MITSUBISHI ELECTRIC

< HIGH VOLTAGE DIODE MODULE >

RM750DC-90X

HIGH POWER SWITCHING USE
INSULATED TYPE

High Voltage Diode Modules

RM750DC-90X

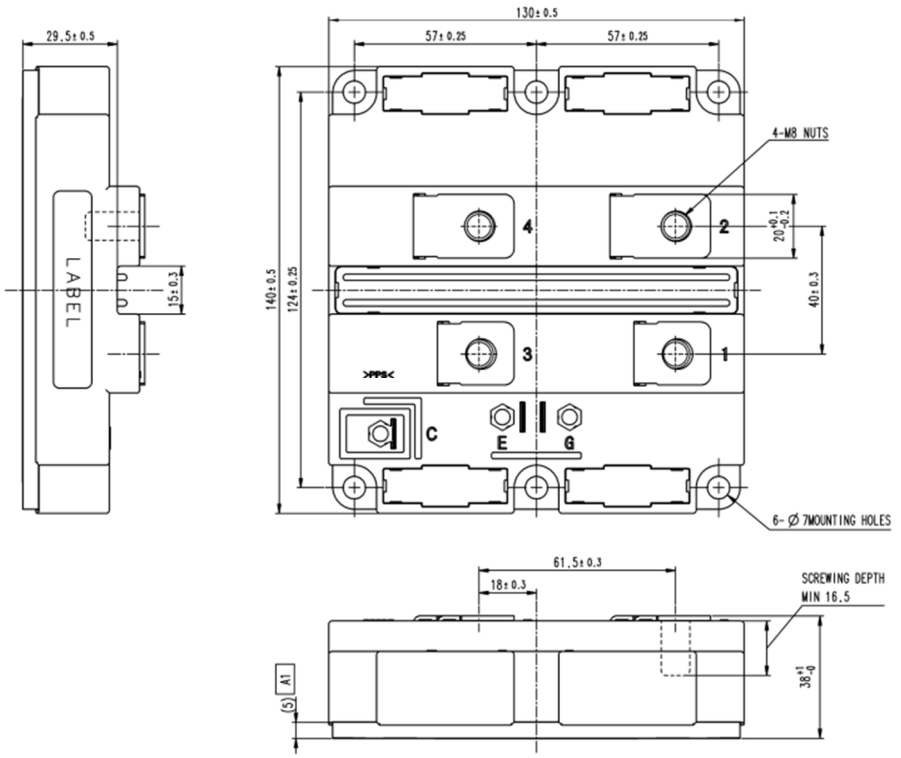
- I_F ..... 2 x 750A
- V_{RRM} 4500V
- 2-element in a Pack
- RFC Diode
- AlSiC Baseplate

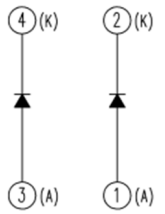
APPLICATION

Traction drives, High Reliability Converters / Inverters, DC choppers

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm





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CIRCUIT DIAGRAM

MAXIMUM RATINGS

Item	Symbol	Conditions	Ratings	Unit
Repetitive peak reverse voltage	V_{RRM}	T_j = -40…+150 °C	4500	V
		T_j = -50 °C	4400	
Non-repetitive peak reverse voltage	V_{RSM}	T_j = -40…+150 °C	4500	V
		T_j = -50 °C	4400	
Forward current	I_F	DC, T_c = 85 °C	750	A
Repetitive peak forward current	I_{FRM}	Pulse	1500	A
Isolation voltage	V_{iso}	RMS, sinusoidal, f = 60 Hz, t = 1 min	6000	V
Partial discharge charge	Q_{PD}	Charged part to the baseplate RMS sinusoidal, 60 Hz 1 min, T_c = 25 °C V1 = 4800 V_{rms}, V2 = 3500 V_{rms} (acc. to IEC 61287-1)	10	pC
Junction temperature	T_j	-	−50 ~ +150	°C
Storage temperature	T_{stg}	-	−55 ~ +150	°C
Operating junction temperature	T_{jop}	-	−50 ~ +150	°C
Reverse recovery power dissipation	P_{rr}	$V_{CC} \leq$ 3400 V, $L_S \leq$ 200 nH, $I_F \leq$ 1500 A, $di_{on}/dt \leq$ 3300 A/µs, T_j = 150 °C	2.0	MW
Non-repetitive surge forward current	I_{FSM}	T_{j_start} = 150 °C, t_p = 10 ms, Half-sine wave, V_R = 0 V	6.7	kA
Surge current load integral	I^2t		224	kA^2s

ELECTRICAL CHARACTERISTICS

Item	Symbol	Conditions		Limits			Unit
				Min.	Typ.	Max.	
Repetitive reverse current	I_{RRM}	$V_{RM} = V_{RRM}$	T_j = 25°C	—	—	1.5	mA
			T_j = 125°C	—	1.5	—	
			T_j = 150°C	—	—	15.0	
Forward voltage	V_{FM} (Terminal)	I_F = 750 A	T_j = 25°C	—	2.55	—	V
			T_j = 125°C	—	3.15	—	
			T_j = 150°C	—	3.30	—	
Forward voltage	V_{FM} (Chip)	I_F = 750 A	T_j = 25°C	—	2.35	—	V
			T_j = 125°C	—	2.90	—	
			T_j = 150°C	—	3.00	3.50	
Reverse recovery time	t_{rr}	V_{CC} = 2800 V I_F = 750 A L_S = 200 nH $-di_F/dt \cong$ 3300 A/µs @ T_j = 25°C 2920A/µs @ T_j = 125°C 2710A/µs @ T_j = 150°C	T_j = 25°C	—	—	—	µs
			T_j = 125°C	—	1.50	—	
			T_j = 150°C	—	1.70	—	
Reverse recovery current	I_{rr}		T_j = 25°C	—	—	—	A
			T_j = 125°C	—	1080	—	
			T_j = 150°C	—	1080	—	
Reverse recovery charge (Note 1)	$Q_{rr(10\%)}$		T_j = 25°C	—	—	—	µC
			T_j = 125°C	—	1530	—	
			T_j = 150°C	—	1560	—	
Reverse recovery charge	Q_{rr}		T_j = 25°C	—	—	—	µC
			T_j = 125°C	—	1590	—	
			T_j = 150°C	—	1620	—	

ELECTRICAL CHARACTERISTICS

Item	Symbol	Conditions		Limits			Unit
				Min.	Min.	Min.	
Reverse recovery energy per pulse (Note 2)	$E_{rec(10\%)}$	V_{CC} = 2800 V I_F = 750 A L_S = 200 nH $-di_F/dt \cong$ 3300 A/μs @ T_j = 25°C 2920A/μs @ T_j = 125°C 2710A/μs @ T_j = 150°C	T_j = 25°C	—	1.85	—	J
			T_j = 125°C	—	2.40	—	
			T_j = 150°C	—	2.45	—	
Reverse recovery energy per pulse	E_{rec}		T_j = 25°C	—	1.90	—	J
			T_j = 125°C	—	2.55	—	
			T_j = 150°C	—	2.60	—	

THERMAL CHARACTERISTICS

Item	Symbol	Conditions	Limits			Unit
			Min.	Typ.	Max.	
Thermal resistance	$R_{th(j-c)}$	Junction to Case, 1/2 module	—	—	23.4	K/kW
Contact thermal resistance	$R_{th(c-s)}$	Case to heat sink, 1/2 module λ_{grease} = 1 W/m·K, $D_{(c-s)}$ = 80 μm	—	15.0	—	K/kW

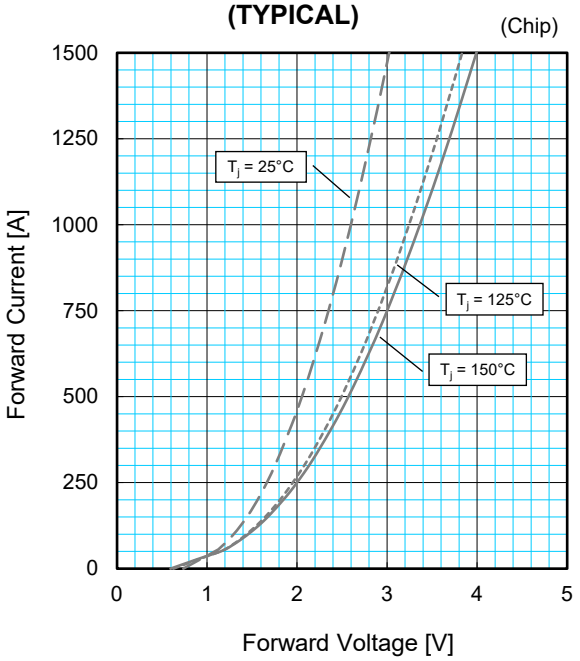
MECHANICAL CHARACTERISTICS

Item	Symbol	Conditions	Limits			Unit
			Min.	Typ.	Max.	
Mounting torque	M_t	Main terminals screw: M8	7.0	—	19.0	N·m
	M_s	Mounting screw: M6	3.0	—	6.0	N·m
Mass	m	-	—	0.9	—	kg
Comparative tracking index	CTI	-	600	—	—	—
Clearance distance in air	d_a	Anode terminal – Cathode terminal	19.5	—	—	mm
Creepage distance along surface	d_s	Anode terminal – Cathode terminal	32.0	—	—	mm
Internal inductance	$L_{P(A-K)}$	T_c = 25 °C, 1/2 module	—	24	—	nH
Internal lead resistance	$R_{AA'+KK'}$	T_c = 25 °C, 1/2 module	—	0.27	—	mΩ

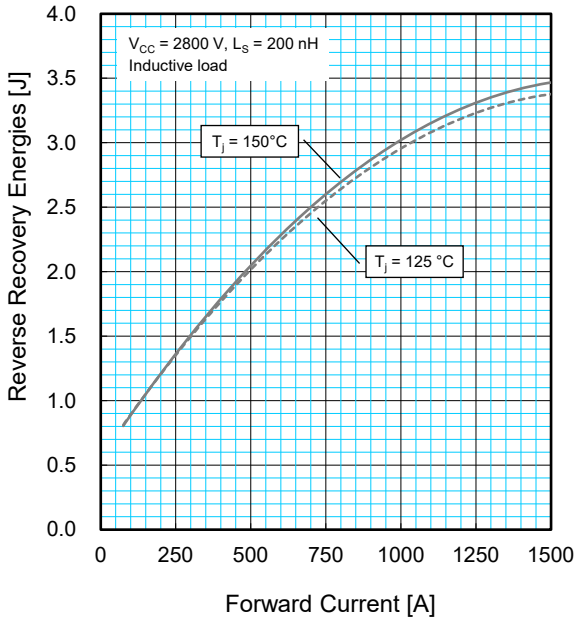
Note 1. $Q_{rr(10\%)}$ is the integral of $I_{rr} \times dt\big(t(0AI_F) - t(-0.1I_F)\big)$.
Note 2. $E_{rec(10\%)}$ is the integral of $0.1V_R \times 0.1I_F \times dt$.

PERFORMANCE CURVES

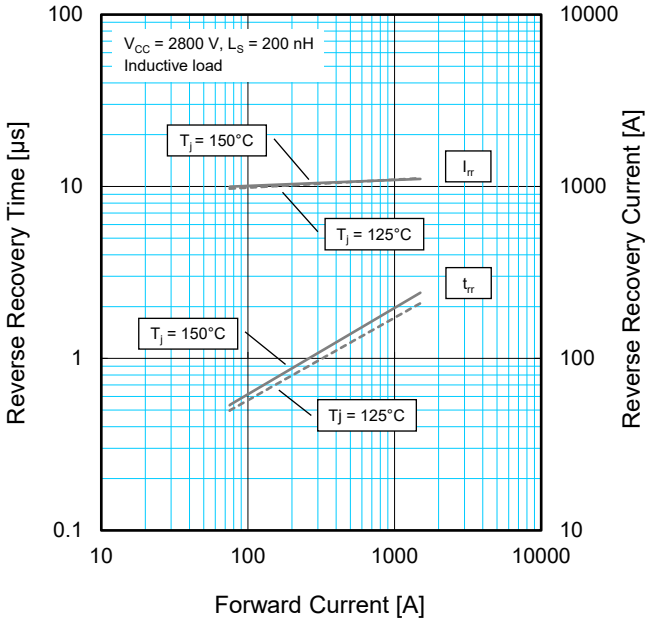
FORWARD CHARACTERISTICS (TYPICAL)



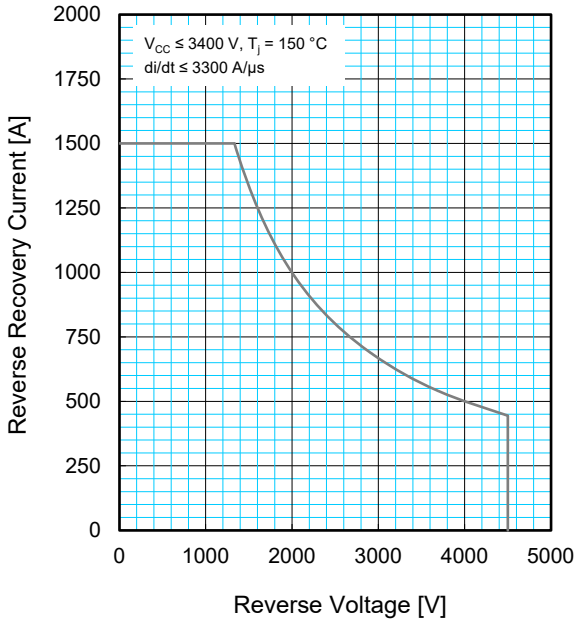
REVERSE RECOVERY ENERGY CHARACTERISTICS (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS (TYPICAL)

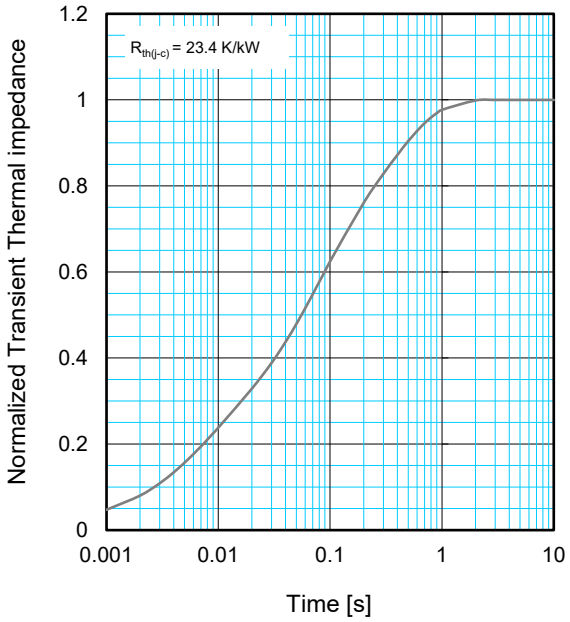


REVERSE RECOVERY SAFE OPERATING AREA (RRSOA)



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 [s]	0.0001	0.0058	0.0602	0.3512

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