QMFF100R12AF

1200V 100A IGBT Module

Electrical Features

- Trench/Fieldstop IGBT
- Half-bridge
- Standard package
- High short circuit capability
- Including anti-parallel FWD

Typical Applications

- Motor Drives
- High Power Converters

IGBT，Inverter

Maximum Rated Values						
Symbol	Item	Conditions		Rating		Unit
IGBT						
V_{CES}	Collector-emitter voltage	T_{vj}=25℃		1200		V
V_{GES}	Gate-emitter voltage	-		±20		V
I_C	Collector current,DC	T_C=100℃,T_{vj}=175℃		100		A
I_{CRM}	Repetitive peak collector current	t_p=1ms		200		A
t_{SC}	Short circuit withstand time	V_{GE}=15V, V_{CC}=600V, T_{vj}≤150℃		10		us
P_{tot}	Total power dissipation	T_C=25℃,T_{vj}=175℃		535		W
Characteristics Values						
Symbol	Item	Conditions		Values		Unit
IGBT				Min.	Typ.	Max.
I_{CES}	Collector-emitter cut-off current	V_{CE}=1200V,V_{GE}=0V,T_{vj}=25℃		-	-	1	mA
I_{GES}	Gate leakage current	V_{CE}=0V,V_{GE}=20V,T_{vj}=25℃		-	-	250	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C=3.8mA,V_{CE}=V_{GE},T_{vj}=25℃		5.0	6.0	7.0	
V_{CEsat}	Collector-emitter saturation voltage	I_C=100A V_{GE}=15V	T_{vj}=25℃	-	1.95	2.4	V
			T_{vj}=125℃	-	2.25	-	
			T_{vj}=150℃	-	2.31	-	
C_{ies}	Input capacitance	V_{CE}=25V,V_{GE}=0V f=1MHz,T_{vj}=25℃		-	6.45	-	nF
C_{res}	Reverse transfer capacitance			-	0.2	-	
Q_G	Gate charge	V_{CC}=600V, I_C=100A, V_{GE}=15V		-	357	-	uC
R_g	Internal gate resistance	T_{vj}=25℃			1.8		Ω

$t_{d(on)}$	Turn-on delay time	V_{CC}=600V, I_C=100A, V_{GE}=±15V, $R_{G(on)}$=7.5 Ω, $R_{G(off)}$=7.5 Ω, Inductive load	T_{vj}=25℃	-	62.1	-	ns
			T_{vj}=125℃	-	71.1	-	
			T_{vj}=150℃	-	75.2	-	
t_r	Rise time		T_{vj}=25℃	-	47.0	-	
			T_{vj}=125℃	-	56.8	-	
			T_{vj}=150℃	-	67.2	-	
$t_{d(off)}$	Turn-off delay time		T_{vj}=25℃	-	160.1	-	
			T_{vj}=125℃	-	179.0	-	
			T_{vj}=150℃	-	188.1	-	
t_f	Fall time		T_{vj}=25℃	-	121.0	-	
			T_{vj}=125℃	-	150.1	-	
			T_{vj}=150℃	-	158.4	-	
E_{on}	Turn-on energy (per pulse)		T_{vj}=25℃	-	2.31	-	mJ
			T_{vj}=125℃	-	3.82	-	
			T_{vj}=150℃	-	4.97	-	
E_{off}	Turn-off energy (per pulse)		T_{vj}=25℃	-	1.84	-	
			T_{vj}=125℃	-	2.90	-	
			T_{vj}=150℃	-	3.81	-	
R_{thJC}	Thermal resistance,junction to case	per IGBT		-	-	0.28	K/W
R_{thCH}	Thermalresistance,case to heatsink	per IGBT/ λgrease=1W/(m·K)		-	0.04	-	K/W
T_{vjop}	Temperature under switching conditions			-40		150	℃

Diode，Inverter
Maximum Rated Values

Symbol	Item	Conditions	Rating	Unit
V_{RRM}	Repetitive peak reverse voltage	T_{vj}=25℃	1200	V
I_F	Forward current,DC	T_C=100℃,T_{vj}=175℃	50	A
I_{FRM}	Repetitive peak forward current	t_p=1ms	100	A

Characteristic Values

V_F	Continuous forward voltage	I_F=50A V_{GE}=0V	T_{vj}=25℃	-	2.0	-	V
			T_{vj}=125℃	-	1.81	-	
			T_{vj}=150℃	-	1.72	-	
I_{RM}	Peak reverse recovery current	V_R=600V I_F=50A di_F/dt=-2900A/μs	T_{vj}=25℃	-	77	-	A
			T_{vj}=125℃	-	80	-	
			T_{vj}=150℃	-	85	-	
t_{rr}	Reverse recovery time		T_{vj}=25℃	-	82.1	-	ns
			T_{vj}=125℃	-	109.6	-	
			T_{vj}=150℃	-	125.7	-	
Q_r	Repetitive peak forward current		T_{vj}=25℃	-	2.8	-	μC
			T_{vj}=125℃	-	4.7	-	
			T_{vj}=150℃	-	5.1	-	
E_{rec}	Recovered charge		T_{vj}=25℃	-	1.8	-	mJ
			T_{vj}=125℃	-	1.9	-	
			T_{vj}=150℃	-	2.3	-	

R_{thJC}	Thermal resistance, junction to case	per diode	-	-	0.5	K/W
R_{thCH}	Thermalresistance,case to heatsink	per IGBT/ λgrease=1W/(m·K)	-	0.04	-	K/W
T_{vjop}	Temperature under switching conditions		-40		150	℃

Module

Symbol	Item	Conditions	Rating			Unit
V_{ISOL}	Isolation voltage	Terminals to baseplate，RMS,f=50Hz,t=1min	2500			V
-	Material of module baseplate	-	Cu			-
-	Internal isolation	Basic insulation(class 1, IEC 61140)	Al_2O_3			-
T_{stg}	Storage temperature	-	-40~125			℃
Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
M	Mounting torque for module mounting	Screw M6	3.0	-	5.0	Nm
	Terminal connection torque	Screw M5	2.5	-	5.0	Nm
ds	Creepage distance	Terminal to terminal	-	23	-	mm
		Terminal to base plate	-	29	-	
da	Clearance	Terminal to terminal	-	11	-	mm
		Terminal to base plate	-	23	-	
m	Weight	-	-	150	-	g

Figure 1 IGBT output characteristic
（T_{vj}=25℃）

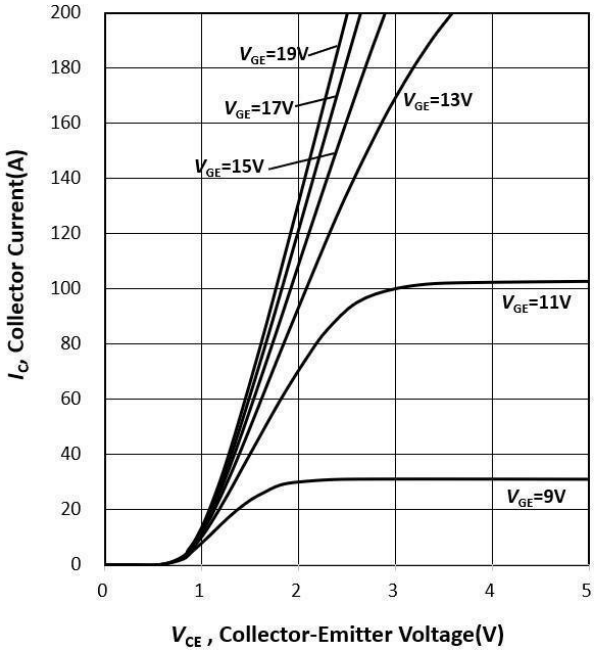


Figure 2 IGBT switching times as a function of collector current
(inductive load, T_{vj}=25℃, V_{CE}=600V, V_{GE}=-15/15V, R_G=7.5Ω)

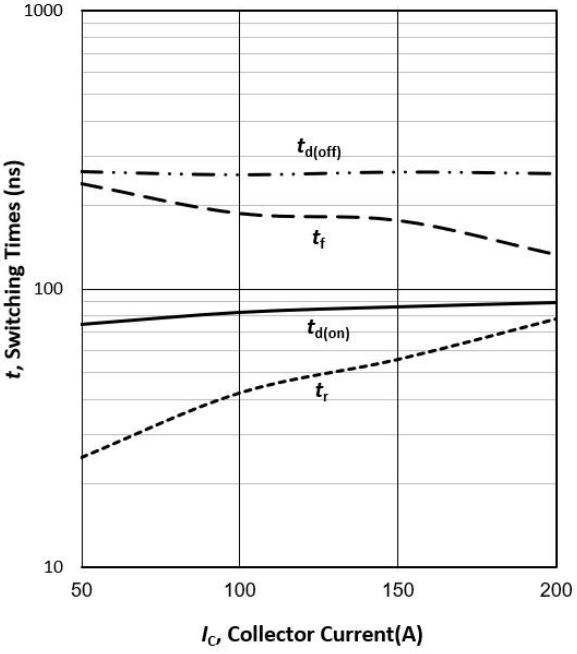


Figure 3 IGBT switching energy losses as a function of collector current
(inductive load, T_{vj}=25℃, V_{CE}=600V, V_{GE}=-15/15V, R_G=7.5Ω)

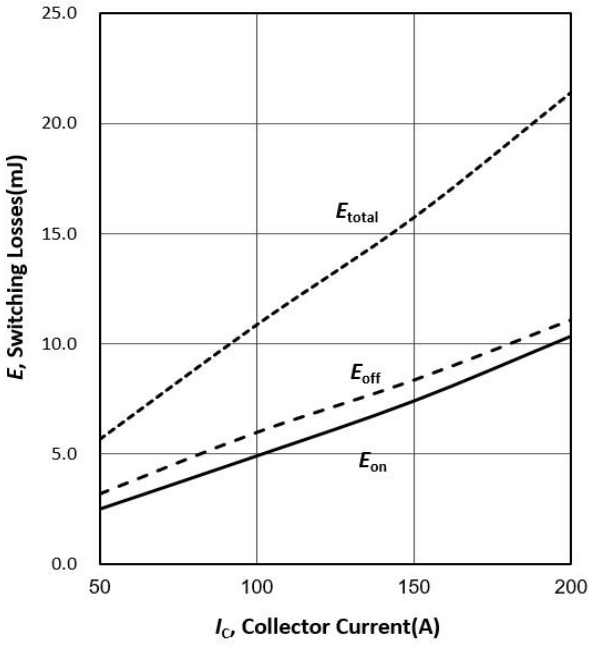


Figure 4 IGBT switching times as a function of gate resistor
(inductive load, T_{vj}=25℃, V_{CE}=600V, V_{GE}=-15/15V, I_C=100A)

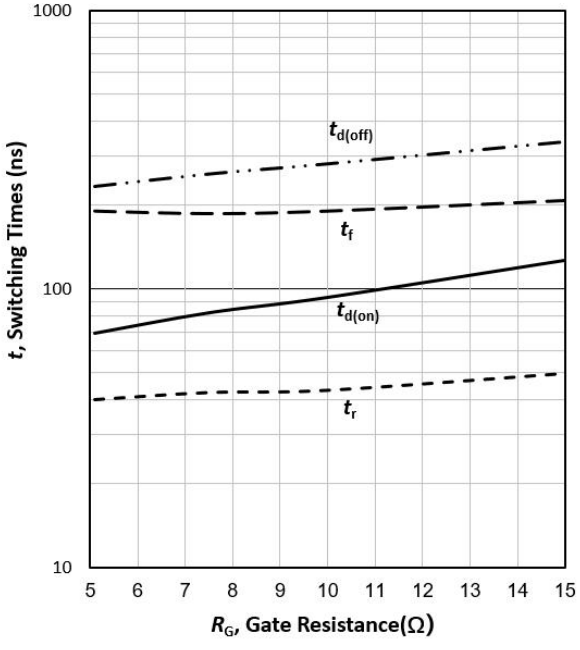


Figure 5 IGBT switching energy losses as a function of gate resistor

(inductive load, T_{vj}=25℃, V_{CE}=600V, V_{GE}=-15/15V, I_C=100A)

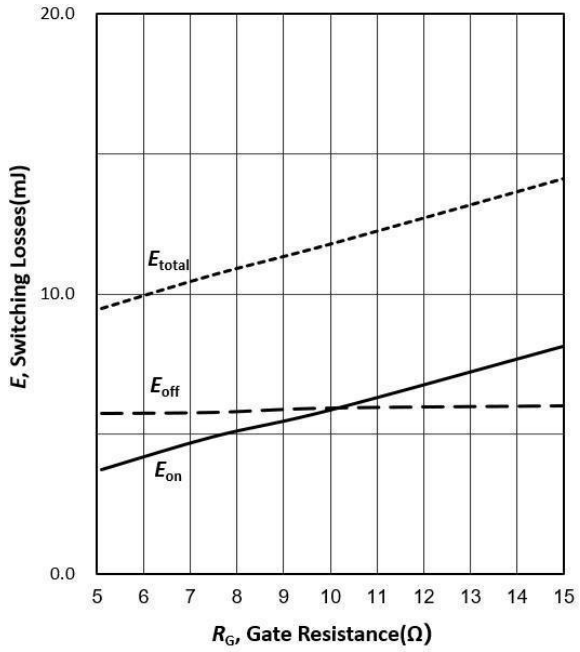


Figure 6 Diode reverse recovery energy as a function of forward current

(T_{vj}=25℃, V_{CE}=600V, R_G=7.5Ω)

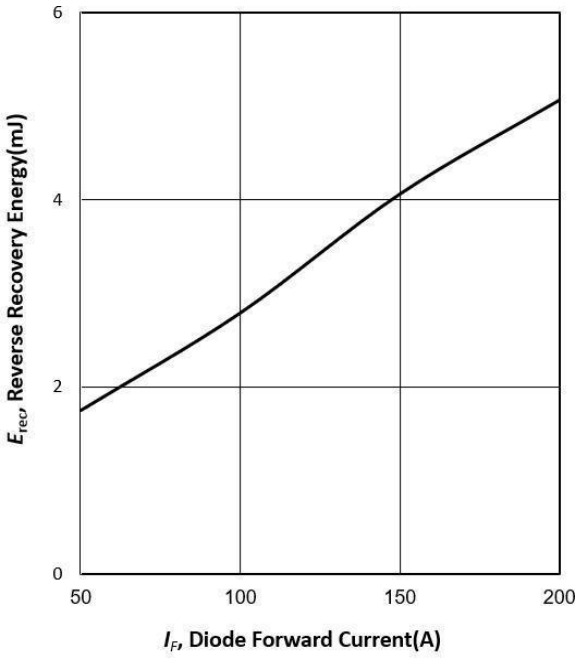


Figure 7 Diode reverse recovery charge as a function of gate resistor

(T_{vj}=25℃, V_{CE}=600V, I_F=100A)

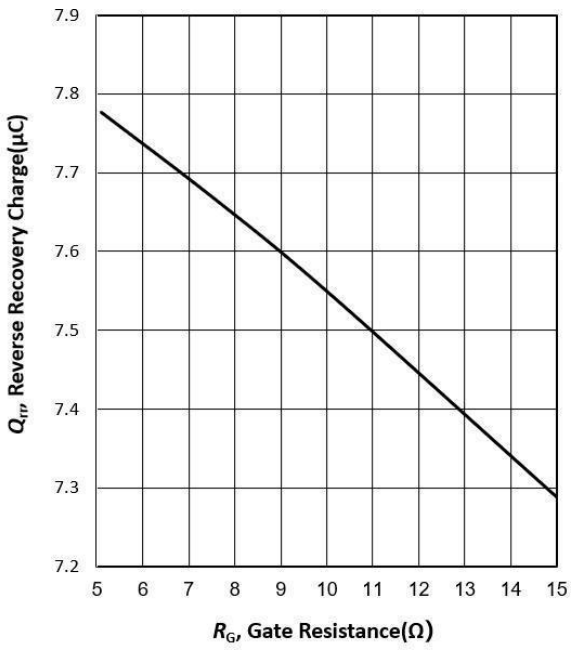
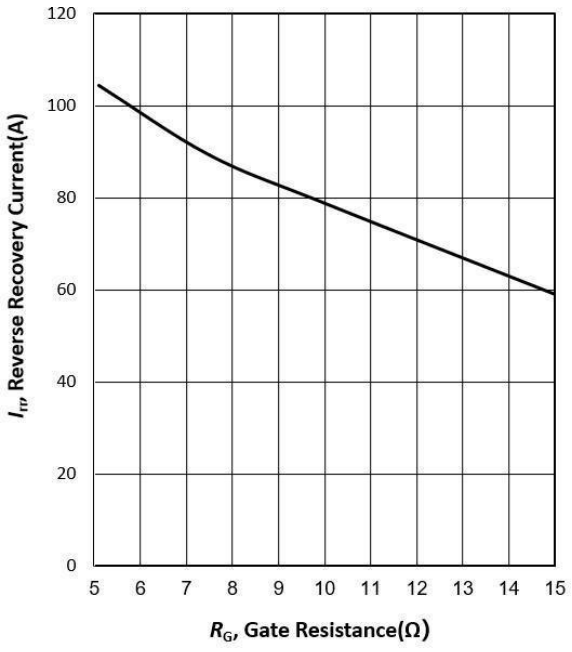
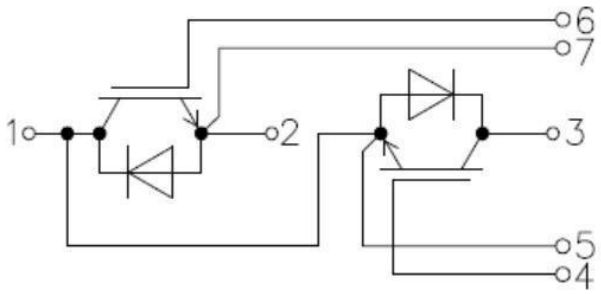


Figure 8 Diode peak reverse recovery current as a function of gate resistor

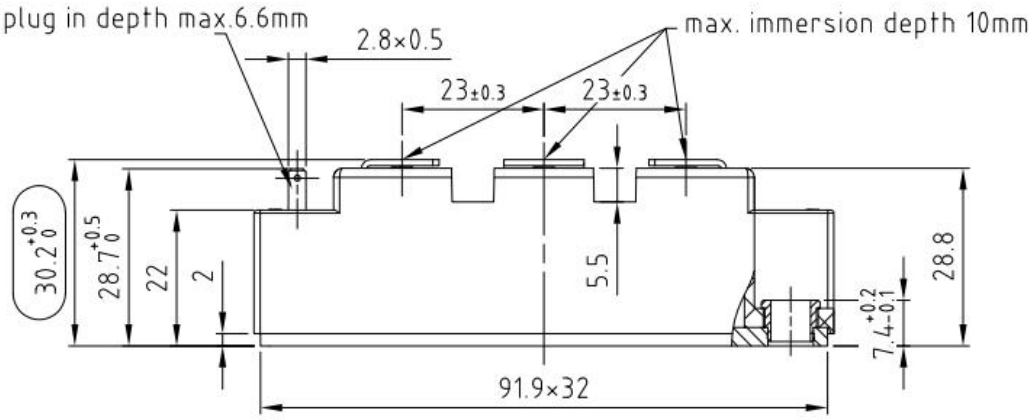
(T_{vj}=25℃, V_{CE}=600V, I_F=100A)

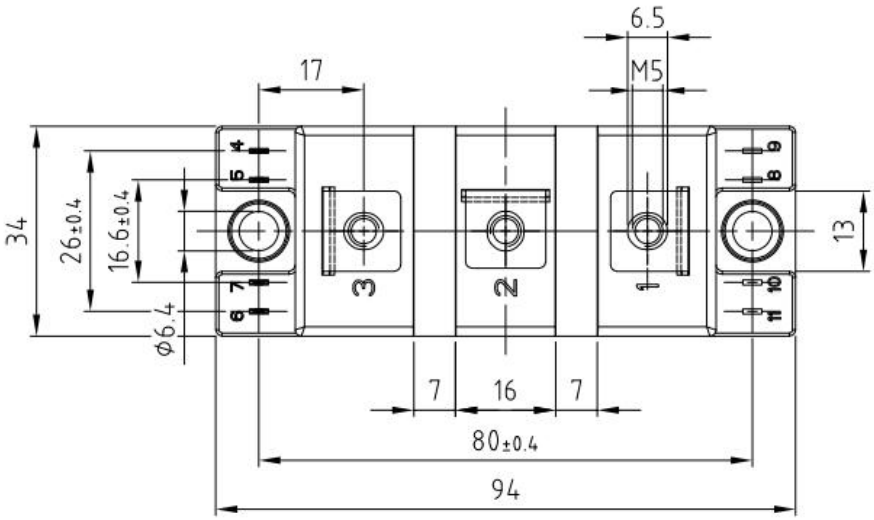


Circuit diagram headline



Package outlines（Unit：mm）





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