

FEATURES

- 10.2kV Isolation Package
- Low Reverse Recovery Charge
- High Switching Speed
- Low Forward Volt Drop
- Isolated AISiC Base With AlN Substrates
- Dual Diodes Can Be Paralleled For 800A Rating

APPLICATIONS

- Chopper Diodes
- Boost and Buck Converters
- Free-wheel Circuits
- Snubber Circuit
- Resonant Converters
- Induction Heating
- Multi-level Switch Inverters

The DFM400XXM45-TS001 is a dual 4500V, fast recovery diode (FRD) module. Designed for low power loss, the module is suitable for a variety of high voltage applications in motor drives and power conversion.

Fast switching times and low reverse recovery losses allow high frequency operation, making the device suitable for the latest drive designs employing PWM and high frequency switching.

The module incorporates an electrically isolated base plate and low inductance construction enabling circuit designers to optimise circuit layouts and utilise grounded heat sinks for safety.

ORDERING INFORMATION

Order As:

DFM400XXM45-TS001

Note: When ordering, please use the complete part number

KEY PARAMETERS

V_{RRM}		4500V
V_F	(typ)	2.7V
I_F	(max)	400A
I_{FM}	(max)	800A

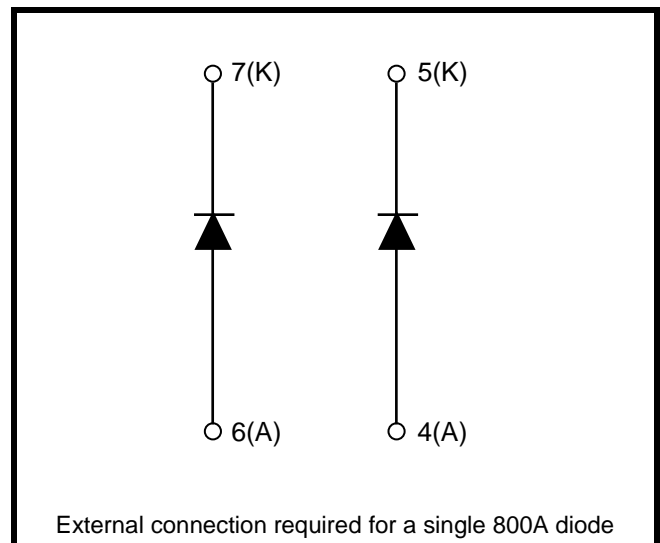


Fig. 1 Circuit configuration

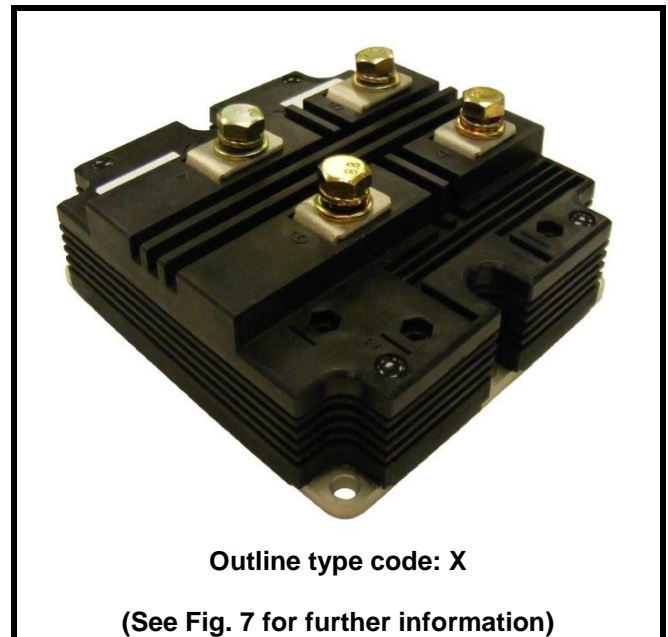


Fig. 2 Package

ABSOLUTE MAXIMUM RATINGS

Stresses above those listed under 'Absolute Maximum Ratings' may cause permanent damage to the device. In extreme conditions, as with all semiconductors, this may include potentially hazardous rupture of the package. Appropriate safety precautions should always be followed. Exposure to Absolute Maximum Ratings may affect device reliability.

$T_{case} = 25^{\circ}\text{C}$ unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
V_{RRM}	Repetitive peak reverse voltage	$T_j = 125^{\circ}\text{C}$	4500	V
I_F	Forward current (per arm)	DC, $T_{case} = 65^{\circ}\text{C}$	400	A
I_{FM}	Max. forward current	$T_{case} = 115^{\circ}\text{C}$, $t_p = 1\text{ms}$	800	A
I^2t	I^2t value fuse current rating	$V_R = 0$, $t_p = 10\text{ms}$, $T_j = 125^{\circ}\text{C}$	75	kA^2s
P_{max}	Max. power dissipation	$T_{case} = 25^{\circ}\text{C}$, $T_j = 125^{\circ}\text{C}$	2080	W
V_{isol}	Isolation voltage – per module	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	10.2	kV
Q_{PD}	Partial discharge – per module	IEC1287, $V_1 = 6900\text{V}$, $V_2 = 5100\text{V}$, 50Hz RMS	10	pC

THERMAL AND MECHANICAL RATINGS

Internal insulation material:	AlN
Baseplate material:	AlSiC
Creepage distance:	56mm
Clearance:	26mm
CTI (Comparative Tracking Index):	> 600

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units
$R_{th(j-c)}$	Thermal resistance (per arm)	Continuous dissipation – junction to case	-	-	48	$^{\circ}\text{C}/\text{kW}$
$R_{th(c-h)}$	Thermal resistance – case to heatsink (per module)	Mounting torque 5Nm (with mounting grease)	-	-	8	$^{\circ}\text{C}/\text{kW}$
T_j	Junction temperature		-40	-	125	$^{\circ}\text{C}$
T_{stg}	Storage temperature range		-40	-	125	$^{\circ}\text{C}$
	Screw Torque	Mounting – M6	-	-	5	Nm
		Electrical connections – M8	-	-	10	Nm

STATIC ELECTRICAL CHARACTERISTICS – PER ARM

$T_{case} = 25^{\circ}\text{C}$ unless stated otherwise.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
I_{RM}	Peak reverse current	$V_R = 4500\text{V}, T_j = 125^{\circ}\text{C}$			30	mA
V_F	Forward voltage	$I_F = 400\text{A}$		2.8		V
		$I_F = 400\text{A}, T_j = 125^{\circ}\text{C}$		3.2		V
L_M	Inductance	-		40		nH

DYNAMIC ELECTRICAL CHARACTERISTICS – PER ARM

$T_{case} = 25^{\circ}\text{C}$ unless stated otherwise (when used with DIM400XSM45-TS000)

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units
Q_{rr}	Reverse recovery charge	$I_F = 400\text{A}$ $V_R = 2800\text{V}$ $di_F/dt = 1000\text{A}/\mu\text{s}$		450		μC
I_{rr}	Peak reverse recovery current			350		A
E_{rec}	Reverse recovery energy				750	

$T_{case} = 125^{\circ}\text{C}$ unless stated otherwise (when used with DIM400XSM45-TS000)

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Units
Q_{rr}	Reverse recovery charge	$I_F = 400\text{A}$ $V_R = 2800\text{V}$ $di_F/dt = 1000\text{A}/\mu\text{s}$		750		μC
I_{rr}	Peak reverse recovery current			380		A
E_{rec}	Reverse recovery energy				1250	

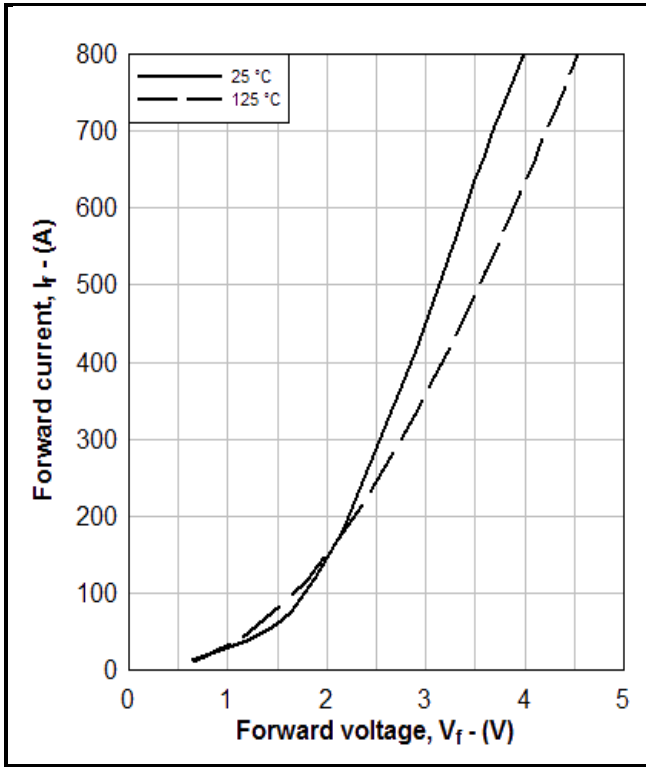


Fig. 3 Diode typical forward characteristics

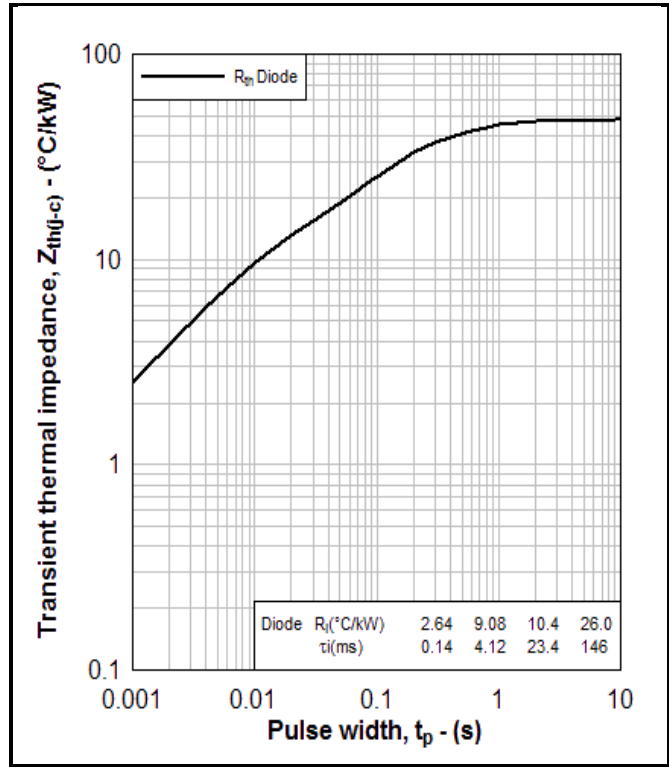


Fig. 4 Transient thermal impedance

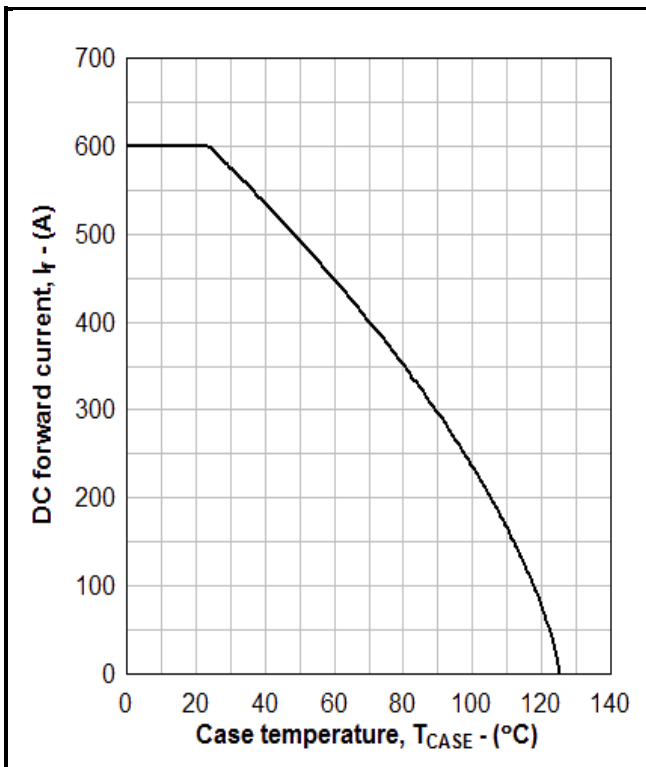


Fig. 5 DC current rating vs case temperature

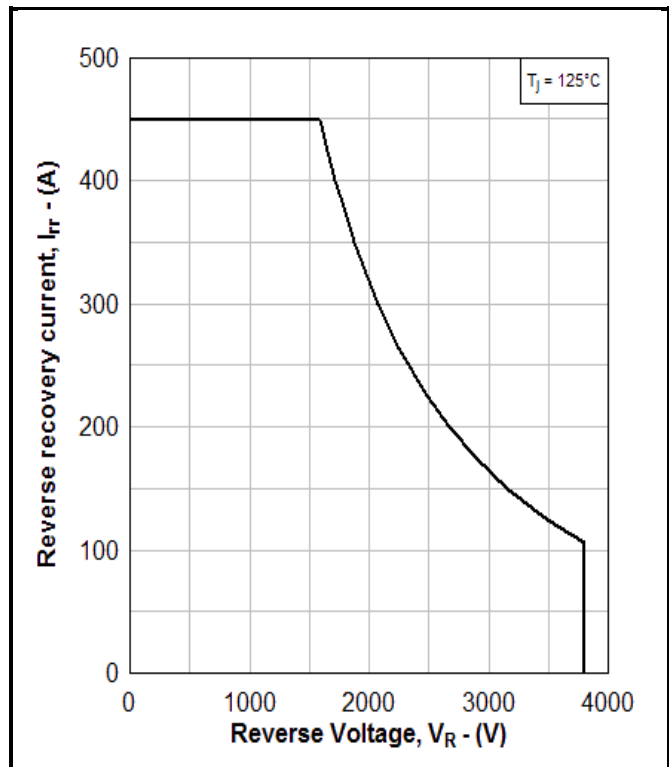
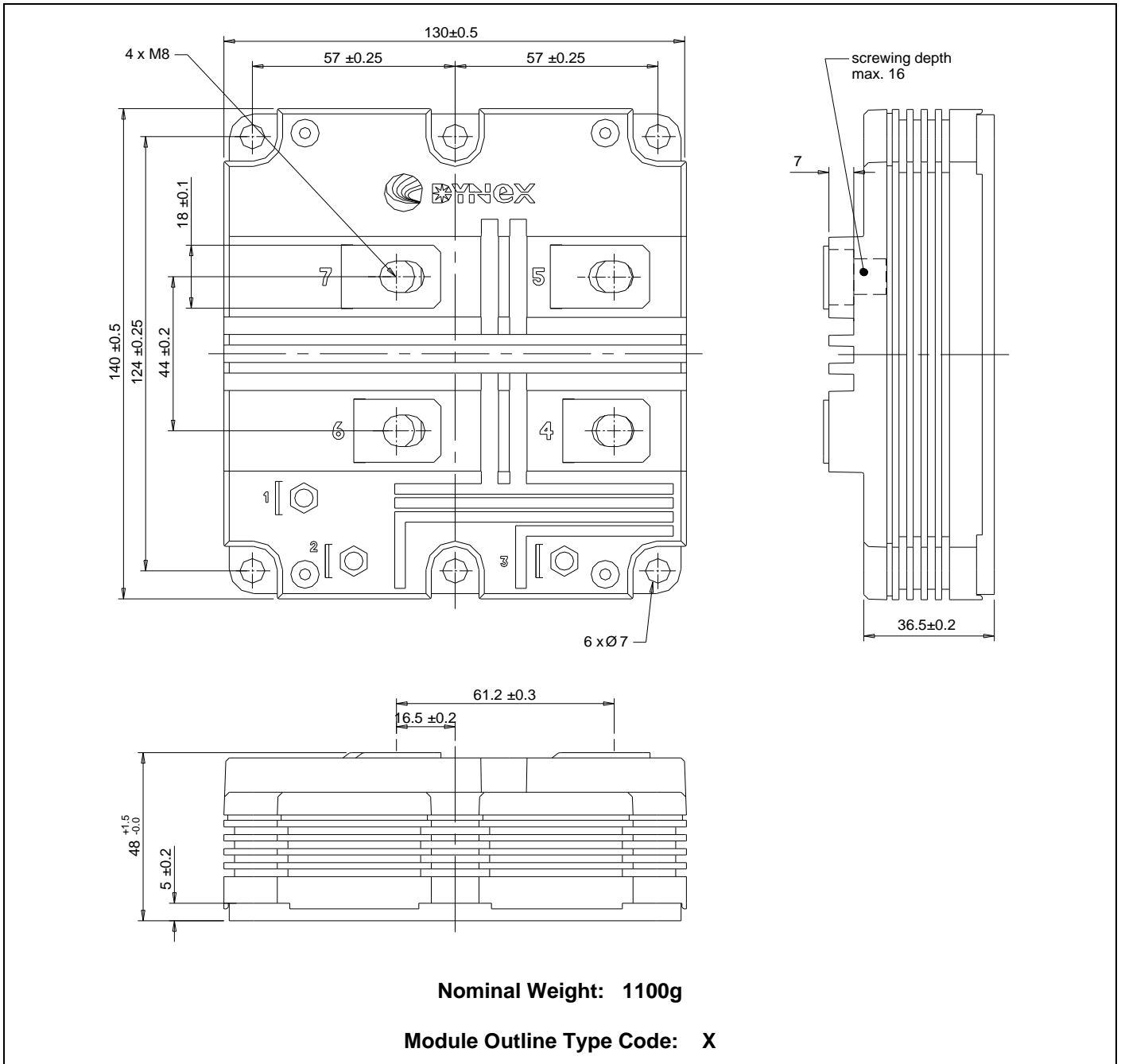


Fig. 6 Reverse Bias Safe Operating Area (RBSOA)

PACKAGE DETAILS

For further package information, please visit our website or contact Customer Services.
 All dimensions in mm, unless stated otherwise.
DO NOT SCALE.


Fig. 7 Module outline drawing

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The products must not be touched when operating because there is a danger of electrocution or severe burning. Always use protective safety equipment such as appropriate shields for the product and wear safety glasses. Even when disconnected any electric charge remaining in the product must be discharged and allowed to cool before safe handling using protective gloves.

Extended exposure to conditions outside the product ratings may affect reliability leading to premature product failure. Use outside the product ratings is likely to cause permanent damage to the product. In extreme conditions, as with all semiconductors, this may include potentially hazardous rupture, a large current to flow or high voltage arcing, resulting in fire or explosion. Appropriate application design and safety precautions should always be followed to protect persons and property.

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