FGY75T95SQDT

Product Preview

75 A, 950 V Field Stop Trench IGBT

Trench Field Stop 4th generation High Speed IGBT co−packaged with full current rated diode

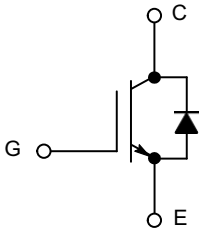
ON Semiconductor®

www.onsemi.com

75 A, 950 V
V_{CESat} = 1.69 V (Typ.)

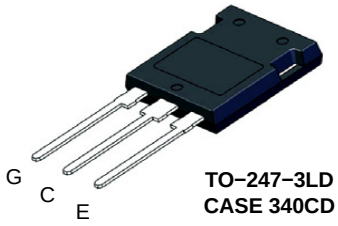
Features

- Maximum Junction Temperature : T_J = 175°C
- Positive Temperature Co−efficient for Easy Parallel Operating
- High Current Capability
- Low Saturation Voltage: $V_{CE(Sat)}$ = 1.69 V (Typ.) @ I_C = 75 A
- Fast Switching
- Tighten Parameter Distribution
- These Devices are Pb−Free and are RoHS Compliant



Applications

- Solar Inverter
- PFC
- DC/DC Converter



TO−247−3LD
CASE 340CD

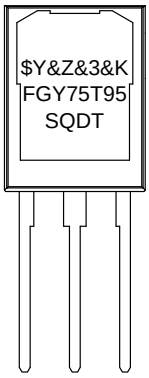
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector to Emitter Voltage	V_{CES}	950	V
Gate to Emitter Voltage Transient Gate to Emitter Voltage	V_{GES}	±20 ±30	V
Collector Current @T_C = 25°C @T_C = 100°C	I_C	150 75	A
Pulsed Collector Current (Note 1)	I_{LM}	300	A
Pulsed Collector Current (Note 2)	I_{CM}	300	A
Diode Forward Current @T_C = 25°C @T_C = 100°C	I_F	150 75	A
Pulsed Diode Forward Current (Note 2)	I_{FM}	300	A
Maximum Power Dissipation @T_C = 25°C @T_C = 100°C	P_D	434 217	W
Operating Junction / Storage Temperature Range	T_J, T_{STG}	−55 to +175	°C
Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds	T_L	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.

1. VCC = 700 V, VGE = 15 V, IC = 300 A, RG = 26 Ω, Inductive Load, 100% Tested
2. Pulse width limited by max Junction temperature. Defined by design. Not subject to production test

MARKING DIAGRAM



$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= 2−Digit Lot Traceability Code
FGY75T95SQDT	= Specific Device Code

ORDERING INFORMATION

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

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

© Semiconductor Components Industries, LLC, 2019

ORDERING INFORMATION

Part Number	Top Marking	Package	Shipping
FGY75T95SQDT	FGY75T95SQDT	TO−247−3LD (Pb-Free)	30 Units / Rail

THERMAL CHARACTERISTICS

Rating	Symbol	Value	Unit
Thermal resistance junction−to−case, for IGBT	$R_{\theta JC}$	0.35	°C/W
Thermal resistance junction−to−case, for Diode	$R_{\theta JC}$	0.23	°C/W
Thermal resistance junction−to−ambient	$R_{\theta JA}$	40	°C/W

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector−emitter breakdown voltage, gate−emitter short−circuited	V_{GE} = 0 V, I_C = 1 mA	BV_{CES}	950			V
Temperature Coefficient of Breakdown Voltage	V_{GE} = 0 V, I_C = 1 mA	$\frac{\Delta BV_{CES}}{\Delta T_J}$		0.96		V/°C
Collector−emitter cut−off current, gate−emitter short−circuited	V_{GE} = 0 V, V_{CE} = 950 V	I_{CES}			250	μA
Gate leakage current, collector−emitter short−circuited	V_{GE} = 20 V , V_{CE} = 0 V	I_{GES}			±400	nA
ON CHARACTERISTICS						
Gate−emitter threshold voltage	V_{GE} = V_{CE}, I_C = 75 mA	$V_{GE(th)}$	3.4	4.84	6.4	V
Collector−emitter saturation voltage	V_{GE} = 15 V, I_C = 75 A V_{GE} = 15 V, I_C = 75 A, T_J = 175°C	$V_{CE(sat)}$		1.69 2.25	2.11	V
DYNAMIC CHARACTERISTICS						
Input capacitance	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz	Cies		4770		pF
Output capacitance		Coes		241		
Reverse transfer capacitance		Cres		19.7		
Gate charge total	V_{CE} = 600 V, I_C = 75 V, V_{GE} = 15 V	Q_g		137		nC
Gate to emitter charge		Qge		33.2		
Gate to collector charge		Qgc		38.6		
SWITCHING CHARACTERISTICS, INDUCTIVE LOAD						
Turn−on delay time	T_J = 25°C V_{CC} = 600 V, I_C = 37.5 A Rg = 4.7 Ω V_{GE} = 15 V Inductive Load	td(on)		28.8		ns
Rise time		t_r		16.0		
Turn−off delay time		td(off)		104.0		
Fall time		t_f		30.4		
Turn−on switching loss		Eon		2.1		mJ
Turn−off switching loss		Eoff		1.0		
Total switching loss		Ets		3.2		

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Turn−on delay time	T_J = 25°C V_{CC} = 600 V, I_C = 75 A Rg = 4.7 Ω V_{GE} = 15 V Inductive Load	td(on)		31.2		ns
Rise time		t_r		58.4		
Turn−off delay time		td(off)		96.0		
Fall time		t_f		65.6		
Turn−on switching loss		Eon		5.4		mJ
Turn−off switching loss		Eoff		2.1		
Total switching loss		Ets		7.6		
Turn−on delay time	T_J = 175°C V_{CC} = 600 V, I_C = 37.5 A Rg = 4.7 Ω V_{GE} = 15 V Inductive Load	td(on)		28.8		ns
Rise time		t_r		17.6		
Turn−off delay time		td(off)		117.0		
Fall time		t_f		60.8		
Turn−on switching loss		Eon		4.1		mJ
Turn−off switching loss		Eoff		1.7		
Total switching loss		Ets		5.8		
Turn−on delay time	T_J = 175°C V_{CC} = 600 V, I_C = 75 A Rg = 4.7 Ω V_{GE} = 15 V Inductive Load	td(on)		28.8		ns
Rise time		t_r		60.8		
Turn−off delay time		td(off)		106.0		
Fall time		t_f		92.8		
Turn−on switching loss		Eon		8.8		mJ
Turn−off switching loss		Eoff		3.2		
Total switching loss		Ets		12.0		

DIODE CHARACTERISTICS

Forward voltage	I_F = 75 A I_F = 75 A, T_J = 175°C	V_F		2.03 1.76	2.51	V
Reverse Recovery Energy	T_J = 25°C V_R = 600 V, I_F = 37.5 A dI_F/dt = 1000 A/μs	E_{rec}		314		uJ
Reverse Recovery Time		t_{rr}		105		ns
Reverse Recovery Charge		Q_{rr}		1635		nC
Reverse Recovery Energy	T_J = 25°C V_R = 600 V, I_F = 75 A dI_F/dt = 1000 A/μs	E_{rec}		2390		uJ
Reverse Recovery Time		t_{rr}		259		ns
Reverse Recovery Charge		Q_{rr}		7515		nC
Reverse Recovery Energy	T_J = 175°C V_R = 600 V, I_F = 37.5 A dI_F/dt = 1000 A/μs	E_{rec}		454		uJ
Reverse Recovery Time		t_{rr}		148		ns
Reverse Recovery Charge		Q_{rr}		2436		nC

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Reverse Recovery Energy	T_J = 175°C V_R = 600 V, I_F = 75 A dI_F/dt = 1000 A/μs	E_{rec}		2790		uJ
Reverse Recovery Time		t_{rr}		294		ns
Reverse Recovery Charge		Q_{rr}		9175		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.

TYPICAL CHARACTERISTICS

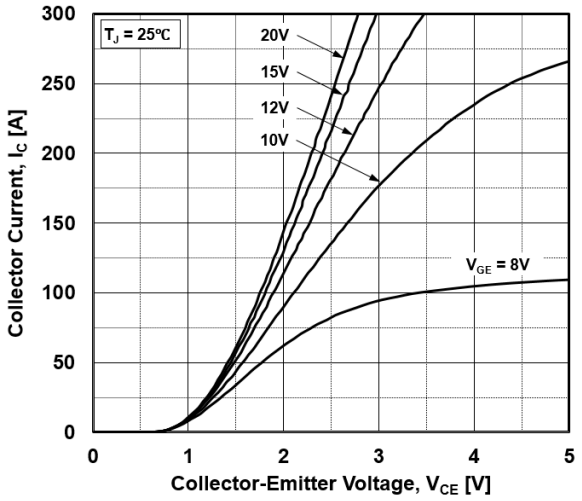


Figure 1. Typical Output Characteristics (T_J = 25°C)

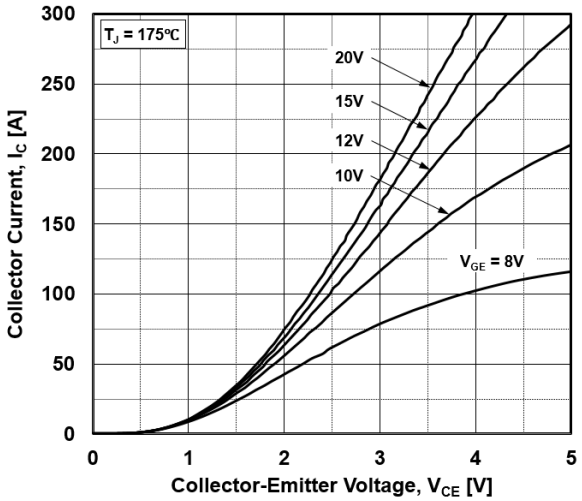


Figure 2. Typical Output Characteristics (T_J = 175°C)

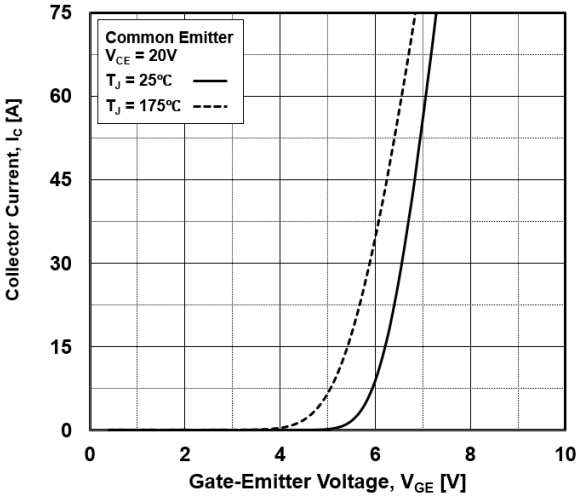


Figure 3. Transfer Characteristics

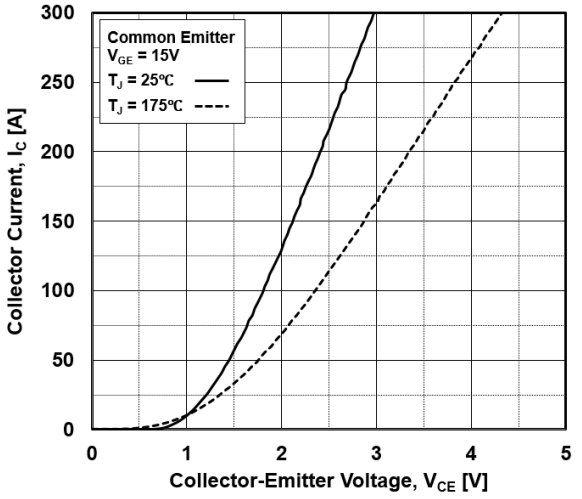


Figure 4. Typical Saturation Voltage Characteristics

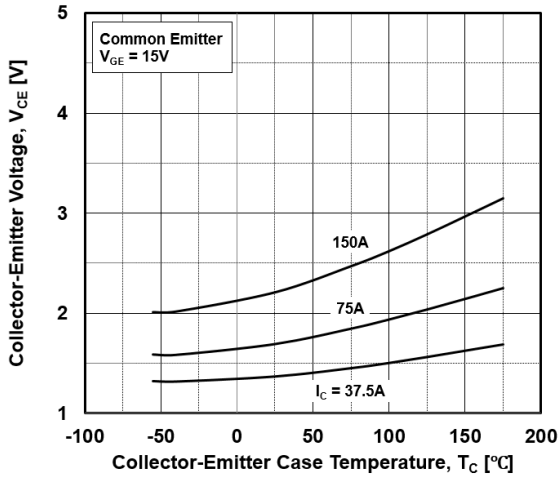


Figure 5. Saturation Voltage vs Case Temperature at Variant Current Level

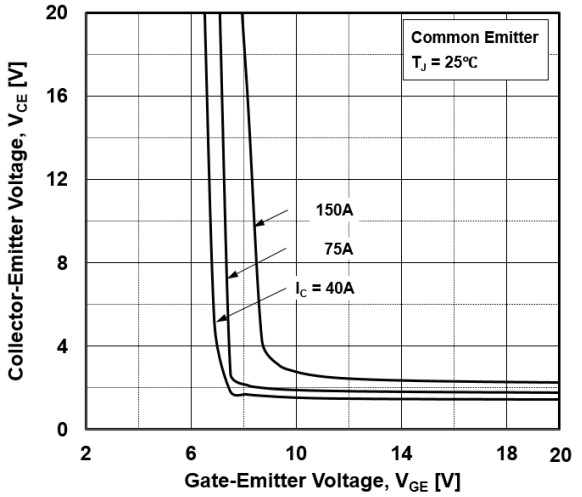


Figure 6. Saturation Voltage vs. V_{GE} (T_J = 25°C)

TYPICAL CHARACTERISTICS

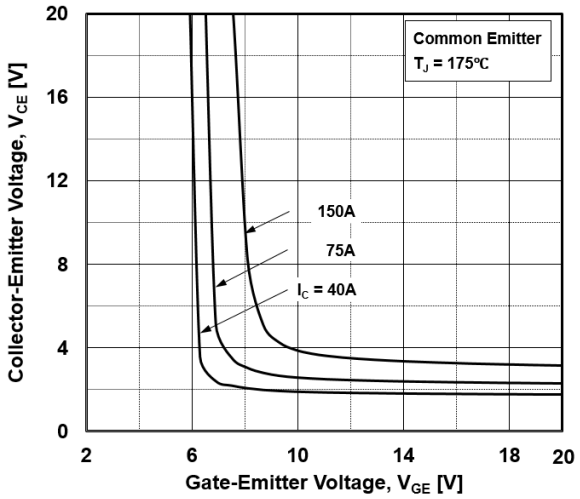


Figure 7. Saturation Voltage vs. V_{GE} (T_J = 175°C)

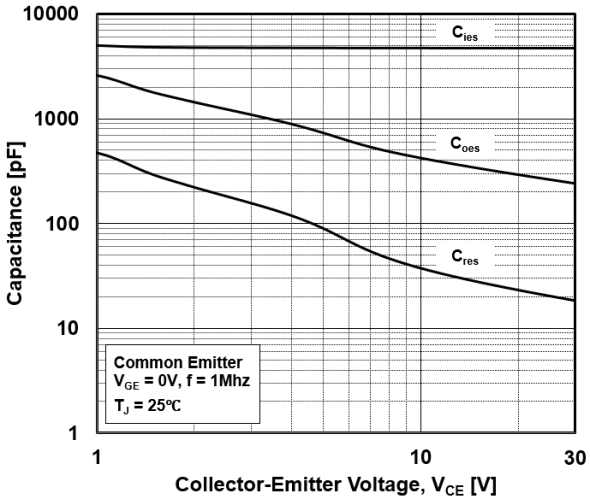


Figure 8. Capacitance Characteristics

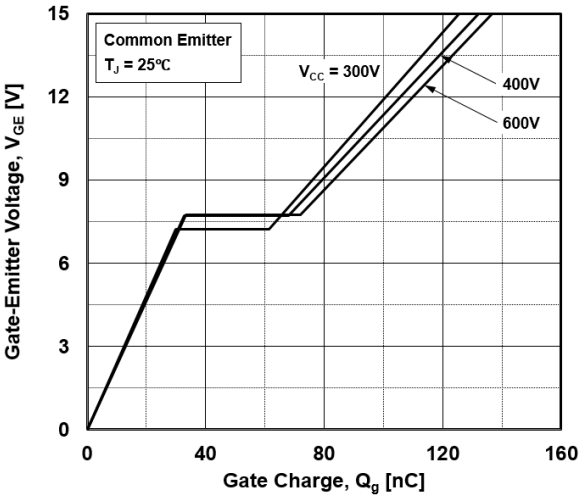


Figure 9. Gate Charge Characteristics (T_J = 25°C)

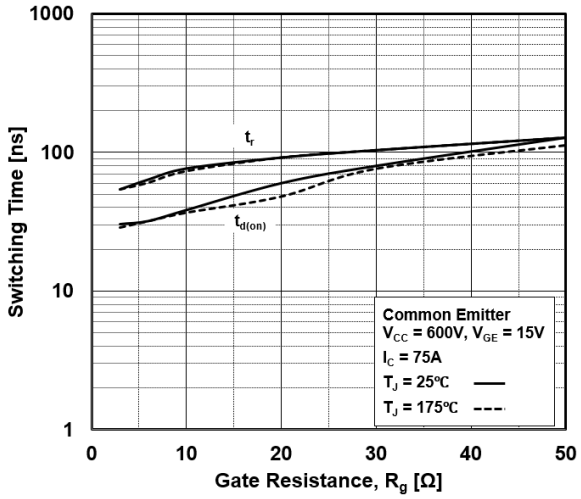


Figure 10. Turn−on Characteristics vs. Gate Resistance

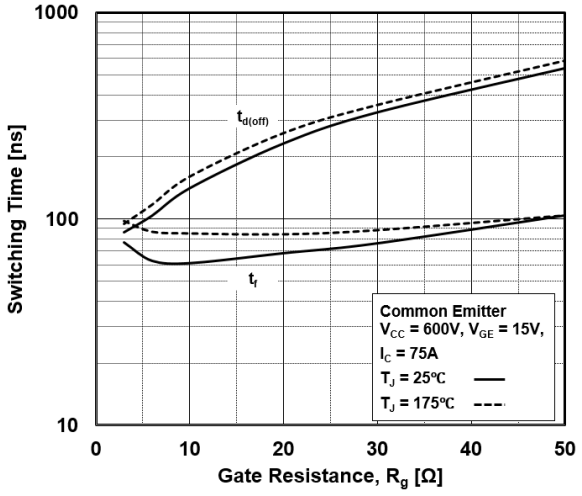


Figure 11. Turn−off Characteristics vs. Gate Resistance

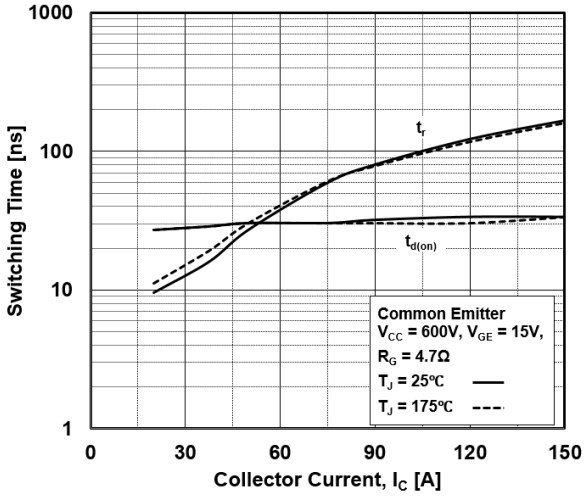


Figure 12. Turn−on Characteristics vs. Collector Current

TYPICAL CHARACTERISTICS

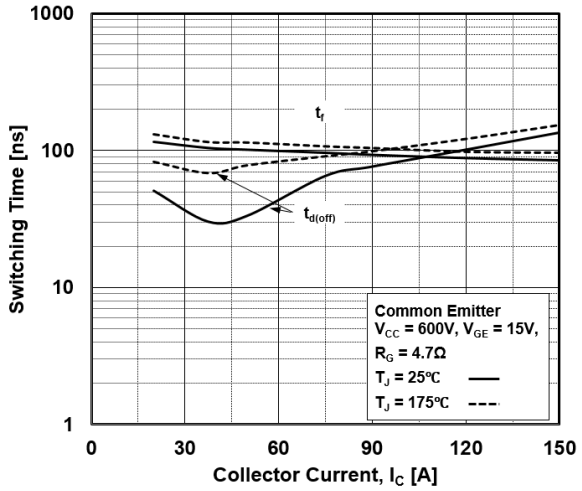


Figure 13. Turn−off Characteristics vs. Collector Current

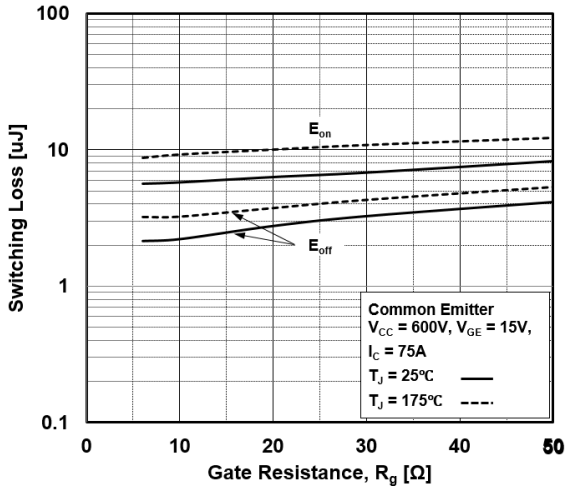


Figure 14. Switching Loss vs. Gate Resistance

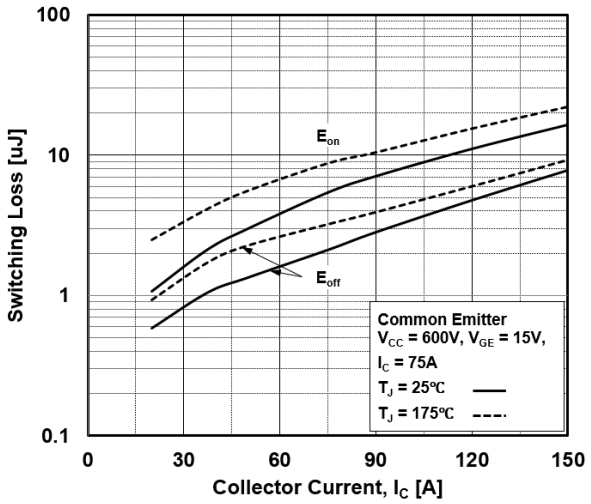


Figure 15. Switching Loss vs. Collector Current

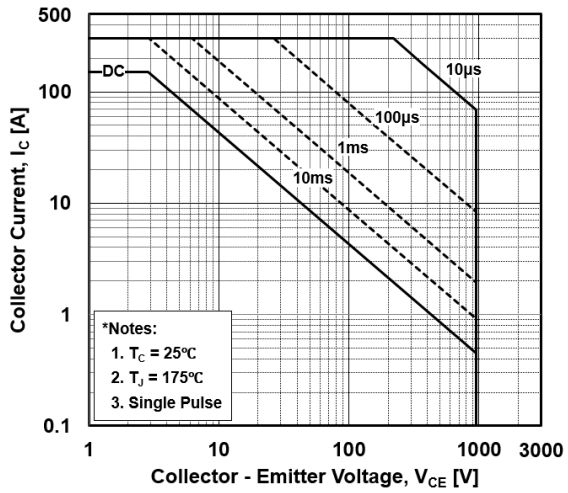


Figure 16. SOA Characteristics (FBSOA)

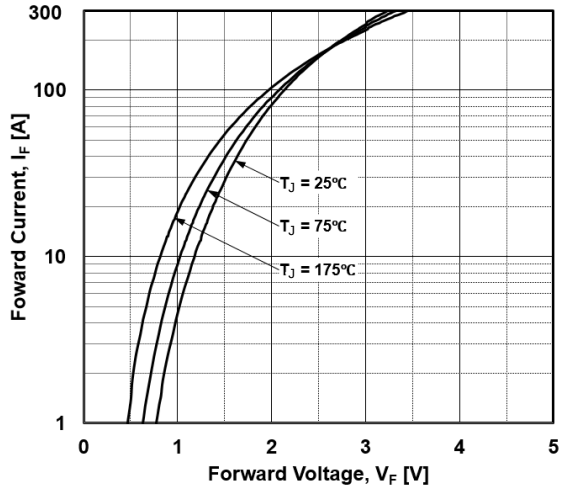


Figure 17. (Diode) Forward Characteristics vs (Normal I−V)

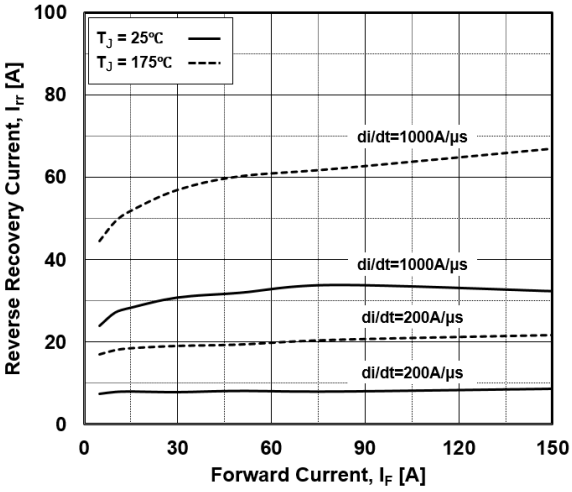


Figure 18. (Diode) Reverse Recovery Current

TYPICAL CHARACTERISTICS

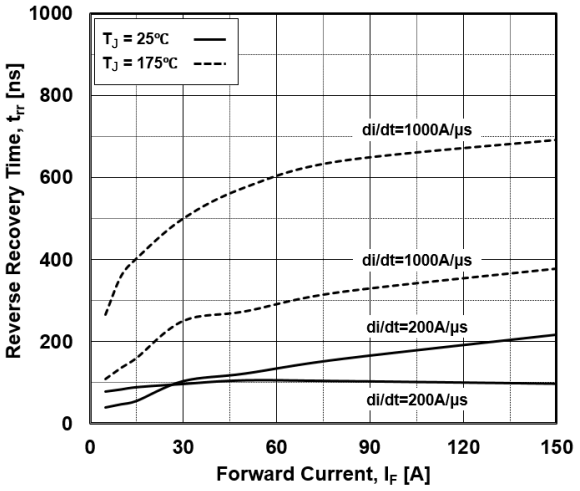


Figure 19. (Diode) Reverse Recovery Time

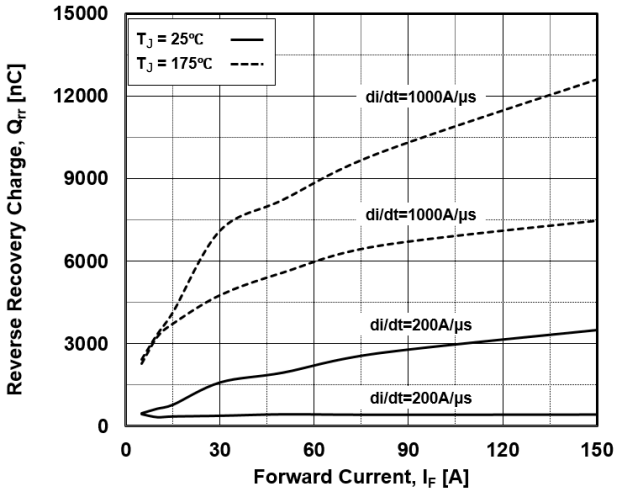


Figure 20. (Diode) Stored Charge

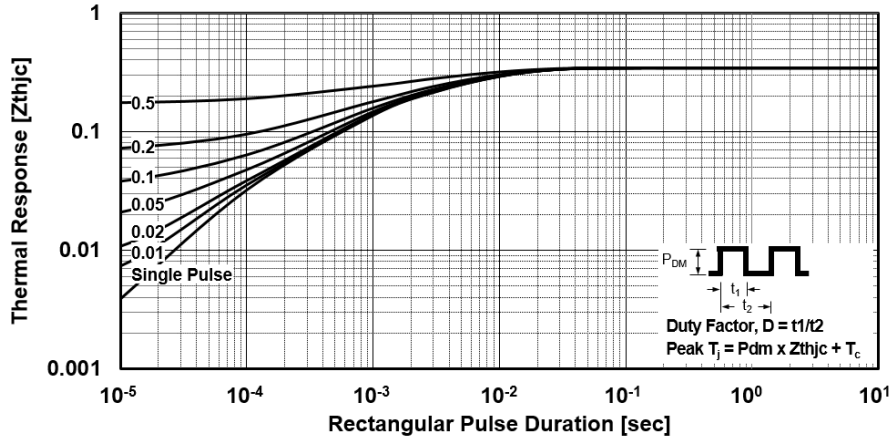


Figure 21. Transient Thermal Impedance of IGBT

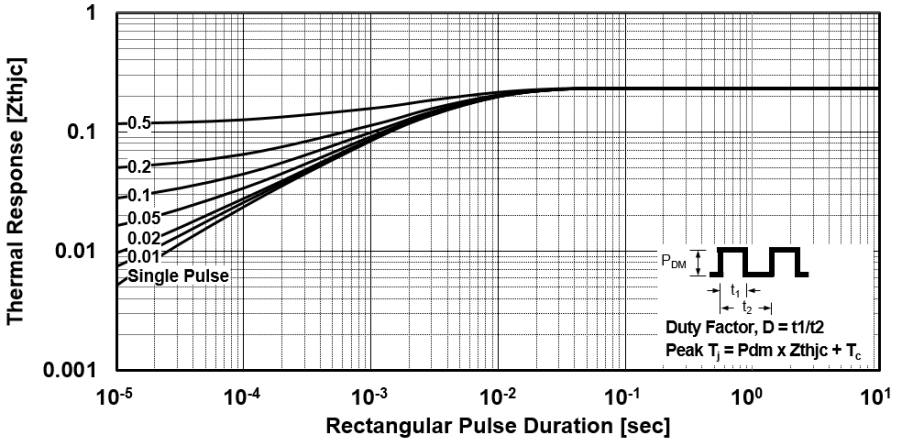
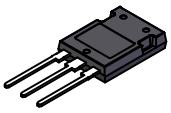


Figure 22. Transient Thermal Impedance of Diode

FGY75T95SQDT

PACKAGE DIMENSIONS

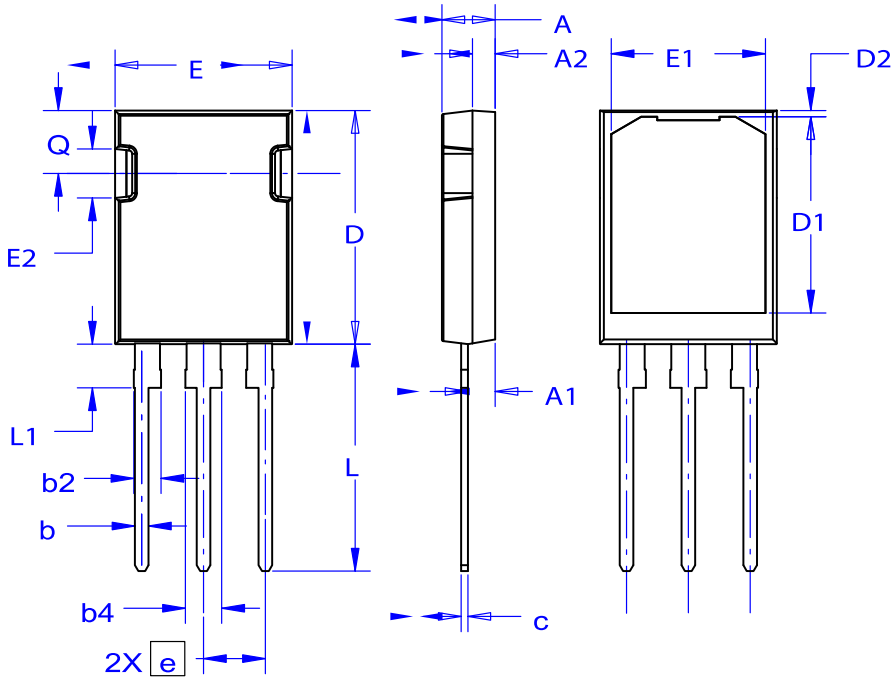


TO−247−3LD
CASE 340CD
ISSUE A

DATE 18 SEP 2018

NOTES:

A. THIS PACKAGE DOES NOT CONFORM TO ANY STANDARDS.
B. ALL DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
D. DIMENSION AND TOLERANCE AS PER ASME Y14.5-2009.



DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.58	4.70	4.82
A1	2.20	2.40	2.60
A2	1.80	2.00	2.20
D	20.32	20.57	20.82
E	15.37	15.62	15.87
E2	4.12	4.32	4.52
e	~	5.45	~
L	19.90	20.00	20.10
L1	3.69	3.81	3.93
Q	5.34	5.46	5.58
b	1.10	1.20	1.30
b2	2.10	2.24	2.39
b4	2.87	3.04	3.20
c	0.51	0.61	0.71
D1	16.63	16.83	17.03
D2	0.51	0.93	1.35
E1	13.40	13.60	13.80

ON Semiconductor and ON 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. 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

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**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative