

Description

The DFI100HF17DERE1 offer lower losses and higher energy for soft switching applications.



Features

- 1700V/100A, $V_{CE(sat)(typ.)}=1.60V$
- Lower losses and higher energy
- Excellent short-circuit capability
- 34mm halfbridge module

Applications

- Motor drive
- Inverter
- Power supply
- Wind Turbines

Circuit diagram

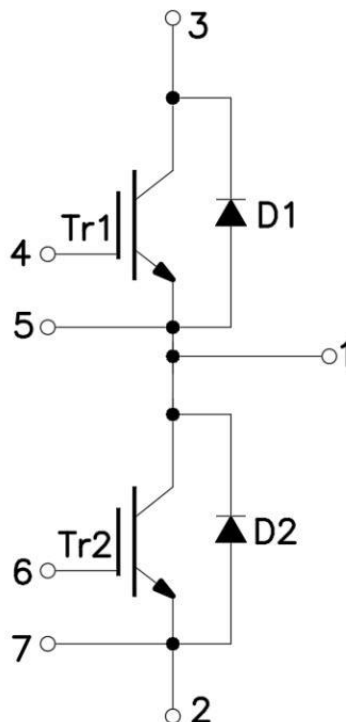


Figure 1. Out drawing & circuit diagram for DFI100HF17DERE1

Pin Configuration and Marking Information

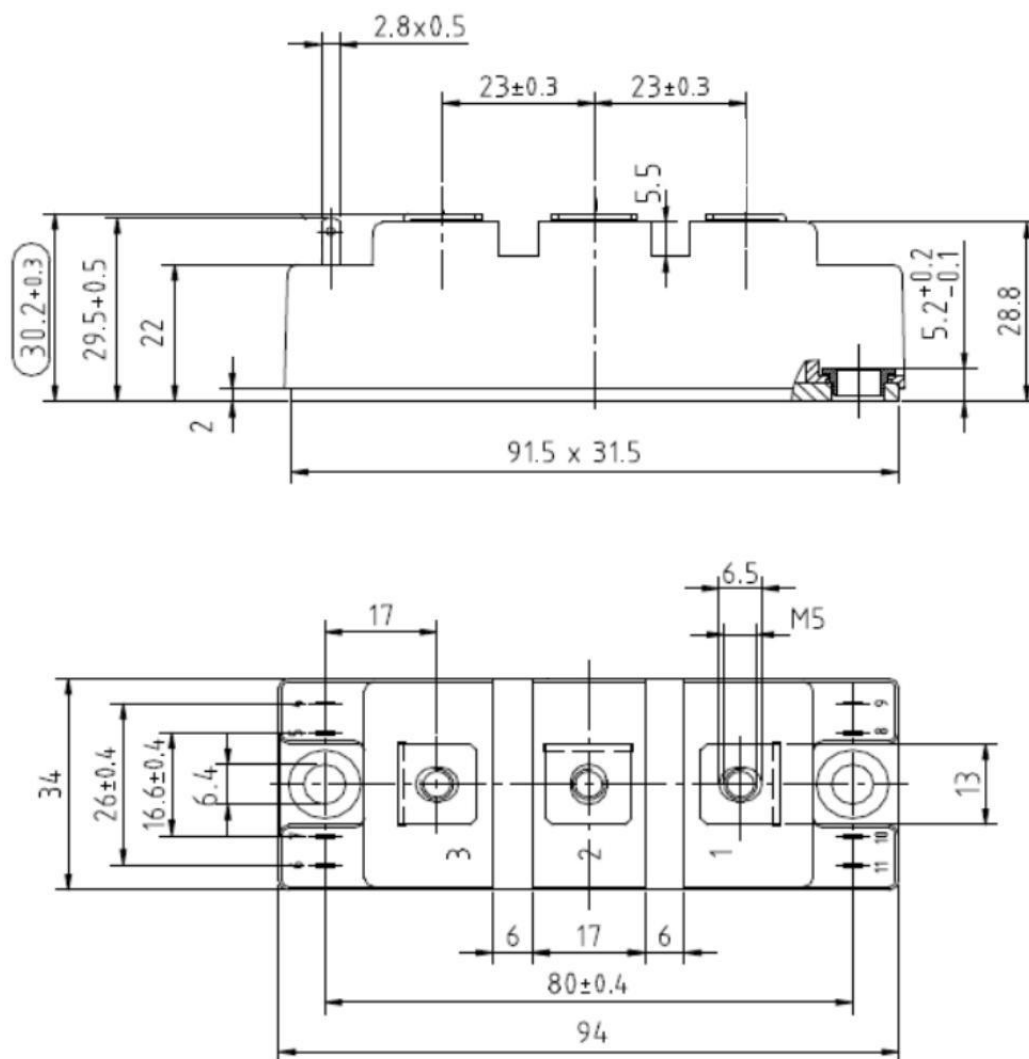


Figure 2. Pin configuration

Module

Parameter	Conditions	Value	Unit
Isolation Voltage	RMS, f = 50Hz, t = 1min	2.5	kV
Material of module baseplate	-	Cu	-
Creepage distance	terminal to heatsink terminal to terminal	26	mm
		21	
Clearance	terminal to heatsink terminal to terminal	23.6	mm
		10	
CTI	-	>200	-

Module lead resistance, terminals - chip	T _C =25°C	0.8	mΩ
Mounting torque for module mounting	M5, M6	3 to 6	Nm
Weight	-	160	g

Maximum Ratings (IGBT, $T_j=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-Emitter Voltage	G-E Short	1800	V
V_{GES}	Gate-Emitter Voltage	C-E Short	± 30	V
I_C	DC Continuous Collector Current	$T_C=100^{\circ}\text{C}$	100	A
I_{CM}	Pulse Collector Current	$t_p=1\text{ms}$, Note1	200	A
P_C	Maximum Power Dissipation	$T_C=25^{\circ}\text{C}$, $T_j=175^{\circ}\text{C}$ (IGBT)	700	W
T_j	junction temperature	-	-40 to 175	$^{\circ}\text{C}$
T_{stg}	Storage temperature	-	-40 to 125	$^{\circ}\text{C}$

Note1: Pulse width limited by maximum junction temperature

Maximum Ratings (Freewheeling diode, $T_j=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V_{RRM}	Peak Repetitive Revers Voltage	-	1700	V
I_F	Diode forward Current	-	100	A
I_{FRM}	Repetitive peak forward Current	$t_p=1\text{ms}$, Note1	200	A
T_j	junction temperature	-	-40 to 175	$^{\circ}\text{C}$
T_{stg}	Storage temperature	-	-40 to 125	$^{\circ}\text{C}$

Note1: Pulse width limited by maximum junction temperature

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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)}	Collector-Emitter Saturation Voltage	I _C =100A, V _{GE} =15V	T _j =25°C	-	1.60	1.90	V	
			T _j =150°C	-	1.80	-	V	
			T _j =175°C	-	1.85	-	V	
V _{GE(th)}	Gate-Emitter threshold Voltage	I _C =1mA, V _{CE} =V _{GE}		5.0	5.8	6.5	V	
Q _G	Gate charge	V _{GE} = -15V to +15V		-	0.998	-	μC	
R _{Gint}	Internal gate resistor	-	T _j =25°C	-	9.0	-	Ω	
C _{ies}	Input Capacitance	V _{CE} =25V	T _j =25°C	-	9000	-	pF	
C _{oes}	Output Capacitance	V _{GE} =0V		-	345	-	pF	
C _{res}	Reverse transfer Capacitance	f=1MHz		-	135	-	pF	
I _{CES}	Collector- Emitter Cut off Current	V _{CE} =1800V, V _{GE} =0V	T _j =25°C	-	-	1	mA	
I _{GES}	Gate-Emitter Leakage Current	V _{GE} =±30V, V _{CE} =0V	T _j =25°C	-	-	300	nA	
t _{d(on)}	Turn-on delay time	V _{CC} =900V I _C =100A R _G =5.0Ω V _{GE} =+15V/-8V Inductive Load	T _j =25°C	-	182	-	ns	
			T _j =150°C	-	217	-		
t _r	Rise time		T _j =25°C	-	54	-	ns	
			T _j =150°C	-	46	-		
t _{d(off)}	Turn-off delay time		T _j =25°C	-	362	-	ns	
			T _j =150°C	-	419	-		
t _f	Fall time		T _j =25°C	-	441	-	ns	
			T _j =150°C	-	672	-		
E _{on}	Turn-on power dissipation		T _j =25°C	-	14.8	-	mJ	
			T _j =150°C	-	21.1	-		
E _{off}	Turn-off power dissipation		T _j =25°C	-	20.2	-	mJ	
			T _j =150°C	-	30.8	-		
R _{th(j-c)}	Thermal Resistance, Junction to Case (IGBT) , Note1			-	-	0.25	°C/W	

Note1: Assumes Thermal Conductivity of grease is 2.8 W/m · K and thickness is 50μm.

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Freewheeling Diode Electrical characteristics ($T_j=25^\circ\text{C}$ unless otherwise specified, chip)

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max.	
V _F	Diode Forward Voltage	I _F =100A, V _{GE} =0V	T _J =25°C	-	1.75	-	V
			T _J =150°C	-	1.70	-	V
			T _J =175°C	-	1.73	-	V
t _{rr}	Diode Reverse Recovery Time	V _R =900V V _{GE} =-8V I _F =100A di/dt =2100A/μs	T _J =25°C		87		ns
	T _J =150°C			255		ns	
I _{rr}	Peak reverse recovery Current		T _J =25°C	-	69	-	A
			T _J =150°C	-	86	-	A
Q _{rr}	Recovered charge		T _J =25°C	-	3.8	-	μC
			T _J =150°C	-	9.2	-	μC
E _{rr}	Reverse recovered energy		T _J =25°C	-	2.3	-	mJ
			T _J =150°C	-	5.6	-	mJ
R _{th(j-c)}	Thermal Resistance, Junction to Case (Diode), Note1			-	-	0.40	°C/W

Note1: Assumes Thermal Conductivity of grease is $2.8 \text{ W/m} \cdot \text{K}$ and thickness is $50\mu\text{m}$.

Test Conditions

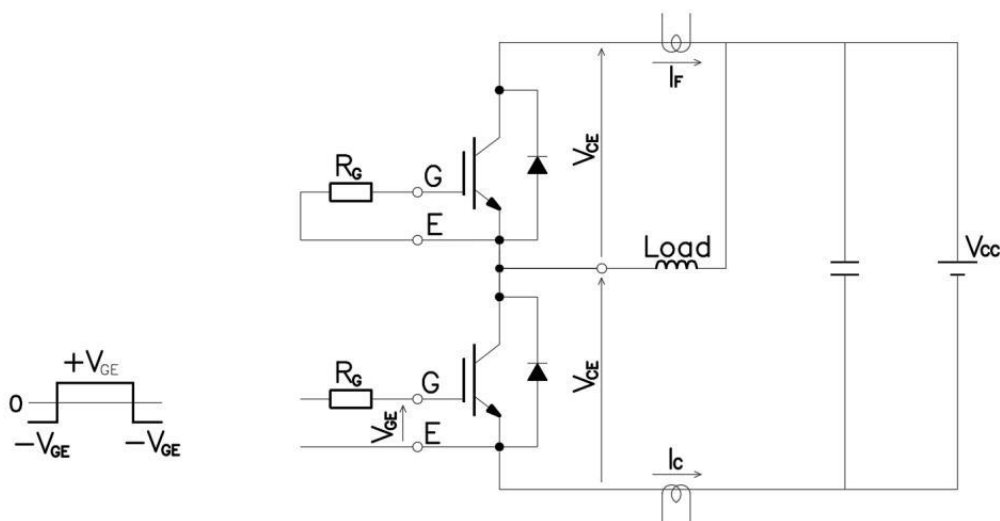


Figure 3. Switching time measure circuit

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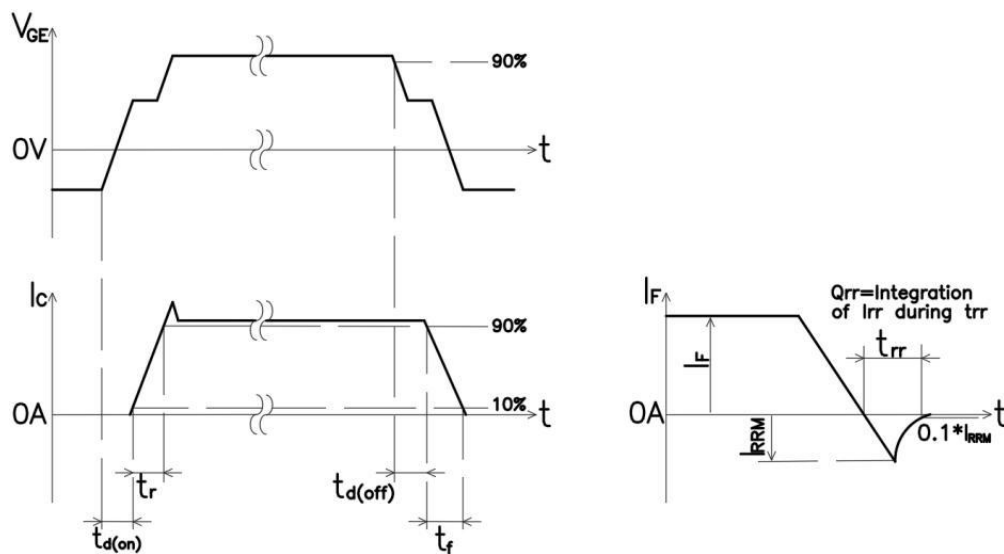


Figure 4. Switching time definition

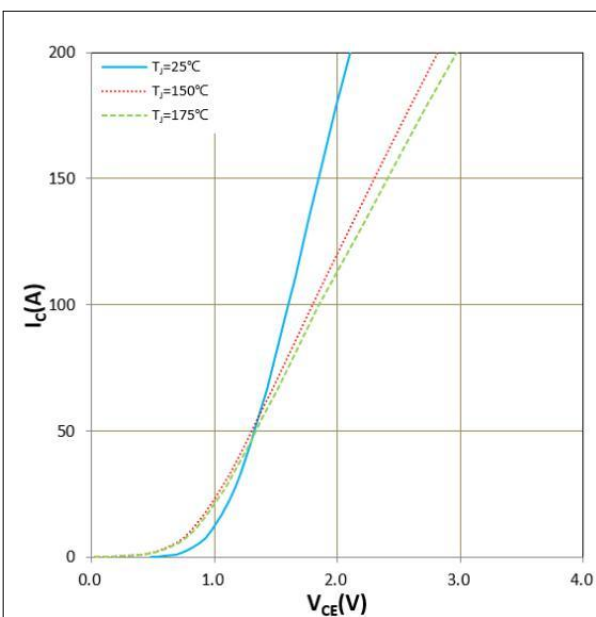


Figure 5. I_C vs V_{CE}
 $V_{GE}=15V$

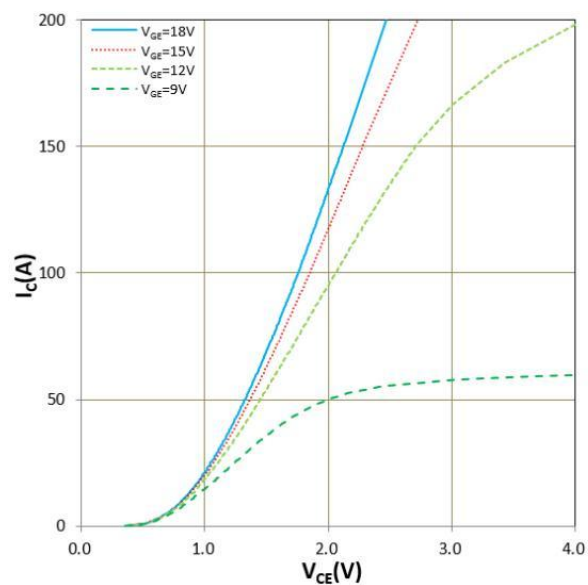


Figure 6. I_C vs V_{CE}
 $T_J=175^{\circ}C$

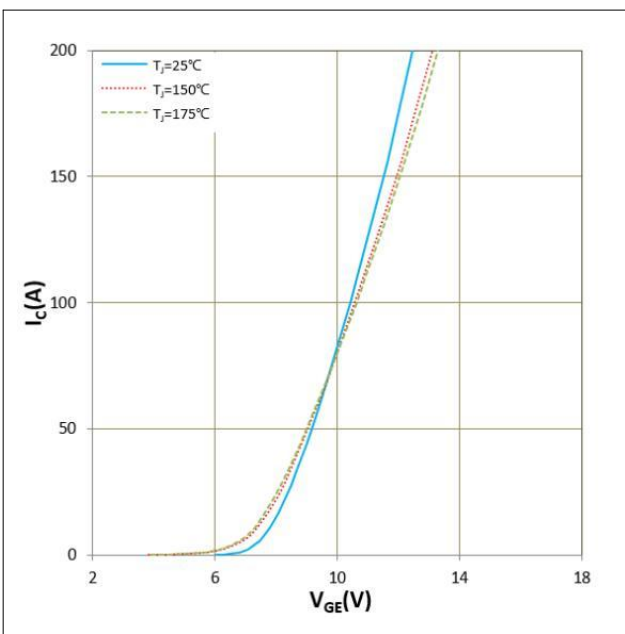


Figure 7. I_c vs V_{GE}

$V_{CE} = 20\text{V}$

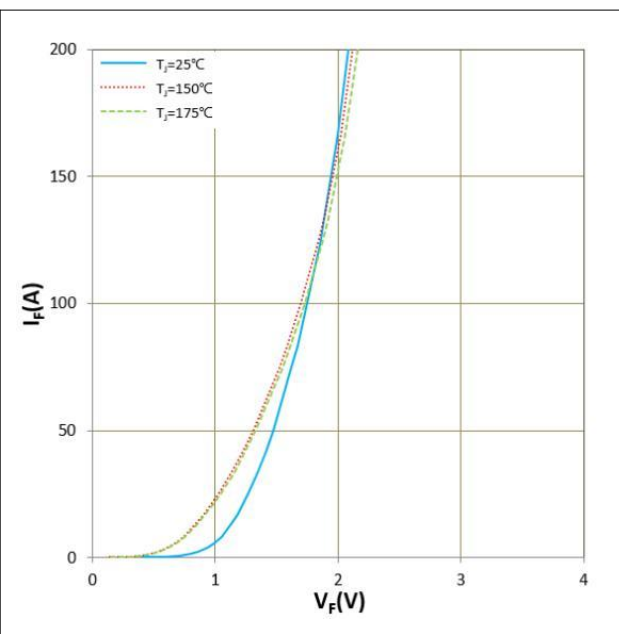


Figure 8. I_F vs V_F

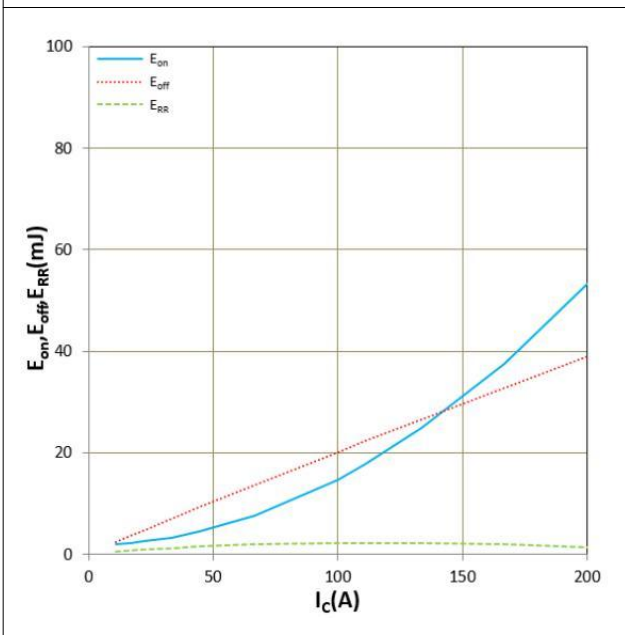


Figure 9. E_{on} , E_{off} , E_{rr} vs I_c (Typ)

$V_{CC} = 900\text{V}$, $V_{GE} = +15\text{V}/-8\text{V}$, $R_g = 5.0\Omega$, $T_j = 25^\circ\text{C}$

Inductive Load

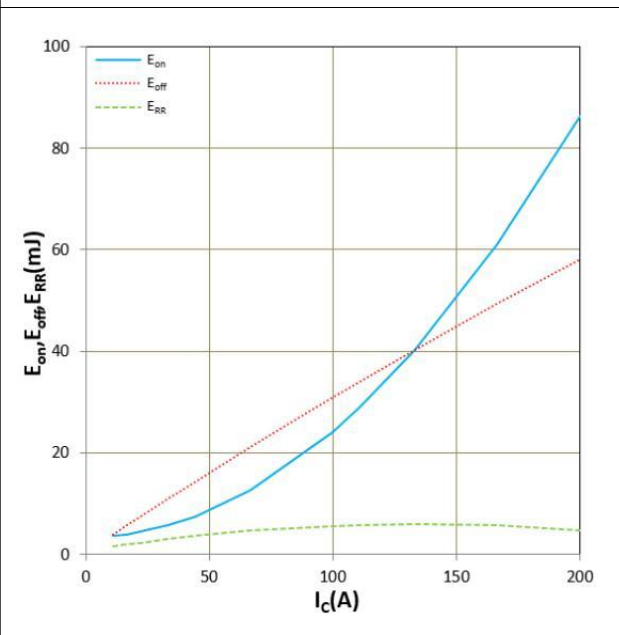


Figure 10. E_{on} , E_{off} , E_{rr} vs I_c (Typ)

$V_{CC} = 900\text{V}$, $V_{GE} = +15\text{V}/-8\text{V}$, $R_g = 5.0\Omega$, $T_j = 150^\circ\text{C}$

Inductive Load

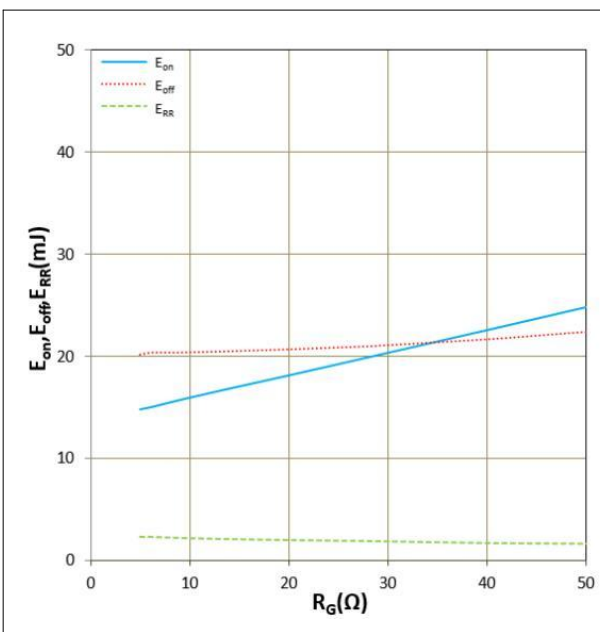


Figure 11. E_{on} , E_{off} vs R_G (Typ)

$V_{CC}=900V$, $V_{GE}=+15V/-8V$, $I_C=100A$, $T_j=25^{\circ}C$

Inductive Load

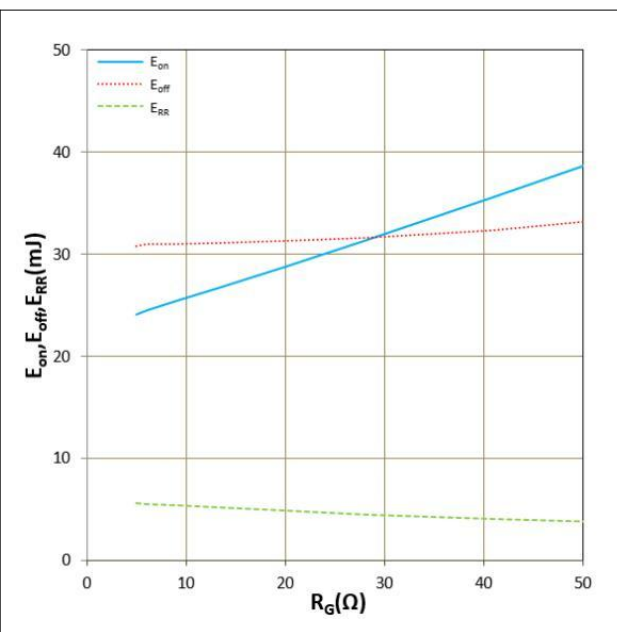


Figure 12. E_{on} , E_{off} vs R_G (Typ)

$V_{CC}=900V$, $V_{GE}=+15V/-8V$, $I_C=100A$, $T_j=150^{\circ}C$

Inductive Load

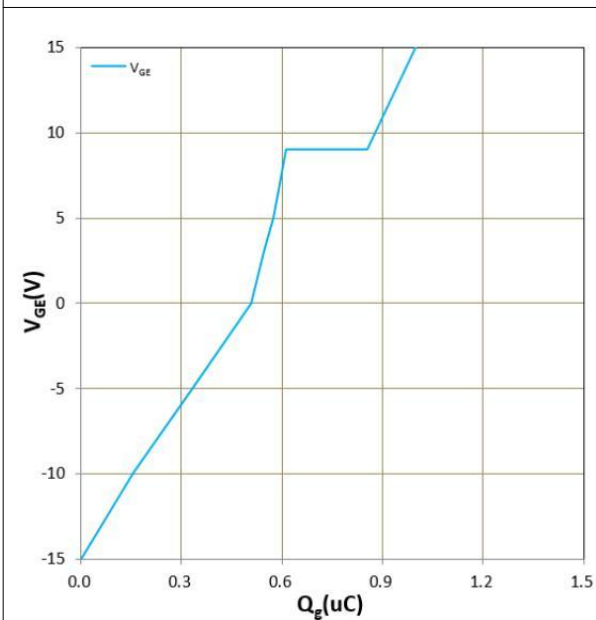


Figure 13. Gate charge

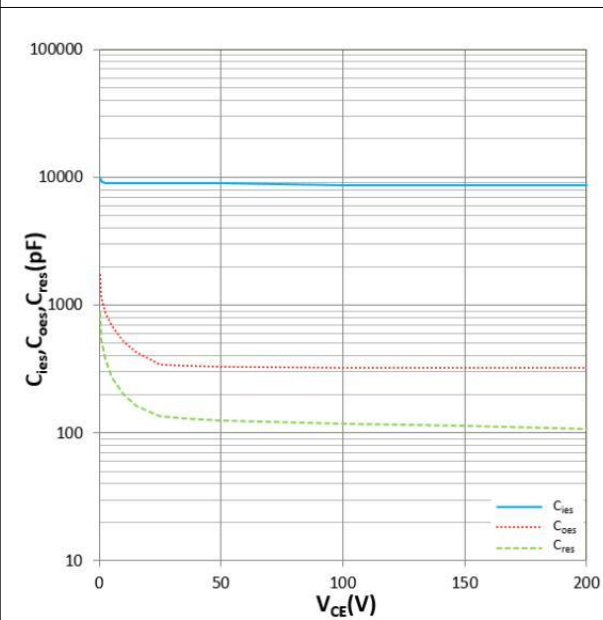


Figure 14. C_{ies} , C_{oes} , C_{res} vs V_{CE}

$T_j=25^{\circ}C$, $f=1MHz$

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