# MPFF100R07RBF

## 650V 100A 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℃ | | 100 | A |
| $I_{CRM}$ | Repetitive peak collector current | $t_p$=1ms | | 200 | 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℃ | | 330 | 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 | $I_C$=100A<br>$V_{GE}$=15V | $T_{vj}$=25℃ | - | 2.0 | 2.4 | V |
| | | | $T_{vj}$=125℃ | - | 2.39 | - | |
| | | | $T_{vj}$=150℃ | - | 2.50 | - | |
| $C_{ies}$ | Input capacitance | $V_{CE}$=25V,$V_{GE}$=0V<br>f=1MHz,$T_{vj}$=25℃ | | - | 8.5 | - | nF |
| $C_{res}$ | Reverse transfer capacitance | | | - | 0.11 | - | |
| $Q_G$ | Gate charge | $V_{CC}$=300V, $I_C$=100A, $V_{GE}$=15V | | - | 0.433 | - | μC |
| $R_g$ | Internal gate resistance | $T_{vj}$=25℃ | | - | 1.7 | - | Ω |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $t_{d(on)}$ | Turn-on delay time | $V_{CC}$=300V, $I_C$=100A, $V_{GE}$=±15V, $R_{G(on)}$=15 Ω, $R_{G(off)}$=15 Ω, $L_{load}$=200uH | $T_{vj}$=25℃ | - | 158.6 | - | ns |
| | | | $T_{vj}$=125℃ | - | 166.4 | - | |
| | | | $T_{vj}$=150℃ | - | 163.2 | - | |
| $t_r$ | Rise time | | $T_{vj}$=25℃ | - | 119.0 | - | |
| | | | $T_{vj}$=125℃ | - | 131.2 | - | |
| | | | $T_{vj}$=150℃ | - | 134.4 | - | |
| $t_{d(off)}$ | Turn-off delay time | | $T_{vj}$=25℃ | - | 152.0 | - | |
| | | | $T_{vj}$=125℃ | - | 164.8 | - | |
| | | | $T_{vj}$=150℃ | - | 168.0 | - | |
| $t_f$ | Fall time | | $T_{vj}$=25℃ | - | 63.0 | - | |
| | | | $T_{vj}$=125℃ | - | 78.4 | - | |
| | | | $T_{vj}$=150℃ | - | 81.6 | - | |
| $E_{on}$ | Turn-on energy (per pulse) | | $T_{vj}$=25℃ | - | 3.2 | - | mJ |
| | | | $T_{vj}$=125℃ | - | 3.66 | - | |
| | | | $T_{vj}$=150℃ | - | 3.96 | - | |
| $E_{off}$ | Turn-off energy (per pulse) | | $T_{vj}$=25℃ | - | 1.6 | - | |
| | | | $T_{vj}$=125℃ | - | 1.82 | - | |
| | | | $T_{vj}$=150℃ | - | 1.86 | - | |
| $R_{thJC}$ | Thermal resistance,junction to case | per IGBT | | - | - | 0.45 | K/W |
| $R_{thCH}$ | Thermalresistance,case to heatsink | per IGBT/ λgrease=1W/(m·K) | | - | 0.078 | - | 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℃ | 650 | V |
| $I_F$ | Forward current,DC | $T_C$=100℃,$T_{vj}$=150℃ | 100 | A |
| $I_{FRM}$ | Repetitive peak forward current | $t_p$=1ms | 200 | A |

**Characteristic Values**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $V_F$ | Continuous forward voltage | $I_F$=100A $V_{GE}$=0V | $T_{vj}$=25℃ | - | 1.7 | - | V |
| | | | $T_{vj}$=125℃ | - | 1.58 | - | |
| | | | $T_{vj}$=150℃ | - | 1.56 | - | |
| $I_{RM}$ | Peak reverse recovery current | $V_R$=300V $I_F$=100A $di_F/dt$=-1100A/μs | $T_{vj}$=25℃ | - | 43.12 | - | A |
| | | | $T_{vj}$=125℃ | - | 42.75 | - | |
| | | | $T_{vj}$=150℃ | - | 45.12 | - | |
| $t_{rr}$ | Reverse recovery time | | $T_{vj}$=25℃ | - | 134 | - | ns |
| | | | $T_{vj}$=125℃ | - | 216 | - | |
| | | | $T_{vj}$=150℃ | - | 228 | - | |
| $Q_r$ | Repetitive peak forward current | | $T_{vj}$=25℃ | - | 3.24 | - | μC |
| | | | $T_{vj}$=125℃ | - | 4.50 | - | |
| | | | $T_{vj}$=150℃ | - | 4.99 | - | |
| $E_{rec}$ | Recovered charge | | $T_{vj}$=25℃ | - | 0.63 | - | mJ |
| | | | $T_{vj}$=125℃ | - | 0.80 | - | |
| | | | $T_{vj}$=150℃ | - | 0.90 | - | |

| | | | | | | |
|---|---|---|---|---|---|---|
| $R_{thJC}$ | Thermal resistance, junction to case | per diode | - | - | 0.8 | K/W |
| $R_{thCH}$ | Thermalresistance,case to heatsink | per IGBT/ λgrease=1W/(m·K) | - | 0.14 | - | K/W |
| $T_{vjop}$ | Temperature under switching conditions | | -40 | | 150 | ℃ |

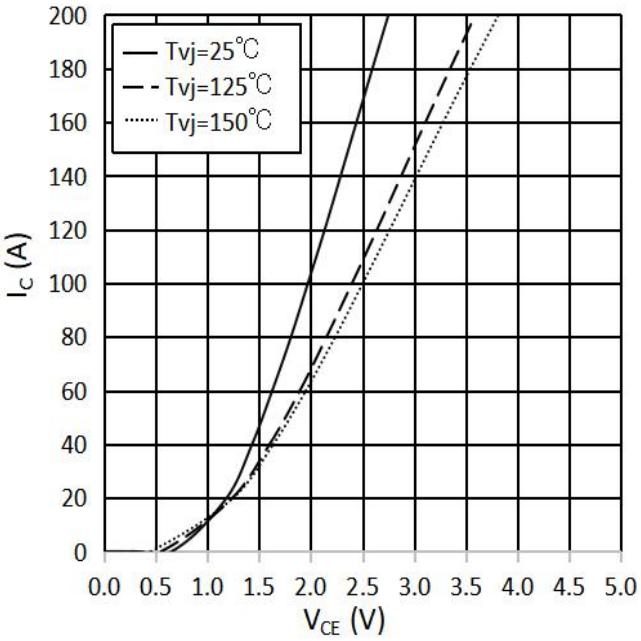
**Module**

| 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)**

$I_C = f(V_{CE})$

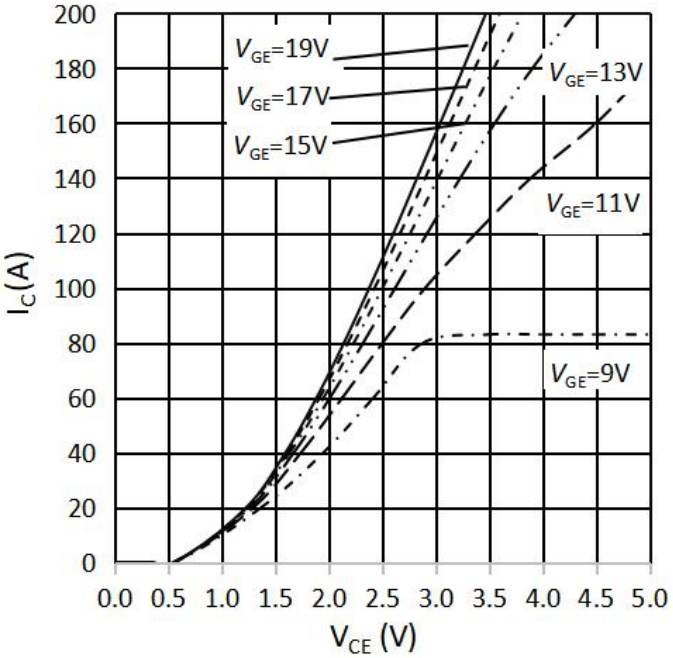
$V_{GE} = 15$ V




**output characteristic IGBT, Inverter (typical)**

$I_C = f(V_{CE})$

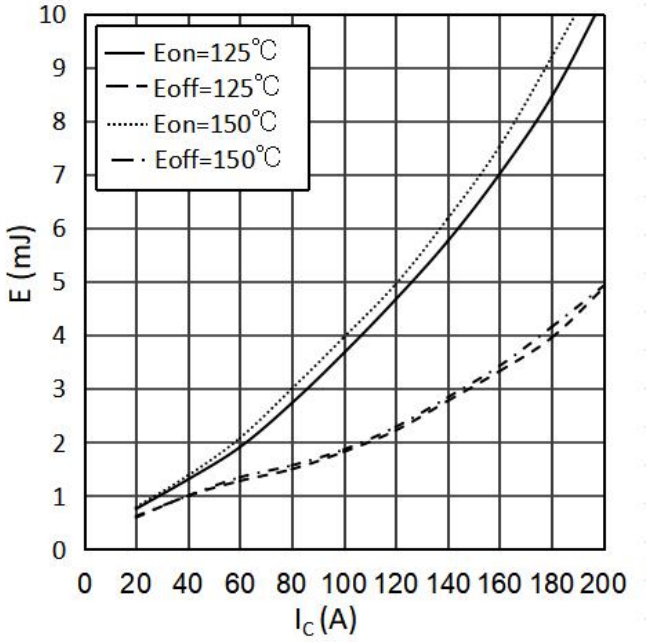
$T_{vj} = 150$℃




**switching losses IGBT,Inverter(typical)**

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

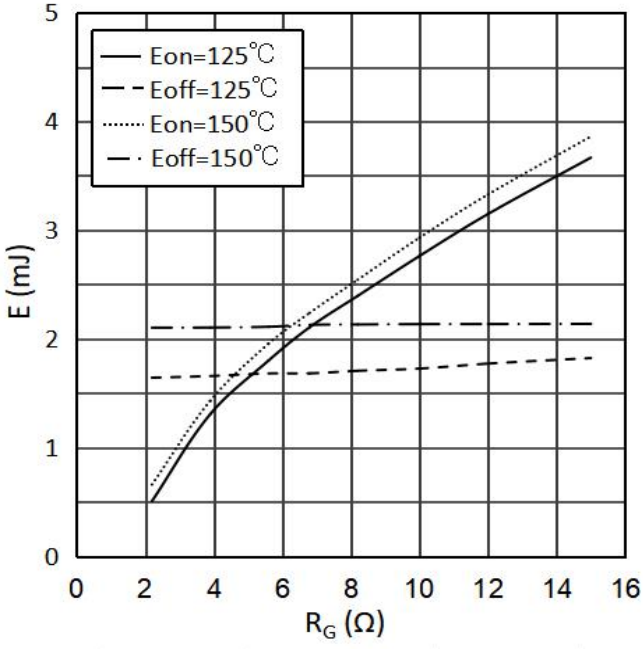
$V_{GE} = \pm 15$V, $R_{Gon} = 15\Omega$, $R_{Goff} = 15\Omega$, $V_{CE} = 300$V




**switching losses IGBT,Inverter(typical)**

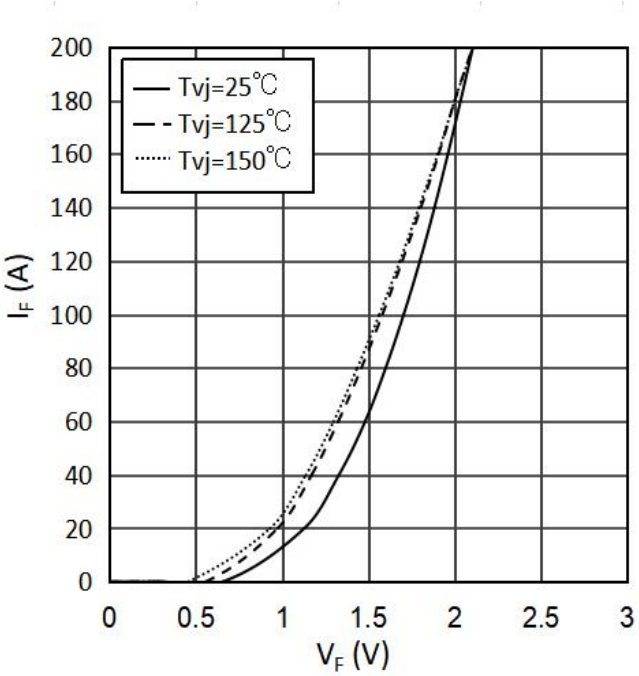
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$

$V_{GE} = \pm 15$V, $I_C = 100$A, $V_{CE} = 300$V



**forward characteristic of Diode, Inverter (typical)**

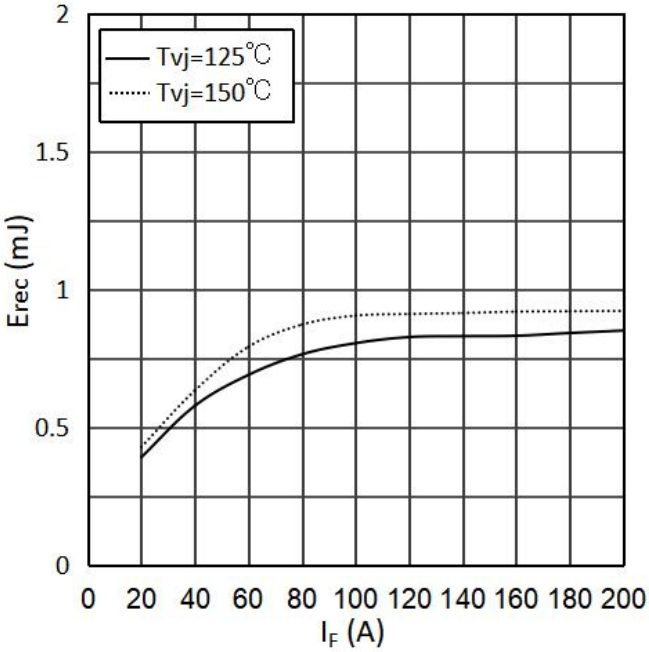
$I_F = f(V_F)$




**switching losses Diode, Inverter (typical)**

$E_{rec} = f(I_F)$

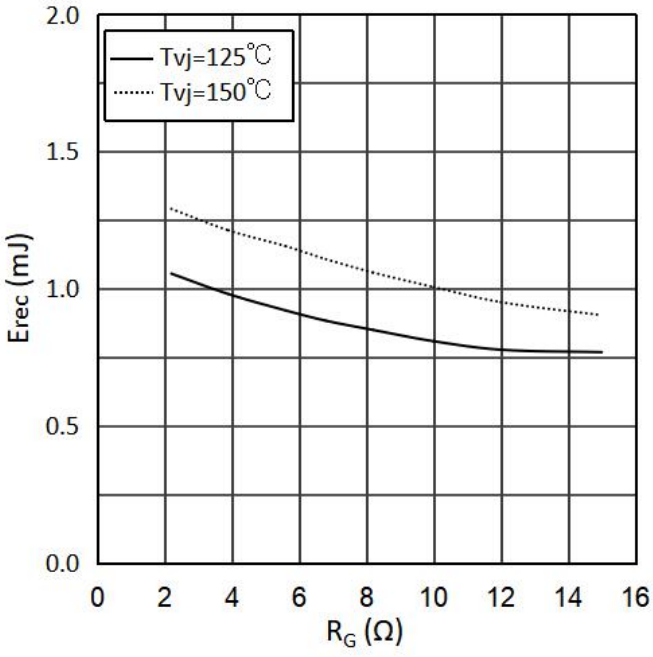
$R_{Gon}$=15Ω, $V_{CE}$=300V



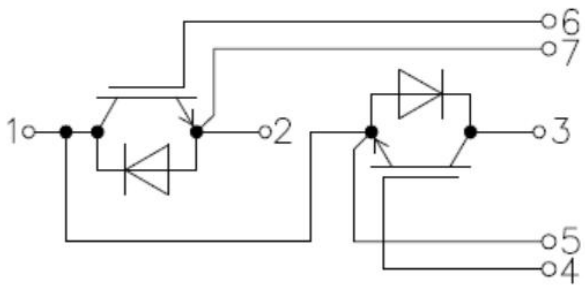

**switching losses Diode, Inverter (typical)**

$E_{rec} = f(R_G)$

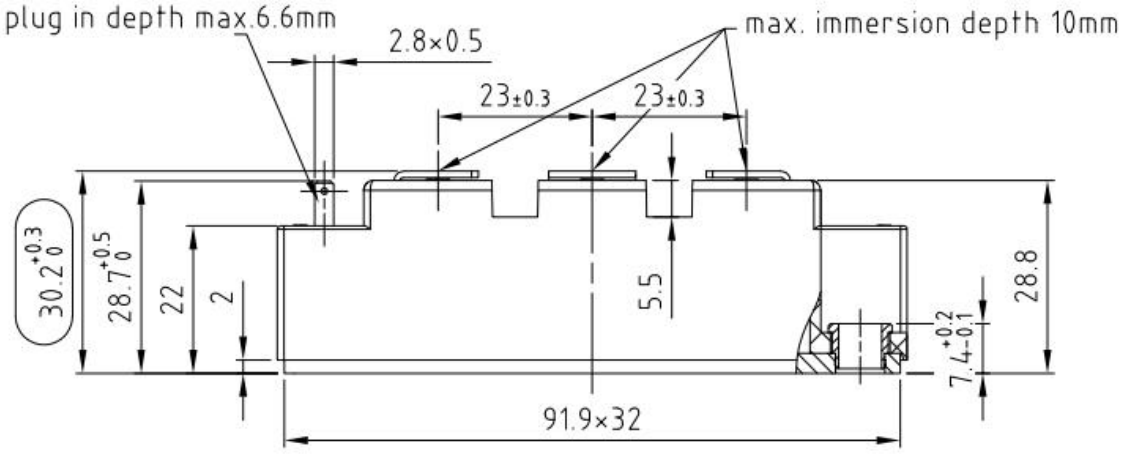
$I_F$=100A, $V_{CE}$=300V

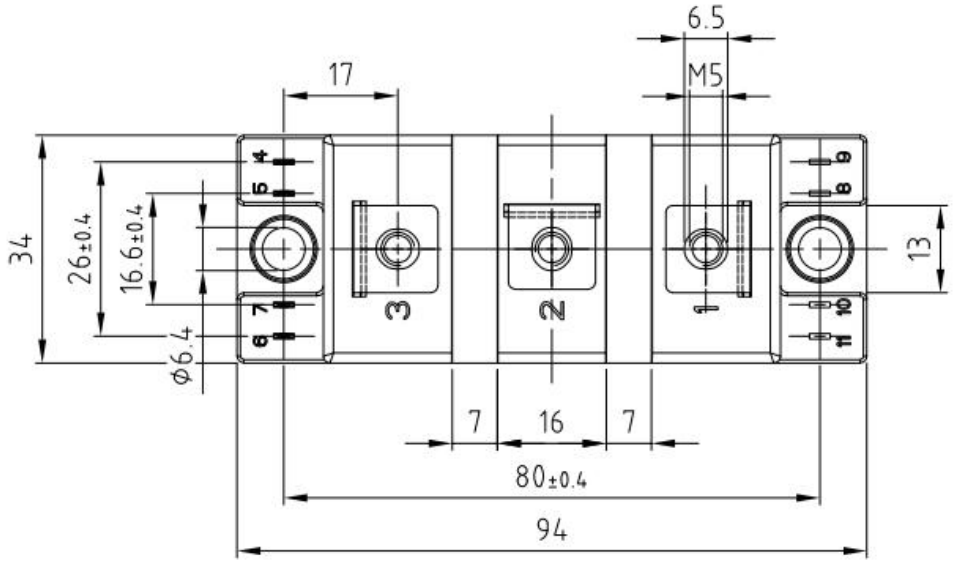


**Circuit diagram headline**




**Package outlines**（Unit：mm）



## 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.