MITSUBISHI ELECTRIC

< HIGH VOLTAGE DIODE MODULES >

RM1500DG-90X

HIGH POWER SWITCHING USE
INSULATED TYPE

High Voltage Diode Modules

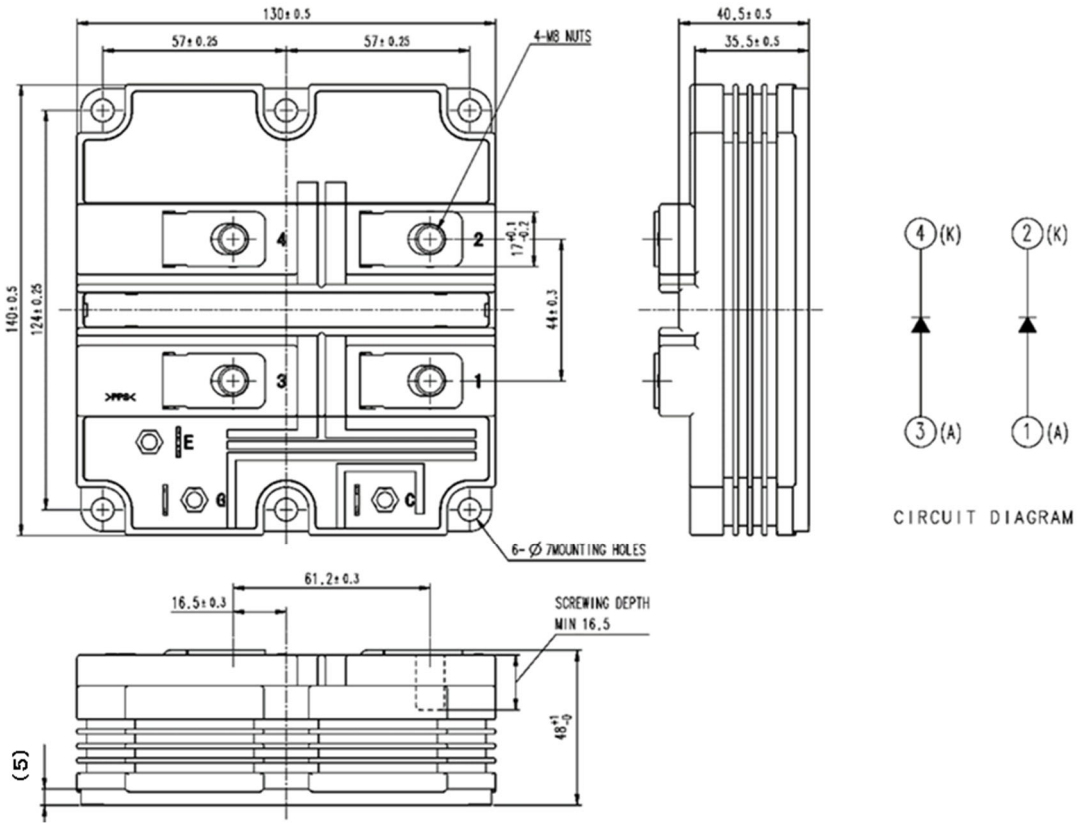
RM1500DG-90X

- I_F ..... 2 x 1500A
- V_{RRM} 4500V
- 2-element in a Pack
- High Insulated Type
- RFC Diode
- AlSiC Baseplate

APPLICATION

Traction drives, High Reliability Converters / Inverters, DC choppers

OUTLINE DRAWING & CIRCUIT DIAGRAM **Dimensions in mm**



MAXIMUM RATINGS

Symbol	Item	Conditions	Ratings	Unit
V_{RRM}	Repetitive peak reverse voltage	V_{GE} = 0 V, T_j = -40…+150 °C	4500	V
		V_{GE} = 0 V, T_j = -50 °C	4400	
I_F	Forward current (note1)	DC, T_c = 70°C	1500	A
I_{FSM}	Surge (non-repetitive) forward current	T_{j_start} = 150°C, t_p = 10 ms, Half-sine wave, V_R = 0 V	12.4	kA
I^2t	Surge current load integral		768	kA^2s
P_{tot}	Maximum power dissipation	T_c = 25°C	8800	W
V_{iso}	Isolation voltage	RMS, sinusoidal, f = 60 Hz, t = 1 min.	10200	V
V_e	Partial discharge extinction voltage	RMS, sinusoidal, f = 60 Hz, Q_{PD} ≤ 10 pC	5100	V
T_j	Junction temperature		−50 ~ +150	°C
T_{jop}	Operating junction temperature		−50 ~ +150	°C
T_{stg}	Storage temperature		−55 ~ +150	°C

ELECTRICAL CHARACTERISTICS

Symbol	Item	Conditions		Limits			Unit
				Min	Typ	Max	
I_{RRM}	Repetitive reverse current	V_{RM} = V_{RRM}	T_j = 25°C	—	—	2.5	mA
			T_j = 125°C	—	2.5	—	
			T_j = 150°C	—	—	40.0	
V_{FM} (Terminal)	Forward voltage	I_F = 1500 A	T_j = 25°C	—	3.05	—	V
			T_j = 125°C	—	3.75	—	
			T_j = 150°C	—	3.90	—	
V_{FM} (Chip)	Forward voltage	I_F = 1500 A	T_j = 25°C	—	2.50	—	V
			T_j = 125°C	—	3.10	—	
			T_j = 150°C	—	3.20	3.70	
t_{rr}	Reverse recovery time	V_{CC} = 2800 V I_F = 1500 A $-d_{iF}/d_t \cong$ 4500 A/µs @ T_j = 25°C 4200 A/µs @ T_j = 125°C 4050 A/µs @ T_j = 150°C L_s = 150 nH Inductive load	T_j = 125°C	—	1.60	—	µs
			T_j = 150°C	—	1.85	—	
I_{rr}	Reverse recovery current		T_j = 125°C	—	1800	—	A
			T_j = 150°C	—	1800	—	
$Q_{rr(10\%)}$	Reverse recovery charge(Note 2)		T_j = 125°C	—	2640	—	µC
			T_j = 150°C	—	2690	—	
Q_{rr}	Reverse recovery charge		T_j = 125°C	—	2850	—	µC
			T_j = 150°C	—	2900	—	
$E_{rec(10\%)}$	Reverse recovery energy (Note 3) per pulse		T_j = 25°C	—	3.75	—	J
			T_j = 125°C	—	4.75	—	
			T_j = 150°C	—	4.85	—	
E_{rec}	Reverse recovery energy per pulse		T_j = 25°C	—	3.90	—	J
			T_j = 125°C	—	5.25	—	
			T_j = 150°C	—	5.40	—	

THERMAL CHARACTERISTICS

Symbol	Item	Conditions	Limits			Unit
			Min	Typ	Max	
$R_{th(j-c)}$	Thermal resistance	Junction to Case (per 1/2 module)	—	—	14.2	K/kW
$R_{th(c-s)}$	Contact thermal resistance	Case to heat sink, λ_{grease} = 1 W/m･k $D_{(c-s)}$ = 80 μm (per 1/2 module)	—	15.0	—	K/kW

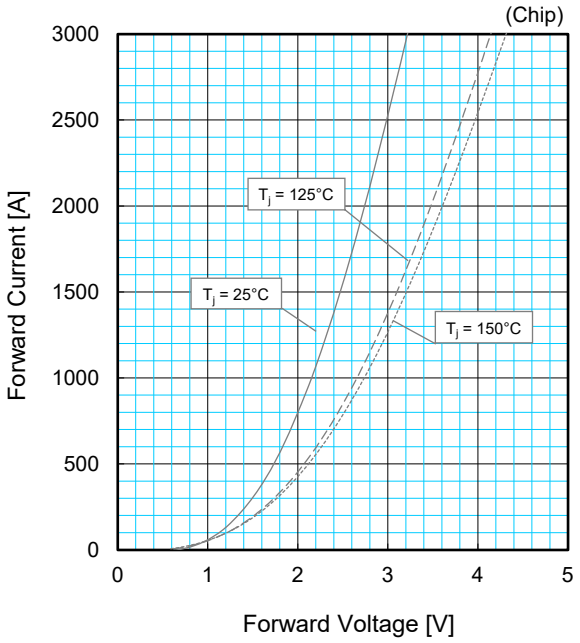
MECHANICAL CHARACTERISTICS

Symbol	Item	Conditions	Limits			Unit
			Min	Typ	Max	
M_t	Mounting torque	M8 : Main terminals screw	7.0	—	19.0	N·m
M_s		M6 : Mounting screw	3.0	—	6.0	N·m
m	Mass		—	1.0	—	kg
CTI	Comparative tracking index		600	—	—	—
d_a	Clearance		26.0	—	—	mm
d_s	Creepage distance		56.0	—	—	mm
$L_{P\,AK}$	Parasitic stray inductance	1/2 module	—	41	—	nH
$R_{AA'+KK'}$	Internal lead resistance	T_c = 25°C, 1/2 module	—	0.36	—	mΩ

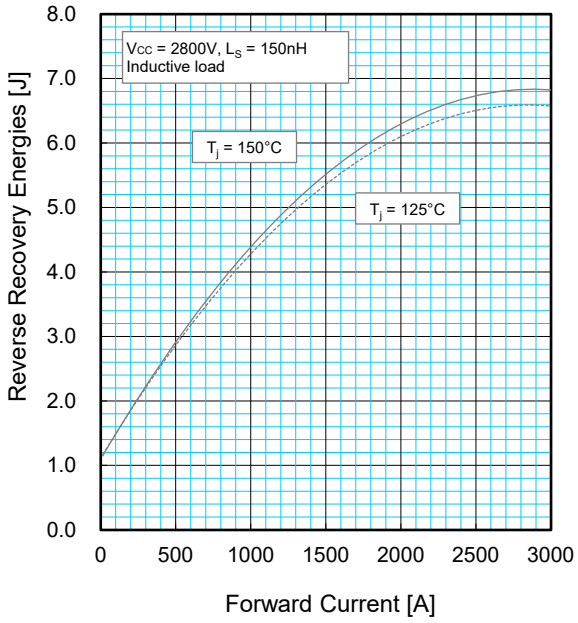
Note 1. The possible running current is 1200Arms.
Note 2. $Q_{rr(10\%)}$ is the integral of I_{rr} x dt ($t(0AI_F)$-$t(-0.1I_F)$)
Note 3. $E_{rec(10\%)}$ is the integral of $0.1V_R$ x $0.1I_F$ x dt.
Note 4. Definition of all item is according to IEC 60747, unless otherwise specified.

PERFORMANCE CURVES

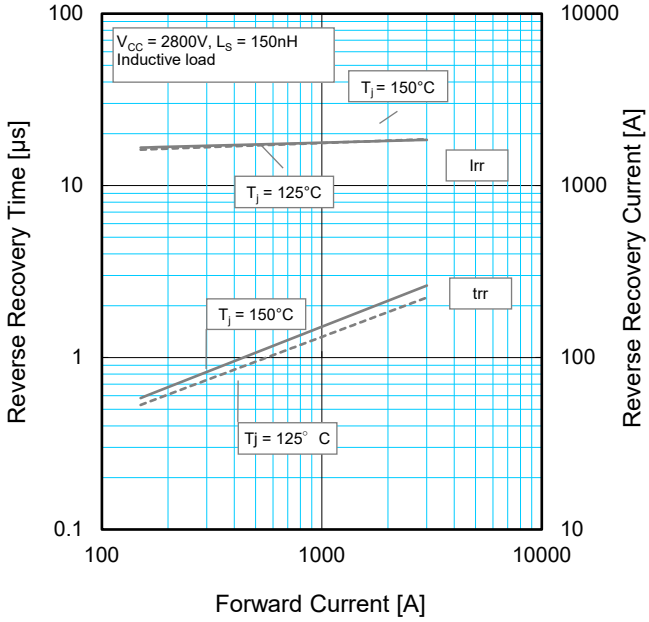
FORWARD CHARACTERISTICS (TYPICAL)



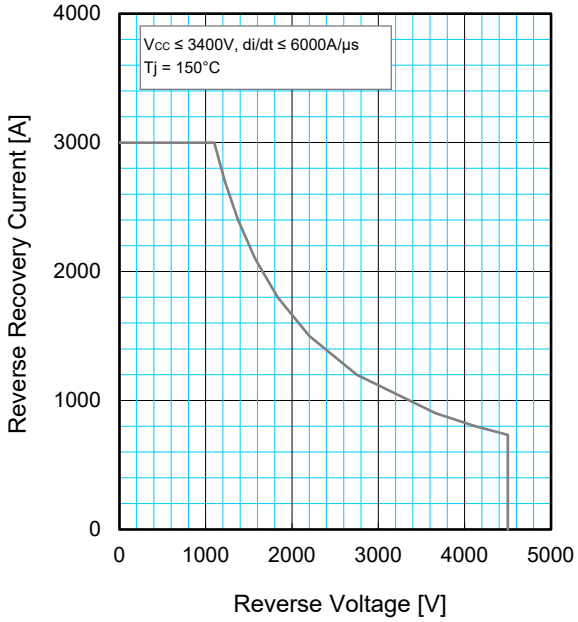
REVERSE RECOVERY ENERGY CHARACTERISTICS (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS (TYPICAL)

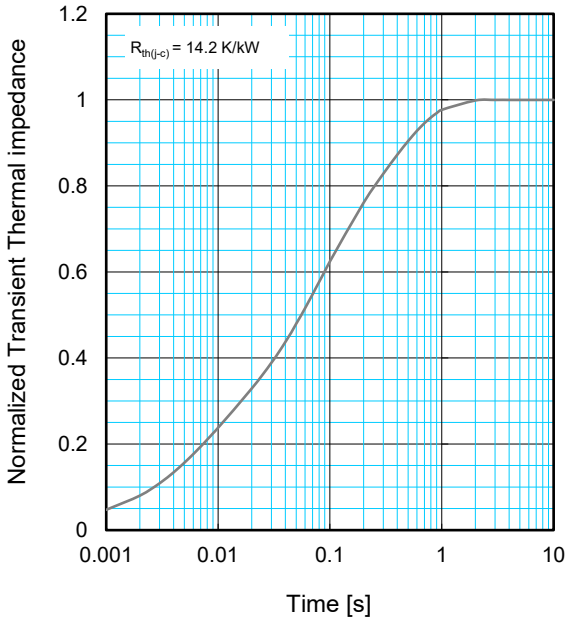


REVERSE RECOVERY SAFE OPERATING AREA (RRSOA)



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 / $R_{th(j-c)}$:	0.0096	0.1893	0.4044	0.3967
τ_i [sec] :	0.0001	0.0058	0.0602	0.3512

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