MPFS50R17CNF

1700V 50A Field stop IGBT Modules

Electrical Features

- Low V_{CEsat}
- Low Switching Losses
- V_{CEsat} with positive Temperature Coefficient
- High Short Circuit Capability, Self Limiting Short Circuit Current

Typical Applications

- Motor Drives
- Auxiliary Inverters

Mechanical Features

- Copper Base Plate
- Standard Housing

IGBT，Inverter

Maximum Rated Values							
Symbol	Item	Conditions		Rating			Unit
IGBT							
V_{CES}	Collector-emitter voltage	T_{vj}=25°C		1700			V
V_{GES}	Gate-emitter voltage	-		±20			V
I_C	Collector current,DC	T_C=100°C,T_{vj}=175°C		50			A
I_{CRM}	Repetitive peak collector current	t_p=1ms		100			A
P_{tot}	Total power dissipation	T_C=25°C,T_{vj}=175°C		-			W
Characteristics Values							
Symbol	Item	Conditions		Values			Unit
IGBT				Min.	Typ.	Max.	
I_{CES}	Collector-emitter cut-off current	V_{CE}=1700V,V_{GE}=0V,T_{vj}=25°C		-	-	1	mA
I_{GES}	Gate leakage current	V_{CE}=0V,V_{GE}=20V,T_{vj}=25°C		-	-	100	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C=1mA,V_{CE}=V_{GE},T_{vj}=25°C		5.2	5.8	6.6	V
V_{CEsat}	Collector-emitter saturation voltage	I_C=50A V_{GE}=15V	T_{vj}=25°C	-	1.55	2.40	V
			T_{vj}=125°C	-	1.81	-	
			T_{vj}=150°C	-	1.84	-	
C_{ies}	Input capacitance	V_{CE}=25V,V_{GE}=0V f=1MHz,T_{vj}=25°C		-	7.9	-	nF
C_{oes}	Output capacitance			-	1.5	-	
C_{res}	Reverse transfer capacitance			-	1.3	-	
Q_G	Gate charge	V_{GE}=-15...+15V		-	0.45	-	µC
R_g	Internal gate resistance	T_{vj}=25°C		-	-	-	Ω
$t_{d(on)}$	Turn-on delay time		T_{vj}=25°C	-	189.9	-	ns
			T_{vj}=125°C	-	198.1	-	
			T_{vj}=150°C	-	199.2	-	
t_r	Rise time		T_{vj}=25°C	-	67.5	-	
			T_{vj}=125°C	-	85.1	-	
			T_{vj}=150°C	-	86.3	-	

©2023 Marching Power. All rights reserved

$t_{d(off)}$	Turn-off delay time	V_{CC}=900V I_C=50A V_{GE}=±15V $R_{G(on)}$=15Ω $R_{G(off)}$=15Ω di/dt=1034A/μs du/dt=5607V/μs (T_{vj}=150℃)	T_{vj}=25℃	-	381.3	-	
			T_{vj}=125℃	-	425.5	-	
			T_{vj}=150℃	-	473.9	-	
t_f	Fall time		T_{vj}=25℃	-	582.9	-	
			T_{vj}=125℃	-	767.1	-	
			T_{vj}=150℃	-	985.1	-	
E_{on}	Turn-on energy (per pulse)		T_{vj}=25℃	-	15.9	-	mJ
			T_{vj}=125℃	-	21.2	-	
			T_{vj}=150℃	-	21.4	-	
E_{off}	Turn-off energy (per pulse)		T_{vj}=25℃	-	12.8	-	
			T_{vj}=125℃	-	15.9	-	
			T_{vj}=150℃	-	17.6	-	
SC data	Short-circuit current	V_{CC}=900V,V_{GE}≤15V V_{CES}≤1700V,t_P≤10μs	T_{vj}=25℃	-	318	-	A
			T_{vj}=150℃	-	271	-	
R_{thJC}	Thermal resistance,junction to case	Per IGBT		-	-	-	K/W
R_{thCH}	Thermalresistance,case to heatsink	Per IGBT λgrease=1W/(m·K)		-	-	-	K/W
Tvjop	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℃		1700	V
I_F	Forward current,DC			50	A
I_{FRM}	Repetitive peak forward current	t_p=1ms		100	A
I^2t	I^2t-value	V_R=0V,t_p=10ms	T_{vj}=25℃	-	A^2s
		V_R=0V,t_p=10ms	T_{vj}=150℃	-	

Characteristic Values

				Min.	Typ.	Max.	
V_F	Continuous forward voltage	I_F=50A V_{GE}=0V	T_{vj}=25℃	-	1.28	-	V
			T_{vj}=125℃	-	1.33	-	
			T_{vj}=150℃	-	1.41	-	
I_{RM}	Peak reverse recovery current	V_R=900V I_F=50A V_{GE}=-15V -di_F/dt=698A/μs (T_{vj}=150℃)	T_{vj}=25℃	-	51.0	-	A
			T_{vj}=125℃	-	55.0	-	
			T_{vj}=150℃	-	56.0	-	
t_{rr}	Reverse recovery time		T_{vj}=25℃	-	709.8	-	ns
			T_{vj}=125℃	-	983.0	-	
			T_{vj}=150℃	-	1017	-	
Q_r	Recovered charge		T_{vj}=25℃	-	16.8	-	μC
			T_{vj}=125℃	-	26.7	-	
			T_{vj}=150℃	-	28.1	-	

©2023 Marching Power. All rights reserved

E_{rec}	Reverse recovery energy	V_R=900V I_F=50A V_{GE}=-15V	T_{vj}=25℃	-	10.0	-	mJ
			T_{vj}=125℃	-	16.5	-	
			T_{vj}=150℃	-	17.4	-	
R_{thJC}	Thermal resistance,junction to case	Per diode		-	-	-	K/W
R_{thCH}	Thermal resistance,case to heatsink	Per diode,λ_{grease} =1 W/(mK)		-	-	-	K/W
Tvjop	Temperature under switching conditions			-40	-	150	℃

NTC Thermistor Characteristics

Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
R_{25}	Rated resistance	T_C=25℃	-	5	-	kΩ
ΔR/R	Deviation of resistance	T_C=100℃,R_{100}=493Ω	-5	-	5	%
P_{25}	Power dissipation	T_C=25℃	-	-	20	mW
$B_{25/50}$	B-constant	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))$	-	3375	-	K
$B_{25/80}$	B-constant	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))$	-	3411	-	
$B_{25/100}$	B-constant	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15K))$	-	3433	-	

Module

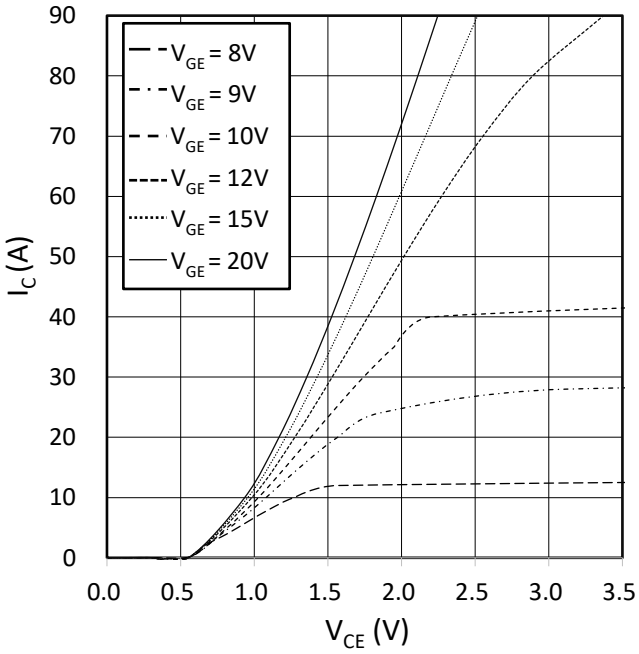
Symbol	Item	Conditions	Rating			Unit
V_{ISOL}	Isolation voltage	Terminals to baseplate，RMS,f=50Hz,t=1min	4000			V
-	Material of module baseplate	-	Cu			
-	Internal isolation	Basic insulation (class 1, IEC 61140)	Al_2O_3			
CTI	Comperative tracking index	-	＞200			
$T_{vj\ max}$	Maximum junction temperature	-	175			℃
$T_{vj\ op}$	Operating junction temperature	Continuous operationg(under switching)	-40~150			℃
T_{stg}	Storage temperature	-	-40~125			℃
Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
Ms	Mounting torque	Mounting to heat sink,M5 screw	3	-	6	Nm
RCC'+EE'		TC = 25°C, per switch	-	2.53	-	mΩ
LsCE	Stray inductance module		-	43	-	nH
ds	Creepage distance	Terminal to terminal	-	-	-	mm
		Terminal to base plate	-	10	-	
da	Clearance	Terminal to terminal	-	-	-	mm
		Terminal to base plate	-	7.5	-	
m	Weight	-	-	175	-	g

©2023 Marching Power. All rights reserved

output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$

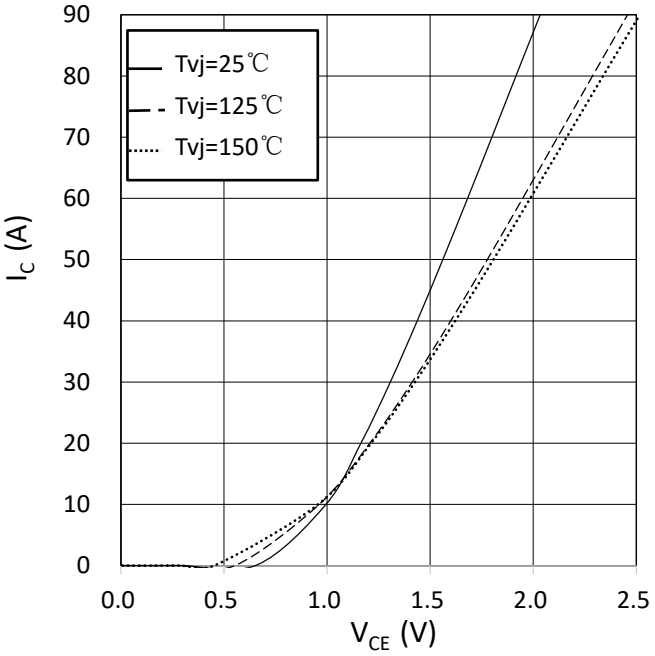
$T_{vj} = 150℃$



output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$

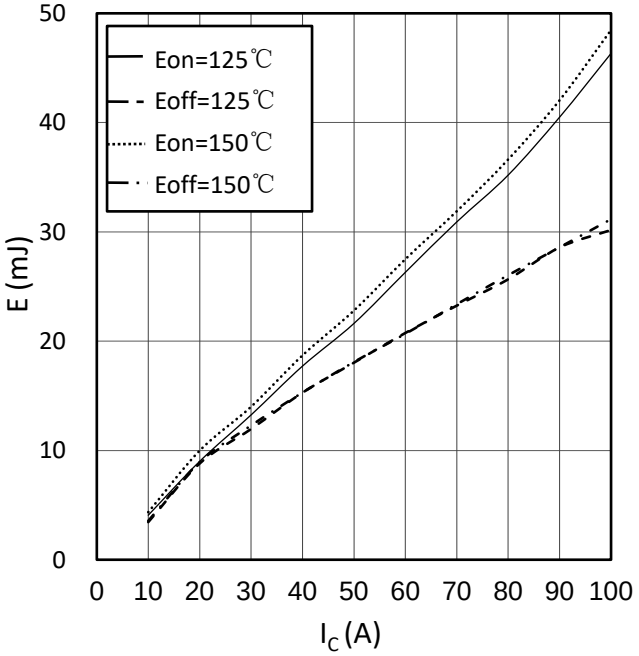
$V_{GE} = 15\ V$



switching losses IGBT,Inverter(typical)

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

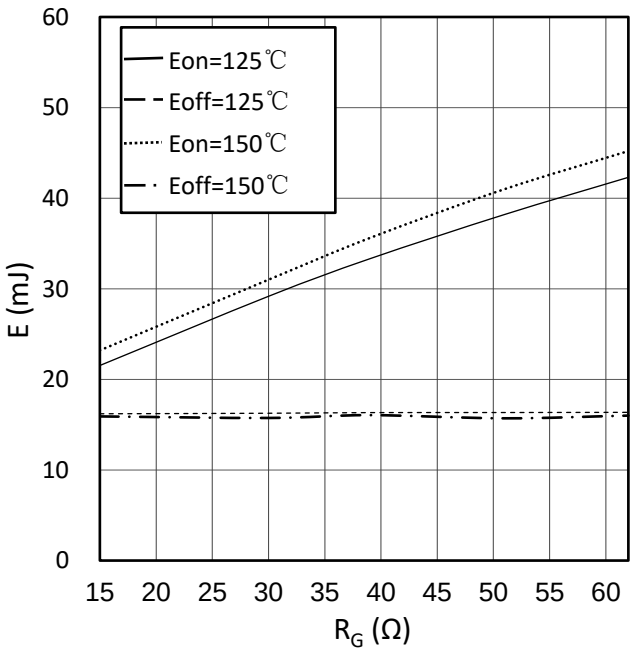
$V_{GE} = \pm 15V$, $R_{Gon} = 15\Omega$, $R_{Goff} = 15\Omega$, $V_{CE} = 900V$



switching losses IGBT,Inverter(typical)

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

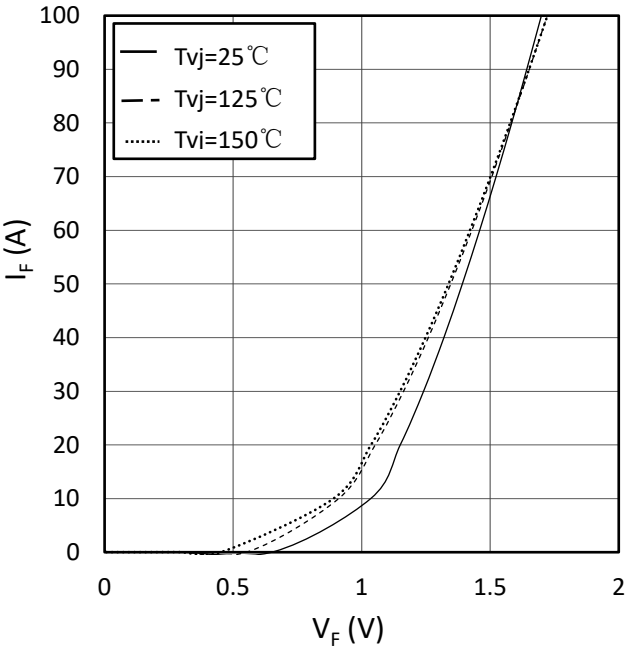
$V_{GE} = \pm 15V$, $I_C = 50A$, $V_{CE} = 900V$



©2023 Marching Power. All rights reserved

forward characteristic of Diode, Inverter (typical)

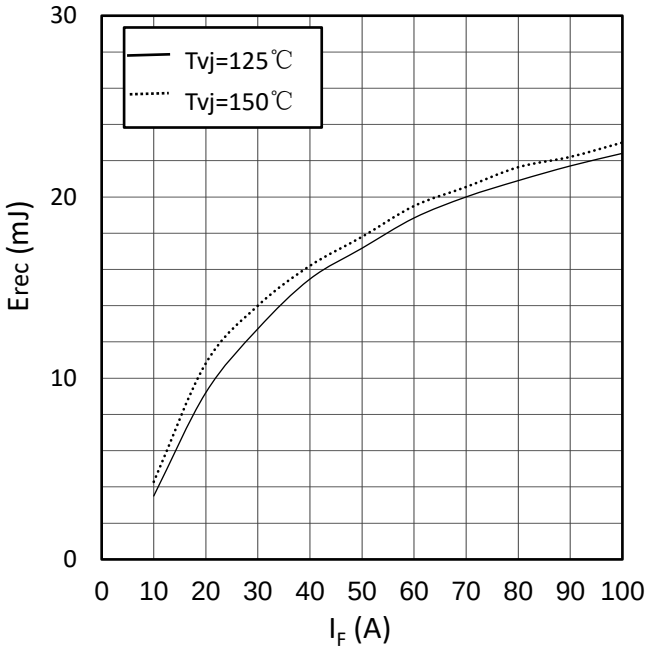
$I_F = f(V_F)$



switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$

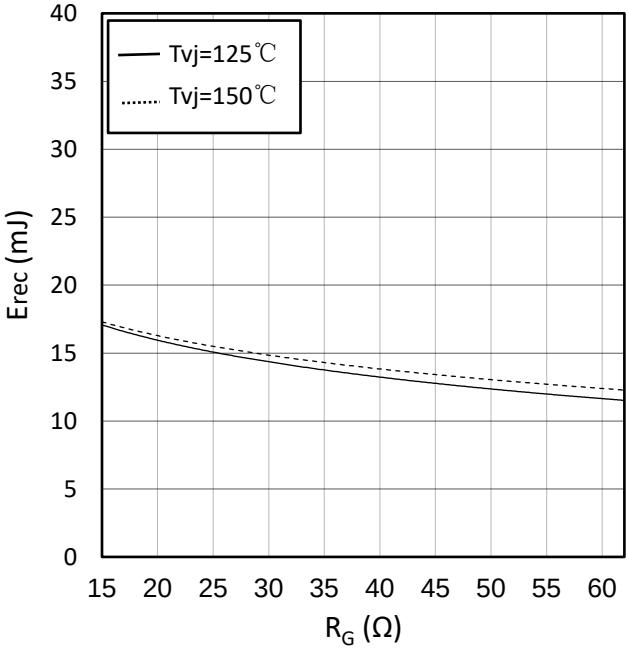
R_{Gon}=15Ω, V_{CE}=900V



switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$

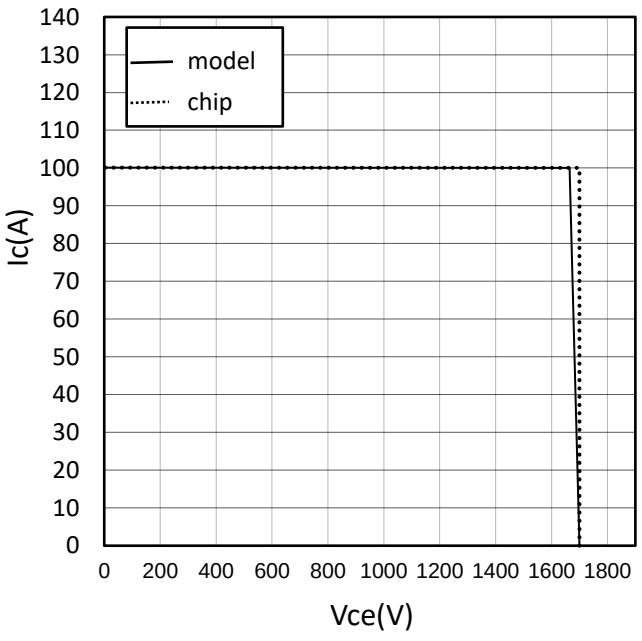
I_F=50A, V_{CE}=900V



Reverse bias safe operating area IGBT,Inverter (RBSOA)

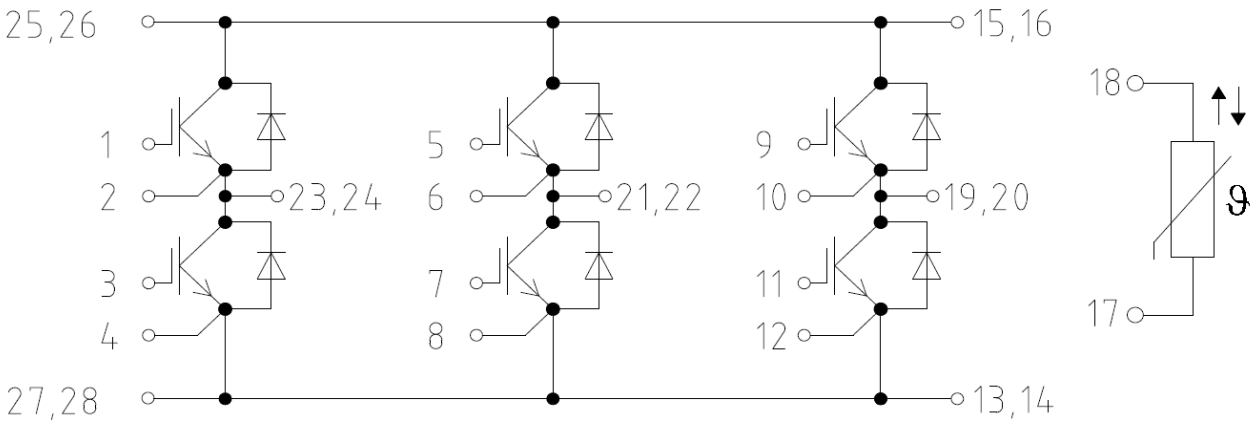
IC = f (VCE)

VGE = ±15 V, RGoff = 15 Ω, Tvj = 150°C

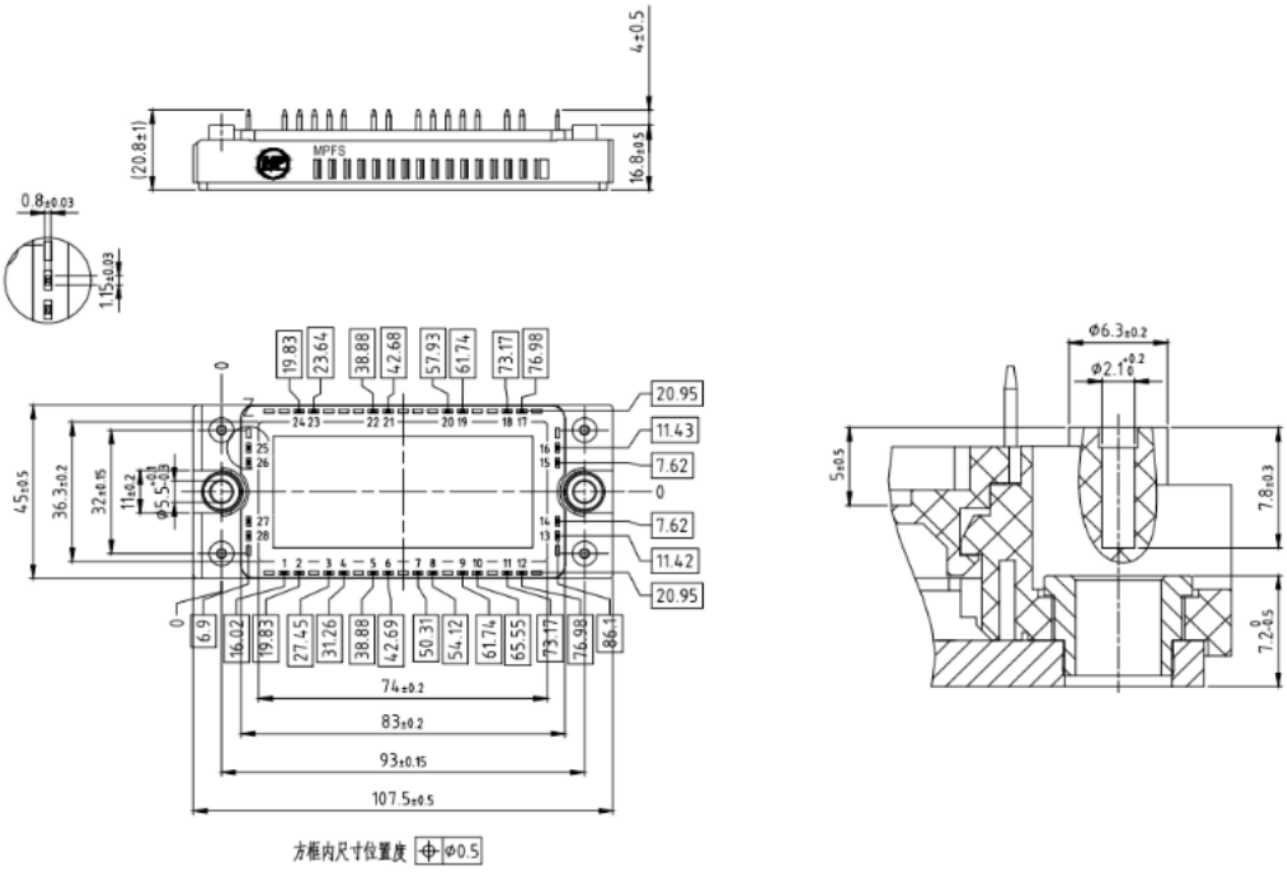


©2023 Marching Power. All rights reserved

Cricuit Diagram



Package Outlines



©2023 Marching Power. All rights reserved

Terms & Conditions of usage

1.The product specifications, characteristics, data, materials and structures given in this datasheet are subject to change without notice.

2.The information given in this datasheet shall in no event be regarded as a guarantee of conditions or characteristics. Marching-Power Technology Co., Ltd. does not warrant or assume any legal liability or responsibility for the accuracy and completeness of any examples, hints or any typical values stated herein and/or any information regarding the application of the product.

3.This datasheet is only used as a reference for customers to apply our products， Marching-Power Technology Co., Ltd. does not undertake to permit the use of intellectual property rights or any third-party property rights related to the product information described in this datasheet.

4.Although Marching-Power Technology Co., Ltd. is committed to enhancing product quality and reliability, all semiconductor products still have a probability of failure. When using Marching-Power semiconductor products in your equipment, you are requested to take adequate safety measures to prevent the equipment from causing accidents or events including but not limited to physical injury, fire or damage to other property if any of the products become faulty.

5.The products introduced in this datasheet are electrostatic sensitive devices and must be protected against static electricity during device installation, testing, packaging, storage and transportation.

6. Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.

7.Do not use the products introduced in this datasheet in equipment or systems that requiring strict reliability or/and may directly endanger human life such as medical, life-saving, life-sustaining, space equipment, aeronautic equipment, nuclear equipment submarine repeater equipment and equivalents to strategic equipment (without limitation).

8.No part of this datasheet may be disseminated and reproduced in any form or by any means without prior written permission from Marching-Power Technology Co., Ltd.

9.The data contained in this datasheet is exclusively intended for use by professional technicians only. It is the responsibility of the customer's own technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to corresponding application. If you have any question about any portion in this datasheet, contact Marching-Power Technology Co., Ltd. before using the product. Marching-Power Technology Co., Ltd. shall not be liable for any injury caused by any use of the products not in accordance with instructions set forth herein.

©2023 Marching Power. All rights reserved

序号 Item	日期 Date	变更记录及描述 Change History Description	版本序号 Rev. item	经办人 Responsibility
1	2023.9.23	初版规格书发布，版本为V1.0	2023 9 Ver1.0	梁华文
2	2023.10.30	更新高温数据、短路电流、高温动静态曲线、安全工作曲线、结电容，版本为V1.1	2023 10Ver1.1	张成宇

©2023 Marching Power. All rights reserved