IGBT - Field Stop
600 V, 20 A

FGH20N60UFD

Description

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

Features

- High Current Capability
- Low Saturation Voltage: $V_{CE(sat)}$ = 1.8 V @ I_C = 20 A
- High Input Impedance
- Fast Switching
- This Device is Pb−Free and is RoHS Compliant

Applications

- Solar Inverter, UPS, Welder, PFC

ABSOLUTE MAXIMUM RATINGS

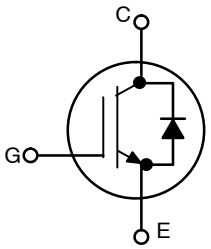
Rating	Symbol	Value	Unit
Collector to Emitter Voltage	V_{CES}	600	V
Gate to Emitter Voltage	V_{GES}	±20	V
Transient Gate to Emitter Voltage		±30	
Collector Current @ Tc = 25°C @ Tc = 100°C	I_C	 40 20	A
Pulsed Collector Current @ Tc = 25°C	I_{CM} (Note 1)	 60	A
Diode Forward Current @ Tc = 25°C @ Tc = 100°C	I_F	 20 10	A
Pulsed Diode Maximum Forward Current	I_{FM} (Note 1)	60	A
Maximum Power Dissipation @ Tc = 25°C @ Tc = 100°C	P_D	 165 66	W
Operating Junction Temperature	T_J	−55 to + 150	°C
Storage Temperature Range	T_{stg}	−55 to + 150	°C
Maximum Lead Temperature for Soldering, 1/8″ from Case for 5 Seconds	T_L	300	°C

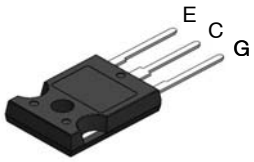
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Repetitive rating: Pulse width limited by max. junction temperature.

ON Semiconductor®

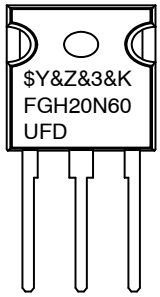
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TO−247−3LD
CASE 340CK

MARKING DIAGRAM



$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
FGH20N60UFD	= Specific Device Code

ORDERING INFORMATION

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

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THERMAL CHARACTERISTICS

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance Junction−to−Case, for IGBT	$R_{\theta JC}$	−	0.76	°C/W
Thermal Resistance Junction−to−Case, for Diode	$R_{\theta JC}$	−	2.51	°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
FGH20N60UFDTU	FGH20N60UFD	TO−247	Tube	N/A	N/A	30 Units

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	600	−	−	V
Temperature Coefficient of Breakdown Voltage	$\Delta BV_{CES}/\Delta T_J$	V_{GE} = 0 V, I_C = 250 μA	−	0.6	−	V/°C
Collector Cut−Off Current	I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0 V	−	−	250	μA
G−E Leakage Current	I_{GES}	V_{GE} = V_{GES}, V_{CE} = 0 V	−	−	±400	nA
ON CHARACTERISTICs						
G−E Threshold Voltage	$V_{GE(th)}$	I_C = 250 μA, V_{CE} = V_{GE}	4.0	5.0	6.5	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 20 A, V_{GE} = 15 V	−	1.8	2.4	V
		I_C = 20 A, V_{GE} = 15 V, T_C = 125°C	−	2.0	−	V
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ies}	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz	−	940	−	pF
Output Capacitance	C_{oes}		−	110	−	pF
Reverse Transfer Capacitance	C_{res}		−	40	−	pF
SWITCHING CHARACTERISTICS						
Turn−On Delay Time	$t_{d(on)}$	V_{CC} = 400 V, I_C = 20 A, R_G = 10 Ω, V_{GE} = 15 V, Inductive Load, T_C = 25°C	−	13	−	ns
Rise Time	t_r		−	17	−	ns
Turn−Off Delay Time	$t_{d(off)}$		−	87	−	ns
Fall Time	t_f		−	32	64	ns
Turn−On Switching Loss	E_{on}		−	0.38	−	mJ
Turn−Off Switching Loss	E_{off}		−	0.26	−	mJ
Total Switching Loss	E_{ts}		−	0.64	−	mJ
Turn−On Delay Time	$t_{d(on)}$	V_{CC} = 400 V, I_C = 20 A, R_G = 10 Ω, V_{GE} = 15 V, Inductive Load, T_C = 125°C	−	13	−	ns
Rise Time	t_r		−	16	−	ns
Turn−Off Delay Time	$t_{d(off)}$		−	92	−	ns
Fall Time	t_f		−	63	−	ns
Turn−On Switching Loss	E_{on}		−	0.41	−	mJ
Turn−Off Switching Loss	E_{off}		−	0.36	−	mJ
Total Switching Loss	E_{ts}		−	0.77	−	mJ
Total Gate Charge	Q_g	V_{CE} = 400 V, I_C = 20 A, V_{GE} = 15 V	−	63	−	nC
Gate to Emitter Charge	Q_{ge}		−	7	−	nC
Gate to Collector Charge	Q_{gc}		−	32	−	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 = 10 A	T_C = 25°C	–	1.9	2.5	V
			T_C = 125°C	–	1.7	–	
Diode Reverse Recovery Time	t_{rr}	I_F = 10 A, di_F/dt = 200 A/μs	T_C = 25°C	–	34	–	ns
			T_C = 125°C	–	57	–	
Diode Reverse Recovery Charge	Q_{rr}		T_C = 25°C	–	41	–	nC
			T_C = 125°C	–	96	–	

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

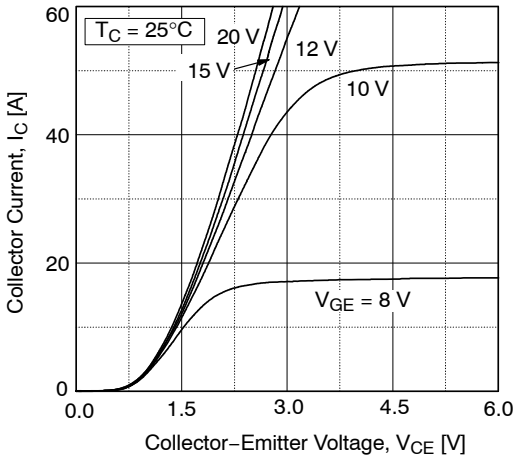


Figure 1. Typical Output Characteristics

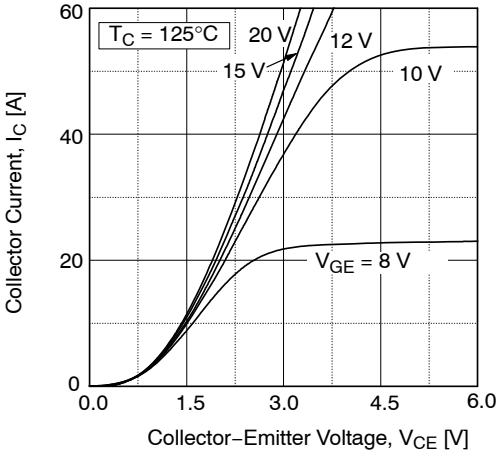


Figure 2. Typical Output Characteristics

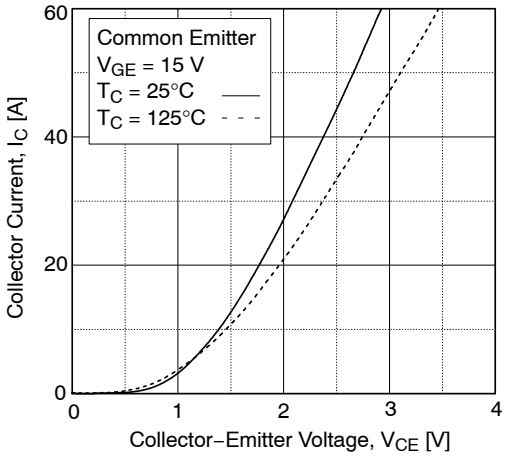


Figure 3. Typical Saturation Voltage Characteristics

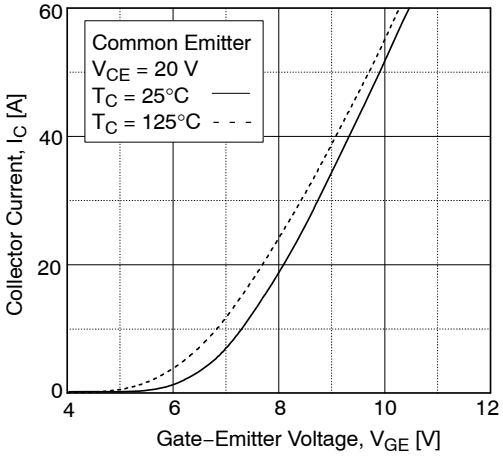


Figure 4. Transfer Characteristics

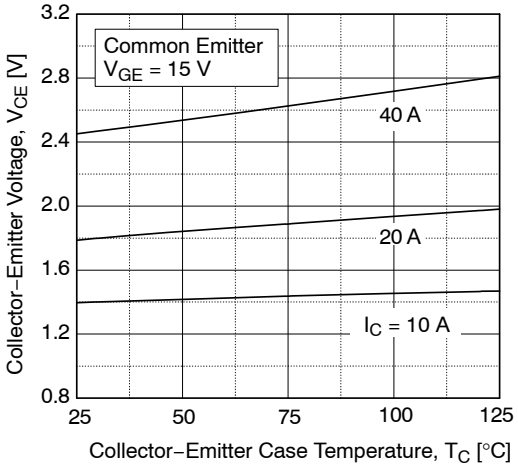


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

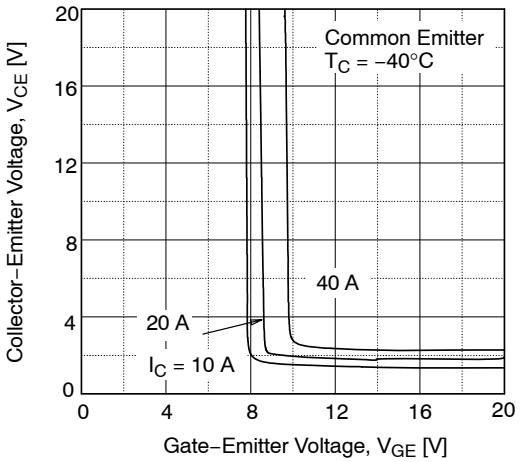


Figure 6. Saturation Voltage vs. V_{GE}

TYPICAL CHARACTERISTICS

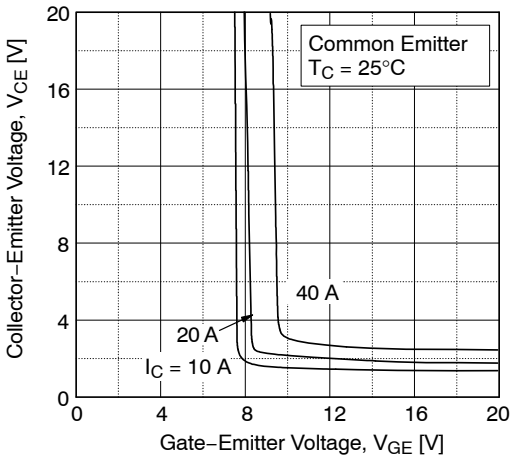


Figure 7. Saturation Voltage vs. V_{GE}

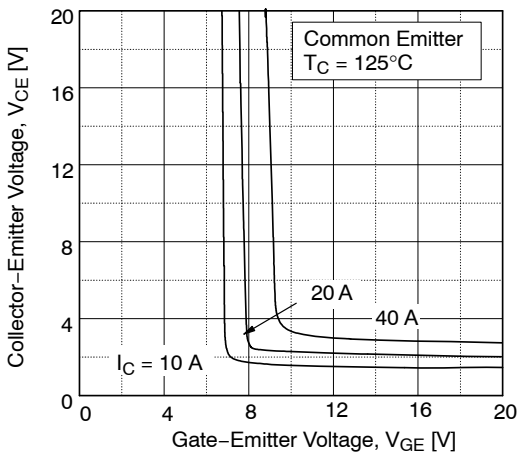


Figure 8. Saturation Voltage vs. V_{GE}

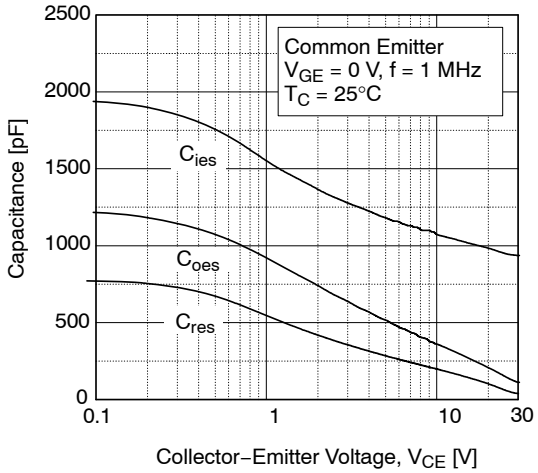


Figure 9. Capacitance Characteristics

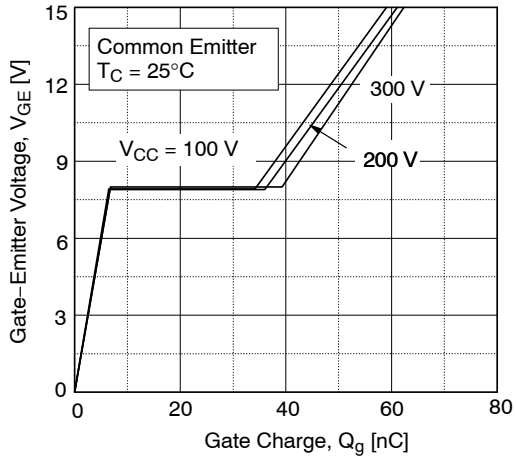


Figure 10. Gate Charge Characteristics

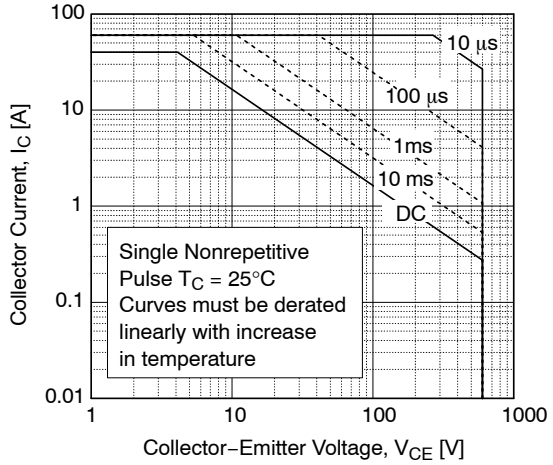


Figure 11. SOA Characteristics

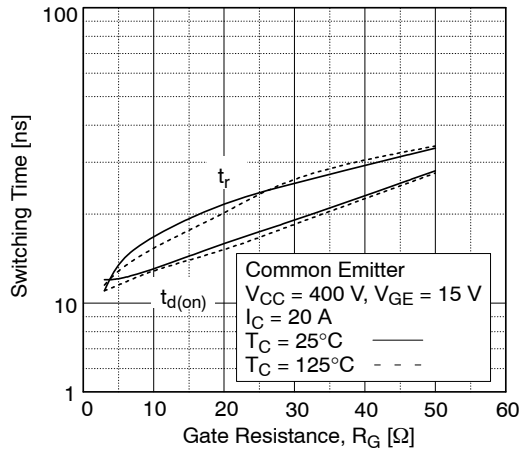


Figure 12. Turn−on Characteristics vs. Gate Resistance

TYPICAL CHARACTERISTICS

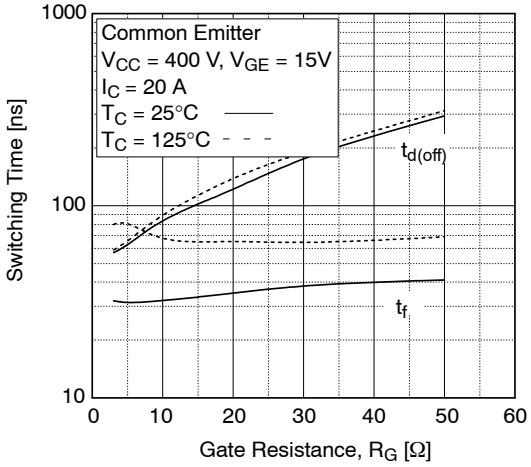


Figure 13. Turn−off Characteristics vs. Gate Resistance

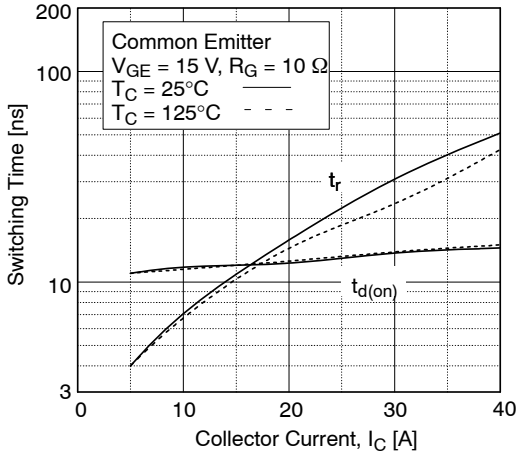


Figure 14. Turn−on Characteristics vs. Collector Current

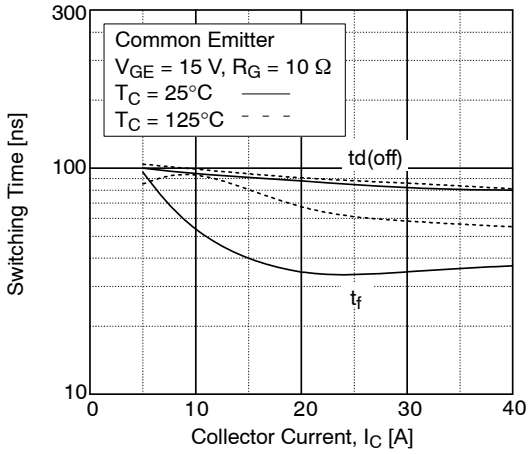


Figure 15. Turn−off Characteristics vs. Collector Current

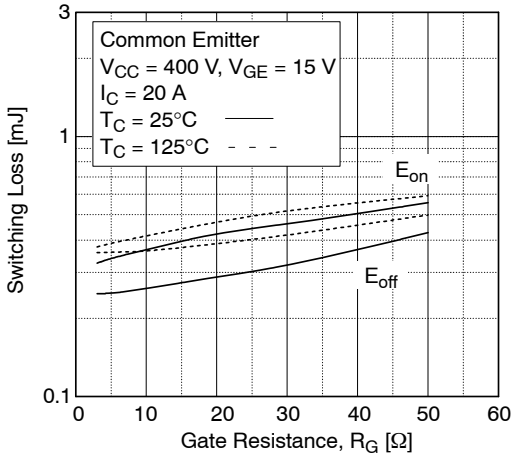


Figure 16. Switching Loss vs. Gate Resistance

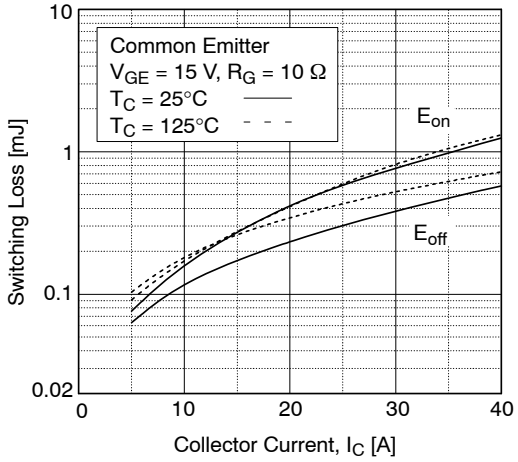


Figure 17. Switching Loss vs. Collector Current

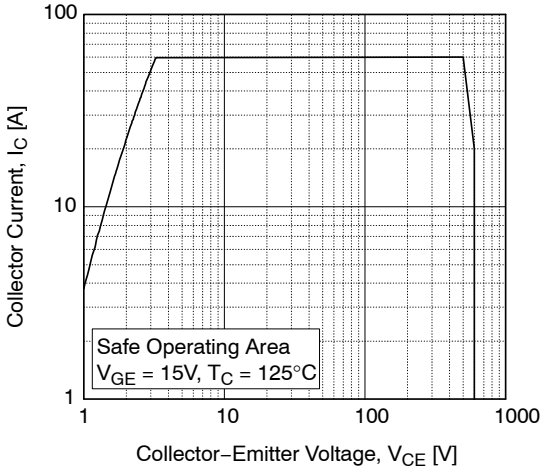


Figure 18. Turn−off Switching SOA Characteristics

TYPICAL CHARACTERISTICS

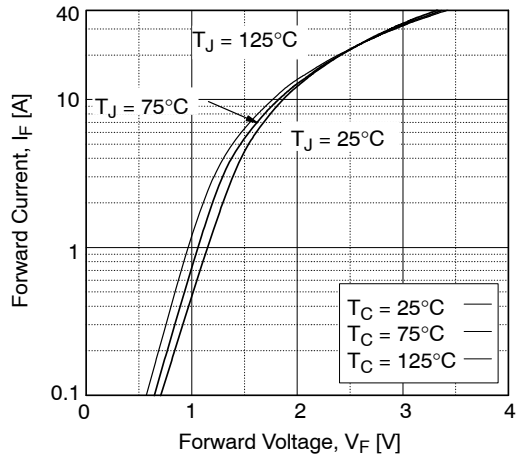


Figure 19. Forward Characteristics

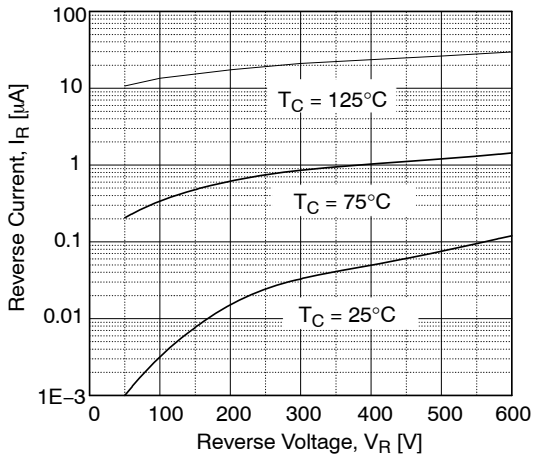


Figure 20. Reverse Current

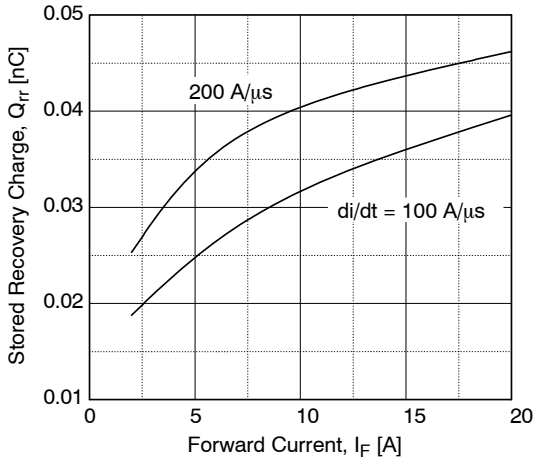


Figure 21. Stored Charge

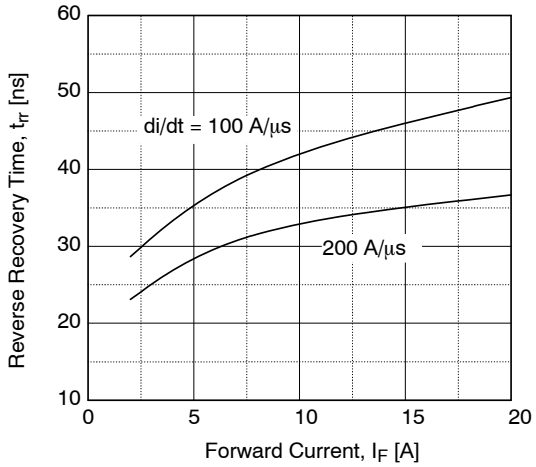


Figure 22. Reverse Recovery Time

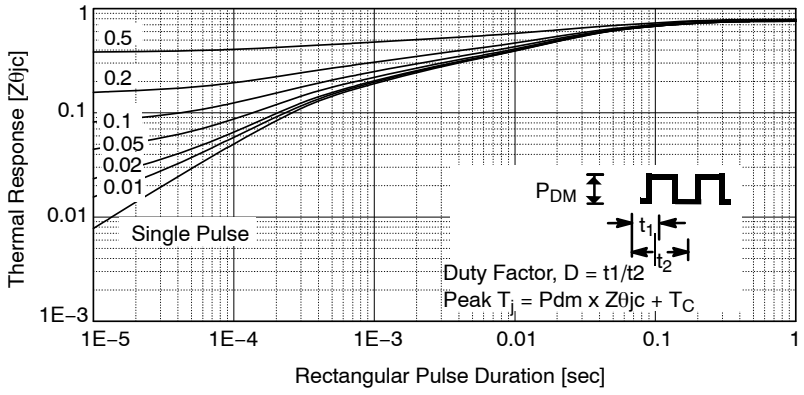
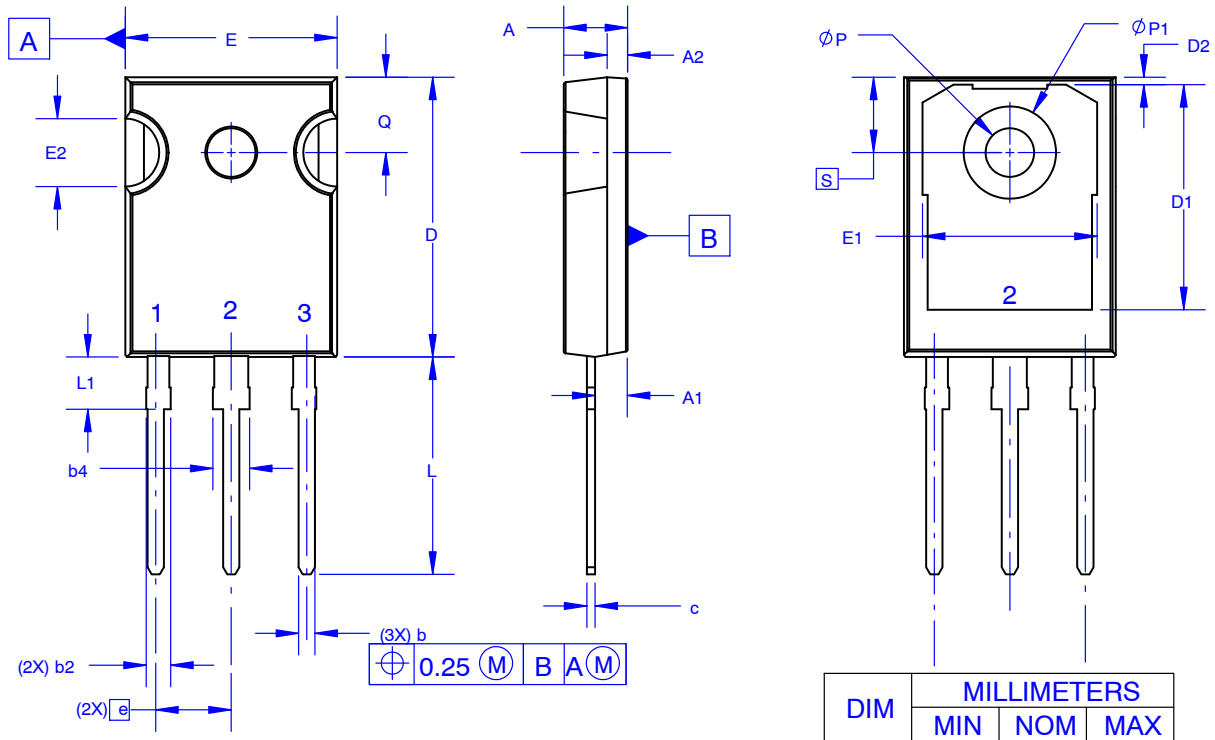


Figure 23. Transient Thermal Impedance of IGBT

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

DATE 31 JAN 2019

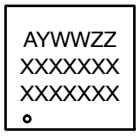


DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.58	4.70	4.82
A1	2.20	2.40	2.60
A2	1.40	1.50	1.60
b	1.17	1.26	1.35
b2	1.53	1.65	1.77
b4	2.42	2.54	2.66
c	0.51	0.61	0.71
D	20.32	20.57	20.82
D1	13.08	~	~
D2	0.51	0.93	1.35
E	15.37	15.62	15.87
E1	12.81	~	~
E2	4.96	5.08	5.20
e	~	5.56	~
L	15.75	16.00	16.25
L1	3.69	3.81	3.93
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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Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

www.entegreci.com

Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

Teklif isteyin

www.entegreci.com | **destek@entegreci.com** | **0850 305 90 34**

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