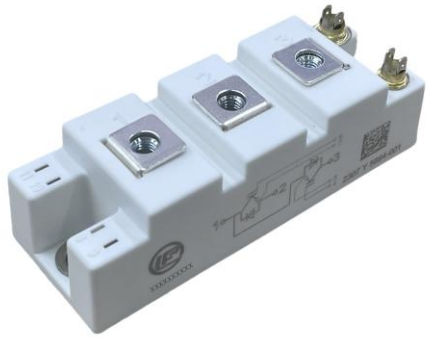
DFI150HF17DERE1

1700V/150A Half Bridge IGBT Module

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

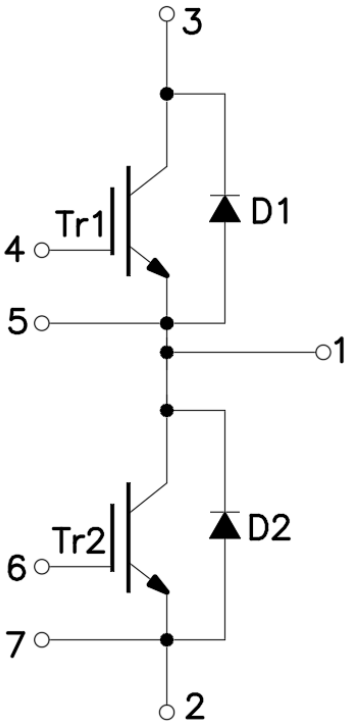


Figure 1. Out drawing & circuit diagram for DFI150HF17DERE1

Pin Configuration and Marking Information

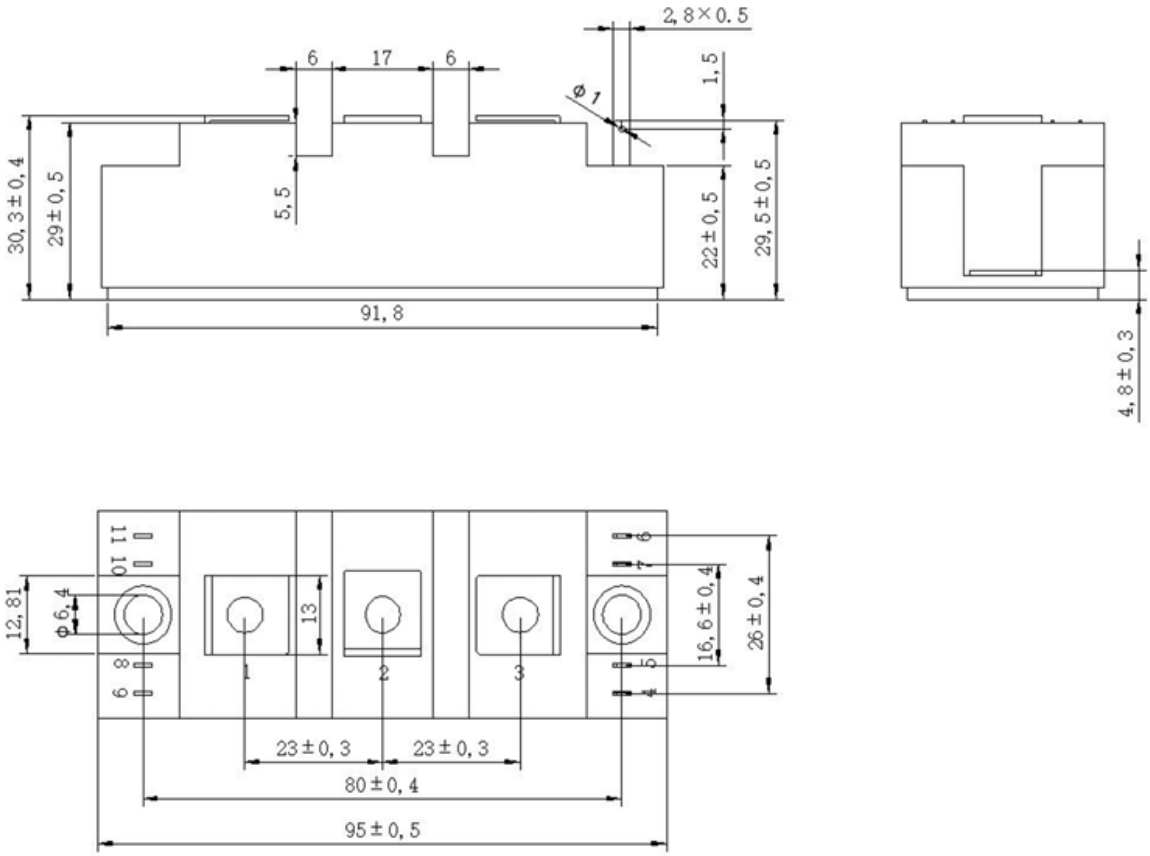


Figure 2. Pin configuration

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°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°C	150	A
I_{CM}	Pulse Collector Current	t_p=1ms, Note1	300	A
P_C	Maximum Power Dissipation	T_C=25°C, T_j=175°C(IGBT)	833	W
T_j	junction temperature	-	-40 to 175	°C
T_{stg}	Storage temperature	-	-40 to 125	°C

Note1: Pulse width limited by maximum junction temperature

Maximum Ratings (Freewheeling diode, T_j=25°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=1ms, Note1	300	A
T_j	junction temperature	-	-40 to 175	°C
T_{stg}	Storage temperature	-	-40 to 125	°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 V_{GE} =0V f =1MHz	T_j =25°C	-	12500	-	pF
C_{oes}	Output Capacitance			-	490	-	pF
C_{res}	Reverse transfer Capacitance			-	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_{GON} =6.8Ω R_{GOFF} =5.6Ω V_{GE} =+15V/-8V Inductive Load	T_j =25°C	-	280.8	-	ns
			T_j =150°C	-	285.6	-	ns
t_r	Rise time		T_j =25°C	-	79.2	-	ns
			T_j =150°C	-	100.8	-	ns
$t_{d(off)}$	Turn-off delay time		T_j =25°C	-	508	-	ns
			T_j =150°C	-	596	-	ns
t_f	Fall time		T_j =25°C	-	394	-	ns
			T_j=150°C	-	520	-	ns
E_{on}	Turn-on power dissipation		T_j =25°C	-	34.6	-	mJ
			T_j =150°C	-	48.1	-	mJ
E_{off}	Turn-off power dissipation		T_j =25°C	-	32.8	-	mJ
			T_j =150°C	-	40.3	-	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 50um.

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 =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 R_{GON} =6.8Ω R_{GOFF} =5.6Ω Inductive Load	T_j =25°C		547.2		ns
			T_j =150°C		782.4		ns
I_{rr}	Peak reverse recovery Current		T_j =25°C	-	216.2	-	A
			T_j =150°C	-	207	-	A
Q_{rr}	Recovered charge		T_j=25°C	-	39.3	-	μC
			T_j =150°C	-	53.4	-	μC
E_{rr}	Reverse recovered energy		T_j =25°C	-	22.8	-	mJ
			T_j =150°C	-	30	-	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 W/m・K and thickness is 50um.

Test Conditions

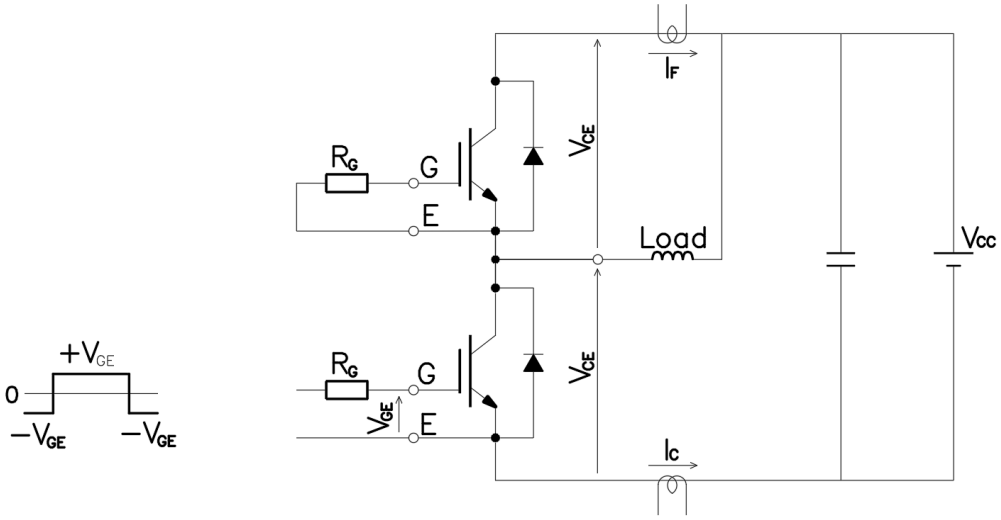


Figure 3. Switching time measure circuit

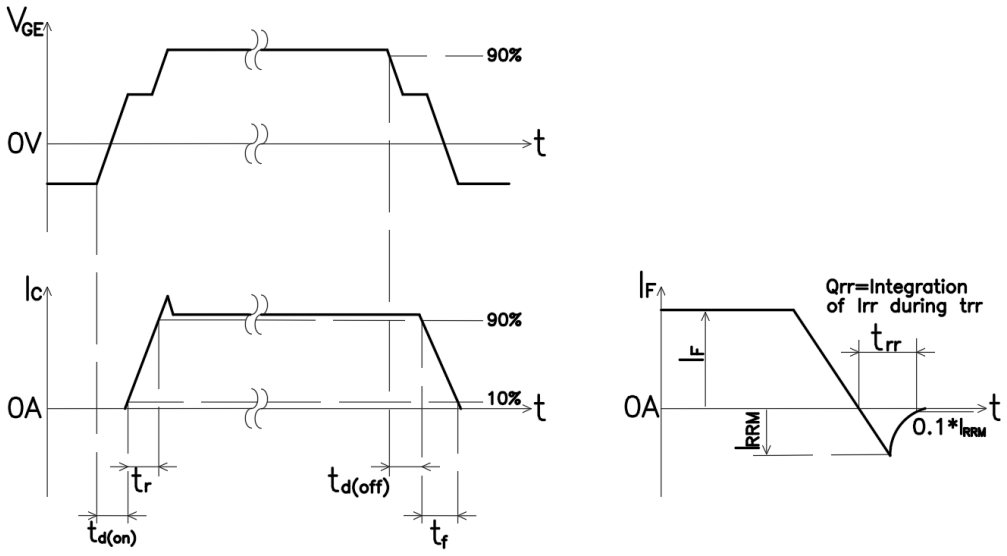


Figure 4. Switching time definition

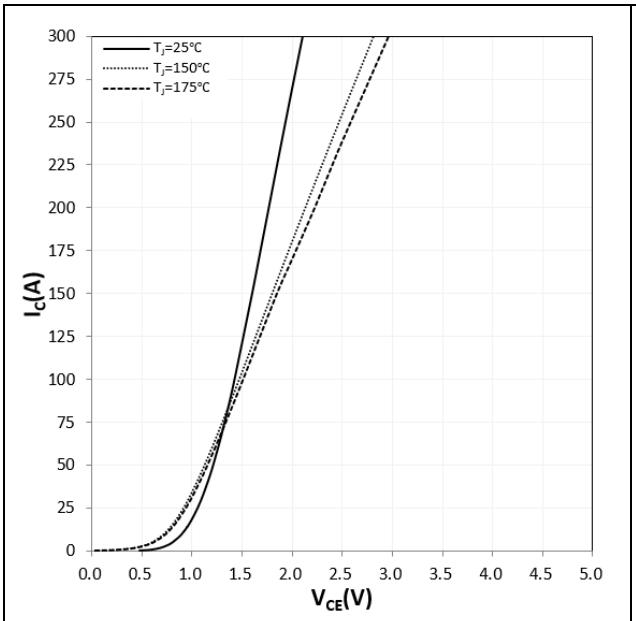


Figure 5. Ic vs V_{CE}
V_{GE}=15V

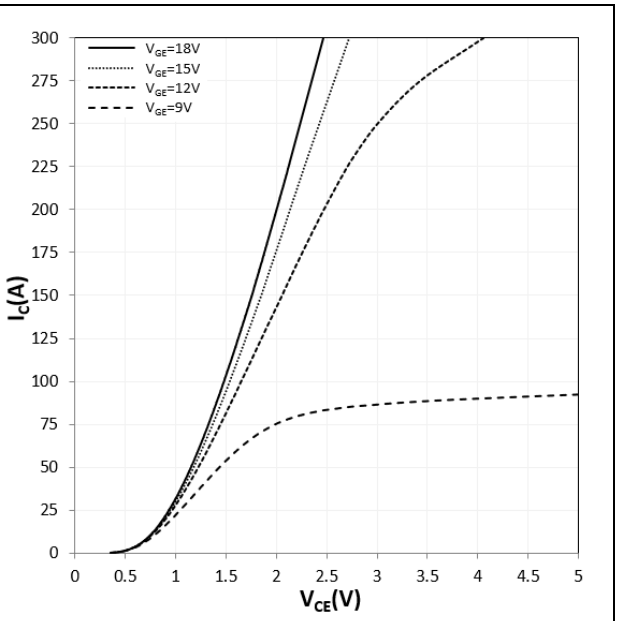


Figure 6. Ic vs V_{CE}
T_j=175°C

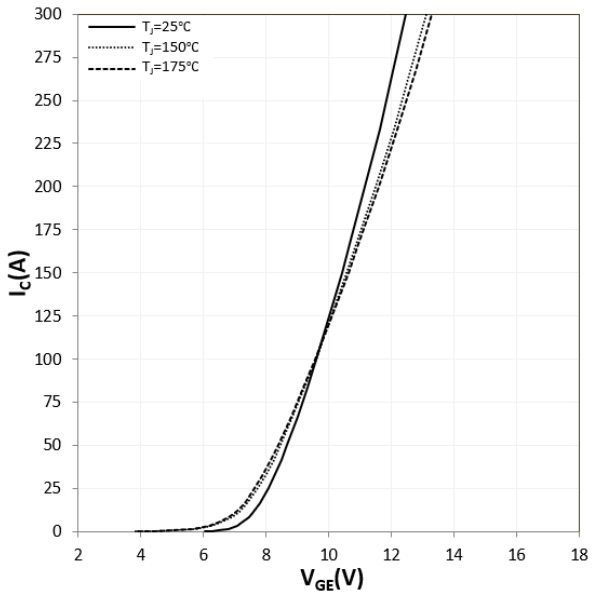


Figure 7. Ic vs V_{GE}
V_{CE} =20V

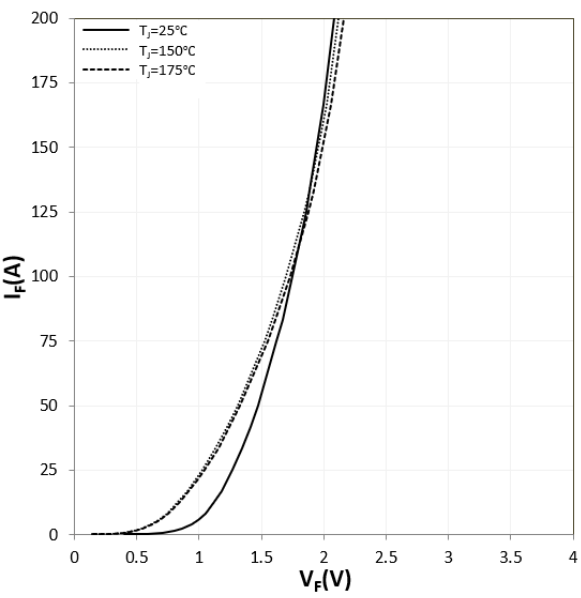


Figure 8. I_F vs V_F

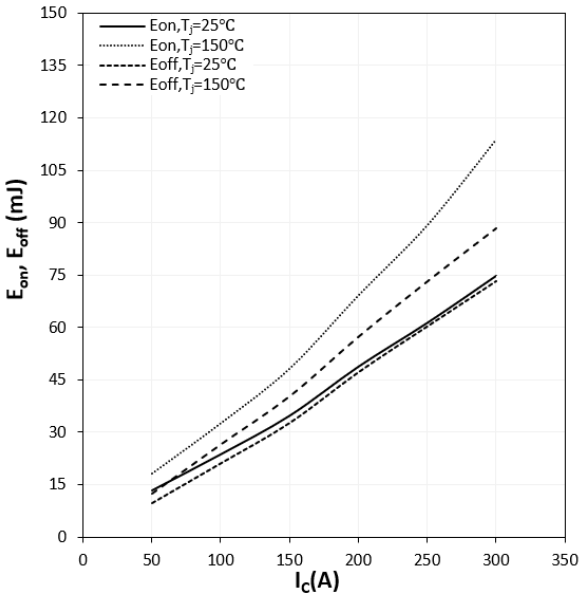


Figure 9. E_{on}, E_{off} vs I_C
V_{CC}=900V, V_{GE} =+15V/-8V, R_{gon}=6.8Ω, R_{goff}=5.6Ω
Inductive Load

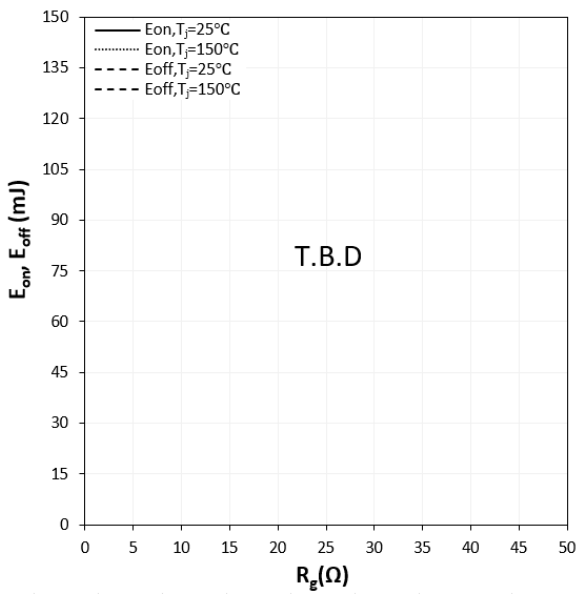


Figure 10. E_{on}, E_{off} vs R_g
V_{CC}=900V, V_{GE} =+15V/-8V, I_C=150A
Inductive Load

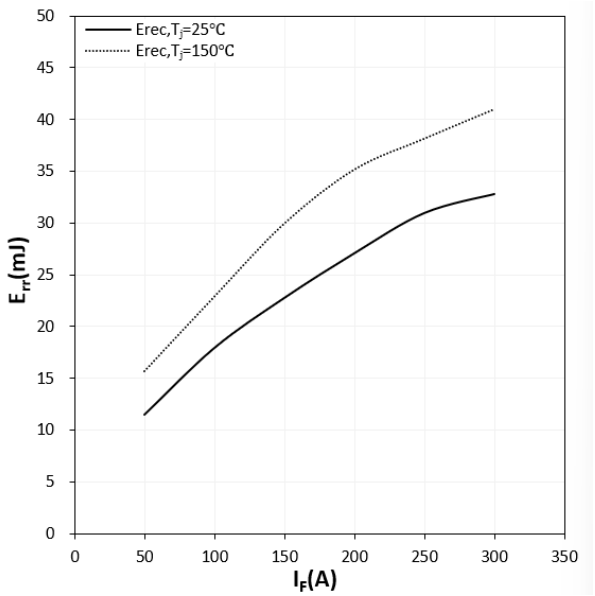


Figure 11. E_{rr} vs I_F
V_{CC}=900V, V_{GE}=+15V/-8V, R_{gon}=6.8Ω, R_{goff}=5.6Ω
Inductive Load

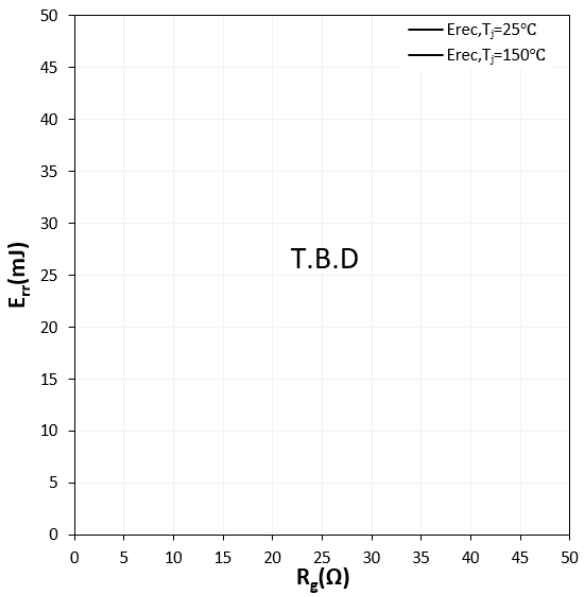


Figure 12. E_{rr} vs R_g
V_{CC}=900V, V_{GE}=+15V/-8V, I_F=150A
Inductive Load

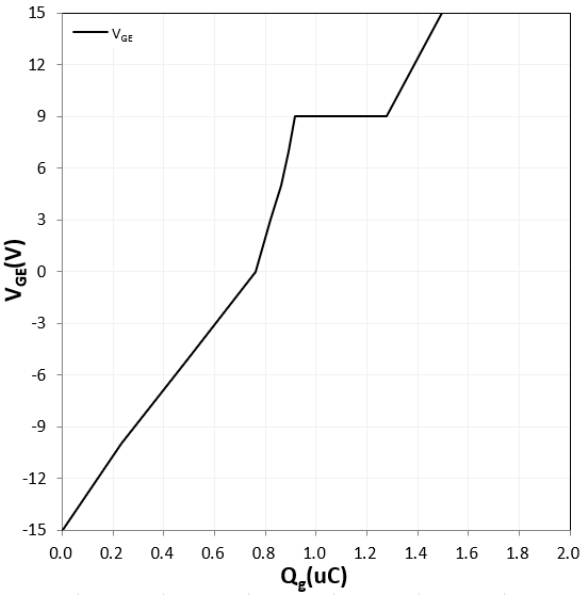


Figure 13. Gate charge

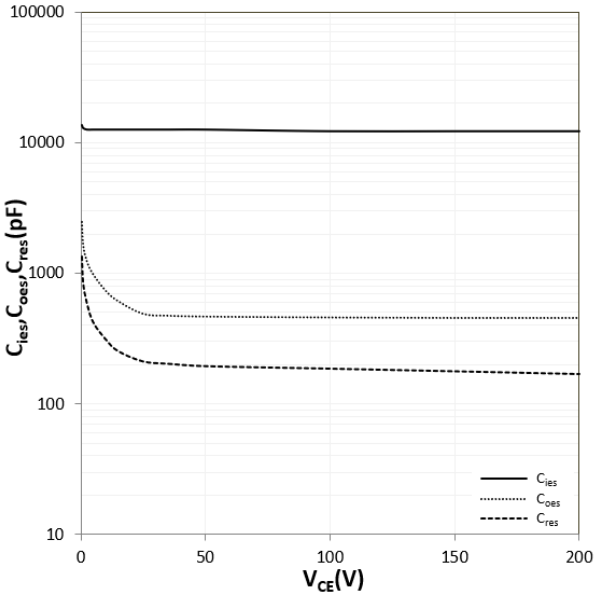


Figure 14. C_{ies}, C_{oes}, C_{res} vs V_{CE}
T_j=25°C, f=1MHz

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