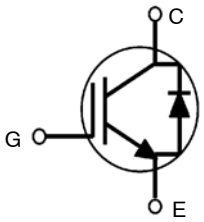
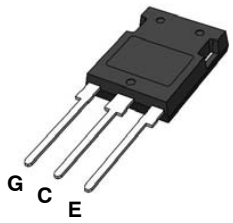
IGBT - Field Stop, Trench With Soft Fast Recovery Diode

650 V, 120 A

FGY120T65SPD-F085





TO−247−3LD
CASE 340CU

Features

- Very Low Saturation Voltage : $V_{CE(sat)}$ = 1.5 V(Typ.) @ I_C = 120 A
- Maximum Junction Temperature : T_J = 175°C
- Positive Temperature Co−efficient
- Tight Parameter Distribution
- High Input Impedance
- 100% of the Parts are Dynamically Tested
- Short Circuit Ruggedness > 6 μs @ 25°C
- Copacked with Soft, Fast Recovery Extremefast Diode
- AEC−Q101 Qualified and PPAP Capable
- This is a Pb−Free Device

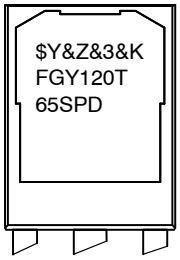
Benefits

- Very Low Conduction and Switching Losses for a High Efficiency Operation in Various Applications
- Rugged Transient Reliability
- Outstanding Parallel Operation Performance with Balance Current Sharing
- Low EMI

Applications

- Traction Inverter for HEV/EV
- Auxiliary DC/AC Converter
- Motor Drives
- Other Power−train Applications Requiring High Power Switch

MARKING DIAGRAM



$Y = **onsemi** Logo
&Z = Assembly Plant Code
&3 = Data Code (Year & Week)
&K = Lot
FGY120T65SPD= Specific Device Code

ORDERING INFORMATION

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

© Semiconductor Components Industries, LLC, 2017

ABSOLUTE MAXIMUM RATINGS

Symbol	Description		Ratings	Units
V_{CES}	Collector to Emitter Voltage		650	V
VG_{ES}	Gate to Emitter Voltage		±20	V
	Transient Gate to Emitter Voltage		±30	V
I_C	Collector Current (Note 1)	@ T_C = 25°C	240	A
	Collector Current	@ T_C = 100°C	220	A
$I_{Nominal}$	Nominal Current		120	A
I_{CM}	Pulsed Collector Current		378	A
I_F	Diode Forward Current (Note 1)	@ T_C = 25°C	240	A
	Diode Forward Current	@ T_C = 100°C	188	A
P_D	Maximum Power Dissipation	@ T_C = 25°C	882	W
	Maximum Power Dissipation	@ T_C = 100°C	441	W
SCWT	Short Circuit Withstand Time	@ T_C = 25°C	6	μs
dV/dt	Voltage Transient Ruggedness (Note 2)		10	V/ns
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

1. Limited by bondwire
2. V_{CC} = 400 V, V_{GE} = 15 V, I_{CE} = 378 A, Inductive Load

THERMAL CHARACTERISTICS

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$(IGBT)	Thermal Resistance, Junction to Case	–	0.17	°C/W
$R_{\theta JC}$(Diode)	Thermal Resistance, Junction to Case	–	0.32	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	–	40	°C/W

PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Pacing Type	Qty per Tube
FGY120T65SPD	FGY120T65SPD−F085	TP−247	Tube	30ea

Share Feedback
Your Opinion Matters

ELECTRICAL CHARACTERISTICS OF THE IGBT T_J = 25 °C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
OFF CHARACTERISTICS						
BV_{CES}	Collector to Emitter Breakdown Voltage	V_{GE} = 0 V, I_C = 1 mA	650	–	–	V
$\frac{\Delta BV_{CES}}{\Delta T_J}$	Temperature Coefficient of Breakdown Voltage	V_{GE} = 0 V, I_C = 1 mA	–	0.6	–	V/°C
I_{CES}	Collector Cut−Off Current	V_{CE} = V_{CES}, V_{GE} = 0 V	–	–	40	μA
I_{GES}	G−E Leakage Current	V_{GE} = V_{GES}, V_{CE} = 0 V	–	–	± 250	nA
ON CHARACTERISTICS						
$V_{GE(th)}$	G−E Threshold Voltage	I_C = 120 mA, V_{CE} = V_{GE}	4.2	5.4	6.2	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C = 120 A, V_{GE} = 15 V	–	1.5	1.85	V
		I_C = 120 A, V_{GE} = 15 V, T_J = 175°C	–	1.8	–	V
DYNAMIC CHARACTERISTICS						
C_{ies}	Input Capacitance	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz	–	6810	–	pF
C_{oes}	Output Capacitance		–	440	–	pF
C_{res}	Reverse Transfer Capacitance		–	50	–	pF
R_G	Internal Gate Resistance	f = 1 MHz	–	3	–	Ω
SWITCHING CHARACTERISTICS						
$T_{d(on)}$	Turn−On Delay Time	V_{CC} = 400 V, I_C = 120 A, R_G = 5 Ω, V_{GE} = 15 V, Inductive Load, T_J = 25°C	–	53	–	ns
T_r	Rise Time		–	134	–	ns
$T_{d(off)}$	Turn−Off Delay Time		–	102	–	ns
T_f	Fall Time		–	115	–	ns
E_{on}	Turn−On Switching Loss		–	6.8	–	mJ
E_{off}	Turn−Off Switching Loss		–	3.5	–	mJ
E_{ts}	Total Switching Loss		–	10.3	–	mJ
$T_{d(on)}$	Turn−On Delay Time	V_{CC} = 400 V, I_C = 120 A, R_G = 5 Ω, V_{GE} = 15 V, Inductive Load, T_J = 175°C	–	50	–	ns
T_r	Rise Time		–	133	–	ns
$T_{d(off)}$	Turn−Off Delay Time		–	109	–	ns
T_f	Fall Time		–	138	–	ns
E_{on}	Turn−On Switching Loss		–	9.8	–	mJ
E_{off}	Turn−Off Switching Loss		–	4.0	–	mJ
E_{ts}	Total Switching Loss		–	13.8	–	mJ
Q_g	Total Gate Charge	V_{CE} = 400 V, I_C = 120 A, V_{GE} = 15 V	–	162	243	nC
Q_{ge}	Gate to Emitter Charge		–	49	–	nC
Q_{gc}	Gate to Collector Charge		–	47	–	nC

Share Feedback
Your Opinion Matters

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

Symbol	Parameter	Test Conditions		Min.	Typ.	Max	Units
V_{FM}	Diode Forward Voltage	I_F = 120 A	T_J = 25°C	–	1.3	1.6	V
			T_J = 175°C	–	1.2	–	
E_{rec}	Reverse Recovery Energy	V_{CE} = 400V, I_F = 120 A, dI_F/dt = 1000 A/μs	T_J = 25°C	–	450	–	μJ
			T_J = 175°C	–	3000	–	
T_{rr}	Diode Reverse Recovery Time		T_J = 25°C	–	123	–	ns
			T_J = 175°C	–	240	–	
Q_{rr}	Diode Reverse Recovery Charge		T_J = 25°C	–	2.8	–	μC
			T_J = 175°C	–	12.2	–	

Share Feedback
Your Opinion Matters

TYPICAL PERFORMANCE CHARACTERISTICS

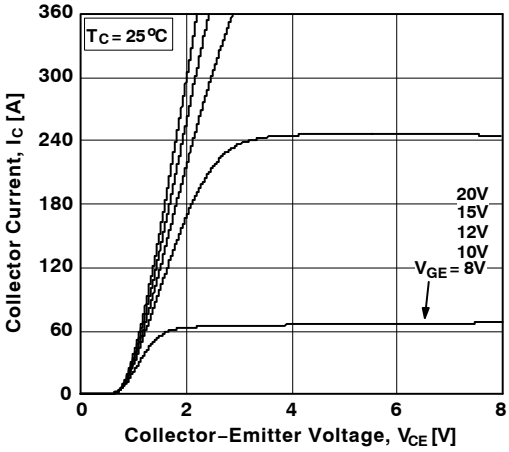


Figure 1. Typical Output Characteristics

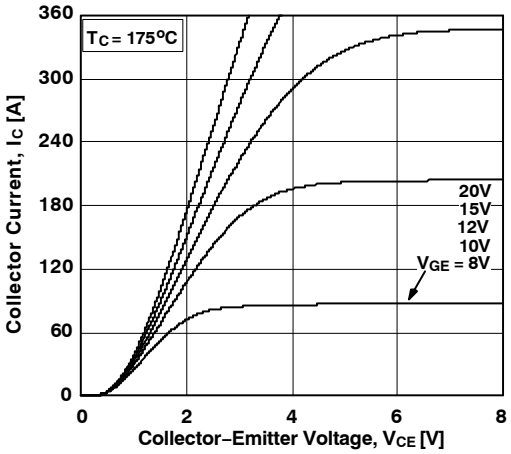


Figure 2. Typical Output Characteristics

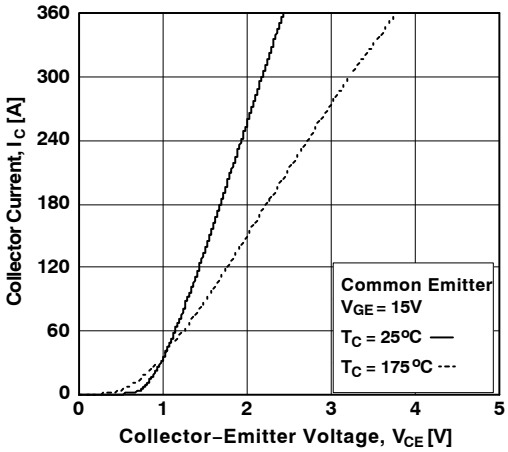


Figure 3. Typical Saturation Voltage Characteristics

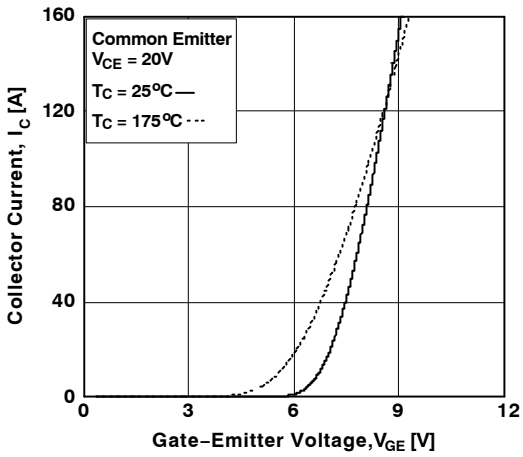


Figure 4. Transfer Characteristics

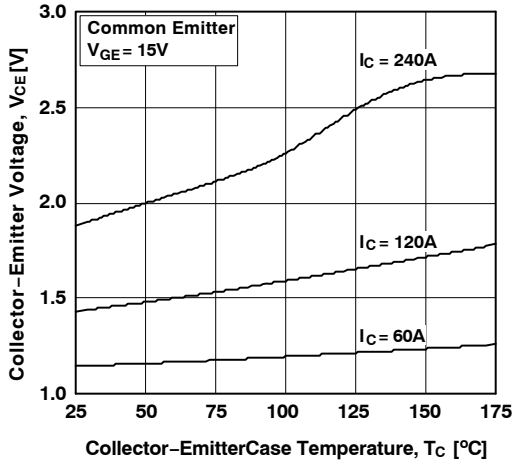


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

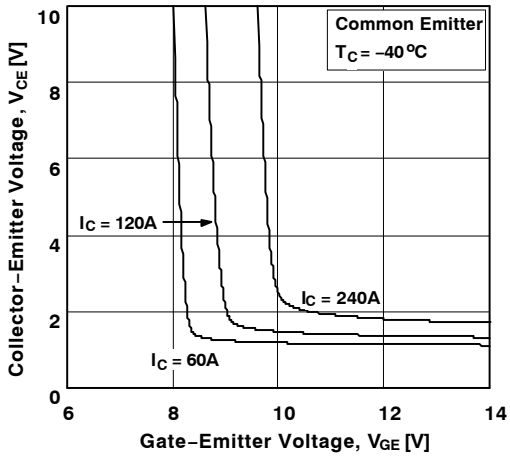


Figure 6. Saturation Voltage vs. V_{GE}

Share Feedback
Your Opinion Matters

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

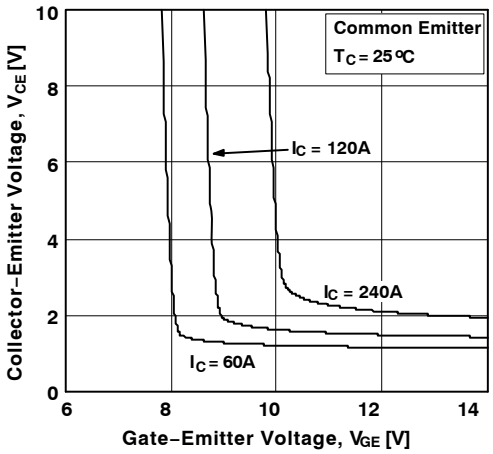


Figure 7. Saturation Voltage vs. V_{GE}

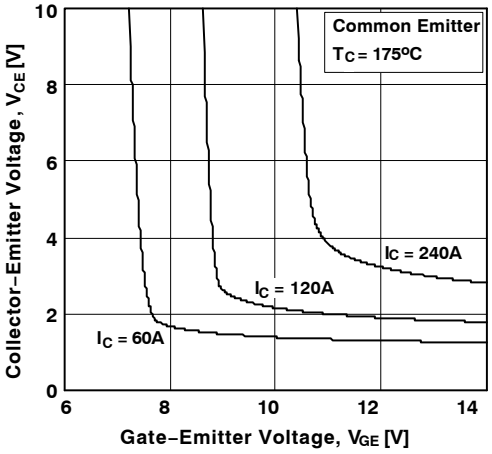


Figure 8. Saturation Voltage vs. V_{GE}

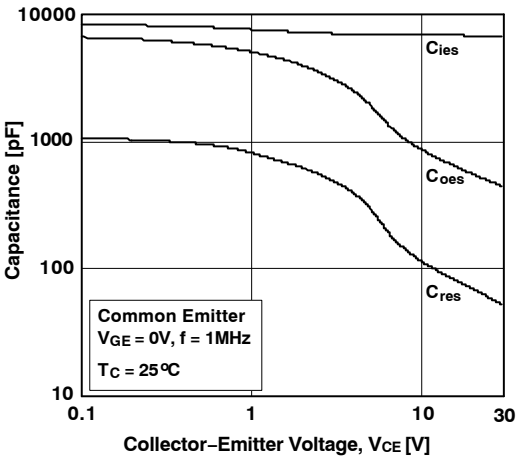


Figure 9. Capacitance Characteristics

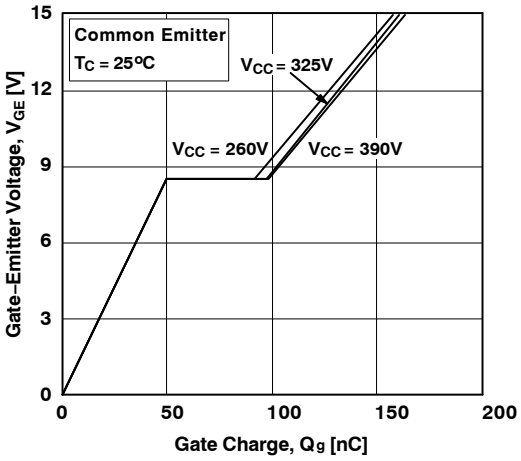


Figure 10. Gate charge Characteristics

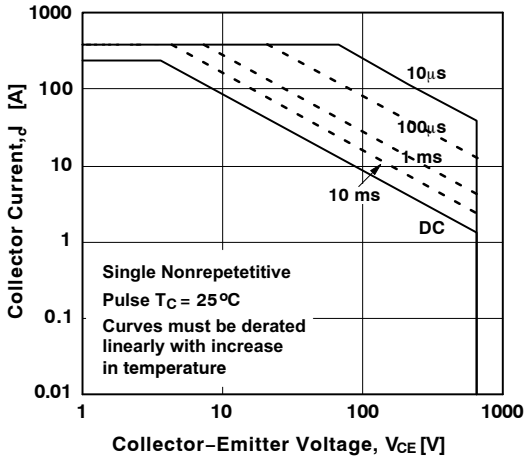


Figure 11. SOA Characteristics

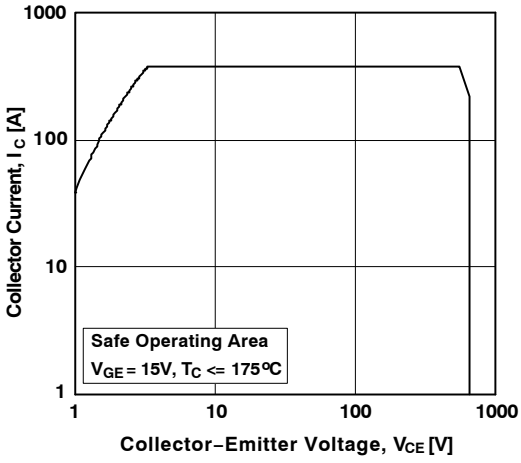


Figure 12. Turn off Switching SOA Characteristics

Share Feedback
Your Opinion Matters

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

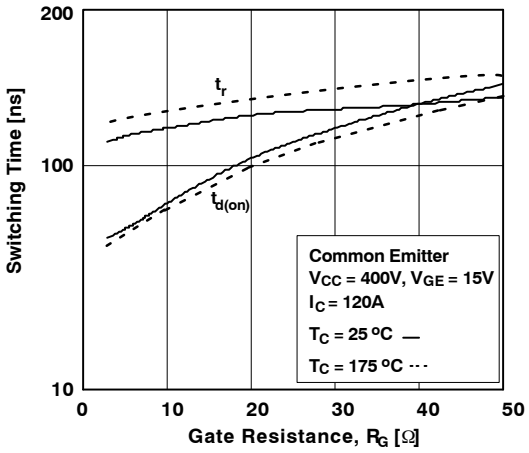


Figure 13. Turn−on Characteristics vs. Gate Resistance

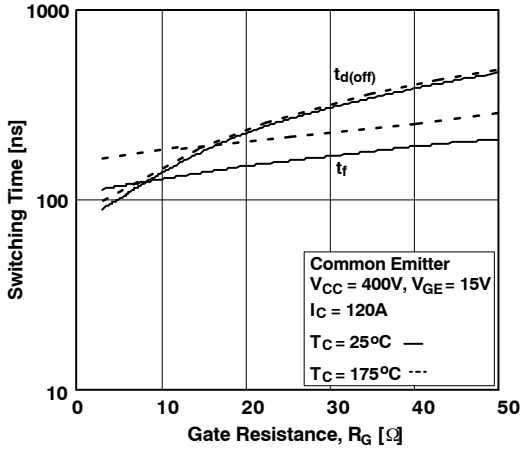


Figure 14. Turn−off Characteristics vs. Gate Resistance

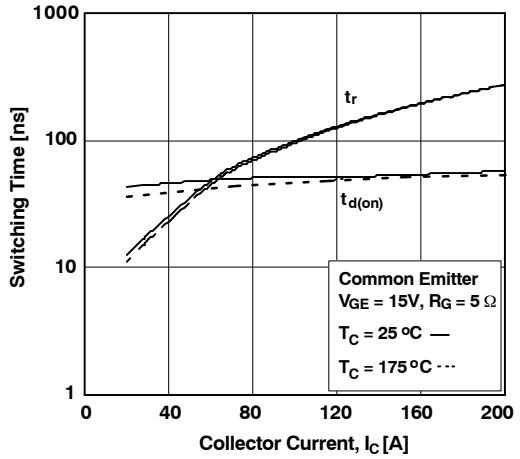


Figure 15. Turn−on Characteristics vs. Collector Current

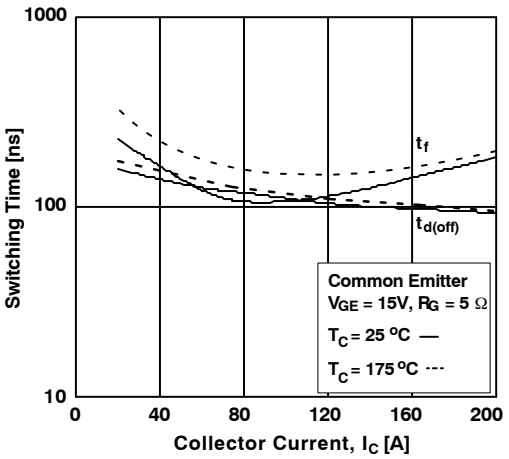


Figure 16. Turn−off Characteristics vs. Collector Current

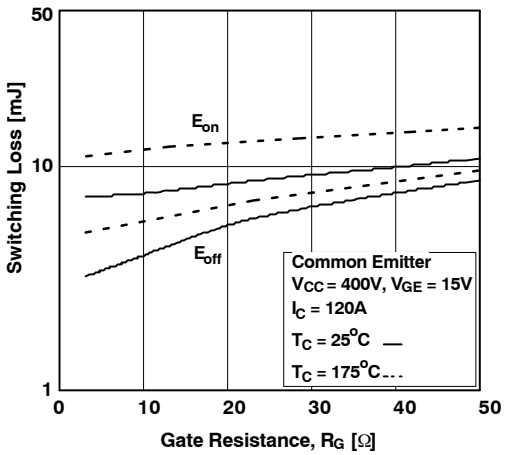


Figure 17. Switching Loss vs Gate Resistance

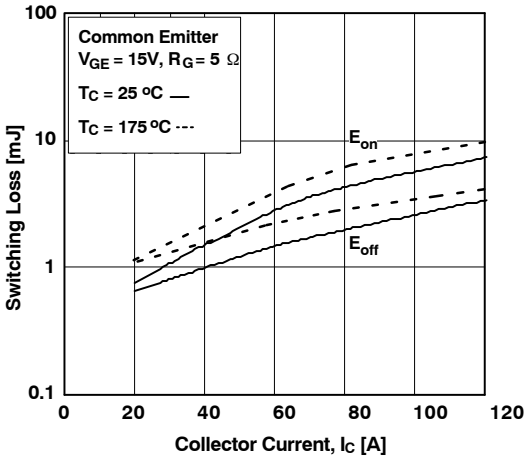


Figure 18. Switching Loss vs Collector Current

Share Feedback
Your Opinion Matters

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

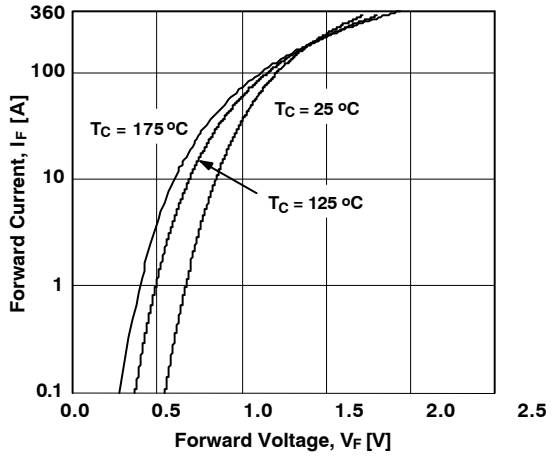


Figure 19. Forward Characteristics

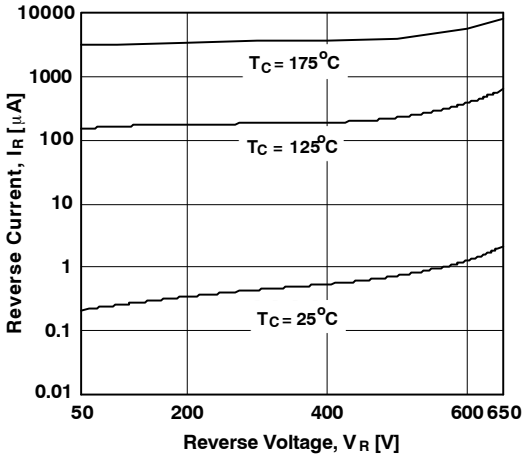


Figure 20. Reverse Current

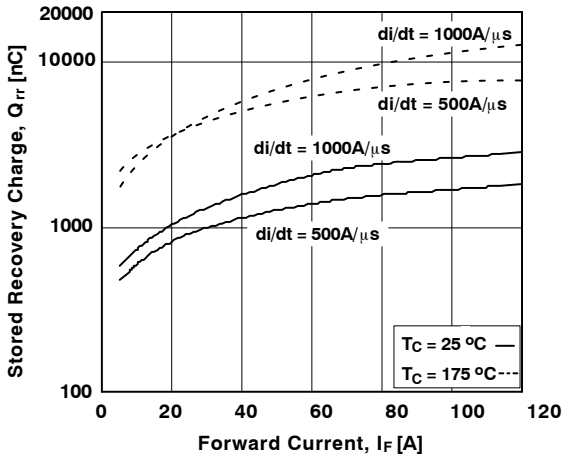


Figure 21. Stored Charge

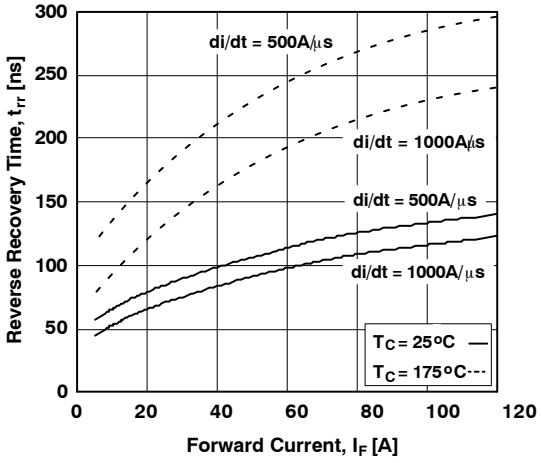


Figure 22. Reverse Recovery Time

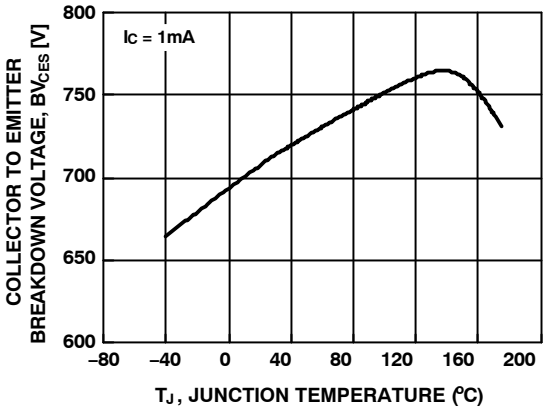


Figure 23. Collector to Emitter Breakdown Voltage vs. Junction Temperature

Share Feedback
Your Opinion Matters

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

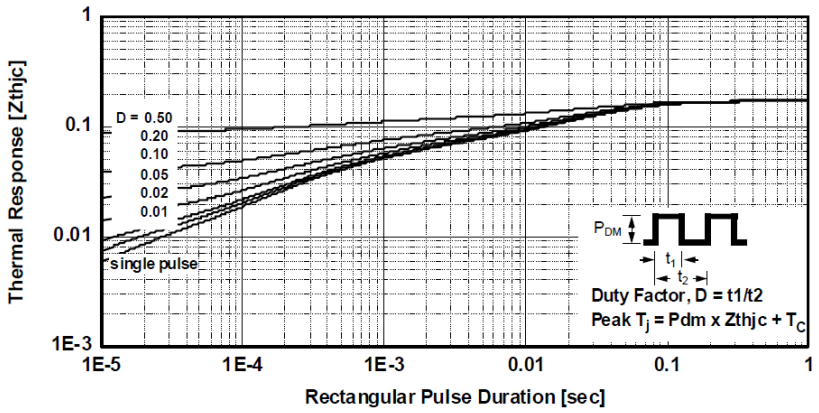


Figure 24. Transient Thermal Impedance of IGBT

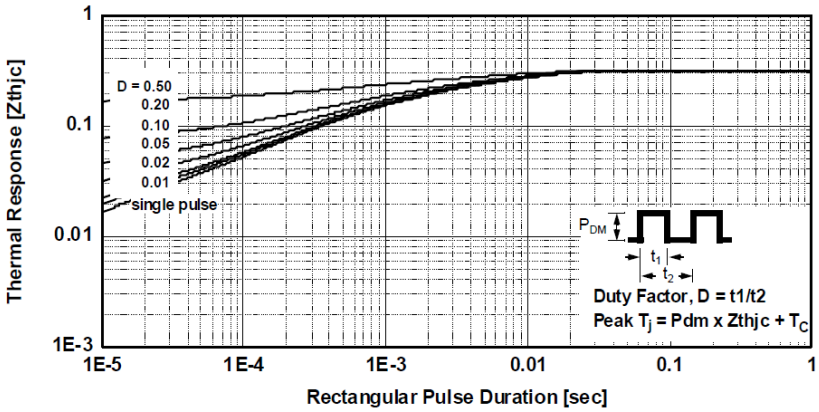
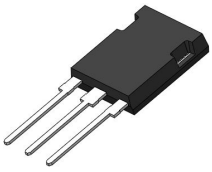


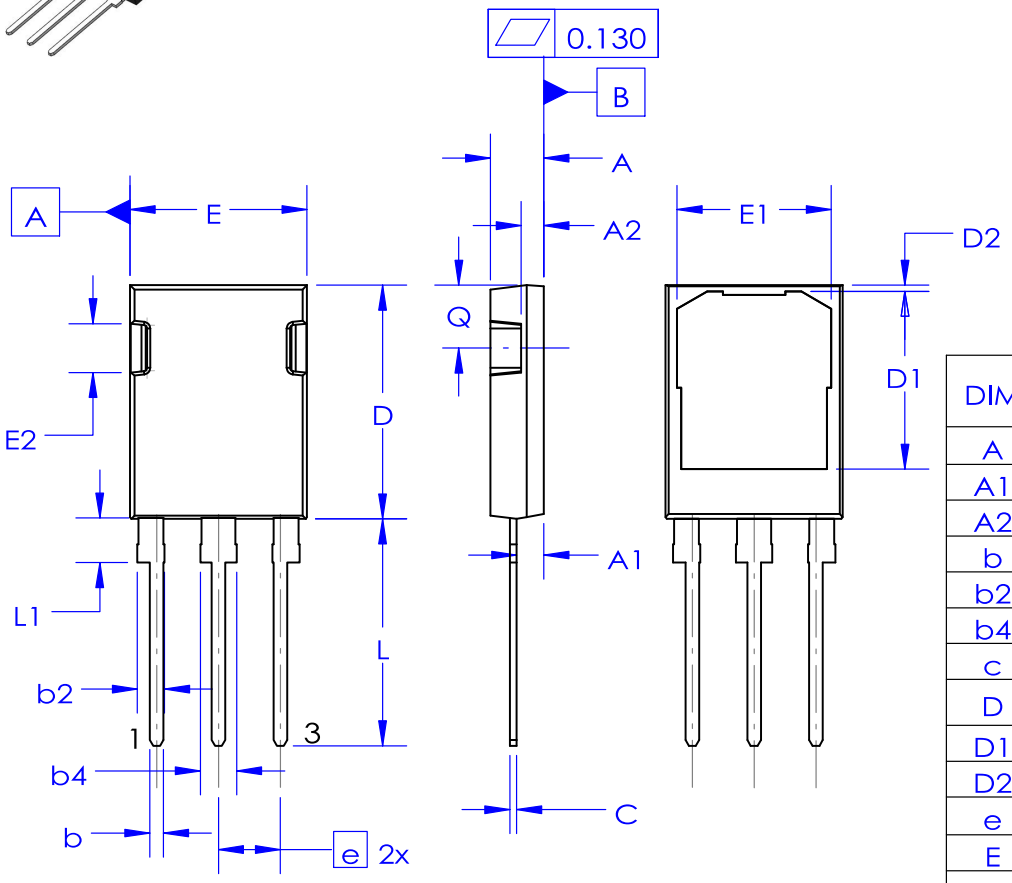
Figure 25. Transient Thermal Impedance of Diode

Share Feedback
Your Opinion Matters



TO−247−3LD
CASE 340CU
ISSUE B

DATE 28 OCT 2021

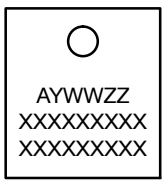


DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.60	4.70	4.80
A1	2.10	2.40	2.70
A2	1.70	2.00	2.30
b	1.16	1.20	1.26
b2	2.20	2.40	2.60
b4	3.00	3.20	3.40
c	0.59	0.60	0.66
D	20.40	20.60	20.80
D1	15.47	15.67	15.87
D2	0.25	0.55	0.85
e	5.45 BSC		
E	15.40	15.60	15.80
E1	13.40	13.60	13.80
E2	4.12	4.30	4.52
L	19.70	20.00	20.30
L1	3.65	3.85	4.05
Q	5.35	5.55	5.75

NOTES:

A. NO INDUSTRY STANDARS APPLIES TO THIS PACKAGE.
B. ALL DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
D. DRAWING CONFORMS TO ASME Y14.5-2009.

GENERIC MARKING DIAGRAM*



XXXX = Specific Device Code
A = Assembly Site Code
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.

DOCUMENT NUMBER:	**98AON13773G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**TO−247−3LD**	**PAGE 1 OF 1**

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** 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. **onsemi** does not convey any license under its patent rights nor the rights of others.

onsemi, , and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent−Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as−is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** 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 **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** 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. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** 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 **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** 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 **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales

ENTEGRECİ

Bu belge www.entegreci.com üzerinden sunulmaktadır.

Elektronik komponent tedarikinde Entegreci

Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

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**

Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

Bu sayfa Entegreci tarafından eklenmiştir. Belgenin önceki sayfaları asıl yayıncısına aittir ve içeriği değiştirilmemiştir; en güncel sürüm için belgenin yayıncısına başvurun.