Unclamped Collector–To–Emitter Avalanche Characteristics (–55° ≤ T_J ≤ 175°C)

	Symbol	Value	Unit
Single Pulse Collector–to–Emitter Avalanche Energy			
V_{CC} = 50 V, V_{GE} = 5.0 V, P_k I_L = 16.7 A, R_G = 1000 Ω, L = 1.8 mH, Starting T_J = 25°C	E_{AS}	250	mJ
V_{CC} = 50 V, V_{GE} = 5.0 V, P_k I_L = 14.9 A, R_G = 1000 Ω, L = 1.8 mH, Starting T_J = 150°C		200	
V_{CC} = 50 V, V_{GE} = 5.0 V, P_k I_L = 14.1 A, R_G = 1000 Ω, L = 1.8 mH, Starting T_J = 175°C		180	
Reverse Avalanche Energy			
V_{CC} = 100 V, V_{GE} = 20 V, P_k I_L = 25.8 A, L = 6.0 mH, Starting T_J = 25°C	$E_{AS(R)}$	2000	mJ

Thermal Characteristics

	Symbol	Value	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.0	°C/W
Thermal Resistance, Junction to Ambient (Note 1)	$R_{\theta JA}$	62.5	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	T_L	275	°C

1. When surface mounted to an FR4 board using the minimum recommended pad size.

Electrical Characteristics - OFF

Characteristic	Symbol	Test Conditions	Temperature	Min	Typ	Max	Unit
Collector–Emitter Clamp Voltage	BV_{CES}	I_C = 2.0 mA	T_J = –40°C to 175°C	370	395	420	V
		I_C = 10 mA	T_J = –40°C to 175°C	390	415	440	
Zero Gate Voltage Collector Current	I_{CES}	V_{GE} = 0 V, VCE = 15 V	T_J = 25°C	–	0.1	1.0	µA
		V_{CE} = 200V V_{GE} = 0 V	T_J = 25°C	0.5	1.5	10	
			T_J = 175°C	1.0	25	100*	
			T_J = -40°C	0.4	0.8	5.0	
Reverse Collector–Emitter Clamp Voltage	$B_{VCES(R)}$	IC = –75 mA	T_J = 25°C	30	35	39	V
			T_J = 175°C	35	39	45*	
			T_J = -40°C	30	33	37	
Reverse Collector–Emitter Leakage Current	$I_{CES(R)}$	V_{CE} = –24 V	T_J = 25°C	0.05	0.2	1.0	mA
			T_J = 175°C	1.0	8.5	25	
			T_J = –40°C	0.005	0.025	0.2	
Gate–Emitter Clamp Voltage	BV_{GES}	I_G = ±5.0 mA	T_J = –40°C to 175°C	12	12.5	14	V
Gate–Emitter Leakage Current	I_{GES}	V_{GE} = ±5.0 V	T_J = –40°C to 175°C	200	300	350*	µA
Gate Resistor	R_G	–	T_J = –40°C to 175°C	-	70	-	Ω
Gate Emitter Resistor	R_{GE}	–	T_J = –40°C to 175°C	14.25	16	25	kΩ

Electrical Characteristics - ON (Note 3)

Characteristic	Symbol	Test Conditions	Temperature	Min	Typ	Max	Unit
Gate Threshold Voltage	$V_{GE(th)}$	I_C = 1.0 mA, V_{GE} = V_{CE}	T_J = 25°C	1.5	1.8	2.1	V
			T_J = 175°C	0.7	1.0	1.3	
			T_J = –40°C	1.7	2.0	2.3*	
Threshold Temperature Coefficient (Negative)	–	–	–	4.0	4.6	5.2	mV/°C

*Maximum Value of Characteristic across Temperature Range.

3. Pulse Test: Pulse Width ≤ 300 µS, Duty Cycle ≤ 2%.

Electrical Characteristics - ON (Note 4)

Characteristic	Symbol	Test Conditions	Temperature	Min	Typ	Max	Unit
Collector–to–Emitter On–Voltage	V_{CE} (on)	I_C = 6.5 A, V_{GE} = 3.7 V	T_J = 25°C	0.85	1.03	1.35	V
			T_J = 175°C	0.7	0.9	1.15	
			T_J = −40°C	0	1.11	1.4	
		I_C = 9.0 A, V_{GE} = 3.9 V	T_J = 25°C	0.9	1.11	1.45	
			T_J = 175°C	0.8	1.01	1.25	
			T_J = −40°C	1.0	1.18	1.5	
		I_C = 7.5 A, V_{GE} = 4.5 V	T_J = 25°C	0.85	1.15	1.4	
			T_J = 175°C	0.7	0.95	1.2	
			T_J = −40°C	1.0	1.3	1.6*	
		I_C = 10 A, V_{GE} = 4.5 V	T_J = 25°C	1.0	1.3	1.6	
			T_J = 175°C	0.8	1.05	1.4	
			T_J = −40°C	1.1	1.4	1.7*	
		I_C = 15 A, V_{GE} = 4.5 V	T_J = 25°C	1.15	1.45	1.7	
			T_J = 175°C	1.0	1.3	1.55	
			T_J = −40°C	1.25	1.55	1.8*	
		I_C = 20 A, V_{GE} = 4.5 V	T_J = 25°C	1.1	1.4	1.9	
			T_J = 175°C	1.2	1.5	1.8	
			T_J = −40°C	1.3	1.42	2.0	
Forward Transconductance	gfs	V_{CE} = 5.0 V, I_C = 6.0 A	T_J = 25°C	10	18	25	Mhos

Dynamic Characteristics

Characteristic	Symbol	Test Conditions	Temperature	Min	Typ	Max	Unit
Input Capacitance	C_{ISS}	V_{CE} = 25 V, f = 10 kHZ	T_J = 25°C	1100	1300	1500	pF
Output Capacitance	C_{OSS}			70	80	90	
Transfer Capacitance	C_{RSS}			18	20	22	

Switching Characteristics

Characteristic	Symbol	Test Conditions	Temperature	Min	Typ	Max	Unit
Turn–Off Delay Time (Resistive)	$t_{d\ (off)}$	V_{CC} = 300 V, I_C = 9 A, R_G = 1.0 kΩ, R_L = 33 Ω, V_{GE} = 5.0 V	T_J = 25°C	6.0	8.0	10	µSec
			T_J = 175°C	6.0	8.0	10	
Fall Time (Resistive)	t_f		T_J = 25°C	4.0	6.0	8.0	
			T_J = 175°C	8.0	10.5	14	
Turn–Off Delay Time (Inductive)	$t_{d\ (off)}$	V_{CC} = 300 V, I_C = 9 A, R_G = 1.0 kΩ, L = 300 µH, V_{GE} = 5.0 V	T_J = 25°C	3.0	5.0	7.0	
			T_J = 175°C	5.0	7.0	9.0	
Fall Time (Inductive)	t_f		T_J = 25°C	1.5	3.0	4.5	
			T_J = 175°C	5.0	7.0	10	
Turn–On Delay Time	$t_{d\ (on)}$	V_{CC} = 14 V, I_C = 9.0 A, R_G = 1.0 kΩ, R_L = 1.5 Ω, V_{GE} = 5.0 V	T_J = 25°C	1.0	1.5	2.0	
			T_J = 175°C	1.0	1.5	2.0	
Rise Time	t_r		T_J = 25°C	4.0	6.0	8.0	
			T_J = 175°C	3.0	5.0	7.0	

4. Pulse Test: Pulse Width ≤ 300 µS, Duty Cycle ≤ 2%.

*Maximum Value of Characteristic across Temperature Range.

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.

Ratings and Characteristic Curves

Figure 1. Self Clamped Inductive Switching

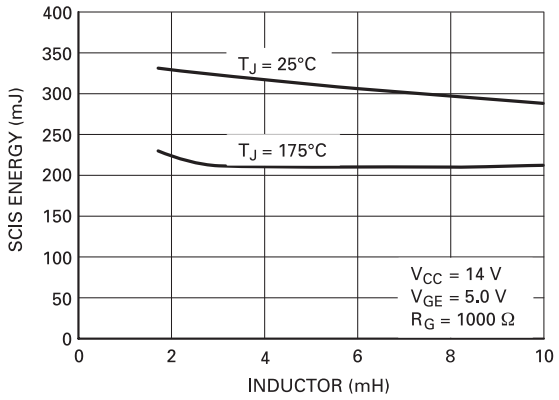


Figure 2. Open Secondary Avalanche Current vs. Temperature

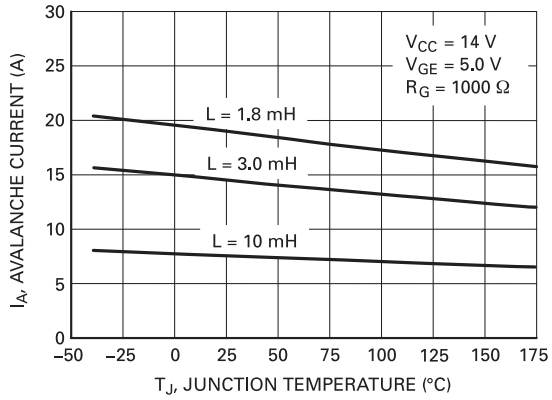


Figure 3. Collector–to–Emitter Voltage vs. Junction Temperature

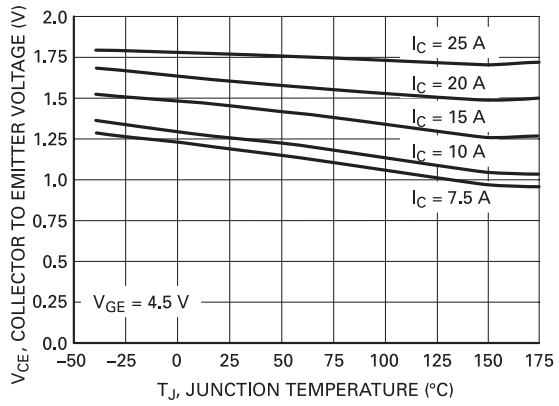


Figure 4. Collector Current vs. Collector–to–Emitter Voltage

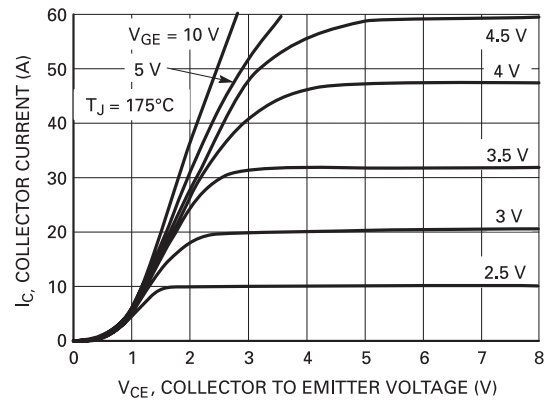


Figure 5. Collector Current vs. Collector–to–Emitter Voltage

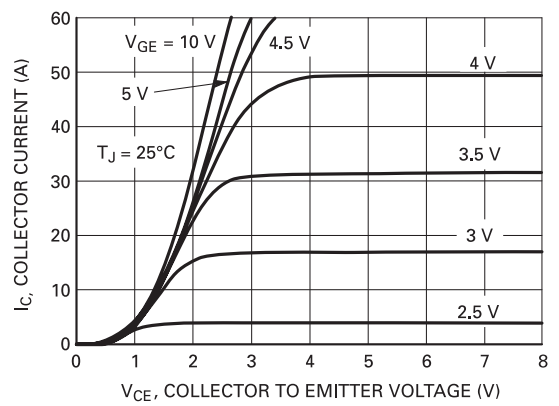
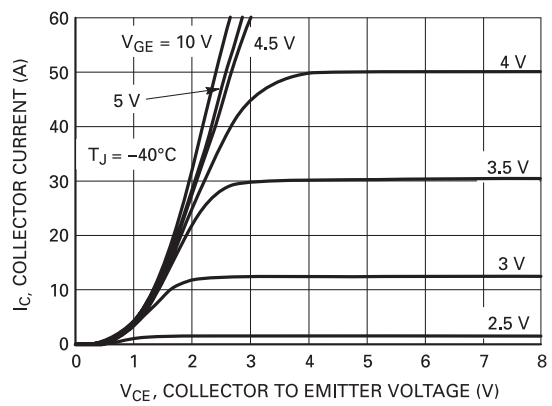


Figure 6. Collector Current vs. Collector–to–Emitter Voltage



Revised: 02/15/18

Figure 7. Transfer Characteristics

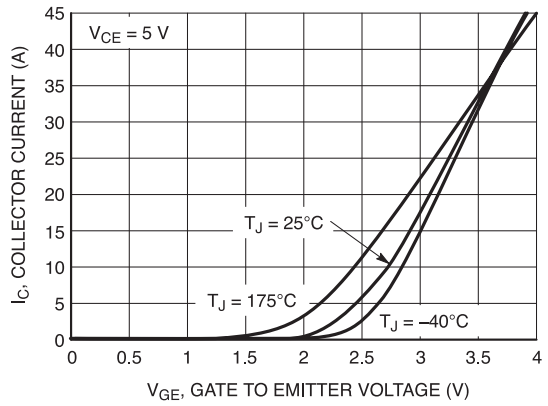


Figure 8. Collector–to–Emitter Leakage Current vs. Temperature

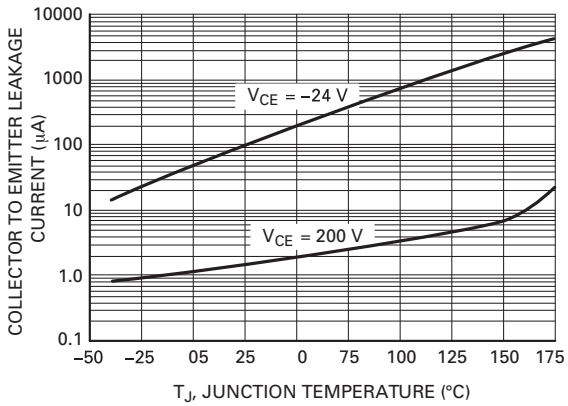


Figure 9. Gate Threshold Voltage vs. Temperature

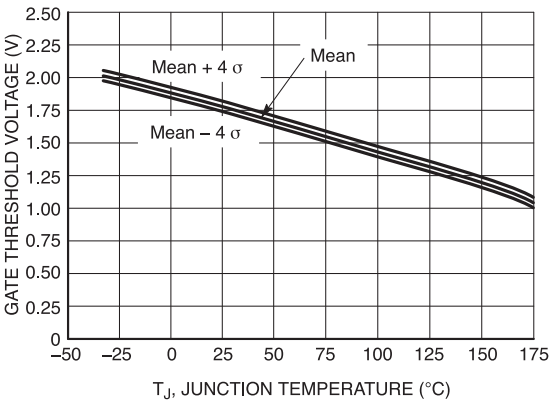


Figure 10. Capacitance vs. Collector–to–Emitter Voltage

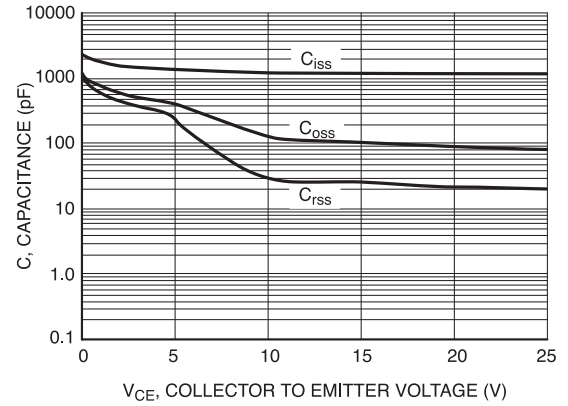


Figure 11. Resistive Switching Fall Time vs. Temperature

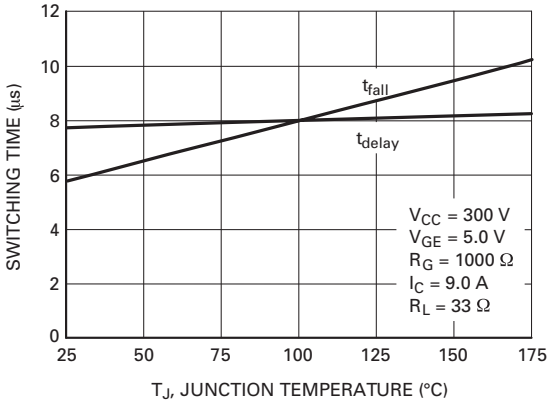


Figure 12. Inductive Switching Fall Time vs. Temperature

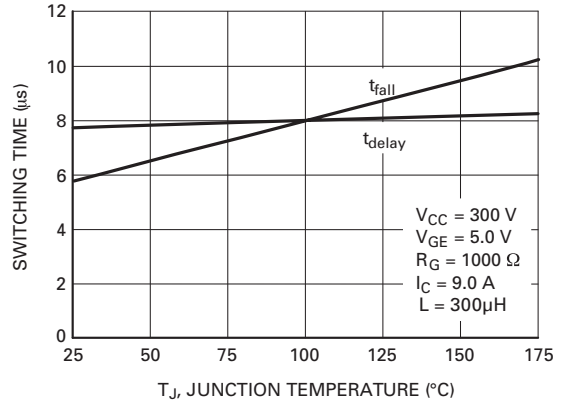


Figure 13. Minimum Pad Transient Thermal Resistance (Non–normalized Junction–to–Ambient)

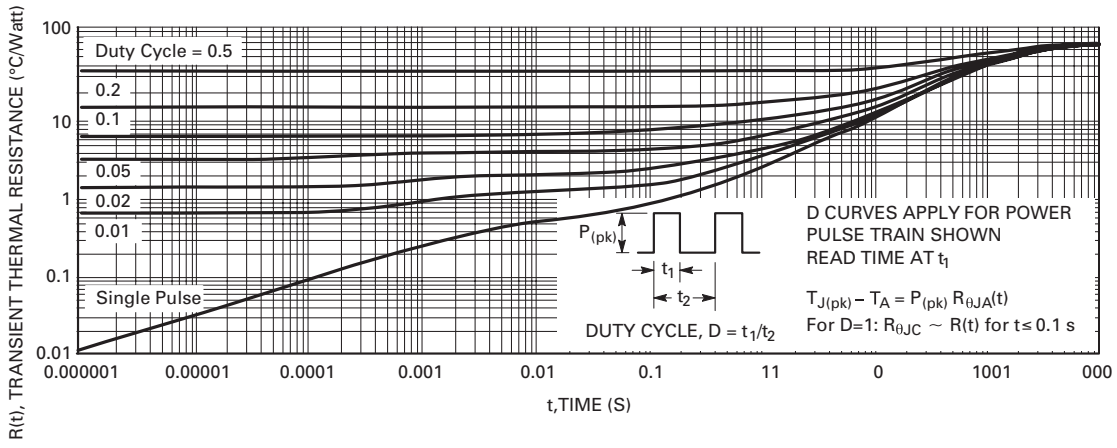


Figure 14. Best Case Transient Thermal Resistance (Non–normalized Junction–to–Case Mounted on Cold Plate)

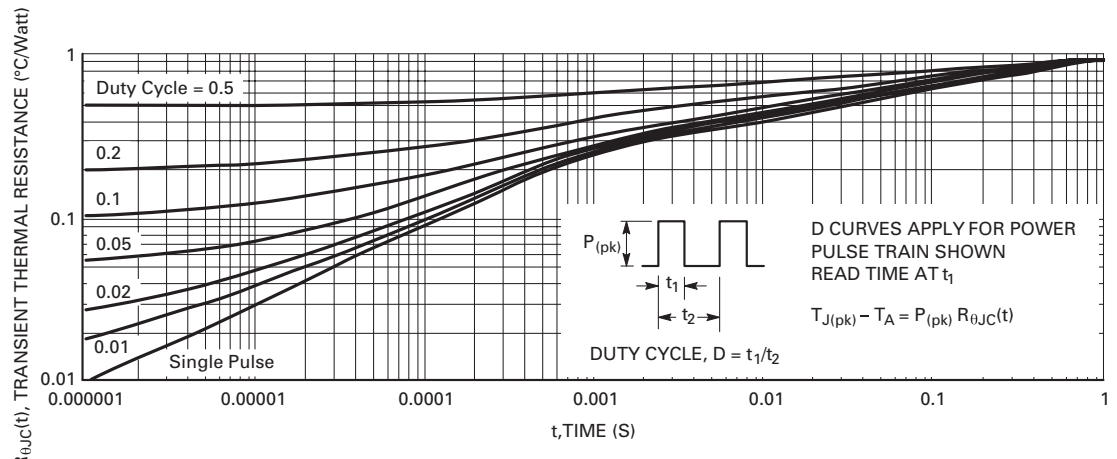


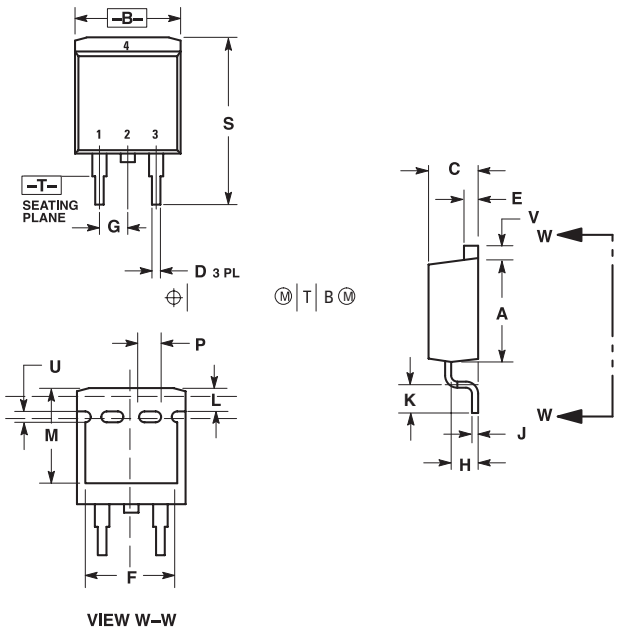
Figure 14. Best Case Transient Thermal Resistance

Littelfuse
Expertise Applied | Answers Delivered

Ignition IGBT

Surface Mount > 400V > NGB8202AN

Dimensions

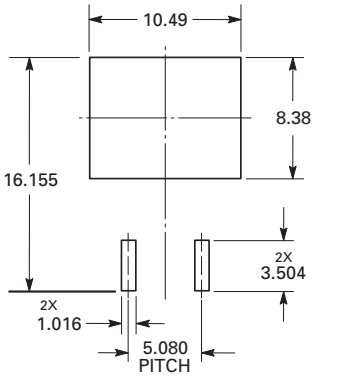


VIEW W–W

Dim	Inches		Millimeters	
	Min	Max	Min	Max
A	0.340	0.380	8.64	9.65
B	0.380	0.405	9.65	10.29
C	0.160	0.190	4.06	4.83
D	0.020	0.035	0.51	0.89
E	0.045	0.055	1.14	1.40
F	0.310	0.350	7.87	8.89
G	0.100 BSC		2.54 BSC	
H	0.080	0.110	2.03	2.79
J	0.018	0.025	0.46	0.64
K	0.090	0.110	2.29	2.79
L	0.052	0.072	1.32	1.83
M	0.280	0.320	7.11	8.13
N	0.197 REF		5.00 REF	
P	0.079 REF		2.00 REF	
R	0.039 REF		0.99 REF	
S	0.575	0.625	14.60	15.88
V	0.045	0.055	1.14	1.40

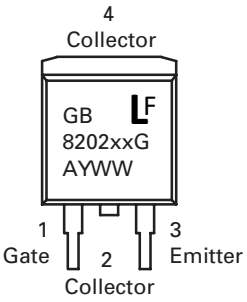
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 418B–01 THRU 418B–03 OBSOLETE, NEW STANDARD 418B–04.

Soldering Footprint



DIMENSIONS: MILLIMETERS

Part Marking System



GB8202xx = Device Code
xx = AN
A= Assembly Location
Y= Year
WW = Work Week
G = Pb–Free Package

ORDERING INFORMATION

Device	Package	Shipping
NGB8202ANT4G	D2PAK (Pb-Free)	800 / Tape & Reel
NGB8202ANTF4G		700 / Tape & Reel