MITSUBISHI ELECTRIC

< HIGH VOLTAGE DIODE MODULE >

RM1000DG-130XA

HIGH POWER SWITCHING USE
INSULATED TYPE

High Voltage Diode Module

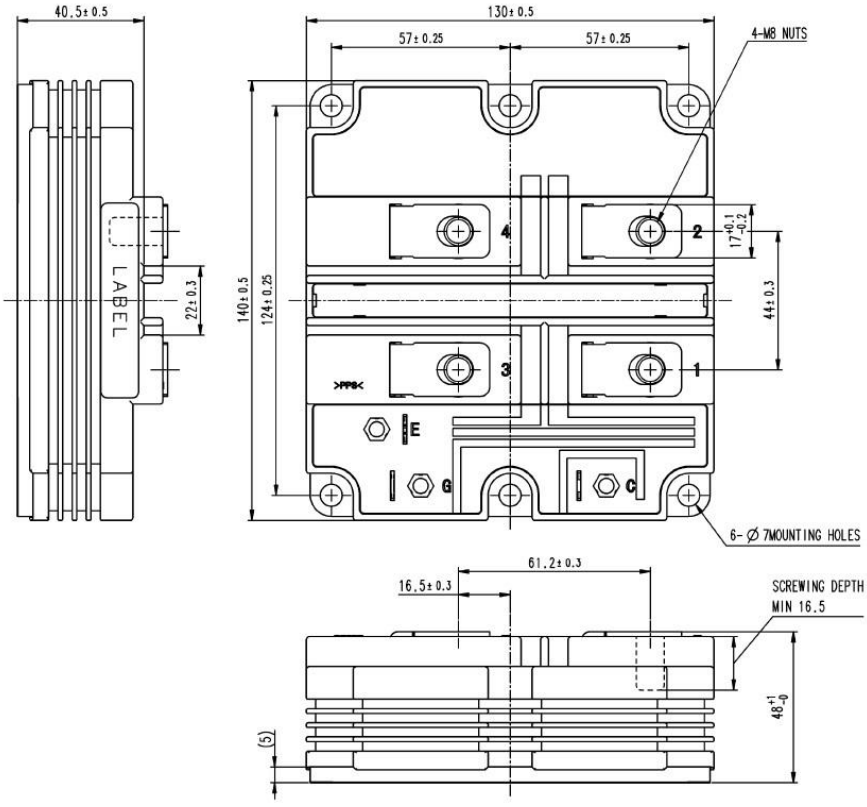
RM1000DG-130XA

- I_F ..... 2 x 1000 A
- V_{RRM} ..... 6500 V
- 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	T_j = +150°C	6500	V
		T_j = +25°C	6300	
		T_j = −50°C	5700	
I_F	Forward current	DC, T_c = 90°C	1000	A
I_{FRM}		Pulse (Note 1)	2000	
I_{FSM}	Surge (non-repetitive) forward current	T_{j_start} = 150°C, t_p = 10 ms	10.8	kA
I^2t	Surge current load integral	Half-sine wave, V_R = 0 V	584	kA^2s
V_{iso}	Isolation voltage	RMS, sinusoidal, f = 60 Hz, t = 1 min.	10200	V
Q_{PD}	Partial discharge	V_1 = 6900 V_{rms}, V_2 = 5100 V_{rms} AC 60Hz (acc. to IEC 61287)	10	pC
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	—	—	3.0	mA
			T_j = 125°C	—	3.0	—	
			T_j = 150°C	—	—	60.0	
V_{FM} (Terminal)	Forward voltage	I_F = 1000 A (Note 2)	T_j = 25°C	—	2.75	—	V
			T_j = 125°C	—	3.25	—	
			T_j = 150°C	—	3.35	—	
V_{FM} (Chip)	Forward voltage	I_F = 1000 A (Note 2)	T_j = 25°C	—	2.40	—	V
			T_j = 125°C	—	2.80	—	
			T_j = 150°C	—	2.90	3.40	
t_{rr}	Reverse recovery time	V_{CC} = 3600 V I_F = 1000 A $-di_F/dt$ = 3400 A/µs @ T_j = 25°C 3000 A/µs @ T_j = 125°C 2800 A/µs @ T_j = 150°C L_s = 150 nH Inductive load	T_j = 25°C	—	2.20	—	µs
			T_j = 125°C	—	2.60	—	
			T_j = 150°C	—	2.75	—	
I_{rr}	Reverse recovery current		T_j = 25°C	—	1350	—	A
			T_j = 125°C	—	1300	—	
			T_j = 150°C	—	1250	—	
$Q_{rr(10\%)}$	Reverse recovery charge (Note 3)		T_j = 25°C	—	2300	—	µC
			T_j = 125°C	—	2800	—	
			T_j = 150°C	—	2900	—	
Q_{rr}	Reverse recovery charge		T_j = 25°C	—	2400	—	µC
			T_j = 125°C	—	2900	—	
			T_j = 150°C	—	3000	—	
$E_{rec(10\%)}$	Reverse recovery energy (Note 4) per pulse		T_j = 25°C	—	4.15	—	J
			T_j = 125°C	—	5.65	—	
			T_j = 150°C	—	5.95	—	
E_{rec}	Reverse recovery energy per pulse		T_j = 25°C	—	4.50	—	J
			T_j = 125°C	—	5.95	—	
			T_j = 150°C	—	6.40	—	

THERMAL CHARACTERISTICS

Symbol	Item	Conditions	Limits			Unit
			Min.	Typ.	Max.	
$R_{th(j-c)}$	Thermal resistance	Junction to Case, 1/2 module	—	—	16.0	K/kW
$R_{th(c-s)}$	Contact thermal resistance	Case to heat sink, λ_{grease} = 1 W/m·K $D_{(c-s)}$ = 80 μm, 1/2 module	—	15.0	—	K/kW

MECHANICAL CHARACTERISTICS

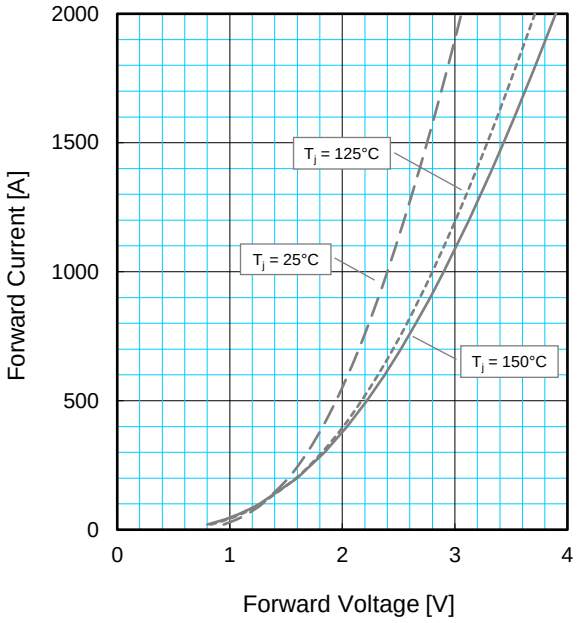
Symbol	Item	Conditions	Limits			Unit
			Min.	Typ.	Max.	
M_t	Mounting torque	M8: Main terminals screw	7.0	—	19.0	N·m
M_s		M6: Mounting screw	3.0	—	6.0	N·m
m	Mass	—	—	1.0	—	kg
CTI	Comparative tracking index	—	600	—	—	—
d_a	Clearance	—	26.0	—	—	mm
d_s	Creepage distance	—	56.0	—	—	mm
$L_{P\,AK}$	Parasitic stray inductance	1/2 module	—	41.0	—	nH
$R_{AA'+KK'}$	Internal lead resistance	T_c = 25°C, 1/2 module	—	0.36	—	mΩ

Note 1. Pulse width and repetition rate should be such that junction temperature (T_j) does not exceed T_{jop_max} rating (150°C).
Note 2. Pulse width and repetition rate should be such as to cause negligible temperature rise.
Note 3. The integration range of reverse recovery charge is from I_F = 0A to 10%I_F.
Note 4. The integration range of switching energies is from 10%V_R to 10%I_F.

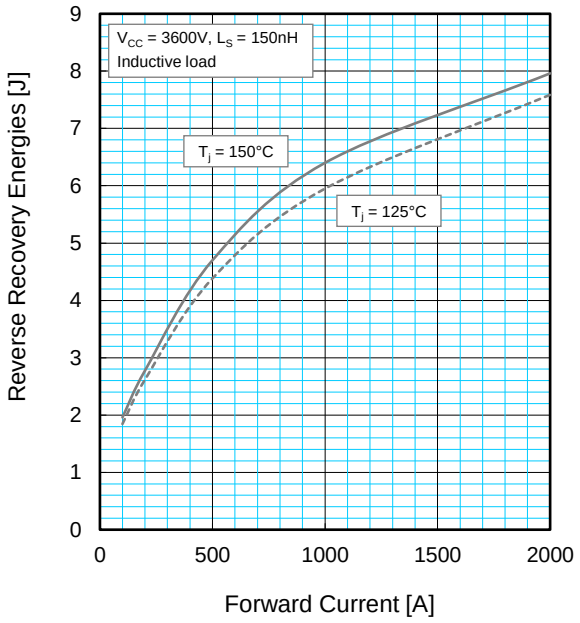
PERFORMANCE CURVES

FORWARD CHARACTERISTICS (TYPICAL)

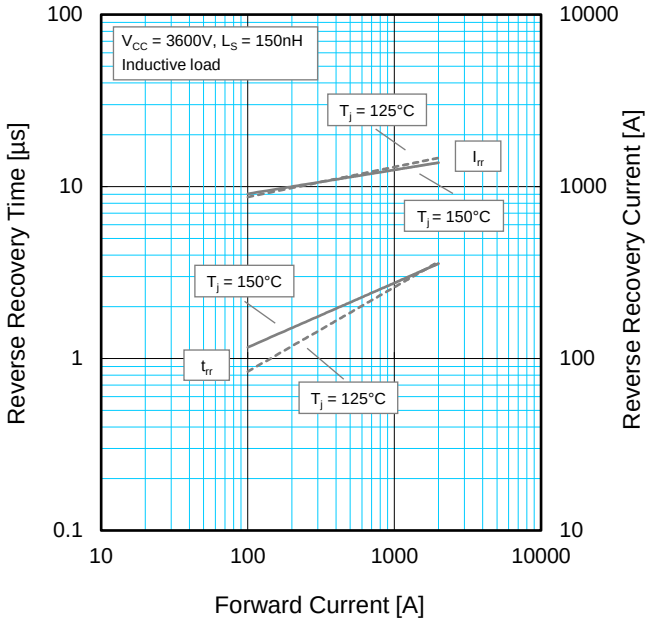
(Chip)



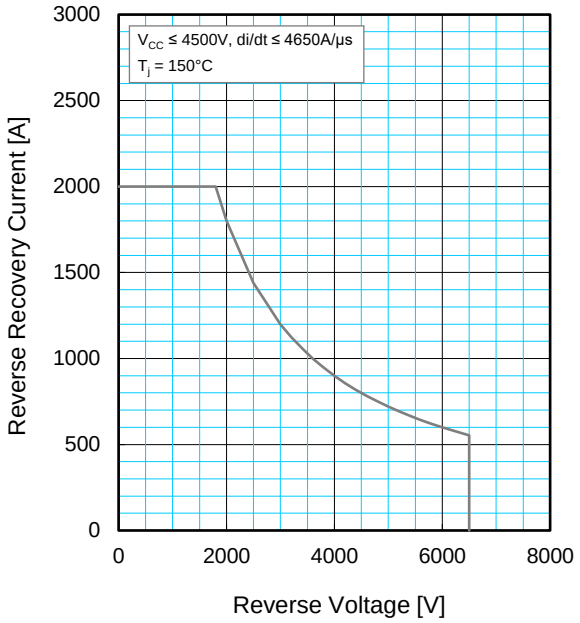
REVERSE RECOVERY ENERGY CHARACTERISTICS (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS (TYPICAL)

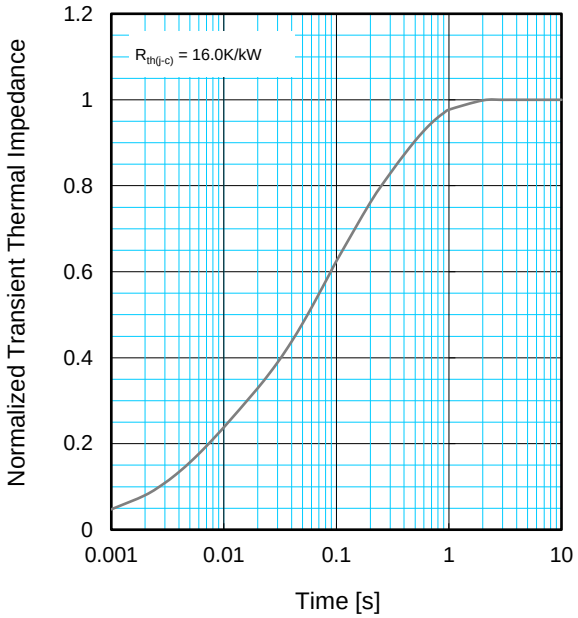


REVERSE RECOVERY SAFE OPERATING AREA (RRSOA)



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 [s]	0.0001	0.0058	0.0602	0.3512

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