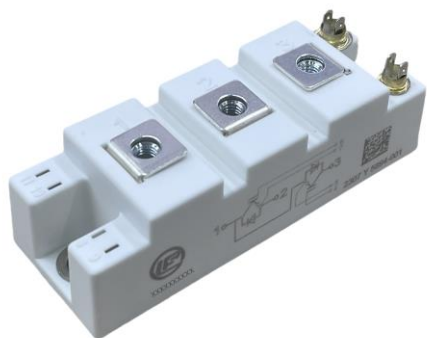


Description

The DFI150HF17DERE1 offer lower losses and higher energy for soft switching applications.



Features

- 1700V150A, $V_{CE(sat)}(typ.) = 1.60V$
- Lower losses and higher energy
- Excellent short-circuit capability
- 34mm half bridge module

Applications

- Motor drive
- Inverter
- Power supply
- Wind Turbines

Circuit diagram

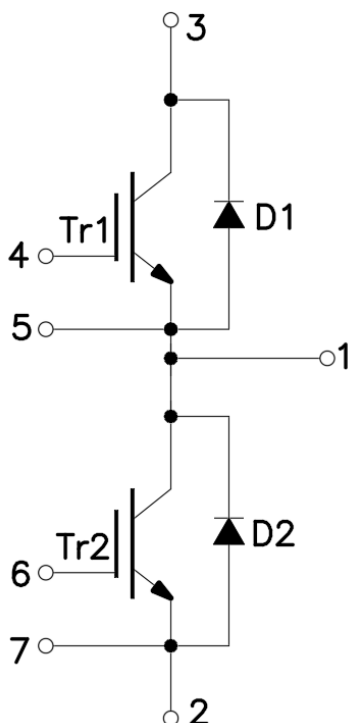


Figure 1. Out drawing & circuit diagram for DFI150HF17DERE1

Pin Configuration and Marking Information

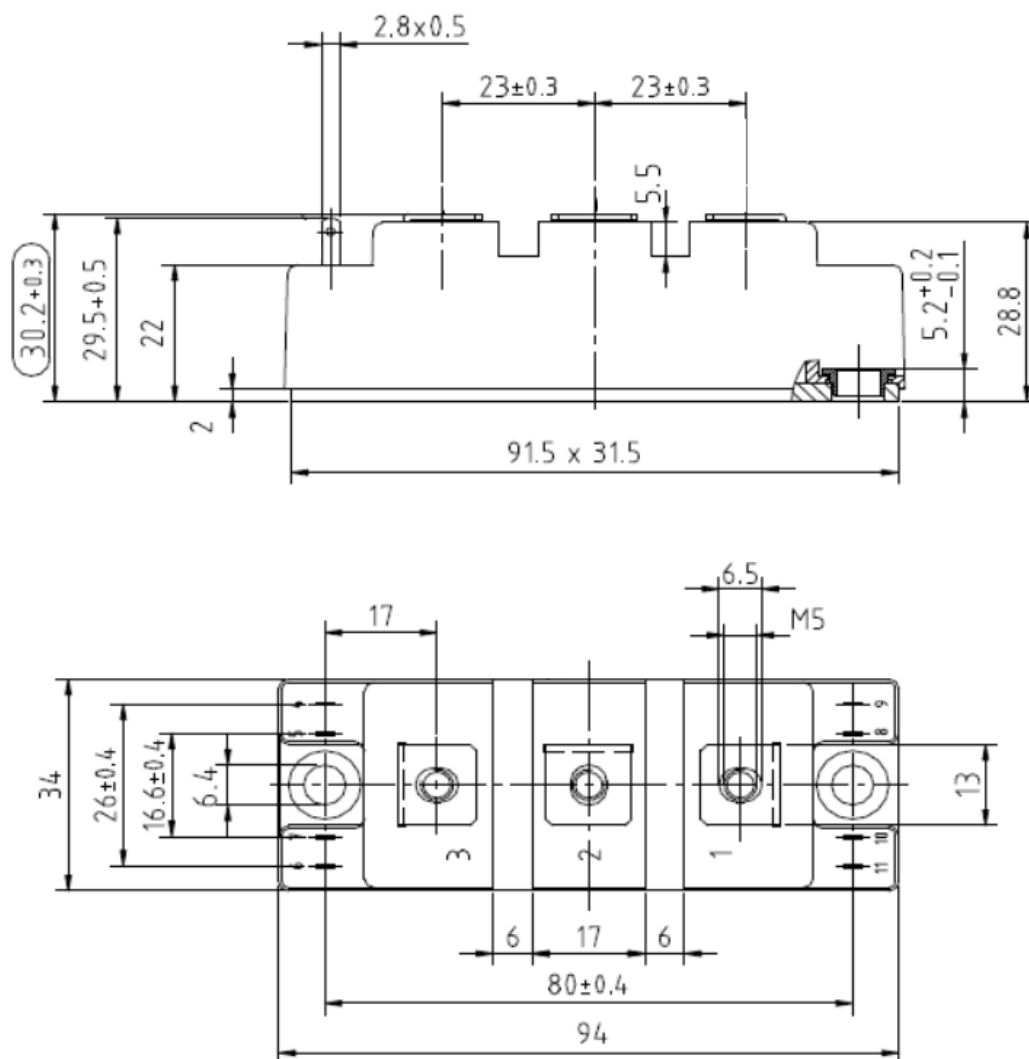


Figure 2. Pin configuration

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 21	mm
Clearance	terminal to heatsink terminal to terminal	23.6 10	mm
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	$T_C = 100^\circ\text{C}$	150	A
I_{CM}	Pulse Collector Current	$t_p = 1\text{ms}$, Note1	300	A
P_C	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$, $T_j = 175^\circ\text{C}$ (IGBT)	833	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	-	150	A
I_{FRM}	Repetitive peak forward Current	$t_p = 1\text{ms}$, Note1	300	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

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 =150A, 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		-	1.5	-	μC
R _{Gint}	Internal gate resistor	-	T _J =25°C	-	6.5	-	Ω
C _{ies}	Input Capacitance	V _{CE} =25V	T _J =25°C	-	12500	-	pF
C _{oes}	Output Capacitance	V _{GE} =0V		-	490	-	pF
C _{res}	Reverse transfer Capacitance	f =1MHz		-	210	-	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	-	-	450	nA
t _{d(on)}	Turn-on delay time	V _{CC} =900V I _C =150A R _G =5.0Ω V _{GE} =+15V/-8V Inductive Load	T _J =25°C	-	121	-	ns
			T _J =150°C	-	147	-	ns
t _r	Rise time		T _J =25°C	-	88	-	ns
			T _J =150°C	-	81	-	ns
t _{d(off)}	Turn-off delay time		T _J =25°C	-	502	-	ns
			T _J =150°C	-	584	-	ns
t _f	Fall time		T _J =25°C	-	412	-	ns
			T _J =150°C	-	673	-	ns
E _{on}	Turn-on power dissipation		T _J =25°C	-	23.1	-	mJ
			T _J =150°C	-	37.4	-	mJ
E _{off}	Turn-off power dissipation		T _J =25°C	-	30.4	-	mJ
			T _J =150°C	-	46.5	-	mJ
R _{th(j-c)}	Thermal Resistance, Junction to Case (IGBT) , Note1			-	-	0.18	°C/W

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

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 =150A, 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 =150A di/dt =2100A/μs	T _J =25°C		95		ns
			T _J =150°C		149		ns
I _{rr}	Peak reverse recovery Current		T _J =25°C	-	122	-	A
			T _J =150°C	-	138	-	A
Q _{rr}	Recovered charge		T _J =25°C	-	8	-	μC
			T _J =150°C	-	15	-	μC
E _{rr}	Reverse recovered energy		T _J =25°C	-	5.1	-	mJ
			T _J =150°C	-	12.2	-	mJ
R _{th(j-c)}	Thermal Resistance, Junction to Case (Diode), Note1			-	-	0.30	°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

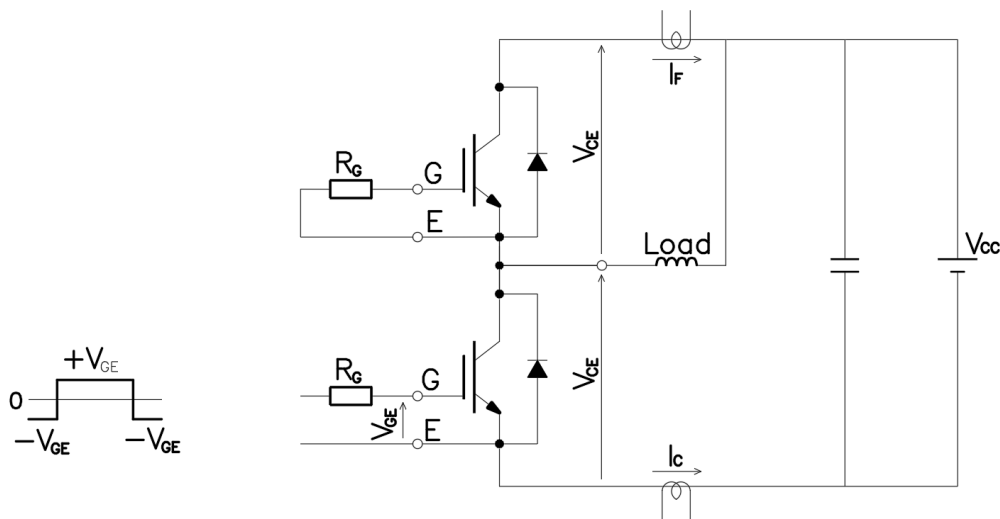


Figure 3. Switching time measure circuit

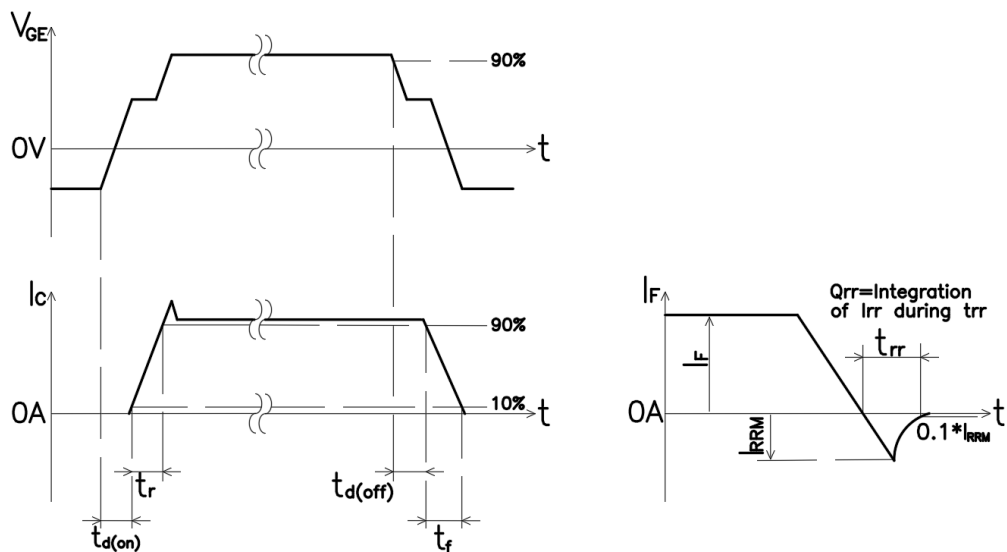


Figure 4. Switching time definition

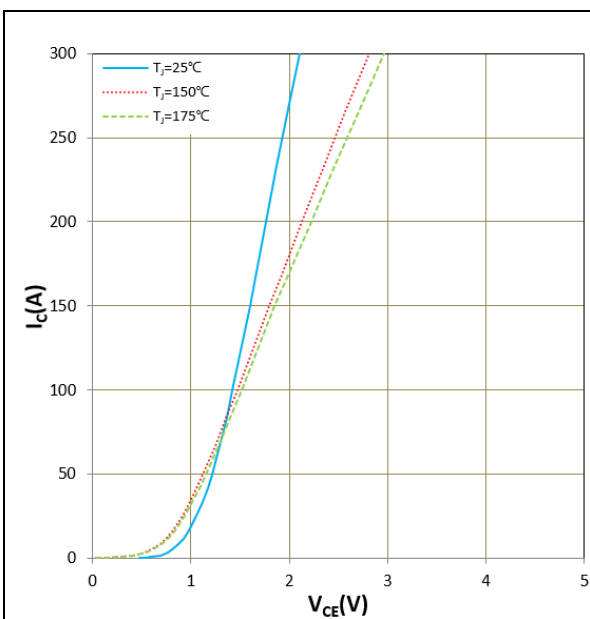


Figure 5. I_C vs V_{CE}
 $V_{GE} = 15V$

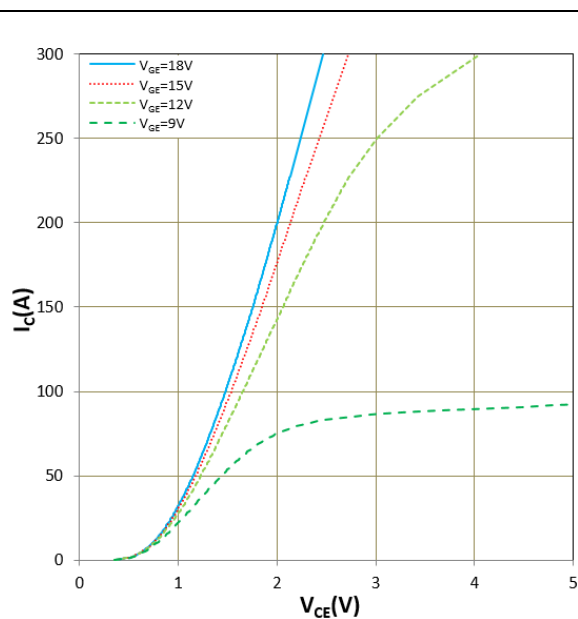


Figure 6. I_C vs V_{CE}
 $T_j = 175^\circ C$

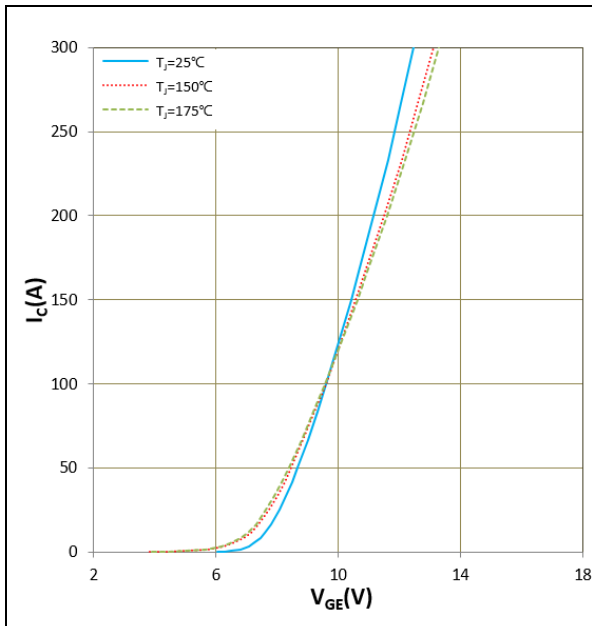


Figure 7. I_c vs V_{GE}
 $V_{CE}=20V$

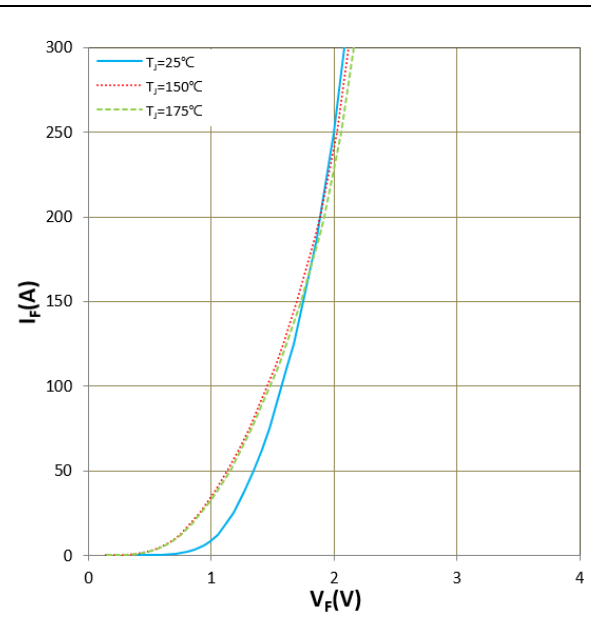


Figure 8. I_F vs V_F

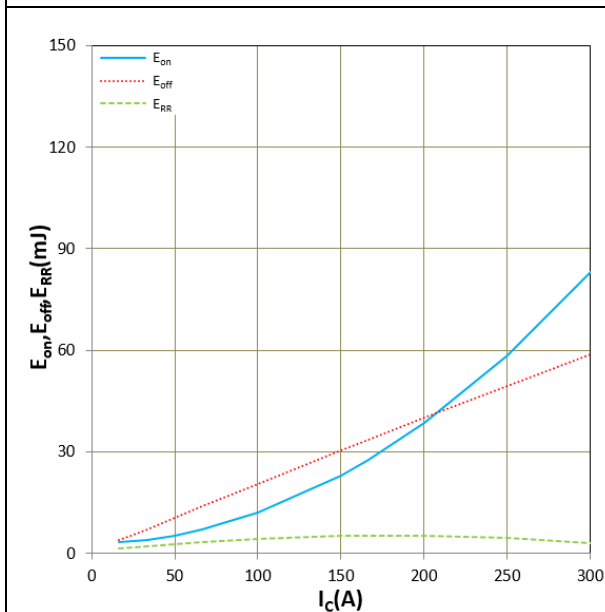


Figure 9. E_{on} , E_{off} , E_{rr} vs I_c (Typ)
 $V_{CC}=900V$, $V_{GE}=+15V/-8V$, $R_g=5.0\Omega$, $T_j=25^\circ C$
Inductive Load

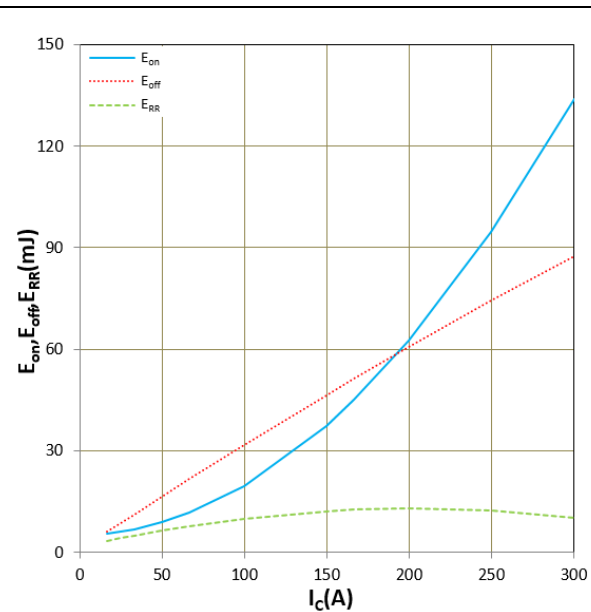


Figure 10. E_{on} , E_{off} , E_{rr} vs I_c (Typ)
 $V_{CC}=900V$, $V_{GE}=+15V/-8V$, $R_g=5.0\Omega$, $T_j=150^\circ C$
Inductive Load

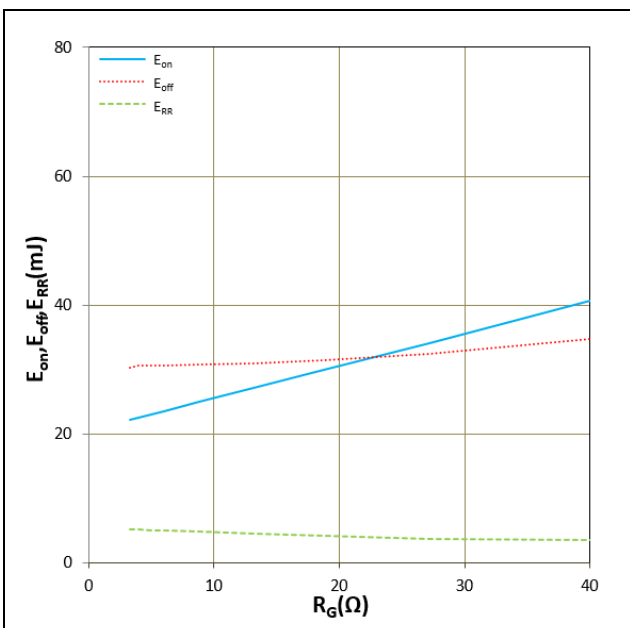


Figure 11. E_{on} , E_{off} vs R_G (Typ)
 $V_{CC}=900V$, $V_{GE}=+15V/-8V$, $I_C=150A$, $T_j=25^\circ C$
 Inductive Load

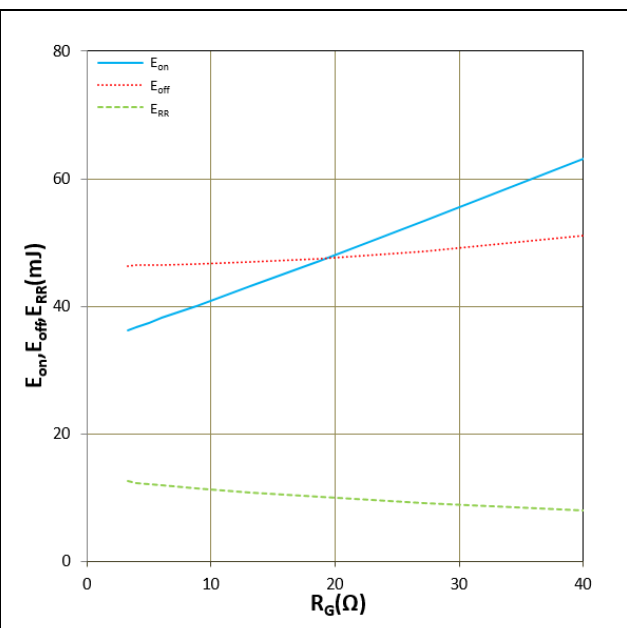


Figure 12. E_{on} , E_{off} vs R_G (Typ)
 $V_{CC}=900V$, $V_{GE}=+15V/-8V$, $I_C=150A$, $T_j=150^\circ C$
 Inductive Load

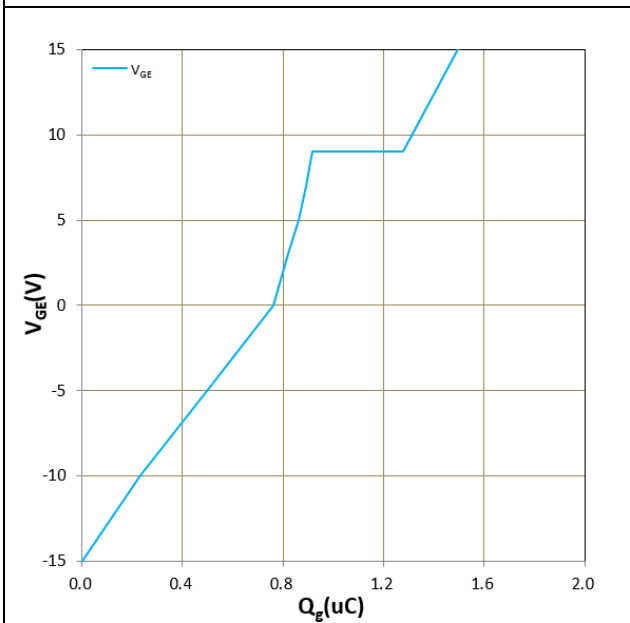


Figure 13. Gate charge

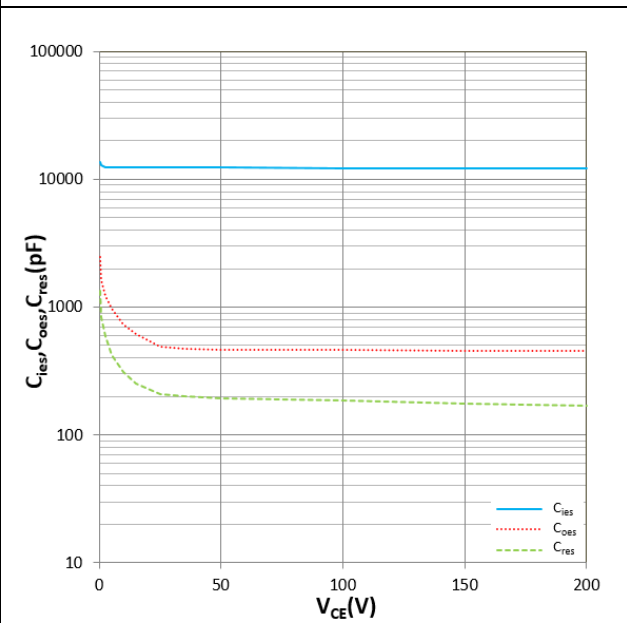


Figure 14. C_{ies} , C_{oes} , C_{res} vs V_{CE}
 $T_j=25^\circ C$, $f=1MHz$

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