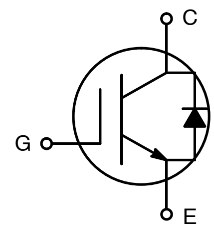
Ultra Field Stop IGBT, 1200 V, 75 A

FGY75T120SQDN

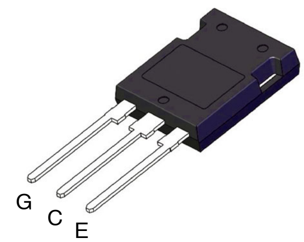


General Description

This Insulated Gate Bipolar Transistor (IGBT) features a robust and cost effective Ultra Field Stop Trench construction, and provides superior performance in demanding switching applications, offering both low on-state voltage and minimal switching loss. The IGBT is well suited for UPS and solar applications. Incorporated into the device is a soft and fast co-packaged free wheeling diode with a low forward voltage.

Features

- Extremely Efficient Trench with Field Stop Technology
- Maximum Junction Temperature: T_J = 175°C
- Low Saturation Voltage: $V_{CE(sat)}$ = 1.7 V (Typ.) @ I_C = 75 A
- 100% of the Parts Tested for I_{LM}(1)
- Soft Fast Reverse Recovery Diode
- Optimized for High Speed Switching
- RoHS Compliant

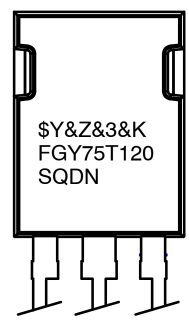


TO−247−3LD
CASE 340CD

Applications

- Solar Inverter, UPS

MARKING DIAGRAM



&Y	=	**onsemi** Logo
&Z	=	Assembly Plant Code
&3	=	Date Code (Year & Week)
&K	=	Lot Run Traceability Code
FGY75T120SQDN	=	Specific Device Code

ABSOLUTE MAXIMUM RATINGS

(T_J = 25°C unless otherwise stated)

Symbol	Parameter	Value	Unit
V_{CES}	Collector to Emitter Voltage	1200	V
V_{GES}	Gate to Emitter Voltage	±20	V
	Transient Gate to Emitter Voltage	±30	V
I_C	Collector Current @ T_C = 25°C	150	A
	Collector Current @ T_C = 100°C	75	A
I_{LM}(1)	Pulsed Collector Current @ T_C = 25°C	300	A
I_{CM}(2)	Pulsed Collector Current	300	A
I_F	Diode Forward Current @ T_C = 25°C	150	A
	Diode Forward Current @ T_C = 100°C	75	A
I_{FM}	Pulsed Diode Max. Forward Current	300	A
P_D	Maximum Power Dissipation @ T_C = 25°C @ T_C = 100°C	 790 395	W
T_J	Operating Junction Temperature	−55 to +175	°C
T_{stg}	Storage Temperature Range	−55 to +175	°C
T_L	Maximum Lead Temp. for soldering Purposes, 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.

1. V_{CC} = 800 V, V_{GE} = 15 V, I_C = 300 A, R_G = 68 Ω, Inductive Load.
2. Repetitive rating: Pulse width limited by max. junction temperature.

ORDERING INFORMATION

See detailed ordering and shipping information on page 3 of this data sheet.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$ (IGBT)	Thermal Resistance, Junction to Case, Max.	0.19	°C/W
$R_{\theta JC}$ (Diode)	Thermal Resistance, Junction to Case, Max.	0.38	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	40	°C/W

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
BV_{CES}	Collector to Emitter Breakdown Voltage	V_{GE} = 0 V, I_C = 500 μA	1200	–	–	V
I_{CES}	Collector Cut-Off Current	V_{CE} = V_{CES}, V_{GE} = 0 V	–	–	400	μA
I_{GES}	G–E Leakage Current	V_{GE} = V_{GES}, V_{CE} = 0 V	–	–	±200	nA
ON CHARACTERISTICS						
$V_{GE(th)}$	G–E Threshold Voltage	I_C = 400 μA, V_{CE} = V_{GE}	4.5	5.5	6.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C = 75 A, V_{GE} = 15 V	–	1.7	1.95	V
		I_C = 75 A, V_{GE} = 15 V, T_C = 175°C	–	2.3	–	V
DYNAMIC CHARACTERISTICS						
C_{ies}	Input Capacitance	V_{CE} = 20 V, V_{GE} = 0 V, f = 1 MHz	–	9060	–	pF
C_{oes}	Output Capacitance		–	242	–	pF
C_{res}	Reverse Transfer Capacitance		–	137	–	pF
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 600 V, I_C = 75 A, R_G = 10 Ω, V_{GE} = 15 V, Inductive Load, T_C = 25°C	–	64	–	ns
t_r	Rise Time		–	96	–	ns
$t_{d(off)}$	Turn-Off Delay Time		–	332	–	ns
t_f	Fall Time		–	28	–	ns
E_{on}	Turn-On Switching Loss		–	6.25	–	mJ
E_{off}	Turn-Off Switching Loss		–	1.96	–	mJ
E_{ts}	Total Switching Loss		–	8.21	–	mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 600 V, I_C = 75 A, R_G = 10 Ω, V_{GE} = 15 V, Inductive Load, T_C = 175°C	–	56	–	ns
t_r	Rise Time		–	80	–	ns
$t_{d(off)}$	Turn-Off Delay Time		–	364	–	ns
t_f	Fall Time		–	88	–	ns
E_{on}	Turn-On Switching Loss		–	8.67	–	mJ
E_{off}	Turn-Off Switching Loss		–	3.2	–	mJ
E_{ts}	Total Switching Loss		–	11.87	–	mJ
Q_g	Total Gate Charge	V_{CE} = 600 V, I_C = 75 A, V_{GE} = 15 V	–	399	–	nC
Q_{ge}	Gate to Emitter Charge		–	74	–	nC
Q_{gc}	Gate to Collector Charge		–	192	–	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 THE DIODE (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_{FM}	Diode Forward Voltage	I_F = 75 A	T_C = 25°C	–	3.4	4	V
			T_C = 175°C	–	2.7	–	
t_{rr}	Diode Reverse Recovery Time	V_R = 600 V, I_F = 75 A, dI_F/dt = 500 A/µs	T_C = 25°C	–	99	–	ns
			T_C = 175°C	–	329	–	
Q_{rr}	Diode Reverse Recovery Charge		T_C = 25°C	–	1001	–	nC
			T_C = 175°C	–	5696	–	
I_{rrm}	Diode Reverse Recovery Current		T_C = 25°C	–	20	–	A
			T_C = 175°C	–	34	–	

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.

PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Top Mark	Package	Shipping
FGY75T120SQDN	FGY75T120SQDN	TO−247−3LD (Pb−Free)	30 / Tube

TYPICAL CHARACTERISTICS

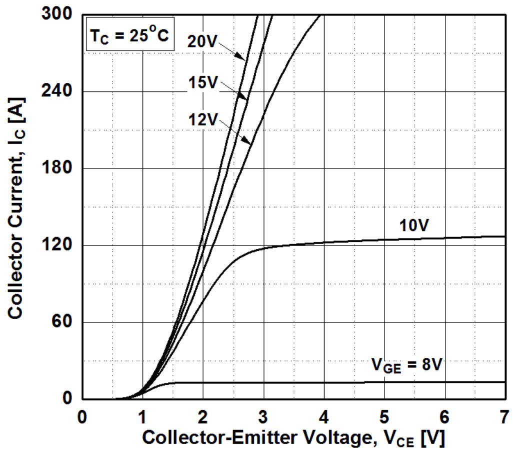


Figure 1. Typical Output Characteristics (25°C)

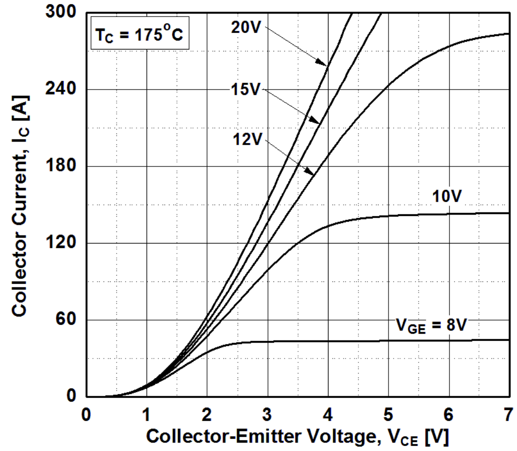


Figure 2. Typical Output Characteristics (175°C)

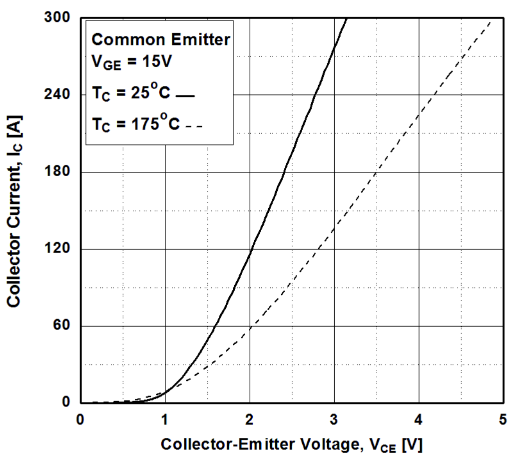


Figure 3. Typical Saturation Voltage Characteristics

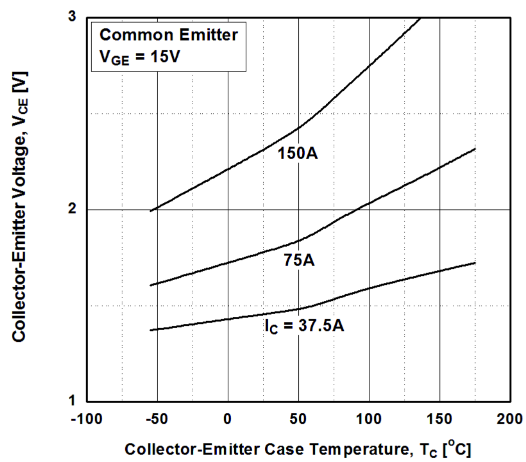


Figure 4. Saturation Voltage vs. Case Temperature at Variant Current Level

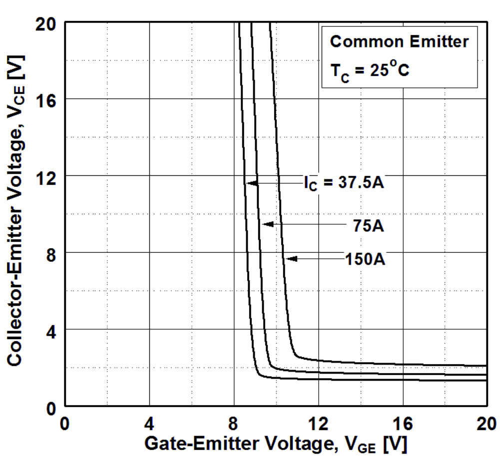


Figure 5. Saturation Voltage vs. V_{GE} (25°C)

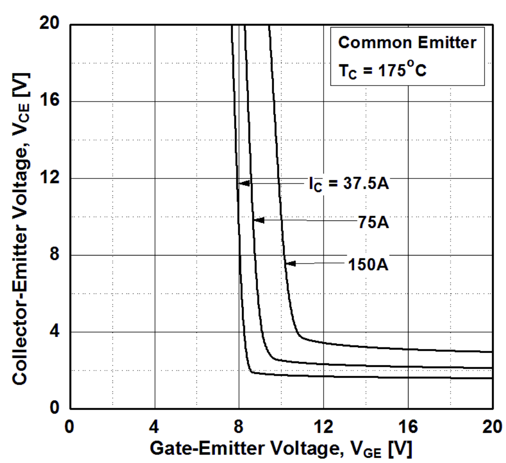


Figure 6. Saturation Voltage vs. V_{GE} (175°C)

TYPICAL CHARACTERISTICS

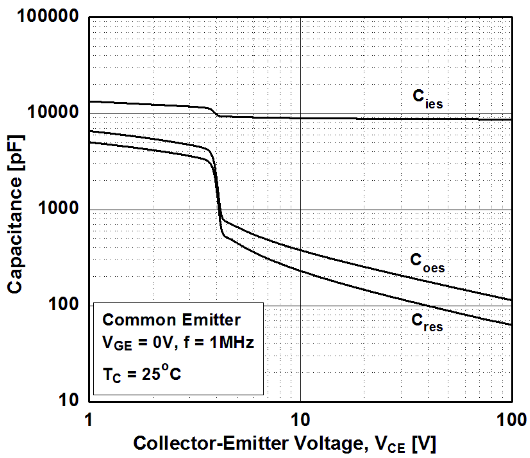


Figure 7. Capacitance Characteristics

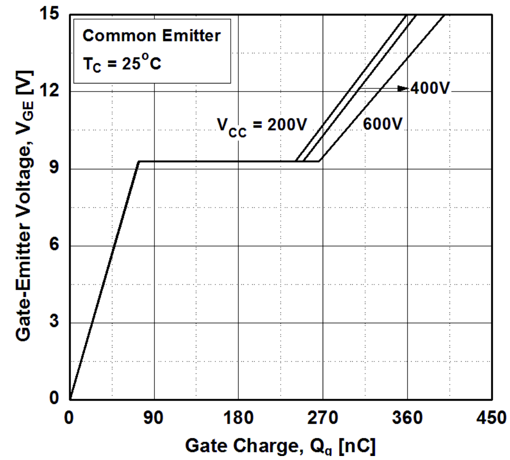


Figure 8. Gate Charge Characteristics

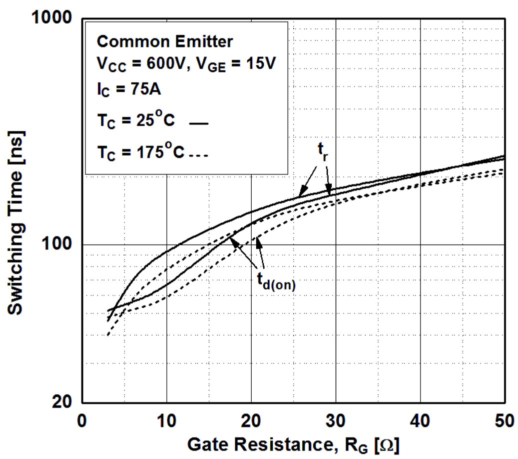


Figure 9. Turn−On Characteristics vs. Gate Resistance

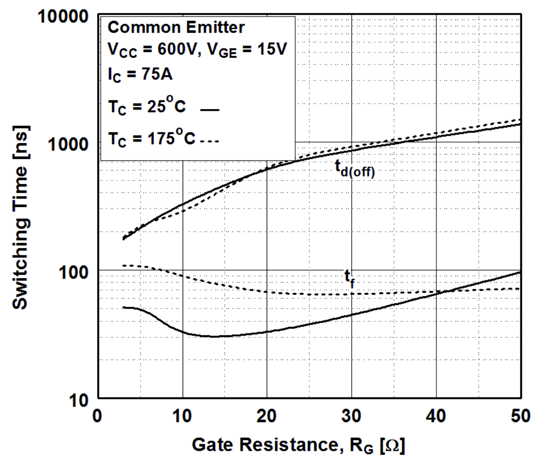


Figure 10. Turn−Off Characteristics vs. Gate Resistance

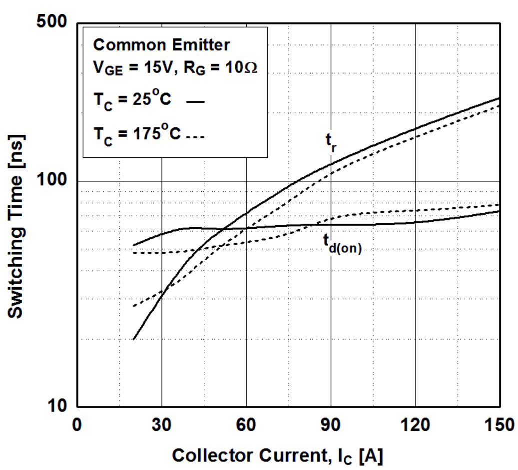


Figure 11. Turn−On Characteristics vs. Collector Current

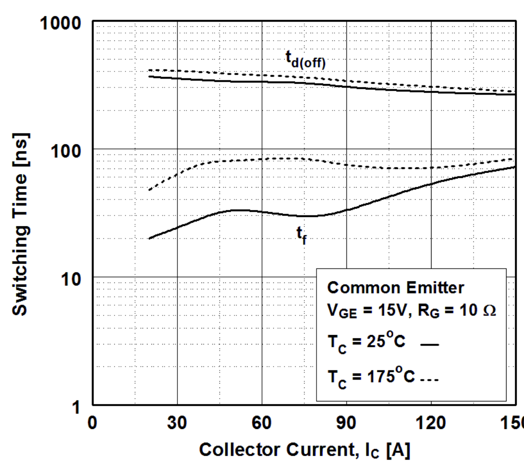


Figure 12. Turn−Off Characteristics vs. Collector Current

TYPICAL CHARACTERISTICS

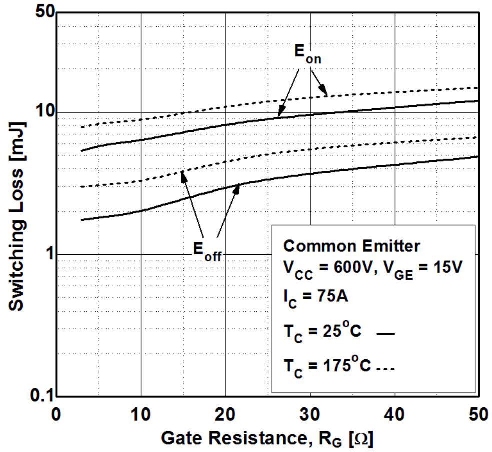


Figure 13. Switching Loss vs. Gate Resistance

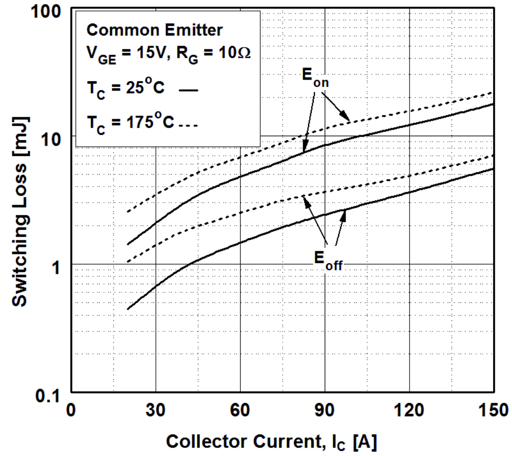


Figure 14. Switching Loss vs. Collector Current

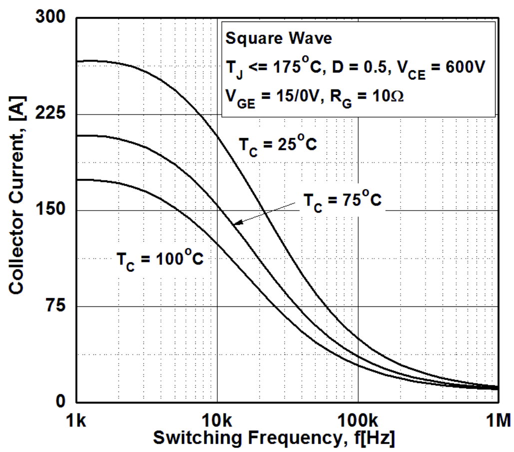


Figure 15. Load Current vs. Frequency

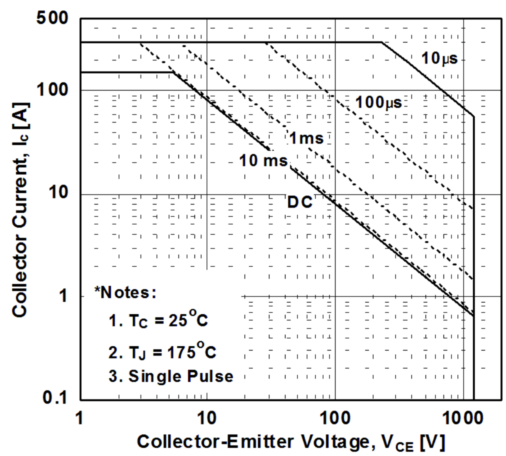


Figure 16. SOA Characteristics

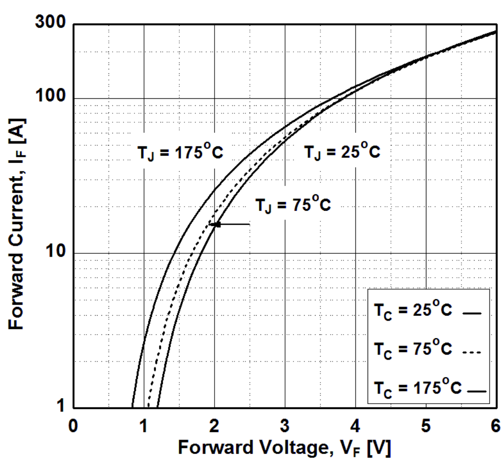


Figure 17. Forward Characteristics

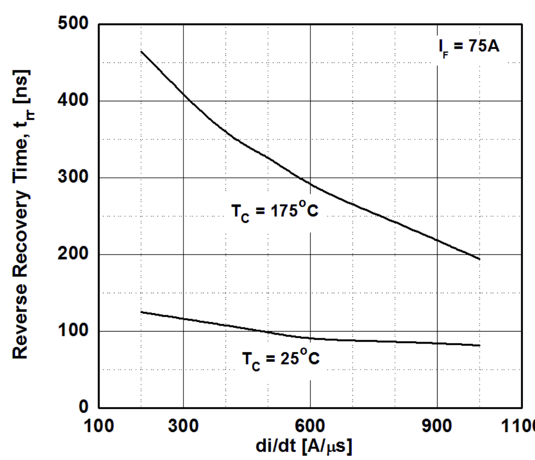


Figure 18. Reverse Recovery Time vs. di_F/dt

TYPICAL CHARACTERISTICS

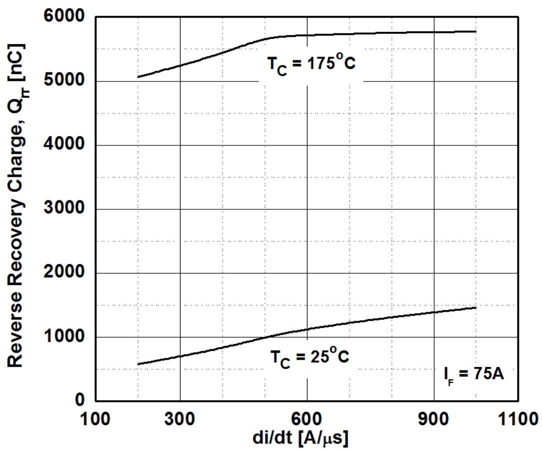


Figure 19. Reverse Recovery Charge vs. di_F/dt

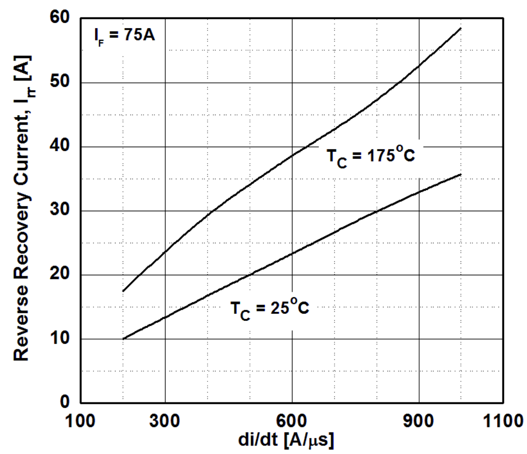


Figure 20. Reverse Recovery Current vs. di_F/dt

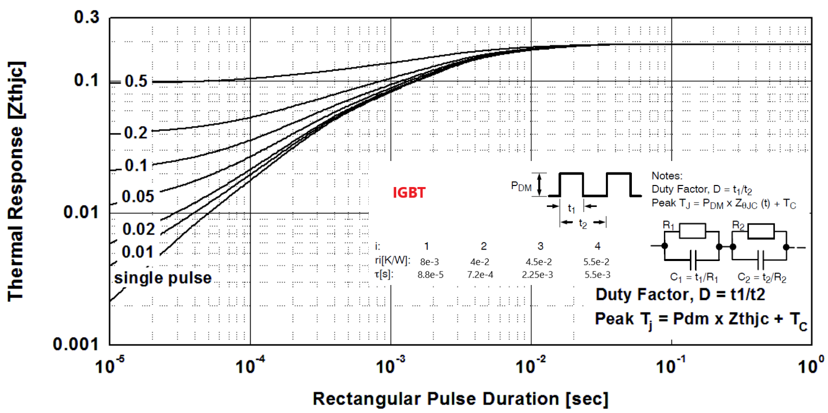


Figure 21. Transient Thermal Impedance of IGBT

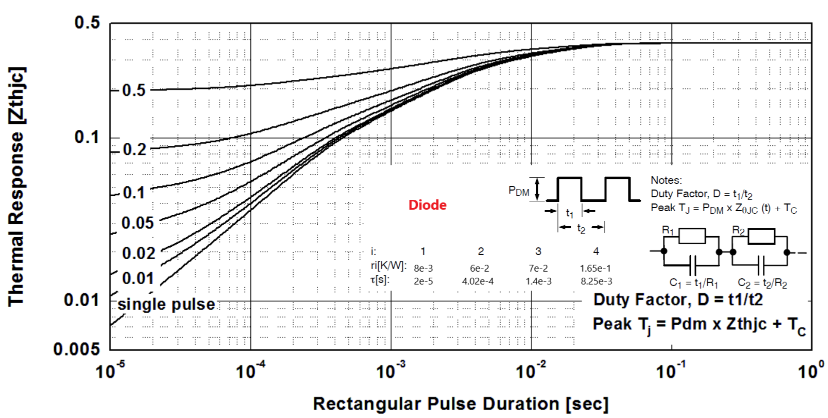
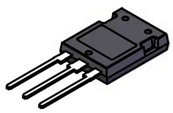


Figure 22. Transient Thermal Impedance of Diode

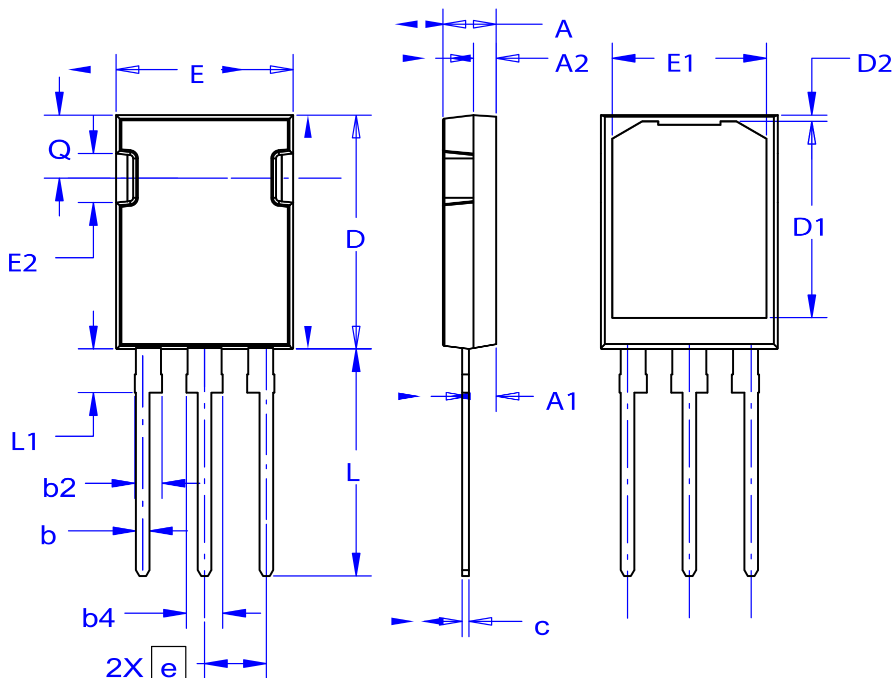


TO−247−3LD
CASE 340CD
ISSUE A

DATE 18 SEP 2018

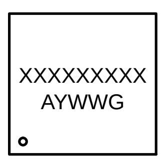
NOTES:

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

GENERIC MARKING DIAGRAM*



XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
G = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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DESCRIPTION:	**TO−247−3LD**	**PAGE 1 OF 1**

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
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onsemi Website: www.onsemi.com

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For additional information, please contact your local Sales Representative