

Description

The DFI600HF17I4RE2 is a Half Bridge IGBT Power Module. It integrates high performance IGBT chips designed for the applications such as High Power supply and Motor control.



Features

- Blocking voltage:1700V
- Low saturation voltage $V_{CE(sat)}$
- Low Switching Losses
- 175°C maximum junction temperature
- Thermistor inside

Applications

- High Power Switching Applications
- Motor Drives
- Solar inverter Systems
- Wind Turbines

Circuit diagram

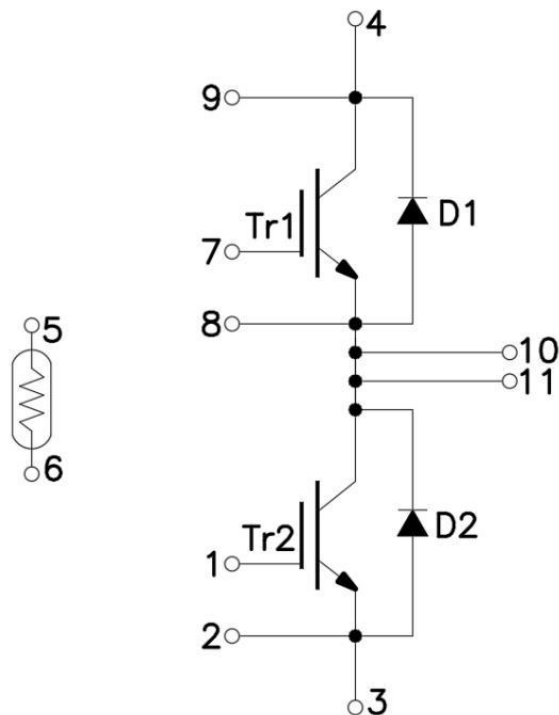


Figure 1. Out drawing & circuit diagram for DFI600HF17I4RE2

Pin Configuration and Marking Information

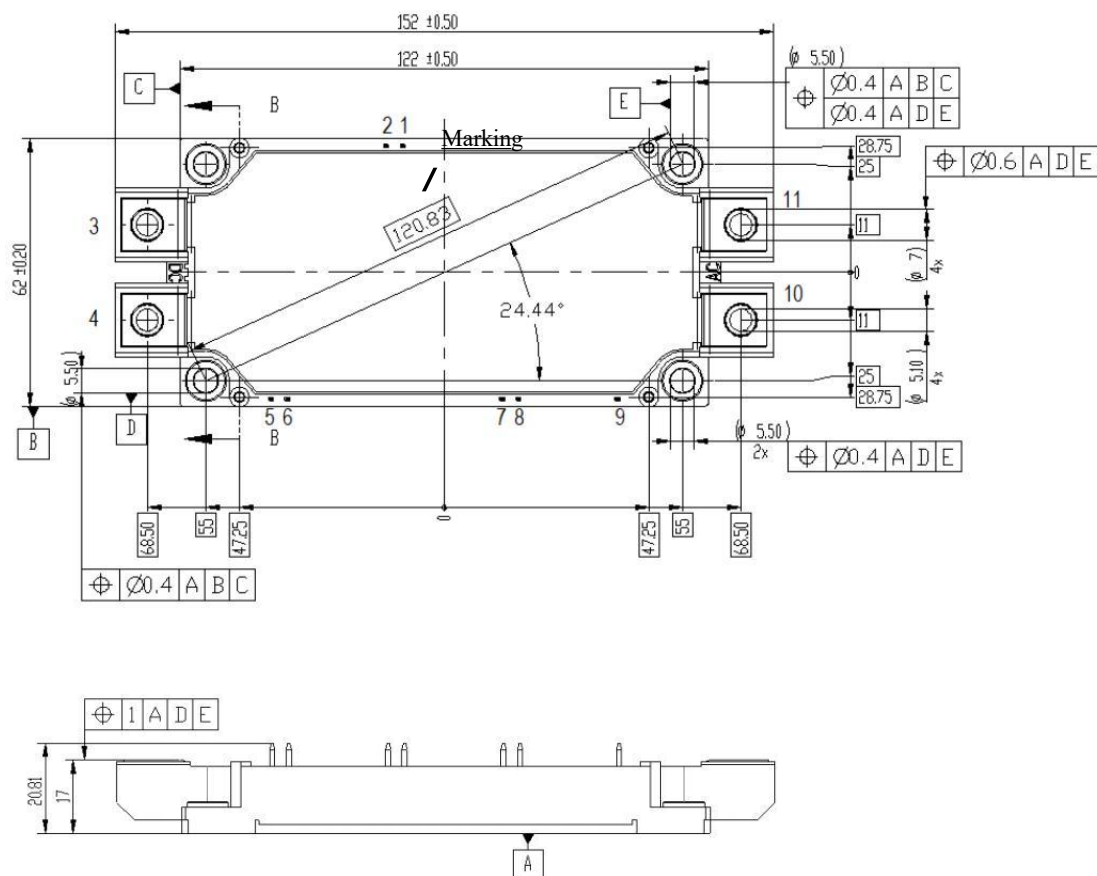


Figure 2. Pin configuration

Module

Parameter	Conditions	Value	Unit
Isolation Voltage	RMS, f=50Hz, t =1min	4.0	KV
Material of module baseplate	-	Cu	-
Creepage distance	terminal to heatsink terminal to terminal	14.5 13	mm
Clearance	terminal to heatsink terminal to terminal	12.5 10	mm
CTI	-	>225	-

Module lead resistance, terminals-chip	$T_c = 25^{\circ}\text{C}$	0.8	mΩ
Mounting torque for module mounting	M5, M6	3 to 6	Nm
Weight	-	420	g

Maximum Ratings (T_j=25°C unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V _{CES}	Collector-Emitter Voltage	G-E Short	1700	V
V _{GES}	Gate-Emitter Voltage	C-E Short	±20	V
I _C	DC Continuous Collector Current	T _C =95°C	600	A
I _{CM}	Pulse Collector Current	t _p =1ms, Note1	1200	A
P _C	Maximum Power Dissipation	T _C =25°C	3333	W
I _F	Diode Forward Current	-	600	A
I _{FRM}	Repetitive peak forward Current	t _p =1ms, Note1	1200	A
T _{jmax}	Max junction temperature	-	175	°C
T _{vjop}	Operating junction temperature	-	-40 to 175	°C
T _{stg}	Storage temperature	-	-40 to 125	°C

Note1: Pulse width limited by maximum junction temperature

NTC characteristics

Symbol	Parameter	Condition	Value			Unit
			Min.	Typ.	Max.	
R ₂₅	Resistance	T _C =25°C	-	5	-	kΩ
ΔR/R	Deviation of R ₁₀₀	T _C =100°C, R ₁₀₀ =493Ω	-5	-	5	%
P ₂₅	Power dissipation	T _C =25°C	-	-	20	mW
B _{25/50}	B-value	R ₂ = R ₂₅ exp [B _{25/50} (1/T ₂ - 1/(298,15 K))]	-	3375	-	K
B _{25/80}	B-value	R ₂ = R ₂₅ exp [B _{25/80} (1/T ₂ - 1/(298,15 K))]	-	3411	-	K
B _{25/100}	B-value	R ₂ = R ₂₅ exp [B _{25/100} (1/T ₂ - 1/(298,15 K))]	-	3433	-	K

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IGBT Electrical characteristics (T_j=25°C unless otherwise specified, chip)

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max.	
V _{CE(sat)} (Chip)	Collector-Emitter Saturation Voltage	I _C =600A V _{GE} =15V	T _J =25°C	-	1.60	1.90	V
			T _J =125°C	-	1.82	-	V
			T _J =150°C	-	1.88	-	V
			T _J =175°C	-	1.93	-	V
V _{GE(th)}	Gate-Emitter threshold Voltage	I _C =24mA, V _{CE} =V _{GE}		5.0	-	6.5	V
Q _G	Gate charge	V _{GE} = -15V to +15V		-	6.2	-	uC
R _{Gint}	Internal gate resistor	-	T _J =25°C	-	1.7	-	Ω
C _{ies}	Input Capacitance	V _{CE} =25V	T _J =25°C	-	39.5	-	nF
C _{oes}	Output Capacitance	V _{GE} =0V		-	1.42	-	nF
C _{res}	Reverse transfer Capacitance	f=1MHz		-	0.60	-	nF
I _{CES}	Collector- Emitter Cut off Current	V _{CE} =1700V, V _{GE} =0V	T _J =25°C	-	-	1	mA
I _{GES}	Gate-Emitter Leakage Current	V _{GE} =20V, V _{CE} =0V	T _J =25°C	-	-	1.8	uA
t _{d(on)}	Turn-on delay time	V _{CC} =900V I _C = 600A V _{GE} =+15V/-8V R _G =1.0Ω Inductive load	T _J =25°C	-	205	-	ns
			T _J =150°C	-	207	-	
t _r	Rise time		T _J =25°C	-	125	-	ns
			T _J =150°C	-	188	-	
t _{d(off)}	Turn-off delay time		T _J =25°C	-	570	-	ns
			T _J =150°C	-	735	-	
t _f	Fall time		T _J =25°C	-	370	-	ns
			T _J =150°C	-	680	-	
E _{on}	Turn-on power dissipation		T _J =25°C	-	234	-	mJ
			T _J =150°C	-	383	-	
E _{off}	Turn-off power dissipation		T _J =25°C	-	134	-	mJ
			T _J =150°C	-	204	-	

Isc	SC data	$V_{GE} < 15V$ $V_{CC} = 1000V$	$T_j = 150^{\circ}C$ $t_p < 10\mu s$	-	3000	-	A
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (IGBT)			-	0.045	-	K/W
$R_{th(c-s)}$	Thermal Resistance, Case to sink (Conductive Grease applied)			-	0.015	-	K/W

Freewheeling Diode Electrical characteristics (T_j=25°C unless otherwise specified, chip)

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max.	
V _F	Diode Forward Voltage	I _F =600A V _{GE} =0V	T _J =25°C	-	2.10	-	V
			T _J =125°C	-	2.28	-	
			T _J =150°C	-	2.30	-	
			T _J =175°C	-	2.32	-	
t _{rr}	Reverse recovery time	(Switch side) V _{CC} =900V, I _C =600A V _{GE} =+15/-8V,R _G =1.0Ω (FRD side) V _n =900V, I _F =600A V _{GE} =+15V/-8V Inductive load switching operation	T _J =25°C	-	1.08	-	us
			T _J =150°C	-	1.51	-	
I _{RM}	Peak reverse recovery Current		T _J =25°C	-	270	-	A
			T _J =150°C	-	333	-	
Q _{rr}	Recovered charge		T _J =25°C	-	112	-	uC
			T _J =150°C	-	244	-	
E _{rr}	Reverse recovered energy		T _J =25°C	-	53	-	mJ
			T _J =150°C	-	125	-	
R _{th(j-c)}	Thermal Resistance, Junction to Case (Diode)			-	0.075	-	K/W
R _{th(c-s)}	Thermal Resistance, Case to sink (Conductive Grease applied)			-	0.020	-	K/W

Test Conditions

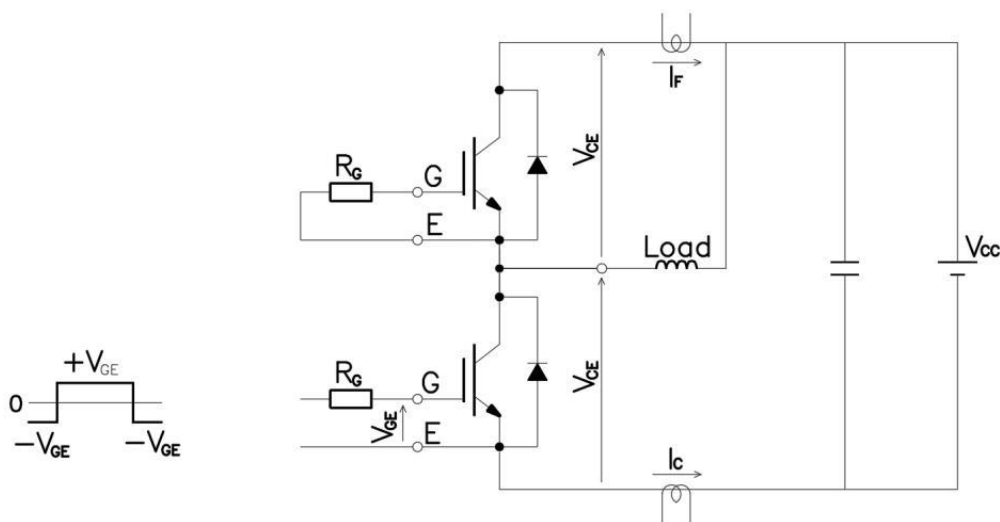


Figure 3. Switching time measure circuit

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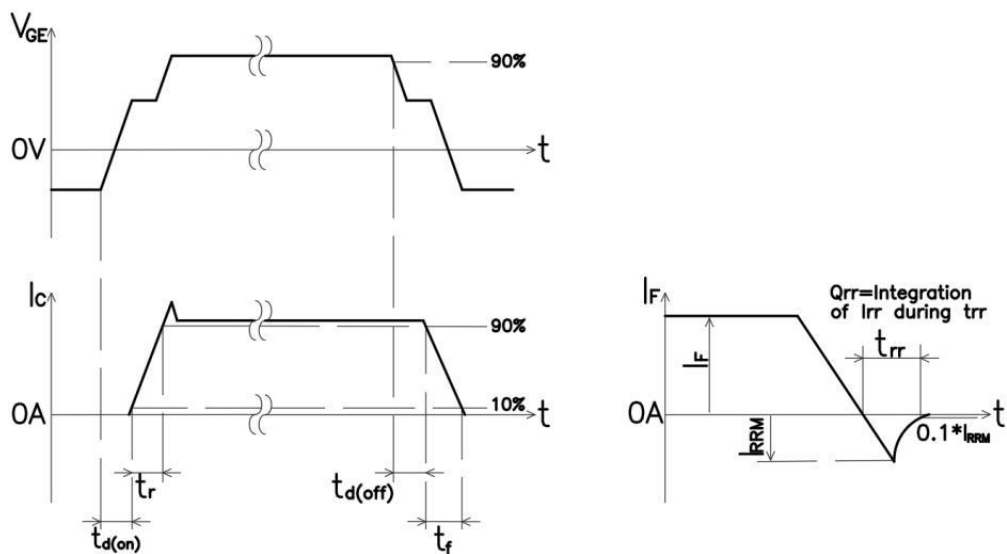


Figure 4. Switching time definition

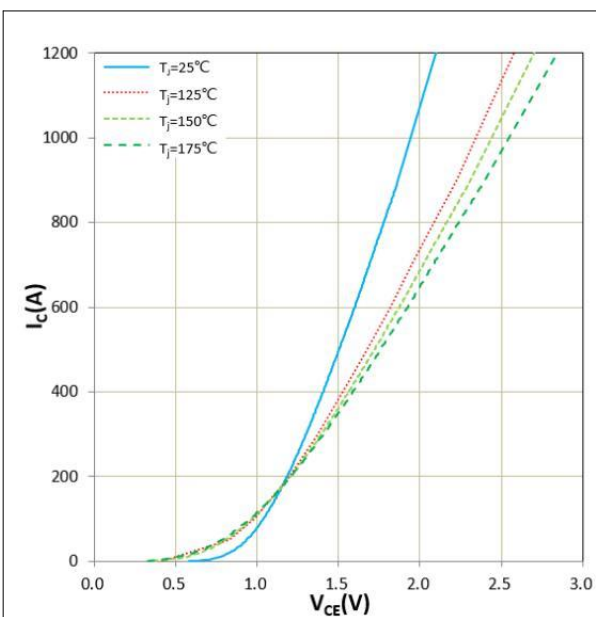


Figure 5. I_C vs V_{CE}
 $V_{GE}=15V$

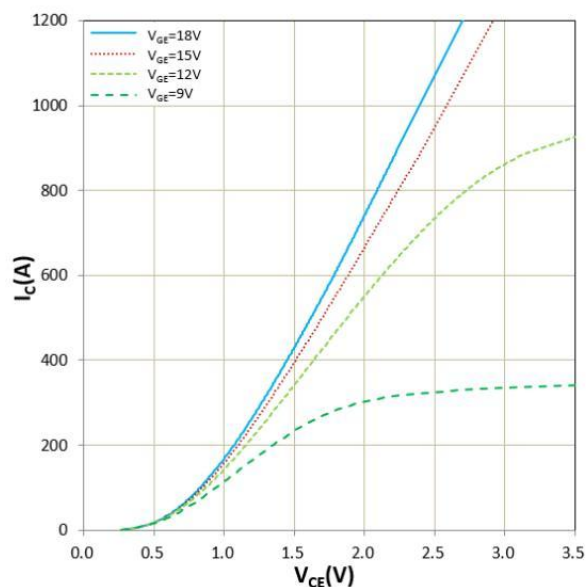


Figure 6. I_C vs V_{CE}
 $T_J=175^{\circ}C$

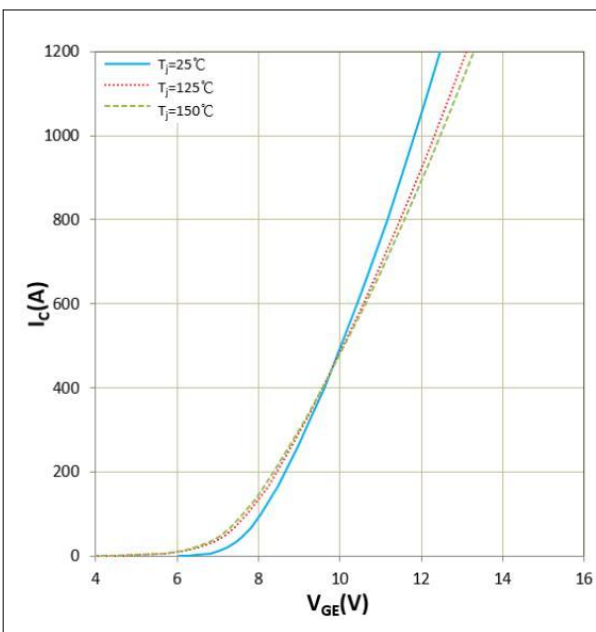


Figure 7. I_c vs V_{GE}

$V_{CE}=20V$

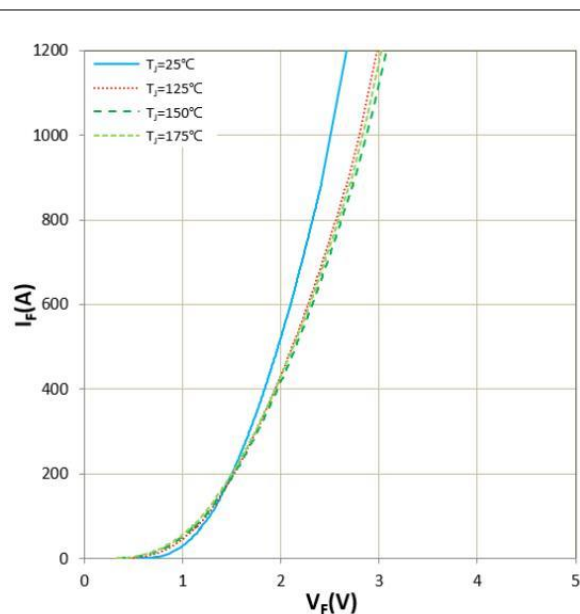


Figure 8. I_F vs V_F

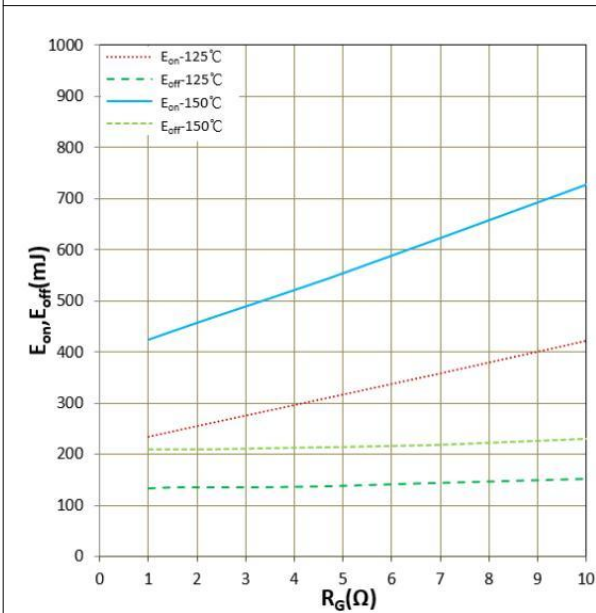


Figure 9. E_{on} , E_{off} vs R_G (Typ)

$V_{CC}=900V$, $V_{GE}=+15V/-8V$, $I_c = 600A$

Inductive Load

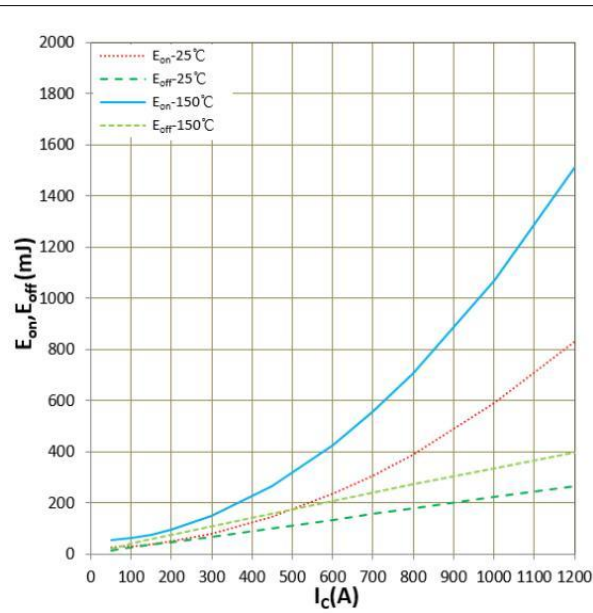


Figure 10. E_{on} , E_{off} vs I_c (Typ)

$V_{CC}=900V$, $V_{GE}=+15V/-8V$, $R_G=1.0\Omega$

Inductive Load

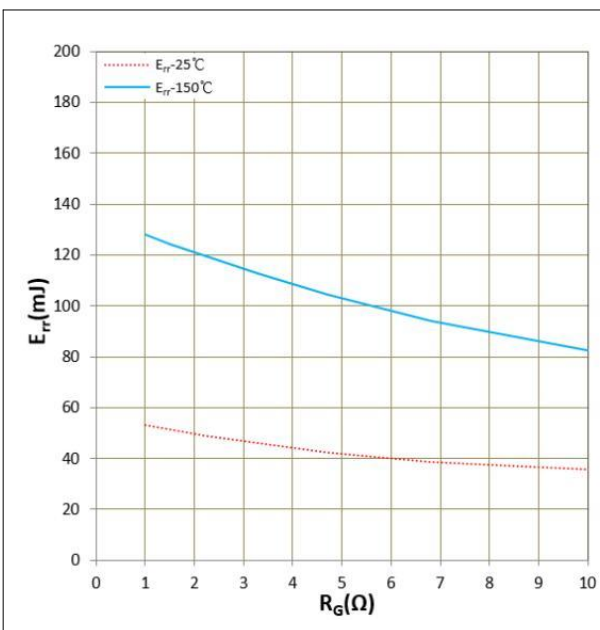


Figure 11. Err vs R_G (Typ)

$V_{CC}=900V$, $V_{GE}=+15V/-8V$, $I_F=600A$

Inductive Load

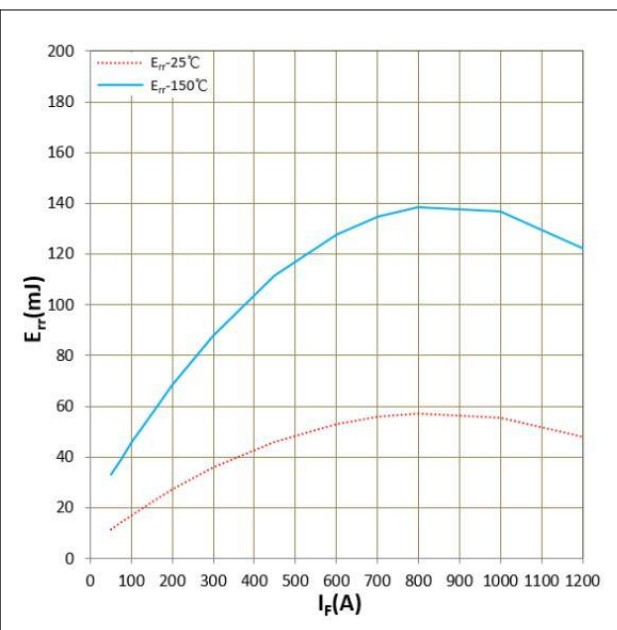


Figure 12. Err vs I_F (Typ)

$V_{CC}=900V$, $V_{GE}=+15V/-8V$, $R_G=1.0\Omega$

Inductive Load

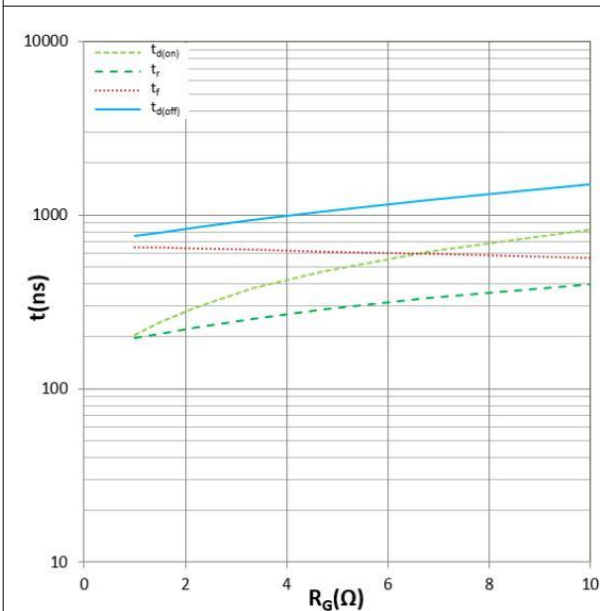


Figure 13. Switching time vs R_G (Typ)

$V_{CC}=900V$, $V_{GE}=+15V/-8V$, $I_C=600A$

$T_J=150^\circ C$, Inductive Load

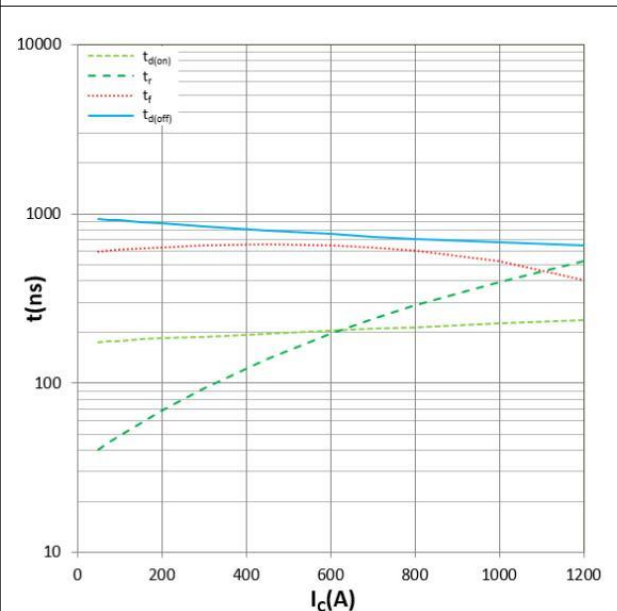


Figure 14. Switching time vs I_C (Typ)

$V_{CC}=900V$, $V_{GE}=+15V/-8V$, $R_G=1.0\Omega$

$T_J=150^\circ C$, Inductive Load

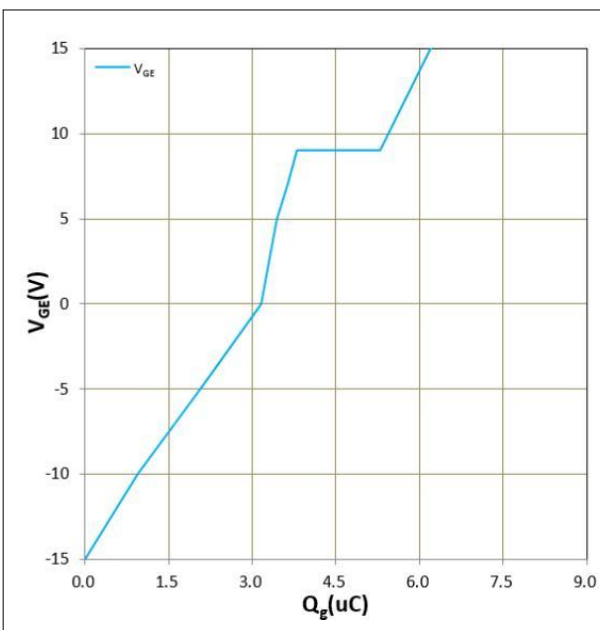


Figure 15. Gate charge

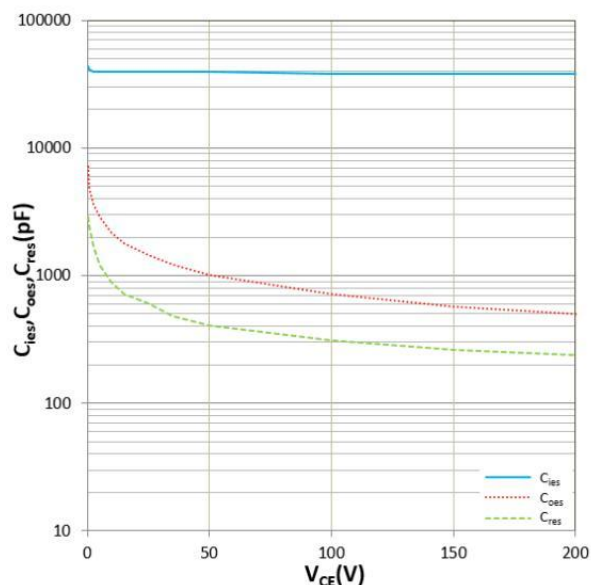


Figure 16. C_{ies} , C_{oes} , C_{res} vs V_{ce}
 $T_j = 25^\circ\text{C}$, $f = 1\text{MHz}$

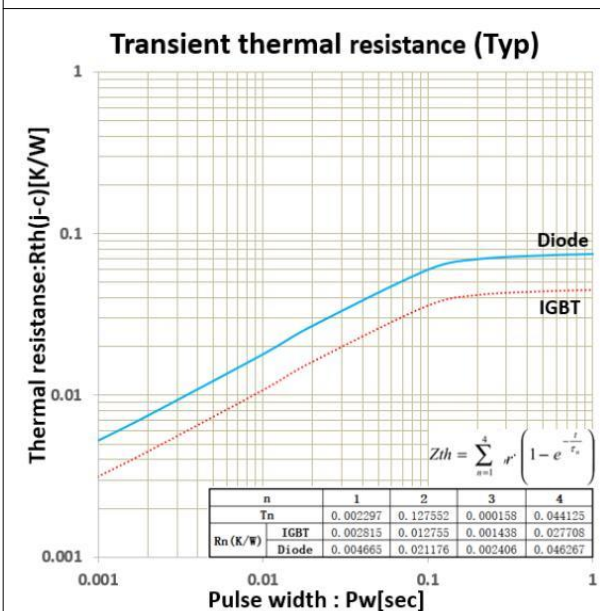


Figure 17. transient thermal impedance
IGBT/Diode

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