RGW00TK65

650V 50A Field Stop Trench IGBT

Datasheet

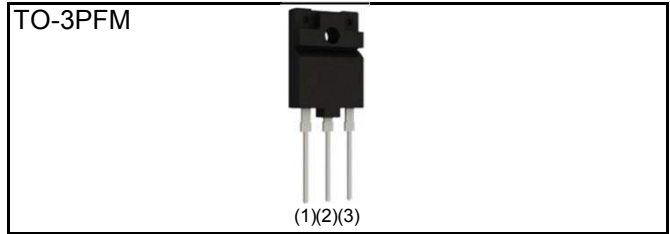|	
V_{CES}	650V
$I_{C \, (100°C)}$	26A
$V_{CE(sat) \, (Typ.)}$	1.5V@I_C=50A
P_D	89W

● **Features**

1) Low Collector - Emitter Saturation Voltage

2) High Speed Switching

3) Low Switching Loss & Soft Switching
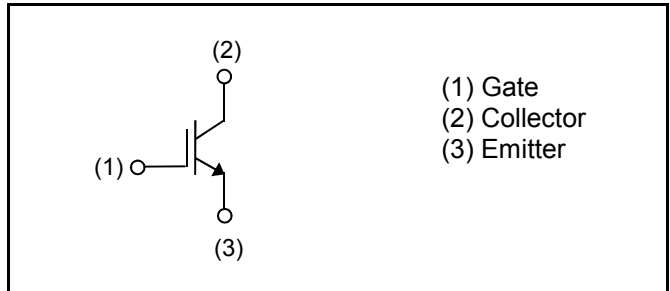
4) Pb - free Lead Plating ; RoHS Compliant

● **Applications**

PFC

UPS

Welding

Solar Inverter

IH

● **Outline**

TO-3PFM

(1)(2)(3)

● **Inner Circuit**

(2)

(1)

(3)

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

● **Packaging Specifications**

	Packaging	Tube
	Reel Size (mm)	-
	Tape Width (mm)	-
Type	Basic Ordering Unit (pcs)	450
	Packing Code	C11
	Marking	RGW00TK65

● **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	45	A
	T_C = 100°C	I_C	26	A
Pulsed Collector Current		I_{CP} [*1]	200	A
Power Dissipation	T_C = 25°C	P_D	89	W
	T_C = 100°C	P_D	44	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	$R_{\theta(j-c)}$	-	-	1.67	°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 = 33.0mA	5.0	6.0	7.0	V
Collector - Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 50A, V_{GE} = 15V T_j = 25°C	-	1.5	1.9	V
		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	-	4200	-	pF
Output Capacitance	C_{oes}	V_{GE} = 0V	-	104	-	
Reverse Transfer Capacitance	C_{res}	f = 1MHz	-	79	-	
Total Gate Charge	Q_g	V_{CE} = 400V	-	141	-	nC
Gate - Emitter Charge	Q_{ge}	I_C = 50A	-	30	-	
Gate - Collector Charge	Q_{gc}	V_{GE} = 15V	-	52	-	
Turn - on Delay Time	$t_{d(on)}$	I_C = 50A, V_{CC} = 400V	-	52	-	ns
Rise Time	t_r	V_{GE} = 15V, R_G = 10Ω	-	21	-	
Turn - off Delay Time	$t_{d(off)}$	T_j = 25°C	-	180	-	
Fall Time	t_f	Inductive Load	-	33	-	
Turn - on Switching Loss	E_{on}	*E_{on} includes diode	-	1.18	-	mJ
Turn - off Switching Loss	E_{off}	reverse recovery	-	0.96	-	
Turn - on Delay Time	$t_{d(on)}$	I_C = 50A, V_{CC} = 400V	-	49	-	ns
Rise Time	t_r	V_{GE} = 15V, R_G = 10Ω	-	23	-	
Turn - off Delay Time	$t_{d(off)}$	T_j = 175°C	-	201	-	
Fall Time	t_f	Inductive Load	-	72	-	
Turn - on Switching Loss	E_{on}	*E_{on} includes diode	-	1.18	-	mJ
Turn - off Switching Loss	E_{off}	reverse recovery	-	1.18	-	
Reverse Bias Safe Operating Area	RBSOA	I_C = 200A, V_{CC} = 520V V_P = 650V, V_{GE} = 15V R_G = 100Ω, T_j = 175°C	FULL SQUARE			-

ROHM SEMICONDUCTOR   **2017.10 - Rev.A**

● **Electrical Characteristic Curves**

Fig.1 Power Dissipation vs. Case Temperature
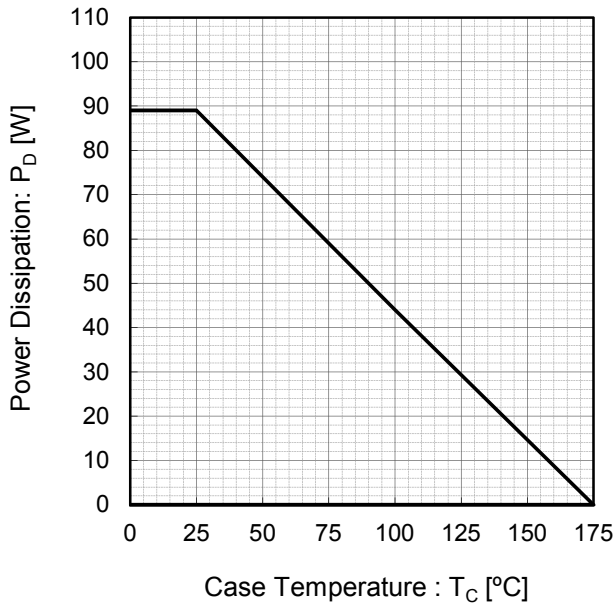
Fig.2 Collector Current vs. Case Temperature
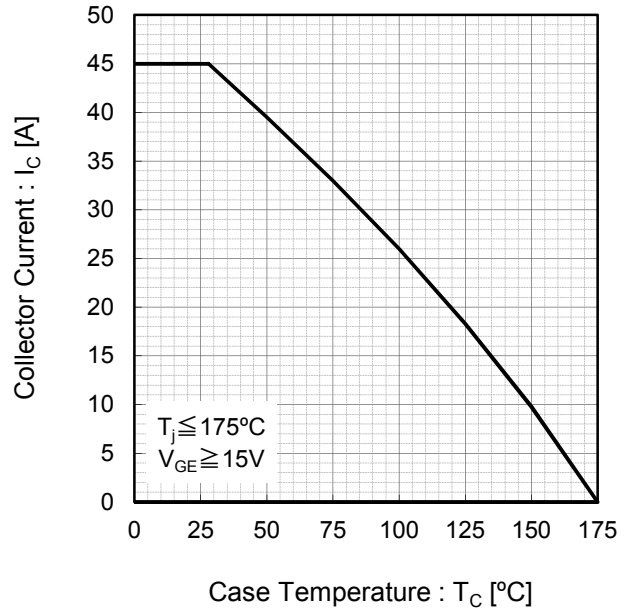
Fig.3 Forward Bias Safe Operating Area
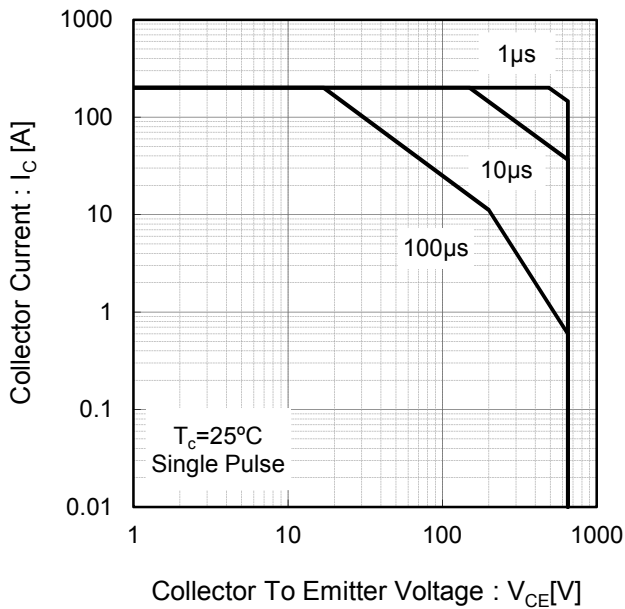
Fig.4 Reverse Bias Safe Operating Area
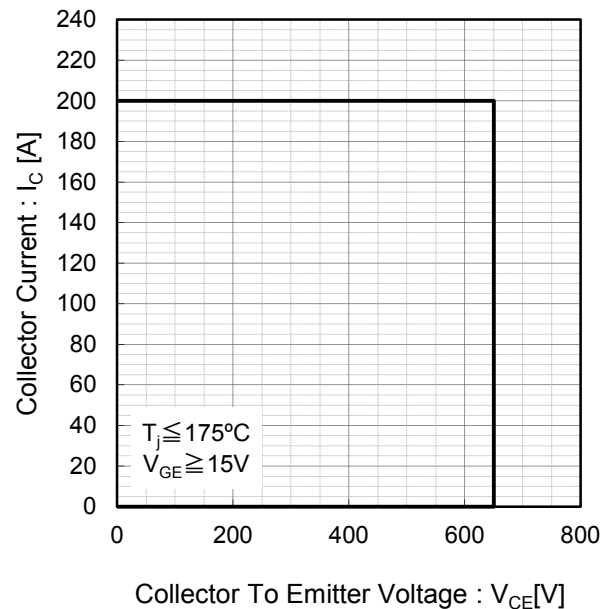
● **Electrical Characteristic Curves**
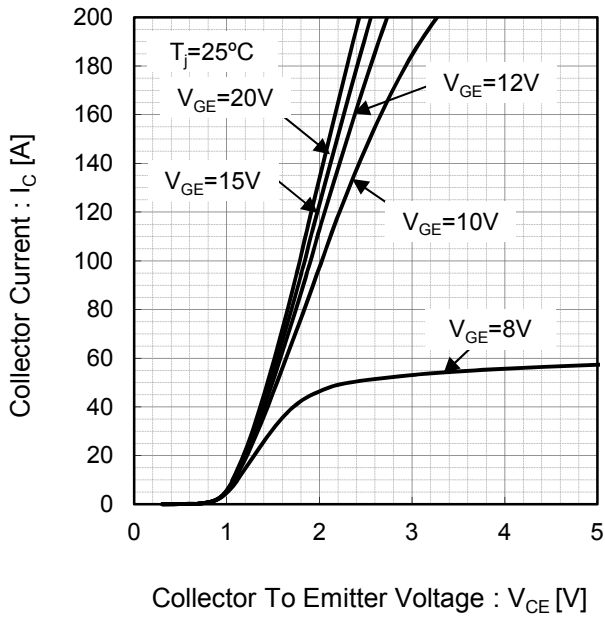
Fig.5 Typical Output Characteristics
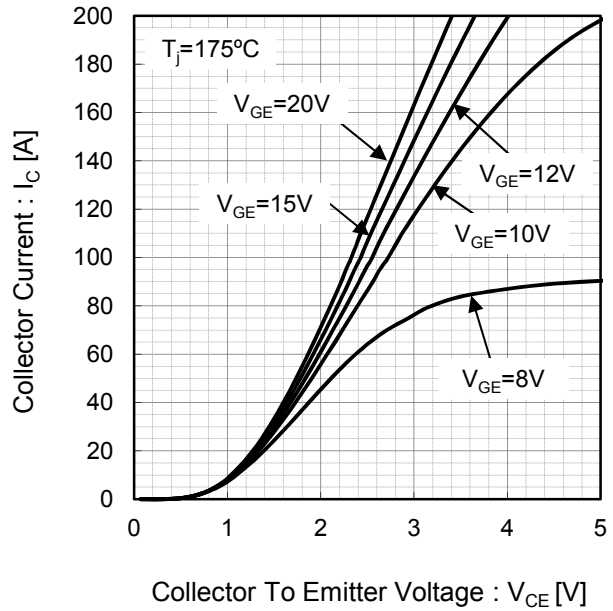

Fig.6 Typical Output Characteristics
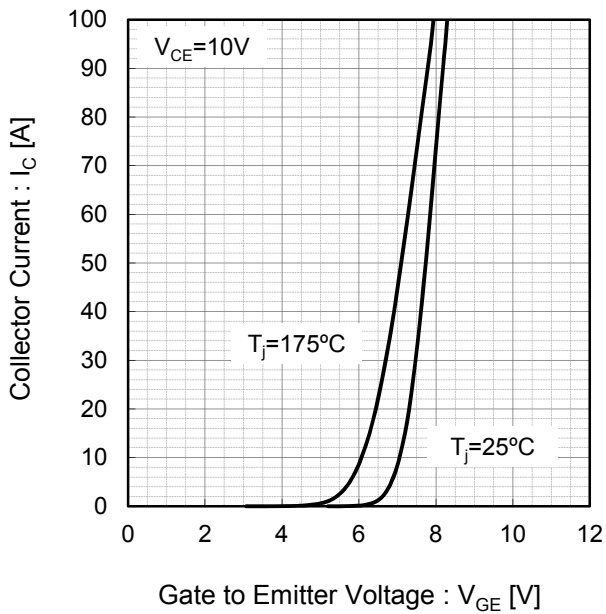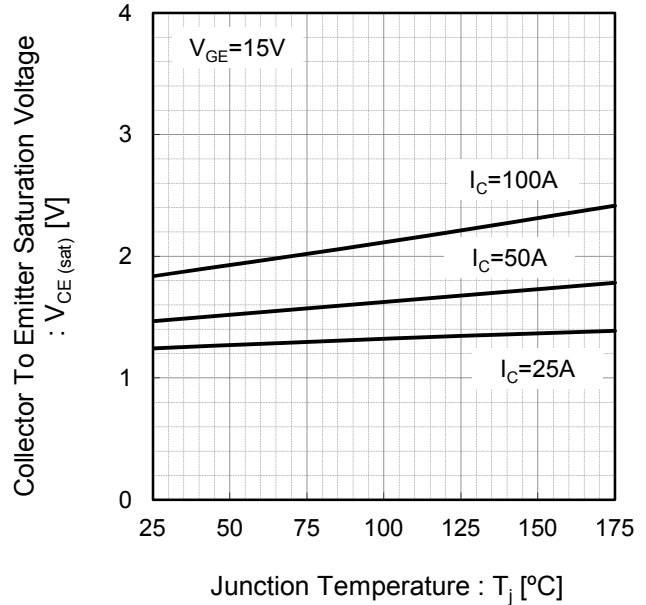

Fig.7 Typical Transfer Characteristics

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
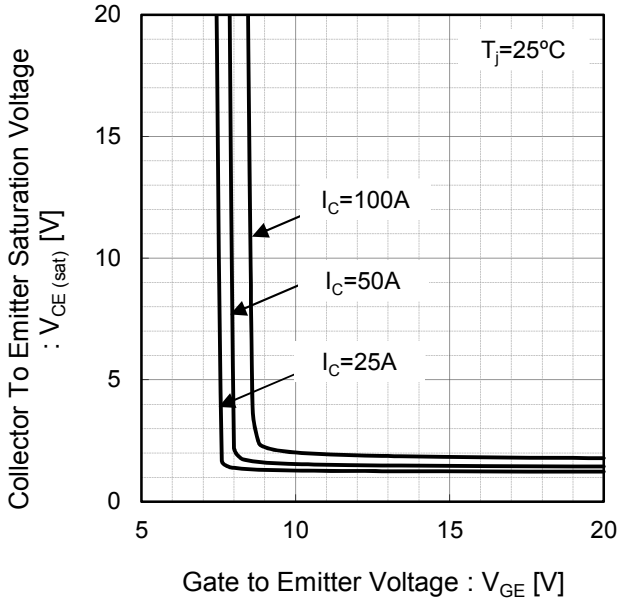
Fig.10 Typical Collector To Emitter Saturation
      Voltage vs. Gate To Emitter Voltage
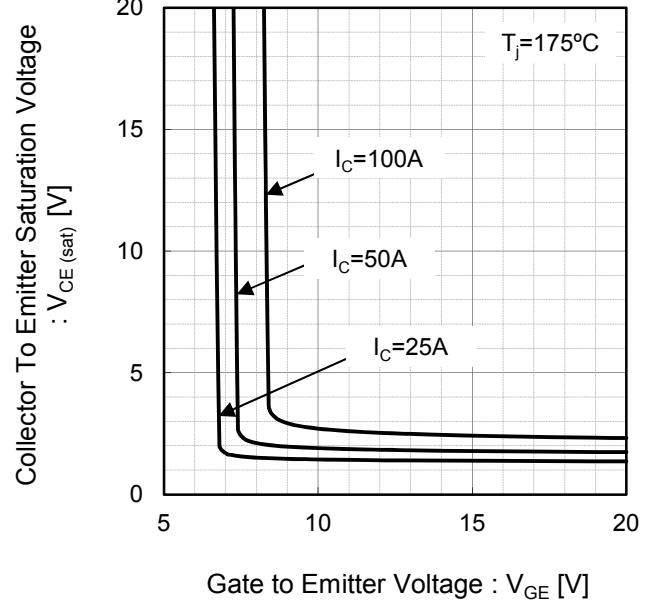
Fig.11 Typical Switching Time vs.
      Collector Current
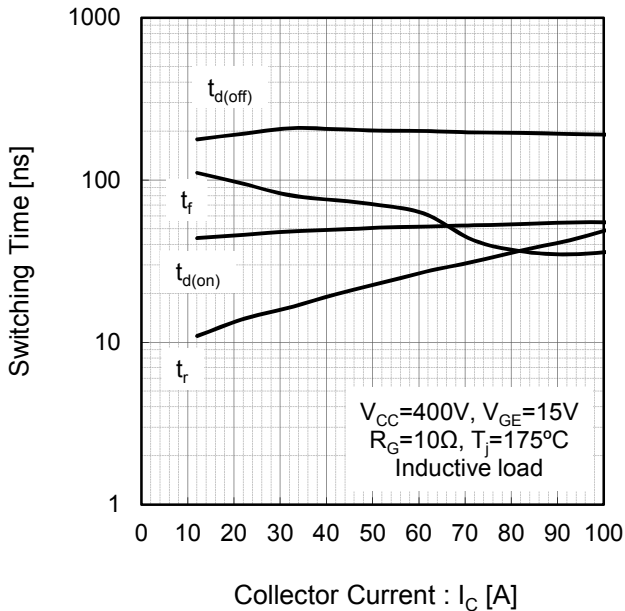
Fig.12 Typical Switching Time
      vs. Gate Resistance
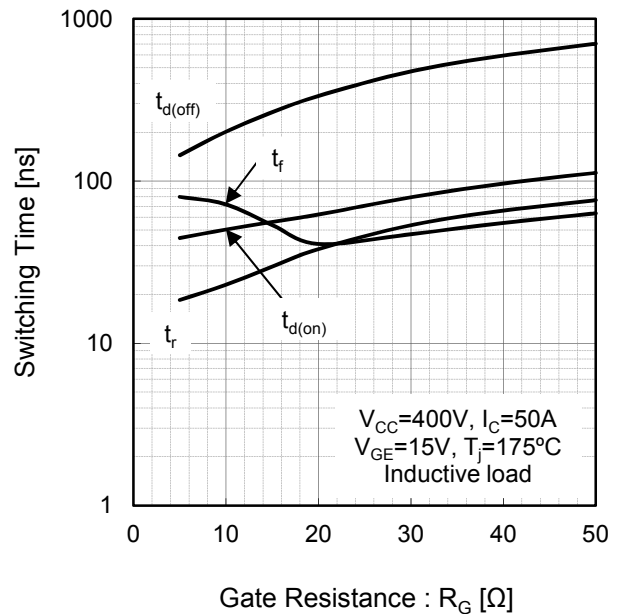
●**Electrical Characteristic Curves**

Fig.13 Typical Switching Energy Losses vs.
        Collector Current

$V_{CC}=400V$, $V_{GE}=15V$
$R_G=10\Omega$, $T_j=175°C$
Inductive load
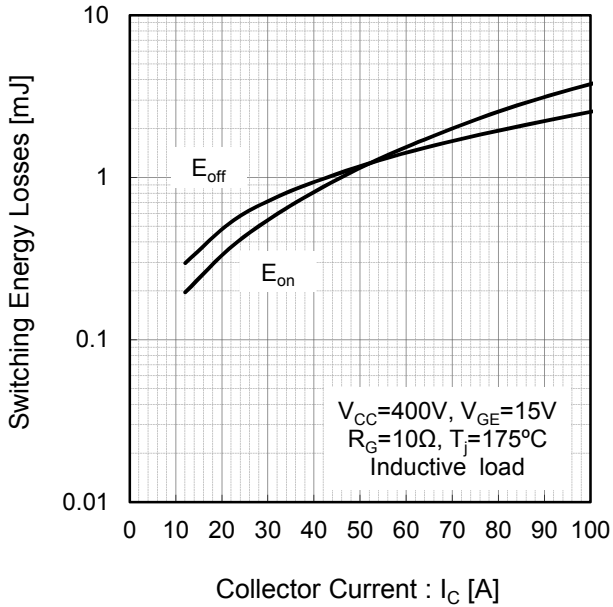
Fig.14 Typical Switching Energy Losses vs.
        Gate Resistance

$V_{CC}=400V$, $I_C=50A$
$V_{GE}=15V$, $T_j=175°C$
Inductive load
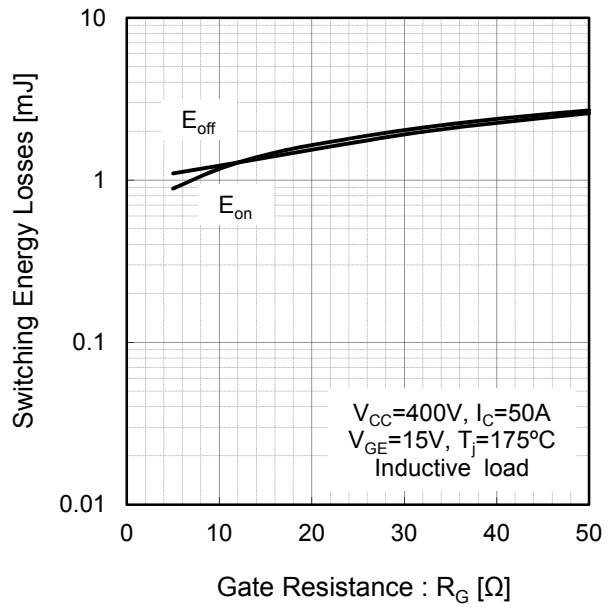
Fig.15 Typical Capacitance vs.
        Collector To Emitter Voltage

f=1MHz
$V_{GE}=0V$
$T_j=25°C$
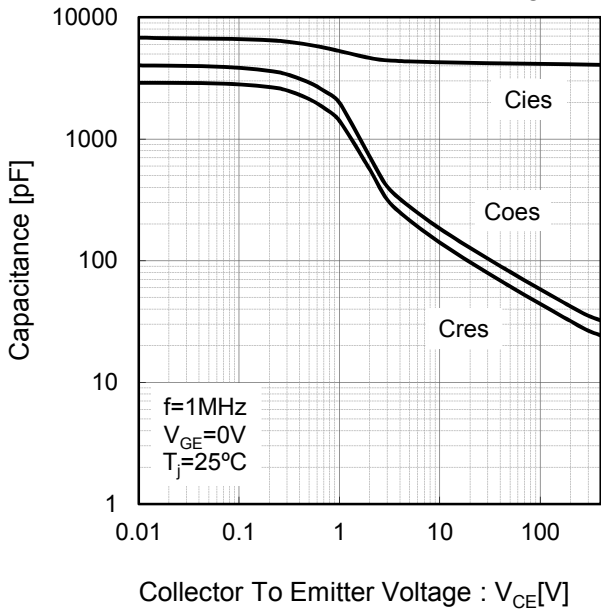
Fig.16 Typical Gate Charge

$V_{CC}=400V$
$I_C=50A$
$T_j=25°C$
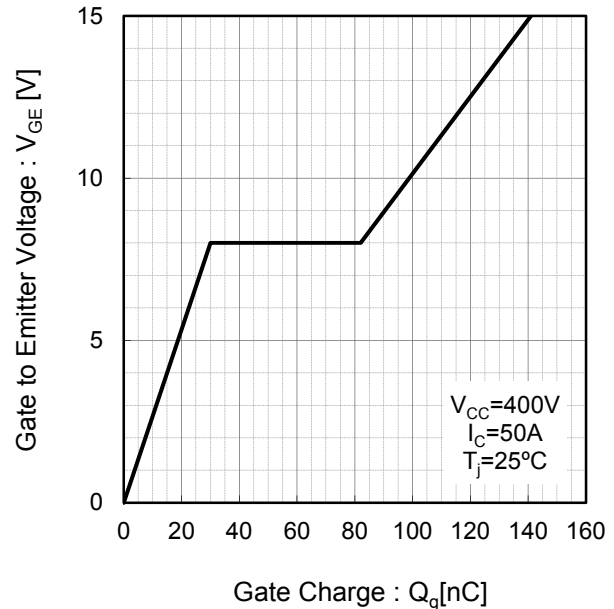
● **Electrical Characteristic Curves**

Fig.17 Typical IGBT Transient Thermal Impedance

C1	C2	C3	R1	R2	R3
700.4u	5.560m	165.6m	203.1m	288.8m	488.1m

Duty=t1/t2

Peak $T_j = P_{DM} \times Z_{thJC} + T_C$

Pulse Width : t1[s]
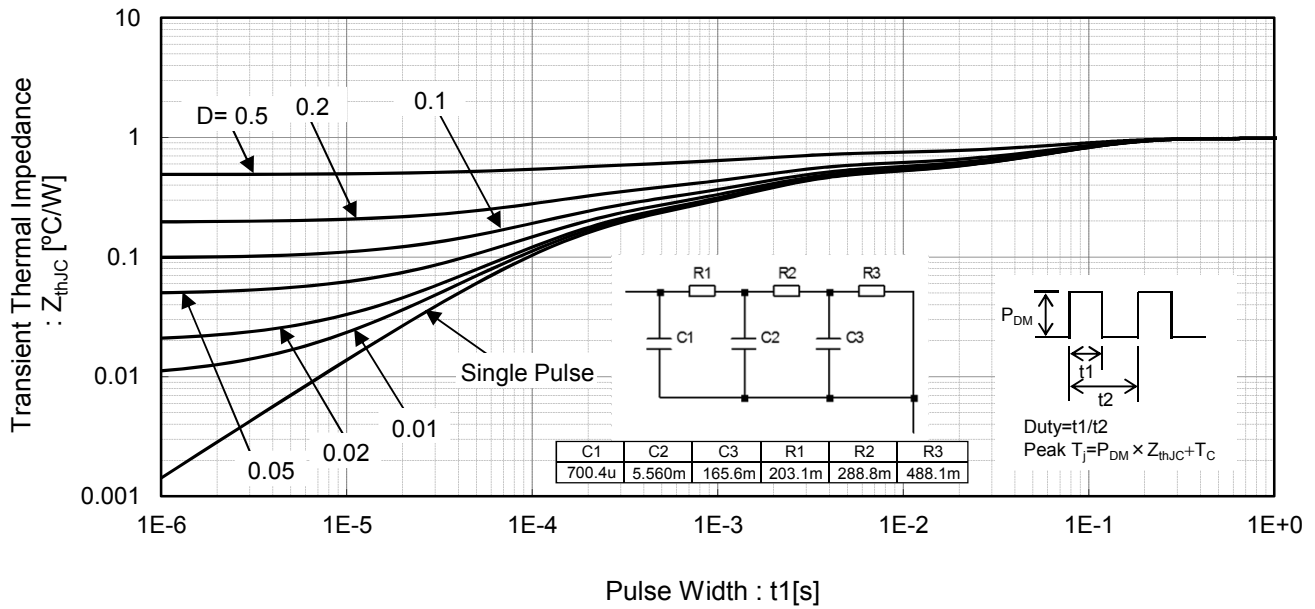
●**Inductive Load Switching Circuit and Waveform**
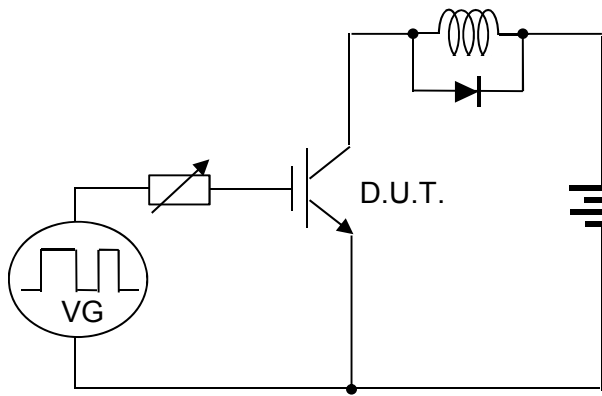
Fig.18 Inductive Load Circuit
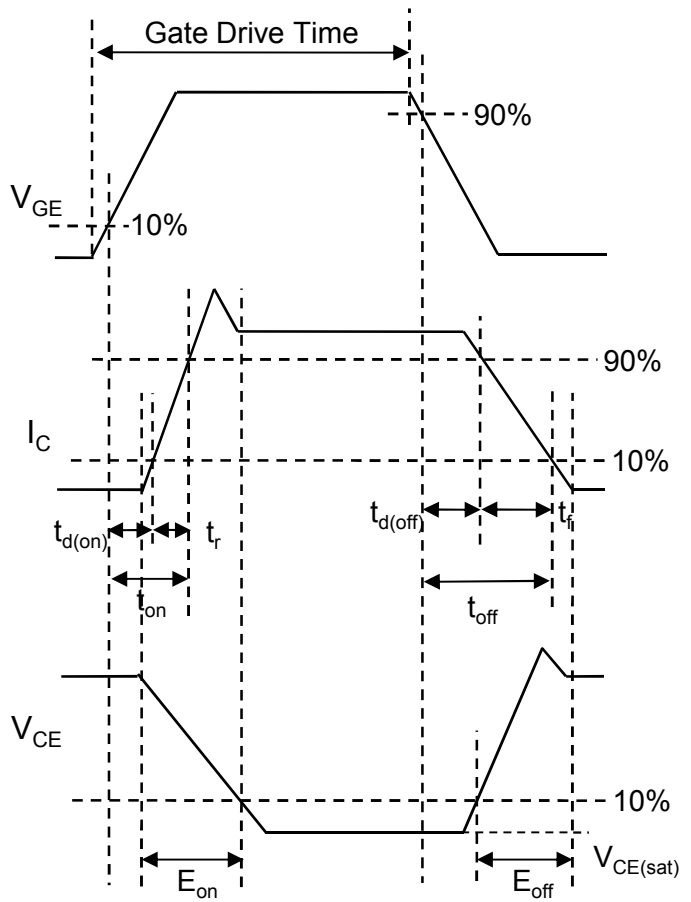
Fig.19 Inductive Load Waveform

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