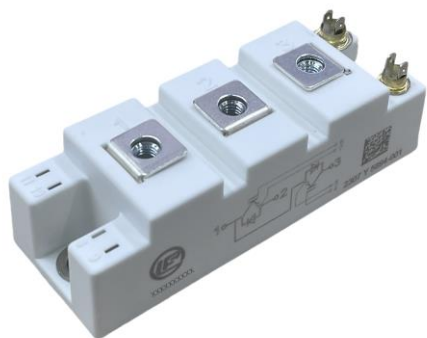


Description

The HMGM100HF17M34 offer lower losses and higher energy for soft switching applications.



Features

- 1700V100A, $V_{CE(sat)(typ.)}=1.60V$
- Lower losses and higher energy
- Excellent short-circuit capability
- 34mm half bridge module

Applications

- Motor drive
- Inverter
- Power supply
- Wind Turbines

Circuit diagram

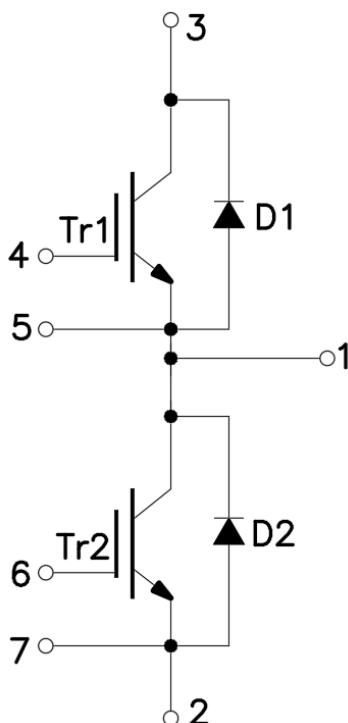


Figure 1. Out drawing & circuit diagram for HMGM100HF17M34

Pin Configuration and Marking Information

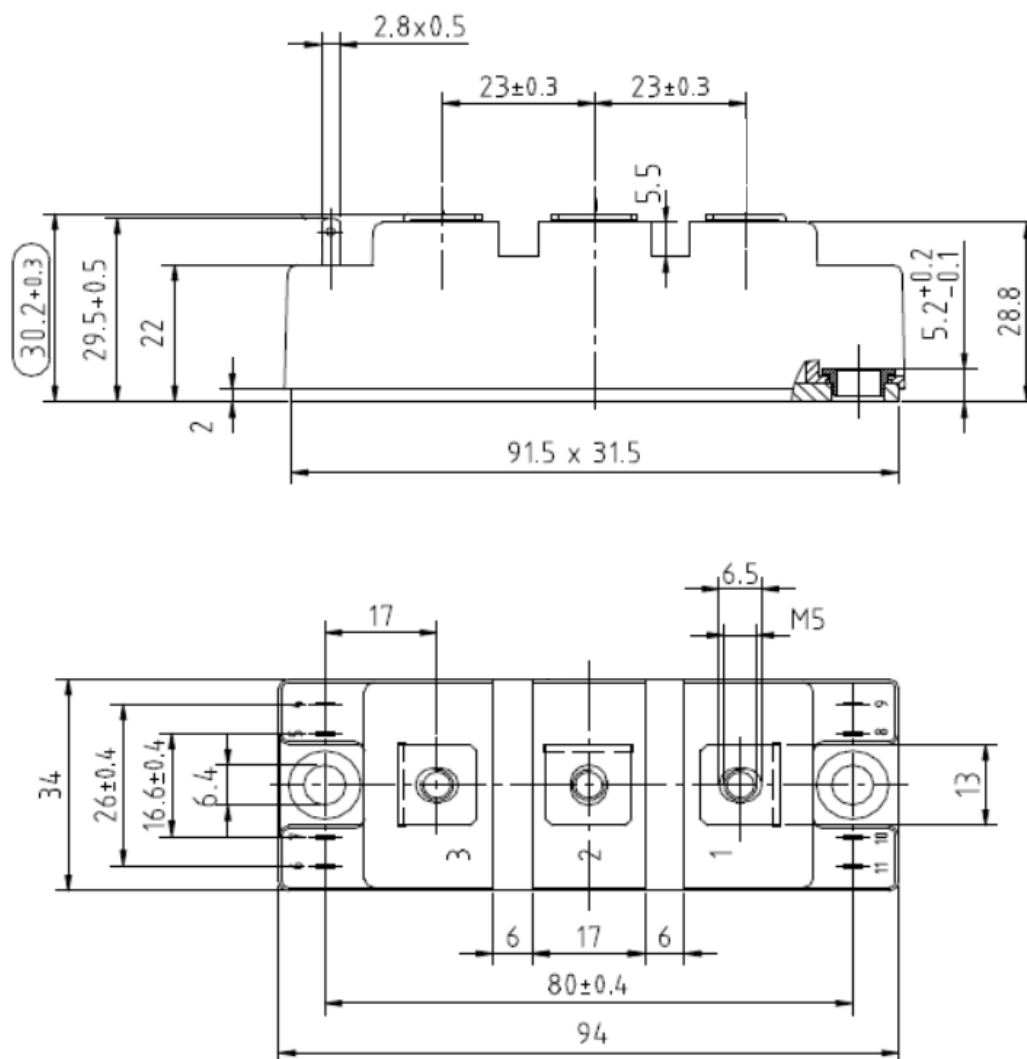


Figure 2. Pin configuration

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

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 =100A, 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		-	0.998	-	μC
R _{Gint}	Internal gate resistor	-	T _J =25℃	-	9.0	-	Ω
C _{ies}	Input Capacitance	V _{CE} =25V	T _J =25℃	-	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℃	-	-	1	mA
I _{GES}	Gate-Emitter Leakage Current	V _{GE} =±30V, V _{CE} =0V	T _J =25℃	-	-	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℃	-	182	-	ns
			T _J =150℃	-	217	-	
t _r	Rise time		T _J =25℃	-	54	-	ns
			T _J =150℃	-	46	-	
t _{d(off)}	Turn-off delay time		T _J =25℃	-	362	-	ns
			T _J =150℃	-	419	-	
t _f	Fall time		T _J =25℃	-	441	-	ns
			T _J =150℃	-	672	-	
E _{on}	Turn-on power dissipation		T _J =25℃	-	14.8	-	mJ
			T _J =150℃	-	21.1	-	
E _{off}	Turn-off power dissipation		T _J =25℃	-	20.2	-	mJ
			T _J =150℃	-	30.8	-	
R _{th(j-c)}	Thermal Resistance, Junction to Case (IGBT) , Note1			-	-	0.25	℃ /W

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

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

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

Test Conditions

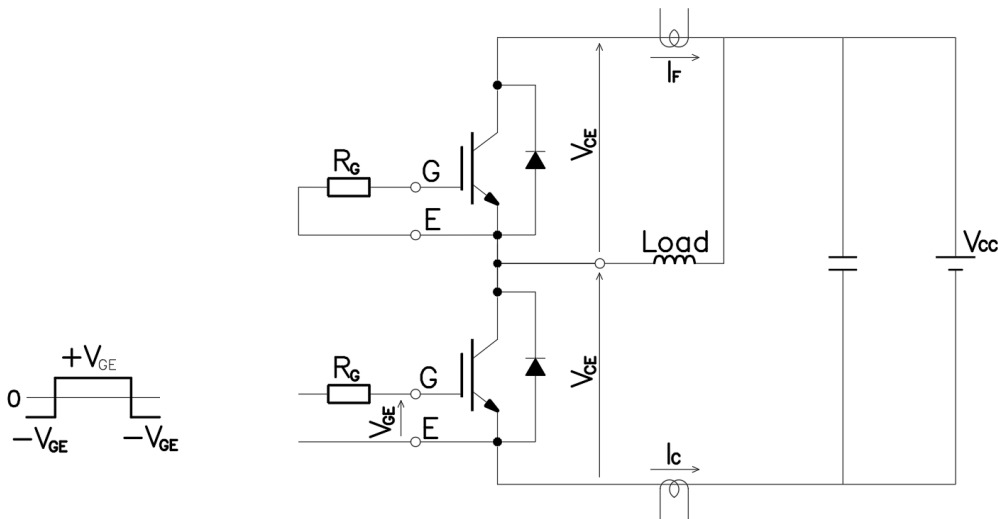


Figure 3. Switching time measure circuit

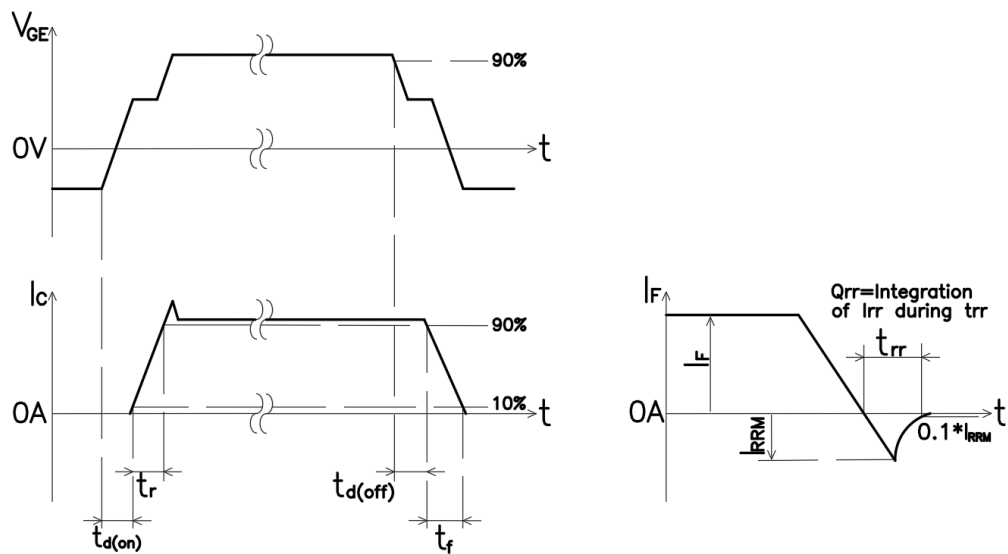


Figure 4. Switching time definition

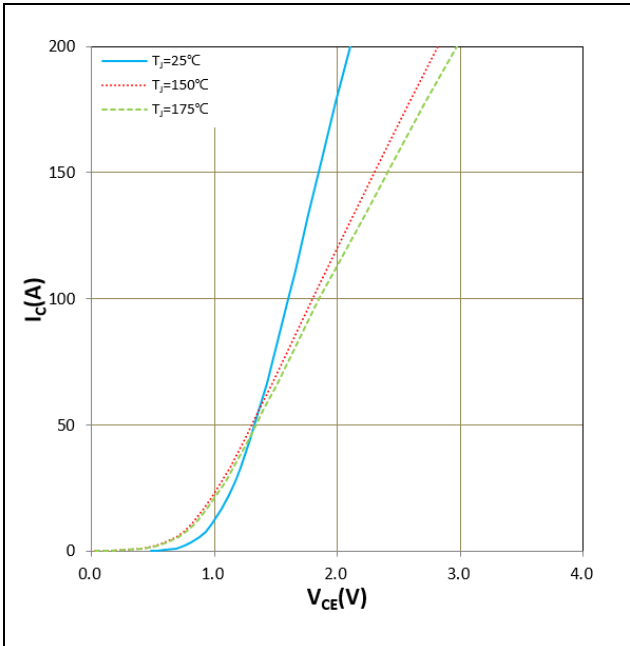


Figure 5. I_C vs V_{CE}
 $V_{GE}=15V$

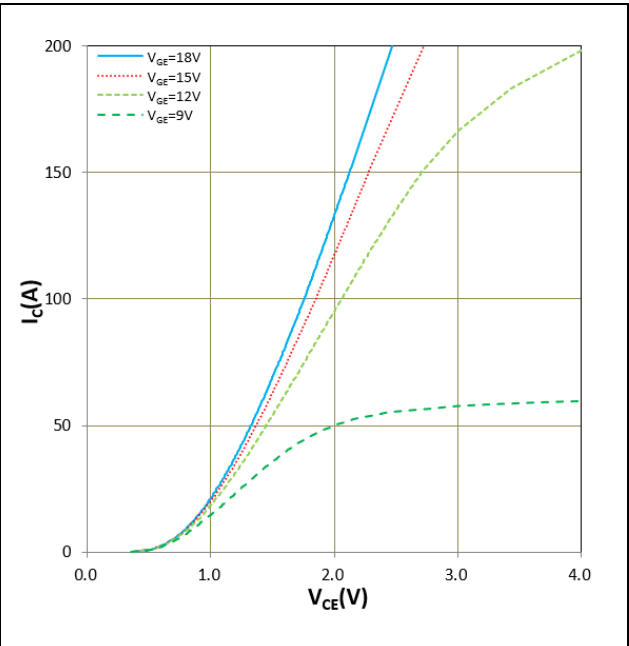


Figure 6. I_C vs V_{CE}
 $T_J=175^{\circ}C$

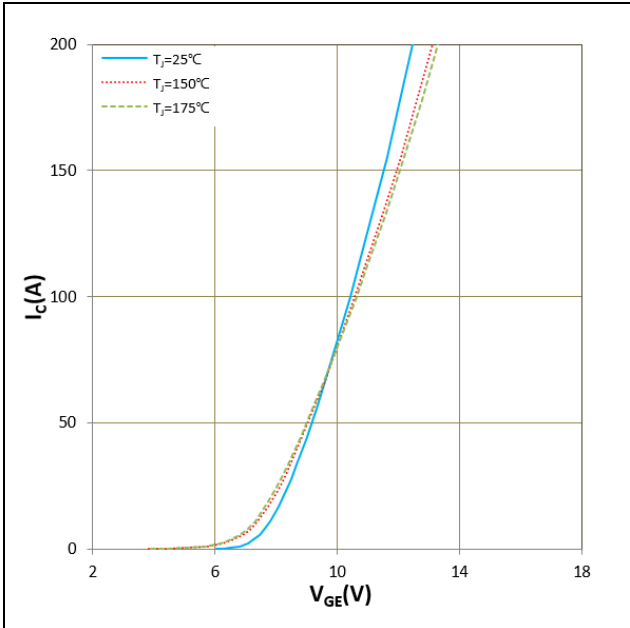


Figure 7. I_C vs V_{GE}
 $V_{CE}=20\text{V}$

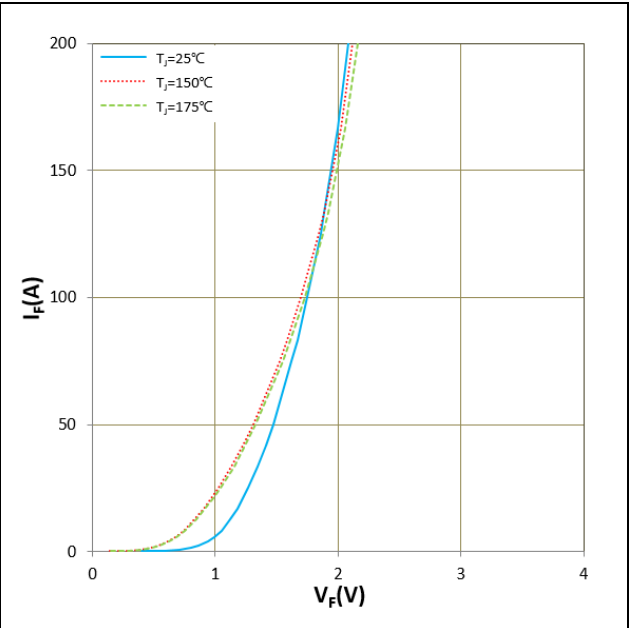


Figure 8. I_F vs V_F

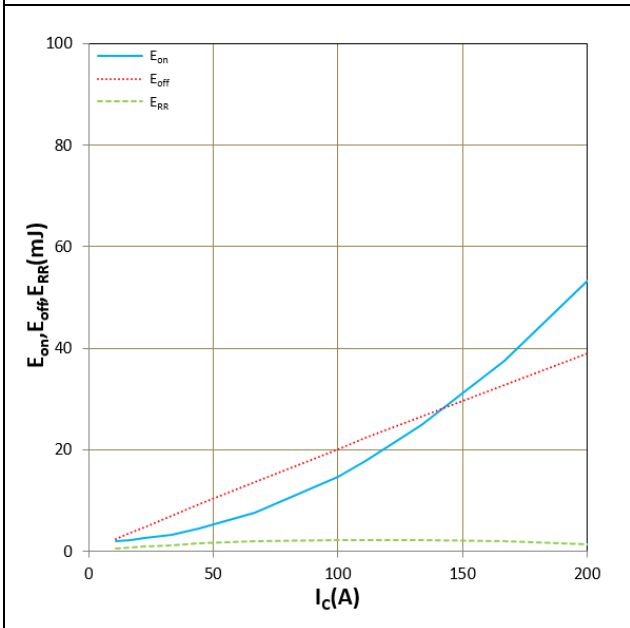


Figure 9. E_{on} , E_{off} , E_{rr} vs I_C (Typ)
 $V_{CC}=900\text{V}$, $V_{GE}=+15\text{V}/-8\text{V}$, $R_g=5.0\Omega$, $T_j=25^\circ\text{C}$
Inductive Load

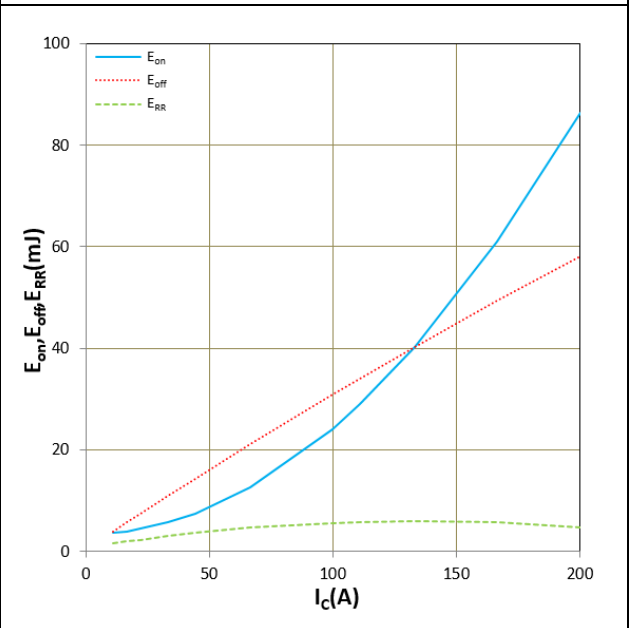


Figure 10. E_{on} , E_{off} , E_{rr} vs I_C (Typ)
 $V_{CC}=900\text{V}$, $V_{GE}=+15\text{V}/-8\text{V}$, $R_g=5.0\Omega$, $T_j=150^\circ\text{C}$
Inductive Load

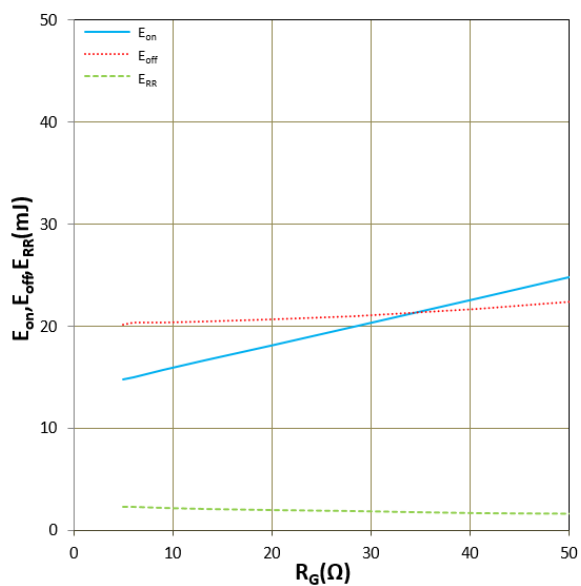


Figure 11. E_{on}, E_{off} vs R_G(Typ)
V_{CC}=900V, V_{GE}=+15V/-8V, I_C=100A, T_j=25°C
Inductive Load

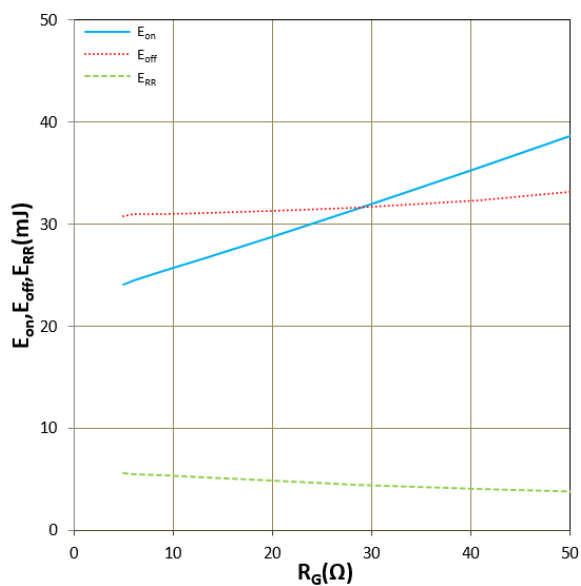


Figure 12. E_{on}, E_{off} vs R_G(Typ)
V_{CC}=900V, V_{GE}=+15V/-8V, I_C=100A, T_j=150°C
Inductive Load

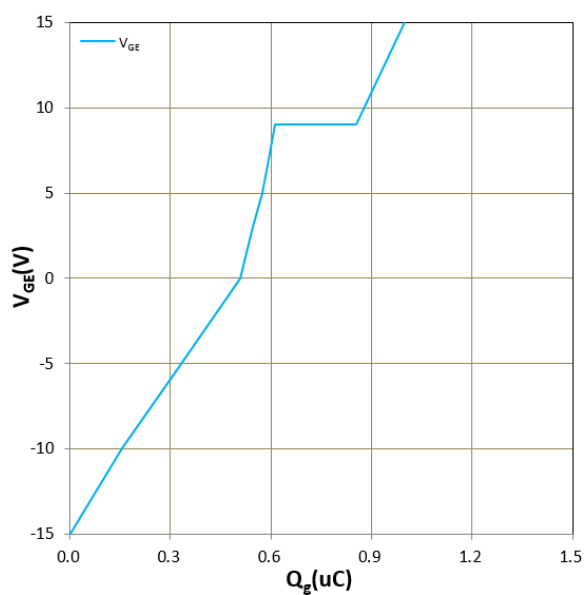


Figure 13. Gate charge

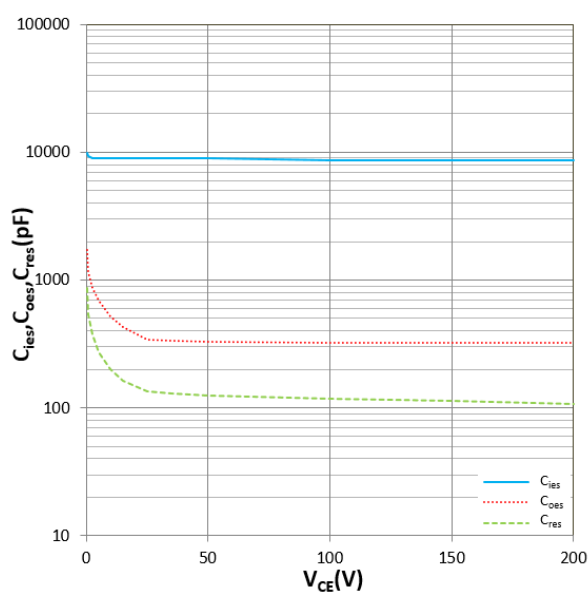


Figure 14. C_{ies}, C_{oes}, C_{res} vs V_{CE}
T_j=25°C, f=1MHz