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FGH25N120FTDS

1200 V, 25 A Field Stop Trench IGBT

Features

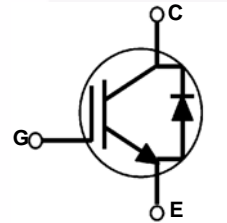
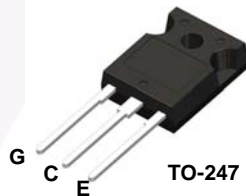
- High Speed Switching
- Low Saturation Voltage: $V_{CE(sat)} = 1.60 \text{ V @ } I_C = 25 \text{ A}$
- High Input Impedance
- RoHS Compliant

Applications

- Solar Inverter, UPS, Welder, PFC

General Description

Using advanced field stop trench technology, Fairchild's 1200V trench IGBTs offer the optimum performance for hard switching application such as solar inverter, UPS, welder and PFC applications.



Absolute Maximum Ratings

Symbol	Description	Ratings	Unit
V_{CES}	Collector to Emitter Voltage	1200	V
V_{GES}	Gate to Emitter Voltage	± 25	V
I_C	Collector Current @ $T_C = 25^\circ\text{C}$	50	A
	Collector Current @ $T_C = 100^\circ\text{C}$	25	A
$I_{CM(1)}$	Pulsed Collector Current	75	A
I_F	Diode Continuous Forward Current @ $T_C = 25^\circ\text{C}$	50	A
	Diode Continuous Forward Current @ $T_C = 100^\circ\text{C}$	25	A
I_{FM}	Diode Maximum Forward Current	75	A
P_D	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	313	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	125	W
T_J	Operating Junction Temperature	-55 to +150	$^\circ\text{C}$
T_{stg}	Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

Notes:

1: Repetitive rating: Pulse width limited by max. junction temperature

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}(\text{IGBT})$	Thermal Resistance, Junction to Case	-	0.4	$^\circ\text{C/W}$
$R_{\theta JC}(\text{Diode})$	Thermal Resistance, Junction to Case	-	1.25	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	40	$^\circ\text{C/W}$

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FGH25N120FTDS	FGH25N120FTDS	TO-247	Tube	N/A	N/A	30

Electrical Characteristics of the IGBT T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
V_{CES}	Collector to Emitter Breakdown Voltage	$V_{GE} = 0\text{ V}, I_C = 250\ \mu\text{A}$	1200	-	-	V
I_{CES}	Collector Cut-Off Current	$V_{CE} = V_{CES}, V_{GE} = 0\text{ V}$	-	-	1	mA
I_{GES}	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0\text{ V}$	-	-	±250	nA
On Characteristics						
$V_{GE(th)}$	G-E Threshold Voltage	$I_C = 25\text{ mA}, V_{CE} = V_{GE}$	3.5	6	7.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 25\text{ A}, V_{GE} = 15\text{ V}$	-	1.6	2	V
		$I_C = 25\text{ A}, V_{GE} = 15\text{ V}, T_C = 125^\circ\text{C}$	-	1.92	-	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	$V_{CE} = 30\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$	-	4090	-	pF
C_{oes}	Output Capacitance		-	135	-	pF
C_{res}	Reverse Transfer Capacitance		-	75	-	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 600\text{ V}, I_C = 25\text{ A}, R_G = 10\ \Omega, V_{GE} = 15\text{ V}, \text{Inductive Load}, T_C = 25^\circ\text{C}$	-	26	35	ns
t_r	Rise Time		-	41	53	ns
$t_{d(off)}$	Turn-Off Delay Time		-	151	196	ns
t_f	Fall Time		-	102	132	ns
E_{on}	Turn-On Switching Loss		-	1.42	1.84	mJ
E_{off}	Turn-Off Switching Loss		-	1.16	1.5	mJ
E_{ts}	Total Switching Loss		-	2.58	3.34	mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 600\text{ V}, I_C = 25\text{ A}, R_G = 10\ \Omega, V_{GE} = 15\text{ V}, \text{Inductive Load}, T_C = 125^\circ\text{C}$	-	22	-	ns
t_r	Rise Time		-	41	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	163	-	ns
t_f	Fall Time		-	136	-	ns
E_{on}	Turn-On Switching Loss		-	2.04	-	mJ
E_{off}	Turn-Off Switching Loss		-	1.58	-	mJ
E_{ts}	Total Switching Loss		-	3.62	-	mJ
Q_g	Total Gate Charge	$V_{CE} = 600\text{ V}, I_C = 25\text{ A}, V_{GE} = 15\text{ V}$	-	169	225	nC
Q_{ge}	Gate to Emitter Charge		-	33	44	nC
Q_{gc}	Gate to Collector Charge		-	78	104	nC

Electrical Characteristics of the Diode $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max	Unit	
V_{FM}	Diode Forward Voltage	$I_F = 25\text{ A}$	$T_C = 25^\circ\text{C}$	-	2.5	3.5	V
			$T_C = 125^\circ\text{C}$	-	2.3	-	
t_{rr}	Diode Reverse Recovery Time	$I_F = 25\text{ A},$ $di_F/dt = 200\text{ A}/\mu\text{s}$	$T_C = 25^\circ\text{C}$	-	411	535	ns
			$T_C = 125^\circ\text{C}$	-	496	-	
I_{rr}	Diode Peak Reverse Recovery Current	$I_F = 25\text{ A},$ $di_F/dt = 200\text{ A}/\mu\text{s}$	$T_C = 25^\circ\text{C}$	-	5.2	6.8	A
			$T_C = 125^\circ\text{C}$	-	6.9	-	
Q_{rr}	Diode Reverse Recovery Charge	$I_F = 25\text{ A},$ $di_F/dt = 200\text{ A}/\mu\text{s}$	$T_C = 25^\circ\text{C}$	-	1.1	1.82	μC
			$T_C = 125^\circ\text{C}$	-	1.7	-	



Typical Performance Characteristics

Figure 1. Typical Output Characteristics

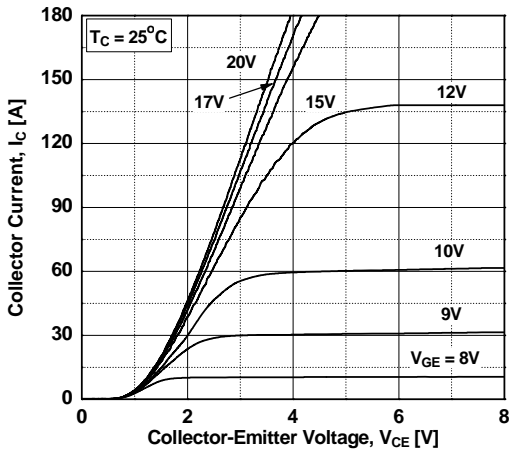


Figure 2. Typical Output Characteristics

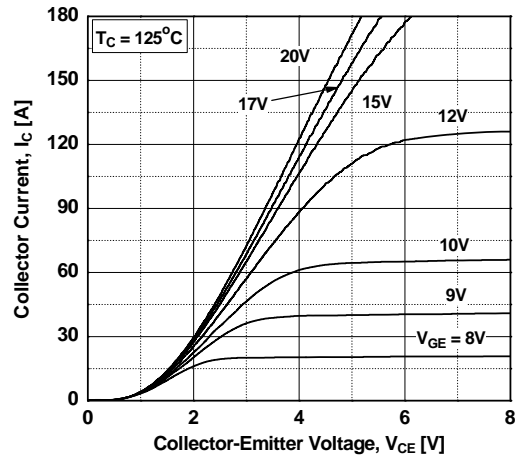


Figure 3. Typical Saturation Voltage Characteristics

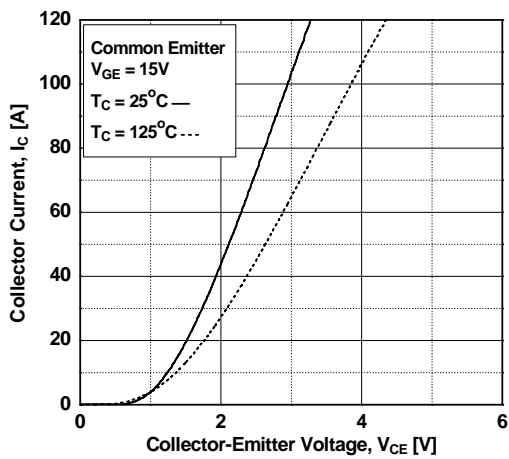


Figure 4. Transfer Characteristics

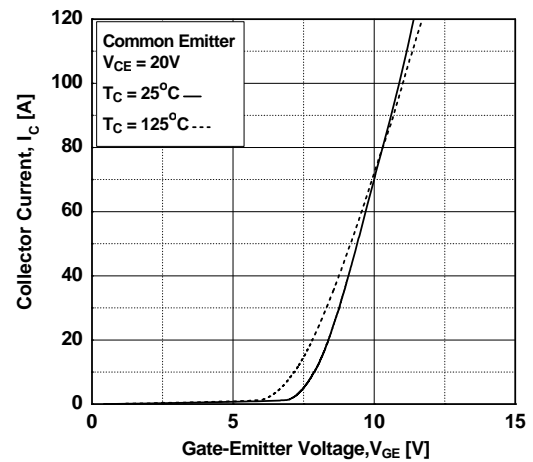


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

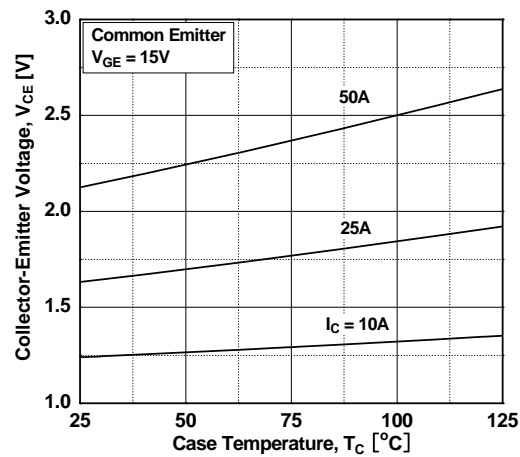
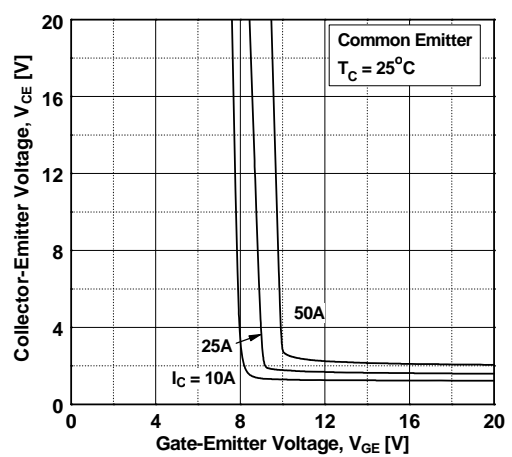


Figure 6. Saturation Voltage vs. Vge



Typical Performance Characteristics

Figure 7. Saturation Voltage vs. V_{GE}

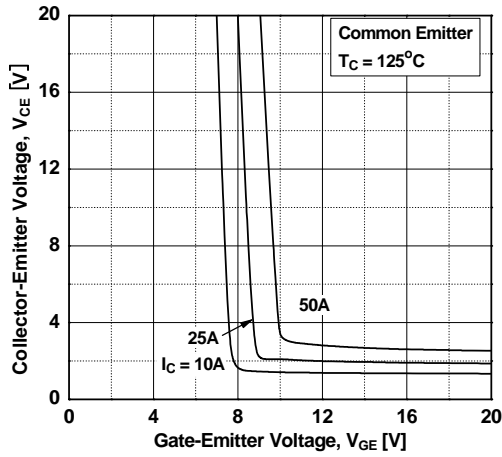


Figure 8. Load Current vs. Frequency

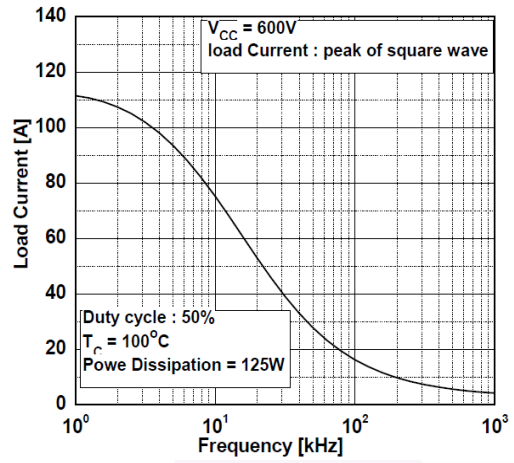


Figure 9. Capacitance Characteristics

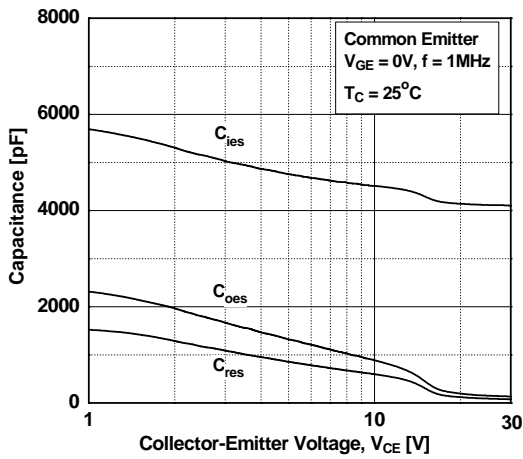


Figure 10. Gate Charge Characteristics

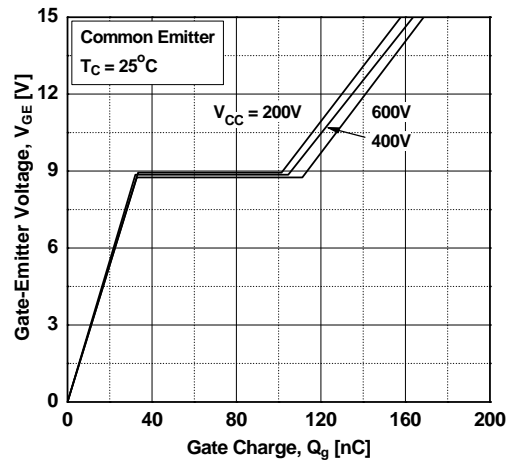


Figure 11. SOA Characteristics Gate Resistance

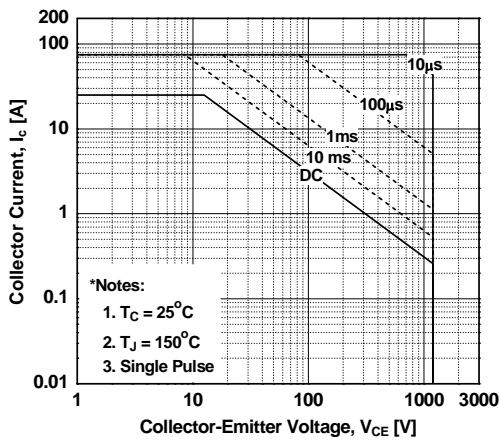
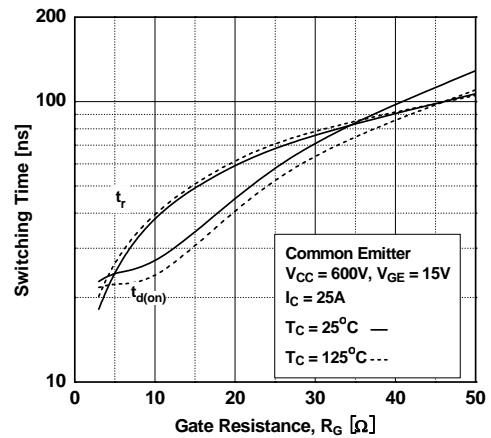


Figure 12. Turn-on Characteristics vs. Gate Resistance



Typical Performance Characteristics

Figure 13. Turn-off Characteristics vs. Gate Resistance

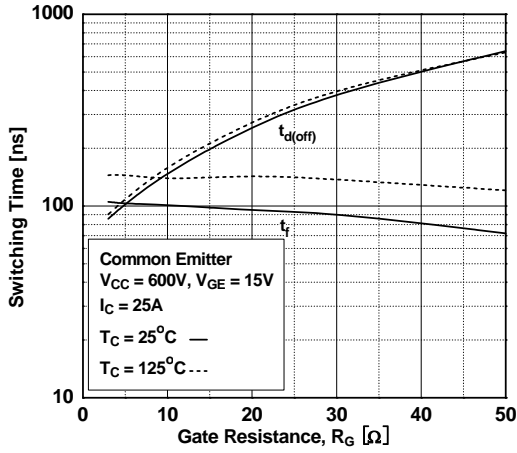


Figure 14. Turn-on Characteristics vs. Collector Current

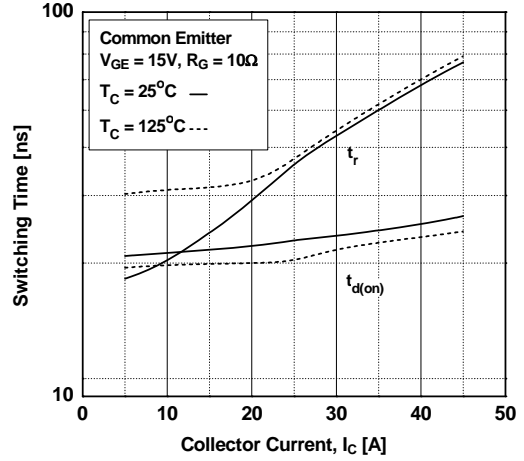


Figure 15. Turn-off Characteristics vs. Collector Current

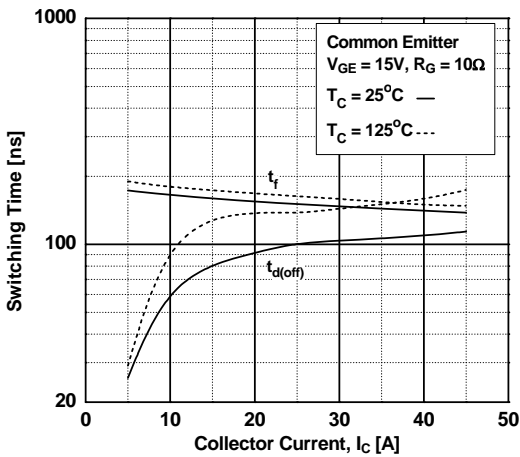


Figure 16. Switching Loss vs. Gate Resistance

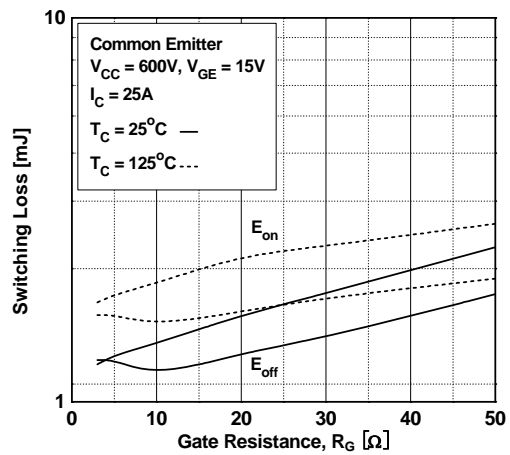


Figure 17. Switching Loss vs. Collector Current

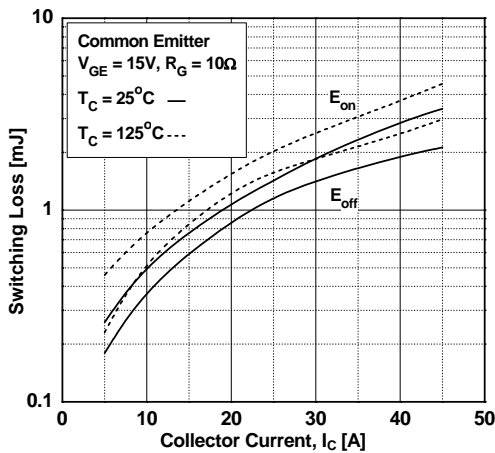
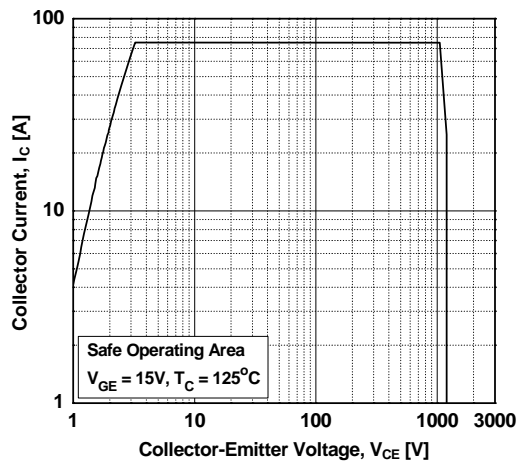


Figure 18. Turn off Switing SOA Characteristics



Typical Performance Characteristics

Figure 19. Forward Characteristics

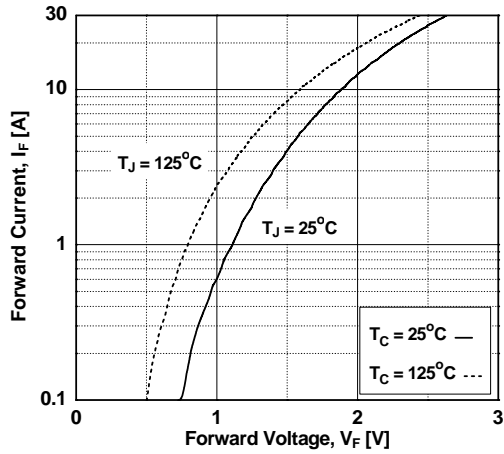


Figure 20. Reverse Recovery Current

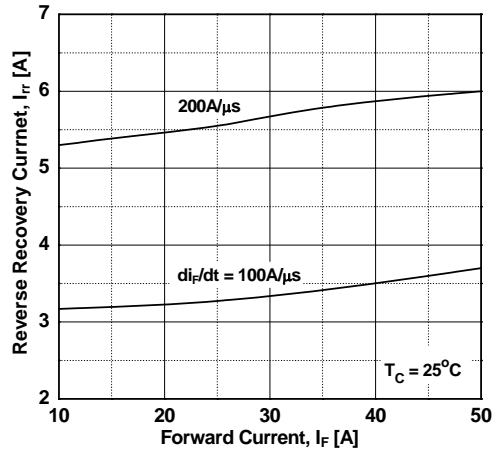


Figure 21. Stored Charge

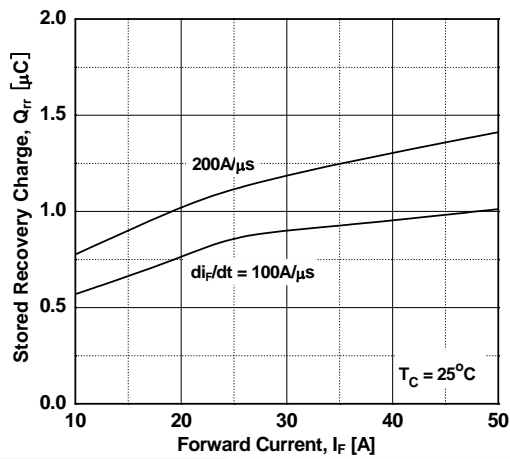


Figure 22. Reverse Recovery Time

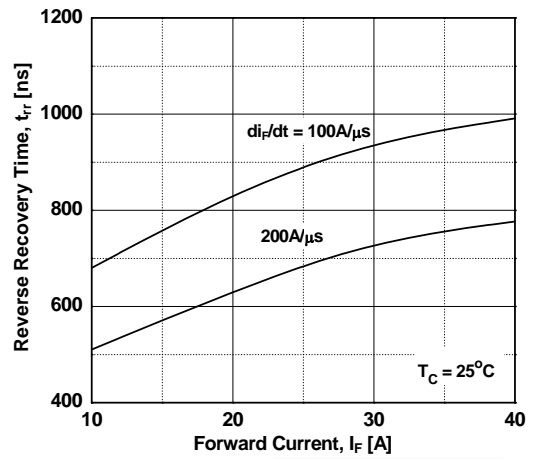
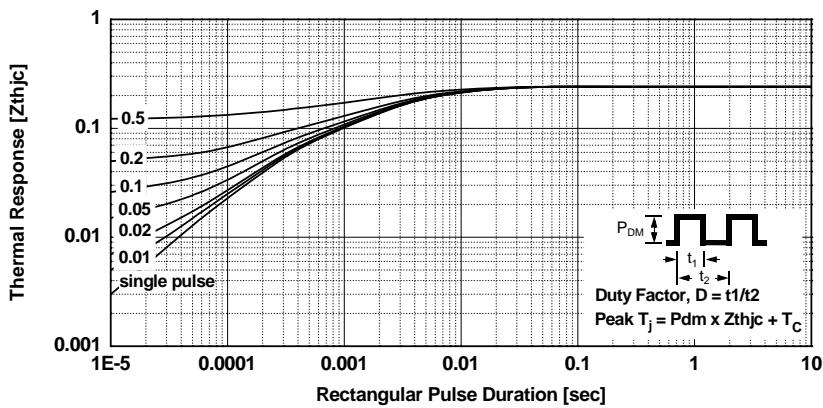
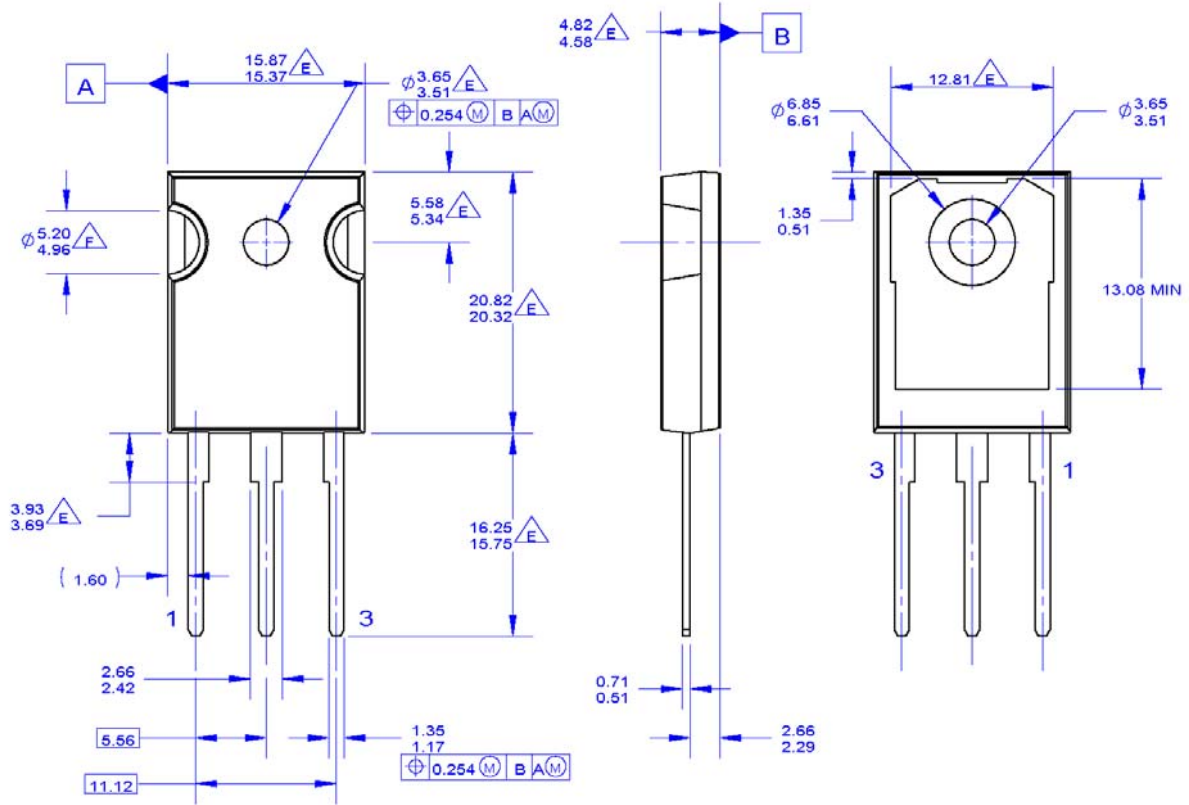


Figure 23. Transient Thermal Impedance of IGBT



Mechanical Dimensions



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- B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- C. ALL DIMENSIONS ARE IN MILLIMETERS.
- D. DRAWING CONFORMS TO ASME Y14.5 - 1994

- $\triangle E$ DOES NOT COMPLY JEDEC STANDARD VALUE
- $\square F$ NOTCH MAY BE SQUARE
- G. DRAWING FILENAME: MKT-TO247A03_REV03

Figure 24. TO-247 3L - TO-247,MOLDED,3 LEAD,JEDEC VARIATION AB





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