RGTH00TK65D

650V 50A Field Stop Trench IGBT Data Sheet

V_{CES}	650V
$I_{C(100°C)}$	21A
$V_{CE(sat)}$ (Typ.)	1.6V@I_C=50A
P_D	72W

●Outline

TO-3PFM



(1)(2)(3)

●Features

1) Low Collector - Emitter Saturation Voltage

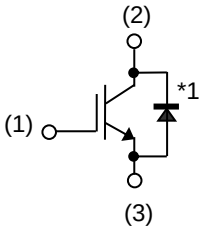
2) High Speed Switching

3) Low Switching Loss & Soft Switching

4) Built in Very Fast & Soft Recovery FRD
(RFN - Series)

5) Pb - free Lead Plating ; RoHS Compliant

●Inner Circuit



(1) Gate
(2) Collector
(3) Emitter

*1 Built in FRD

●Applications

PFC

UPS

Power Conditioner

IH

●Packaging Specifications

Type	Packaging	Tube
	Reel Size (mm)	-
	Tape Width (mm)	-
	Basic Ordering Unit (pcs)	450
	Packing Code	C11
	Marking	RGTH00TK65D

●Absolute Maximum Ratings (at T_C = 25°C unless otherwise specified)

Parameter		Symbol	Value	Unit
Collector - Emitter Voltage		V_{CES}	650	V
Gate - Emitter Voltage		V_{GES}	±30	V
Collector Current	T_C = 25°C	I_C	35	A
	T_C = 100°C	I_C	21	A
Pulsed Collector Current		I_{CP} *1	200	A
Diode Forward Current	T_C = 25°C	I_F	34	A
	T_C = 100°C	I_F	19	A
Diode Pulsed Forward Current		I_{FP} *1	200	A
Power Dissipation	T_C = 25°C	P_D	72	W
	T_C = 100°C	P_D	36	W
Operating Junction Temperature		T_j	−40 to +175	°C
Storage Temperature		T_{stg}	−55 to +175	°C

*1 Pulse width limited by $T_{jmax.}$

© 2016 ROHM Co., Ltd. All rights reserved.

●Thermal Resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal Resistance IGBT Junction - Case	$R_{\theta(j-c)}$	-	-	2.07	°C/W
Thermal Resistance Diode Junction - Case	$R_{\theta(j-c)}$	-	-	3.09	°C/W

●IGBT Electrical Characteristics (at T_j = 25°C unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Collector - Emitter Breakdown Voltage	BV_{CES}	I_C = 10μA, V_{GE} = 0V	650	-	-	V
Collector Cut - off Current	I_{CES}	V_{CE} = 650V, V_{GE} = 0V	-	-	10	μA
Gate - Emitter Leakage Current	I_{GES}	V_{GE} = ±30V, V_{CE} = 0V	-	-	±200	nA
Gate - Emitter Threshold Voltage	$V_{GE(th)}$	V_{CE} = 5V, I_C = 34.7mA	4.5	5.5	6.5	V
Collector - Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 50A, V_{GE} = 15V				V
		T_j = 25°C	-	1.6	2.1	
		T_j = 175°C	-	2.1	-	

© 2016 ROHM Co., Ltd. All rights reserved.

●**IGBT Electrical Characteristics** (at T_j = 25°C unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input Capacitance	C_{ies}	V_{CE} = 30V	-	2740	-	pF
Output Capacitance	C_{oes}	V_{GE} = 0V	-	106	-	
Reverse Transfer Capacitance	C_{res}	f = 1MHz	-	43	-	
Total Gate Charge	Q_g	V_{CE} = 300V	-	94	-	nC
Gate - Emitter Charge	Q_{ge}	I_C = 50A	-	22	-	
Gate - Collector Charge	Q_{gc}	V_{GE} = 15V	-	31	-	
Turn - on Delay Time	$t_{d(on)}$	I_C = 50A, V_{CC} = 400V	-	39	-	ns
Rise Time	t_r	V_{GE} = 15V, R_G = 10Ω	-	63	-	
Turn - off Delay Time	$t_{d(off)}$	T_j = 25°C	-	143	-	
Fall Time	t_f	Inductive Load	-	50	-	
Turn - on Delay Time	$t_{d(on)}$	I_C = 50A, V_{CC} = 400V	-	39	-	ns
Rise Time	t_r	V_{GE} = 15V, R_G = 10Ω	-	63	-	
Turn - off Delay Time	$t_{d(off)}$	T_j = 175°C	-	159	-	
Fall Time	t_f	Inductive Load	-	62	-	
Reverse Bias Safe Operating Area	RBSOA	I_C = 200A, V_{CC} = 520V V_P = 650V, V_{GE} = 15V R_G = 60Ω, T_j = 175°C	FULL SQUARE			-

© 2016 ROHM Co., Ltd. All rights reserved.

●**IGBT Electrical Characteristics** (at T_j = 25°C unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_F	I_F = 30A T_j = 25°C T_j = 175°C	- -	1.45 1.25	2.0 -	V
Diode Reverse Recovery Time	t_{rr}	I_F = 30A V_{CC} = 400V di_F/dt = 200A/μs T_j = 25°C	-	54	-	ns
Diode Peak Reverse Recovery Current	I_{rr}		-	7.4	-	A
Diode Reverse Recovery Charge	Q_{rr}		-	0.22	-	μC
Diode Reverse Recovery Time	t_{rr}	I_F = 30A V_{CC} = 400V di_F/dt = 200A/μs T_j = 175°C	-	225	-	ns
Diode Peak Reverse Recovery Current	I_{rr}		-	12.8	-	A
Diode Reverse Recovery Charge	Q_{rr}		-	1.60	-	μC

© 2016 ROHM Co., Ltd. All rights reserved.

●Electrical Characteristic Curves

Fig.1 Power Dissipation vs. Case Temperature

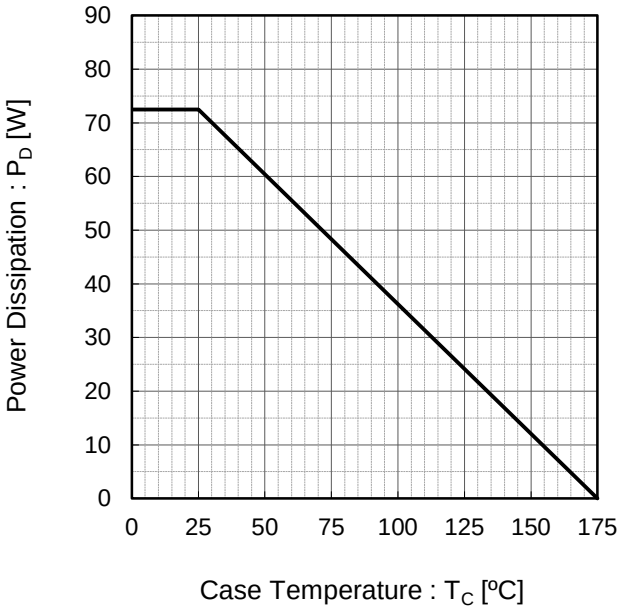


Fig.2 Collector Current vs. Case Temperature

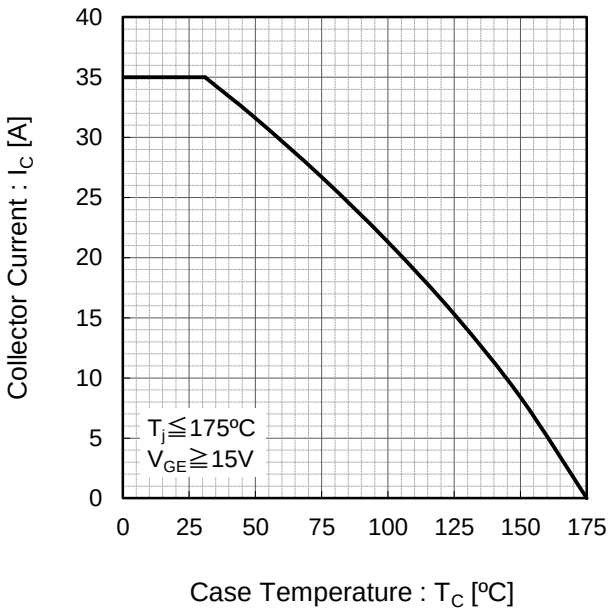


Fig.3 Forward Bias Safe Operating Area

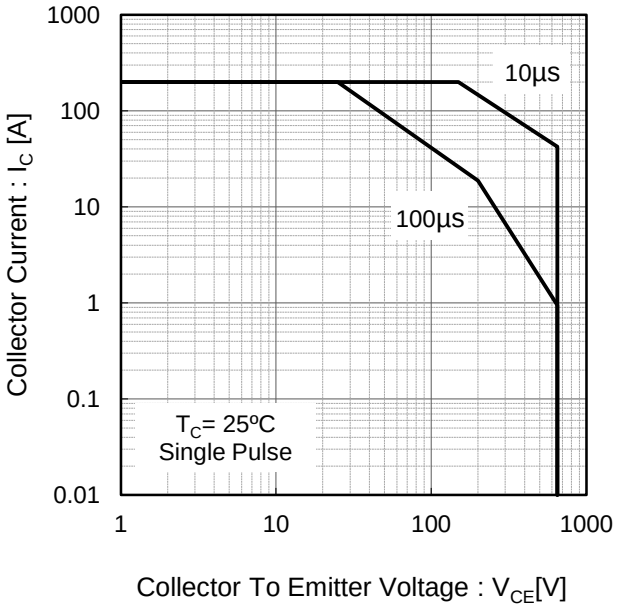
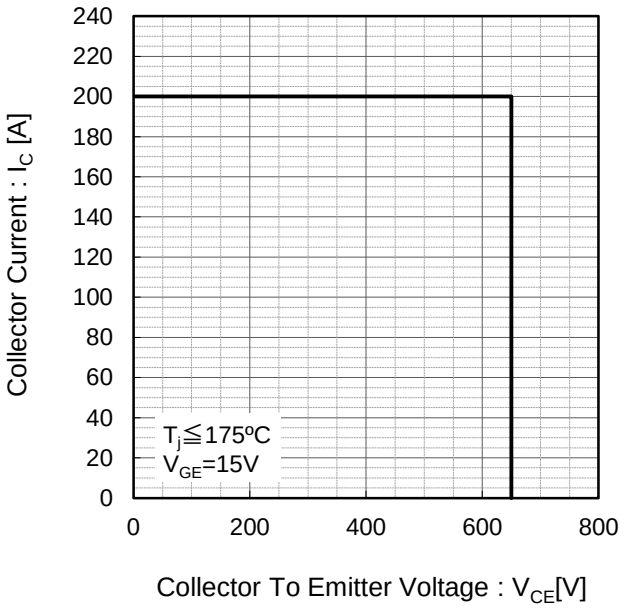


Fig.4 Reverse Bias Safe Operating Area



© 2016 ROHM Co., Ltd. All rights reserved.

●Electrical Characteristic Curves

Fig.5 Typical Output Characteristics

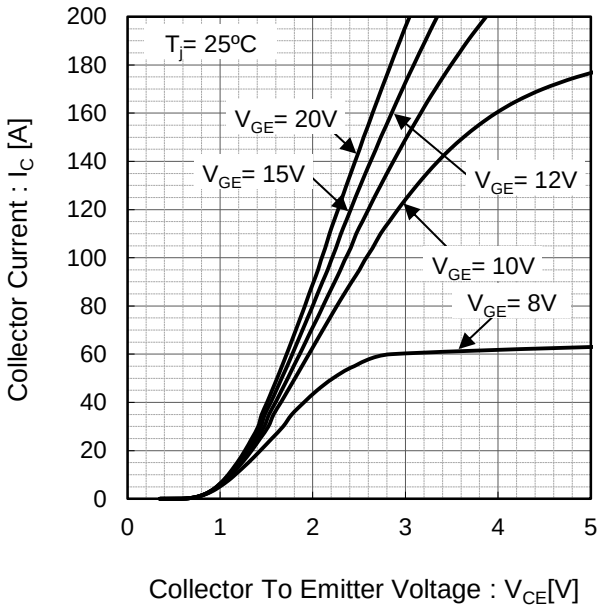


Fig.6 Typical Output Characteristics

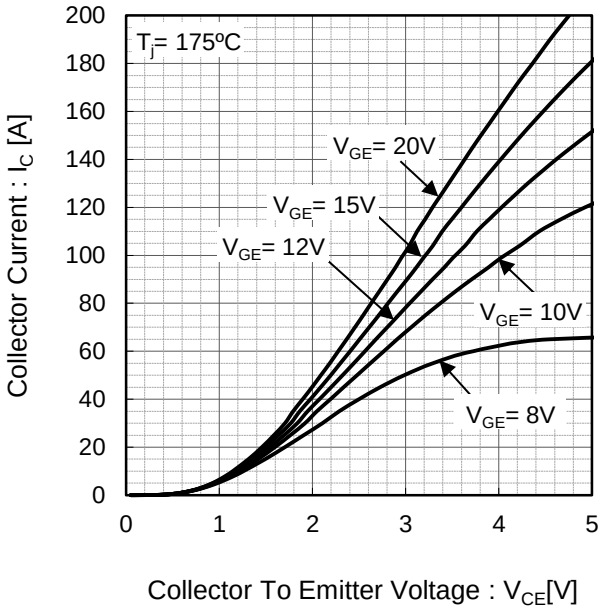


Fig.7 Typical Transfer Characteristics

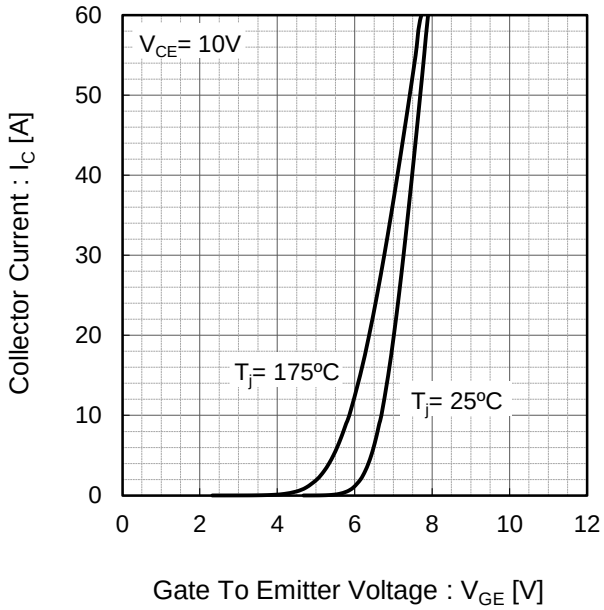
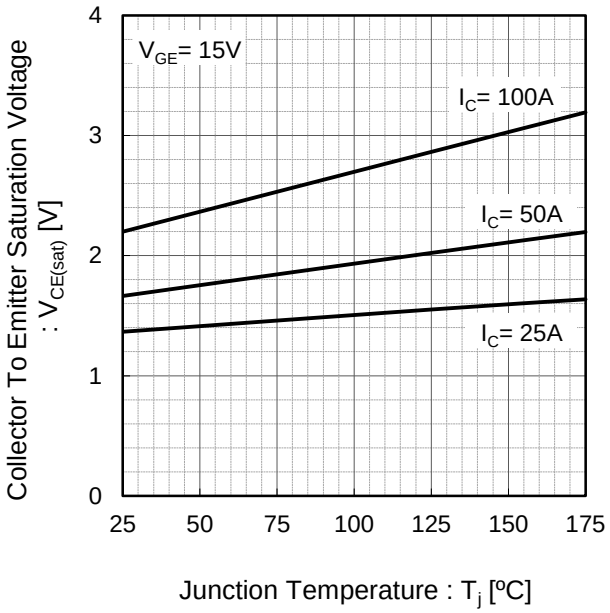


Fig.8 Typical Collector To Emitter Saturation Voltage vs. Junction Temperature



© 2016 ROHM Co., Ltd. All rights reserved.

●Electrical Characteristic Curves

Fig.9 Typical Collector To Emitter Saturation Voltage vs. Gate To Emitter Voltage

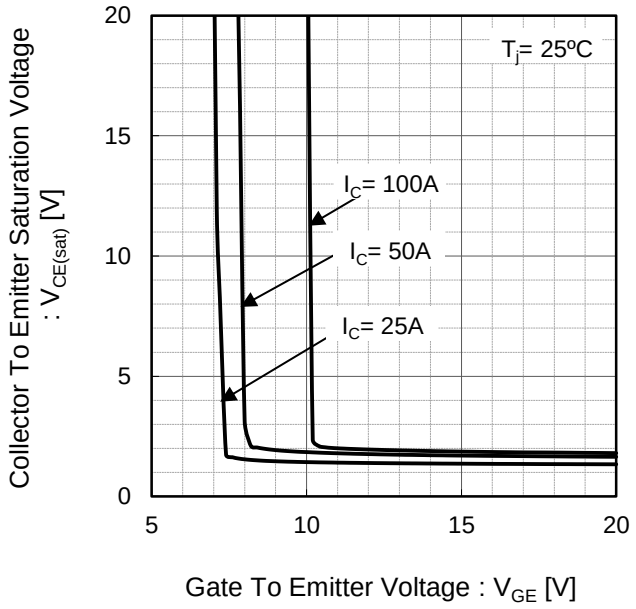


Fig.10 Typical Collector To Emitter Saturation Voltage vs. Gate To Emitter Voltage

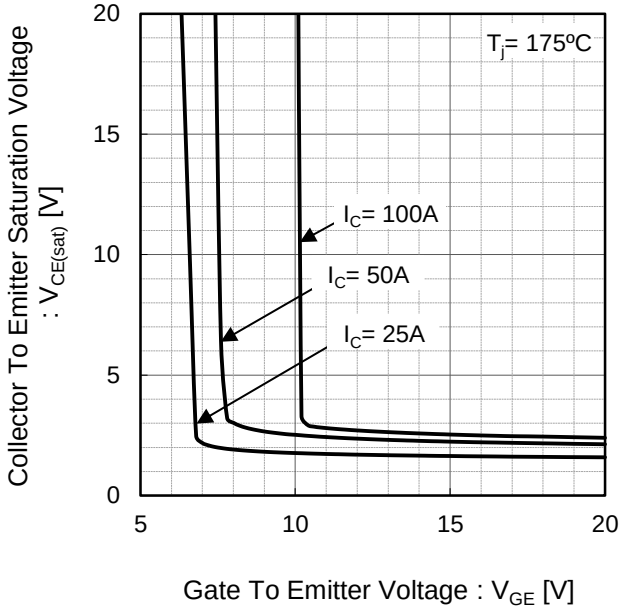


Fig.11 Typical Switching Time vs. Collector Current

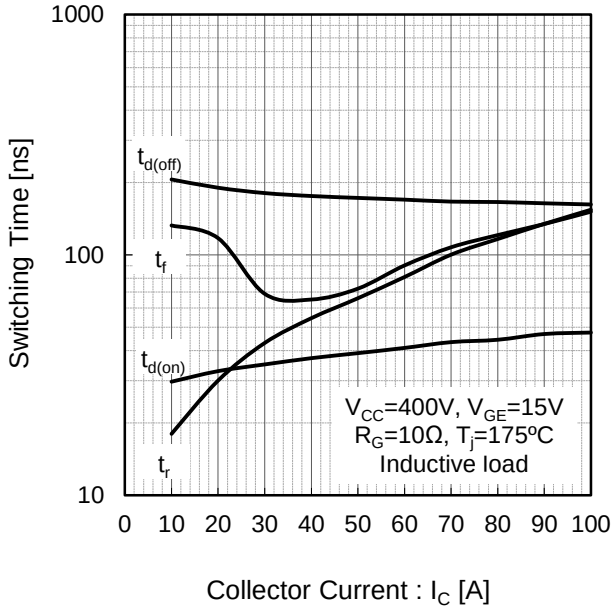
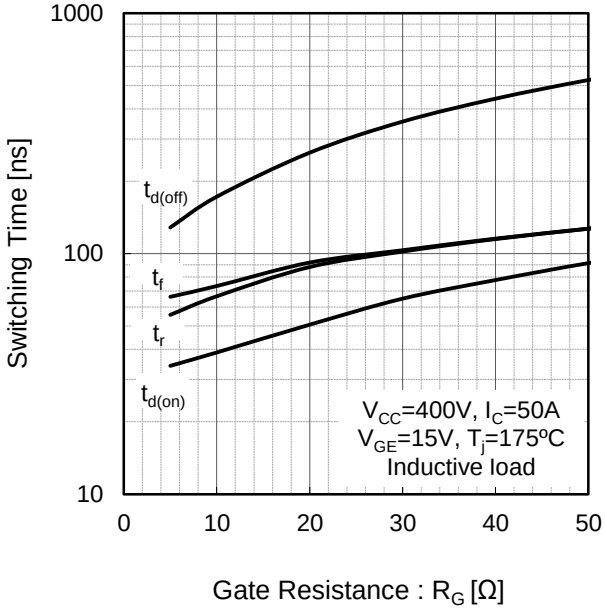


Fig.12 Typical Switching Time vs. Gate Resistance



© 2016 ROHM Co., Ltd. All rights reserved.

●Electrical Characteristic Curves

Fig.13 Typical Switching Energy Losses vs. Collector Current

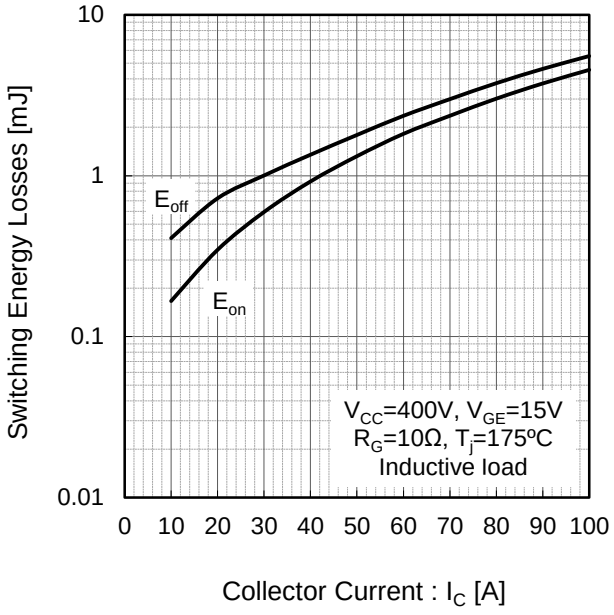


Fig.14 Typical Switching Energy Losses vs. Gate Resistance

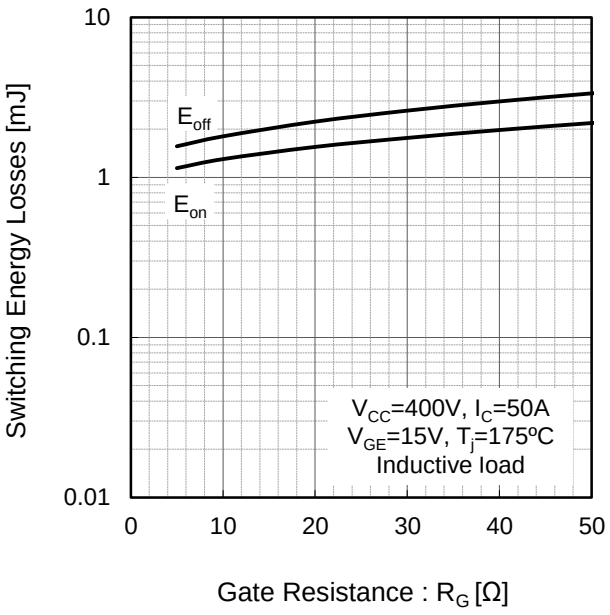


Fig.15 Typical Capacitance vs. Collector To Emitter Voltage

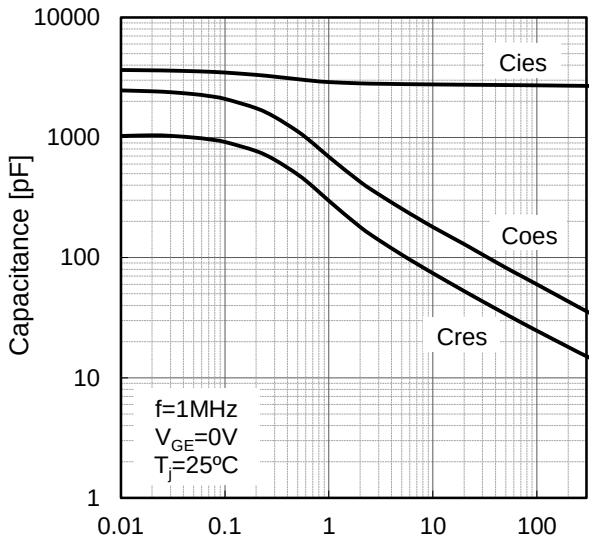
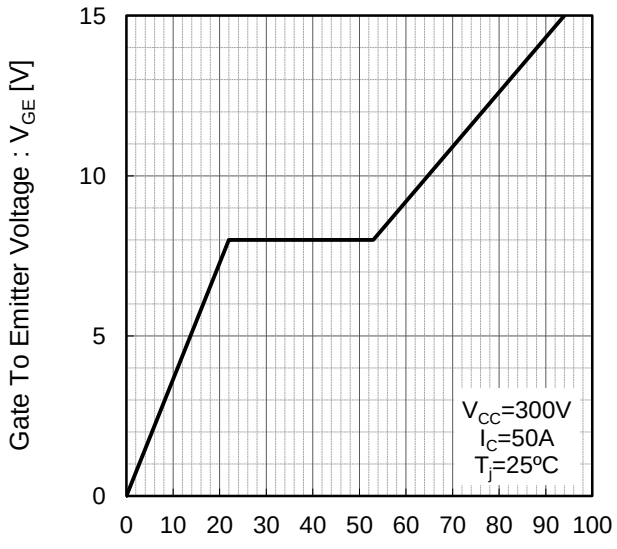


Fig.16 Typical Gate Charge



© 2016 ROHM Co., Ltd. All rights reserved.

●Electrical Characteristic Curves

Fig.17 Typical Diode Forward Current vs. Forward Voltage

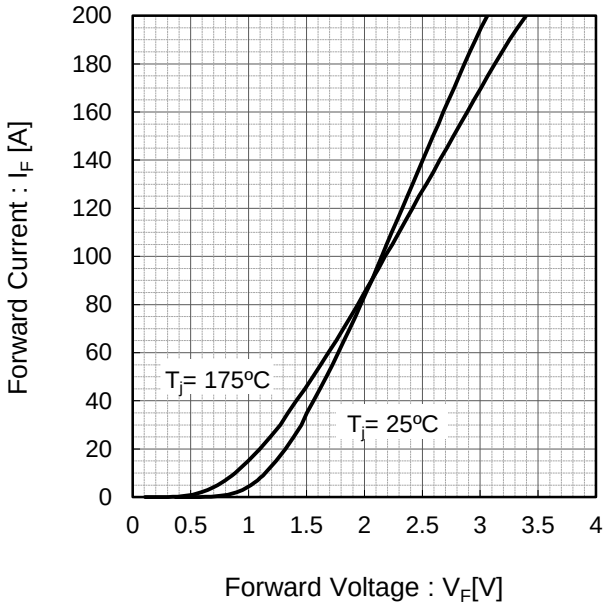


Fig.18 Typical Diode Reverse Recovery Time vs. Forward Current

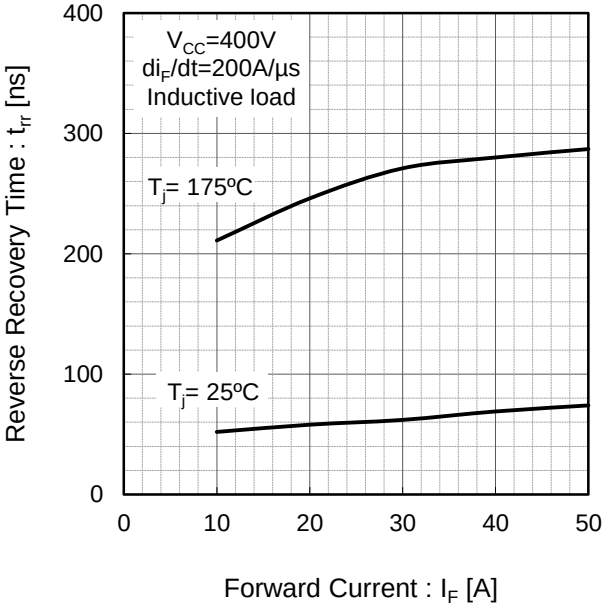


Fig.19 Typical Diode Reverse Recovery Current vs. Forward Current

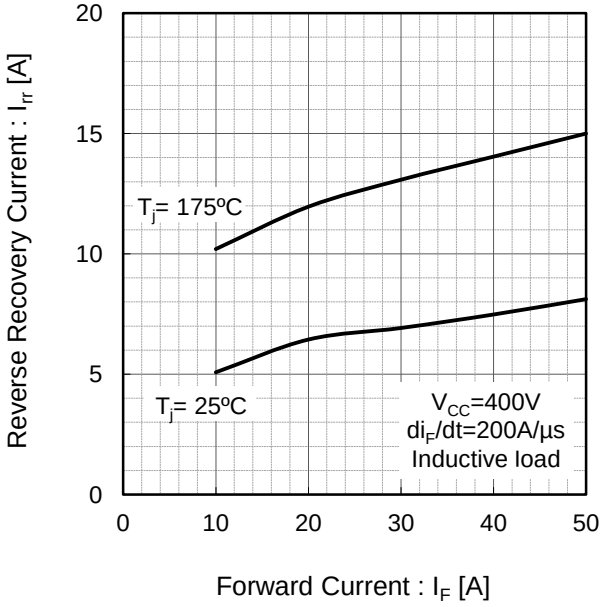
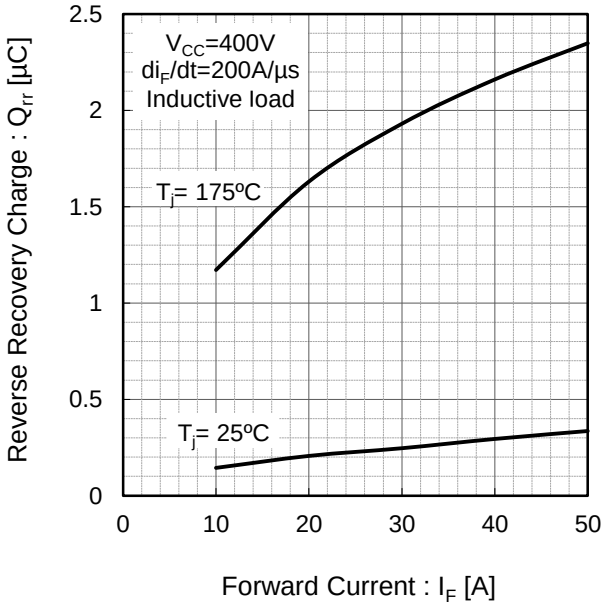


Fig.20 Typical Diode Reverse Recovery Charge vs. Forward Current



© 2016 ROHM Co., Ltd. All rights reserved.

●Electrical Characteristic Curves

Fig.21 IGBT Transient Thermal Impedance

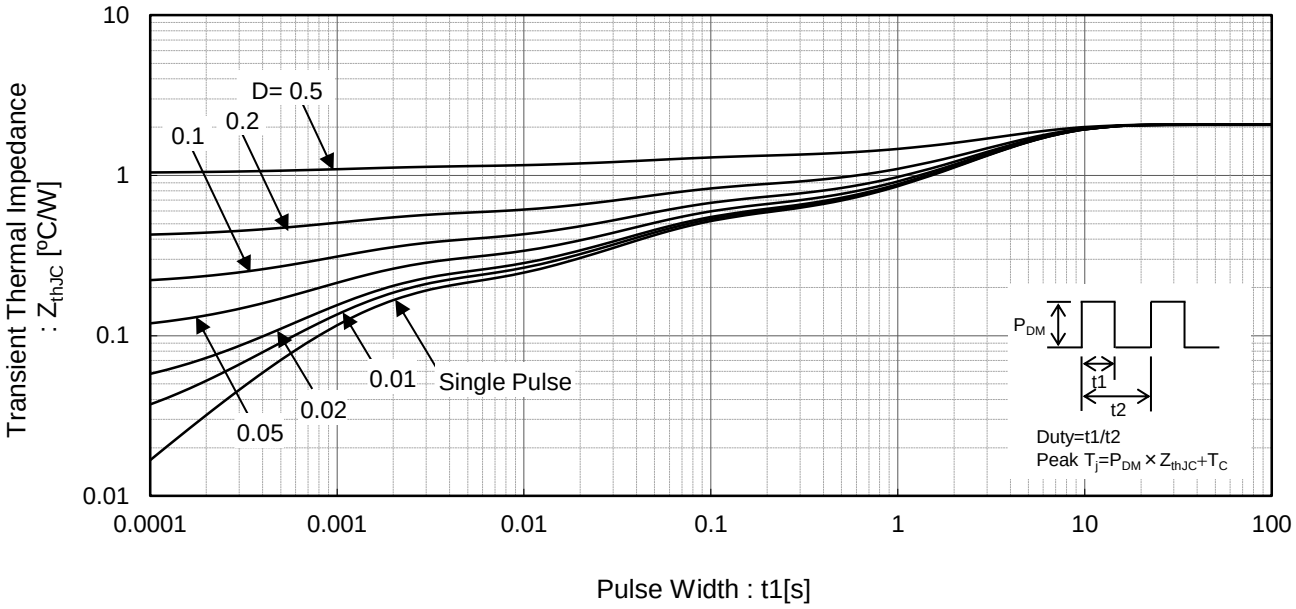
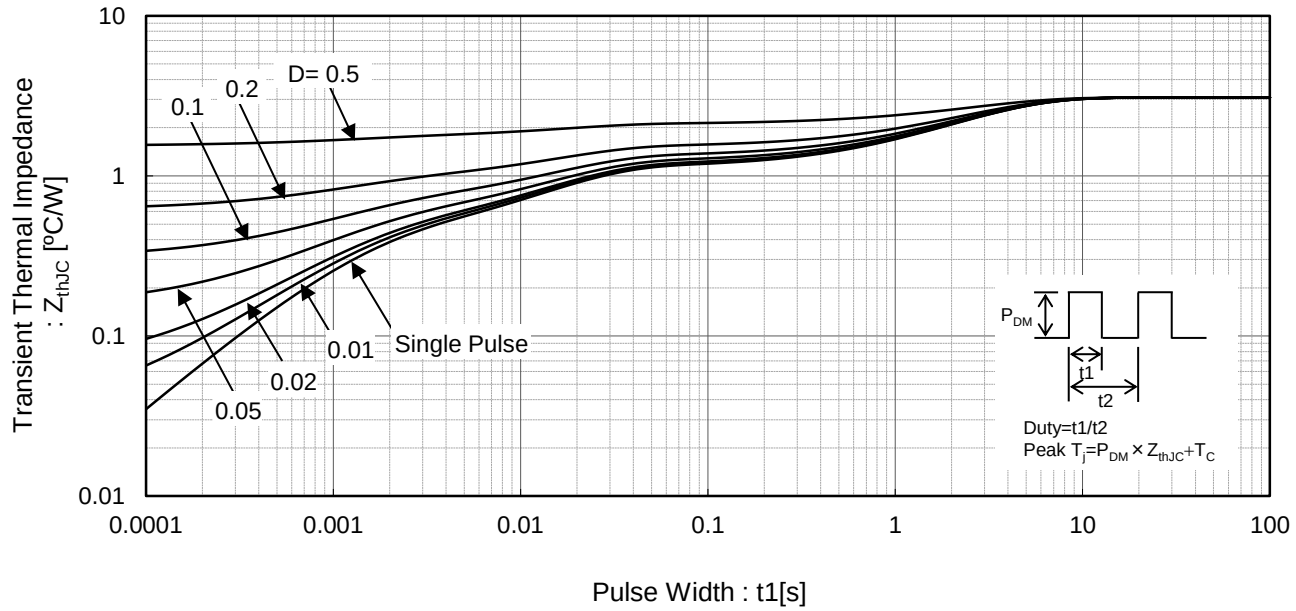


Fig.22 Diode Transient Thermal Impedance



© 2016 ROHM Co., Ltd. All rights reserved.

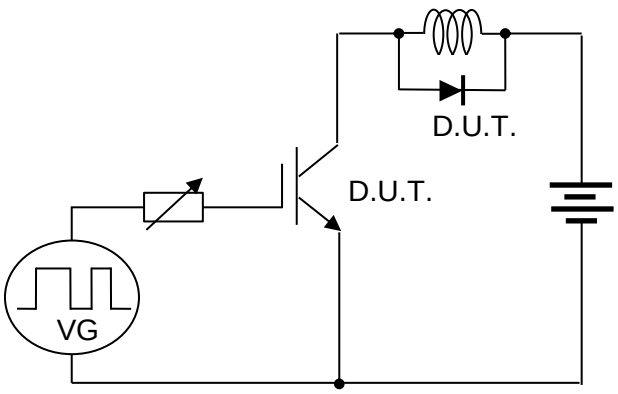


Fig.23 Inductive Load Circuit

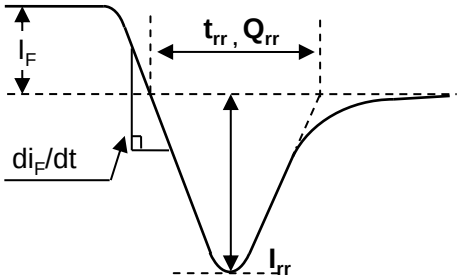


Fig.25 Diode Reverce Recovery Waveform

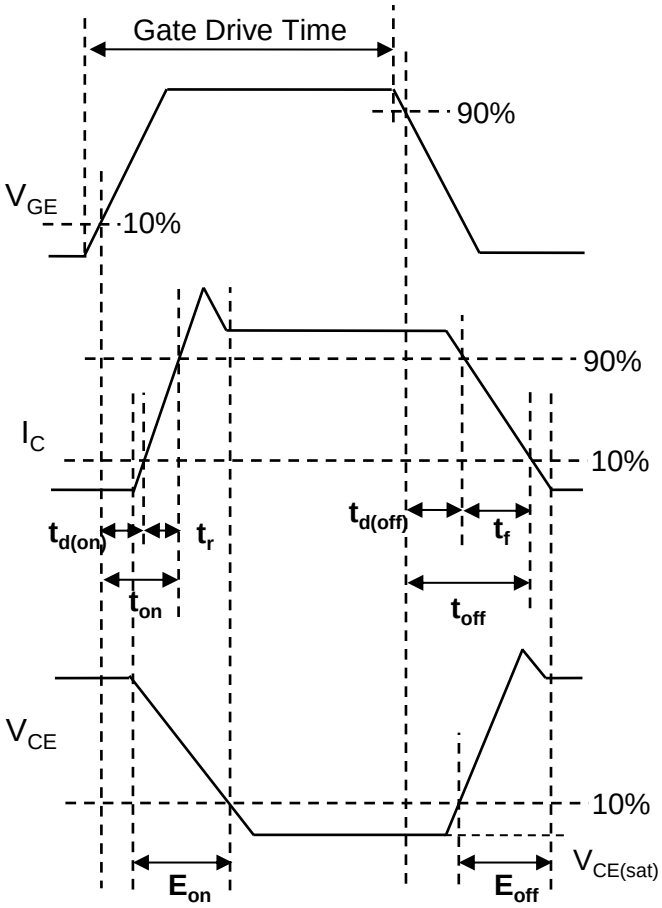


Fig.24 Inductive Load Waveform

© 2016 ROHM Co., Ltd. All rights reserved.

Notes

1) The information contained herein is subject to change without notice.

2) Before you use our Products, please contact our sales representative and verify the latest specifications :

3) Although ROHM is continuously working to improve product reliability and quality, semiconductors can break down and malfunction due to various factors.
Therefore, in order to prevent personal injury or fire arising from failure, please take safety measures such as complying with the derating characteristics, implementing redundant and fire prevention designs, and utilizing backups and fail-safe procedures. ROHM shall have no responsibility for any damages arising out of the use of our Poducts beyond the rating specified by ROHM.

4) Examples of application circuits, circuit constants and any other information contained herein are provided only to illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

5) The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM or any other parties. ROHM shall have no responsibility whatsoever for any dispute arising out of the use of such technical information.

6) The Products are intended for use in general electronic equipment (i.e. AV/OA devices, communication, consumer systems, gaming/entertainment sets) as well as the applications indicated in this document.

7) The Products specified in this document are not designed to be radiation tolerant.

8) For use of our Products in applications requiring a high degree of reliability (as exemplified below), please contact and consult with a ROHM representative : transportation equipment (i.e. cars, ships, trains), primary communication equipment, traffic lights, fire/crime prevention, safety equipment, medical systems, servers, solar cells, and power transmission systems.

9) Do not use our Products in applications requiring extremely high reliability, such as aerospace equipment, nuclear power control systems, and submarine repeaters.

10) ROHM shall have no responsibility for any damages or injury arising from non-compliance with the recommended usage conditions and specifications contained herein.

11) ROHM has used reasonable care to ensur the accuracy of the information contained in this document. However, ROHM does not warrants that such information is error-free, and ROHM shall have no responsibility for any damages arising from any inaccuracy or misprint of such information.

12) Please use the Products in accordance with any applicable environmental laws and regulations, such as the RoHS Directive. For more details, including RoHS compatibility, please contact a ROHM sales office. ROHM shall have no responsibility for any damages or losses resulting non-compliance with any applicable laws or regulations.

13) When providing our Products and technologies contained in this document to other countries, you must abide by the procedures and provisions stipulated in all applicable export laws and regulations, including without limitation the US Export Administration Regulations and the Foreign Exchange and Foreign Trade Act.

14) This document, in part or in whole, may not be reprinted or reproduced without prior consent of ROHM.

ROHM SEMICONDUCTOR

Thank you for your accessing to ROHM product informations.
More detail product informations and catalogs are available, please contact us.

ROHM Customer Support System

http://www.rohm.com/contact/

© 2016 ROHM Co., Ltd. All rights reserved.

RGTH00TK65D - Web Page

Part Number	RGTH00TK65D
Package	TO-3PFM
Unit Quantity	450
Minimum Package Quantity	450
Packing Type	Tube
Constitution Materials List	inquiry
RoHS	Yes