NPT Trench IGBT

1200 V, 25 A

FGA25N120ANTDTU

Description

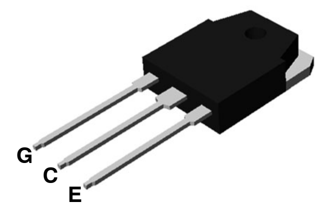
Using **onsemi**'s proprietary trench design and advanced NPT Technology, the 1200 V NPT IGBT offers superior conduction and switching performances, high avalanche ruggedness and easy parallel operation. This device is well suited for the resonant or soft switching application such as induction heating, microwave oven.

Features

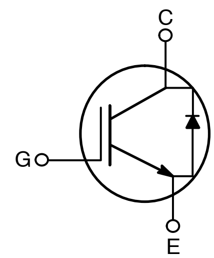
- NPT Trench Technology, Positive Temperature Coefficient
- Low Saturation Voltage: $V_{CE(sat)}$, typ = 2.0 V @ I_C = 25 A and T_C = 25°C
- Low Switching Loss: $E_{CE\ off,\ typ}$ = 0.96 mJ @ I_C = 25 A and T_C = 25°C
- Extremely Enhanced Avalanche Capability
- This Device is Pb−Free Halide, Free and RoHS Compliant

Applications

- Induction Heating, Microwave Oven



TO−3P−3
CASE 340BZ



MARKING DIAGRAM

FGA25
N120
AYWWZZ

FGA25N120	= Specific Device Code
A	= Assembly Location
YWW	= Date Code (Year and Week)
ZZ	= Assembly Lot Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CES}	Collector−Emitter Voltage	1200	V
V_{GES}	Gate−Emitter Voltage	±20	
I_C	Collector Current (@T_C = 25°C)	50	A
	Collector Current (@T_C = 100°C)	25	
I_{CM}	Pulsed Collector Current (Note 1)	90	A
I_F	Diode Continuous Forward Current (@T_C = 25°C)	50	A
	Diode Continuous Forward Current (@T_C = 100°C)	25	A
I_{FM}	Diode Maximum Forward Current	150	A
P_D	Maximum Power Dissipation (@T_C = 25°C)	312	W
	Maximum Power Dissipation (@T_C = 100°C)	125	W
T_J	Operating Temperature Range	−55 to +150	°C
T_{STG}	Storage Temperature Range	−55 to +150	°C
T_L	Maximum Lead Temp for Soldering Purpose, 1/8” from Case for 5 s	300	°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.

NOTES:
1. Repetitive Rating: Pulse−width limited by maximum junction temperature.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$(IGBT)	Thermal Resistance, Junction to Case	0.4	°C/W
$R_{\theta JC}$(DIODE)	Thermal Resistance, Junction to Case	2.0	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	40	°C/W

ORDERING INFORMATION

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FGA25N120ANTDTU−F109	FGA25N120ANTD	TO−3PN	Tube	N/A	N/A	30

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

ELECTRICAL CHARACTERISTICS OF THE IGBT (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
I_{CES}	Collector Cut-Off Current	$V_{CE} = V_{CES}$, V_{GE} = 0 V	–	–	3	mA
I_{GES}	G−E Leakage Current	$V_{GE} = V_{GES}$, V_{CE} = 0 V	–	–	±250	nA
On Characteristics						
$V_{GE(th)}$	G−E Threshold Voltage	I_C = 25 mA, $V_{CE} = V_{GE}$	3.5	5.5	7.5	V
$V_{CE(Sat)}$	Collector to Emitter Saturation Voltage	I_C = 25 A, V_{GE} = 15 V	–	2.0	–	V
		I_C = 25 A, V_{GE} = 15 V, T_C = 125°C	–	2.15	–	V
		I_C = 50 A, V_{GE} = 15 V	–	2.65	–	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz	–	3700	–	pF
C_{oes}	Output Capacitance		–	130	–	pF
C_{res}	Reverse Transfer Capacitance		–	80	–	pF
Switching Characteristics						
$t_{d(on)}$	Turn−On Delay Time	V_{CC} = 600 V, I_C = 25 A, R_G = 10 Ω, V_{GE} = 15 V, Inductive Load, T_C = 125°C	–	50		ns
t_r	Rise Time		–	60		ns
$t_{d(off)}$	Turn−Off Delay Time		–	190		ns
t_f	Fall Time		–	100		ns
E_{on}	Turn−On Switching Loss		–	4.1		mj
E_{off}	Turn−Off Switching Loss		–	0.96		mj
E_{ts}	Total Switching Loss		–	5.06		mj
$t_{d(on)}$	Turn−On Delay Time	V_{CC} = 600 V, I_C = 25 A, R_G = 10 Ω, V_{GE} = 15 V, Inductive Load, T_C = 125°C	–	50		ns
t_r	Rise Time		–	60		ns
$t_{d(off)}$	Turn−Off Fall Time		–	200		ns
t_f	Fall Time		–	154		ns
E_{on}	Turn−On Switching Loss		–	4.3		mj
E_{off}	Turn−Off Switching Loss		–	1.5		mj
E_{ts}	Total Switching Loss		–	5.8		mj
Q_g	Total Gate Charge	V_{CE} = 600 V, I_C = 25 A, V_{GE} = 15 V	–	200		nC
Q_{ge}	Gate−Emitter Charge		–	15		nC
Q_{gc}	Gate−Collector Charge		–	100		nC

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.

ELECTRICAL CHARACTERISTICS OF DIODE (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
V_{FM}	Diode Forward Voltage	I_F = 25 A	T_C = 25°C	–	2.0	3.0	V
			T_C = 125°C	–	2.1	–	
t_{rr}	Diode Reverse Recovery Time	I_F = 25 A, dI_F/dt = 100 A/μs	T_C = 25°C	–	235	350	ns
			T_C = 125°C	–	300	–	
I_{rr}	Diode Peak Reverse Recovery Current		T_C = 25°C	–	27	40	A
			T_C = 125°C	–	31	–	
Q_{rr}	Diode Reverse Recovery Charge		T_C = 25°C	–	3130	4700	nC
			T_C = 125°C	–	4650	–	

TYPICAL PERFORMANCE CHARACTERISTICS

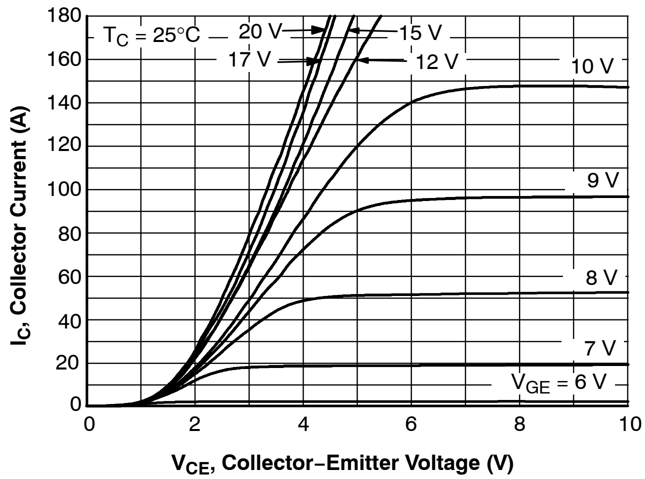


Figure 1. Typical Output Characteristics

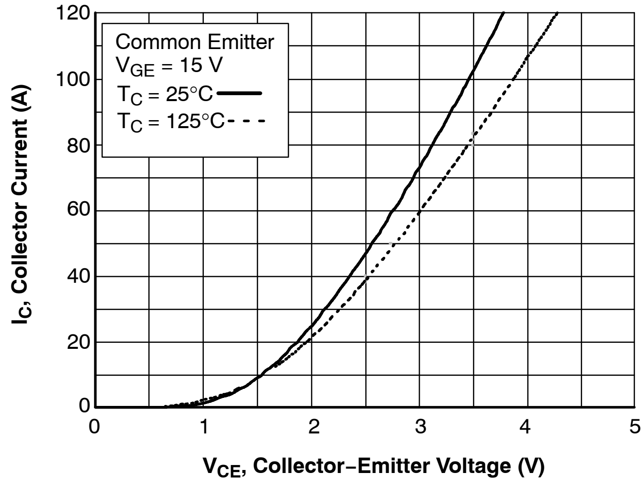


Figure 2. Typical Saturation Voltage Characteristics

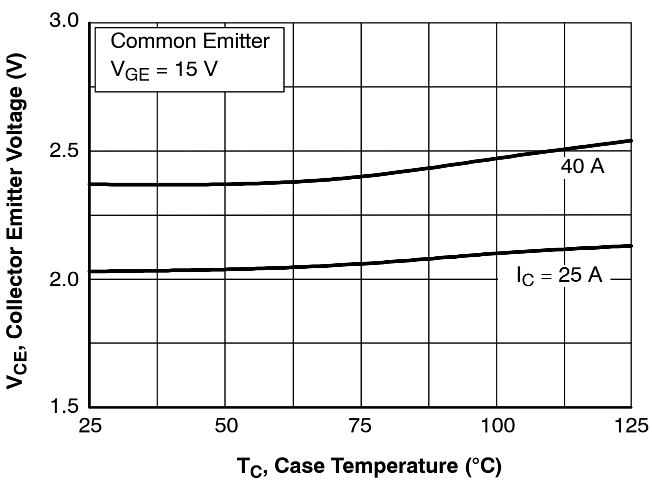


Figure 3. Saturation Voltage vs. Case Temperature at Variant Current Level

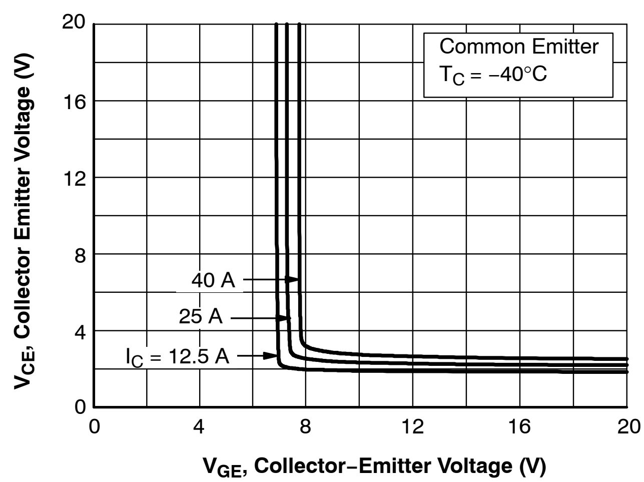


Figure 4. V_{GE} vs Saturation Voltage

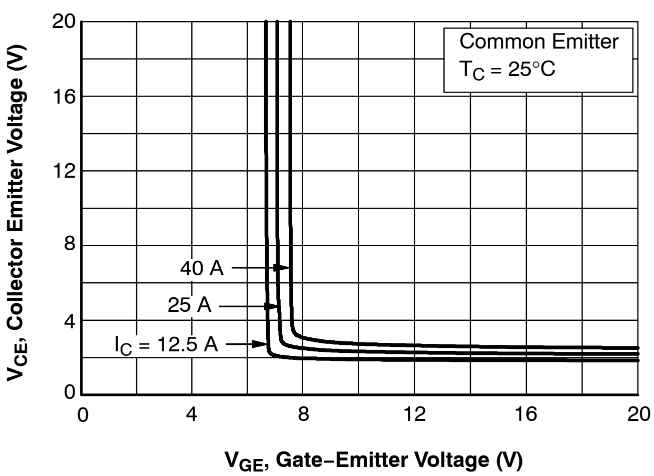


Figure 5. V_{GE} vs. Saturation Voltage

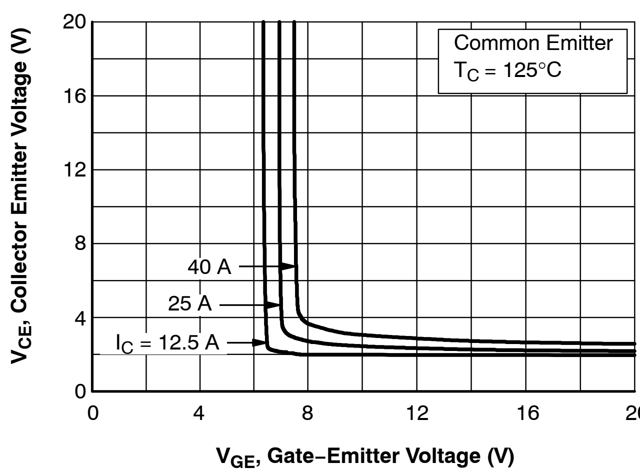


Figure 6. V_{GE} vs. Saturation Voltage

TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

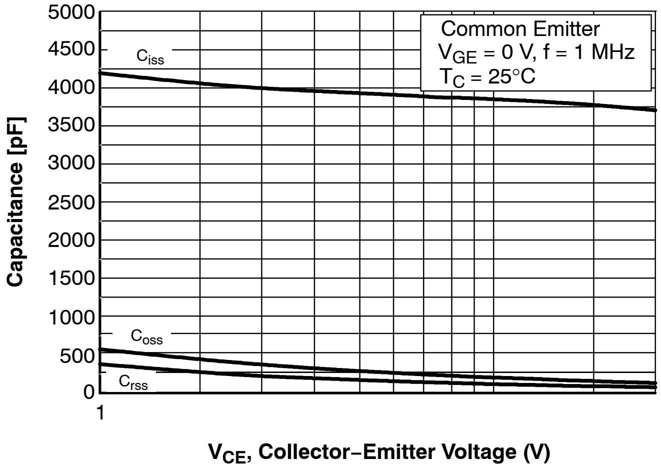


Figure 7. Capacitance Characteristics

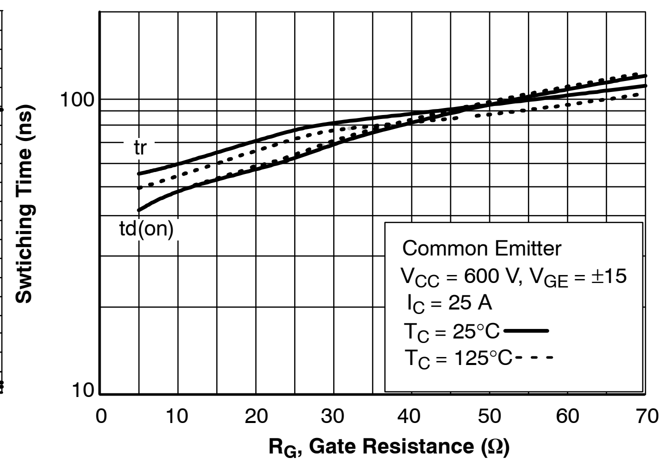


Figure 8. Turn On−Characteristics vs. Gate Resistance

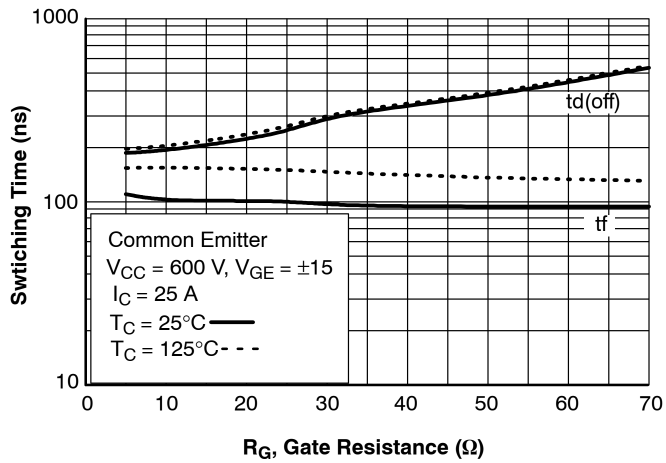


Figure 9. Turn Off−Characteristics vs. Gate Resistance

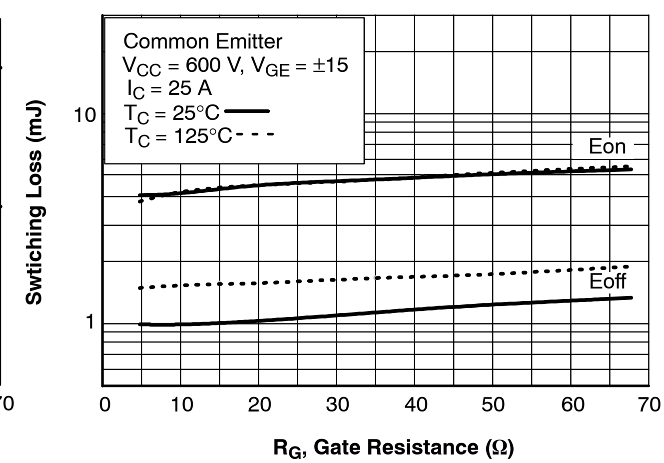


Figure 10. Switching Loss vs. Gate Resistance

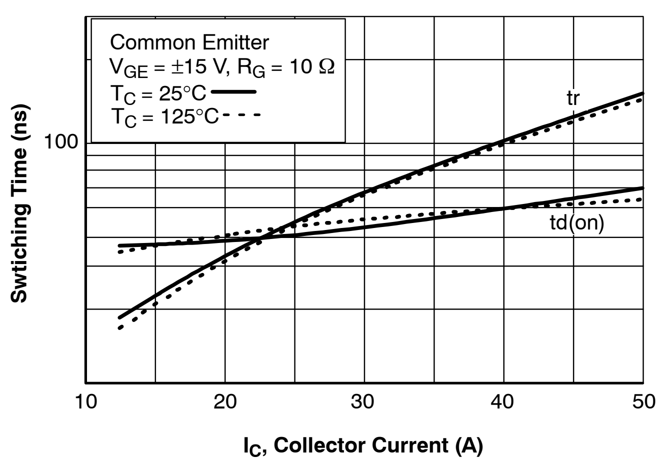


Figure 11. Turn−On Characteristics vs. Collector Current

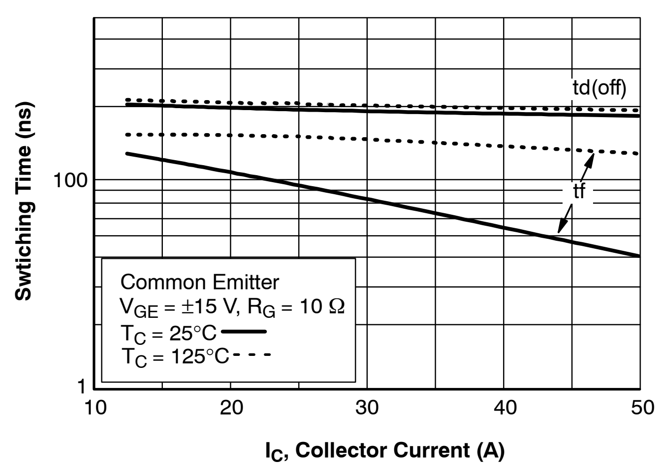


Figure 12. Turn−Off Characteristics vs. Collector Current

TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

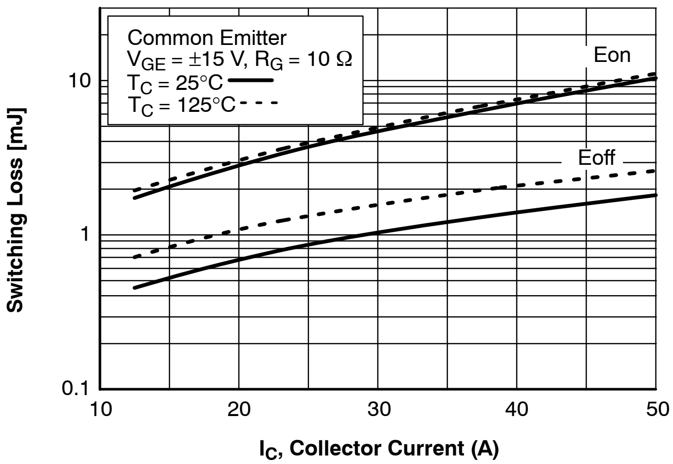


Figure 13. Switching Loss vs Collector Current

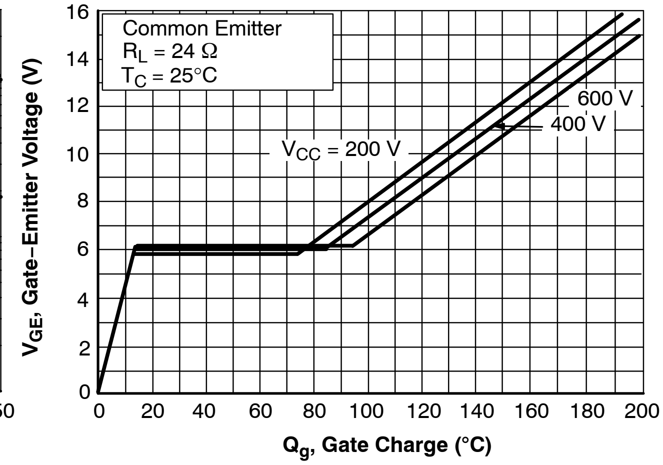


Figure 14. Gate Charge Characteristics

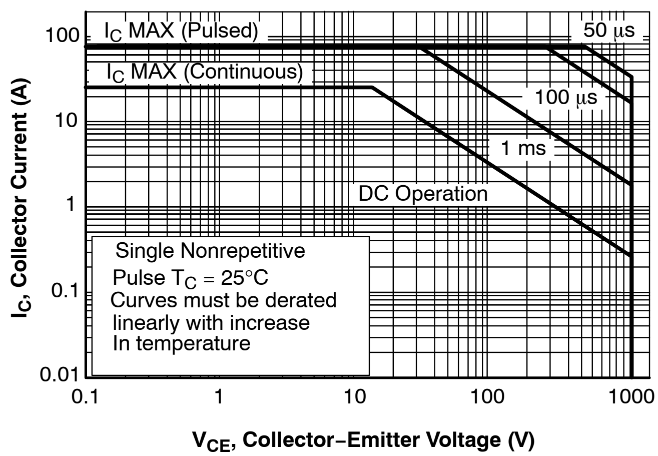


Figure 15. SOA Characteristics

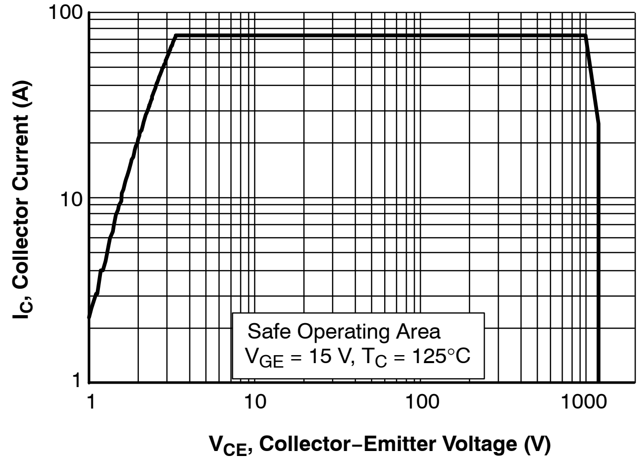


Figure 16. Turn−Off SOA

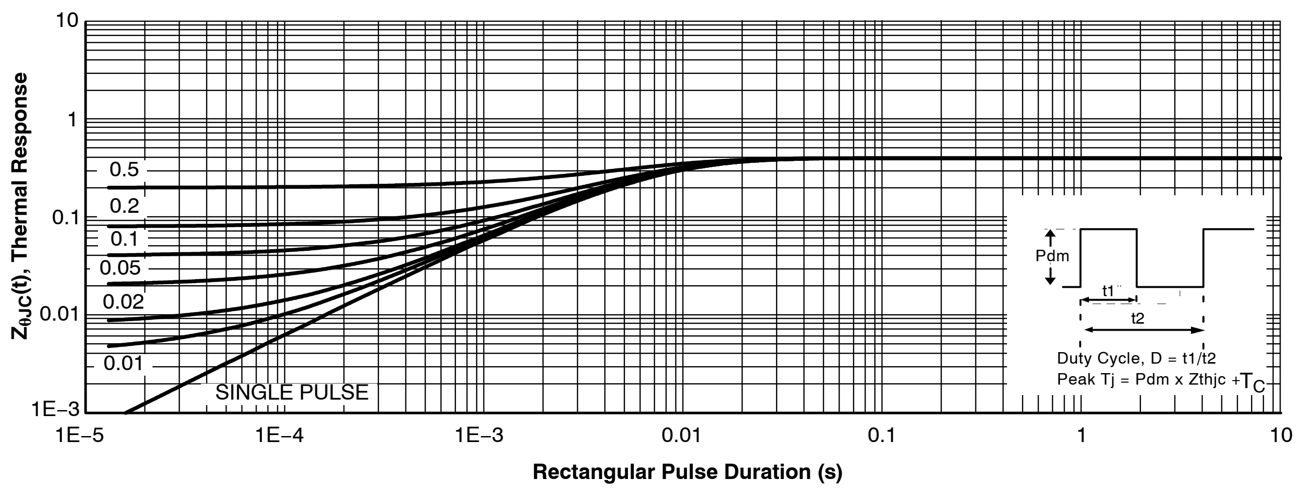


Figure 17. Transient Thermal Impedance of IGBT

TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

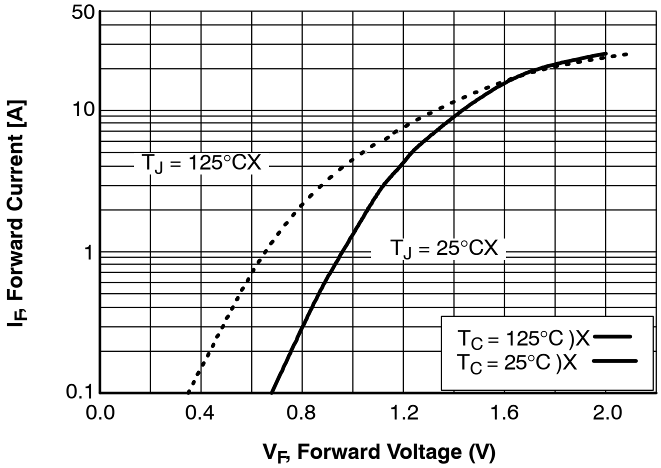


Figure 18. Forward Characteristics

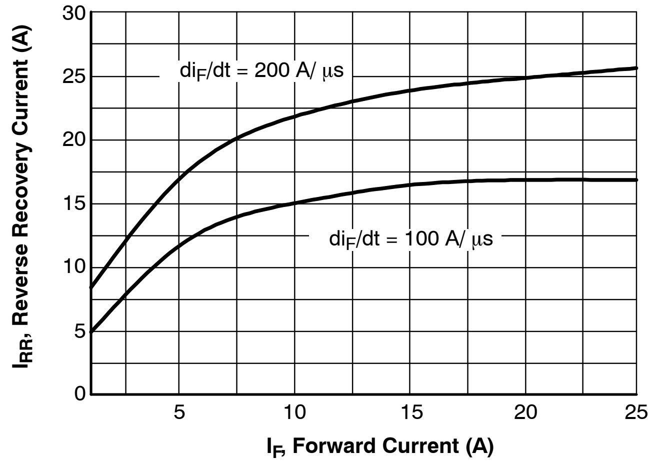


Figure 19. Reverse Recovery Current

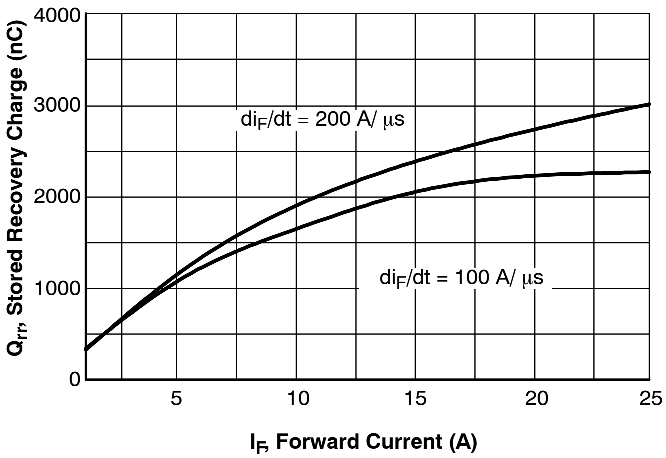


Figure 20. Stored Charge

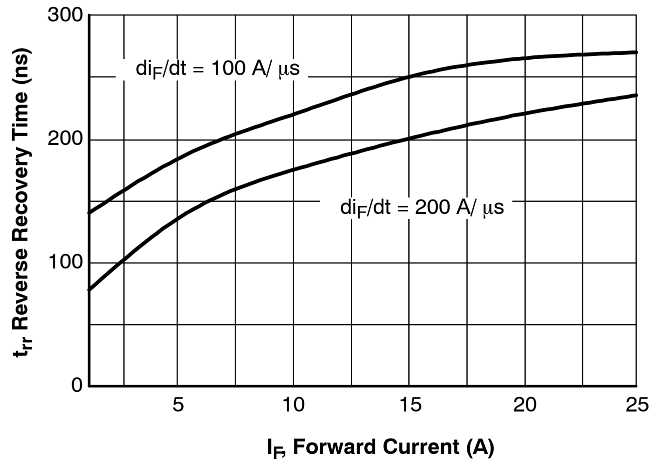


Figure 21. Reverse Recovery Time

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CASE 340BZ
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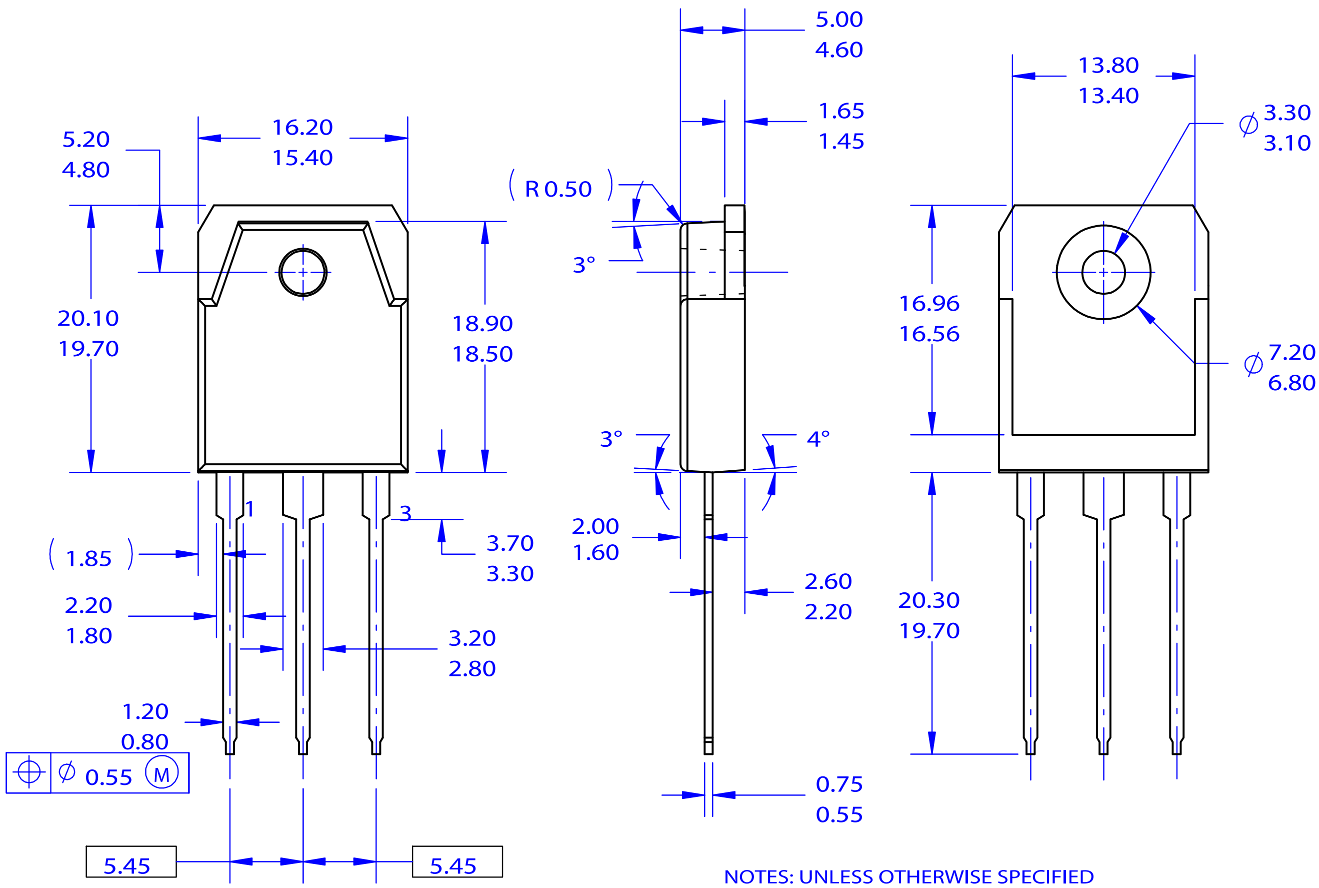

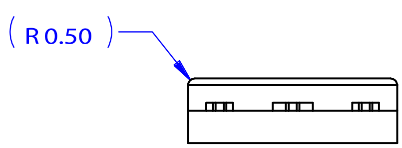

NOTES: UNLESS OTHERWISE SPECIFIED

A) THIS PACKAGE CONFORMS TO EIAJ SC-65 PACKAGING STANDARD.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSION AND TOLERANCING PER ASME14.5-2009.
D) DIMENSIONS ARE EXCLUSSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSSIONS.

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ADDITIONAL INFORMATION

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