NGTB30N135IHRWG

IGBT with Monolithic Free Wheeling Diode

This Insulated Gate Bipolar Transistor (IGBT) features a robust and cost effective Field Stop (FS) Trench construction, provides superior performance in demanding switching applications, and offers low on−state voltage with minimal switching losses. The IGBT is well suited for resonant or soft switching applications.

Features
- Extremely Efficient Trench with Fieldstop Technology
- 1350 V Breakdown Voltage
- Optimized for Low Losses in IH Cooker Application
- Reliable and Cost Effective Single Die Solution
- These are Pb−Free Devices

Typical Applications
- Inductive Heating
- Consumer Appliances
- Soft Switching

ON Semiconductor®

http://onsemi.com

30 A, 1350 V
V_{CEsat} = 2.30 V
E_{off} = 0.85 mJ

TO−247
CASE 340AL

ABSOLUTE MAXIMUM RATINGS

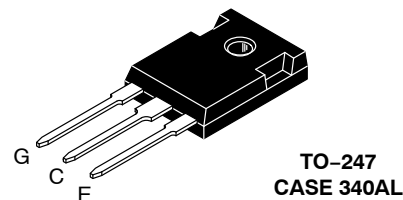| Rating	Symbol	Value	Unit
Collector−emitter voltage @ T_J = 25°C	V_{CES}	1350	V
Collector current @ Tc = 25°C @ Tc = 100°C	I_C	60 30	A
Pulsed collector current, T_{pulse} limited by T_{Jmax} 10 μs pulse, V_{GE} = 15 V	I_{CM}	120	A
Diode forward current @ Tc = 25°C @ Tc = 100°C	I_F	60 30	A
Diode pulsed current, T_{pulse} limited by T_{Jmax} 10 μs pulse, V_{GE} = 0 V	I_{FM}	120	A
Gate−emitter voltage Transient Gate−emitter Voltage (T_{pulse} = 5 μs, D < 0.10)	V_{GE}	±20 ±25	V
Power Dissipation @ Tc = 25°C @ Tc = 100°C	P_D	394 197	W
Operating junction temperature range	T_J	−40 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 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.

MARKING DIAGRAM

30N135IHR
AYWWG

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

ORDERING INFORMATION

Device	Package	Shipping
NGTB30N135IHRWG	TO−247 (Pb−Free)	30 Units / Rail

NGTB30N135IHRWG

THERMAL CHARACTERISTICS

Rating	Symbol	Value	Unit
Thermal resistance junction−to−case	$R_{\theta JC}$	0.38	°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 = 5 mA	$V_{(BR)CES}$	1350	–	–	V
Collector−emitter saturation voltage	V_{GE} = 15 V, I_C = 30 A V_{GE} = 15 V, I_C = 30 A, T_J = 175°C	V_{CEsat}	– –	2.30 2.50	2.65 –	V
Gate−emitter threshold voltage	V_{GE} = V_{CE}, I_C = 250 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} = 1350 V V_{GE} = 0 V, V_{CE} = 1350 V, T_J = 175°C	I_{CES}	– –	– –	0.5 2.0	mA
Gate leakage current, collector−emitter short−circuited	V_{GE} = 20 V, V_{CE} = 0 V	I_{GES}	–	–	100	nA
DYNAMIC CHARACTERISTIC						
Input capacitance	V_{CE} = 20 V, V_{GE} = 0 V, f = 1 MHz	C_{ies}	–	5290	–	pF
Output capacitance		C_{oes}	–	124	–	
Reverse transfer capacitance		C_{res}	–	100	–	
Gate charge total	V_{CE} = 600 V, I_C = 30 A, V_{GE} = 15 V	Q_g	–	234	–	nC
Gate to emitter charge		Q_{ge}	–	39	–	
Gate to collector charge		Q_{gc}	–	105	–	
SWITCHING CHARACTERISTIC, INDUCTIVE LOAD						
Turn−off delay time	T_J = 25°C V_{CC} = 600 V, I_C = 30 A R_g = 10 Ω V_{GE} = 0 V/ 15V	$t_{d(off)}$	–	250	–	ns
Fall time		t_f	–	150	–	
Turn−off switching loss		E_{off}	–	0.85	–	mJ
Turn−off delay time	T_J = 150°C V_{CC} = 600 V, I_C = 30 A R_g = 10 Ω V_{GE} = 0 V/ 15V	$t_{d(off)}$	–	265	–	ns
Fall time		t_f	–	225	–	
Turn−off switching loss		E_{off}	–	1.90	–	mJ
DIODE CHARACTERISTIC						
Forward voltage	V_{GE} = 0 V, I_F = 30 A V_{GE} = 0 V, I_F = 30 A, T_J = 175°C	V_F	– –	2.10 3.20	2.40 –	V

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TYPICAL CHARACTERISTICS
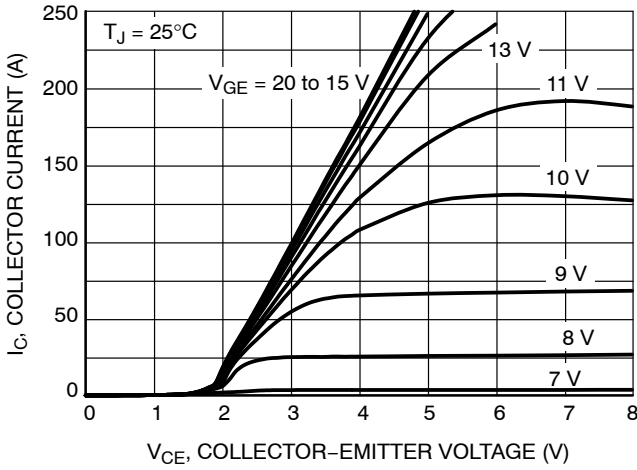
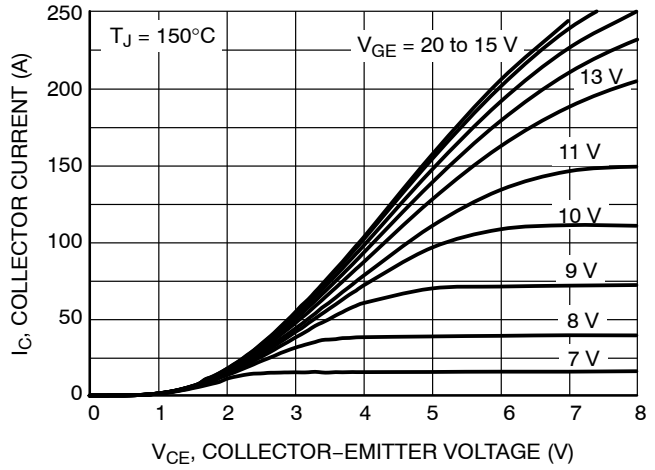Figure 1. Output Characteristics

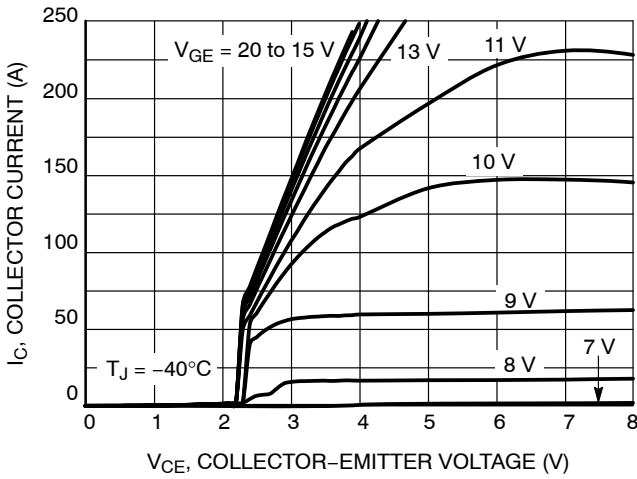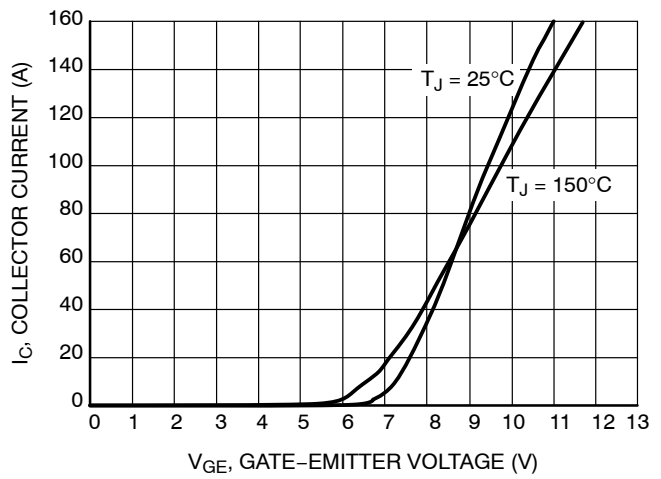Figure 2. Output Characteristics

Figure 3. Output Characteristics
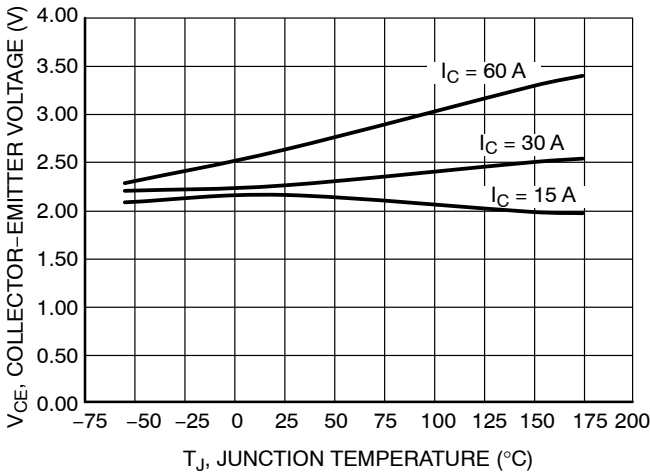

Figure 4. Typical Transfer Characteristics

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

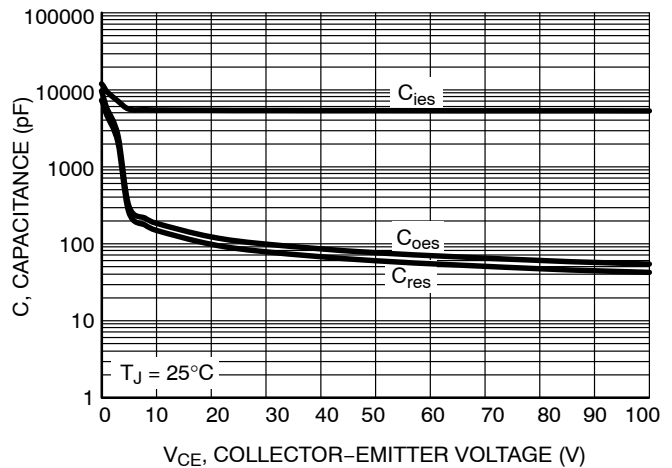

Figure 6. Typical Capacitance

TYPICAL CHARACTERISTICS
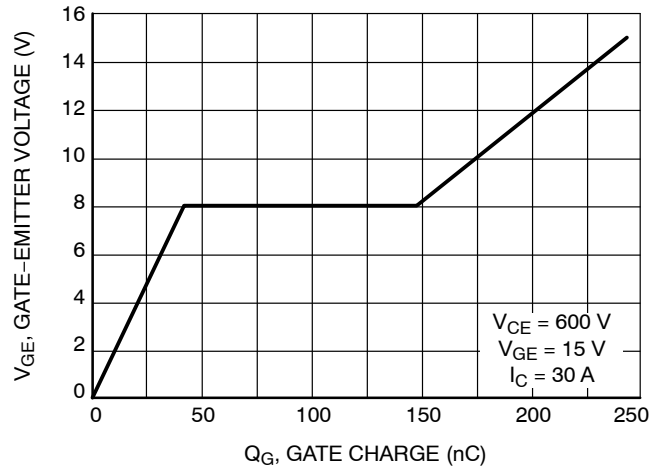

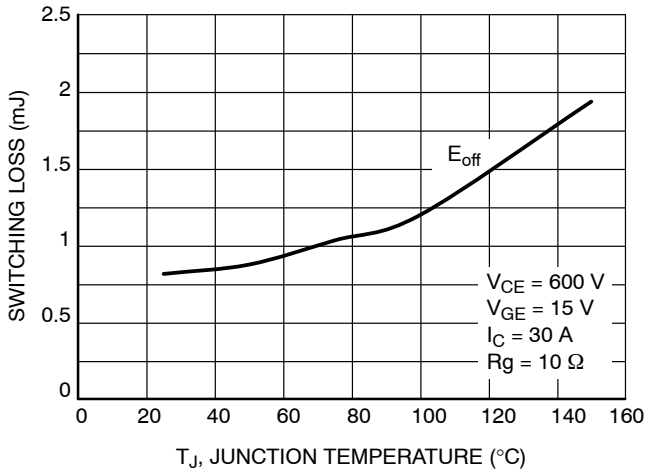**Figure 7. Diode Forward Characteristics**

Figure 8. Typical Gate Charge
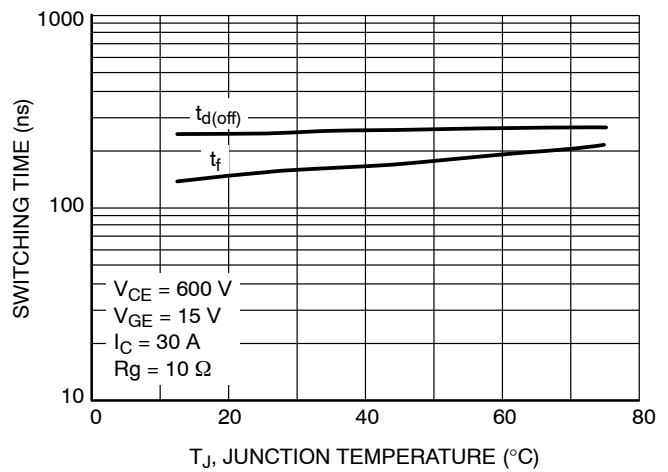

Figure 9. Switching Loss vs. Temperature

Figure 10. Switching Time vs. Temperature
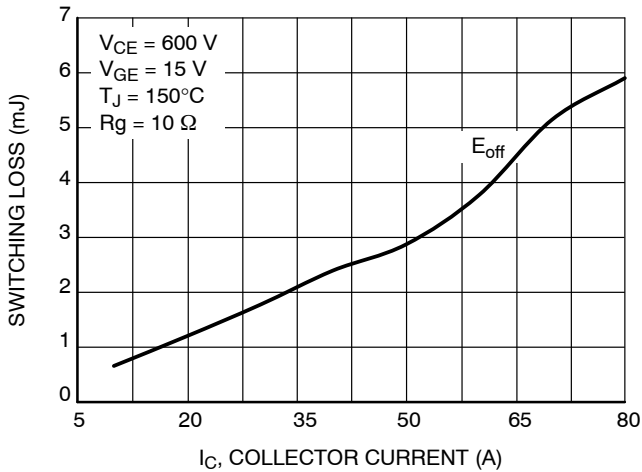
Figure 11. Switching Loss vs. I_C
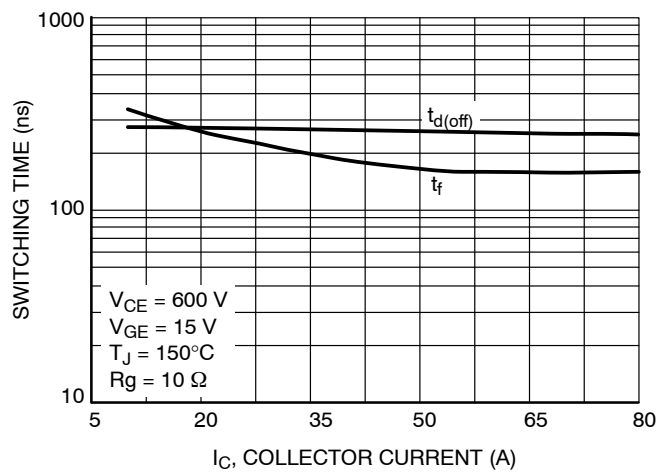
Figure 12. Switching Time vs. I_C

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TYPICAL CHARACTERISTICS
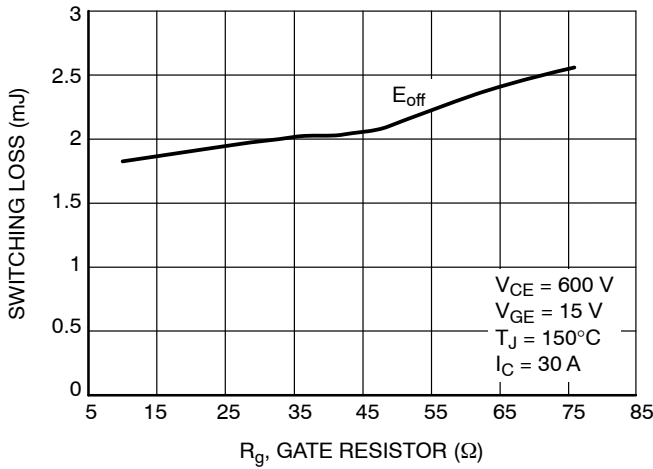
Figure 13. Switching Loss vs. R_g
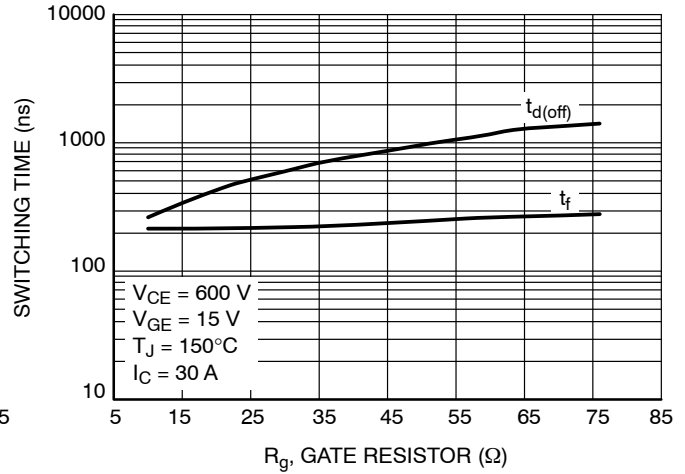
Figure 14. Switching Time vs. R_g
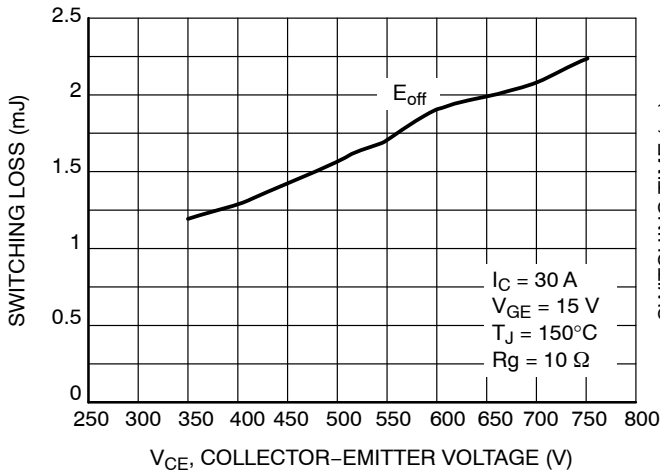
Figure 15. Switching Loss vs. V_{CE}
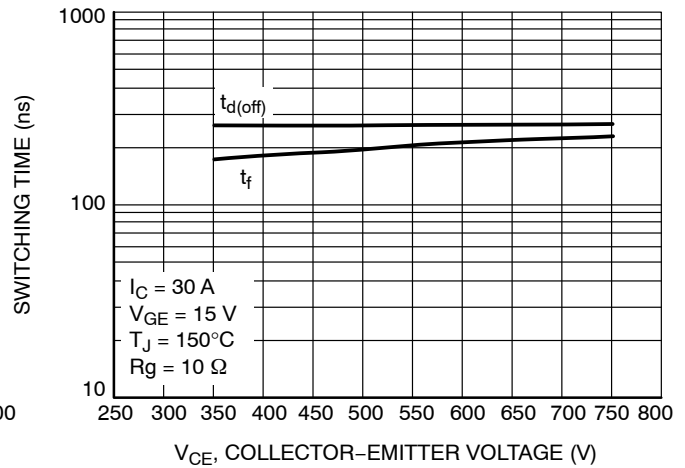
Figure 16. Switching Time vs. V_{CE}
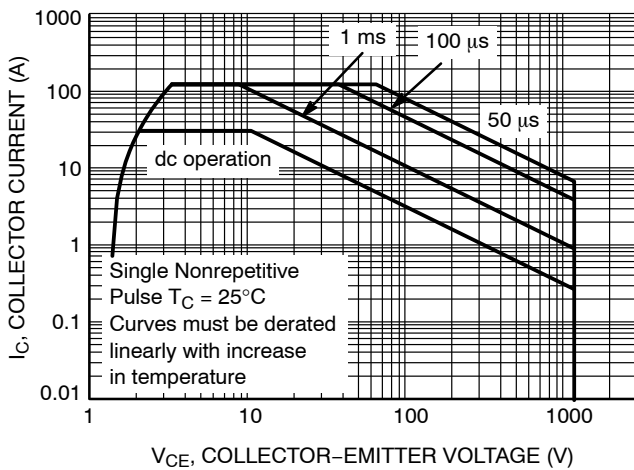
Figure 17. Safe Operating Area
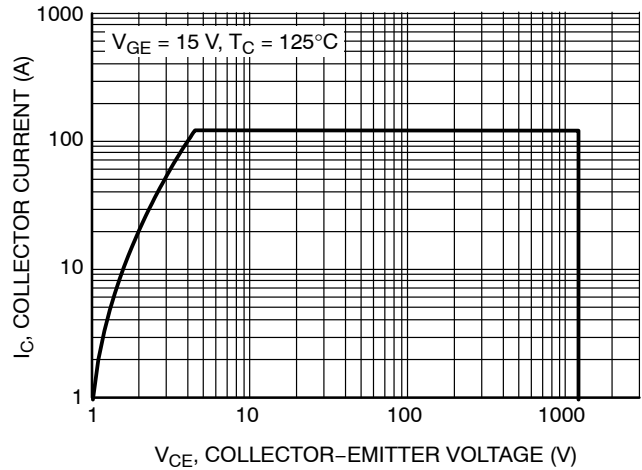
Figure 18. Reverse Bias Safe Operating Area

TYPICAL CHARACTERISTICS
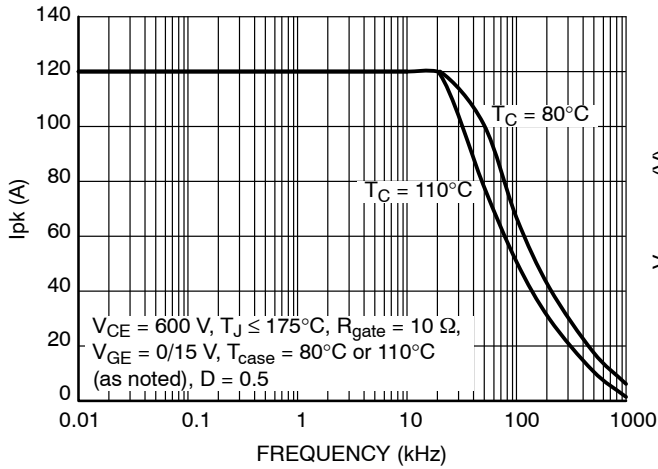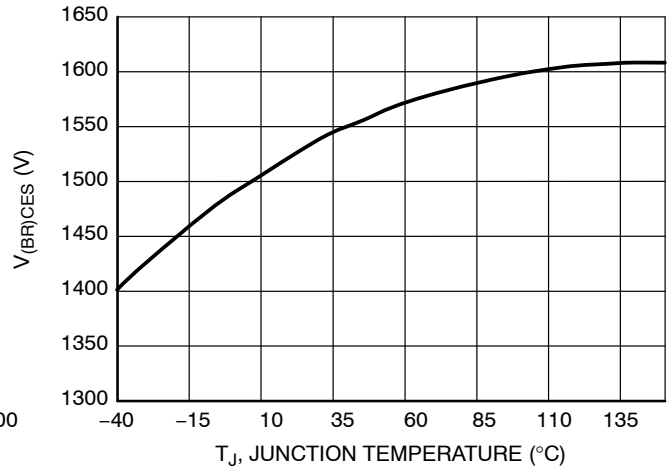

Figure 19. Collector Current vs. Switching Frequency

Figure 20. Typical V(BR)CES vs. Temperature

Figure 21. IGBT Transient Thermal Impedance

R_i (°C/W)	τ_i (sec)
0.005757	0.000174
0.000122	0.025884
0.007153	0.001398
0.010643	0.002971
0.016539	0.006046
0.048615	0.006505
0.019522	0.051225
0.015924	0.198582
0.051783	0.193115
0.025689	1.23097
0.180713	0.553364

Figure 22. Test Circuit for Switching Characteristics

Figure 23. Definition of Turn On Waveform

Figure 24. Definition of Turn Off Waveform

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ISSUE D

DATE 17 MAR 2017

SCALE 1:1

NOTE 4

⊕ ⌀ 0.635 Ⓜ B A Ⓜ   NOTE 6

SEATING PLANE

⊕ 0.25 Ⓜ B 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. ⌀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	1.07	1.33
b2	1.65	2.35
b4	2.60	3.40
c	0.45	0.68
D	20.80	21.34
E	15.50	16.25
E2	4.32	5.49
e	5.45 BSC	
F	2.655	---
L	19.80	20.80
L1	3.81	4.32
P	3.55	3.65
Q	5.40	6.20
S	6.15 BSC	

GENERIC
MARKING DIAGRAM*

XXXXXXXXX
AYWWG

XXXXX = Specific Device Code
A = Assembly Location
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.

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