

# FGH75T65SHDTLN4

## Product Preview

### Field Stop Trench IGBT 75 A, 650 V

Using the novel field stop 3rd generation IGBT technology, FGH75T65SHDTLN4 offers the optimum performance for solar inverter, UPS, welder, telecom, ESS and PFC applications where low conduction loss and switching loss are essential.

#### Features

- Maximum Junction Temperature:  $T_J = 175^\circ\text{C}$
- Positive Temperature Co-efficient for Easy Parallel Operating
- High Current Capability
- Low Saturation Voltage:  $V_{CE(\text{Sat})} = 1.6\text{ V (Typ.) @ } I_C = 75\text{ A}$
- 100% of the Parts Tested for  $I_{LM}(1)$
- High Input Impedance
- Fast Switching
- Tight Parameter Distribution
- Pb Free and RoHS Compliant
- Not Recommended for Reflow and Full PKG Dipping

#### Typical Applications

- Solar Inverter
- UPS
- Welder
- Telecom
- ESS
- PFC

#### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit	
Collector-to-Emitter Voltage	$V_{CES}$	650	V	
Gate-to-Emitter Voltage Transient Gate-to-Emitter Voltage	$V_{GES}$	$\pm 20$ $\pm 30$	V	
Collector Current	$I_C$	$T_C = 25^\circ\text{C}$	150	A
		$T_C = 100^\circ\text{C}$	75	
Pulsed Collector Current (Note 1)	$I_{LM}$	300	A	
Pulsed Collector Maximum Current (Note 2)	$I_{CM}$	300	A	
Diode Forward Current	$I_F$	$T_C = 25^\circ\text{C}$	125	A
		$T_C = 100^\circ\text{C}$	75	
Pulsed Diode Maximum Forward Current (Note 2)	$I_{FM}$	300	A	
Maximum Power Dissipation	$P_D$	$T_C = 25^\circ\text{C}$	455	W
		$T_C = 100^\circ\text{C}$	227	
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +175	$^\circ\text{C}$	
Maximum Lead Temperature for Soldering Purposes (1/8" from case for 5 seconds)	$T_L$	300	$^\circ\text{C}$	

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.

1.  $V_{CC} = 400\text{ V}$ ,  $V_{GE} = 15\text{ V}$ ,  $I_C = 300\text{ A}$ ,  $R_G = 73\ \Omega$ , Inductive Load
2. Repetitive rating: pulse width limited by max. Junction temperature

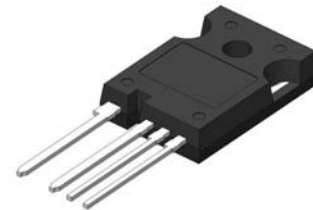
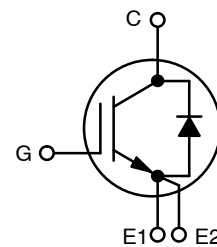
This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.



ON Semiconductor®

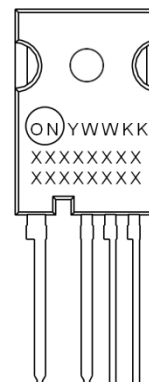
[www.onsemi.com](http://www.onsemi.com)

75 A, 650 V  
 $V_{CE(\text{sat})} = 1.6\text{ V}$   
 $E_{on} = 1.06\text{ mJ}$



TO-247  
THIN LEADS  
CASE 340CW

#### DEVICE MARKING INFORMATION



Line 1: Date Code  
Line 2: Device Marking  
Line 3: Device Marking

#### ORDERING INFORMATION

Device	Package	Shipping
FGH75T65SHDTLN4	TO-247	30 Units / Tube

# FGH75T65SHDTLN4

**Table 1. THERMAL CHARACTERISTICS**

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, for IGBT	0.33	$^{\circ}\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case, for Diode	0.65	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	40	$^{\circ}\text{C}/\text{W}$

**Table 2. ELECTRICAL CHARACTERISTICS** ( $T_J = 25^{\circ}\text{C}$  unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
-----------	--------	----------------	-----	-----	-----	------

**OFF CHARACTERISTICS**

Collector-emitter breakdown voltage, gate-emitter short-circuited	$BV_{CES}$	$V_{GE} = 0\text{ V}, I_C = 1\text{ mA}$	650	-	-	V
Temperature Coefficient of Breakdown Voltage	$\Delta BV_{CES}/\Delta T_J$	$V_{GE} = 0\text{ V}, I_C = 1\text{ mA}$	-	0.65	-	$\text{V}/^{\circ}\text{C}$
Collector-emitter cut-off current, gate-emitter short-circuited	$I_{CES}$	$V_{GE} = 0\text{ V}, V_{CE} = 650\text{ V}$	-	-	250	$\mu\text{A}$
Gate leakage current, collector-emitter short-circuited	$I_{GES}$	$V_{GE} = \pm 20\text{ V}, V_{CE} = 0\text{ V}$	-	-	$\pm 400$	nA

**ON CHARACTERISTICS**

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 75\text{ mA}$	4.0	5.5	7.5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_{GE} = 15\text{ V}, I_C = 75\text{ A}, V_{GE} = 15\text{ V}, I_C = 75\text{ A}, T_J = 175^{\circ}\text{C}$	-	1.6 2.28	2.1 -	$\text{mV}/^{\circ}\text{C}$

**DYNAMIC CHARACTERISTICS**

Input Capacitance	$C_{ies}$	$V_{CE} = 30\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$	-	3710	-	pF
Output Capacitance	$C_{oes}$		-	183	-	
Reverse Transfer Capacitance	$C_{res}$		-	43	-	
Gate Charge Total	$Q_g$	$V_{CE} = 400\text{ V}, I_C = 75\text{ A}, V_{GE} = 15\text{ V}$	-	126	-	nC
Gate-to-Emitter Charge	$Q_{ge}$		-	24.1	-	
Gate-to-Collector Charge	$Q_{gc}$		-	47.6	-	

**SWITCHING CHARACTERISTICS, INDUCTIVE LOAD**

Turn-On Delay Time	$t_{d(on)}$	$T_C = 25^{\circ}\text{C}$ $V_{CC} = 400\text{ V}, I_C = 75\text{ A}$ $R_g = 15\ \Omega$ $V_{GE} = 15\text{ V}$ Inductive Load, $T_C = 25^{\circ}\text{C}$	-	55	-	ns	
Rise Time	$t_r$		-	50	-		
Turn-Off Delay Time	$t_{d(off)}$		-	189	-		
Fall Time	$t_f$		-	39	-		
Turn-On Switching Loss	$E_{on}$	$V_{CC} = 400\text{ V}, I_C = 75\text{ A}$ $R_g = 15\ \Omega$ $V_{GE} = 15\text{ V}$ Inductive Load, $T_C = 175^{\circ}\text{C}$	-	1.06	-	mJ	
Turn-Off Switching Loss	$E_{off}$		-	1.56	-		
Total Switching Loss	$E_{ts}$		-	2.62	-		
Turn-On Delay Time	$t_{d(on)}$		$V_{CC} = 400\text{ V}, I_C = 75\text{ A}$ $R_g = 15\ \Omega$ $V_{GE} = 15\text{ V}$ Inductive Load, $T_C = 175^{\circ}\text{C}$	-	48	-	ns
Rise Time	$t_r$			-	56	-	
Turn-Off Delay Time	$t_{d(off)}$			-	205	-	
Fall Time	$t_f$			-	40	-	
Turn-On Switching Loss	$E_{on}$	-		2.34	-	mJ	
Turn-Off Switching Loss	$E_{off}$	-		1.81	-		
Total Switching Loss	$E_{ts}$	-	4.15	-			

**DIODE CHARACTERISTICS**

Forward voltage	$V_F$	$I_F = 75\text{ A}$ $I_F = 75\text{ A}, T_J = 175^{\circ}\text{C}$	-	1.8 1.7	2.1 -	V
-----------------	-------	---	---	------------	----------	---

# FGH75T65SHDTLN4

**Table 2. ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>DIODE CHARACTERISTICS</b>						
Reverse Recovery Time	$t_{rr}$	$T_J = 25^\circ\text{C}$ $I_F = 75\text{ A}, di_F/dt = 200\text{ A}/\mu\text{s}$	-	36	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	18	-	
Reverse Recovery Time	$t_{rr}$	$T_J = 175^\circ\text{C}$ $I_F = 75\text{ A}, di_F/dt = 200\text{ A}/\mu\text{s}$	-	270	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	2199	-	$\mu\text{C}$
Reverse Recovery Energy	$E_{rec}$		-	160	-	$\mu\text{J}$

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.

# FGH75T65SHDTLN4

## TYPICAL CHARACTERISTICS

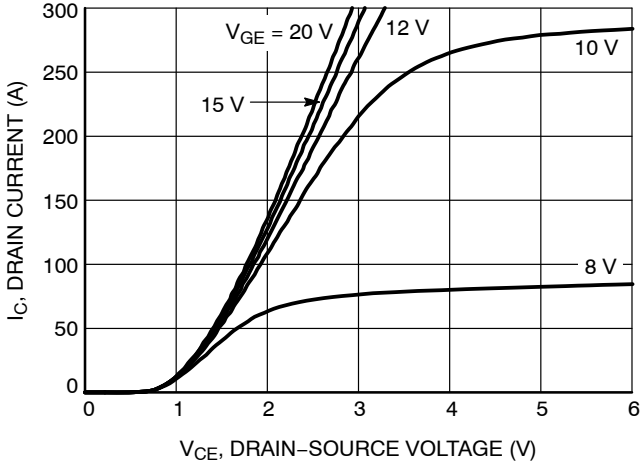


Figure 1. Typical Output Characteristics (25°C)

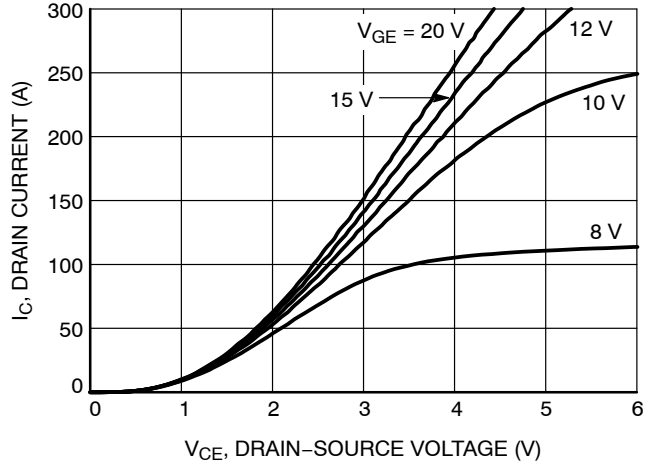


Figure 2. Typical Output Characteristics (175°C)

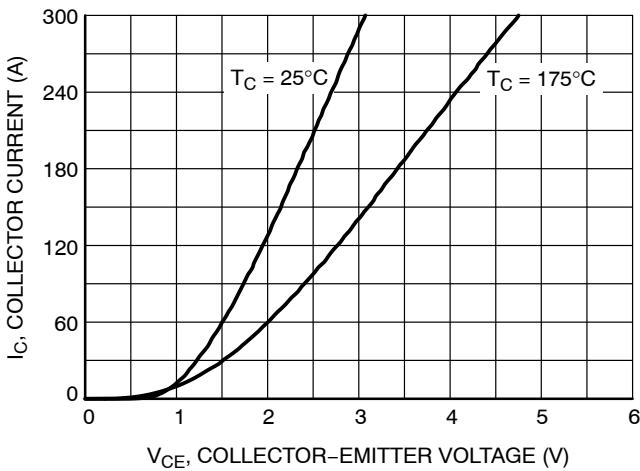


Figure 3. Typical Saturation Voltage Characteristics

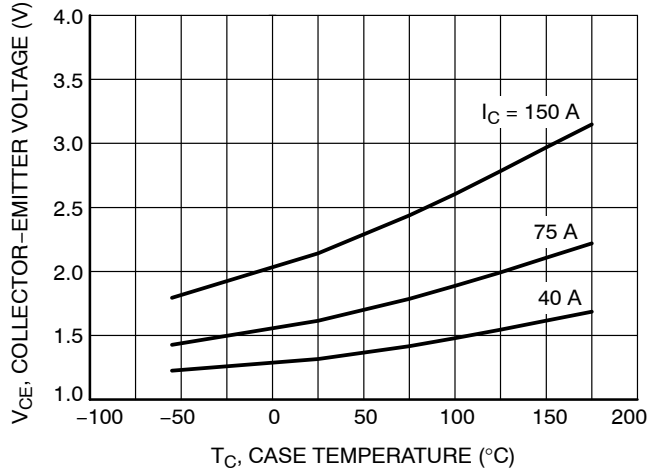


Figure 4. Saturation Voltage vs. Case Temperature at Variant Current Level

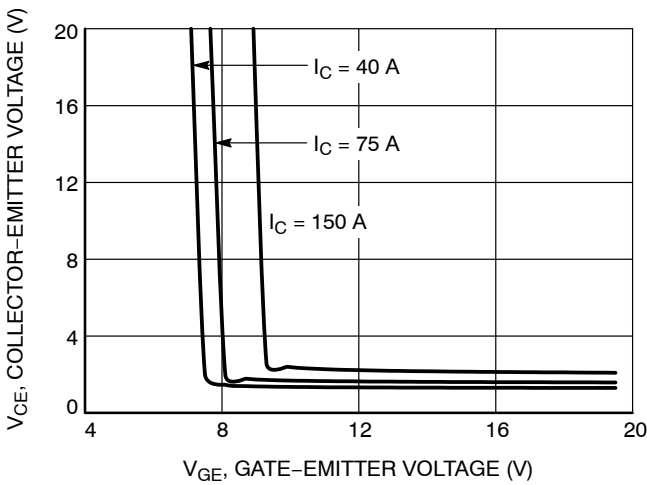


Figure 5. Saturation Voltage vs.  $V_{GE}$  (25°C)

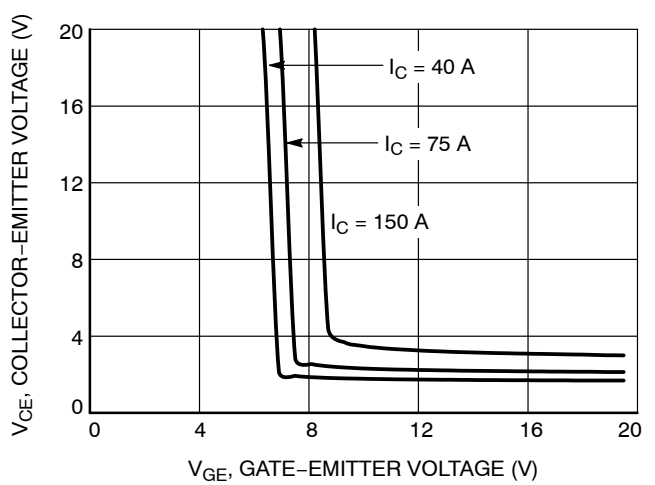


Figure 6. Saturation Voltage vs.  $V_{GE}$  (175°C)

# FGH75T65SHDTLN4

## TYPICAL CHARACTERISTICS

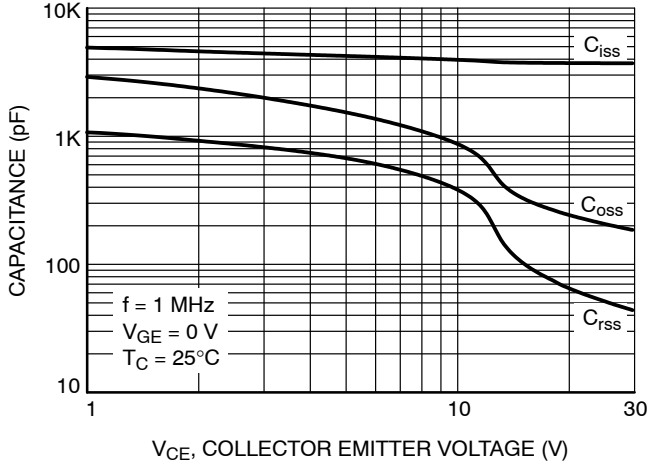


Figure 7. Capacitance Characteristics

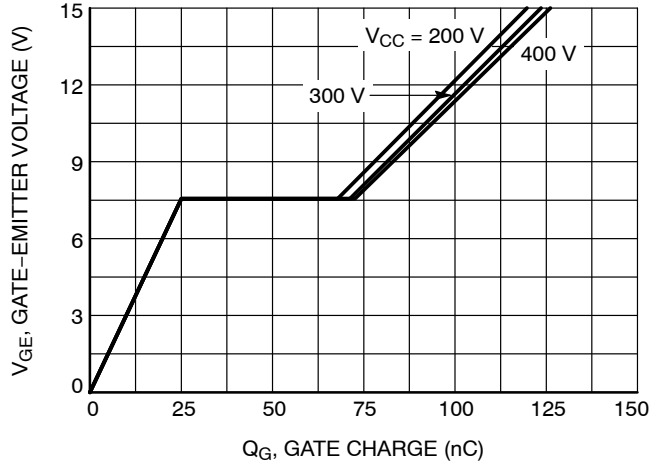


Figure 8. Gate Charge Characteristics

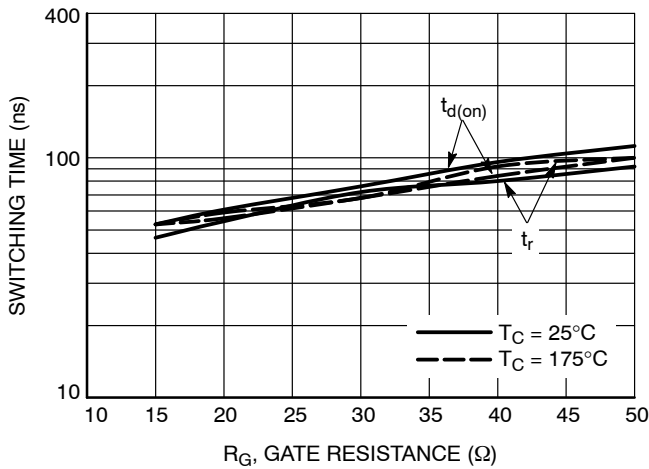


Figure 9. Turn-On Characteristics vs. Gate Resistance

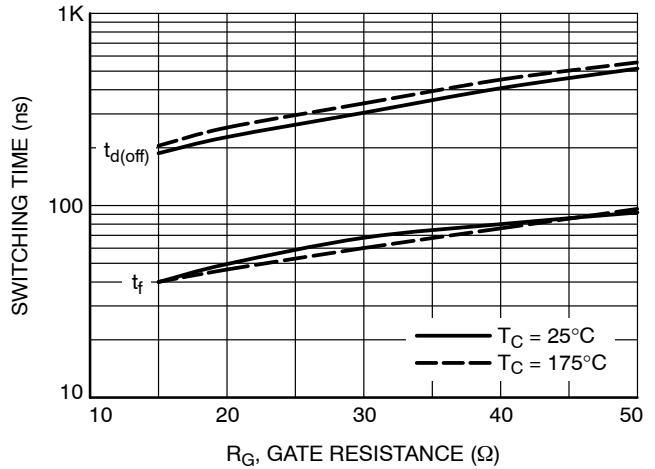


Figure 10. Turn-Off Characteristics vs. Gate Resistance

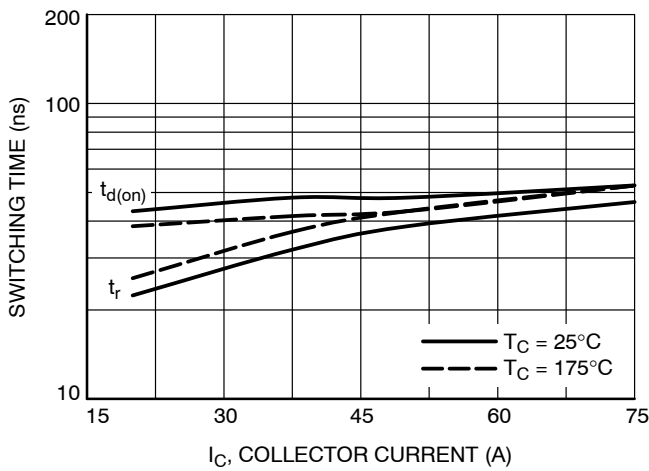


Figure 11. Turn-On Characteristics vs. Collector Current

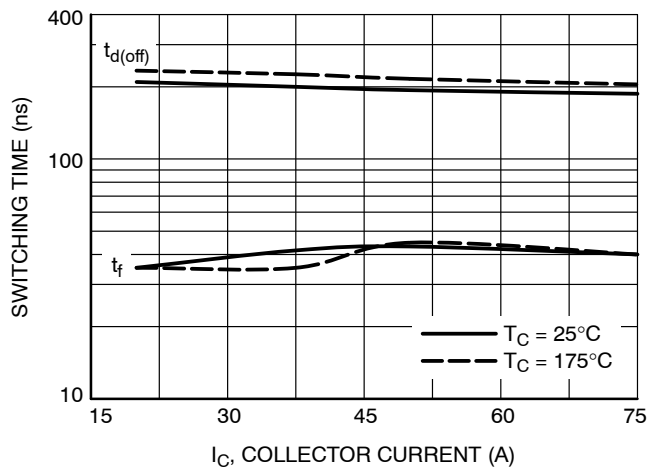


Figure 12. Turn-Off Characteristics vs. Collector Current

# FGH75T65SHDTLN4

## TYPICAL CHARACTERISTICS

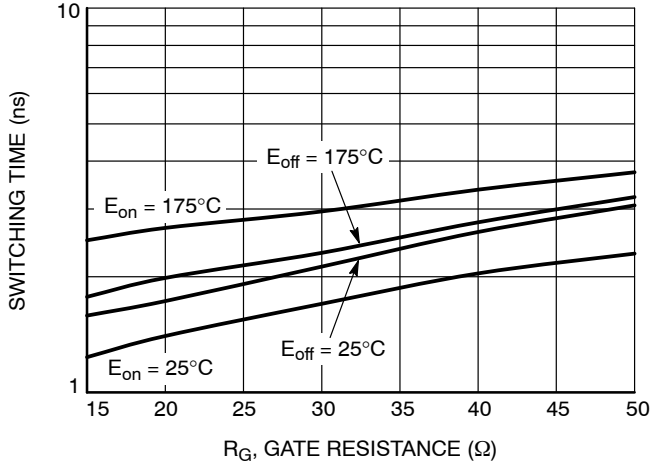


Figure 13. Switching Loss vs. Gate Resistance

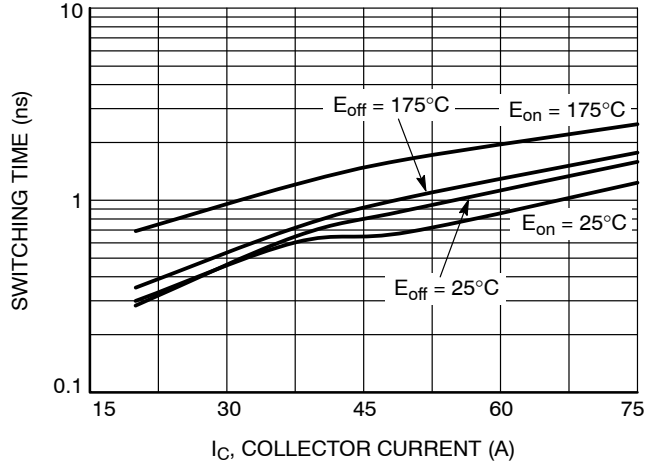


Figure 14. Switching Loss vs. Collector Current

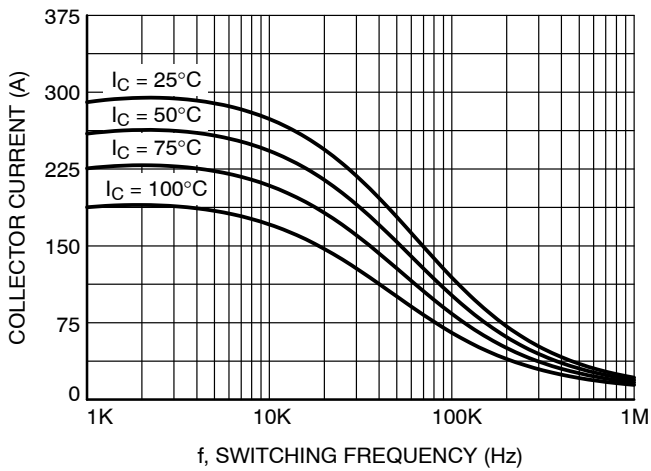


Figure 15. Load Frequency Template

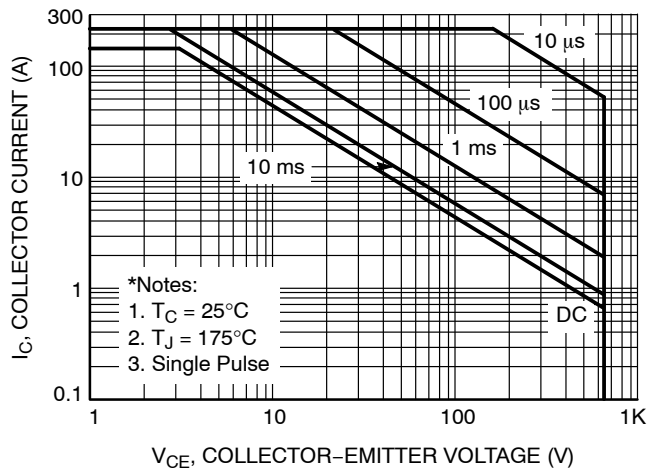


Figure 16. SOA Characteristics

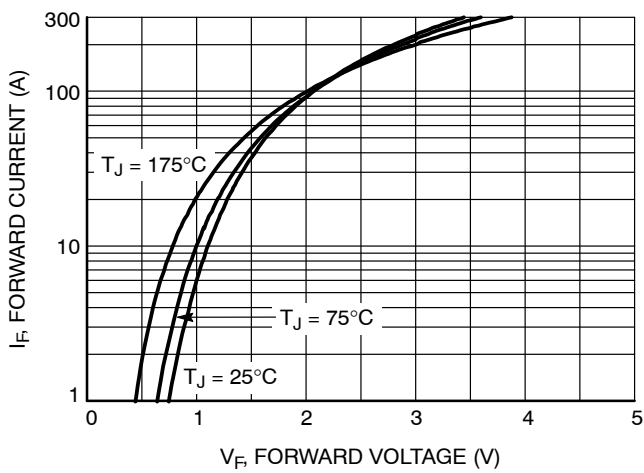


Figure 17. Forward Characteristics

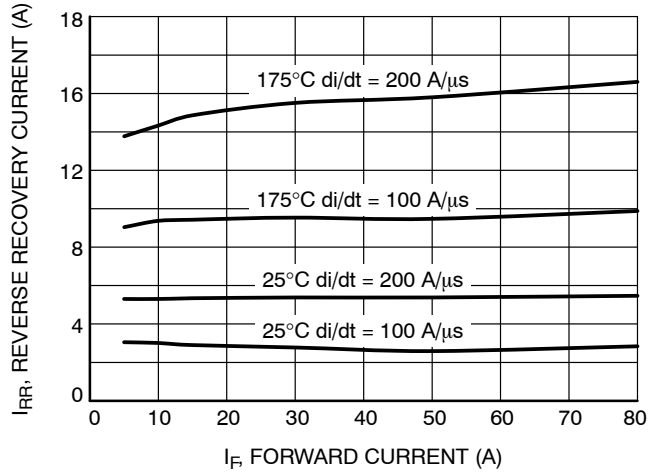


Figure 18. Reverse Recovery Current

# FGH75T65SHDTLN4

## TYPICAL CHARACTERISTICS

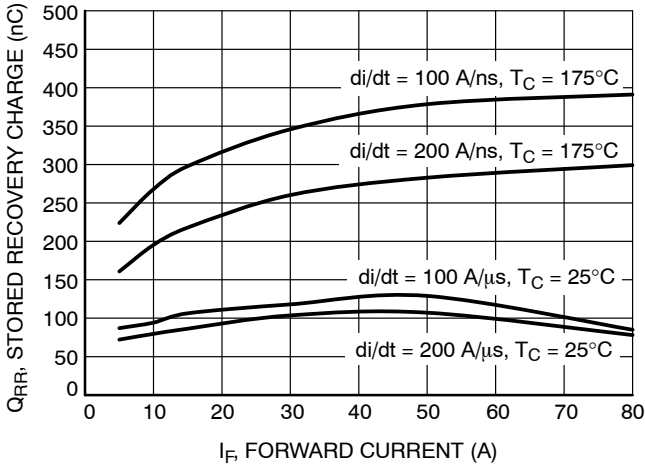


Figure 19. Reverse Recovery Time

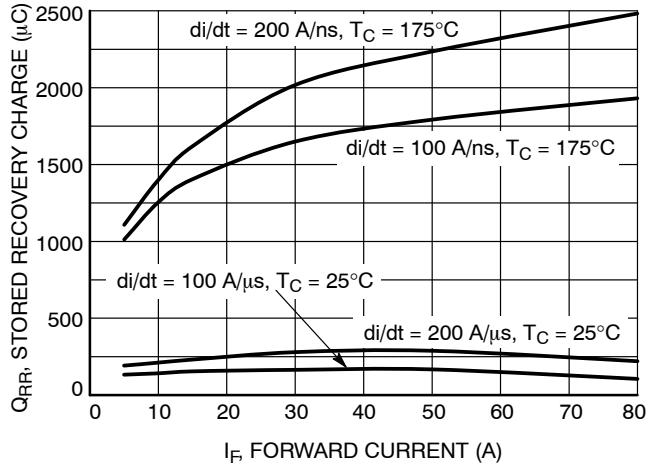


Figure 20. Stored Charge

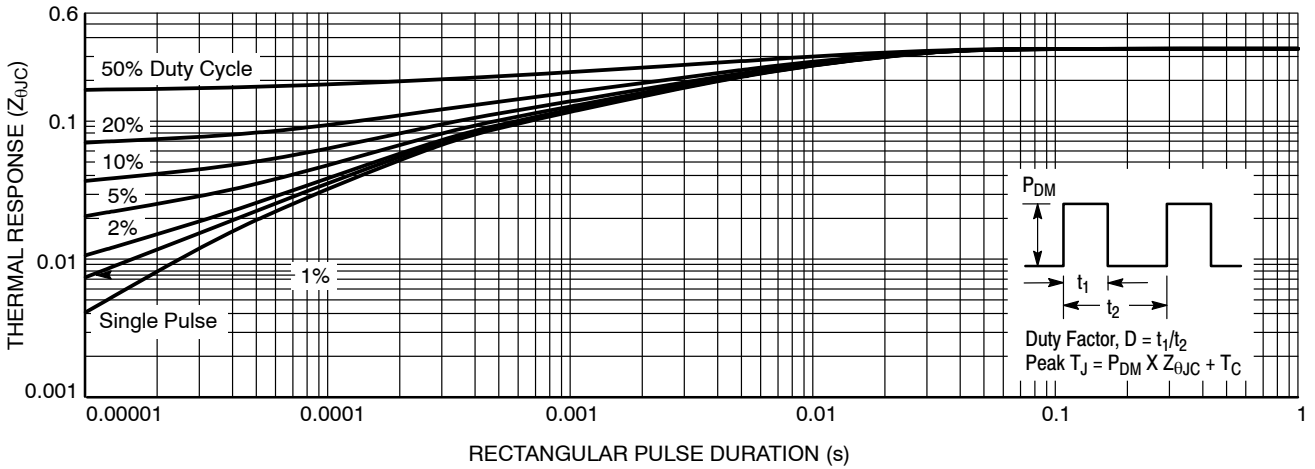


Figure 21. Transient Thermal Impedance of IGBT

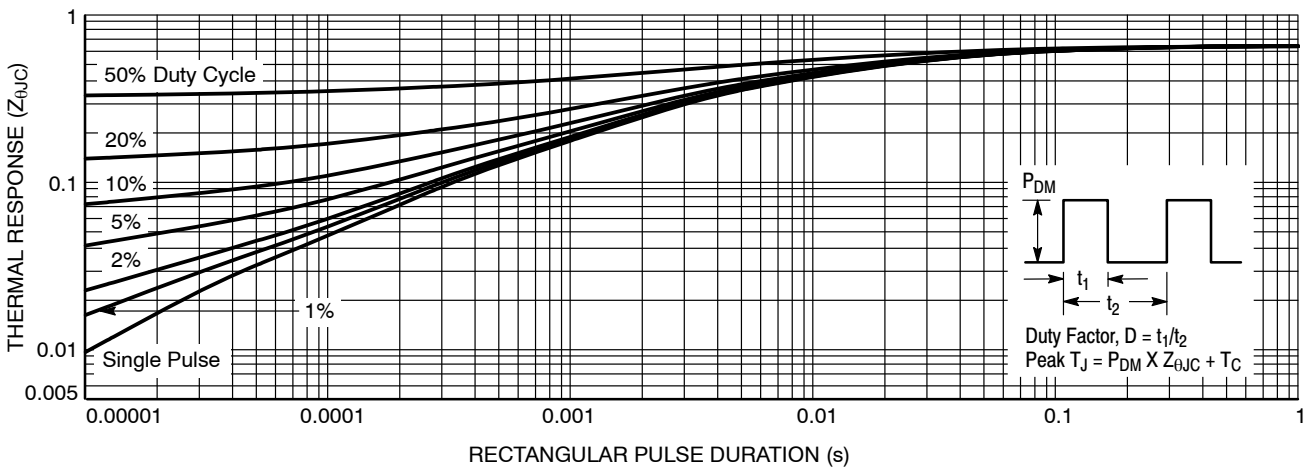
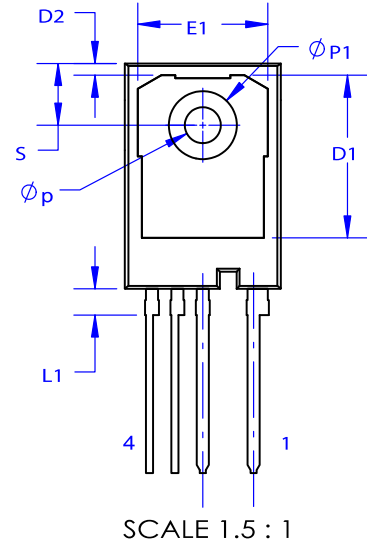
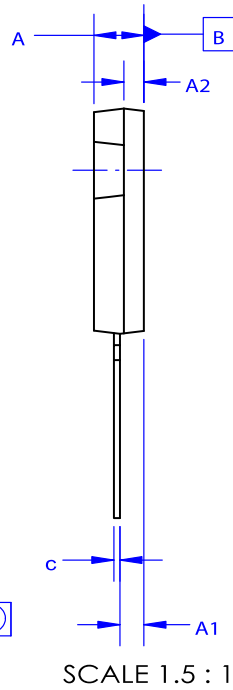
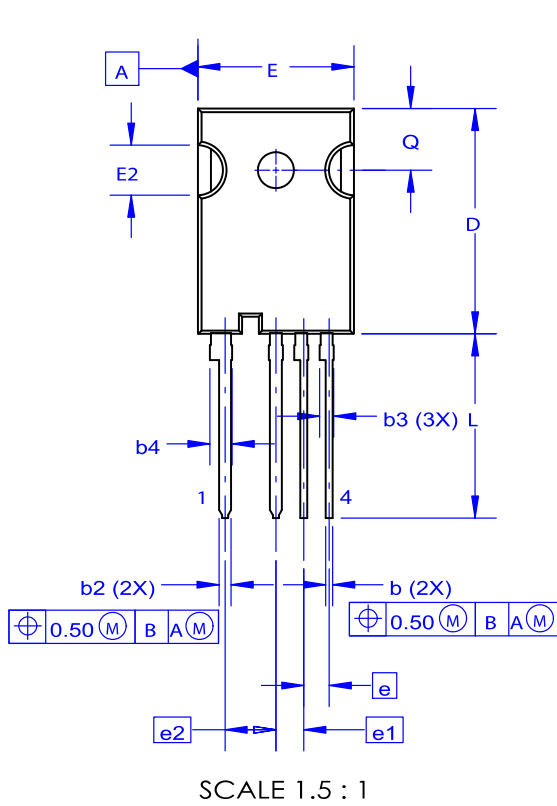


Figure 22. Transient Thermal Impedance of Diode

# FGH75T65SHDTLN4

## PACKAGE DIMENSIONS

TO-247 4-LEAD, THIN LEADS  
CASE 340CW  
ISSUE O



DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	1.90	2.40	2.90
A2	1.80	2.00	2.20
b	0.57	0.70	0.83
b2	1.07	1.20	1.33
b3	1.20	1.40	1.60
b4	2.02	2.22	2.42
c	0.50	0.60	0.70
D	22.34	22.54	22.74
D1	16.00	16.30	16.50
D2	0.97	1.17	1.37
e		2.54	
e1		2.79	
e2		5.08	
E	15.40	15.60	15.80
E1	12.80	13.00	13.20
E2	4.80	5.00	5.20
L	18.12	18.42	18.72
L1	2.42	2.62	2.82
Øp	3.40	3.60	3.80
ØP1	6.60	6.80	7.00
Q	5.97	6.17	6.37
S	5.97	6.17	6.37

### NOTES:

- A. NO INDUSTRY STANDARD APPLIES TO THIS PACKAGE.
- B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
- C. ALL DIMENSIONS ARE IN MILLIMETERS.



# FGH75T65SHDTLN4

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)

**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local  
Sales Representative



## Стандарт Электрон Связь

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

### Наши контакты:

**Телефон:** +7 812 627 14 35

**Электронная почта:** [sales@st-electron.ru](mailto:sales@st-electron.ru)

**Адрес:** 198099, Санкт-Петербург,  
Промышленная ул, дом № 19, литера Н,  
помещение 100-Н Офис 331