MPFF150R07RBF

650V 150A IGBT Module

Electrical Features

- Trench/Fieldstop IGBT
- Low VCE(sat)
- VCE(sat) with positive temperature coefficient
- 10 μ s short circuit capability
- Fast&soft reverse recovery anti-parallel FWD
- Low inductance case

Typical Applications

- Motor Drives
- High Power Converters
- UPS System

IGBT，Inverter

Maximum Rated Values					
Symbol	Item	Conditions		Rating	Unit
IGBT					
V_{CES}	Collector-emitter voltage	T_{vj}=25℃		650	V
V_{GES}	Gate-emitter voltage	-		±20	V
I_C	Collector current,DC	T_C=100℃,T_{vj}=175℃		150	A
I_{CRM}	Repetitive peak collector current	t_p=1ms		300	A
t_{SC}	Short circuit withstand time	V_{GE}=15V, V_{CC}=300V, T_{vj}≤150℃		10	us
P_{tot}	Total power dissipation	T_C=25℃,T_{vj}=175℃		500	W

Characteristics Values							
Symbol	Item	Conditions		Values			Unit
IGBT				Min.	Typ.	Max.	
I_{CES}	Collector-emitter cut-off current	V_{CE}=650V,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	6.1	7.0	V
V_{CEsat}	Collector-emitter saturation voltage	I_C=150A V_{GE}=15V	T_{vj}=25℃	-	2.1	2.5	V
			T_{vj}=125℃	-	2.6	-	
			T_{vj}=150℃	-	2.7	-	
C_{ies}	Input capacitance	V_{CE}=25V,V_{GE}=0V f=1MHz,T_{vj}=25℃		-	13	-	nF
C_{res}	Reverse transfer capacitance			-	0.17	-	
Q_G	Gate charge	V_{CC}=300V, I_C=150A, V_{GE}=15V		-	706	-	uC
R_g	Internal gate resistance	T_{vj}=25℃			1.7		Ω

$t_{d(on)}$	Turn-on delay time	V_{CC}=300V, I_C=150A, V_{GE}=±15V, $R_{G(on)}$=15 Ω, $R_{G(off)}$=15 Ω, L_{load}=200uH	T_{vj}=25°C	-	228.8	-	ns
			T_{vj}=125°C	-	225.6	-	
			T_{vj}=150°C	-	216.0	-	
t_r	Rise time		T_{vj}=25°C	-	141.2	-	
			T_{vj}=125°C	-	145.6	-	
			T_{vj}=150°C	-	148.8	-	
$t_{d(off)}$	Turn-off delay time		T_{vj}=25°C	-	216.2	-	
			T_{vj}=125°C	-	225.6	-	
			T_{vj}=150°C	-	228.8	-	
t_f	Fall time		T_{vj}=25°C	-	66.9	-	
			T_{vj}=125°C	-	78.4	-	
			T_{vj}=150°C	-	84.8	-	
E_{on}	Turn-on energy (per pulse)		T_{vj}=25°C	-	4.3	-	mJ
			T_{vj}=125°C	-	5.5	-	
			T_{vj}=150°C	-	5.7	-	
E_{off}	Turn-off energy (per pulse)		T_{vj}=25°C	-	3.1	-	
			T_{vj}=125°C	-	3.3	-	
			T_{vj}=150°C	-	3.6	-	
R_{thJC}	Thermal resistance,junction to case	per IGBT		-	-	0.3	K/W
R_{thCH}	Thermalresistance,case to heatsink	per IGBT/ λgrease=1W/(m·K)		-	0.05	-	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°C	650	V
I_F	Forward current,DC	T_C=100°C,T_{vj}=150°C	150	A
I_{FRM}	Repetitive peak forward current	t_p=1ms	300	A

Characteristic Values

V_F	Continuous forward voltage	I_F=150A V_{GE}=0V	T_{vj}=25°C	-	1.66	-	V
			T_{vj}=125°C	-	1.56	-	
			T_{vj}=150°C	-	1.54	-	
I_{RM}	Peak reverse recovery current	V_R=300V I_F=150A di_F/dt=-1400A/μs	T_{vj}=25°C	-	120	-	A
			T_{vj}=125°C	-	61	-	
			T_{vj}=150°C	-	58	-	
t_{rr}	Reverse recovery time		T_{vj}=25°C	-	147	-	ns
			T_{vj}=125°C	-	204.8	-	
			T_{vj}=150°C	-	254.4	-	
Q_r	Repetitive peak forward current		T_{vj}=25°C	-	4.86	-	μC
			T_{vj}=125°C	-	7.48	-	
			T_{vj}=150°C	-	7.57	-	
E_{rec}	Recovered charge		T_{vj}=25°C	-	0.87	-	mJ
			T_{vj}=125°C	-	1.30	-	
			T_{vj}=150°C	-	1.37	-	

R_{thJC}	Thermal resistance, junction to case	per diode	-	-	0.58	K/W
R_{thCH}	Thermalresistance,case to heatsink	per IGBT/ λgrease=1W/(m·K)	-	0.05	-	K/W
T_{vjop}	Temperature under switching conditions		-40		150	℃

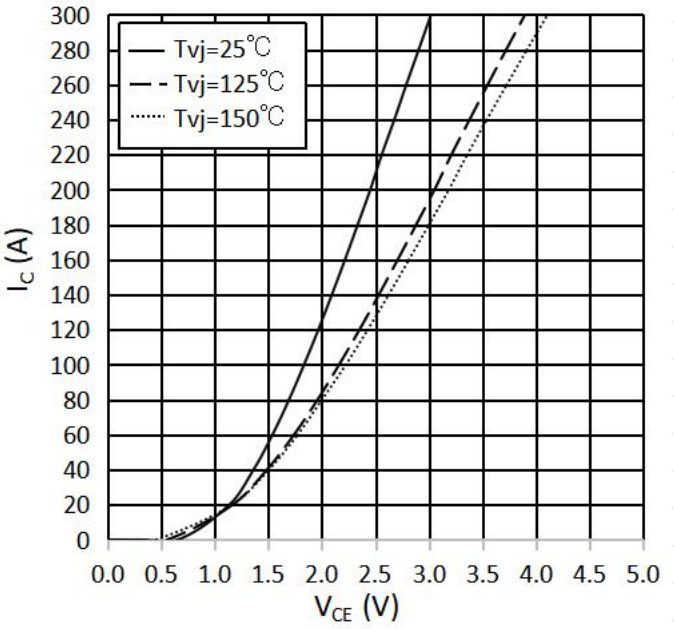
Module

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 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	-	-	147	-	g

output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$

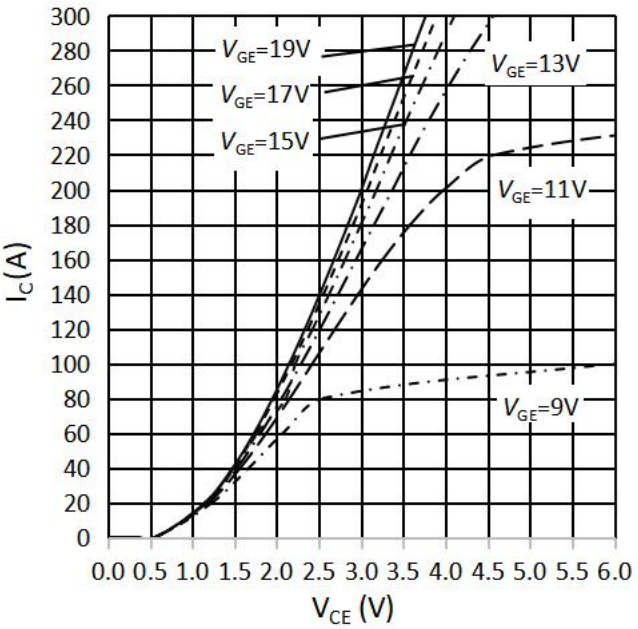
$V_{GE} = 15$ V



output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$

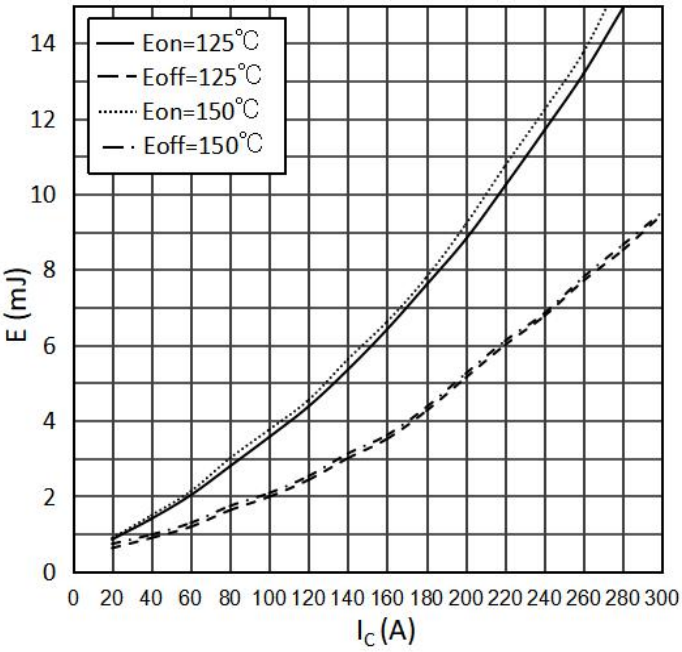
$T_{vj} = 150℃$



switching losses IGBT,Inverter(typical)

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

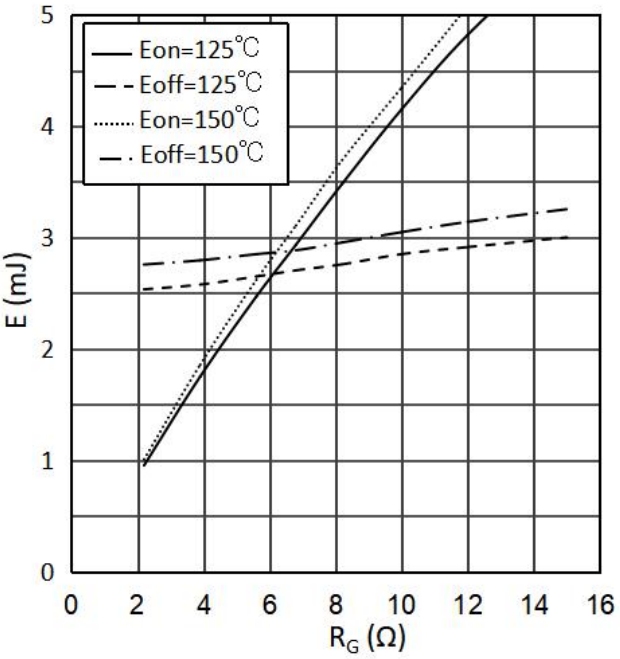
$V_{GE} = \pm 15V$, $R_{Gon} = 15\Omega$, $R_{Goff} = 15\Omega$, $V_{CE} = 300V$



switching losses IGBT,Inverter(typical)

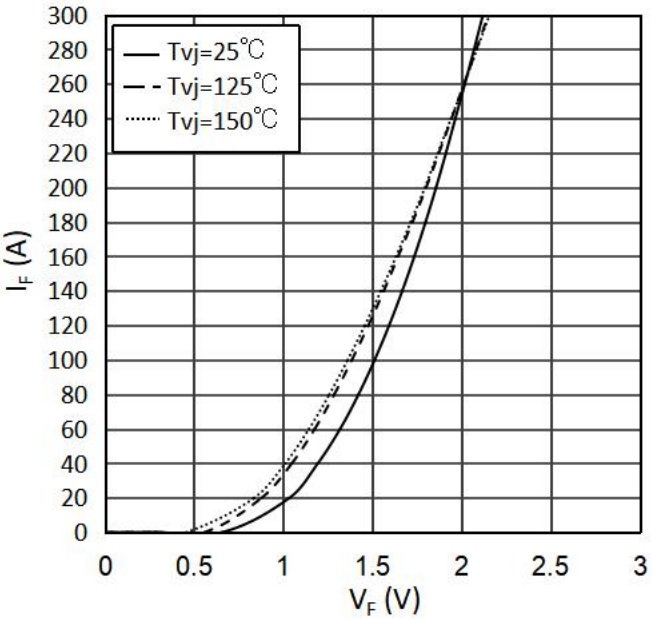
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$

$V_{GE} = \pm 15V$, $I_C = 150A$, $V_{CE} = 300V$



forward characteristic of Diode, Inverter (typical)

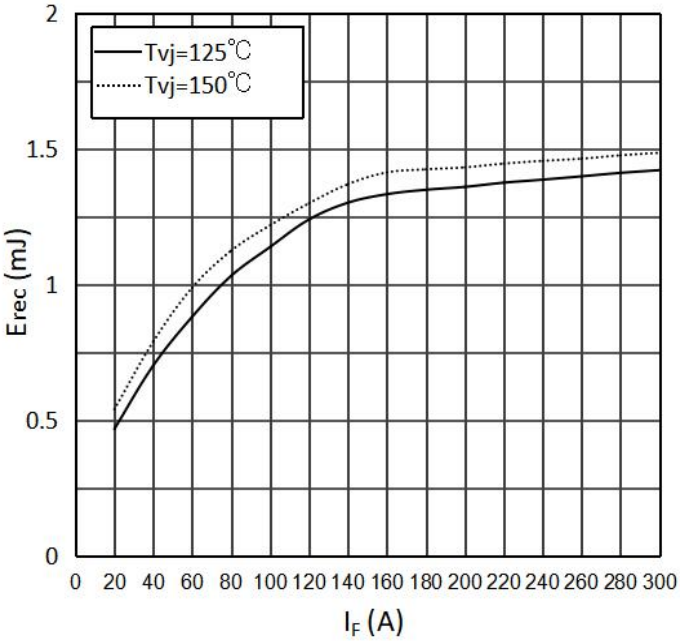
$I_F = f(V_F)$



switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$

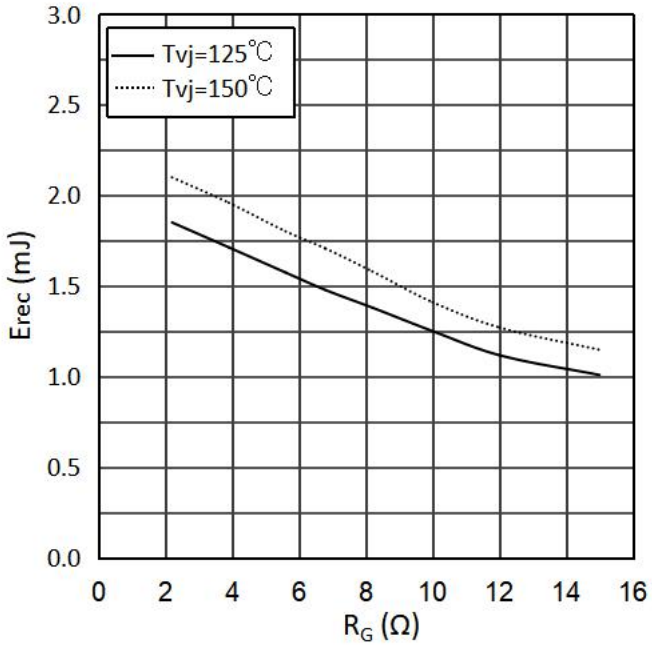
R_{Gon}=15Ω, V_{CE}=300V



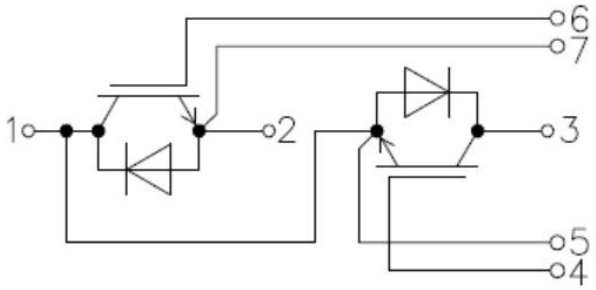
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$

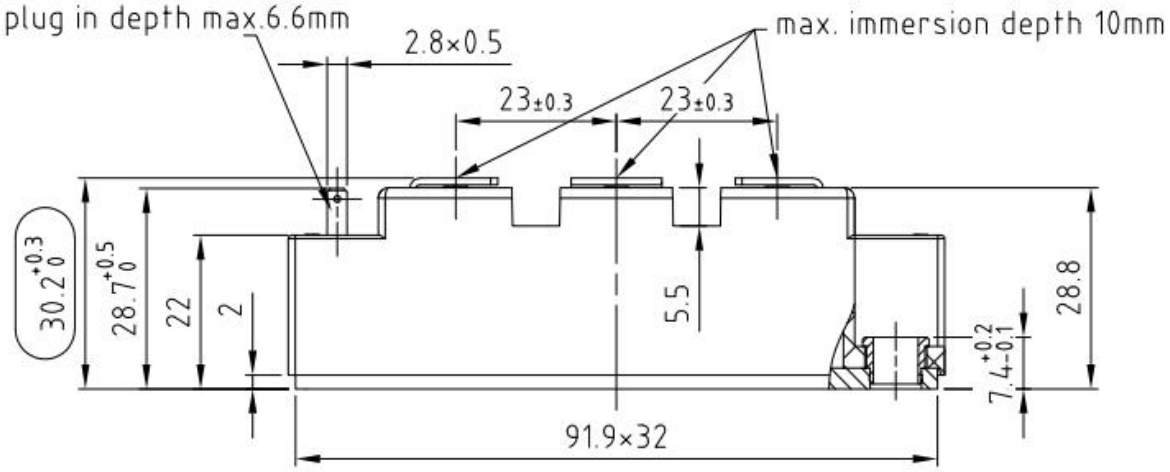
I_F=150A, V_{CE}=300V

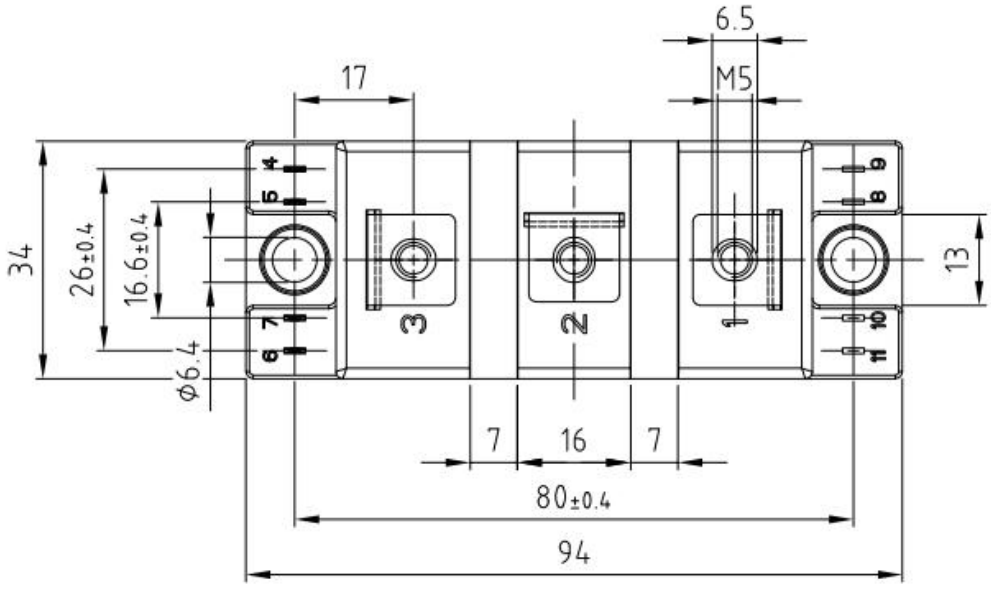


Circuit diagram headline



Package outlines（Unit：mm）





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