

< HIGH VOLTAGE DIODE MODULES >

# RM400DG-90F

HIGH POWER SWITCHING USE  
INSULATED TYPE

High Voltage Diode Modules

**RM400DG-90F**



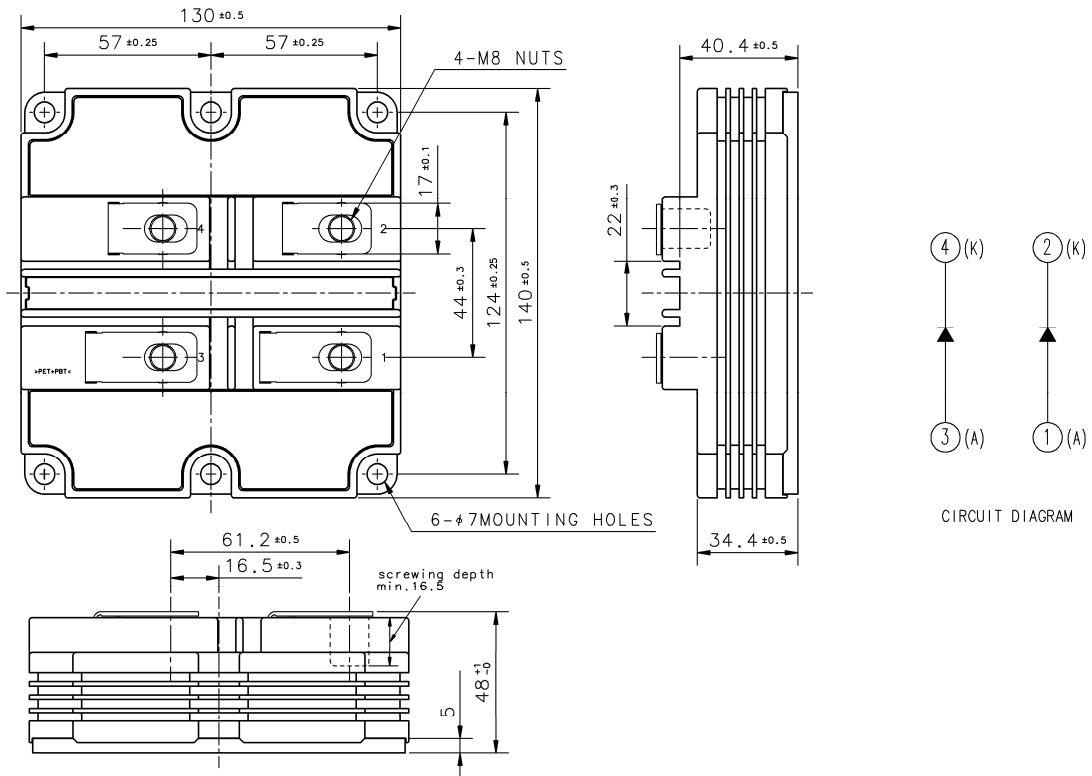
- $I_F$  ..... 400A
- $V_{RRM}$  ..... 4500V
- 2-element in a Pack
- High insulated Type
- Soft Recovery Diode
- AISiC Baseplate

**APPLICATION**

Traction drives, High Reliability Converters / Inverters, DC choppers

**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm



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**MAXIMUM RATINGS**

Symbol	Item	Conditions	Ratings	Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage	T <sub>j</sub> = -40...+125°C	4500	V
		T <sub>j</sub> = -50°C	4400	
I <sub>F</sub>	Forward current	DC, T <sub>c</sub> = 65°C	400	A
I <sub>FSM</sub>	Surge forward current	T <sub>j_start</sub> = 125°C, t <sub>p</sub> = 10 ms, Half-sine wave, V <sub>R</sub> = 0 V	3.2	kA
I <sub>t</sub> <sup>2</sup>	Surge current load integral		51	kA <sup>2</sup> s
P <sub>tot</sub>	Maximum power dissipation	T <sub>c</sub> = 25°C	2080	W
V <sub>iso</sub>	Isolation voltage	RMS, sinusoidal, f = 60 Hz, t = 1 min.	10200	V
V <sub>e</sub>	Partial discharge extinction voltage	RMS, sinusoidal, f = 60 Hz, Q <sub>PD</sub> ≤ 10 pC	3500	V
T <sub>j</sub>	Junction temperature		-50 ~ +150	°C
T <sub>jop</sub>	Operating junction temperature		-50 ~ +125	°C
T <sub>stg</sub>	Storage temperature		-55 ~ +125	°C

**ELECTRICAL CHARACTERISTICS**

Symbol	Item	Conditions	Limits			Unit	
			Min	Typ	Max		
I <sub>RRM</sub>	Repetitive reverse current	V <sub>RM</sub> = V <sub>RRM</sub>	T <sub>j</sub> = 25°C	—	—	1.0	mA
			T <sub>j</sub> = 125°C	—	3.0	—	
V <sub>FM</sub>	Forward voltage	I <sub>F</sub> = 400 A	T <sub>j</sub> = 25°C	—	2.55	—	V
			T <sub>j</sub> = 125°C	—	2.85	3.45	
t <sub>rr</sub>	Reverse recovery time	V <sub>CC</sub> = 2800 V I <sub>F</sub> = 400 A	T <sub>j</sub> = 25°C	—	0.70	—	μs
			T <sub>j</sub> = 125°C	—	0.90	—	
I <sub>rr</sub>	Reverse recovery current	-d <sub>v</sub> /d <sub>t</sub> = 1300 A/μs @ T <sub>j</sub> = 25°C -d <sub>v</sub> /d <sub>t</sub> = 1200 A/μs @ T <sub>j</sub> = 125°C	T <sub>j</sub> = 25°C	—	350	—	A
			T <sub>j</sub> = 125°C	—	380	—	
Q <sub>rr</sub>	Reverse recovery charge	L <sub>s</sub> = 150 nH Inductive load	T <sub>j</sub> = 25°C	—	330	—	μC
			T <sub>j</sub> = 125°C	—	520	—	
E <sub>rec(10%)</sub>	Reverse recovery energy (Note 1)	L <sub>s</sub> = 150 nH Inductive load	T <sub>j</sub> = 25°C	—	0.48	—	J
E <sub>rec</sub>	Reverse recovery energy		T <sub>j</sub> = 125°C	—	0.75	—	J
			T <sub>j</sub> = 25°C	—	0.55	—	J
			T <sub>j</sub> = 125°C	—	0.85	—	J

**THERMAL CHARACTERISTICS**

Symbol	Item	Conditions	Limits			Unit
			Min	Typ	Max	
R <sub>th(j-c)</sub>	Thermal resistance	Junction to Case (per 1/2 module)	—	—	60.0	K/kW
R <sub>th(c-s)</sub>	Contact thermal resistance	Case to heat sink, λ <sub>grease</sub> = 1 W/m <sup>2</sup> ·k D <sub>(c-s)</sub> = 100 μm (per 1/2 module)	—	48.0	—	K/kW

**MECHANICAL CHARACTERISTICS**

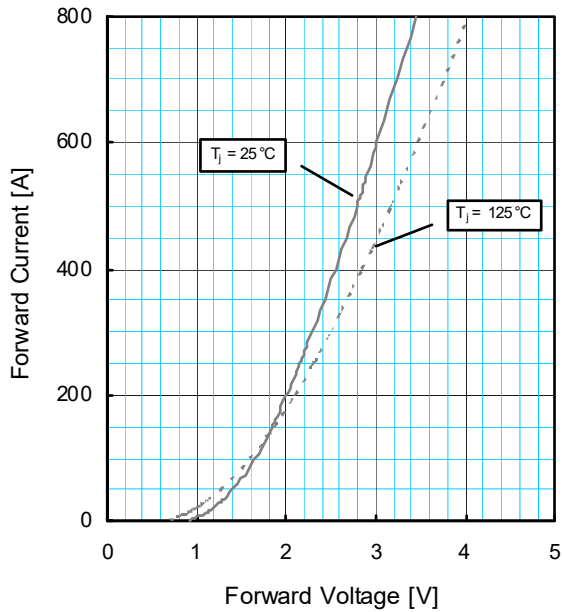
Symbol	Item	Conditions	Limits			Unit
			Min	Typ	Max	
M <sub>t</sub>	Mounting torque	M8 : Main terminals screw	7.0	—	22.0	N·m
M <sub>s</sub>		M6 : Mounting screw	3.0	—	6.0	N·m
m	Mass		—	1.0	—	kg
CTI	Comparative tracking index		600	—	—	—
d <sub>a</sub>	Clearance		26.0	—	—	mm
d <sub>s</sub>	Creepage distance		56.0	—	—	mm
L <sub>PAK</sub>	Parasitic stray inductance		—	44.0	—	nH
R <sub>AA+KK</sub>	Internal lead resistance	T <sub>c</sub> = 25°C	—	0.27	—	mΩ

Note 1. E<sub>rec(10%)</sub> are the integral of 0.1V<sub>R</sub> × 0.1I<sub>F</sub> × dt.

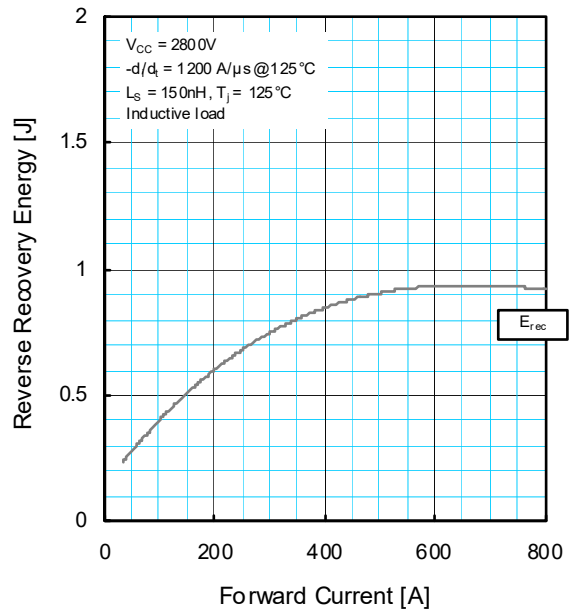
Note 2. Definition of all items is according to IEC 60747, unless otherwise specified.

PERFORMANCE CURVES

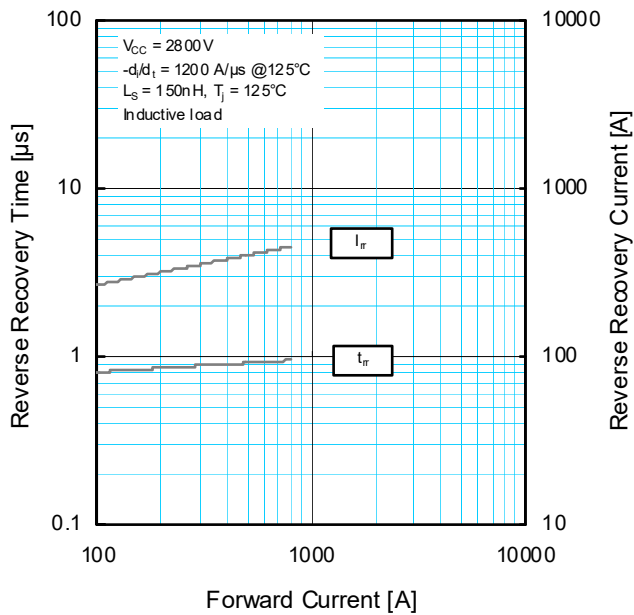
**FORWARD CHARACTERISTICS (TYPICAL)**



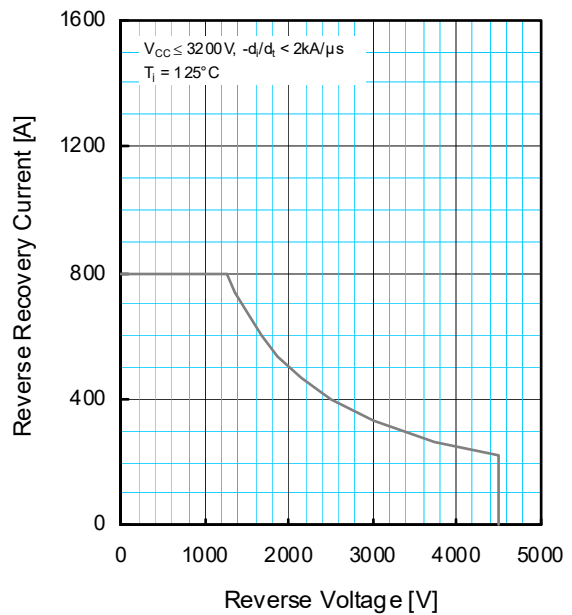
**REVERSE RECOVERY ENERGY CHARACTERISTICS (TYPICAL)**



**REVERSE RECOVERY CHARACTERISTICS (TYPICAL)**

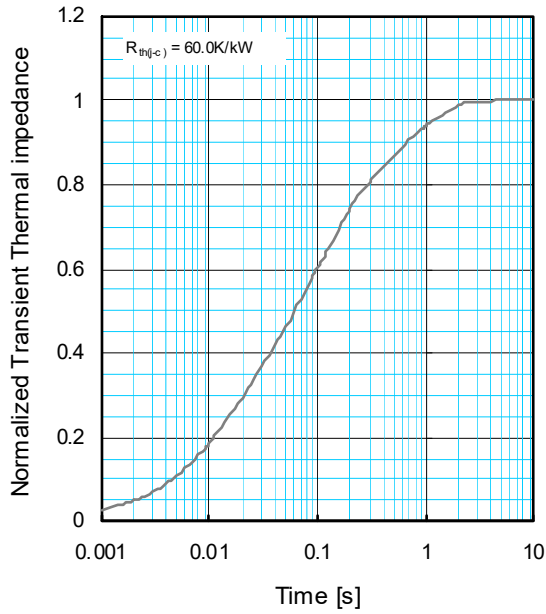


**REVERSE RECOVERY SAFE OPERATING AREA (RRSOA)**



PERFORMANCE CURVES

**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS**



$$Z_{th(j-c)}(t) = \sum_{i=1}^n R_i \left\{ 1 - \exp\left(-\frac{t}{\tau_i}\right) \right\}$$

	1	2	3	4
$R_i$ [K/kW]	0.0055	0.2360	0.4680	0.2905
$\tau_i$ [sec]	0.0001	0.0131	0.0878	0.6247

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