ON Semiconductor

Is Now



To learn more about onsemi™, please visit our website at
www.onsemi.com

onsemi and 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** 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. Other names and brands may be claimed as the property of others.

Field Stop Trench IGBT

650 V, 50 A

FGHL50T65MQDT

Field stop 4th generation mid speed IGBT technology copacked with full rated current diode.

Features

- Maximum Junction Temperature: T_J = 175°C
- Positive Temperature Co−efficient for Easy Parallel Operating
- High Current Capability
- Low Saturation Voltage: $V_{CE(Sat)}$ = 1.45 V (Typ.) @ I_C = 50 A
- 100% of the Parts are Tested for I_{LM} (Note 2)
- Smooth and Optimized Switching
- Tight Parameter Distribution
- RoHS Compliant

Typical Applications

- Solar Inverter
- UPS, ESS
- PFC, Converters

MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Collector to Emitter Voltage	V_{CES}	650	V
Gate to Emitter Voltage Transient Gate to Emitter Voltage	V_{GES}	±20 ±30	V
Collector Current (Note 1) @ T_C = 25°C @ T_C = 100°C	I_C	80 50	A
Pulsed Collector Current (Note 2)	I_{LM}	200	A
Pulsed Collector Current (Note 3)	I_{CM}	200	A
Diode Forward Current (Note 1) @ T_C = 25°C @ T_C = 100°C	I_F	60 50	A
Pulsed Diode Maximum Forward Current	I_{FM}	200	A
Maximum Power Dissipation @ T_C = 25°C @ T_C = 100°C	P_D	268 134	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	−55 to +175	°C
Maximum Lead Temp. for Soldering Purposes (1/8″ from case for 5 s)	T_L	260	°C

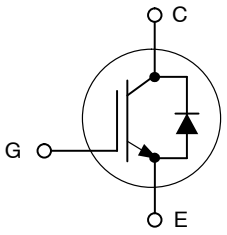
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

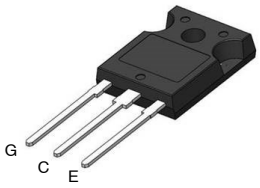
1. Value limit by bond wire
2. V_{CC} = 400 V, V_{GE} = 15 V, I_C = 200 A, Inductive Load, 100% tested
3. Repetitive rating: pulse width limited by max. junction temperature

ON Semiconductor®

www.onsemi.com

50 A, 650 V
V_{CESat} = 1.45 V





TO−247−3L
CASE 340CX

MARKING DIAGRAM



$Y = ON Semiconductor Logo
&Z = Assembly Plant Code
&3 = 3−Digit Date Code
&K = 2−Digit Lot Traceability Code
FGHL50T65MQDT = Specific Device Code

ORDERING INFORMATION

Device	Package	Shipping
FGHL50T65MQDT	TO−247−3L	30 Units / Tube

© Semiconductor Components Industries, LLC, 2020

THERMAL CHARACTERISTICS

Rating	Symbol	Value	Unit
Thermal Resistance Junction−to−case, for IGBT	$R_{\theta JC}$	0.56	°C/W
Thermal Resistance Junction−to−case, for Diode	$R_{\theta JC}$	0.74	°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 to Emitter Breakdown Voltage	V_{GE} = 0 V, I_C = 1 mA	BV_{CES}	650	–	–	V
Temperature Coefficient of Breakdown Voltage	V_{GE} = 0 V, I_C = 1 mA	$\frac{\Delta BV_{CES}}{\Delta T_J}$	–	0.6	–	V/°C
Collector−emitter Cut−off Current	V_{GE} = 0 V, V_{CE} = 650 V	I_{CES}	–	–	250	μA
Gate Leakage Current	V_{GE} = 20 V, V_{CE} = 0 V	I_{GES}	–	–	±400	nA
ON CHARACTERISTICS						
Gate to Emitter Threshold Voltage	V_{GE} = V_{CE}, I_C = 50 mA	$V_{GE(th)}$	3.0	4.5	6.0	V
Collector to Emitter Saturation Voltage	V_{GE} = 15 V, I_C = 50 A, T_J = 25°C V_{GE} = 15 V, I_C = 50 A, T_J = 175°C	$V_{CE(sat)}$	– –	1.45 1.65	1.8 –	V
DYNAMIC CHARACTERISTICS						
Input Capacitance	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz	C_{ies}	–	3335	–	pF
Output Capacitance		C_{oes}	–	105	–	
Reverse Transfer Capacitance		C_{res}	–	11	–	
Gate Charge Total	V_{CE} = 400 V, I_C = 50 A, V_{GE} = 15 V	Q_g	–	99	–	nC
Gate to Emitter Charge		Q_{ge}	–	17	–	
Gate to Collector Charge		Q_{gc}	–	24	–	
SWITCHING CHARACTERISTICS, INDUCTIVE LOAD						
Turn−on Delay Time	T_J = 25°C, V_{CC} = 400 V, I_C = 25 A, R_G = 6 Ω, V_{GE} = 15 V	$t_{d(on)}$	–	19	–	ns
Rise Time		t_r	–	11	–	
Turn−off Delay Time		$t_{d(off)}$	–	96	–	
Fall Time		t_f	–	58	–	
Turn−on Switching Loss		E_{on}	–	0.47	–	mJ
Turn−off Switching Loss		E_{off}	–	0.29	–	
Total Switching Loss		E_{ts}	–	0.77	–	
Turn−on Delay Time	T_J = 25°C, V_{CC} = 400 V, I_C = 50 A, R_G = 6 Ω, V_{GE} = 15 V	$t_{d(on)}$	–	21	–	ns
Rise Time		t_r	–	30	–	
Turn−off Delay Time		$t_{d(off)}$	–	90	–	
Fall Time		t_f	–	54	–	
Turn−on Switching Loss		E_{on}	–	1.19	–	mJ
Turn−off Switching Loss		E_{off}	–	0.63	–	
Total Switching Loss		E_{ts}	–	1.82	–	

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

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS, INDUCTIVE LOAD						
Turn−on Delay Time	T_J = 175°C, V_{CC} = 400 V, I_C = 25 A, R_G = 6 Ω, V_{GE} = 15 V	$t_{d(on)}$	−	18	−	ns
Rise Time		t_r	−	14	−	
Turn−off Delay Time		$t_{d(off)}$	−	98	−	
Fall Time		t_f	−	88	−	
Turn−on Switching Loss		E_{on}	−	0.9	−	mJ
Turn−off Switching Loss		E_{off}	−	0.55	−	
Total Switching Loss		E_{ts}	−	1.44	−	
Turn−on Delay Time	T_J = 175°C, V_{CC} = 400 V, I_C = 50 A, R_G = 6 Ω, V_{GE} = 15 V	$t_{d(on)}$	−	19	−	ns
Rise Time		t_r	−	32	−	
Turn−off Delay Time		$t_{d(off)}$	−	99	−	
Fall Time		t_f	−	82	−	
Turn−on Switching Loss		E_{on}	−	1.87	−	mJ
Turn−off Switching Loss		E_{off}	−	1.08	−	
Total Switching Loss		E_{ts}	−	2.95	−	
DIODE CHARACTERISTICS						
Diode Forward Voltage	I_F = 50 A, T_J = 25°C	V_F	−	1.65	2.1	V
	I_F = 50 A, T_J = 175°C		−	1.55	−	
DIODE SWITCHING CHARACTERISTICS, INDUCTIVE LOAD						
Reverse Recovery Energy	T_J = 25°C, V_{CE} = 400 V, I_F = 25 A, di_F/dt = 1000 A/μs	E_{rec}	−	65	−	μJ
Diode Reverse Recovery Time		T_{rr}	−	44	−	ns
Diode Reverse Recovery Charge		Q_{rr}	−	387	−	nC
Diode Reverse Recovery Current		I_{rr}	−	18	−	A
Reverse Recovery Energy	T_J = 25°C, V_{CE} = 400 V, I_F = 50 A, di_F/dt = 1000 A/μs	E_{rec}	−	128	−	μJ
Diode Reverse Recovery Time		T_{rr}	−	79	−	ns
Diode Reverse Recovery Charge		Q_{rr}	−	681	−	nC
Diode Reverse Recovery Current		I_{rr}	−	17	−	A
Reverse Recovery Energy	T_J = 175°C, V_{CE} = 400 V, I_F = 25 A, di_F/dt = 1000 A/μs	E_{rec}	−	380	−	μJ
Diode Reverse Recovery Time		T_{rr}	−	102	−	ns
Diode Reverse Recovery Charge		Q_{rr}	−	1482	−	nC
Diode Reverse Recovery Current		I_{rr}	−	29	−	A
Reverse Recovery Energy	T_J = 175°C, V_{CE} = 400 V, I_F = 50 A, di_F/dt = 1000 A/μs	E_{rec}	−	544	−	μJ
Diode Reverse Recovery Time		T_{rr}	−	135	−	ns
Diode Reverse Recovery Charge		Q_{rr}	−	2023	−	nC
Diode Reverse Recovery Current		I_{rr}	−	30	−	A

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

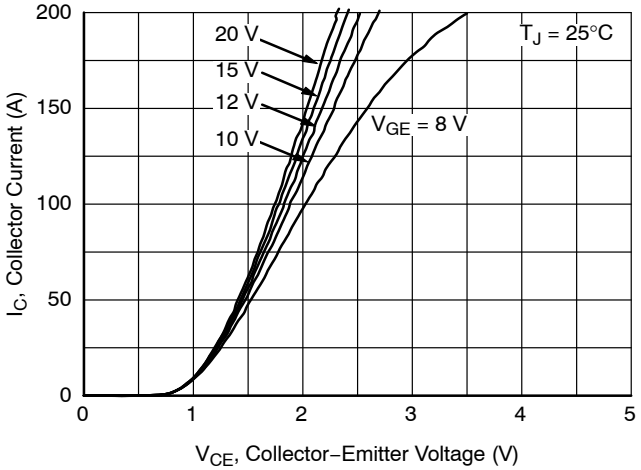


Figure 1. Typical Output Characteristics (T_J = 25°C)

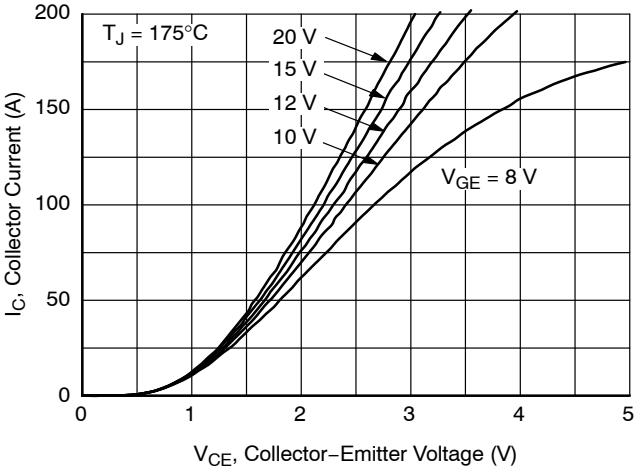


Figure 2. Typical Output Characteristics (T_J = 175°C)

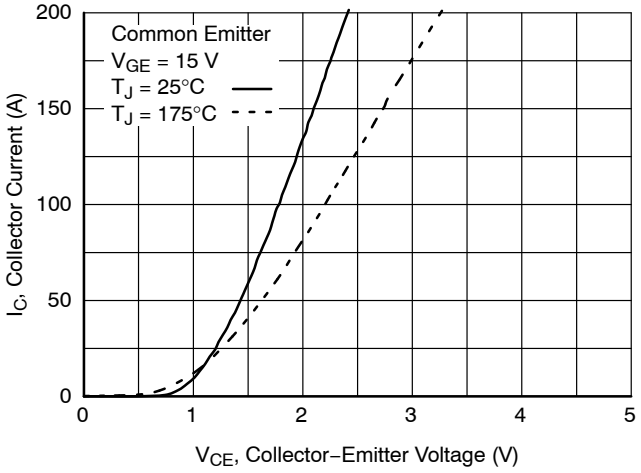


Figure 3. Typical Saturation Voltage Characteristics

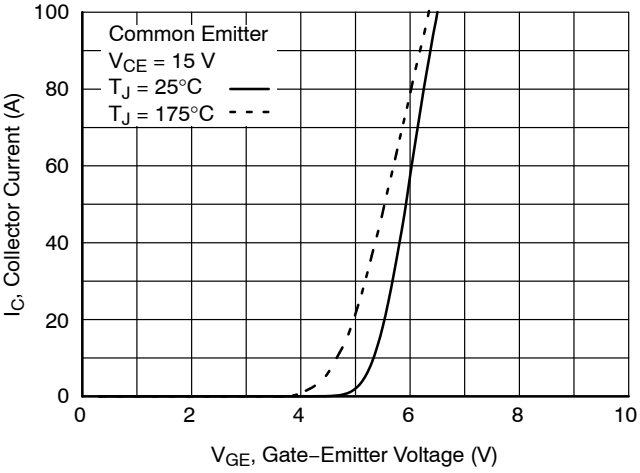


Figure 4. Typical Transfer Characteristics

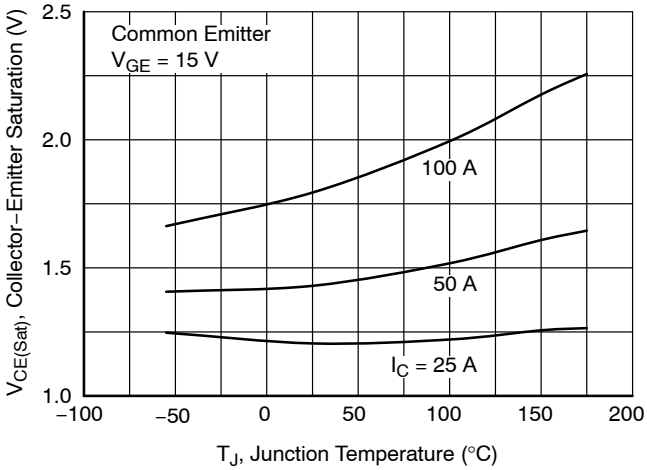


Figure 5. Saturation Voltage vs. Junction Temperature

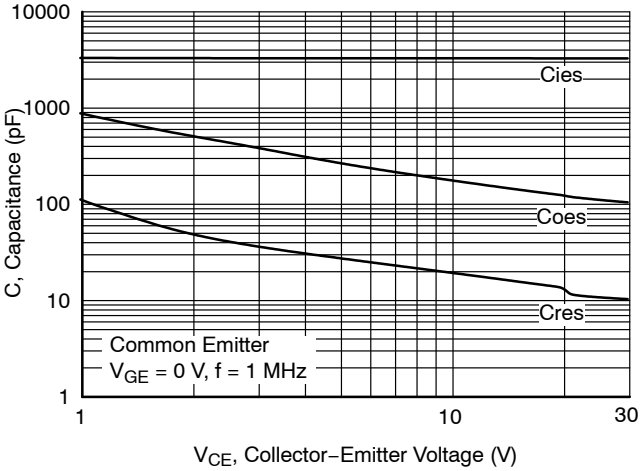


Figure 6. Capacitance Characteristics

TYPICAL CHARACTERISTICS (continued)

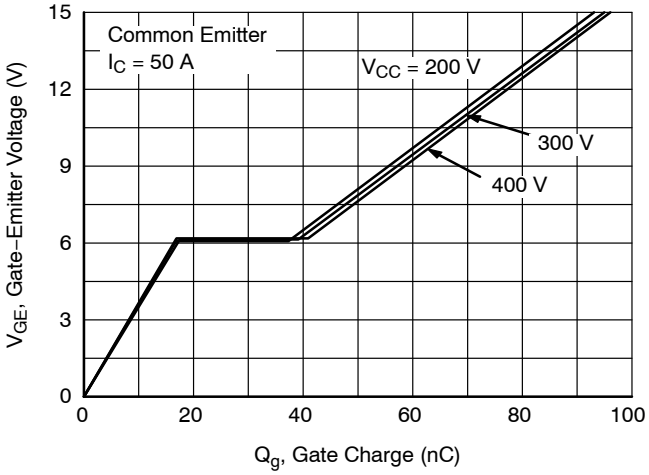


Figure 7. Gate Charge Characteristics

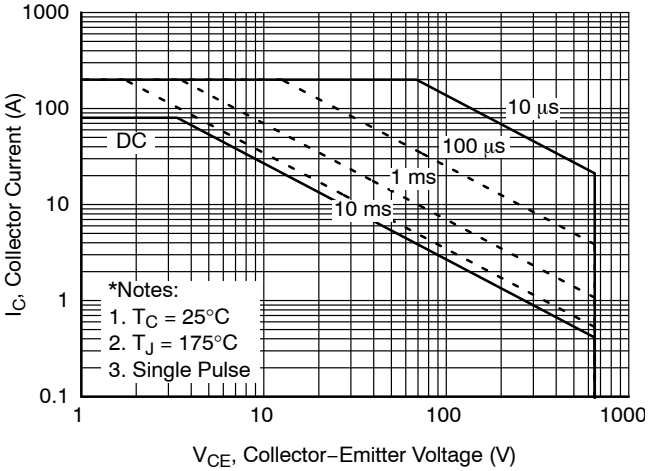


Figure 8. SOA Characteristics

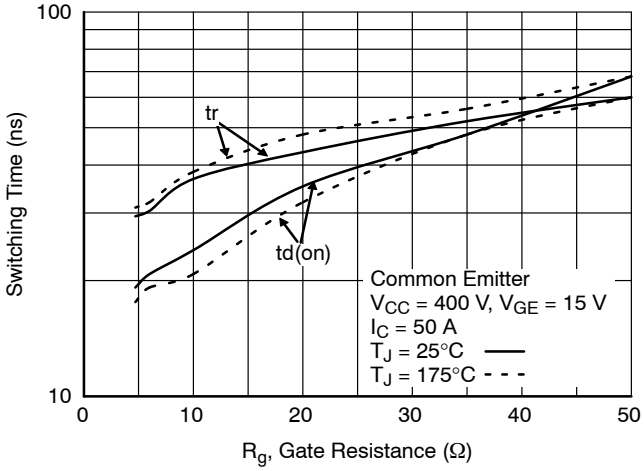


Figure 9. Turn−on Characteristics vs. Gate Resistance

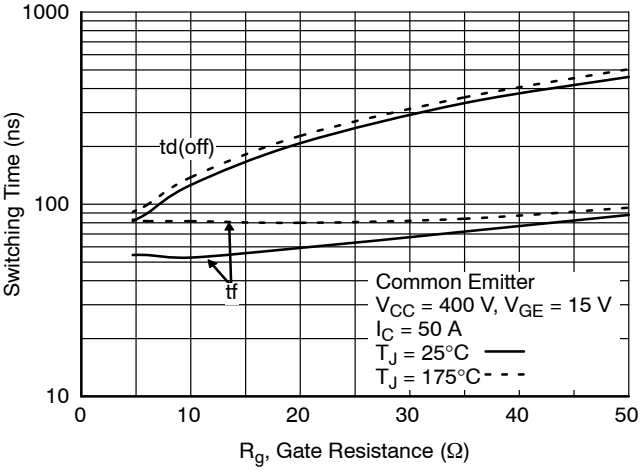


Figure 10. Turn−off Characteristics vs. Gate Resistance

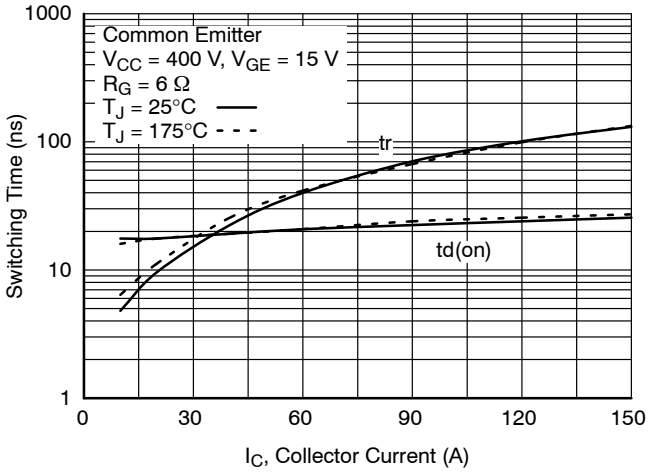


Figure 11. Turn−on Characteristics vs. Collector Current

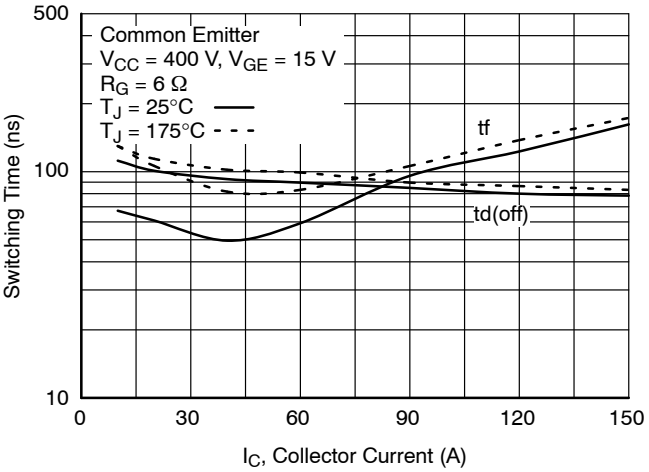


Figure 12. Turn−off Characteristics vs. Collector Current

TYPICAL CHARACTERISTICS (continued)

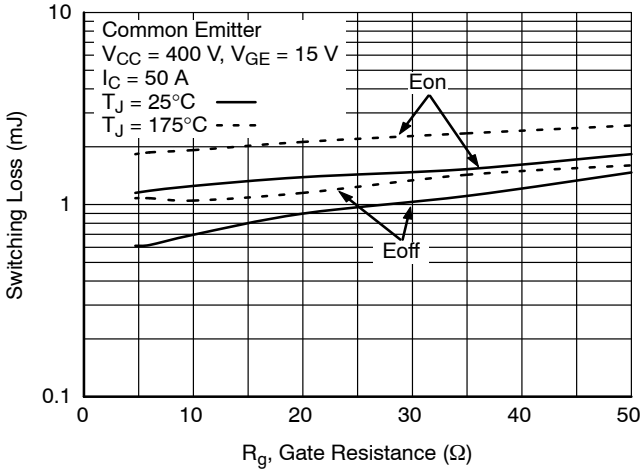


Figure 13. Switching Loss vs. Gate Resistance

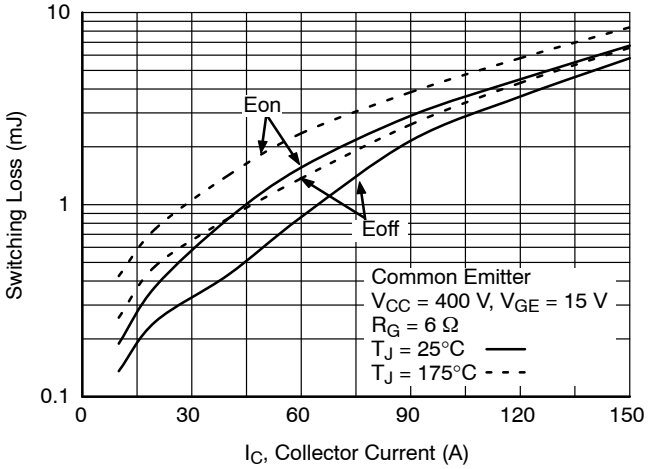


Figure 14. Switching Loss vs. Collector Current

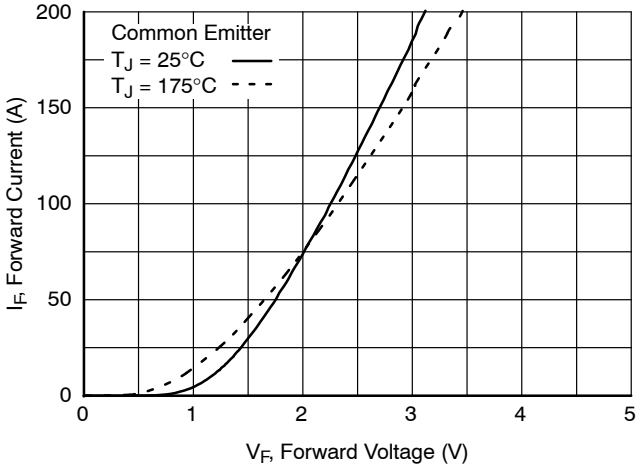


Figure 15. Forward Characteristics

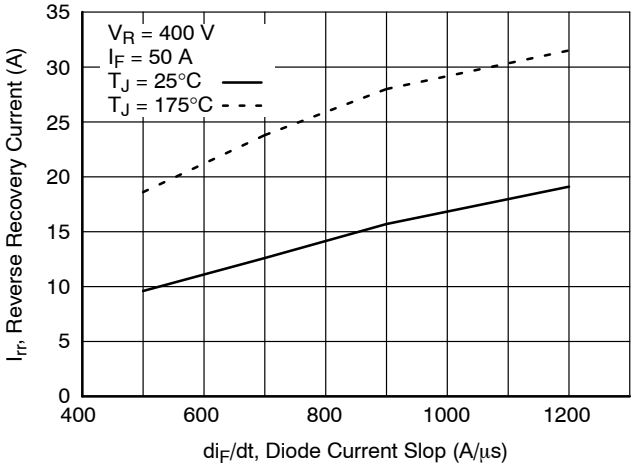


Figure 16. Reverse Recovery Current

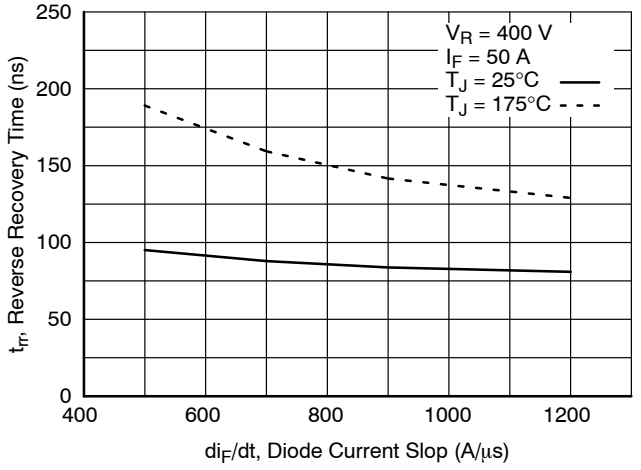


Figure 17. Reverse Recovery Time

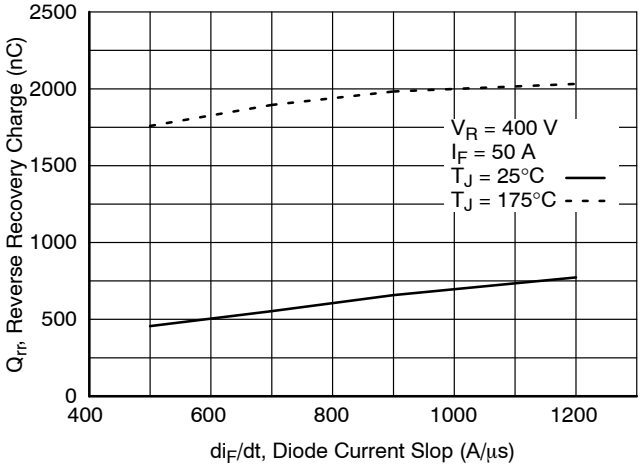


Figure 18. Stored Charge

TYPICAL CHARACTERISTICS (continued)

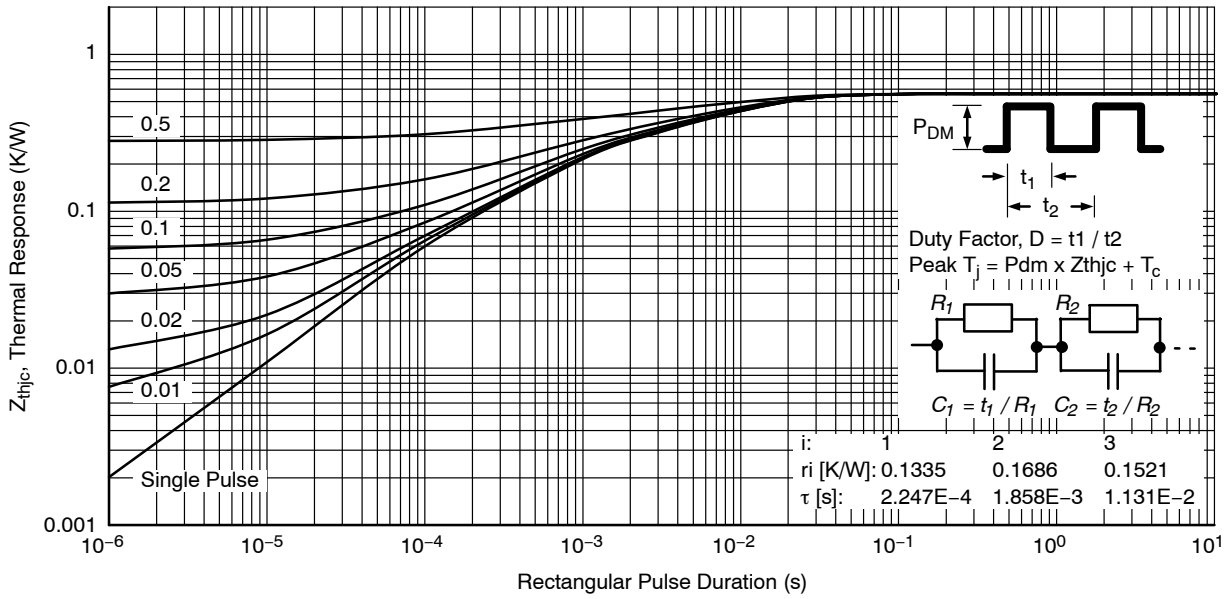


Figure 19. Transient Thermal Impedance of IGBT

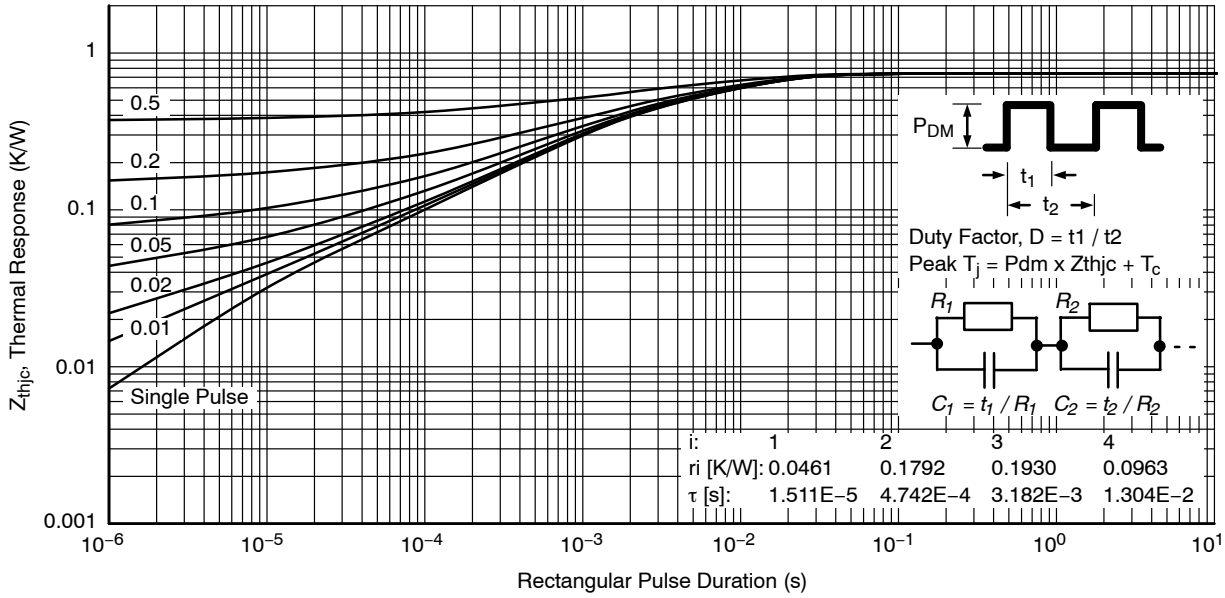
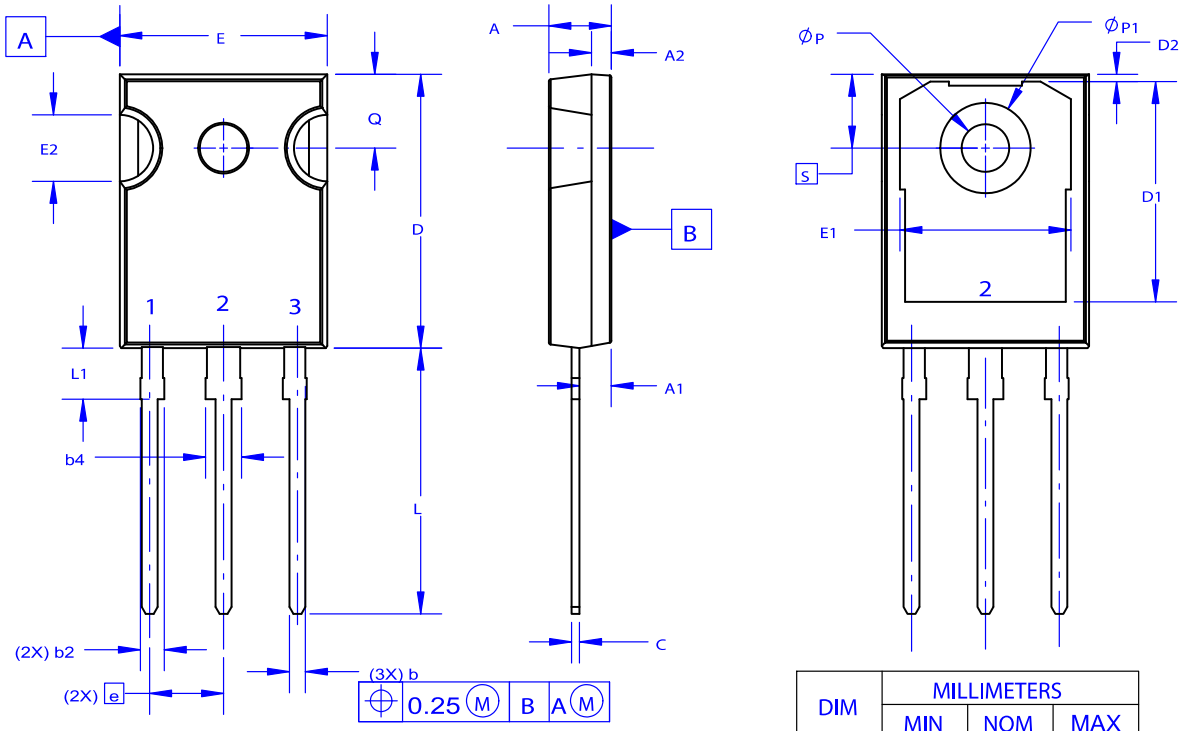


Figure 20. Transient Thermal Impedance of Diode

PACKAGE DIMENSIONS

TO−247−3LD
CASE 340CX
ISSUE A



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.

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
D	20.32	20.57	20.82
E	15.37	15.62	15.87
E2	4.96	5.08	5.20
e	~	5.56	~
L	19.75	20.00	20.25
L1	3.69	3.81	3.93
ØP	3.51	3.58	3.65
Q	5.34	5.46	5.58
S	5.34	5.46	5.58
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
D1	13.08	~	~
D2	0.51	0.93	1.35
E1	12.81	~	~
ØP1	6.60	6.80	7.00

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:
Email Requests to: orderlit@onsemi.com

ON Semiconductor 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

◊

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.