

Description

The DFI500HF17DFRE1 offer lower losses and higher energy for soft switching applications.



Features

- 1700V500 A, $V_{CE(sat)}(typ.) = 1.8V$
- Lower losses and higher energy
- Excellent short-circuit capability
- 62mm half bridge module

Applications

- Motor drive
- Inverter
- Power supply
- Wind Turbines

Circuit diagram

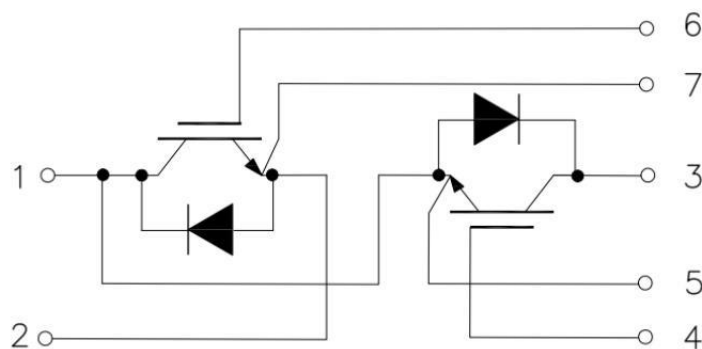


Figure 1. Out drawing & circuit diagram for DFI500HF17DFRE1

Pin Configuration and Marking Information

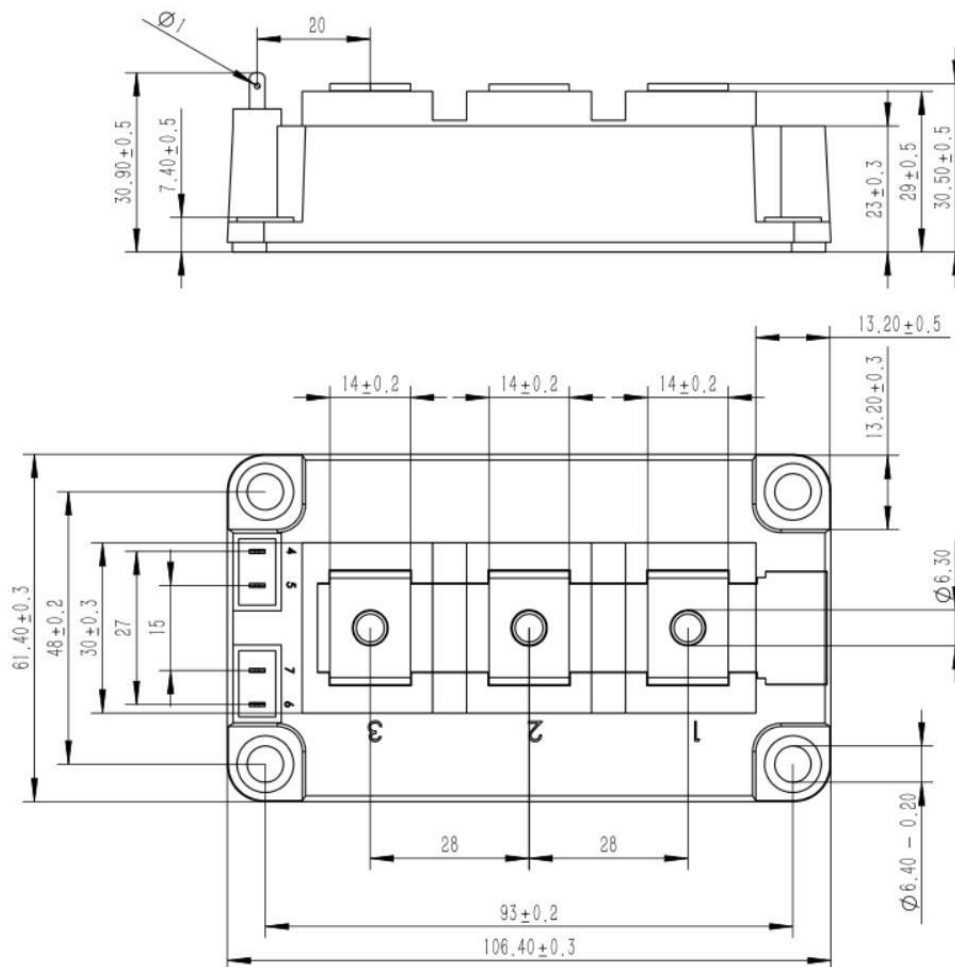


Figure 2. Pin configuration

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	47	mm
		26	
Clearance	terminal to heatsink terminal to terminal	29	mm
		14	
CTI	-	>200	-
Module lead resistance, terminals - chip	T _C =25°C	0.8	mΩ
Mounting torque for module mounting	M6	3 to 6	Nm
Weight	-	315	g

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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	1700	V
V_{GES}	Gate-Emitter Voltage	C-E Short	$\pm 20\text{V}$	V
I_C	DC Continuous Collector Current	$T_C=80^{\circ}\text{C}$	500	A
I_{CM}	Pulse Collector Current	$t_p=1\text{ms}$, Note1	1000	A
P_C	Maximum Power Dissipation	$T_C=25^{\circ}\text{C}$, $T_j=150^{\circ}\text{C}$ (IGBT)	1645	W
I_F	Diode forward Current	-	500	A
I_{FRM}	Repetitive peak forward Current	$t_p=1\text{ms}$, Note1	1000	A
I^2t	I^2t -value	$V_R=0\text{V}$, $t_p=10\text{ms}$, $T_j=125^{\circ}\text{C}$ (Diode)	20000	A^2s
T_{jmax}	Max junction temperature	-	175	$^{\circ}\text{C}$
T_{jop}	Operating junction temperature	-	-40 to 150	$^{\circ}\text{C}$
T_{stg}	Storage temperature	-	-40 to 125	$^{\circ}\text{C}$

Note1: Pulse width limited by maximum junction temperature

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

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=500\text{A}$ $V_{GE}=15\text{V}$	$T_j=25^{\circ}\text{C}$	-	1.8	-	V
			$T_j=125^{\circ}\text{C}$	-	2.2	-	V
			$T_j=150^{\circ}\text{C}$	-	2.3	-	V
$V_{GE(th)}$	Gate-Emitter threshold Voltage	$I_C=24\text{mA}$, $V_{CE}=V_{GE}$		5.2	5.8	6.4	V
Q_G	Gate charge	$V_{GE}=-15\text{V}$ to $+15\text{V}$		-	4.2	-	μC
R_{Gint}	Internal gate resistor	$f=1\text{M}$, $V_{pp}=1\text{V}$	$T_j=25^{\circ}\text{C}$	-	2.55	-	Ω
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$ $f=1\text{MHz}$	$T_j=25^{\circ}\text{C}$	-	33	-	nF
C_{oes}	Output Capacitance			-	1.2	-	nF

C _{res}	Reverse transfer Capacitance			-	0.5	-	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	-	-	1.2	uA
t _{d(on)}	Turn-on delay time	V _{CC} =900V I _C = 500A V _{GE} =+15V/-8V R _{Gon} = R _{Goff} =1Ω Inductive load	T _j =25°C	-	240	-	ns
			T _j =150°C	-	244	-	
t _r	Rise time		T _j =25°C	-	84	-	ns
			T _j =150°C	-	102	-	
t _{d(off)}	Turn-off delay time		T _j =25°C	-	546	-	ns
			T _j =150°C	-	656	-	
t _f	Fall time		T _j =25°C	-	368	-	ns
			T _j =150°C	-	536	-	
E _{on}	Turn-on power dissipation		T _j =25°C	-	114	-	mJ
			T _j =150°C	-	177	-	

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E _{off}	Turn-off power dissipation		T _j =25°C	-	103	-	mJ
			T _j =150°C	-	138	-	
I _{sc}	SC data	V _{GE} <15V V _{CC} =1000V	T _j =150°C t _p <10us	-	2000	-	A
R _{th(j-c)}	Thermal Resistance, Junction to Case (IGBT)			-	0.075	-	°C/W
R _{th(c-s)}	Thermal Resistance, Case to sink (Conductive Grease applied)			-	0.025	-	°C/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 =500A, V _{GE} =0V	T _j =25°C	-	1.82	-	V	
			T _j =150°C	-	1.86	-		
t _{rr}	Diode Reverse Recovery Time	(Switch side) V _{CC} =900V, I _c =500A V _{GE} =+15V/-8V	T _j =25°C		264		ns	
			T _j =150°C		546			
I _{RM}	Peak reverse recovery Current		R _{Gon} = R _{Goff} =1Ω (FRD side) V _π =900V, I _F =500A V _{GE} =+15V/-8V Inductive load switching operation	T _j =25°C	-	865	-	A
				T _j =150°C	-	742	-	
Q _{rr}	Recovered charge	T _j =25°C		-	132	-	uC	
		T _j =150°C		-	155	-		
E _{rr}	Reverse recovered energy	T _j =25°C	-	79.2	-	mJ		
		T _j =150°C	-	74.1	-			
R _{th(j-c)}	Thermal Resistance, Junction to Case (Diode)			-	0.075	-	°C/W	
R _{th(c-s)}	Thermal Resistance, Case to sink (Conductive Grease applied)			-	0.025	-	°C/W	

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Test Conditions

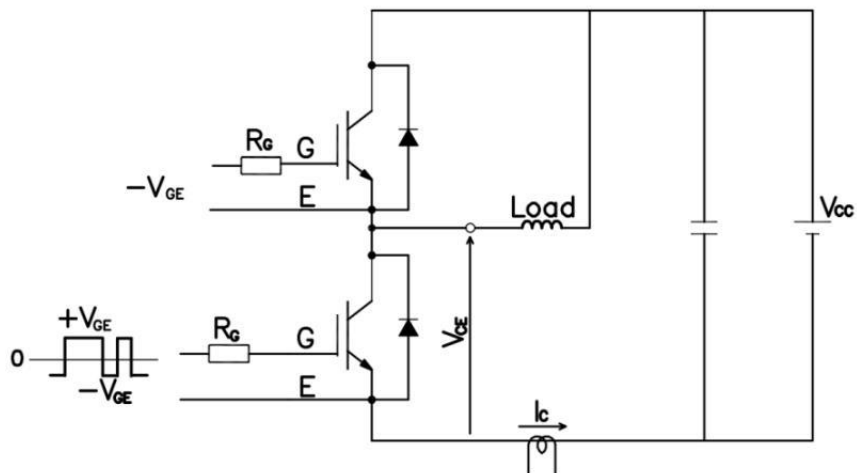


Figure 3. Switching time measure circuit

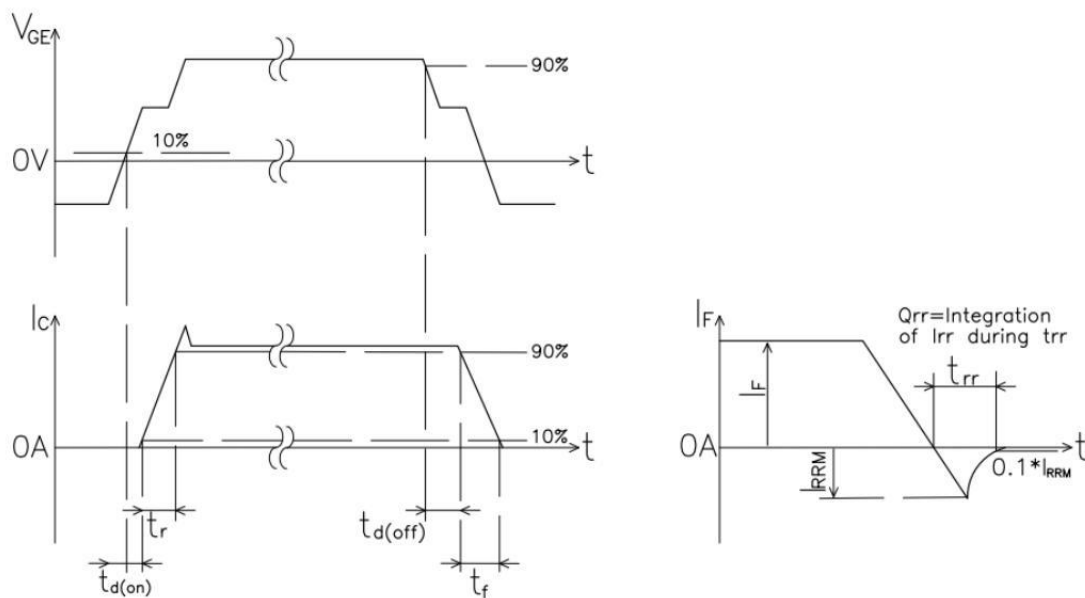


Figure 4. Switching time definition

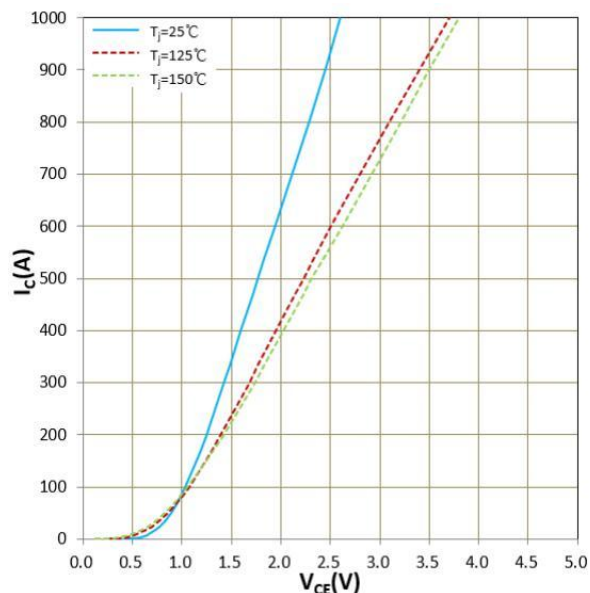


Figure 5. I_c vs V_{ce}
 $V_{ge} = 15\text{V}$

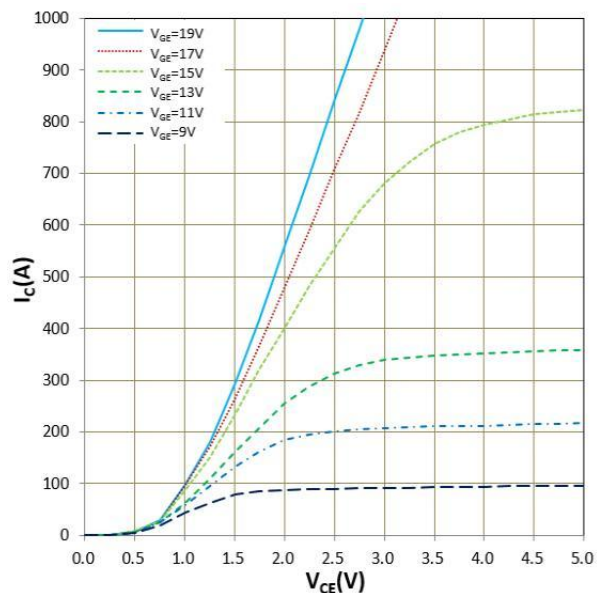


Figure 6. I_c vs V_{ce}
 $T_j = 150^\circ\text{C}$

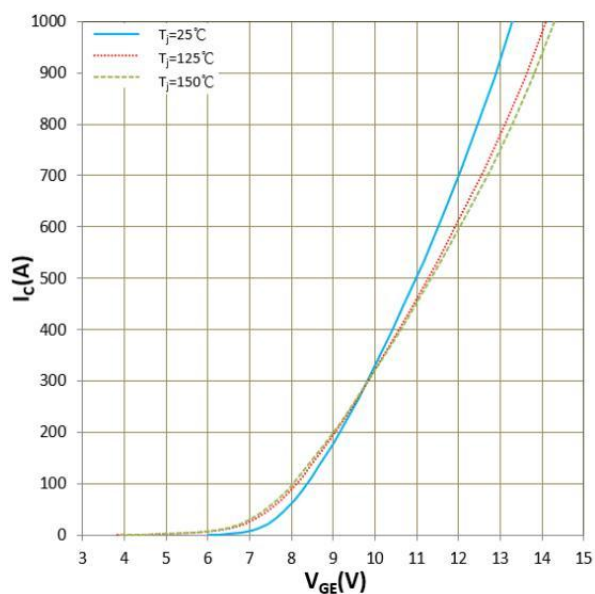


Figure 7. I_c vs V_{ge}
 $V_{ce} = 20\text{V}$

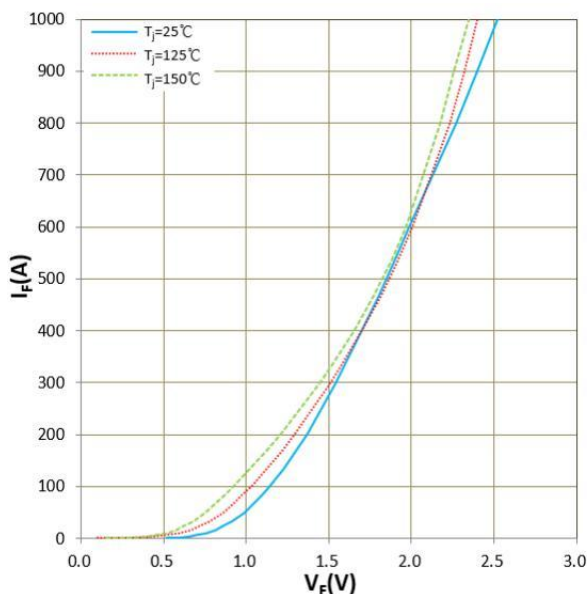


Figure 8. I_F vs V_F

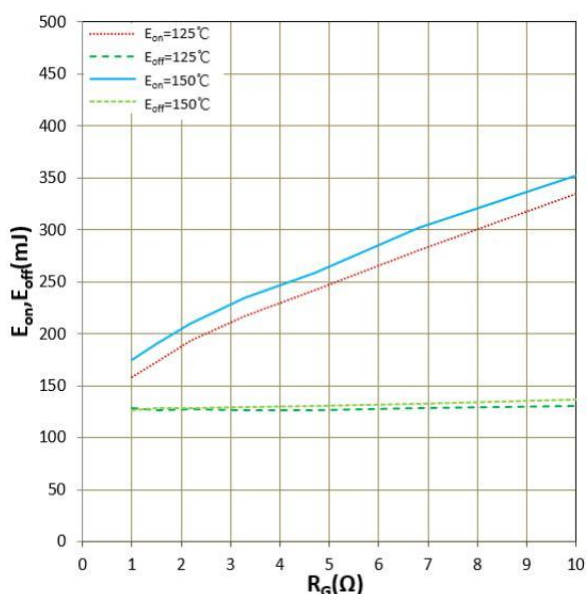


Figure 9. E_{on} , E_{off} vs R_G (Typ)
 $V_{CC}=900V$, $V_{GE}=+15V/-8V$, $I_C = 500A$
 Inductive Load

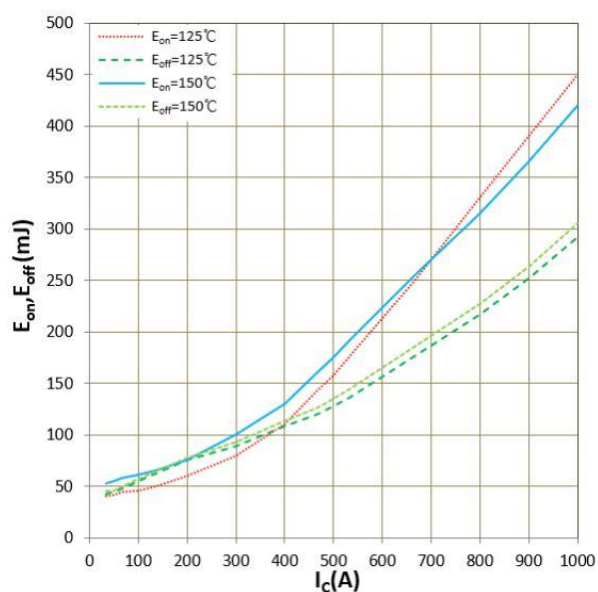


Figure 10 E_{on} , E_{off} vs I_C (Typ)
 $V_{CC}=900V$, $V_{GE}=+15V/-8V$, $R_{Gon} = R_{Goff}=1\Omega$
 Inductive Load

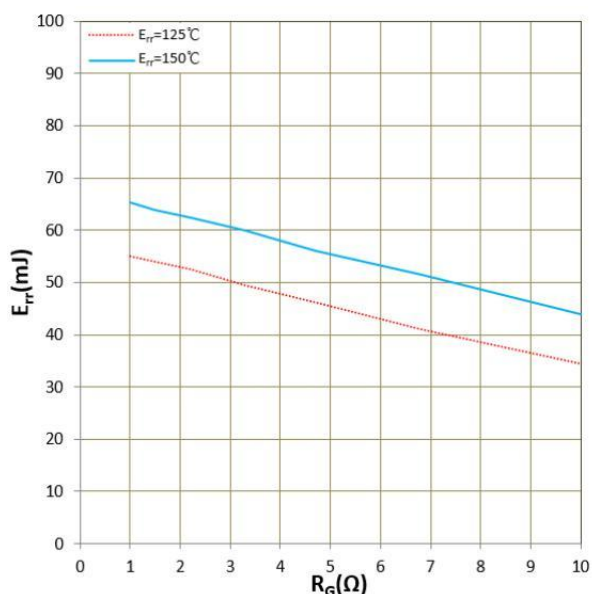


Figure 11. E_{rr} vs R_G (Typ)
 $V_{CC}=900V$, $V_{GE}=+15V/-8V$, $I_F = 500A$
 Inductive Load

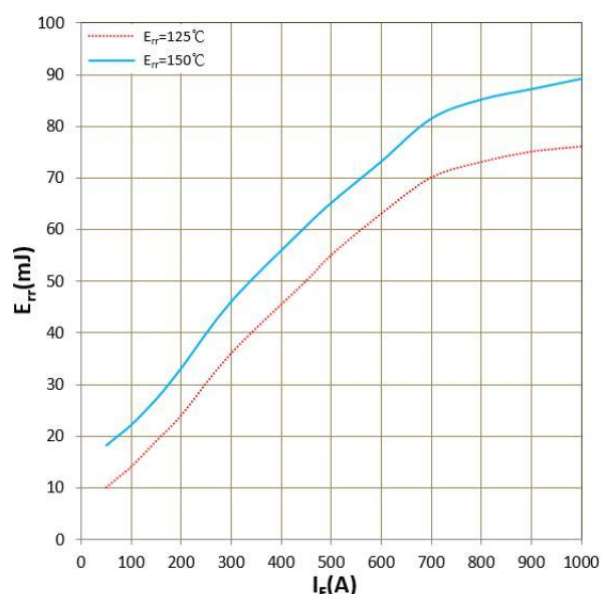


Figure 12. E_{rr} vs I_F (Typ)
 $V_{CC}=900V$, $V_{GE}=+15V/-8V$, $R_{Gon} = R_{Goff}=1\Omega$
 Inductive Load

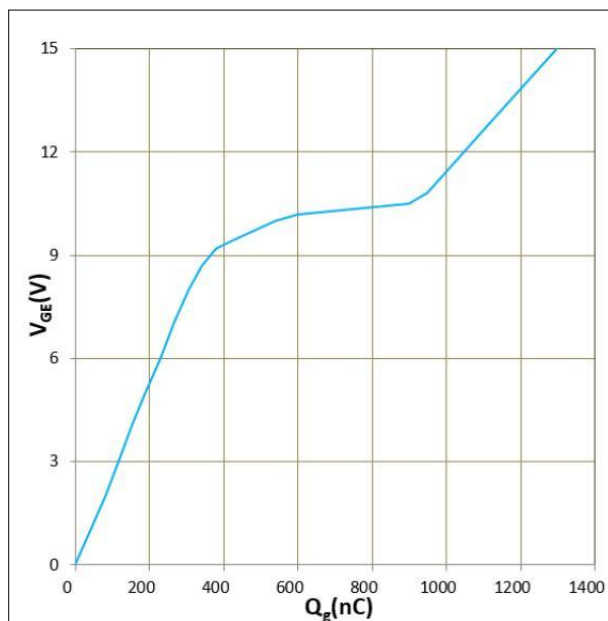


Figure 13. Gate charge

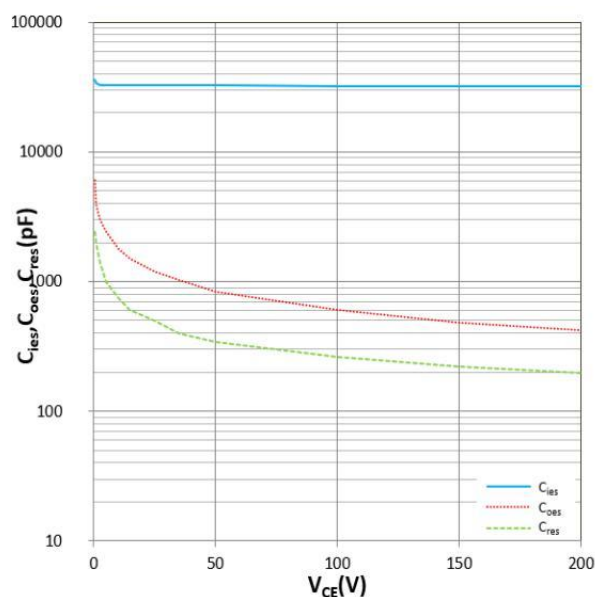


Figure 14. C_{ies} , C_{oes} , C_{res} vs V_{CE}

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

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The data contained in this document is exclusively intended for technically trained staff. You and your technical departments will have to evaluate the product's suitability for the intended application and the completeness of the product data concerning such application.

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