

# FGH75N60UF

## 600 V, 75 A Field Stop IGBT

### Features

- High Current Capability
- Low Saturation Voltage:  $V_{CE(sat)} = 1.9$  V @  $I_C = 75$  A
- High Input Impedance
- Fast Switching
- RoHS Compliant

### Applications

- Solar Inverter, UPS, Welder, PFC

### General Description

Using novel field stop IGBT technology, Fairchild's field stop IGBTs offer the optimum performance for solar inverter, UPS, welder and PFC applications where low conduction and switching losses are essential.



### Absolute Maximum Ratings

Symbol	Description	Ratings	Unit
$V_{CES}$	Collector to Emitter Voltage	600	V
$V_{GES}$	Gate to Emitter Voltage	$\pm 20$	V
$I_C$	Collector Current @ $T_C = 25^\circ\text{C}$	150	A
	Collector Current @ $T_C = 100^\circ\text{C}$	75	A
$I_{CM(1)}$	Pulsed Collector Current @ $T_C = 25^\circ\text{C}$	225	A
$P_D$	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	452	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	181	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	-	0.276	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	40	$^\circ\text{C}/\text{W}$

## Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FGH75N60UFTU	FGH75N60UF	TO-247	Tube	N/A	N/A	30

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
$\text{BV}_{\text{CES}}$	Collector to Emitter Breakdown Voltage	$\text{V}_{\text{GE}} = 0 \text{ V}$ , $\text{I}_C = 250 \mu\text{A}$	600	-	-	V
$\frac{\Delta \text{BV}_{\text{CES}}}{\Delta T_J}$	Temperature Coefficient of Breakdown Voltage	$\text{V}_{\text{GE}} = 0 \text{ V}$ , $\text{I}_C = 250 \mu\text{A}$	-	0.75	-	$^\circ\text{C}$
$\text{I}_{\text{CES}}$	Collector Cut-Off Current	$\text{V}_{\text{CE}} = \text{V}_{\text{CES}}$ , $\text{V}_{\text{GE}} = 0 \text{ V}$	-	-	250	$\mu\text{A}$
$\text{I}_{\text{GES}}$	G-E Leakage Current	$\text{V}_{\text{GE}} = \text{V}_{\text{GES}}$ , $\text{V}_{\text{CE}} = 0 \text{ V}$	-	-	$\pm 400$	nA
<b>On Characteristics</b>						
$\text{V}_{\text{GE}(\text{th})}$	G-E Threshold Voltage	$\text{I}_C = 250 \mu\text{A}$ , $\text{V}_{\text{CE}} = \text{V}_{\text{GE}}$	4.0	5.0	6.5	V
$\text{V}_{\text{CE}(\text{sat})}$	Collector to Emitter Saturation Voltage	$\text{I}_C = 75 \text{ A}$ , $\text{V}_{\text{GE}} = 15 \text{ V}$	-	1.9	2.4	V
		$\text{I}_C = 75 \text{ A}$ , $\text{V}_{\text{GE}} = 15 \text{ V}$ , $T_C = 125^\circ\text{C}$	-	2.15	-	V
<b>Dynamic Characteristics</b>						
$\text{C}_{\text{ies}}$	Input Capacitance	$\text{V}_{\text{CE}} = 30 \text{ V}$ , $\text{V}_{\text{GE}} = 0 \text{ V}$ , $f = 1 \text{ MHz}$	-	3850	-	pF
$\text{C}_{\text{oes}}$	Output Capacitance		-	375	-	pF
$\text{C}_{\text{res}}$	Reverse Transfer Capacitance		-	147	-	pF
<b>Switching Characteristics</b>						
$t_{\text{d}(\text{on})}$	Turn-On Delay Time	$\text{V}_{\text{CC}} = 400 \text{ V}$ , $\text{I}_C = 75 \text{ A}$ , $R_G = 3 \Omega$ , $\text{V}_{\text{GE}} = 15 \text{ V}$ , Inductive Load, $T_C = 25^\circ\text{C}$	-	27	-	ns
$t_r$	Rise Time		-	70	-	ns
$t_{\text{d}(\text{off})}$	Turn-Off Delay Time		-	128	-	ns
$t_f$	Fall Time		-	30	80	ns
$E_{\text{on}}$	Turn-On Switching Loss		-	3.05	-	mJ
$E_{\text{off}}$	Turn-Off Switching Loss		-	1.35	-	mJ
$E_{\text{ts}}$	Total Switching Loss		-	4.4	-	mJ
$t_{\text{d}(\text{on})}$	Turn-On Delay Time		-	27	-	ns
$t_r$	Rise Time	$\text{V}_{\text{CC}} = 400 \text{ V}$ , $\text{I}_C = 75 \text{ A}$ , $R_G = 3 \Omega$ , $\text{V}_{\text{GE}} = 15 \text{ V}$ , Inductive Load, $T_C = 125^\circ\text{C}$	-	74	-	ns
$t_{\text{d}(\text{off})}$	Turn-Off Delay Time		-	153	-	ns
$t_f$	Fall Time		-	35	-	ns
$E_{\text{on}}$	Turn-On Switching Loss		-	3.6	-	mJ
$E_{\text{off}}$	Turn-Off Switching Loss		-	1.8	-	mJ
$E_{\text{ts}}$	Total Switching Loss		-	5.4	-	mJ
$Q_g$	Total Gate Charge		-	250	-	nC
$Q_{\text{ge}}$	Gate to Emitter Charge		-	30	-	nC
$Q_{\text{gc}}$	Gate to Collector Charge		-	130	-	nC

## Typical Performance Characteristics

Figure 1. Typical Output Characteristics

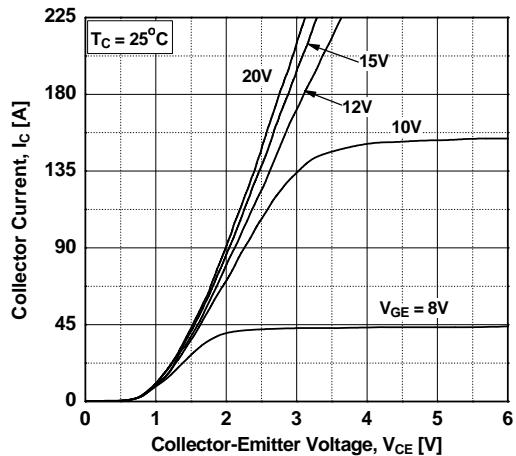


Figure 2. Typical Output Characteristics

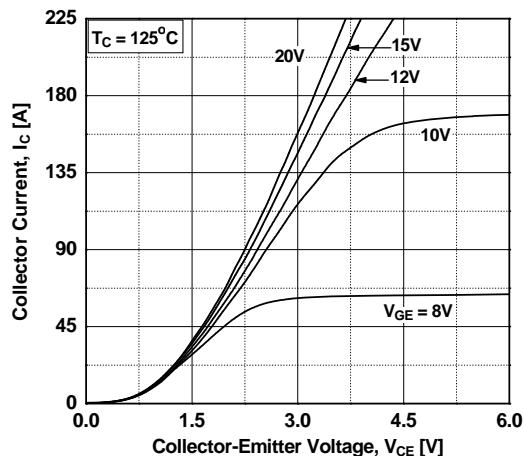


Figure 3. Typical Saturation Voltage Characteristics

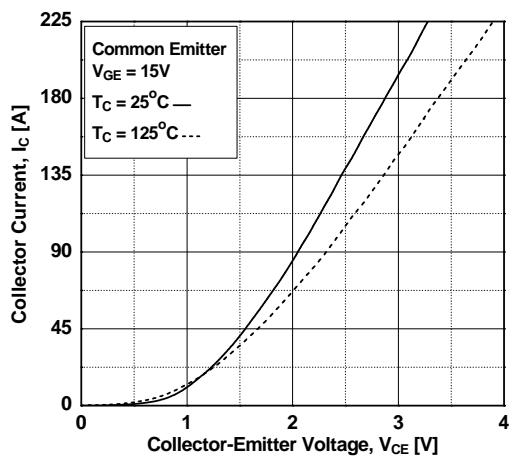


Figure 4. Transfer Characteristics

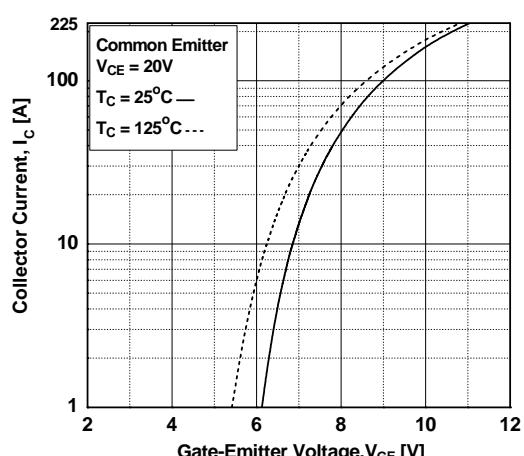


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

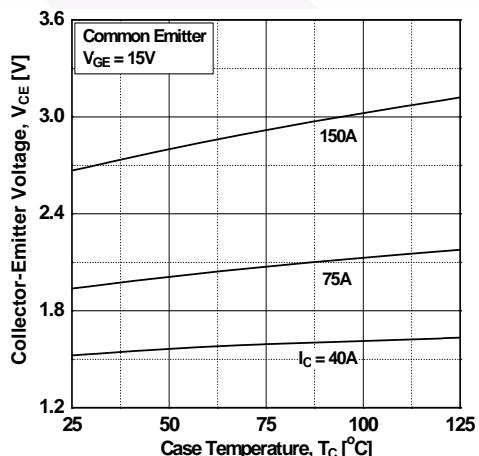
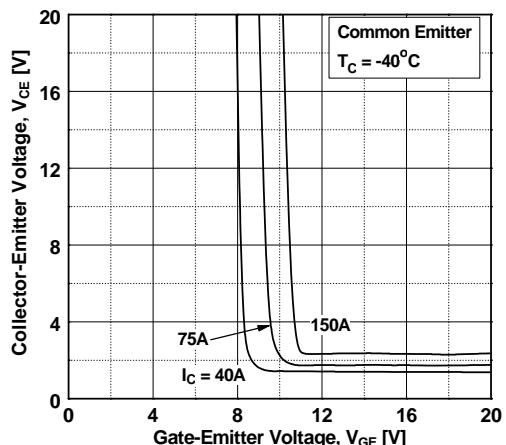


Figure 6. Saturation Voltage vs.  $V_{GE}$



## Typical Performance Characteristics

Figure 7. Saturation Voltage vs.  $V_{GE}$

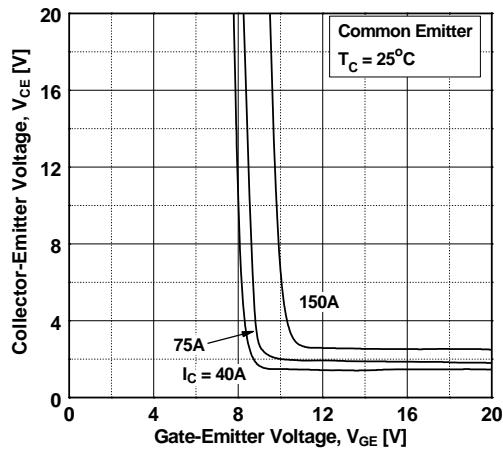


Figure 8. Saturation Voltage vs.  $V_{GE}$

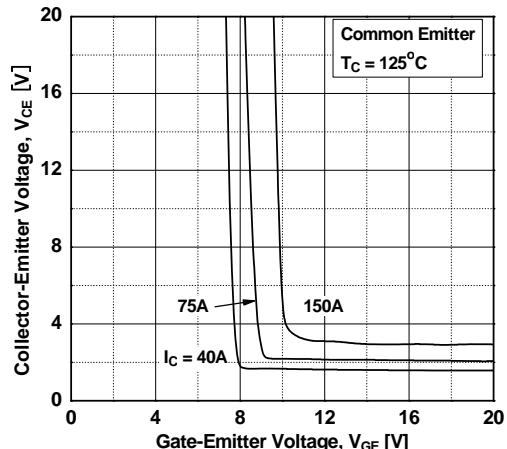


Figure 9. Capacitance Characteristics

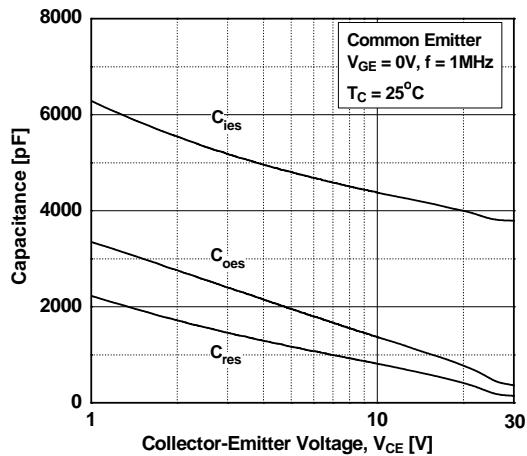


Figure 10. Gate charge Characteristics

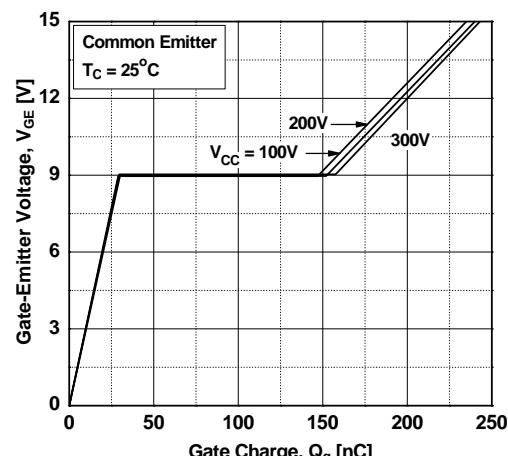


Figure 11. SOA Characteristics

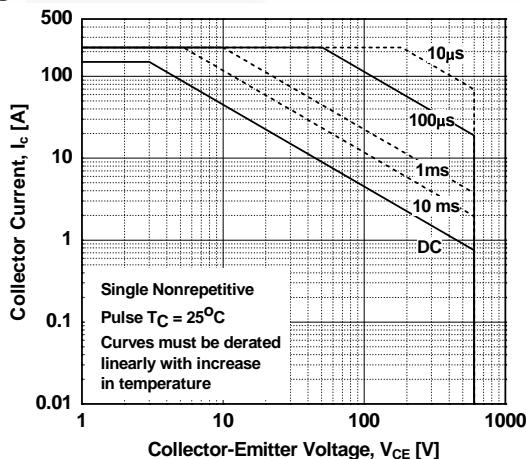
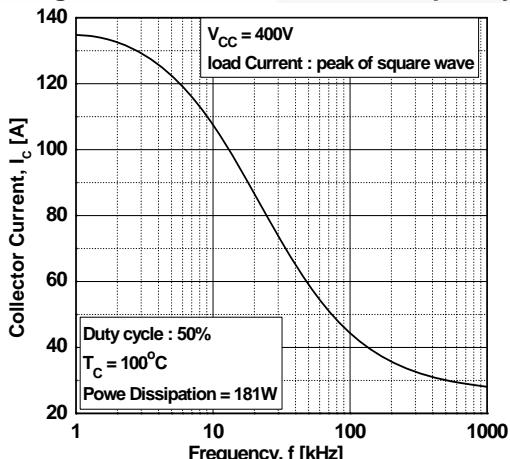


Figure 12. Load Current vs. Frequency



## Typical Performance Characteristics

Figure 13. Turn-on Characteristics vs. Gate Resistance

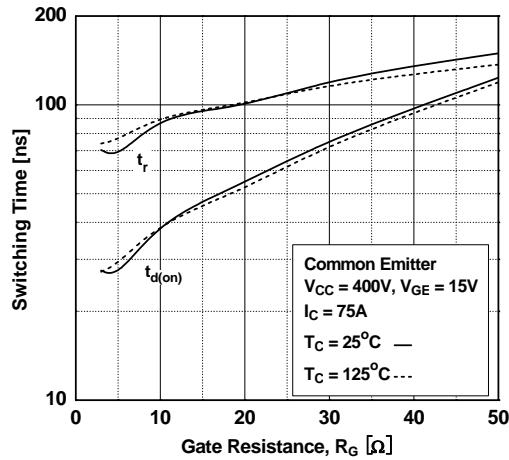


Figure 14. Turn-off Characteristics vs. Gate Resistance

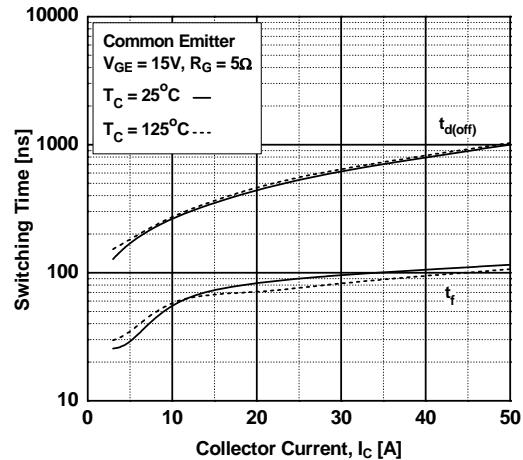


Figure 15. Turn-on Characteristics vs. Collector Current

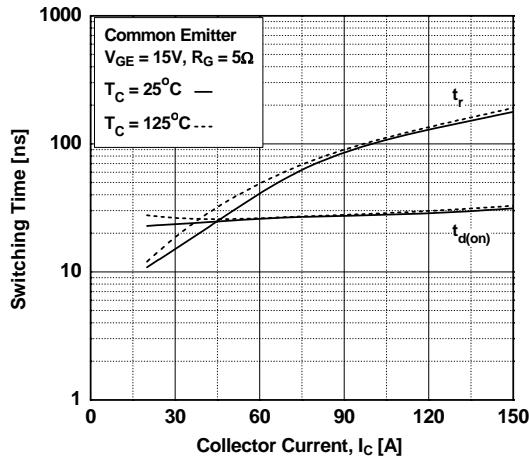


Figure 16. Turn-off Characteristics vs. Collector Current

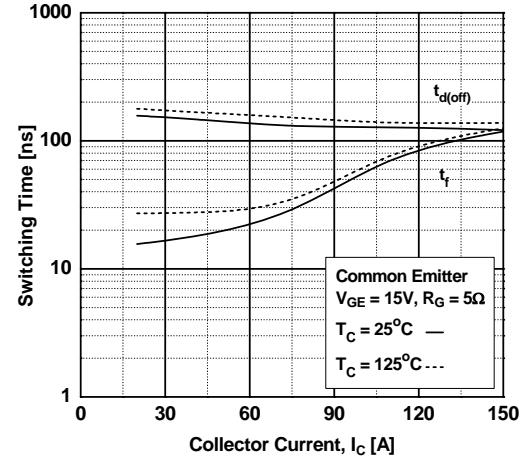


Figure 17. Switching Loss vs. Gate Resistance

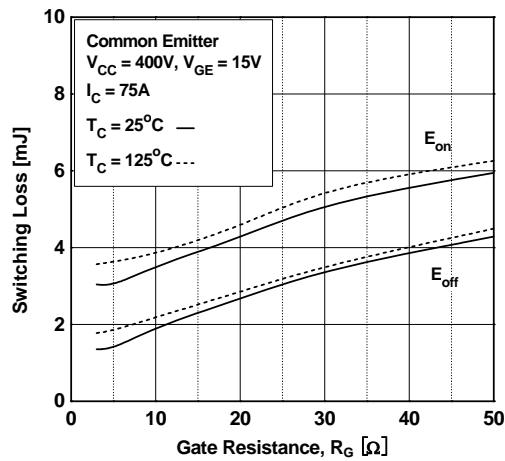
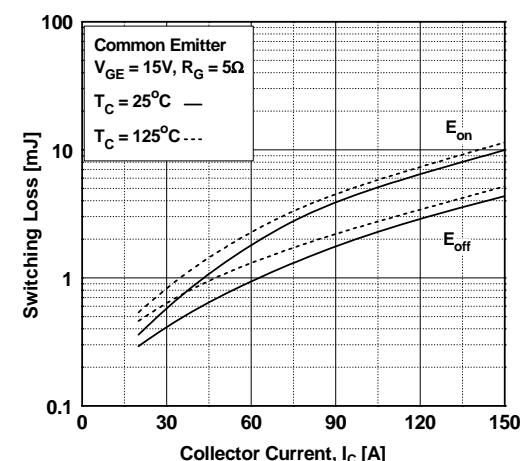


Figure 18. Switching Loss vs. Collector Current



## Typical Performance Characteristics

Figure 19. Turn off Switching SOA Characteristics

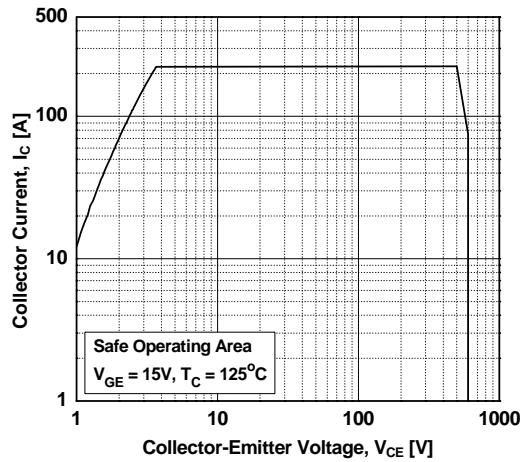
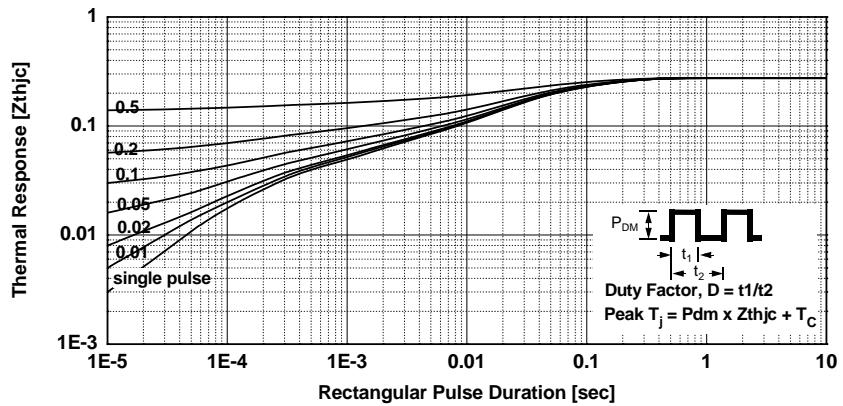
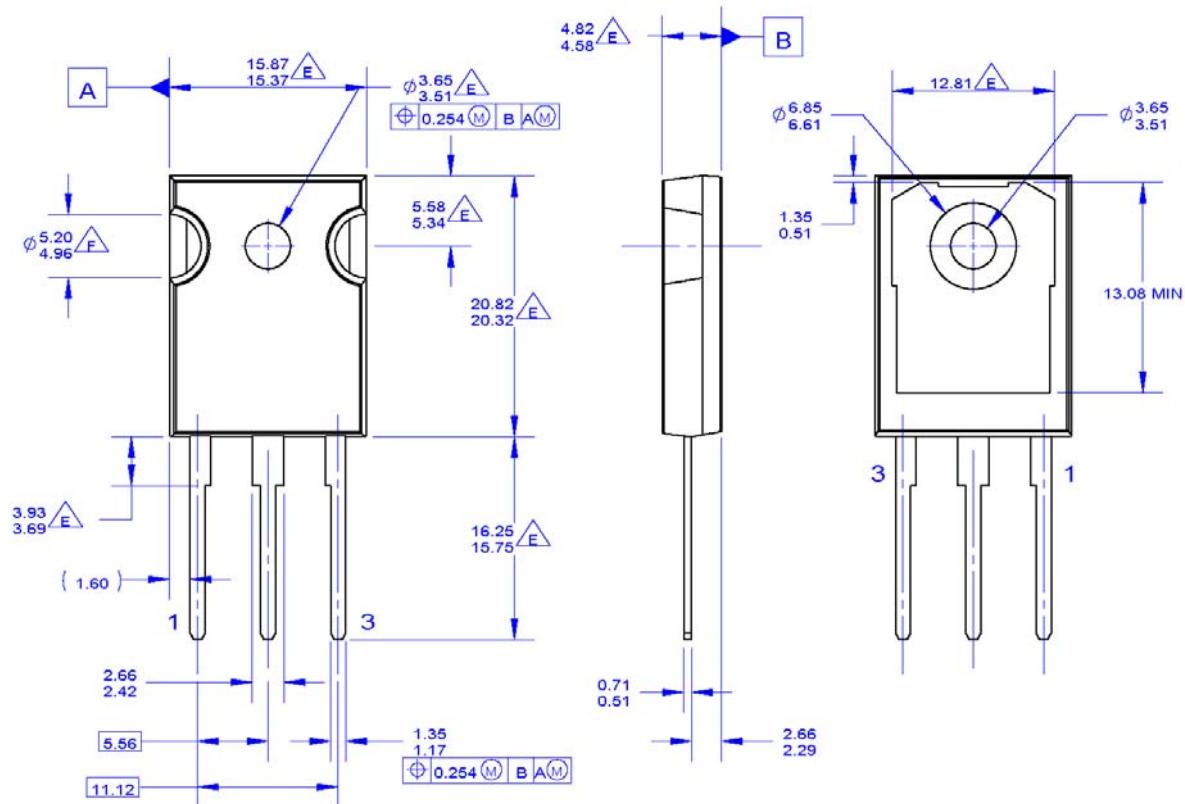


Figure 20. Transient Thermal Impedance of IGBT



## Mechanical Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED.

- A. PACKAGE REFERENCE: JEDEC TO-247,  
ISSUE E, VARIATION AB, DATED JUNE, 2004.
- 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
- E. DOES NOT COMPLY JEDEC STANDARD VALUE
- F. NOTCH MAY BE SQUARE
- G. DRAWING FILENAME: MKT-TO247A03\_REV03

Figure 21. TO-247,MOLDED,3 LEAD,JEDEC VARIATION AB

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SuperSOT™-3  
SuperSOT™-6  
SuperSOT™-8  
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SyncFET™

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TinyLogic®  
TINYOPTO™  
TinyPower™  
TinyPWM™  
TinyWire™  
TranSiC™  
TriFault Detect™  
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Datasheet Identification	Product Status	Definition
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Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
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