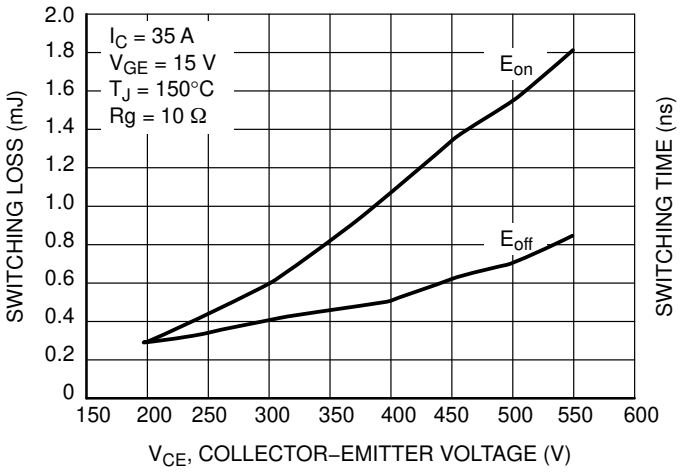


Figure 14. Switching Loss vs. V_{CE}

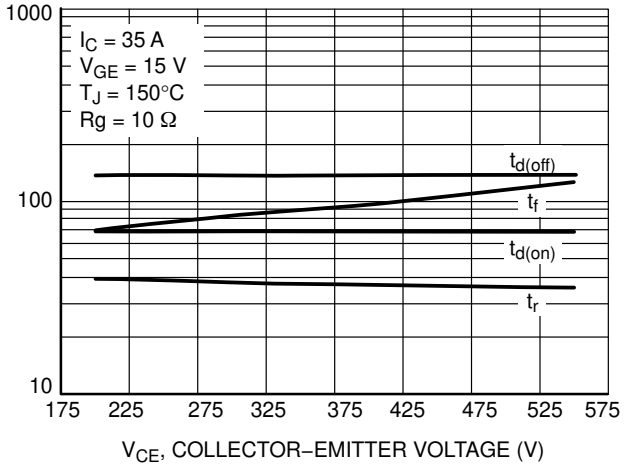


Figure 15. Switching Time vs. V_{CE}

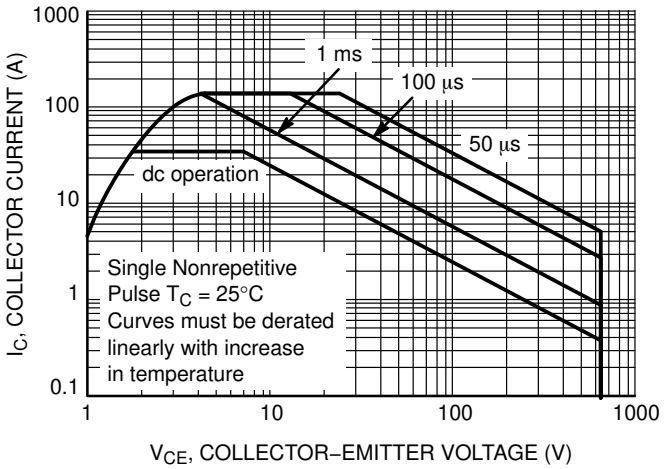


Figure 16. Safe Operating Area

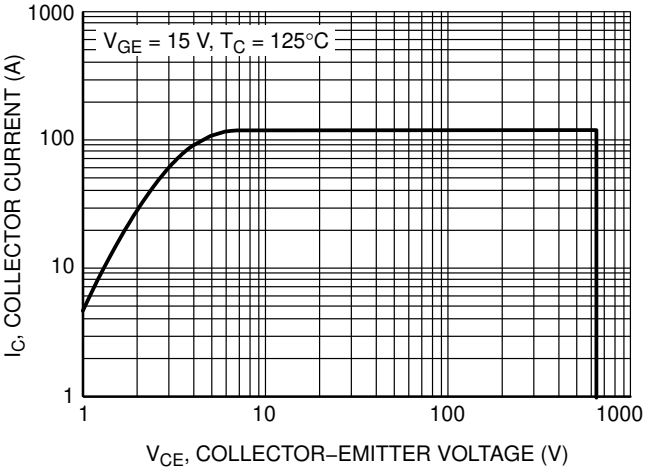
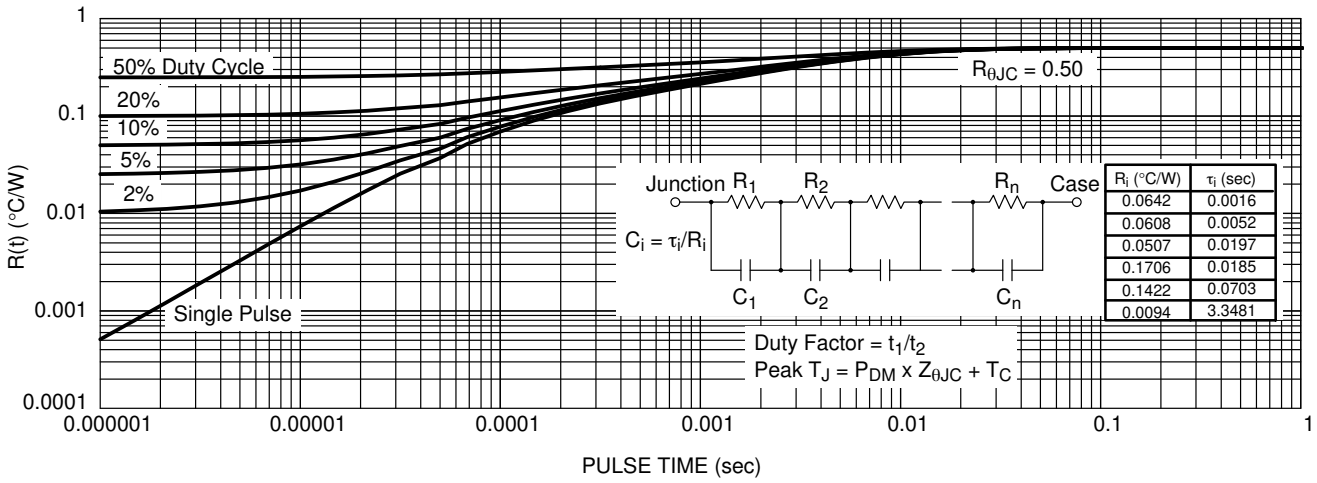


Figure 17. Reverse Bias Safe Operating Area

TYPICAL CHARACTERISTICS



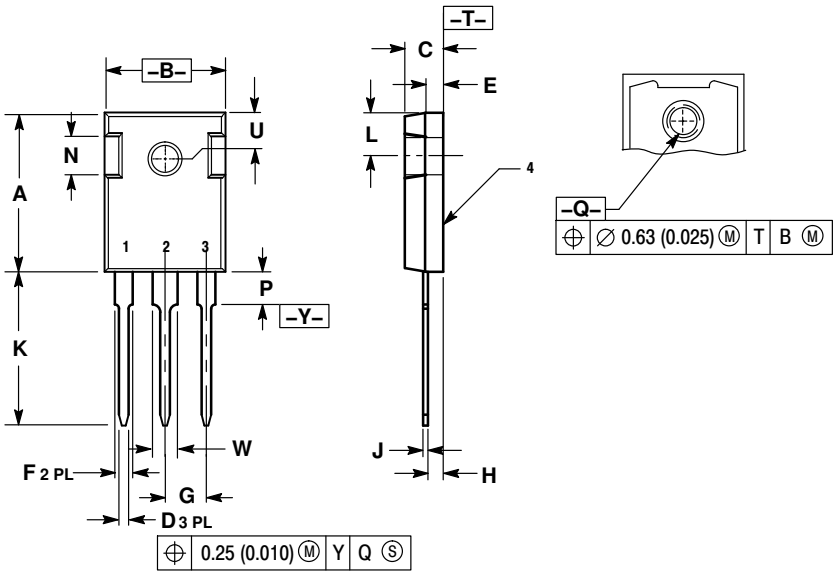
R_i (°C/W)	τ_i (sec)
0.0642	0.0016
0.0608	0.0052
0.0507	0.0197
0.1706	0.0185
0.1422	0.0703
0.0094	3.3481

Figure 18. IGBT Transient Thermal Impedance

NGTG35N65FL2WG

PACKAGE DIMENSIONS

TO−247
CASE 340L−02
ISSUE F



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	20.32	21.08	0.800	8.30
B	15.75	16.26	0.620	0.640
C	4.70	5.30	0.185	0.209
D	1.00	1.40	0.040	0.055
E	1.90	2.60	0.075	0.102
F	1.65	2.13	0.065	0.084
G	5.45 BSC		0.215 BSC	
H	1.50	2.49	0.059	0.098
J	0.40	0.80	0.016	0.031
K	19.81	20.83	0.780	0.820
L	5.40	6.20	0.212	0.244
N	4.32	5.49	0.170	0.216
P	---	4.50	---	0.177
Q	3.55	3.65	0.140	0.144
U	6.15 BSC		0.242 BSC	
W	2.87	3.12	0.113	0.123

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

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