IGBT - Field Stop, Trench

1200 V, 25 A

FGH25N120FTDS

Description

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

Features

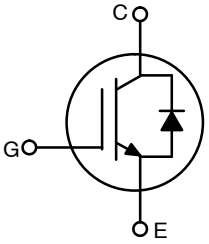
- High Speed Switching
- Low Saturation Voltage: $V_{CE(sat)}$ =1.60 V @ I_C = 25 A
- High Input Impedance
- These Device is Pb−Free and is RoHS Compliant

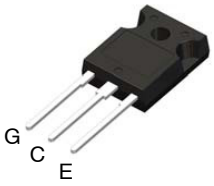
Applications

- Solar Inverter, UPS, Welder, PFC

ON Semiconductor®

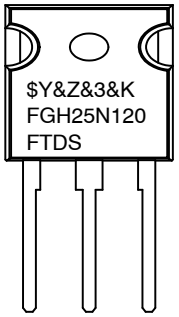
www.onsemi.com





TO−247−3
CASE 340CK

MARKING DIAGRAM



$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
FGH25N120FTDS	= Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Description		Symbol	Rating	Unit
Collector to Emitter Voltage		V_{CES}	1200	V
Gate to Emitter Voltage		V_{GES}	±25	V
Collector Current	T_C = 25°C	I_C	50	A
Collector Current	T_C = 100°C		25	A
Pulsed Collector Current		I_{CM} (Note 1)	75	A
Diode Forward Current	T_C = 25°C	I_F	50	A
Diode Forward Current	T_C = 100°C		25	A
Diode Maximum Forward Current		I_{FM}	75	A
Maximum Power Dissipation	T_C = 25°C	P_D	313	W
Maximum Power Dissipation	T_C = 100°C		125	W
Operating Junction Temperature		T_J	−55 to +150	°C
Storage Temperature Range		T_{stg}	−55 to +150	°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. Repetitive rating: Pulse width limited by max. junction temperature.

THERMAL CHARACTERISTICS

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

PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FGH25N120FTDS	FGH25N120FTDS	TO−247 (Pb−Free)	Tube	N/A	N/A	30

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector to Emitter Breakdown Voltage	BV_{CES}	V_{GE} = 0 V, I_C = 250 μA	1200	–	–	V
Collector Cut−Off Current	I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0 V	–	–	1	mA
G−E Leakage Current	I_{GES}	V_{GE} = V_{GES}, V_{CE} = 0 V	–	–	±250	nA
ON CHARACTERISTICs						
G−E Threshold Voltage	$V_{GE(th)}$	I_C = 25 mA, V_{CE} = V_{GE}	3.5	6	7.5	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 25 A, V_{GE} = 15 V	–	1.6	2	V
		I_C = 25 A, V_{GE} = 15 V, T_C = 125°C	–	1.92	–	V

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ies}	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz	–	4090	–	pF
Output Capacitance	C_{oes}		–	135	–	pF
Reverse Transfer Capacitance	C_{res}		–	75	–	pF
SWITCHING CHARACTERISTICS						
Turn−On Delay Time	$t_{d(on)}$	V_{CC} = 600 V, I_C = 25 A, R_G = 10 Ω, V_{GE} = 15 V, Inductive Load, T_C = 25°C	–	26	35	ns
Rise Time	t_r		–	41	53	ns
Turn−Off Delay Time	$t_{d(off)}$		–	151	196	ns
Fall Time	t_f		–	102	132	ns
Turn−On Switching Loss	E_{on}		–	1.42	1.84	mJ
Turn−Off Switching Loss	E_{off}		–	1.16	1.5	mJ
Total Switching Loss	E_{ts}		–	2.58	3.34	mJ
Turn−On Delay Time	$t_{d(on)}$	V_{CC} = 600 V, I_C = 25 A, R_G = 10 Ω, V_{GE} = 15 V, Inductive Load, T_C = 125°C	–	22	–	ns
Rise Time	t_r		–	41	–	ns
Turn−Off Delay Time	$t_{d(off)}$		–	163	–	ns
Fall Time	t_f		–	136	–	ns
Turn−On Switching Loss	E_{on}		–	2.04	–	mJ
Turn−Off Switching Loss	E_{off}		–	1.58	–	mJ
Total Switching Loss	E_{ts}		–	3.62	–	mJ
Total Gate Charge	Q_g	V_{CE} = 600 V, I_C = 25 A, V_{GE} = 15 V	–	169	225	nC
Gate to Emitter Charge	Q_{ge}		–	33	44	nC
Gate to Collector Charge	Q_{gc}		–	78	104	nC

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

Parametr	Symbol	Test Conditions		Min	Typ	Max	Unit
Diode Forward Voltage	V_{FM}	I_F = 25 A	T_C = 25°C	–	2.5	3.5	V
			T_C = 125°C	–	2.3	–	
Diode Reverse Recovery Time	t_{rr}	I_F = 25 A, di_F/dt = 200 A/μs	T_C = 25°C	–	411	535	ns
			T_C = 125°C	–	496	–	
Diode Peak Reverse Recovery Current	I_{rr}		T_C = 25°C	–	5.2	6.8	A
			T_C = 125°C	–	6.9	–	
Diode Reverse Recovery Charge	Q_{rr}		T_C = 25°C	–	1.1	1.82	μC
			T_C = 125°C	–	1.7	–	

TYPICAL PERFORMANCE CHARACTERISTICS

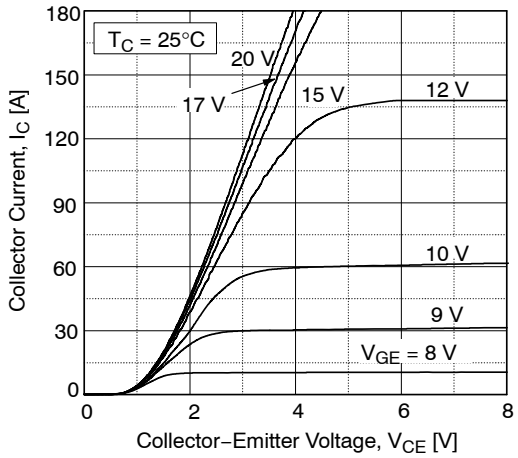


Figure 1. Typical Output Characteristics

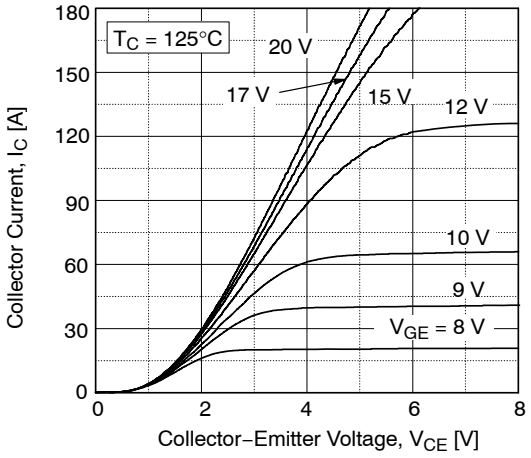


Figure 2. Typical Output Characteristics

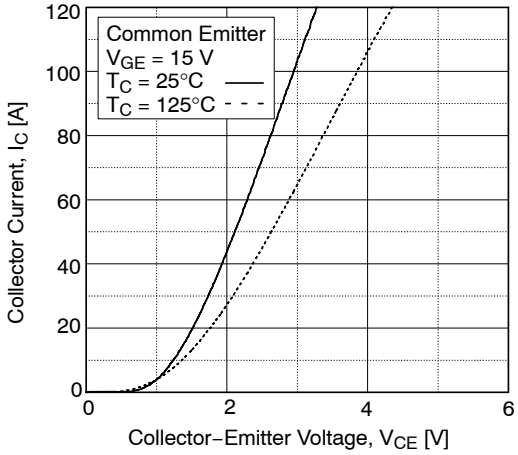


Figure 3. Typical Saturation Voltage Characteristics

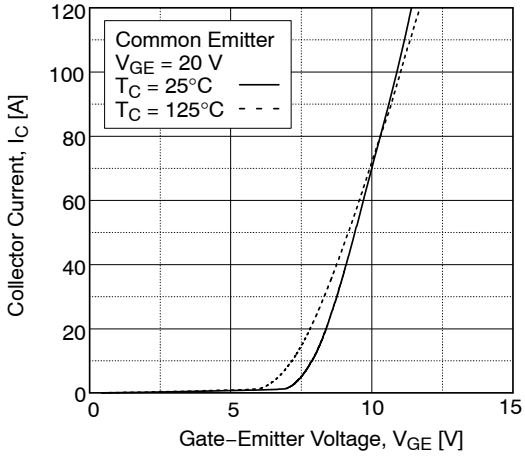


Figure 4. Transfer Characteristics

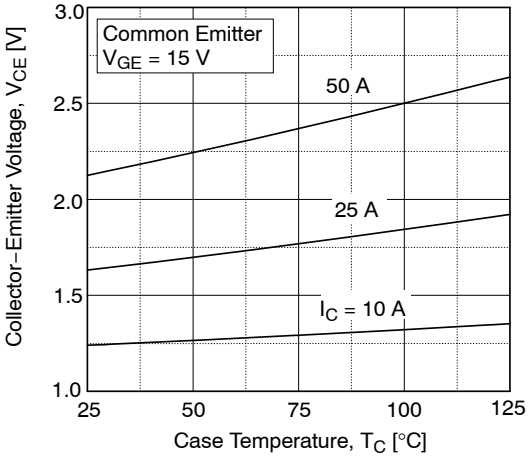


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

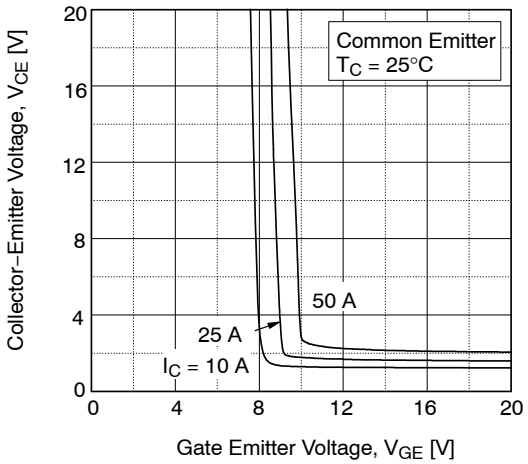


Figure 6. Saturation Voltage vs V_{GE}

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

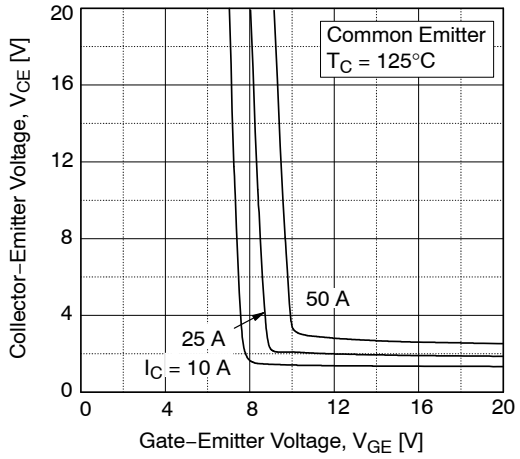


Figure 7. Saturation Voltage vs. V_{GE}

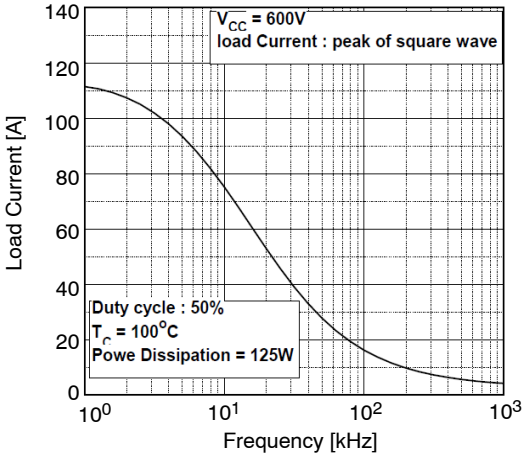


Figure 8. Load Current vs. Frequency

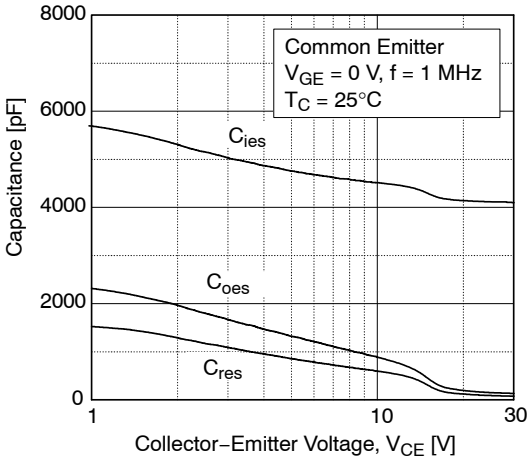


Figure 9. Capacitance Characteristics

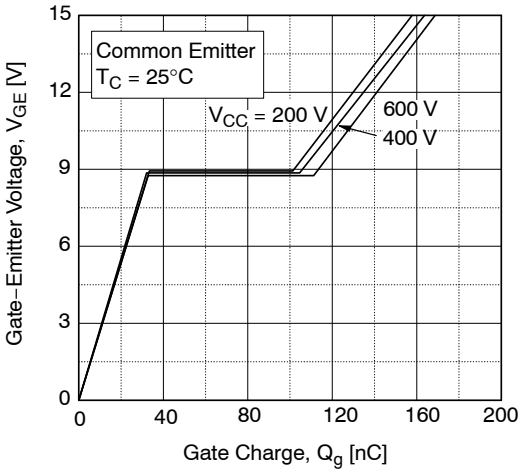


Figure 10. Gate Charge Characteristics

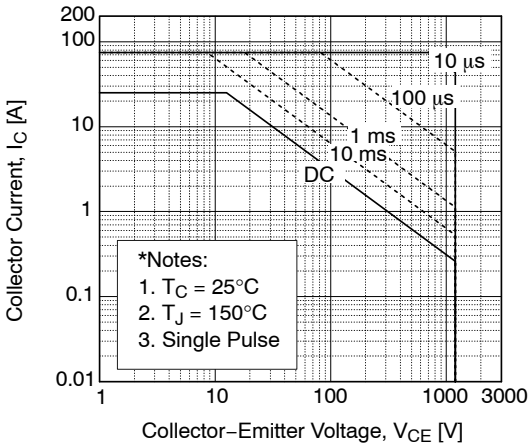


Figure 11. SOA Characteristics Gate Resistance

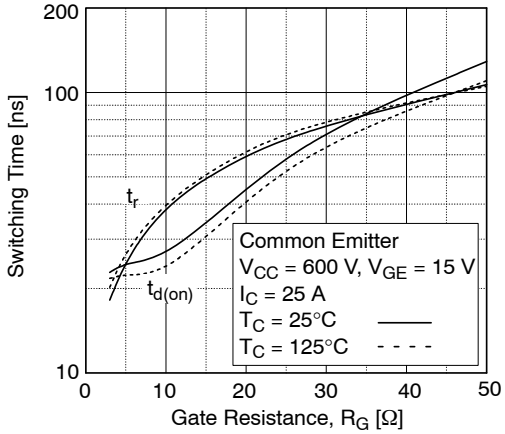


Figure 12. Turn−On Characteristics vs. Gate Resistance

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

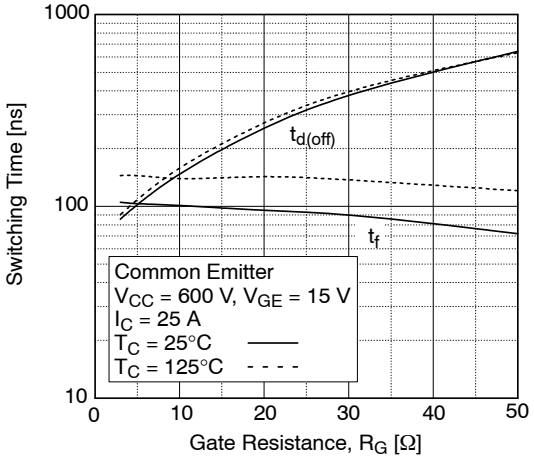


Figure 13. Turn−Off Characteristics vs. Gate Resistance

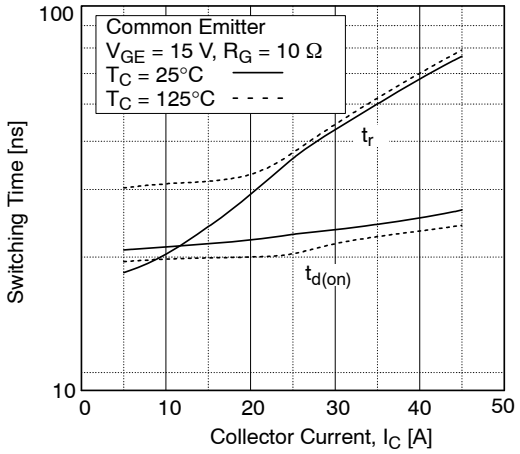


Figure 14. Turn−on Characteristics vs. Collector Current

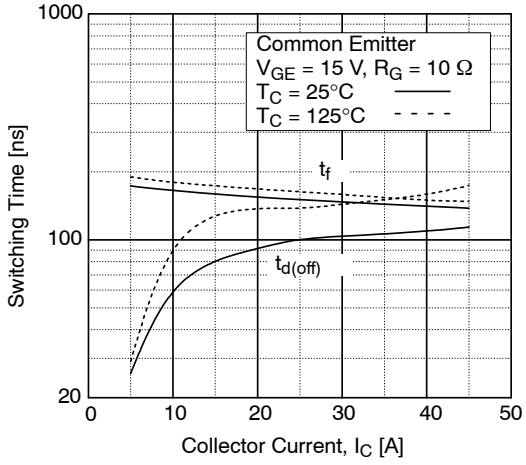


Figure 15. Turn−off Characteristics vs. Collector Current

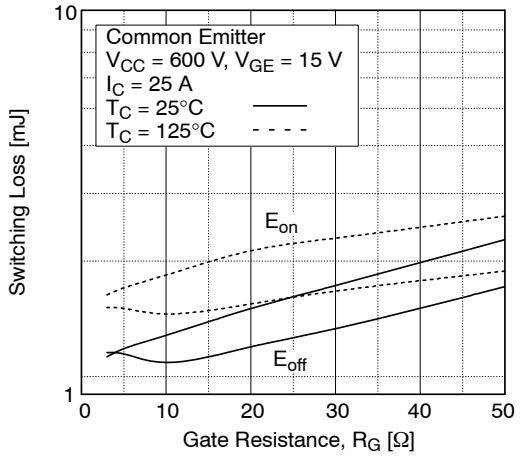


Figure 16. Switching Loss vs. Gate Resistance

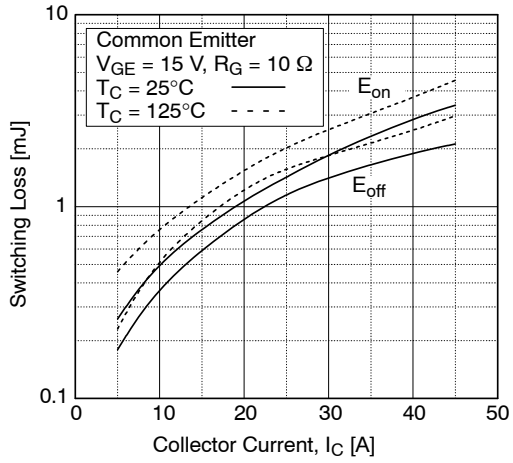


Figure 17. Switching Loss vs. Collector Current

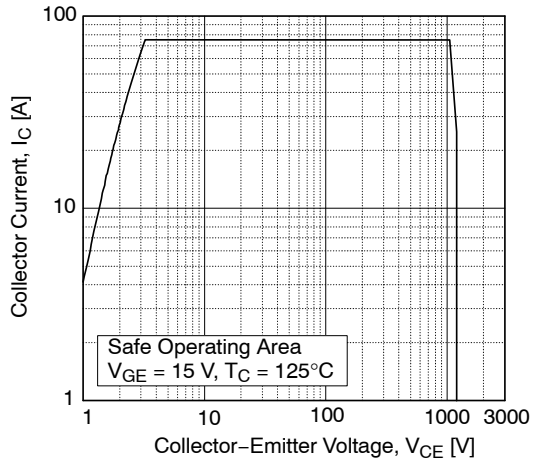


Figure 18. Turn−off Switching SOA Characteristics

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

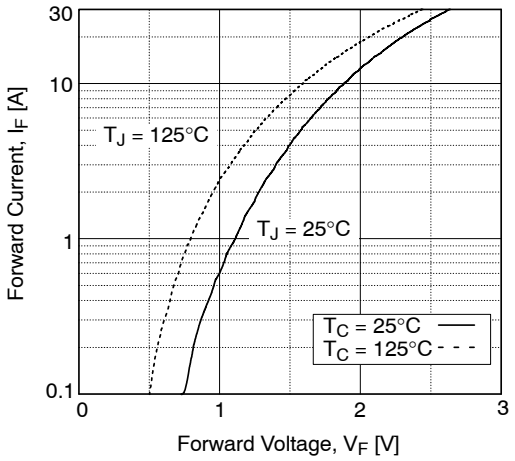


Figure 19. Forward Characteristics

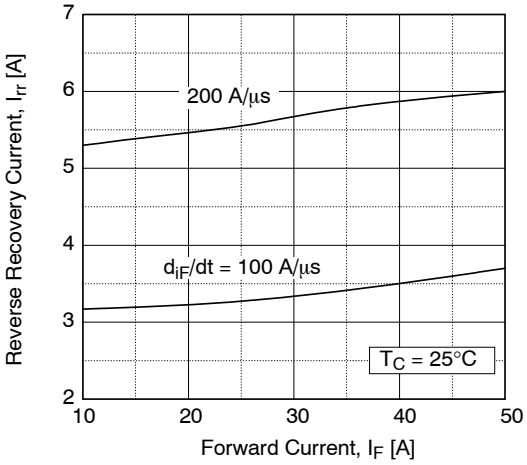


Figure 20. Reverse Recovery Current

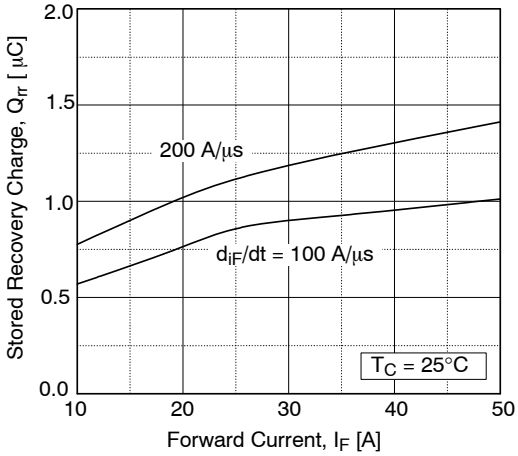


Figure 21. Stored Charge

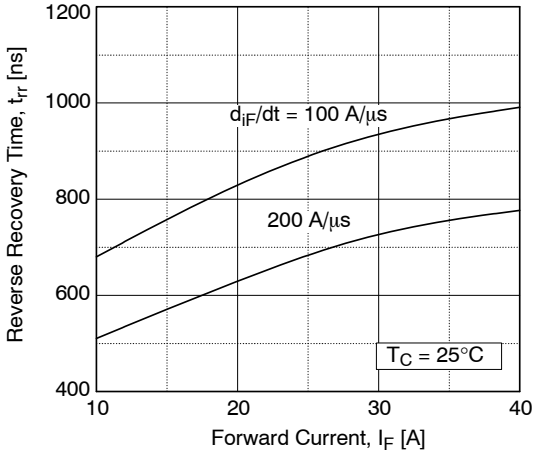


Figure 22. Reverse Recovery Time

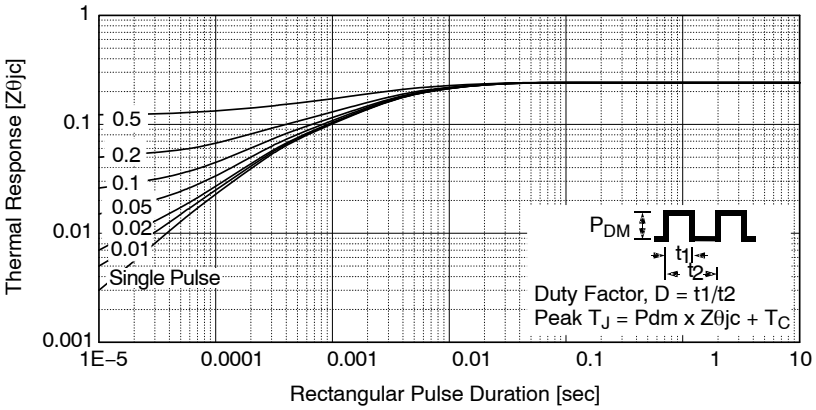


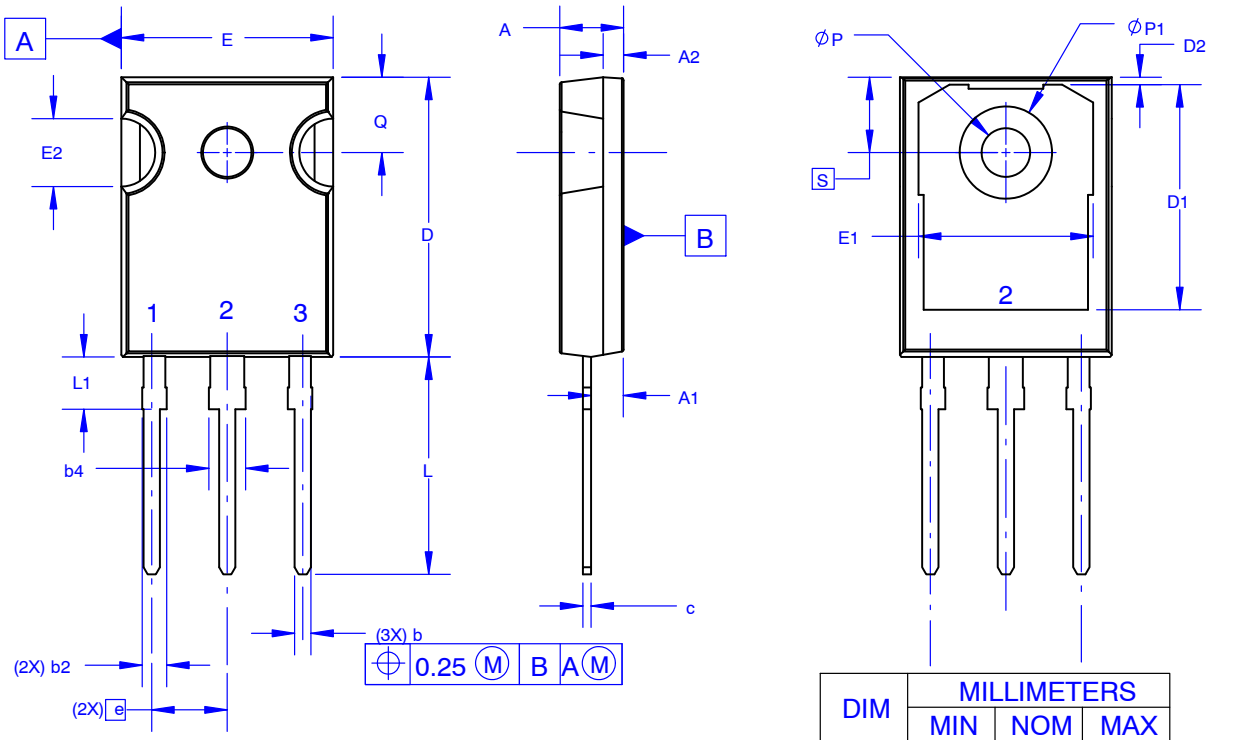
Figure 23. Transient Thermal Impedance of IGBT

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

ON Semiconductor®

TO−247−3LD SHORT LEAD
CASE 340CK
ISSUE A

DATE 31 JAN 2019

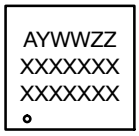


DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.58	4.70	4.82
A1	2.20	2.40	2.60
A2	1.40	1.50	1.60
b	1.17	1.26	1.35
b2	1.53	1.65	1.77
b4	2.42	2.54	2.66
c	0.51	0.61	0.71
D	20.32	20.57	20.82
D1	13.08	~	~
D2	0.51	0.93	1.35
E	15.37	15.62	15.87
E1	12.81	~	~
E2	4.96	5.08	5.20
e	~	5.56	~
L	15.75	16.00	16.25
L1	3.69	3.81	3.93
ØP	3.51	3.58	3.65
ØP1	6.60	6.80	7.00
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

NOTES: UNLESS OTHERWISE SPECIFIED.

A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
B. ALL DIMENSIONS ARE IN MILLIMETERS.
C. DRAWING CONFORMS TO ASME Y14.5 - 2009.
D. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
E. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.

GENERIC
MARKING DIAGRAM*



XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code

*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 SHORT LEAD**	**PAGE 1 OF 1**

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Email Requests to: orderlit@onsemi.com

onsemi Website: www.onsemi.com

TECHNICAL SUPPORT
North American Technical Support:
Voice Mail: 1 800−282−9855 Toll Free USA/Canada
Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:
Phone: 00421 33 790 2910
For additional information, please contact your local Sales Representative

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