QMFF450R12EFF

1200V 450A IGBT Module

Electrical Features

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

Typical Applications

- Motor Drives
- Servo Drives
- UPS System
- High Power Converters
- Wind Turbines

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℃		450		A
I_{CRM}	Repetitive peak collector current	t_p= 1ms		900		A
t_{SC}	Short circuit withstand time	V_{GE}= 15V, V_{CC}=600V, T_{vj}≤ 150℃		10		μs
P_{tot}	Total power dissipation	T_C=25℃ ,T_{vj}= 175℃		2420		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= 16mA,V_{CE}=V_{GE},T_{vj}=25℃		5	5.78	7	V
V_{CEsat}	Collector-emitter saturation voltage	I_C=450A V_{GE}= 15V	T_{vj}=25℃	-	2.04	2.4	V
			T_{vj}= 125℃	-	2.48	-	
			T_{vj}= 150℃	-	2.59	-	
C_{ies}	Input capacitance	V_{CE}=25V,V_{GE}=0V f=1MHz,T_{vj}=25℃		-	31.1	-	nF
C_{oes}	Output capacitance			-	1.4	-	
C_{res}	Reverse transfer capacitance			-	1.35	-	
Q_G	Gate charge	V_{CC}=600V, I_C=450A, V_{GE}= 15V		-	2.16	-	μC
R_g	Internal gate resistance	T_{vj}=25℃		-	1.25	-	Ω

$t_{d(on)}$	Turn-on delay time	V_{CC}=600V I_C=450A V_{GE}=±15V $R_{G(on)}$=5. 1 Ω $R_{G(off)}$=5. 1 Ω Inductive load	T_{vj}=25℃	-	203.8	-	ns
			T_{vj}= 125℃	-	209.6	-	
			T_{vj}= 150℃	-	200. 1	-	
t_r	Rise time		T_{vj}=25℃	-	202.5	-	
			T_{vj}= 125℃	-	208.5	-	
			T_{vj}= 150℃	-	209. 1	-	
$t_{d(off)}$	Turn-off delay time		T_{vj}=25℃	-	649. 1	-	
			T_{vj}= 125℃	-	713.6	-	
			T_{vj}= 150℃	-	724.8	-	
t_f	Fall time		T_{vj}=25℃	-	98.5	-	
			T_{vj}= 125℃	-	129.6	-	
			T_{vj}= 150℃	-	174.4	-	
E_{on}	Turn-on energy (per pulse)	V_{CC}=600V, I_C=450A V_{GE}=±15V, $R_{G(on)}$/$R_{G(on)}$=5. 1 Ω di/dt=2676A/μs du/dt=5700V/ μs Inductive load	T_{vj}=25℃	-	88.4	-	mJ
			T_{vj}= 125℃	-	118.5	-	
			T_{vj}= 150℃	-	127.7	-	
E_{off}	Turn-off energy (per pulse)		T_{vj}=25℃	-	43.7	-	
			T_{vj}= 125℃	-	52.7	-	
			T_{vj}= 150℃	-	56. 1	-	
SC data	Short-circuit current	V_{CC}=600V,V_{GE}≤ 15V,T_{vj}=25℃ V_{CES}≤ 1200V,t_P≤ 10μs		-	2160	-	A
R_{thJC}	Thermal resistance,junction to case	per IGBT		-	-	0.062	K/W
R_{thCH}	Thermalresistance,case to heatsink	per IGBT/ λgrease= 1W/(m·K)		-	0.031	-	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		450	A
I_{FRM}	Repetitive peak forward current	t_p= 1ms	900	A
I^2t	I^2t-value	V_R=0V,t_p= 10ms,T_{vj}= 150℃	32000	A^2s

Characteristic Values

V_F	Continuous forward voltage	I_F=450A V_{GE}=0V	T_{vj}=25℃	-	1.82	2.6	V
			T_{vj}= 125℃	-	1.59	-	
			T_{vj}= 150℃	-	1.53	-	
I_{RM}	Peak reverse recovery current	V_R=600V I_F=450A -di$_F$/dt=2950A/ μs V_{GE}=-15V	T_{vj}=25℃	-	146.3	-	A
			T_{vj}= 125℃	-	246.9	-	
			T_{vj}= 150℃	-	274.8	-	
t_{rr}	Reverse recovery time		T_{vj}=25℃	-	172.2	-	ns
			T_{vj}= 125℃	-	698.7	-	
			T_{vj}= 150℃	-	761.9	-	
Q_r	Recovered charge		T_{vj}=25℃	-	22.7	-	μC
			T_{vj}= 125℃	-	71.8	-	
			T_{vj}= 150℃	-	89.3	-	

E_{rec}	Reverse recovery energy		T_{vj}=25℃	-	6 6	-	mJ
			T_{vj}= 125℃	-	19.2	-	
			T_{vj}= 150℃	-	29.2	-	
R_{thJC}	Thermal resistance, junction to case	per diode		-	-	0. 11	K/W
R_{thCH}	Thermalresistance,case to heatsink	per diode/ λgrease= 1W/(m·K)		-	0.055	-	K/W
T_{vjop}	Temperature under switching conditions			-40		150	℃

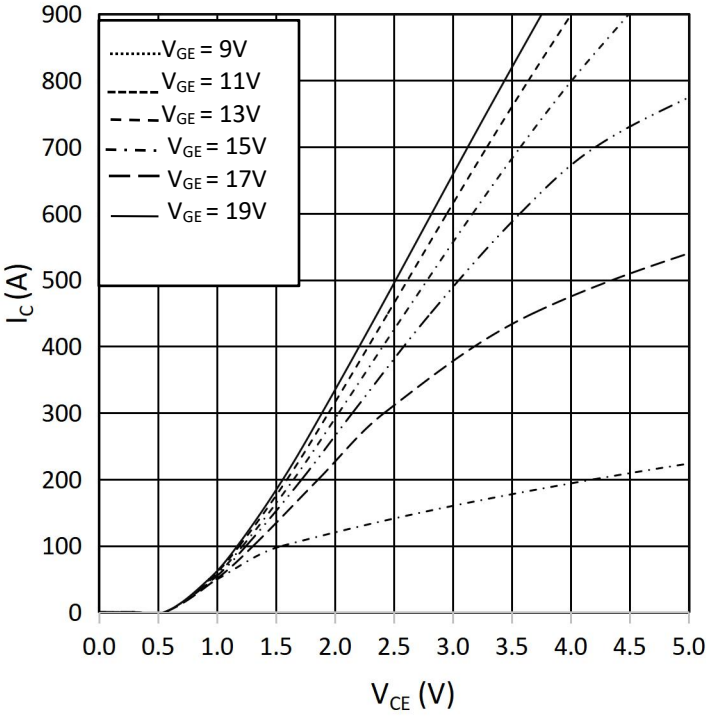
Module

Symbol	Item	Conditions	Rating			Unit
V_{ISOL}	Isolation voltage	Terminals to baseplate，RMS,f=50Hz,t=1min	4000			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	-	6.0	Nm
	Terminal connection torque	Screw M6	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	-	-	320	-	g

output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$

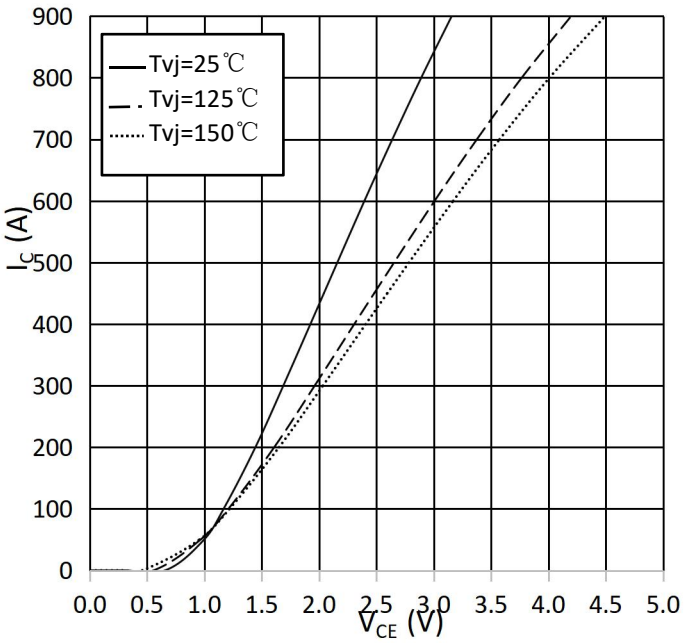
$T_{vj} = 150℃$



output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$

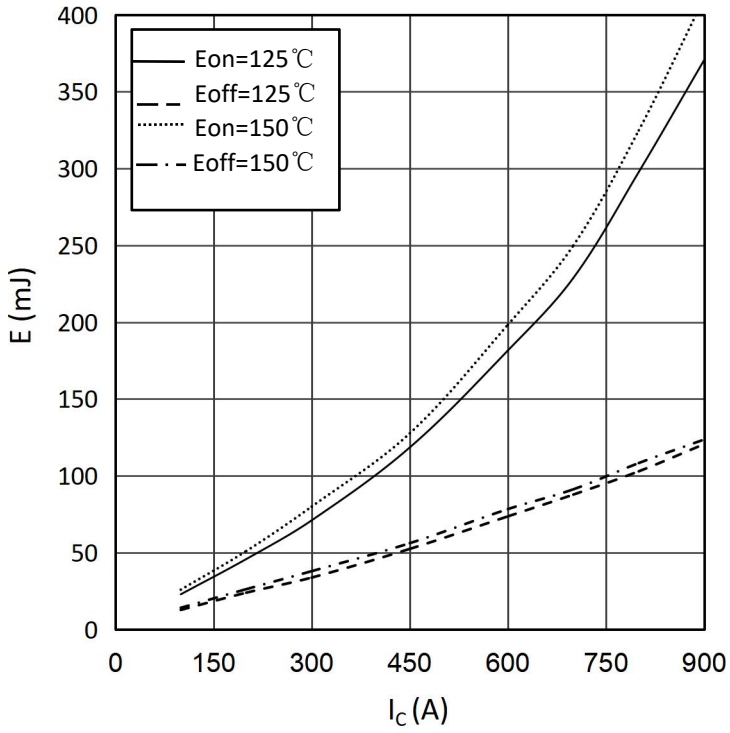
$V_{GE} = 15\ V$



switching losses IGBT,Inverter(typical)

$E_{on} = f(I_C)$, $E_{off} = f(I_C)$

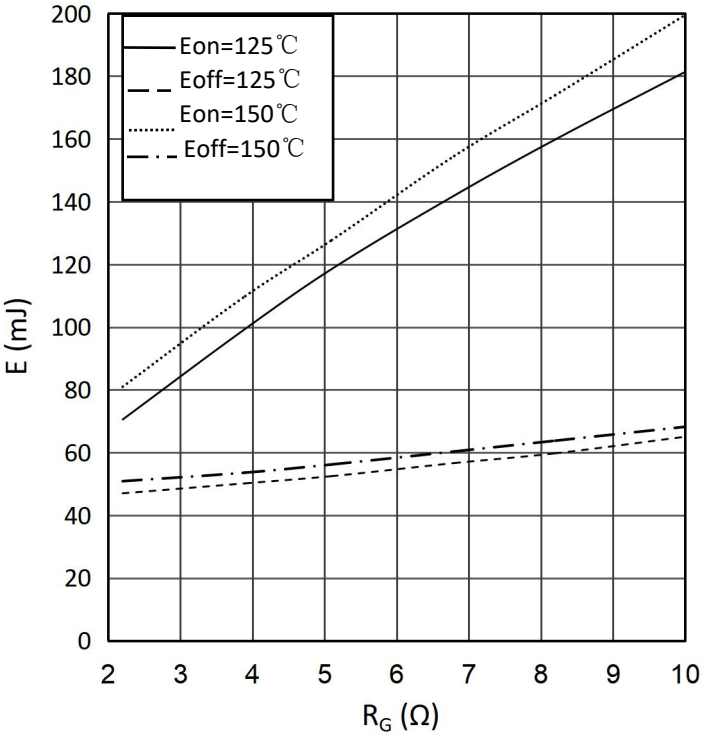
$V_{GE} = \pm 15V$, $R_{Gon} = 5.1\Omega$, $R_{Goff} = 5.1\Omega$, $V_{CE} = 600V$



switching losses IGBT,Inverter(typical)

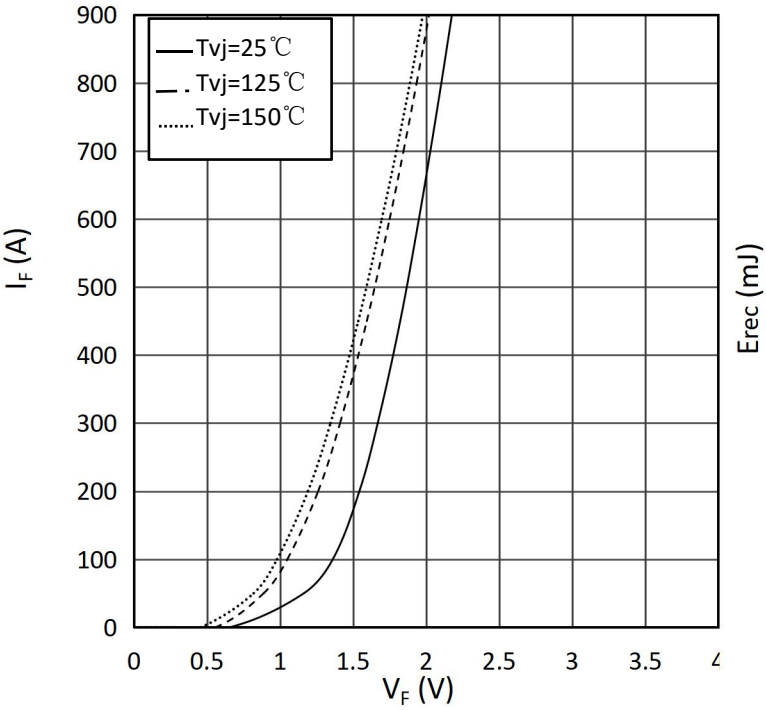
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$

$V_{GE} = \pm 15V$, $I_C = 450A$, $V_{CE} = 600V$



forward characteristic of Diode, Inverter (typical)

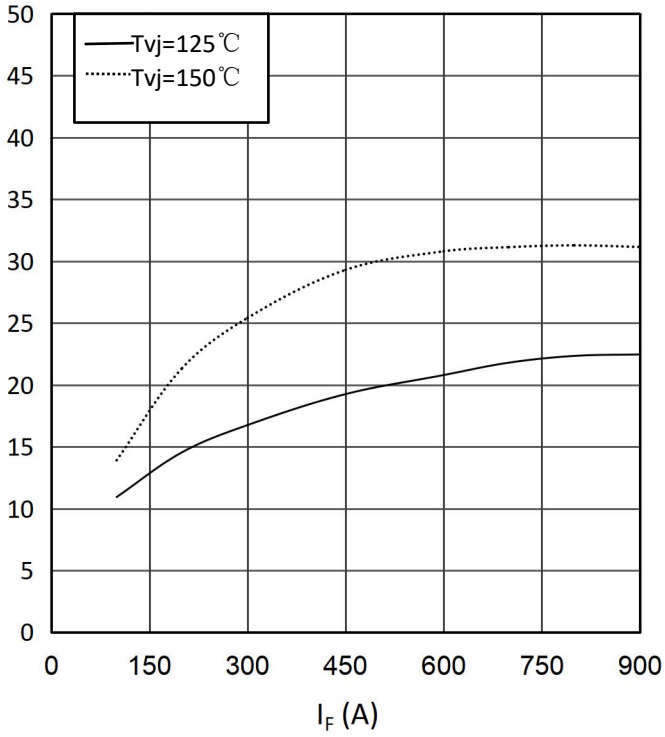
$I_F = f(V_F)$



switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$

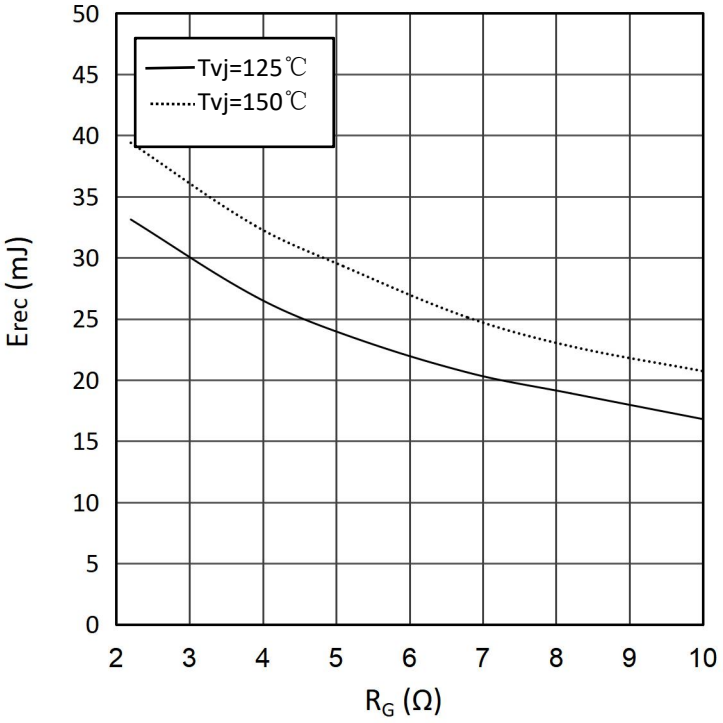
R_{Gon}=5. 1Ω, V_{CE}=600V



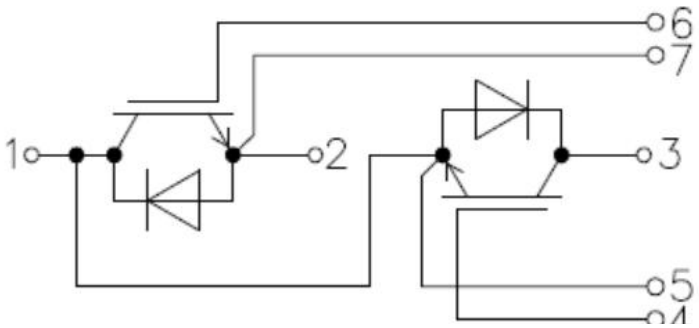
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$

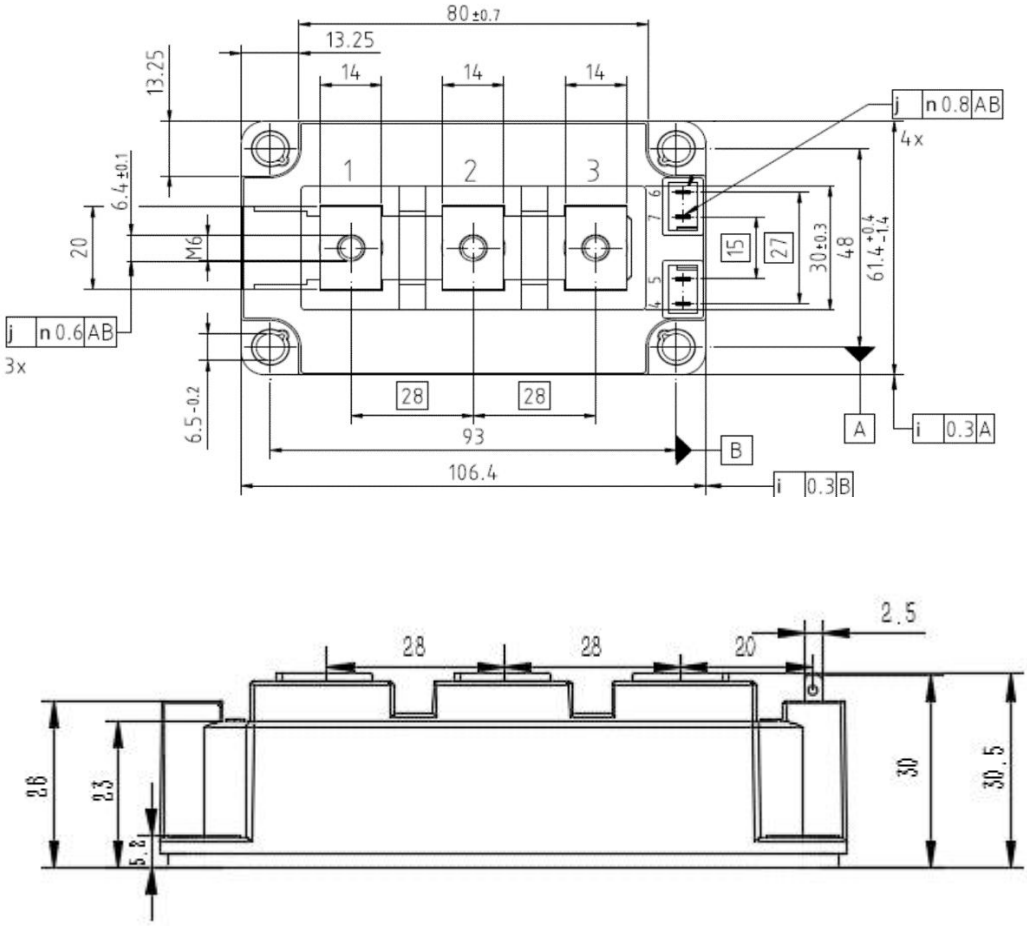
I_F=450A, V_{CE}=600V



Circuit diagram headline



Package outlines （Unit：mm）



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