Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

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Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

RGW80TK65D

650V 40A Field Stop Trench IGBT Datasheet

V_{CES}	650V
$I_{C\ (100℃)}$	23A
$V_{CE(sat)}$ (Typ.)	1.5V@I_C=40A
P_D	81W

●Outline

TO-3PFM

(1)(2)(3)

●Features

1) Low Collector - Emitter Saturation Voltage

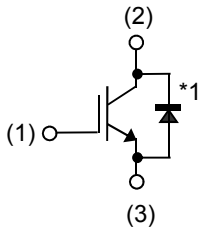
2) High Speed Switching

3) Low Switching Loss & Soft Switching

4) Built in Very Fast & Soft Recovery FRD

5) Pb - free Lead Plating ; RoHS Compliant

●Inner Circuit



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

*1 Built in FRD

●Applications

PFC

UPS

Welding

Solar Inverter

IH

●Packaging Specifications

Type	Packaging	Tube
	Reel Size (mm)	-
	Tape Width (mm)	-
	Basic Ordering Unit (pcs)	450
	Packing Code	C11
	Marking	RGW80TK65D

●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	39	A
	T_C = 100°C	I_C	23	A
Pulsed Collector Current		I_{CP} *1	160	A
Diode Forward Current	T_C = 25°C	I_F	27	A
	T_C = 100°C	I_F	16	A
Diode Pulsed Forward Current		I_{FP} *1	160	A
Power Dissipation	T_C = 25°C	P_D	81	W
	T_C = 100°C	P_D	40	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}.

●Thermal Resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal Resistance IGBT Junction - Case	$R_{\theta(j-c)}$	-	-	1.85	°C/W
Thermal Resistance Diode Junction - Case	$R_{\theta(j-c)}$	-	-	2.79	°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 = 26.0mA	5.0	6.0	7.0	V
Collector - Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 40A, V_{GE} = 15V				V
		T_j = 25°C	-	1.5	1.9	
		T_j = 175°C	-	1.85	-	

●**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	-	3320	-	pF
Output Capacitance	C_{oes}	V_{GE} = 0V	-	83	-	
Reverse Transfer Capacitance	C_{res}	f = 1MHz	-	60	-	
Total Gate Charge	Q_g	V_{CE} = 400V	-	110	-	nC
Gate - Emitter Charge	Q_{ge}	I_C = 40A	-	23	-	
Gate - Collector Charge	Q_{gc}	V_{GE} = 15V	-	41	-	
Turn - on Delay Time	$t_{d(on)}$	I_C = 40A, V_{CC} = 400V	-	44	-	ns
Rise Time	t_r	V_{GE} = 15V, R_G = 10Ω	-	17	-	
Turn - off Delay Time	$t_{d(off)}$	T_j = 25°C	-	143	-	
Fall Time	t_f	Inductive Load	-	34	-	
Turn - on Switching Loss	E_{on}	*E_{on} includes diode	-	0.76	-	mJ
Turn - off Switching Loss	E_{off}	reverse recovery	-	0.72	-	
Turn - on Delay Time	$t_{d(on)}$	I_C = 40A, V_{CC} = 400V	-	41	-	ns
Rise Time	t_r	V_{GE} = 15V, R_G = 10Ω	-	18	-	
Turn - off Delay Time	$t_{d(off)}$	T_j = 175°C	-	158	-	
Fall Time	t_f	Inductive Load	-	70	-	
Turn - on Switching Loss	E_{on}	*E_{on} includes diode	-	0.76	-	mJ
Turn - off Switching Loss	E_{off}	reverse recovery	-	0.91	-	
Reverse Bias Safe Operating Area	RBSOA	I_C = 160A, V_{CC} = 520V V_P = 650V, V_{GE} = 15V R_G = 100Ω, T_j = 175°C	FULL SQUARE			-

●**FRD 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 = 20A T_j = 25°C T_j = 175°C	- -	1.45 1.55	1.9 -	V
Diode Reverse Recovery Time	t_{rr}	I_F = 20A V_{CC} = 400V di_F/dt = 200A/μs T_j = 25°C	-	92	-	ns
Diode Peak Reverse Recovery Current	I_{rr}		-	6.7	-	A
Diode Reverse Recovery Charge	Q_{rr}		-	0.34	-	μC
Diode Reverse Recovery Energy	E_{rr}		-	14.1	-	μJ
Diode Reverse Recovery Time	t_{rr}	I_F = 20A V_{CC} = 400V di_F/dt = 200A/μs T_j = 175°C	-	123	-	ns
Diode Peak Reverse Recovery Current	I_{rr}		-	7.8	-	A
Diode Reverse Recovery Charge	Q_{rr}		-	0.59	-	μC
Diode Reverse Recovery Energy	E_{rr}		-	30.7	-	μJ

●Electrical Characteristic Curves

Fig.1 Power Dissipation vs. Case Temperature

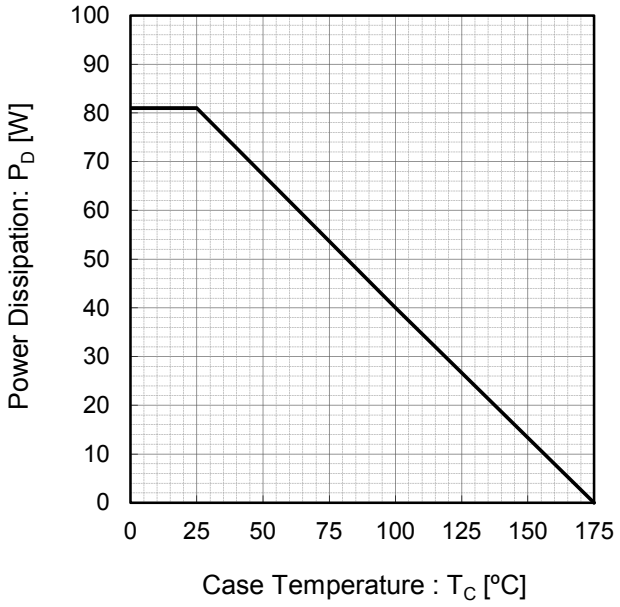


Fig.2 Collector Current vs. Case Temperature

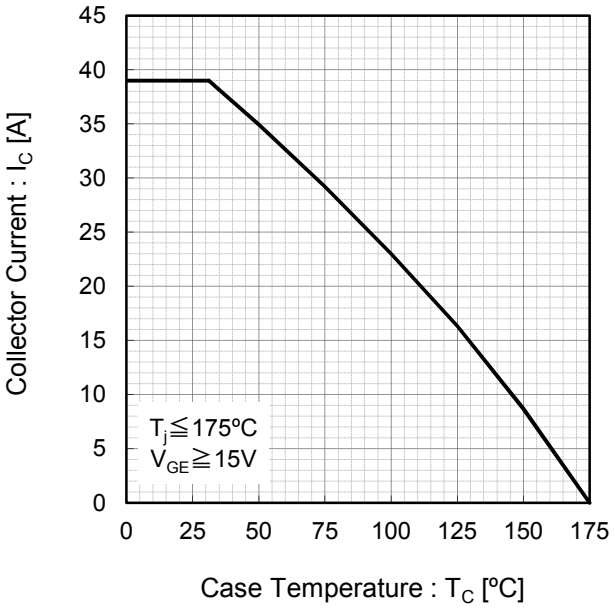


Fig.3 Forward Bias Safe Operating Area

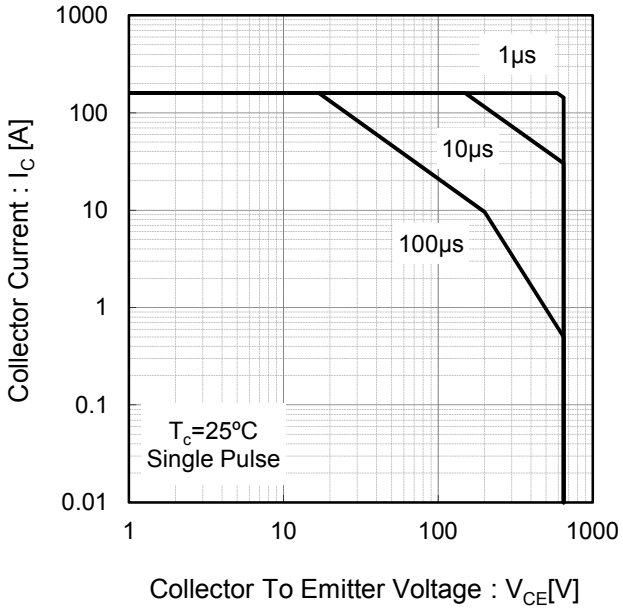
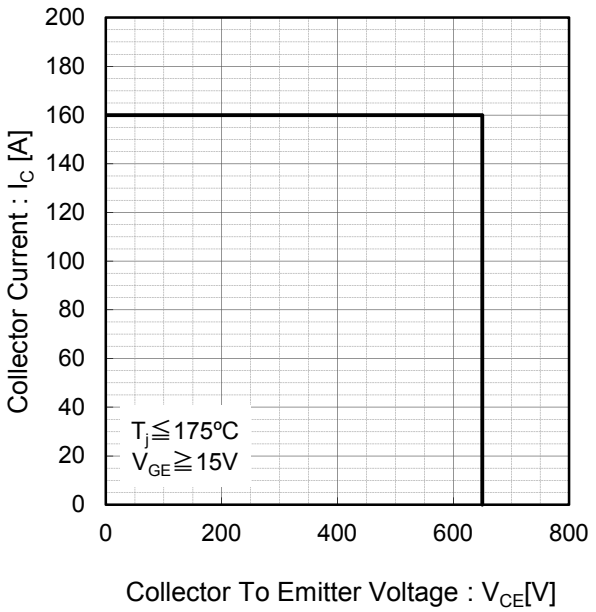


Fig.4 Reverse Bias Safe Operating Area



●Electrical Characteristic Curves

Fig.5 Typical Output Characteristics

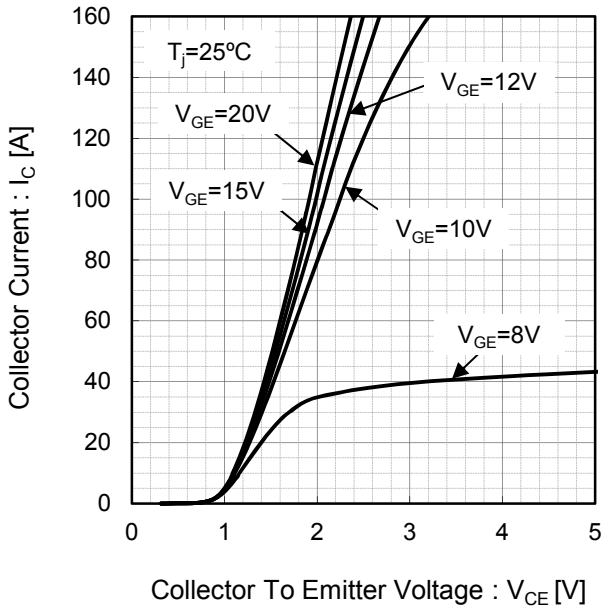


Fig.6 Typical Output Characteristics

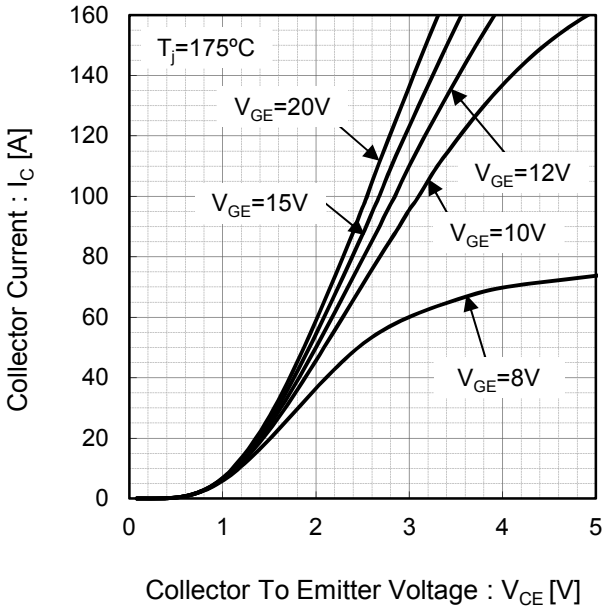


Fig.7 Typical Transfer Characteristics

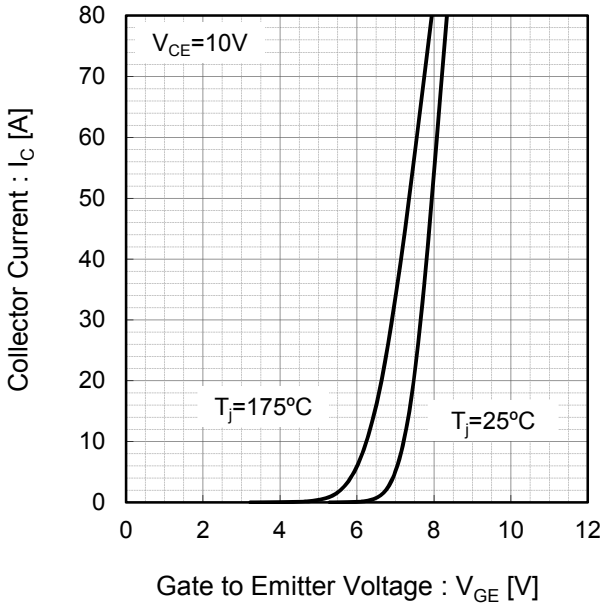
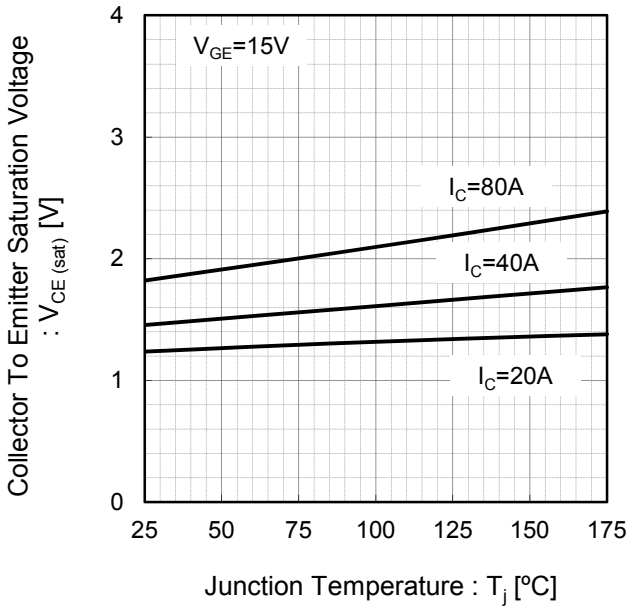


Fig.8 Typical Collector To Emitter Saturation Voltage vs. Junction Temperature



●Electrical Characteristic Curves

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

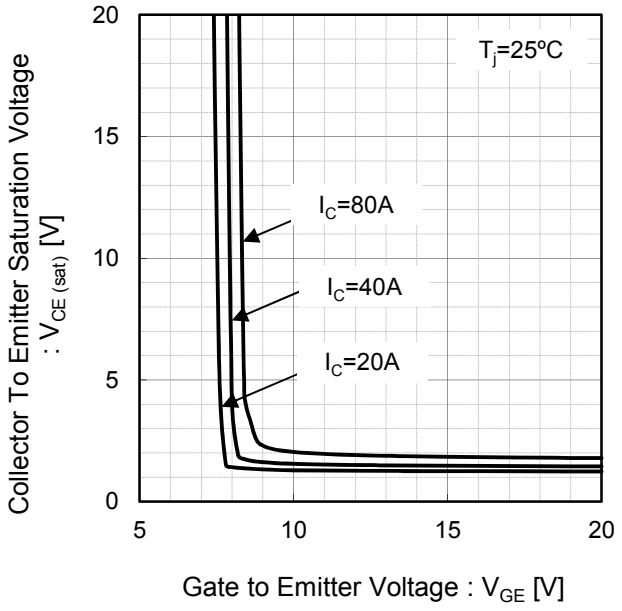


Fig.10 Typical Collector To Emitter Saturation Voltage vs. Gate To Emitter Voltage

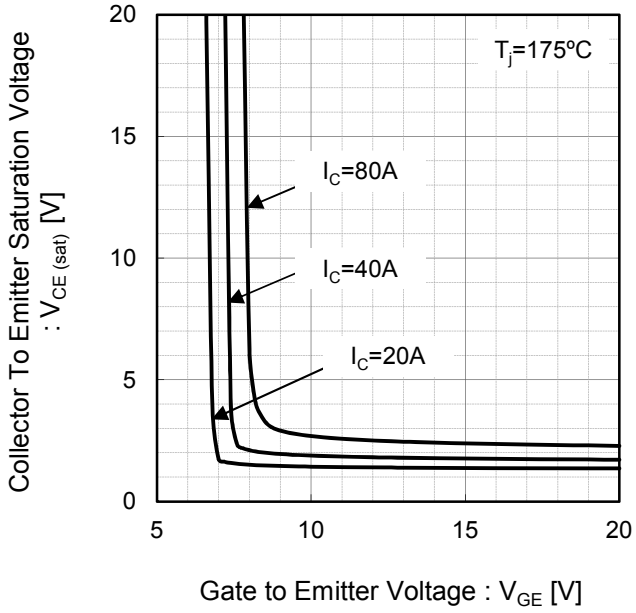


Fig.11 Typical Switching Time vs. Collector Current

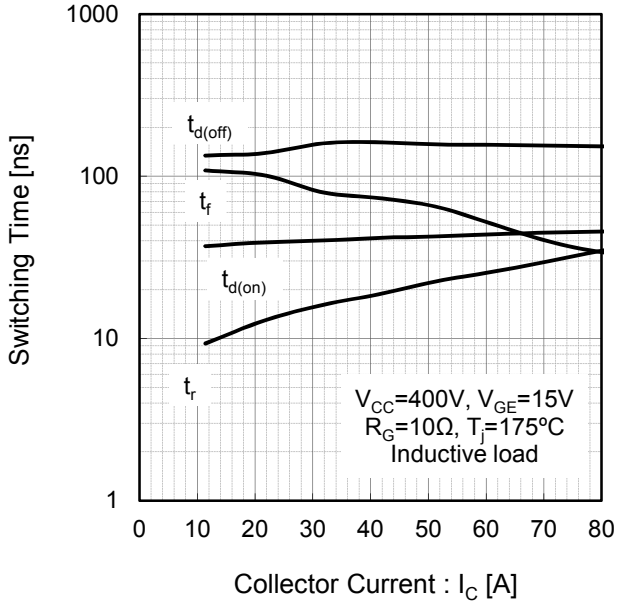
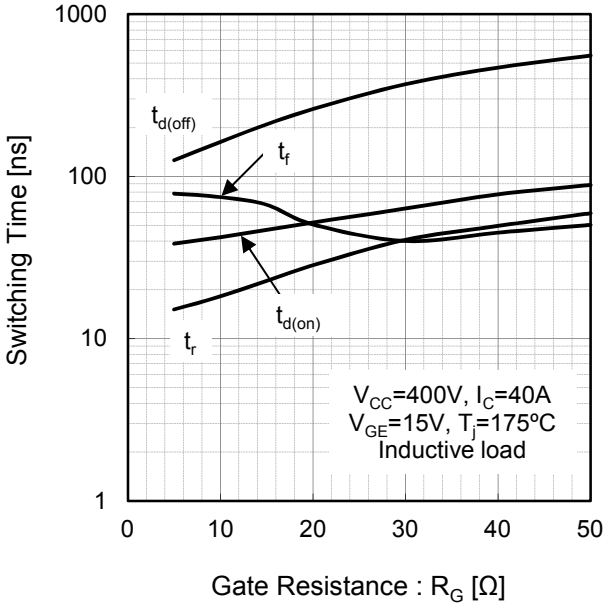


Fig.12 Typical Switching Time vs. Gate Resistance



●Electrical Characteristic Curves

Fig.13 Typical Switching Energy Losses vs. Collector Current

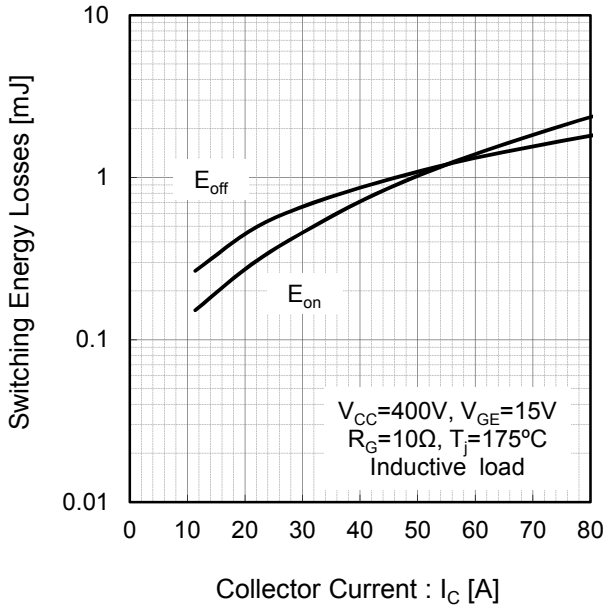


Fig.14 Typical Switching Energy Losses vs. Gate Resistance

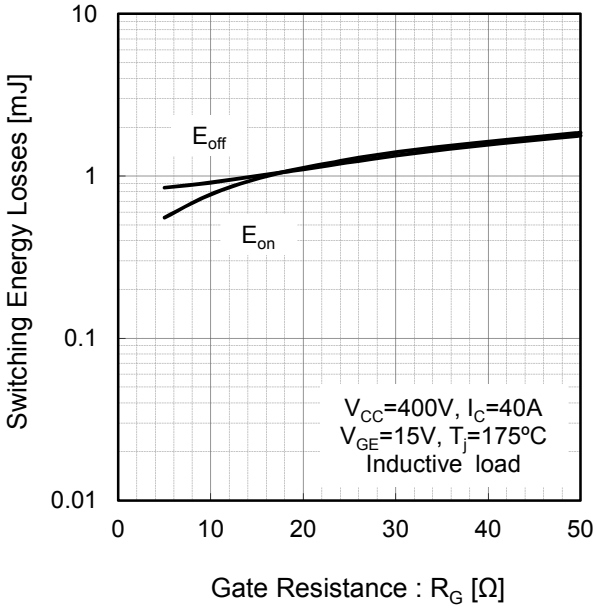


Fig.15 Typical Capacitance vs. Collector To Emitter Voltage

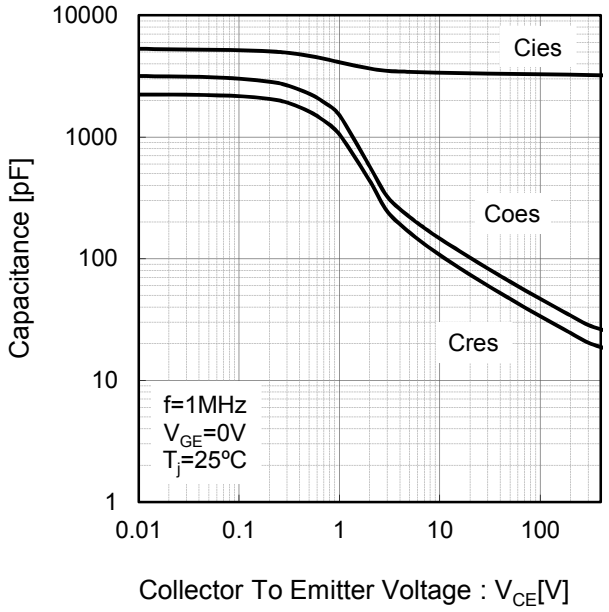
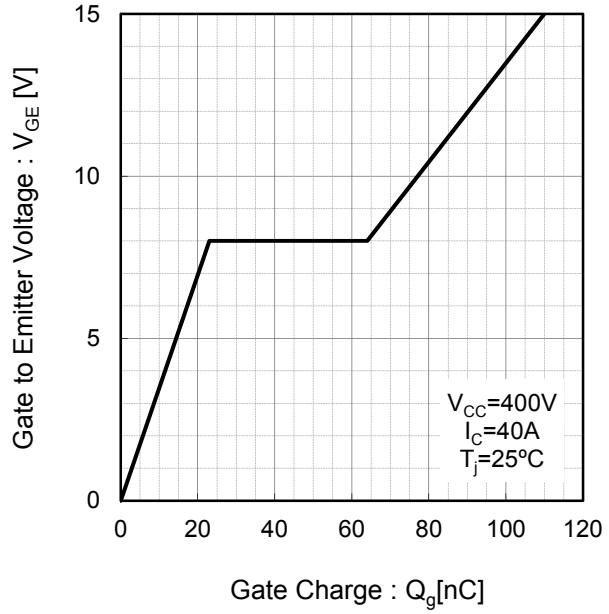


Fig.16 Typical Gate Charge



●Electrical Characteristic Curves

Fig.17 Typical Diode Forward Current vs. Forward Voltage

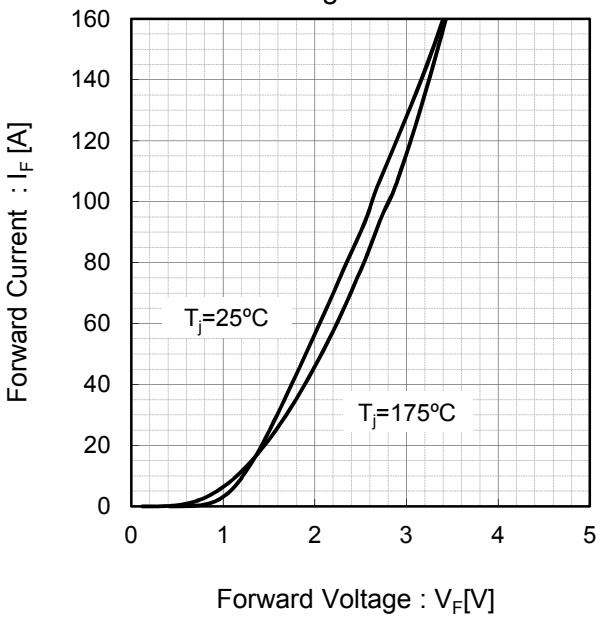


Fig.18 Typical Diode Reverse Recovery Time vs. Forward Current

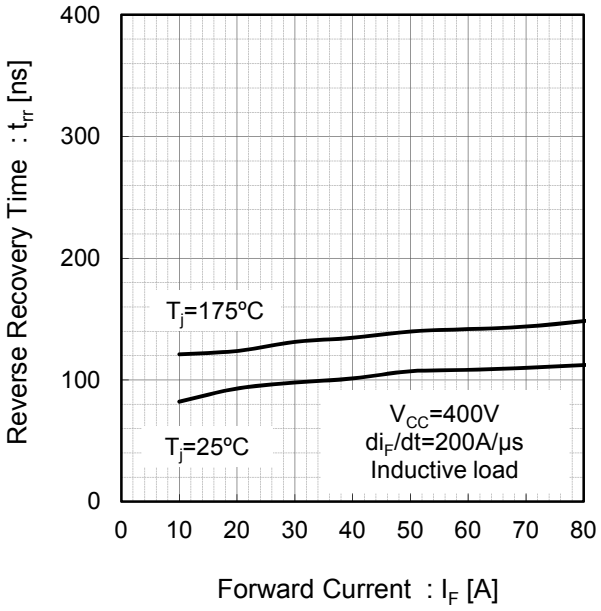


Fig.19 Typical Diode Reverse Recovery Current vs. Forward Current

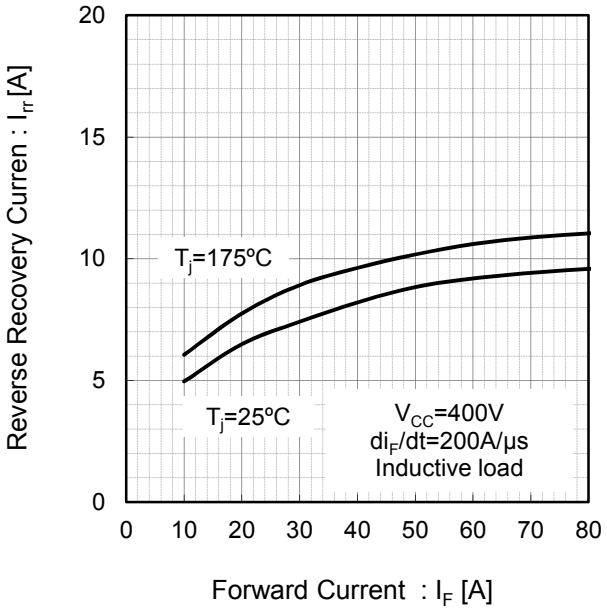
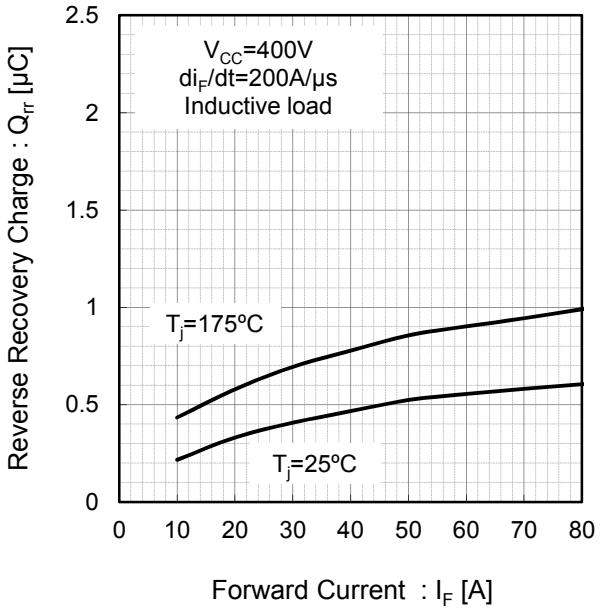
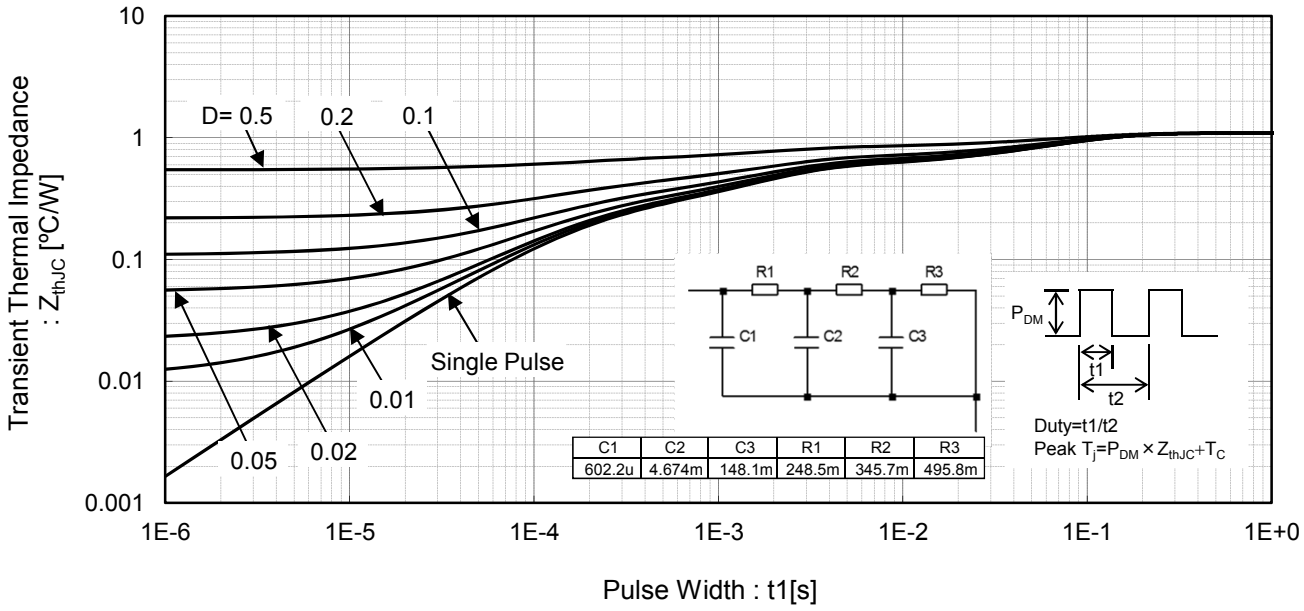


Fig.20 Typical Diode Reverse Recovery Charge



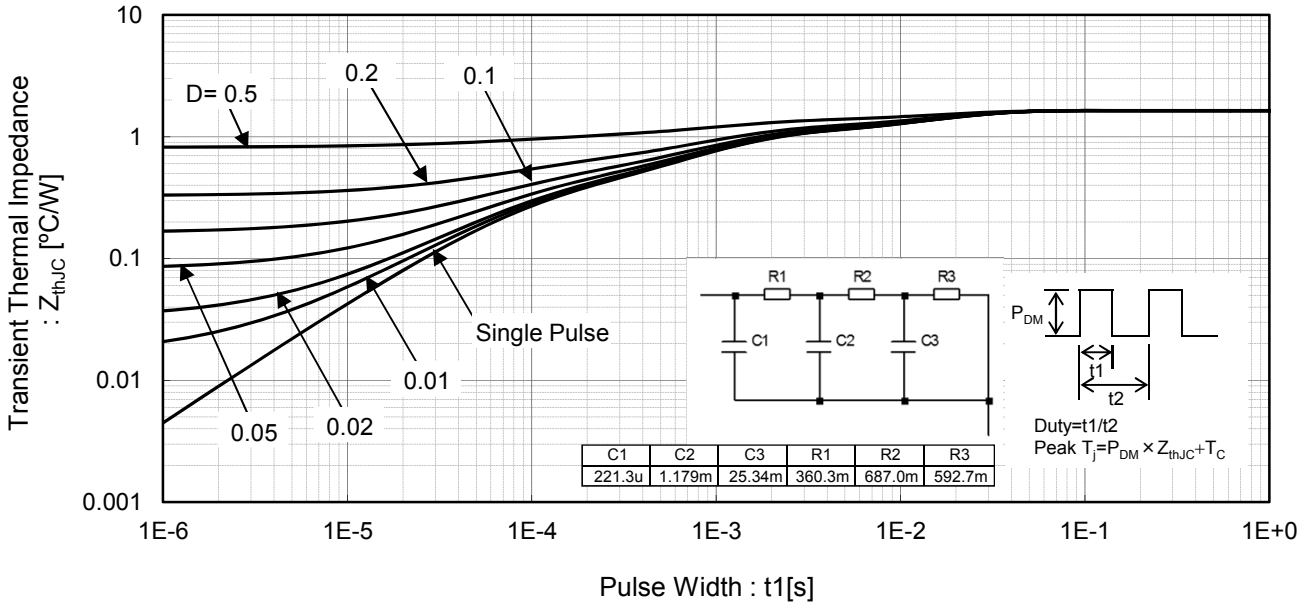
●Electrical Characteristic Curves

Fig.21 Typical IGBT Transient Thermal Impedance



C1	C2	C3	R1	R2	R3
602.2u	4.674m	148.1m	248.5m	345.7m	495.8m

Fig.22 Typical Diode Transient Thermal Impedance



C1	C2	C3	R1	R2	R3
221.3u	1.179m	25.34m	360.3m	687.0m	592.7m

●Inductive Load Switching Circuit and Waveform

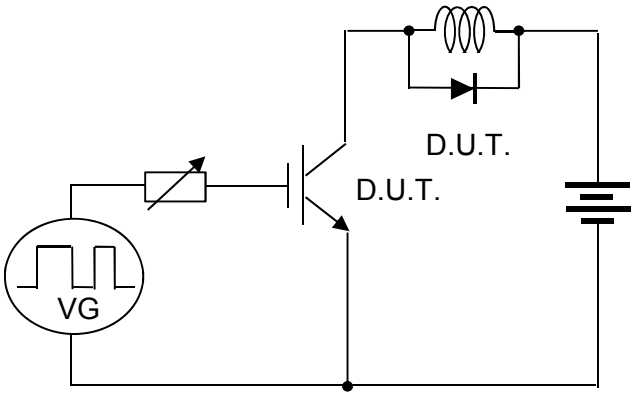


Fig.23 Inductive Load Circuit

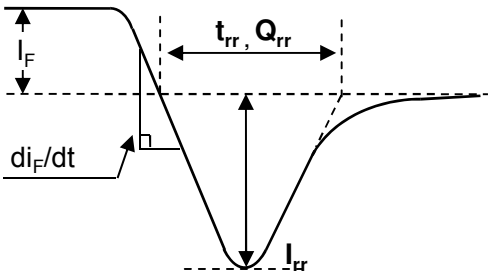


Fig.25 Diode Reverce Recovery Waveform

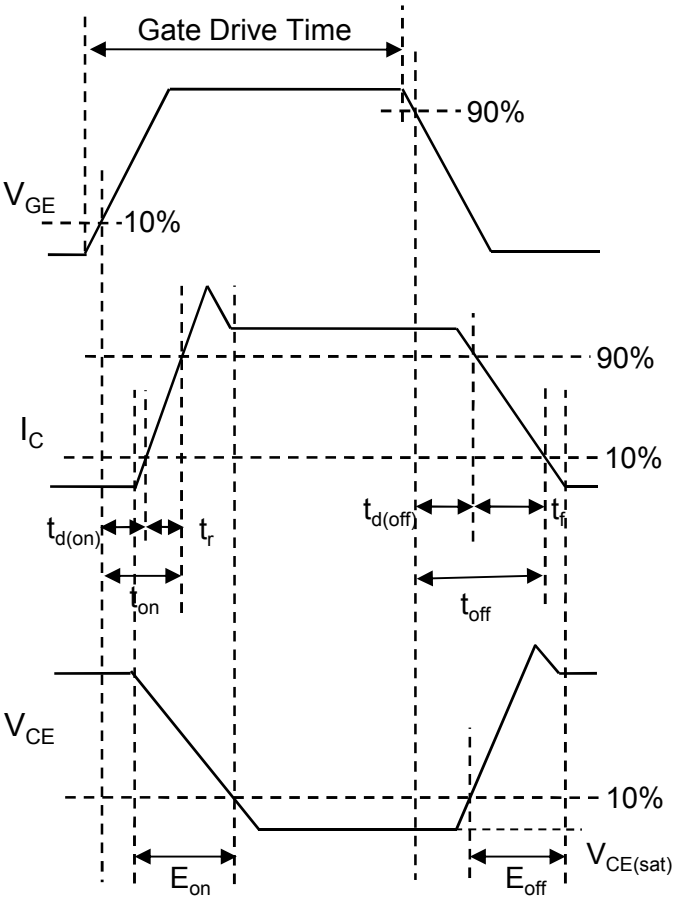


Fig.24 Inductive Load Waveform

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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.

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