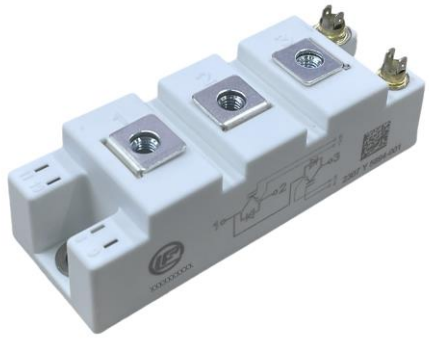
虹美功率半导体
www.hmpowersemi.com

HMGM150HF17M34

1700V/150A Half Bridge IGBT Module

Description

The HMGM150HF17M34 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

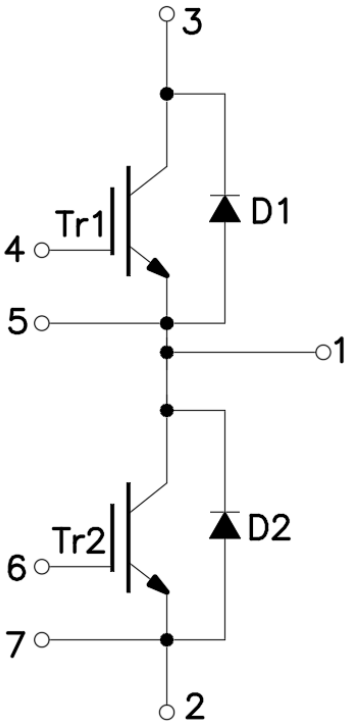


Figure 1. Out drawing & circuit diagram for HMGM150HF17M34

Pin Configuration and Marking Information

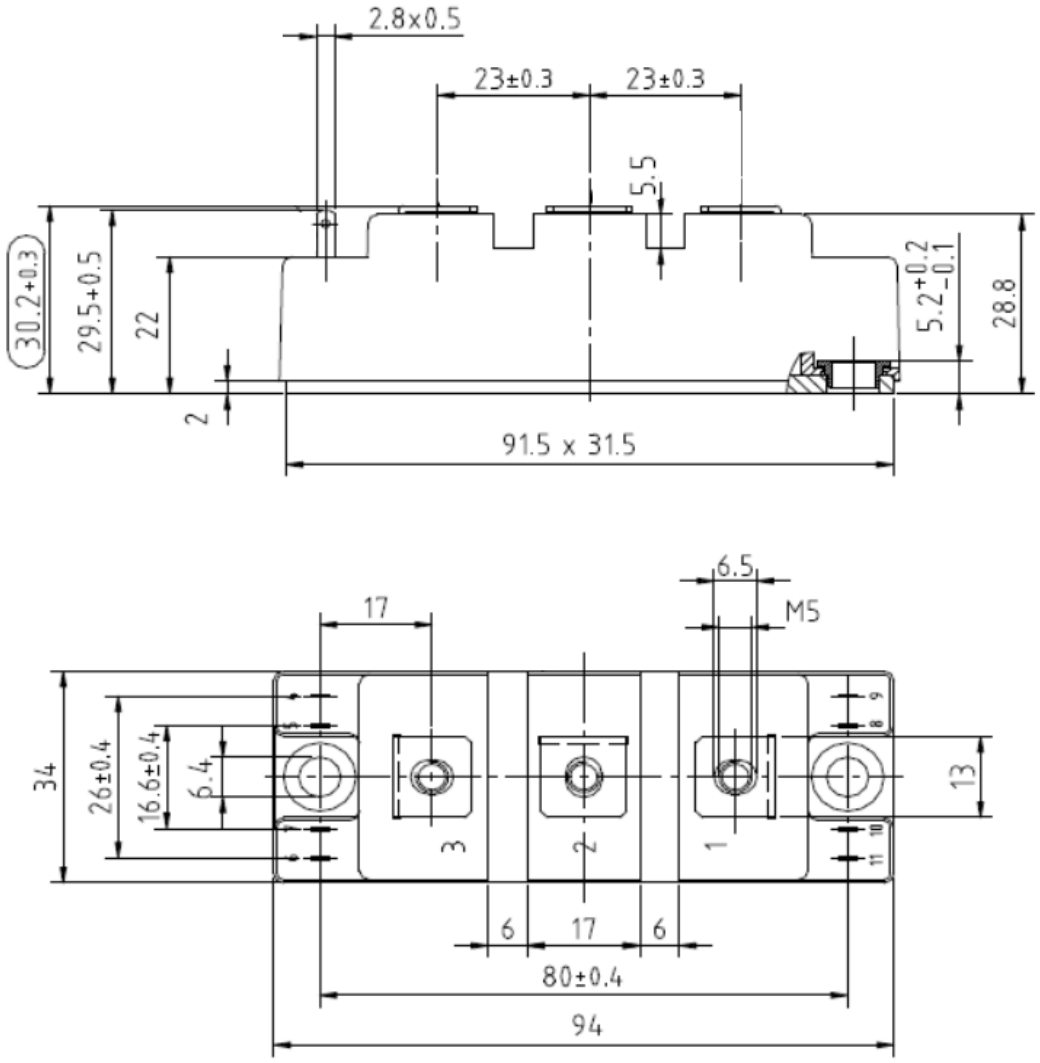


Figure 2. Pin configuration

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℃	0.8	mΩ
Mounting torque for module mounting	M5, M6	3 to 6	Nm
Weight	-	160	g

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

Note1: Pulse width limited by maximum junction temperature

Maximum Ratings (Freewheeling diode, T_j=25℃ 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	℃
T_{stg}	Storage temperature	-	-40 to 125	℃

Note1: Pulse width limited by maximum junction temperature

IGBT Electrical characteristics (T_j =25℃ 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℃	-	1.60	1.90	V
			T_j =150℃	-	1.80	-	V
			T_j =175℃	-	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℃	-	6.5	-	Ω
C_{ies}	Input Capacitance	V_{CE} =25V V_{GE} =0V f =1MHz	T_j =25℃	-	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℃	-	-	1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE} =±30V, V_{CE} =0V	T_j =25℃	-	-	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℃	-	121	-	ns
			T_j =150℃	-	147	-	ns
t_r	Rise time		T_j =25℃	-	88	-	ns
			T_j =150℃	-	81	-	ns
$t_{d(off)}$	Turn-off delay time		T_j =25℃	-	502	-	ns
			T_j =150℃	-	584	-	ns
t_f	Fall time		T_j =25℃	-	412	-	ns
			T_j=150℃	-	673	-	ns
E_{on}	Turn-on power dissipation		T_j =25℃	-	23.1	-	mJ
			T_j =150℃	-	37.4	-	mJ
E_{off}	Turn-off power dissipation		T_j =25℃	-	30.4	-	mJ
			T_j =150℃	-	46.5	-	mJ
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (IGBT) , Note1			-	-	0.18	℃ /W

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

Freewheeling Diode Electrical characteristics (T_j=25℃ 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℃	-	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℃		95		ns
			T_j =150℃		149		ns
I_{rr}	Peak reverse recovery Current		T_j =25℃	-	122	-	A
			T_j =150℃	-	138	-	A
Q_{rr}	Recovered charge		T_j=25℃	-	8	-	μC
			T_j =150℃	-	15	-	μC
E_{rr}	Reverse recovered energy		T_j =25℃	-	5.1	-	mJ
			T_j =150℃	-	12.2	-	mJ
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (Diode), Note1			-	-	0.30	℃ /W

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

Test Conditions

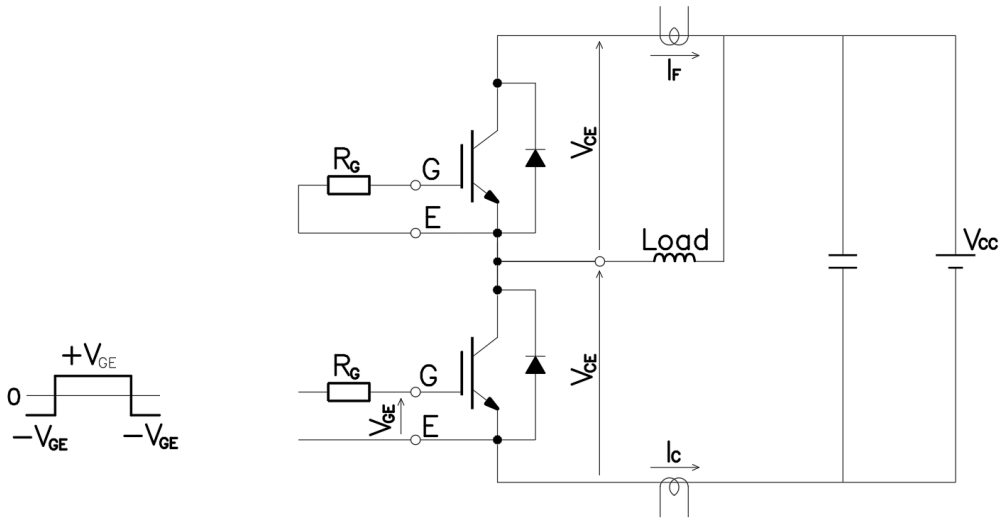


Figure 3. Switching time measure circuit

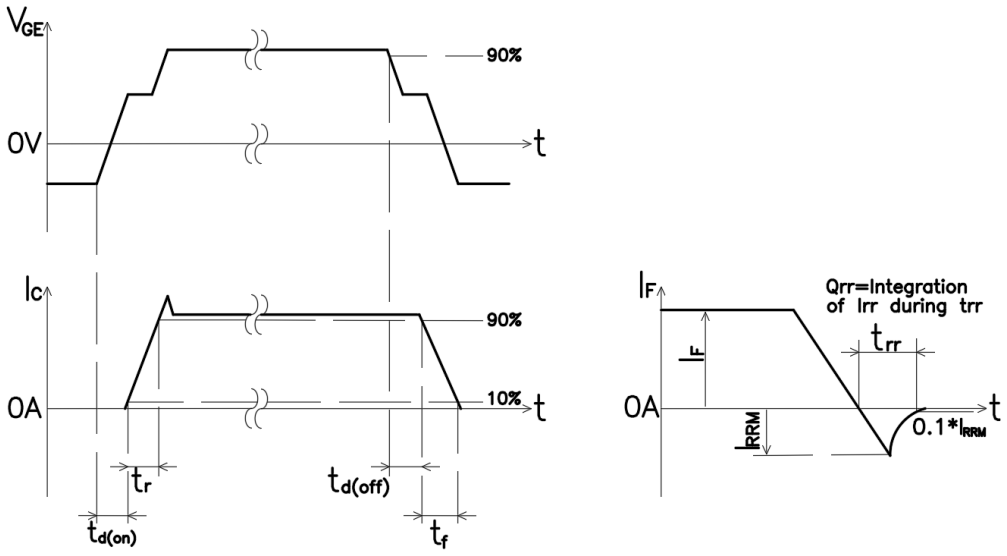


Figure 4. Switching time definition

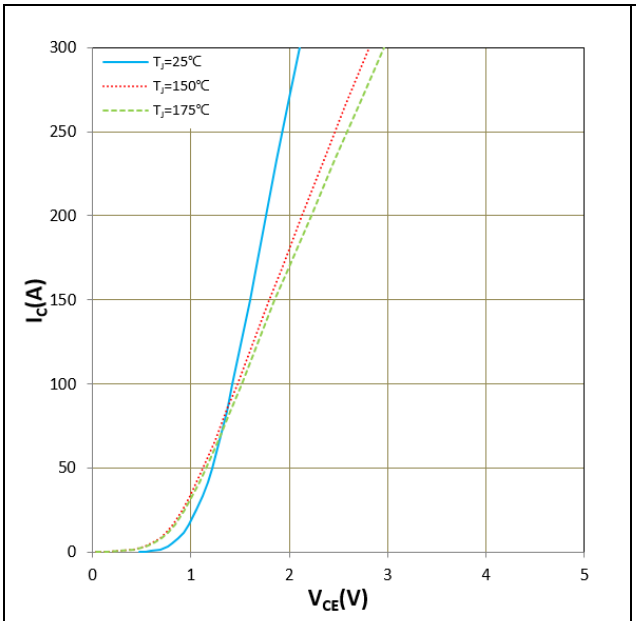


Figure 5. Ic vs V_{CE}
V_{GE}=15V

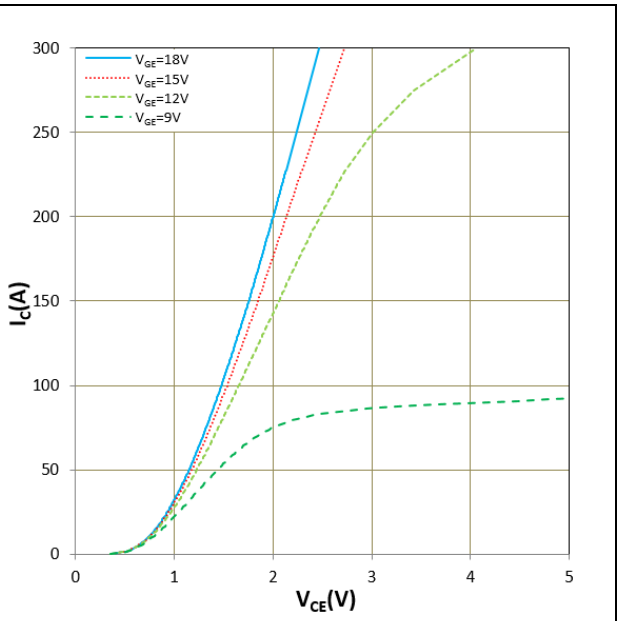


Figure 6. Ic vs V_{CE}
T_j=175°C

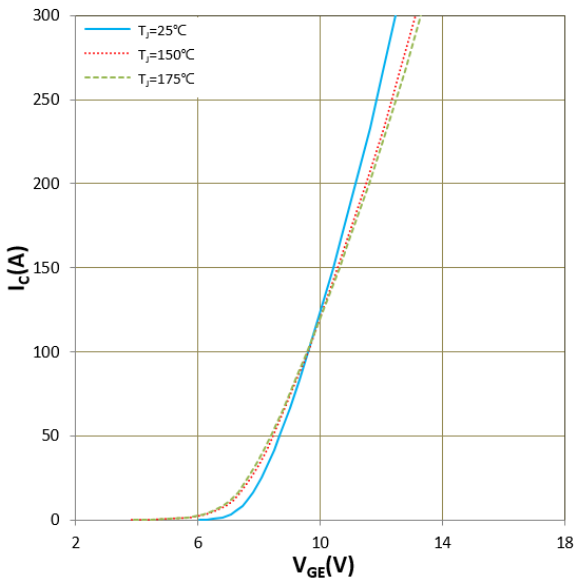


Figure 7. Ic vs V_{GE}
V_{CE} =20V

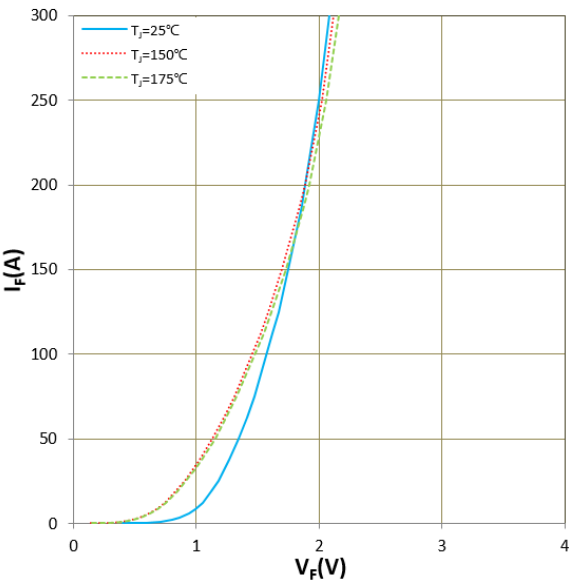


Figure 8. I_F vs V_F

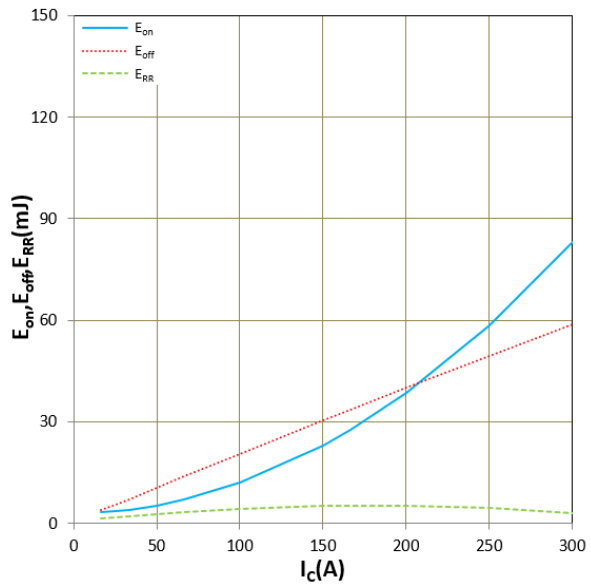


Figure 9. E_{on}, E_{off}, E_{rr} vs Ic(Typ)
V_{CC}=900V, V_{GE} =+15V/-8V, R_g =5.0Ω, T_j =25°C
Inductive Load

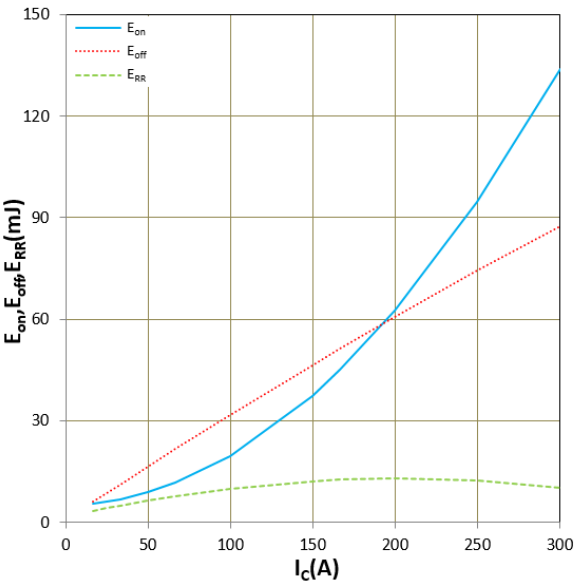


Figure 10. E_{on}, E_{off}, E_{rr} vs Ic(Typ)
V_{CC}=900V, V_{GE} =+15V/-8V, R_g =5.0Ω, T_j =150℃
Inductive Load

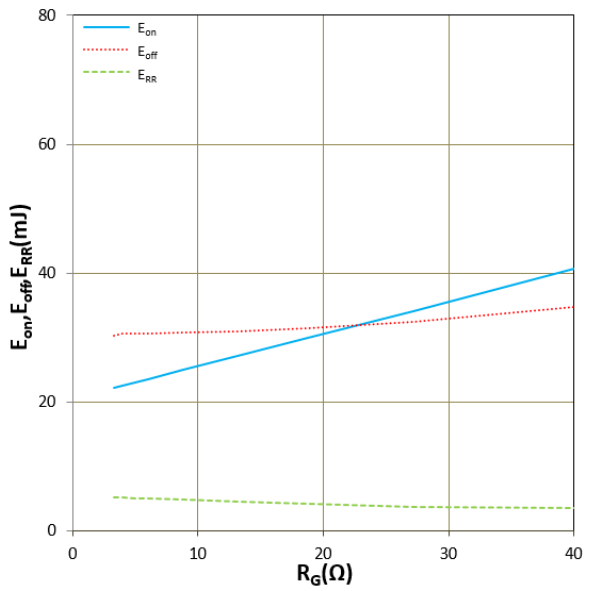


Figure 11. E_{on}, E_{off} vs R_G(Typ)
V_{CC} =900V, V_{GE} =+15V/-8V, I_C =150A,T_j =25°C
Inductive Load

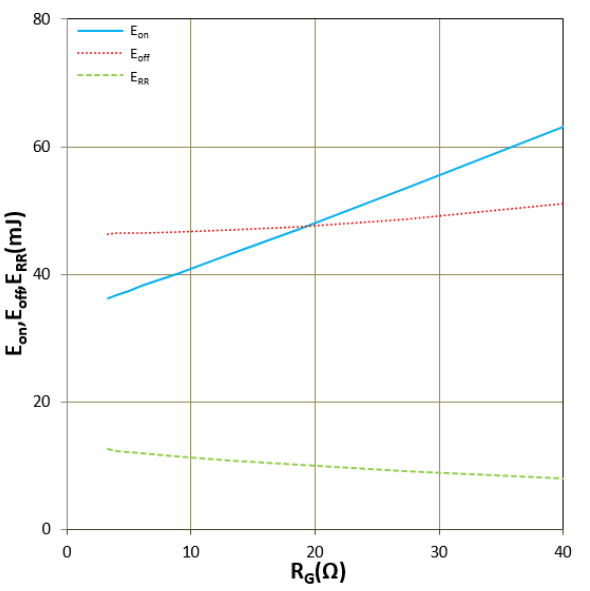


Figure 12. E_{on}, E_{off} vs R_G(Typ)
V_{CC} =900V, V_{GE} =+15V/-8V, I_C =150A,T_j =150℃
Inductive Load

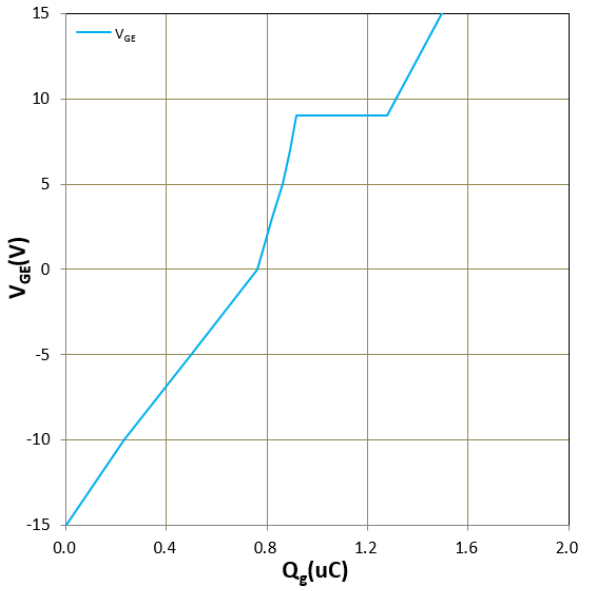


Figure 13. Gate charge

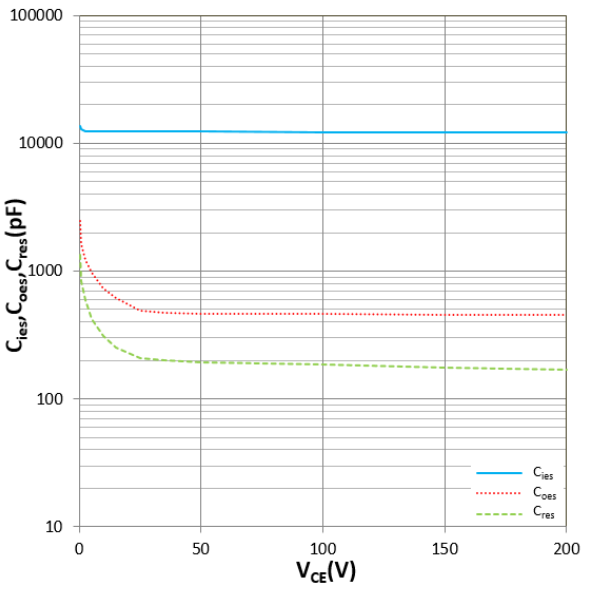


Figure 14. C_{ies}, C_{oes}, C_{res} vs V_{CE}
T_j =25°C, f =1MHz