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RGWS80TS65

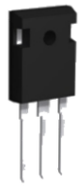
650V 40A Field Stop Trench IGBT

Datasheet

V_{CES}	650V
$I_{C\ (100°C)}$	40A
$V_{CE(sat)}\ (Typ.)$	1.6V
P_D	202W

●Outline

TO-247GE



(1) (2)(3)

●Features

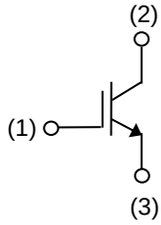
1) Low Collector - Emitter Saturation Voltage

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

●Application

PFC

Solar converters

Mid to high switching frequency converters

●Packaging Specifications

Type	Packaging	Tube
	Reel Size (mm)	-
	Tape Width (mm)	-
	Basic Ordering Unit (pcs)	600
	Packing Code	C13
	Marking	RGWS80TS65

●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	71	A
	T_C = 100°C	I_C	43	A
Pulsed Collector Current		I_{CP} *1	120	A
Power Dissipation	T_C = 25°C	P_D	202	W
	T_C = 100°C	P_D	101	W
Operating Junction Temperature		T_j	-40 to +175	°C
Storage Temperature		T_{stg}	-55 to +175	°C

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

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●Thermal Resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal Resistance IGBT Junction - Case	$R_{\theta(j-c)}$	-	-	0.74	°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 = 40A, V_{GE} = 15V,				V
		T_j = 25°C	-	1.6	2.0	
		T_j = 175°C	-	2.0	-	

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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,	-	83	-	nC
Gate - Emitter Charge	Q_{ge}	I_C = 40A,	-	18	-	
Gate - Collector Charge	Q_{gc}	V_{GE} = 15V	-	31	-	
Turn - on Delay Time	$t_{d(on)}$	I_C = 40A, V_{CC} = 400V, V_{GE} = 15V, R_G = 10Ω, T_j = 25°C Inductive Load *E_{on} include diode reverse recovery	-	40	-	ns
Rise Time	t_r		-	17	-	
Turn - off Delay Time	$t_{d(off)}$		-	114	-	
Fall Time	t_f		-	40	-	
Turn - on Switching Loss	E_{on}		-	0.70	-	mJ
Turn - off Switching Loss	E_{off}		-	0.66	-	
Turn - on Delay Time	$t_{d(on)}$	I_C = 40A, V_{CC} = 400V, V_{GE} = 15V, R_G = 10Ω, T_j = 175°C Inductive Load *E_{on} include diode reverse recovery	-	38	-	ns
Rise Time	t_r		-	18	-	
Turn - off Delay Time	$t_{d(off)}$		-	127	-	
Fall Time	t_f		-	74	-	
Turn - on Switching Loss	E_{on}		-	0.70	-	mJ
Turn - off Switching Loss	E_{off}		-	0.84	-	
Reverse Bias Safe Operating Area	RBSOA	I_C = 120A, V_{CC} = 520V V_P = 650V, V_{GE} = 15V R_G = 100Ω, T_j = 175℃	FULL SQUARE			-

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●Electrical Characteristic Curves

Fig.1 Power Dissipation vs. Case Temperature

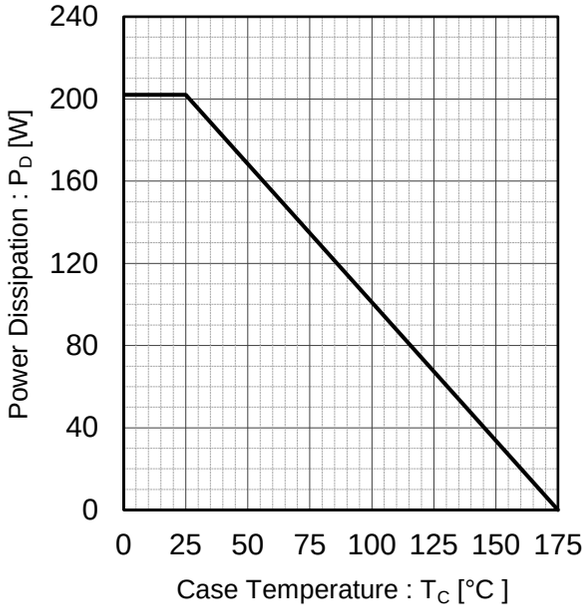


Fig.2 Collector Current vs. Case Temperature

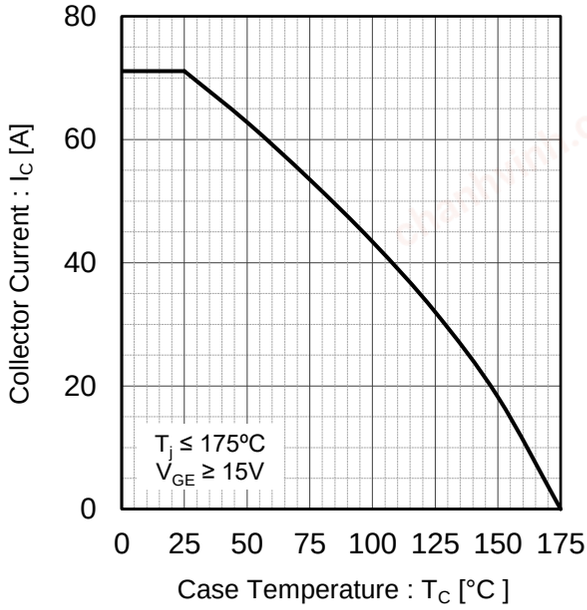


Fig.3 Forward Bias Safe Operating Area

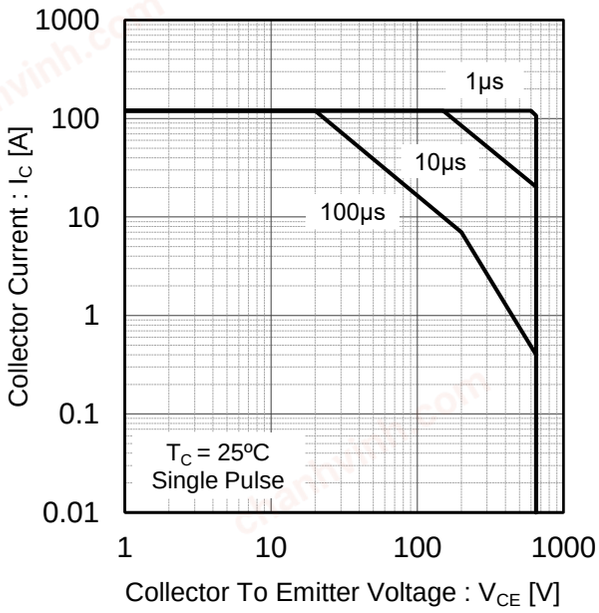
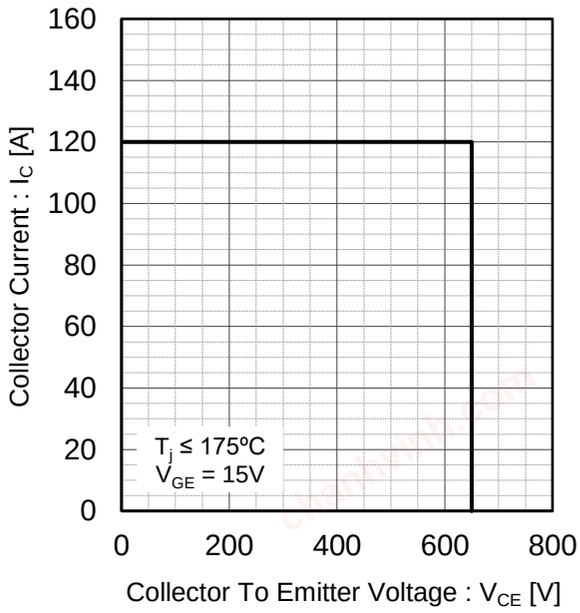


Fig.4 Reverse Bias Safe Operating Area



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●Electrical Characteristic Curves

Fig.5 Typical Output Characteristics

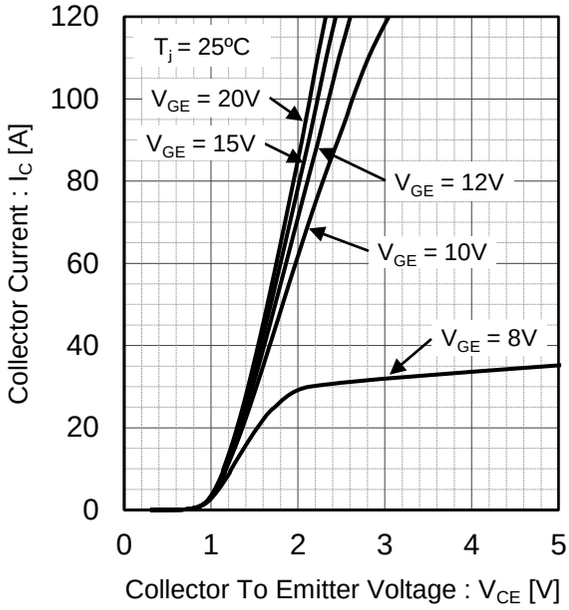


Fig.6 Typical Output Characteristics

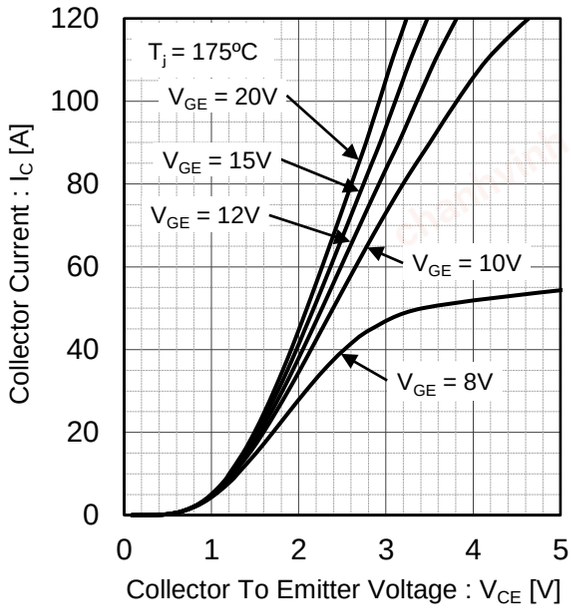


Fig.7 Typical Transfer Characteristics

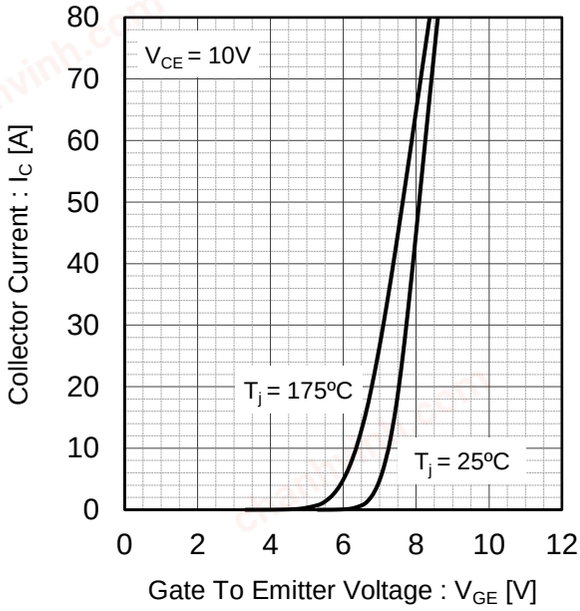
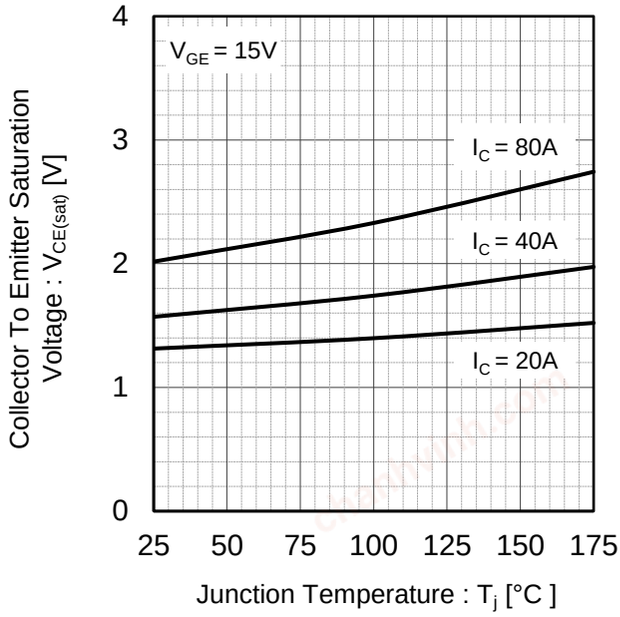


Fig.8 Typical Collector to Emitter Saturation Voltage vs. Junction Temperature



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●Electrical Characteristic Curves

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

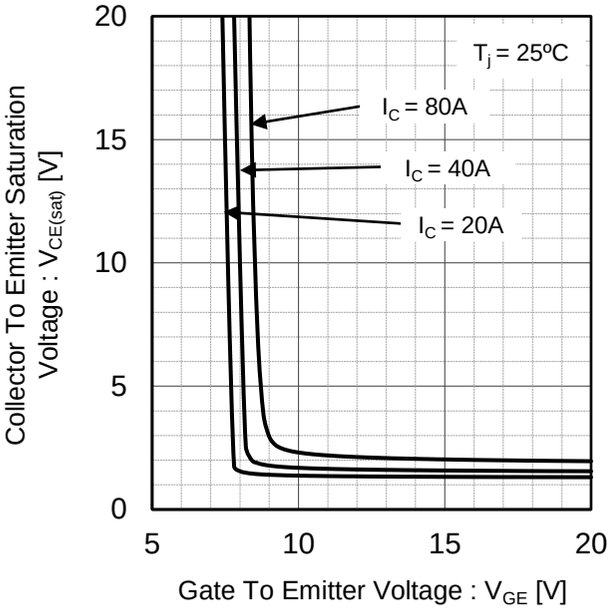


Fig.10 Typical Collector to Emitter Saturation Voltage vs. Gate to Emitter Voltage

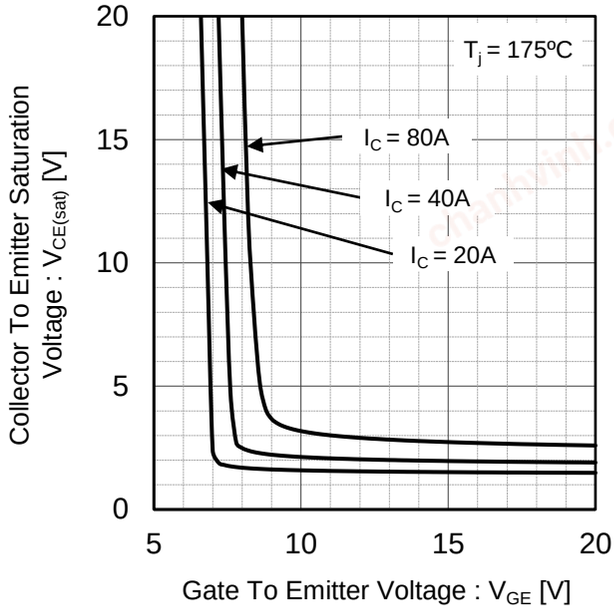


Fig.11 Typical Switching Time vs. Collector Current

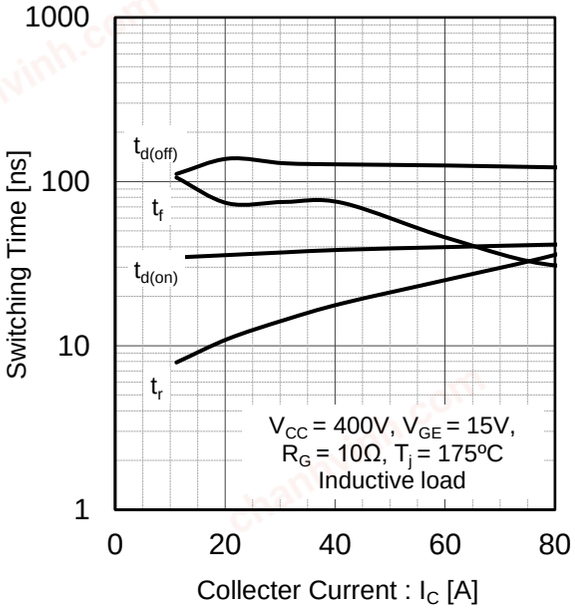
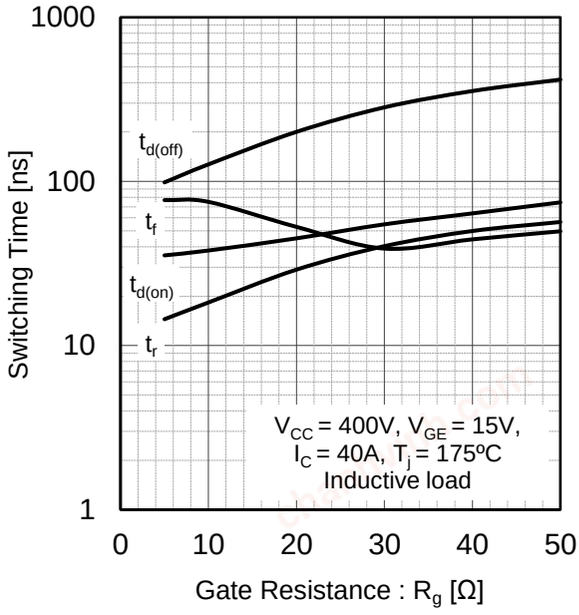


Fig.12 Typical Switching Time vs. Gate Resistance



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●Electrical Characteristic Curves

Fig.13 Typical Switching Energy Losses vs. Collector Current

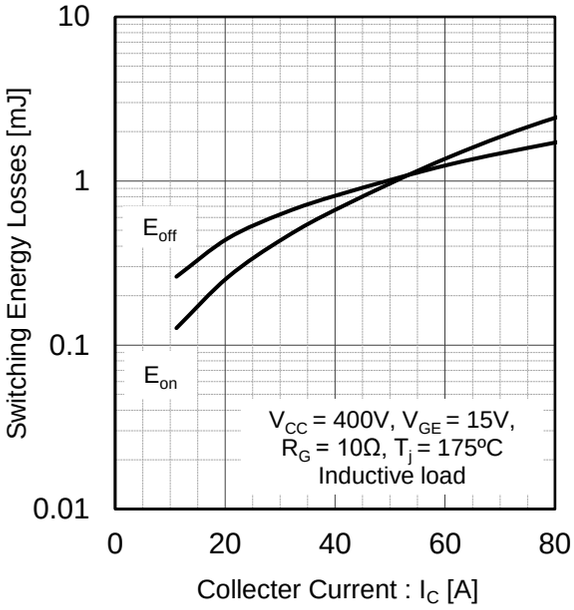


Fig.14 Typocal Switching Energy Losses vs. Gate Resistance

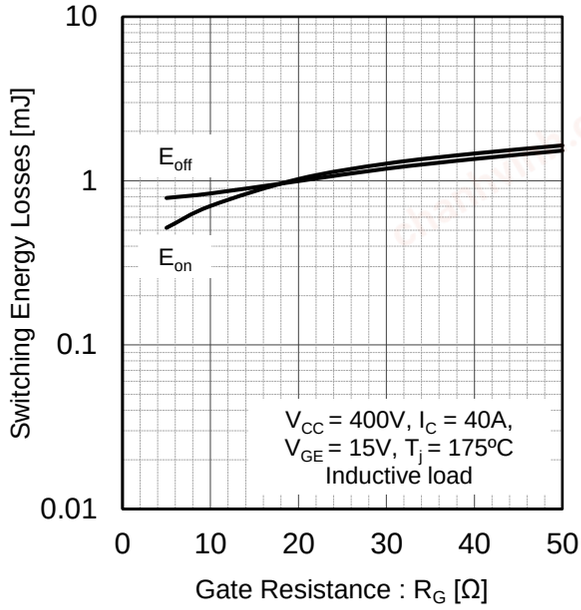


Fig.15 Typical Capacitance vs. Collector to Emitter Voltage

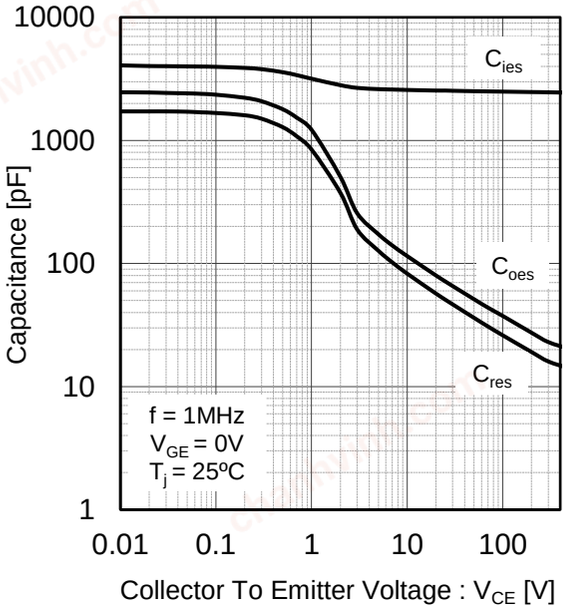
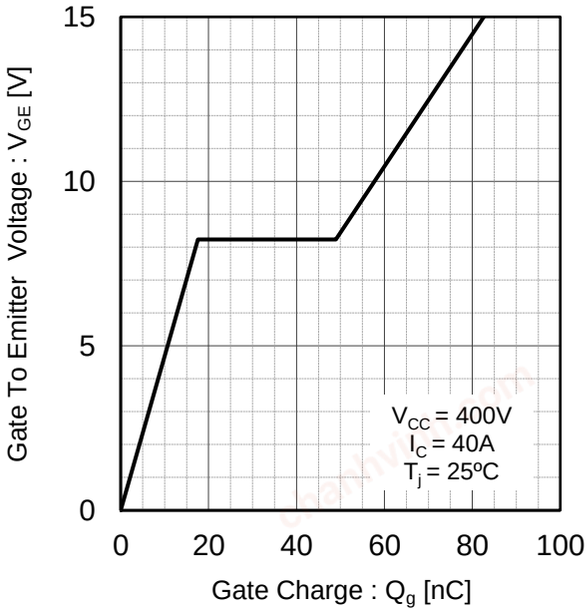


Fig.16 Typical Gate Charge

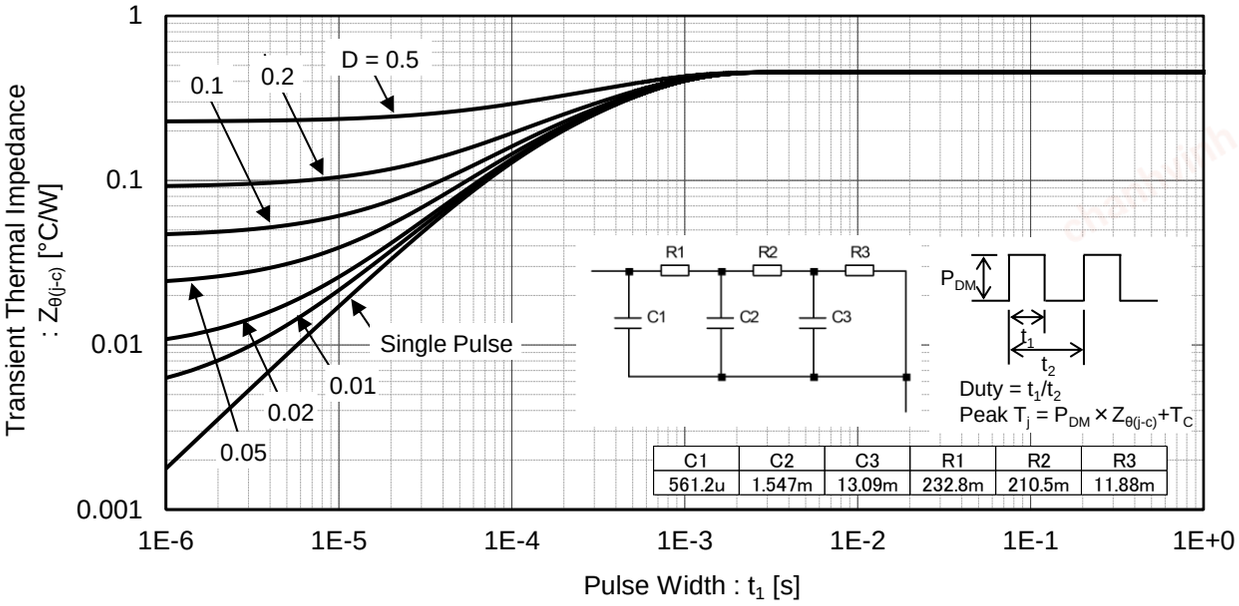


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●Electrical Characteristic Curves

Fig.17 Typical IGBT Transient Thermal Impedance



C1	C2	C3	R1	R2	R3
561.2u	1.547m	13.09m	232.8m	210.5m	11.88m

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●Inductive Load Switching Circuit and Waveform

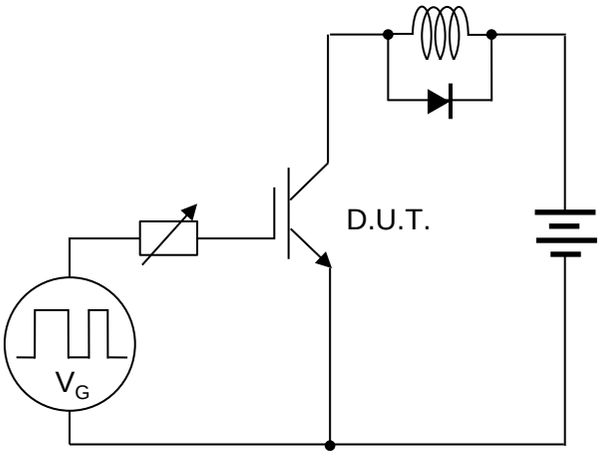


Fig.18 Inductive Load Circuit

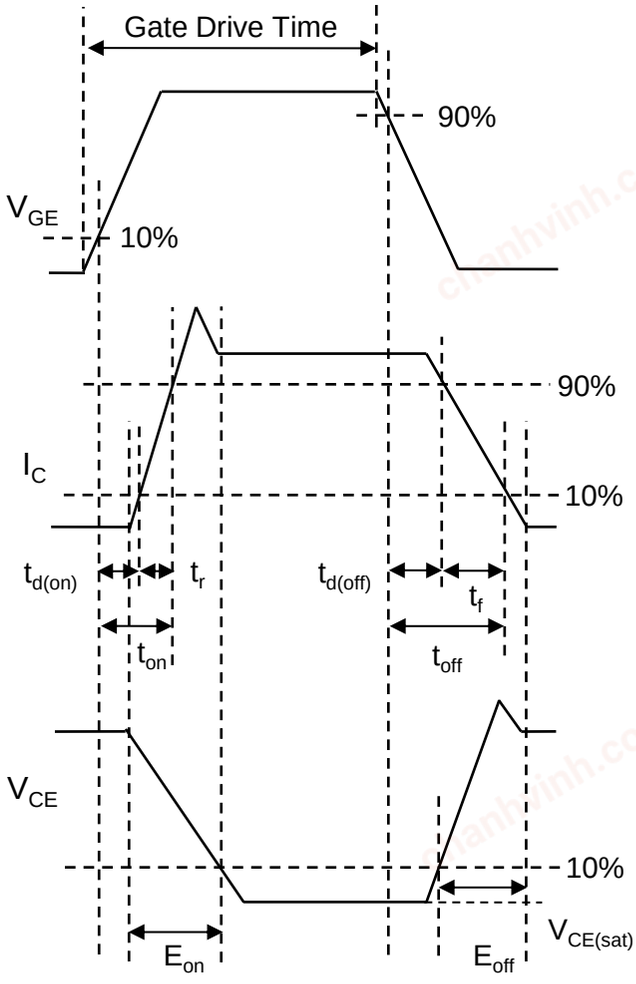


Fig.19 Inductive Load Waveform

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