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RGW60TK65GVC11

650V 30A Field Stop Trench IGBT Datasheet

V_{CES}	650V
$I_{C\ (100℃)}$	20A
$V_{CE(sat)\ (Typ.)}$	1.5V@I_C=30A
P_D	72W

●Outline

TO-3PFM



●Features

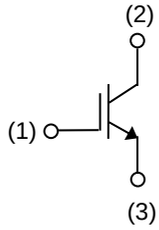
1) Low Collector - Emitter Saturation Voltage

2) High Speed Switching

3) Low Switching Loss & Soft Switching

4) Pb - free Lead Plating ; RoHS Compliant

●Inner Circuit



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

●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	RGW60TK65

●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} *1	±30	V
Collector Current	T_C = 25°C	I_C	33	A
	T_C = 100°C	I_C	20	A
Pulsed Collector Current		I_{CP} *2	120	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 Please be advised not to use IGBTs with V_{GE} below 10V as doing so may cause thermal runaway.

*2 Pulse width limited by T_{jmax}.

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●Thermal Resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal Resistance IGBT Junction - Case	$R_{\theta(j-c)}$	-	-	2.07	°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 = 20.0mA	5.0	6.0	7.0	V
Collector - Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 30A, V_{GE} = 15V				V
		T_j = 25°C	-	1.5	1.9	
		T_j = 175°C	-	1.85	-	

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●**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	-	2530	-	pF
Output Capacitance	C_{oes}	V_{GE} = 0V	-	65	-	
Reverse Transfer Capacitance	C_{res}	f = 1MHz	-	46	-	
Total Gate Charge	Q_g	V_{CE} = 400V	-	84	-	nC
Gate - Emitter Charge	Q_{ge}	I_C = 30A	-	17	-	
Gate - Collector Charge	Q_{gc}	V_{GE} = 15V	-	31	-	
Turn - on Delay Time	$t_{d(on)}$	I_C = 30A, V_{CC} = 400V	-	37	-	ns
Rise Time	t_r	V_{GE} = 15V, R_G = 10Ω	-	13	-	
Turn - off Delay Time	$t_{d(off)}$	T_j = 25°C	-	114	-	
Fall Time	t_f	Inductive Load	-	35	-	
Turn - on Switching Loss	E_{on}	*E_{on} includes diode	-	0.48	-	mJ
Turn - off Switching Loss	E_{off}	reverse recovery	-	0.49	-	
Turn - on Delay Time	$t_{d(on)}$	I_C = 30A, V_{CC} = 400V	-	36	-	ns
Rise Time	t_r	V_{GE} = 15V, R_G = 10Ω	-	14	-	
Turn - off Delay Time	$t_{d(off)}$	T_j = 175°C	-	133	-	
Fall Time	t_f	Inductive Load	-	76	-	
Turn - on Switching Loss	E_{on}	*E_{on} includes diode	-	0.49	-	mJ
Turn - off Switching Loss	E_{off}	reverse recovery	-	0.63	-	
Reverse Bias Safe Operating Area	RBSOA	I_C = 120A, V_{CC} = 520V V_P = 650V, V_{GE} = 15V R_G = 100Ω, T_j = 175°C	FULL SQUARE			-

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●Electrical Characteristic Curves

Fig.1 Power Dissipation vs. Case Temperature

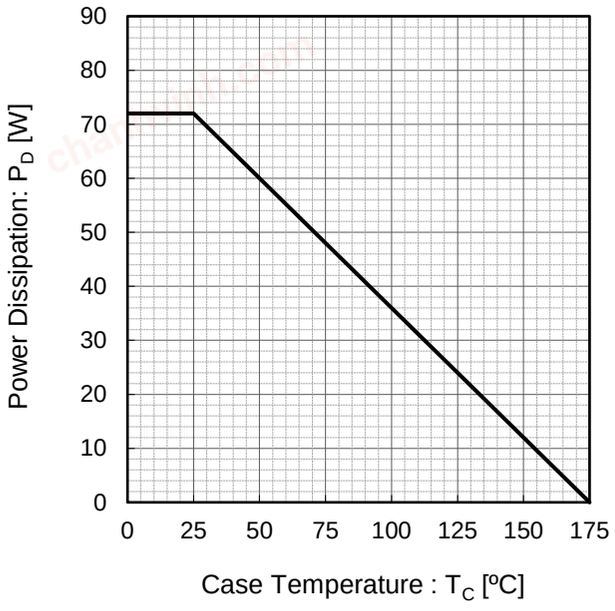


Fig.2 Collector Current vs. Case Temperature

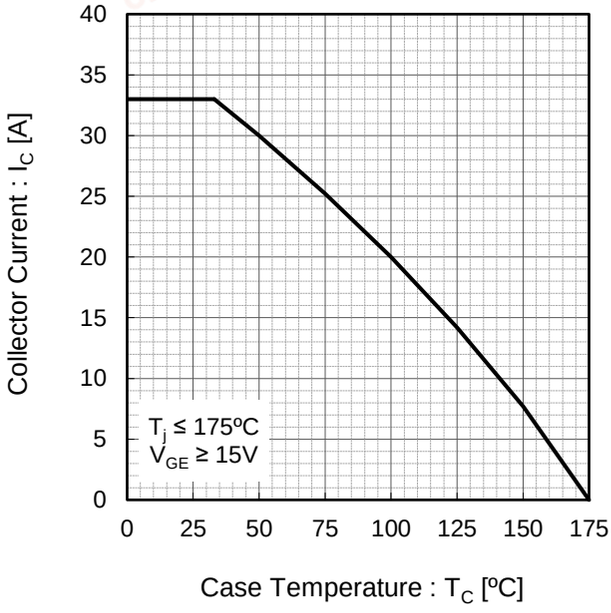


Fig.3 Forward Bias Safe Operating Area

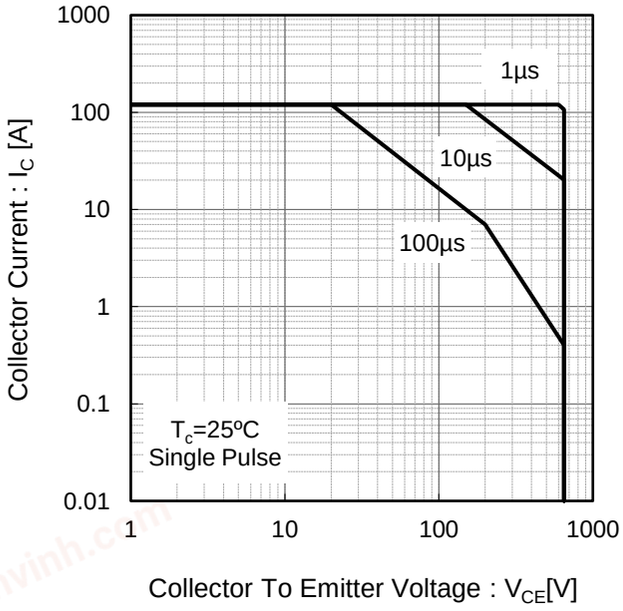
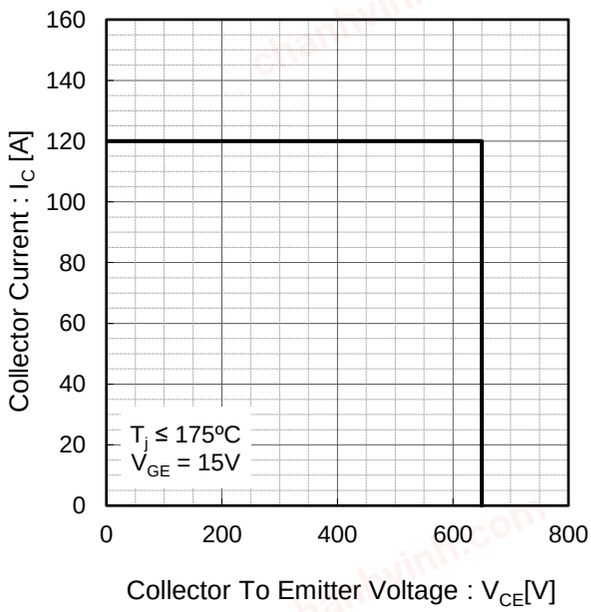


Fig.4 Reverse Bias Safe Operating Area



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●Electrical Characteristic Curves

Fig.5 Typical Output Characteristics

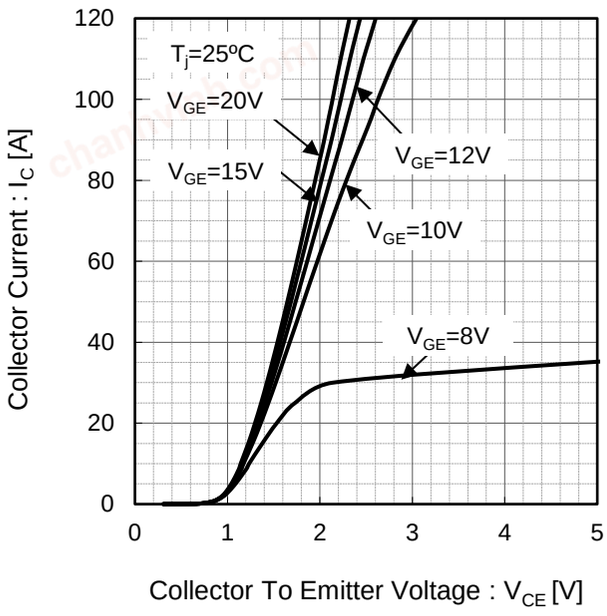


Fig.6 Typical Output Characteristics

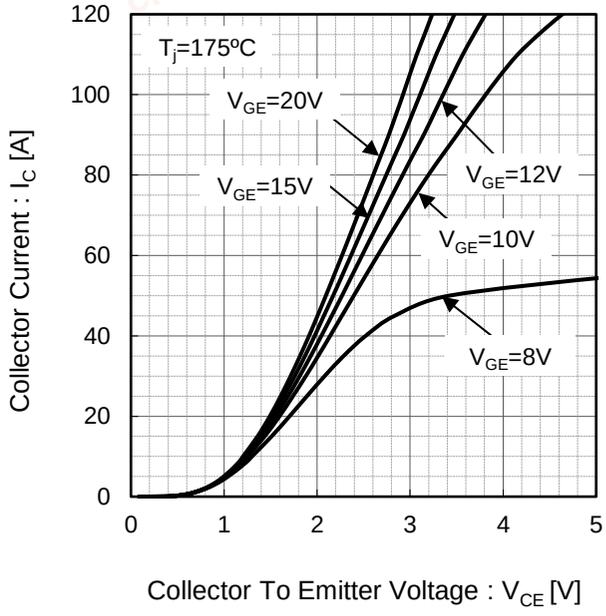


Fig.7 Typical Transfer Characteristics

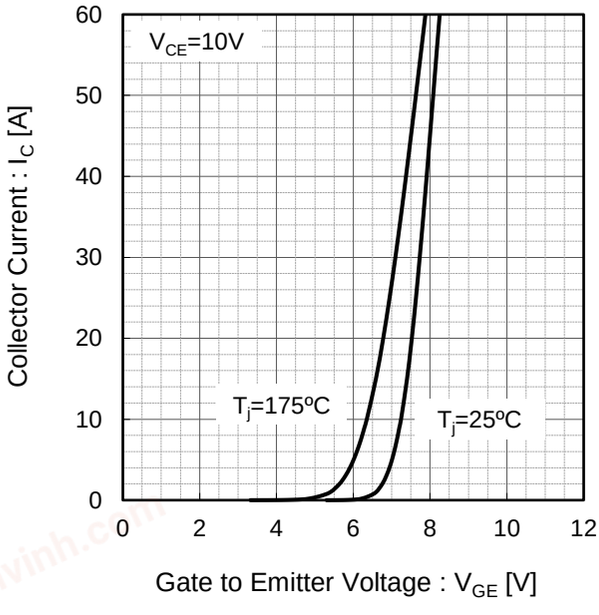
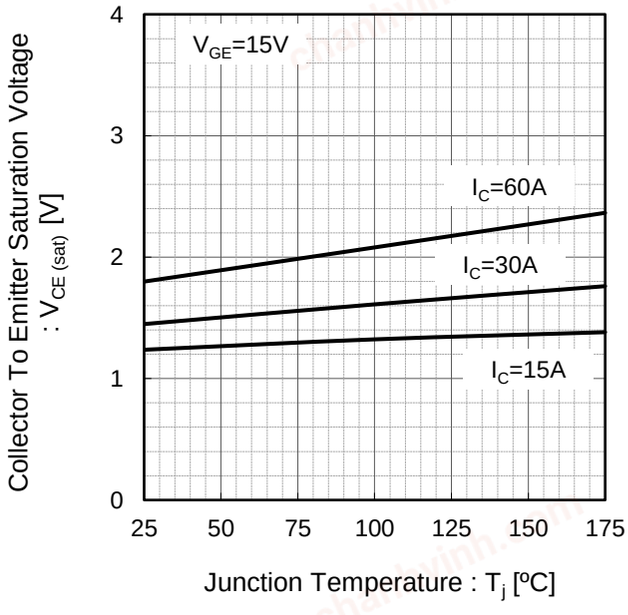


Fig.8 Typical Collector To Emitter Saturation Voltage vs. Junction Temperature



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●Electrical Characteristic Curves

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

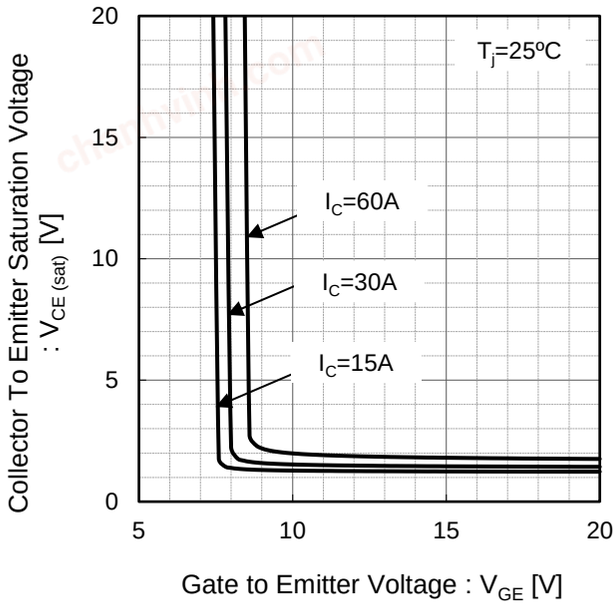


Fig.10 Typical Collector To Emitter Saturation Voltage vs. Gate To Emitter Voltage

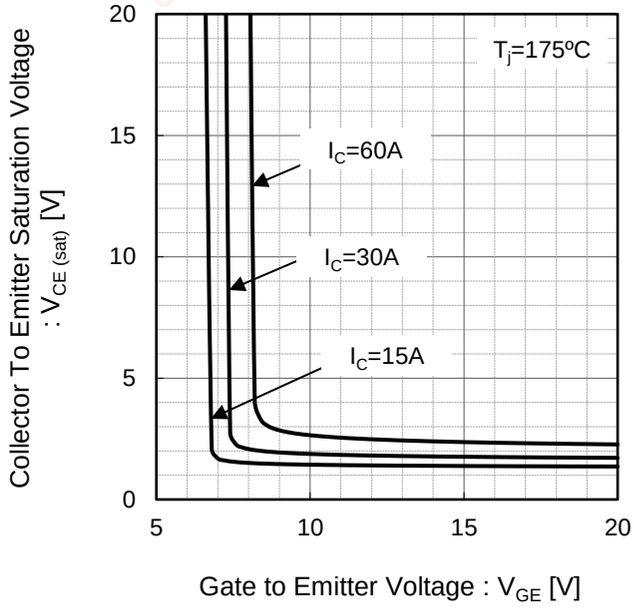


Fig.11 Typical Switching Time vs. Collector Current

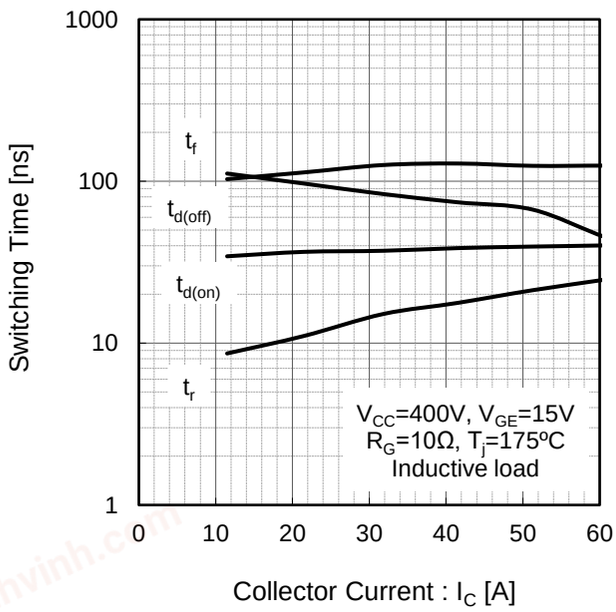
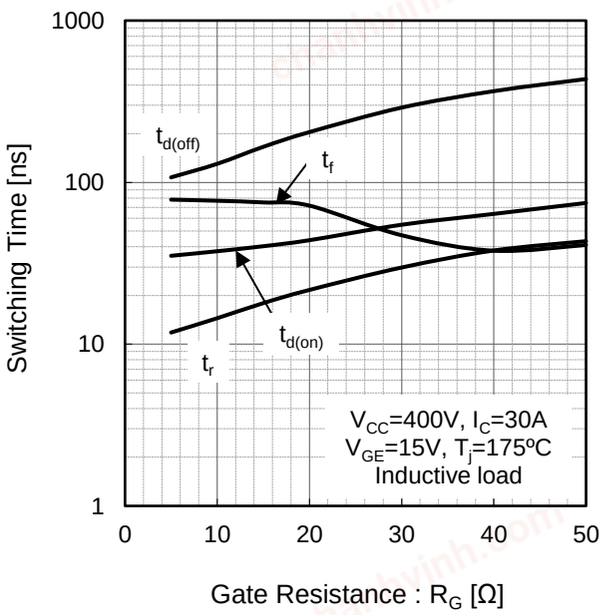


Fig.12 Typical Switching Time vs. Gate Resistance



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●Electrical Characteristic Curves

Fig.13 Typical Switching Energy Losses vs. Collector Current

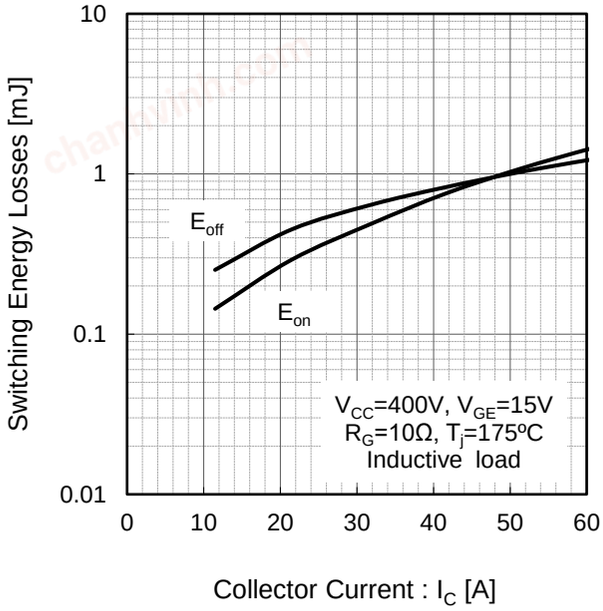


Fig.14 Typical Switching Energy Losses vs. Gate Resistance

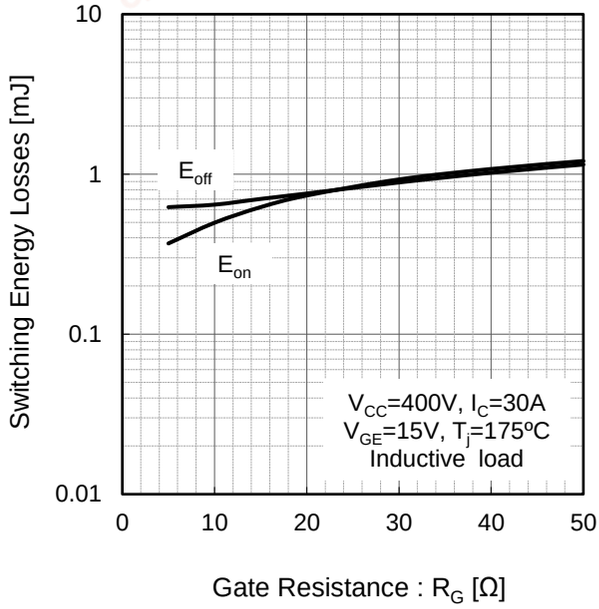


Fig.15 Typical Capacitance vs. Collector To Emitter Voltage

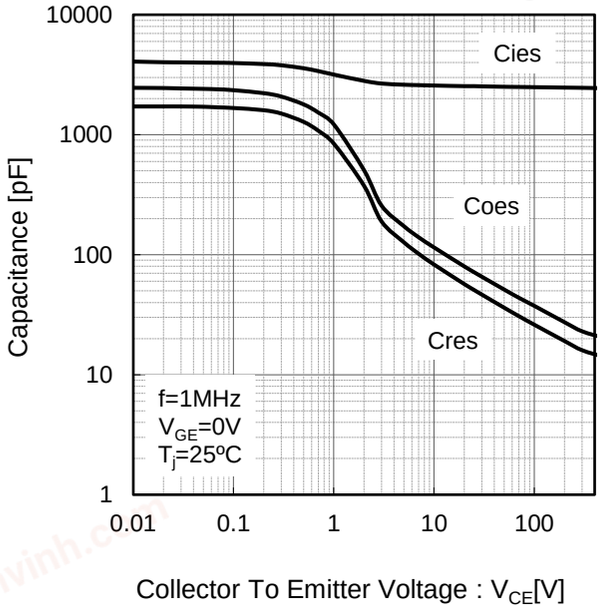
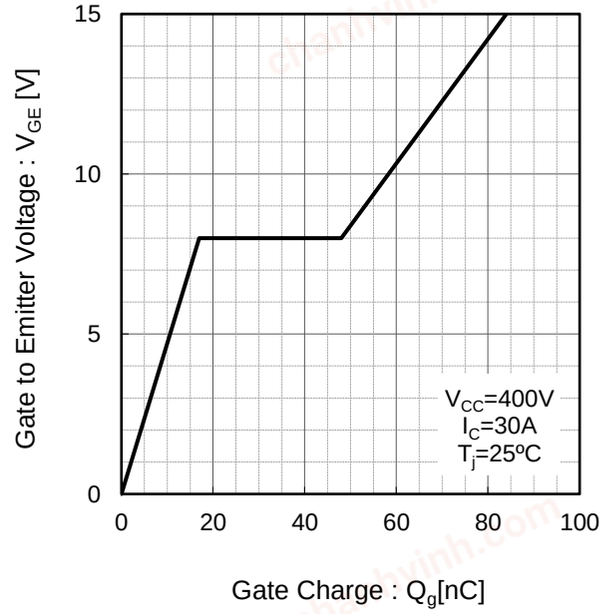


Fig.16 Typical Gate Charge

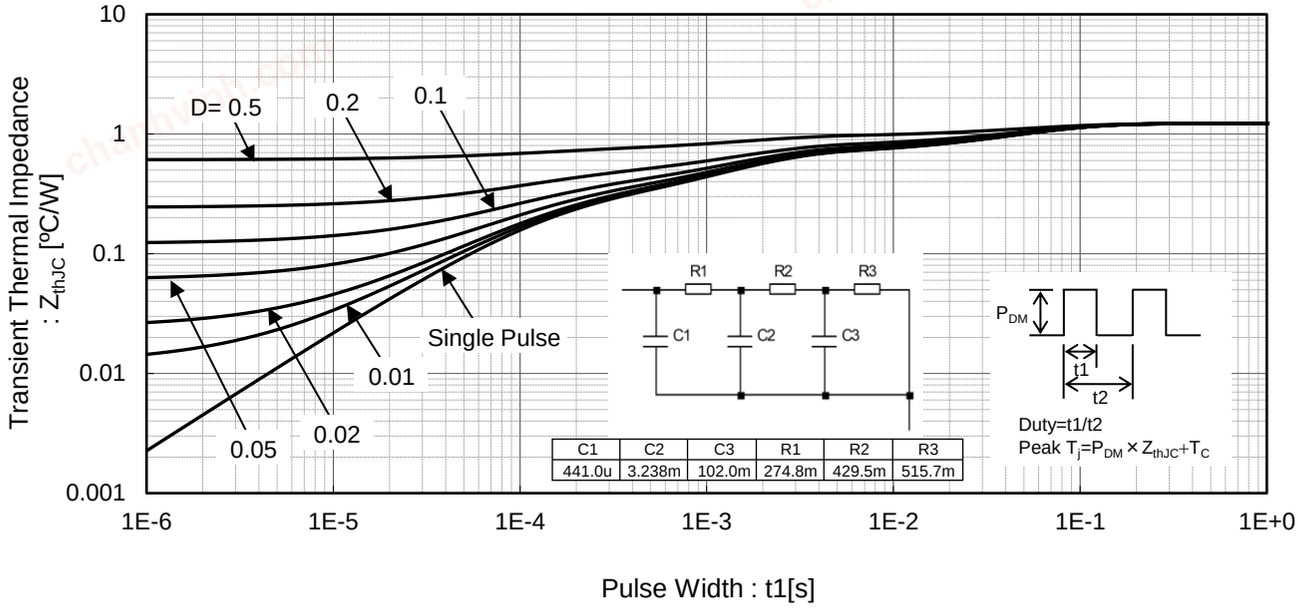


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●Electrical Characteristic Curves

Fig.17 Typical IGBT Transient Thermal Impedance



C1	C2	C3	R1	R2	R3
441.0u	3.238m	102.0m	274.8m	429.5m	515.7m

Pulse Width : t1[s]

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●Inductive Load Switching Circuit and Waveform

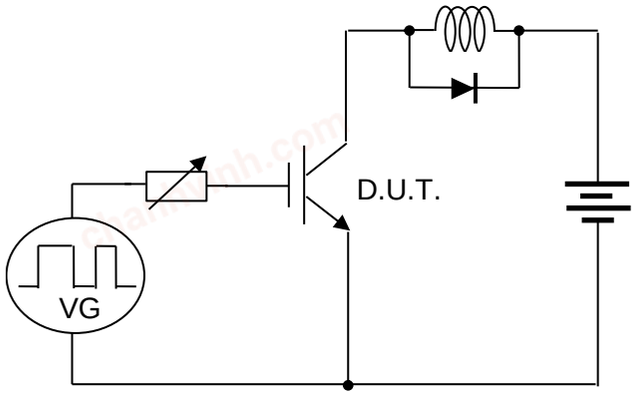


Fig.18 Inductive Load Circuit

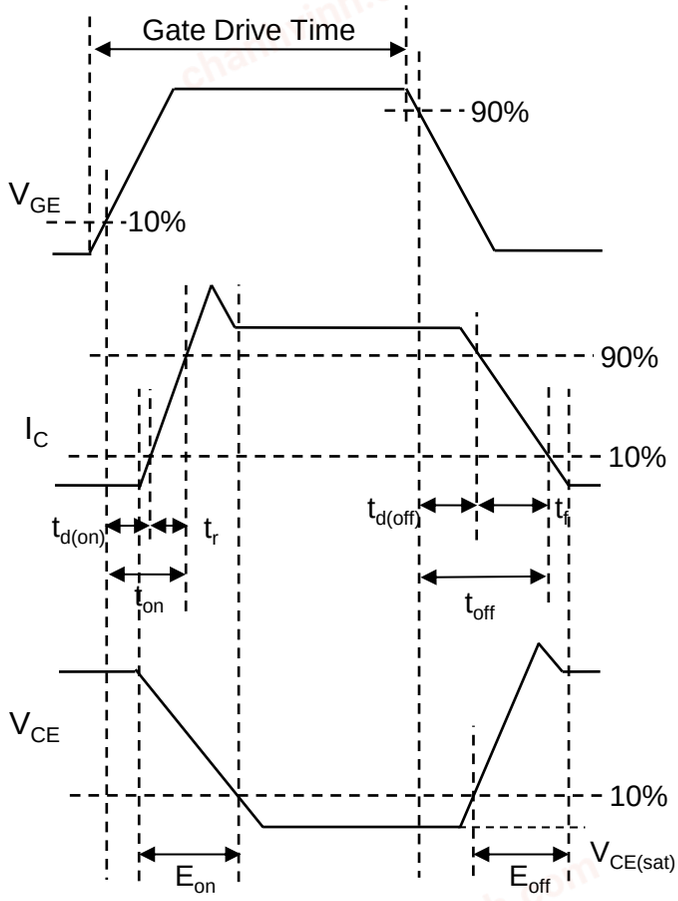


Fig.19 Inductive Load Waveform

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