Rectifier Diode Module

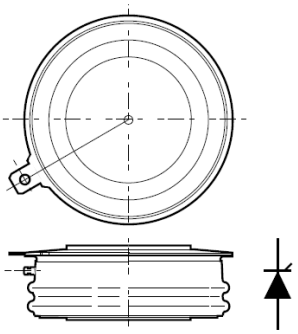
multicomp PRO

Features

- Double Side Cooling
- High Surge Capability

Applications

- High Power Drives
- High Voltage Power Supplies
- Static Switches



Outline type code: D

Key Parameters

V_{DRM}	$I_{T(AV)}$	I_{TSM}	dV/dt*	dI/dt
1800V	860A	11500A	1000V/µs	200A/µs

*Higher dV/dt selections available

Voltage Ratings

Part Number	Repetitive Peak Voltages VDRM and VRRM V	Conditions
MPRD520T140	1800	T_{vj} = -40°C to +125°C, I_{DRM} = I_{RRM} = 50mA, V_{DRM}, V_{RRM} tp = 10ms, V_{DSM} & V_{RSM} = V_{DRM} & V_{RRM} +100V respectively

Current Ratings

Tcase = 60°C unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
Double Side Cooled				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	860	A
$I_{T(RMS)}$	RMS value	-	1350	
I_T	Continuous (direct) on-state current	-	1220	

Surge Ratings

Symbol	Parameter	Test Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine, Tcase = 125°C V_R = 0	11.5	kA
I^2t	I^2t for fusing		0.661	MA^2s

Thermal and Mechanical Ratings

Symbol	Parameter	Test Conditions		Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance – junction to case	Double side cooled	DC	-	0.035	°C/W
$R_{th(c-h)}$	Thermal resistance – case to heatsink	Double side cooled	DC	-	0.01	°C/W
T_{vj}	Virtual junction temperature	Blocking V_{DRM} / V_{RRM}		-	125	°C
T_{stg}	Storage temperature range			-40	140	°C
F_m	Clamping force			8	12	kN

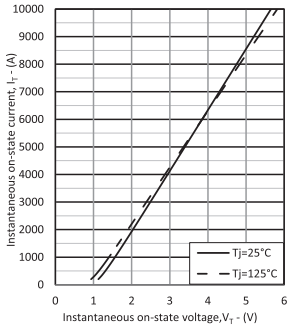
Dynamic Characteristics

Symbol	Parameter	Test Conditions		Min.	Max.	Units
I_{RRM}/I_{DRM}	Peak reverse and off-state current	At V_{RRM}/V_{DRM}, Tcase = 125°C		-	50	mA
dV/dt	Max. linear rate of rise of off-state voltage	To 67% V_{DRM}, Tj = 125°C, gate open		1000	-	V/µs
dI/dt	Rate of rise of on-state current	From 67% V_{DRM} to 1000A Gate source 30V, 10Ω, tr < 0.5ms, T_J = 125°C	Repetitive 50Hz	-	200	A/µs
			Non-repetitive	-	1000	A/µs
V_T	On-state voltage	I_T = 1500A, Tcase = 125°C		-	1.65	V
$V_{T(TO)}$	Threshold voltage	Tcase = 125°C		-	0.90	V
r_T	On-state slope resistance	Tcase = 125°C		-	0.50	mΩ
t_{gd}	Delay time	V_D = 67% V_{DRM}, gate source 30V, 10Ω tr = 0.5µs, Tj = 25°C		-	3.0	µs
t_q	Turn-off time	Tj = 125°C, V_R = 100V, dI/dt = 10A/µs, dVDR/dt = 20V/µs linear to 67% V_{DRM}		-	150	µs
Qs	Stored charge	I_T = 1000A, tp = 1000us,Tj = 125°C, dI/dt =10A/µs,		-	1500	µC
I_{RR}	Reverse recovery current			-	105	A
I_L	Latching current	Tj = 25°C,		-	1	A
I_H	Holding current	Tj = 25°C,		-	200	mA

Gate Trigger Characteristics and Ratings

Symbol	Parameter	Test Conditions	Max.	Units
V_{GT}	Gate trigger voltage	V_{DRM} = 5V, Tcase = 25°C	3	V
V_{GD}	Gate non-trigger voltage	At 40% V_{DRM}, Tcase = 125°C	0.3	V
I_{GT}	Gate trigger current	V_{DRM} = 5V, Tcase = 25°C	300	mA
I_{GD}	Gate non-trigger current	At 40% V_{DRM}, Tcase = 125°C	20	mA

Curves

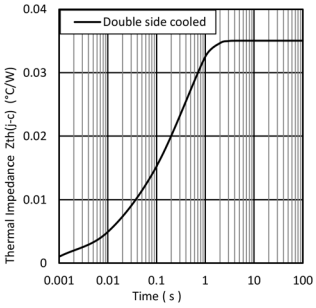


V_{TM} EQUATION

$V_{TM} = A + B\ln(I_T) + C.I_T + D.\sqrt{I_T}$

Where A = 0.239798
B = 0.138469
C = 0.000533
D = -0.010242
These values are valid for T_j = 125°C

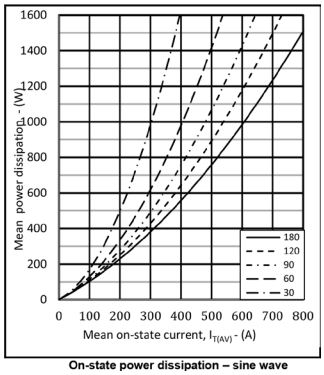
Maximum &minimum on-state characteristics



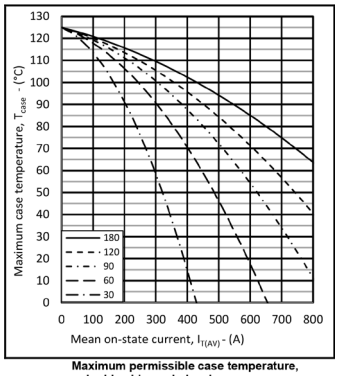
$$R_{thjc}(t) = \sum_{i=1}^{n} R_{thi} \cdot \left(1 - e^{-\frac{t}{\tau_i}}\right)$$

i	τ_i (s)	R_{thi} (°C/kW)
1	0.5391689	15.7
2	0.1940576	11.19235
3	0.0219527	6.412673
4	0.0021962	1.759765

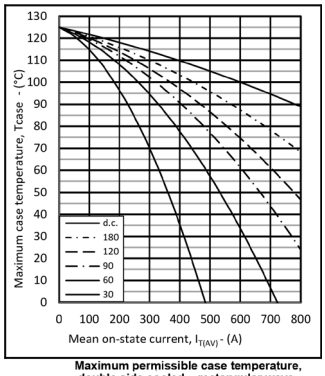
Maximum (limit) transient thermal impedance – junction to case (°C/W)



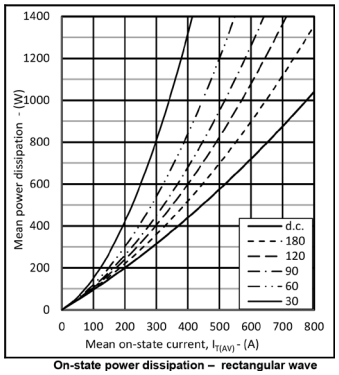
On-state power dissipation – sine wave



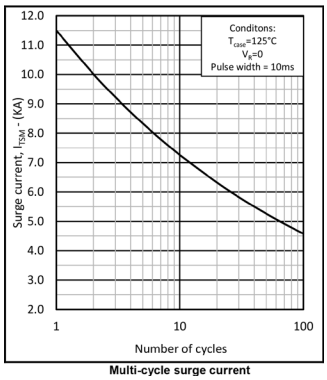
Maximum permissible case temperature, double side cooled – sine wave



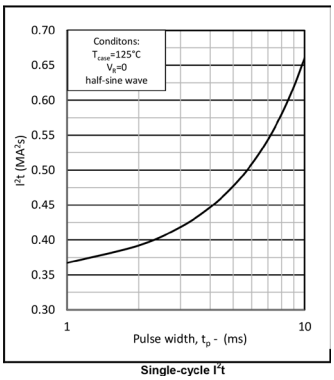
Maximum permissible case temperature, double side cooled – rectangular wave



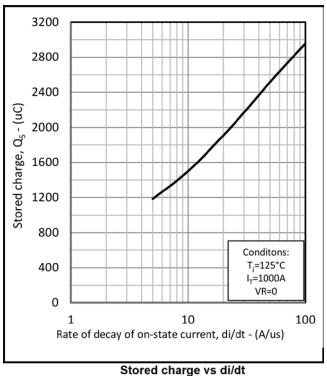
On-state power dissipation – rectangular wave



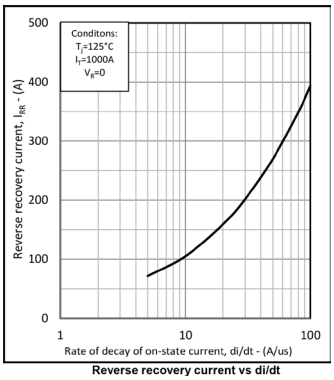
Multi-cycle surge current



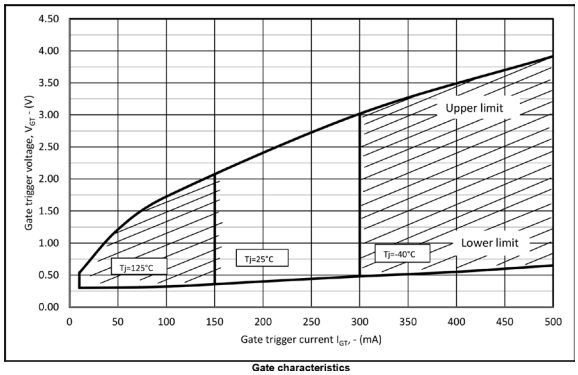
Single-cycle I^2t



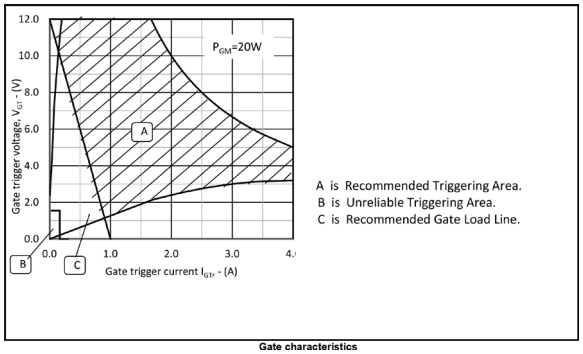
Stored charge vs di/dt



Reverse recovery current vs di/dt



Gate characteristics

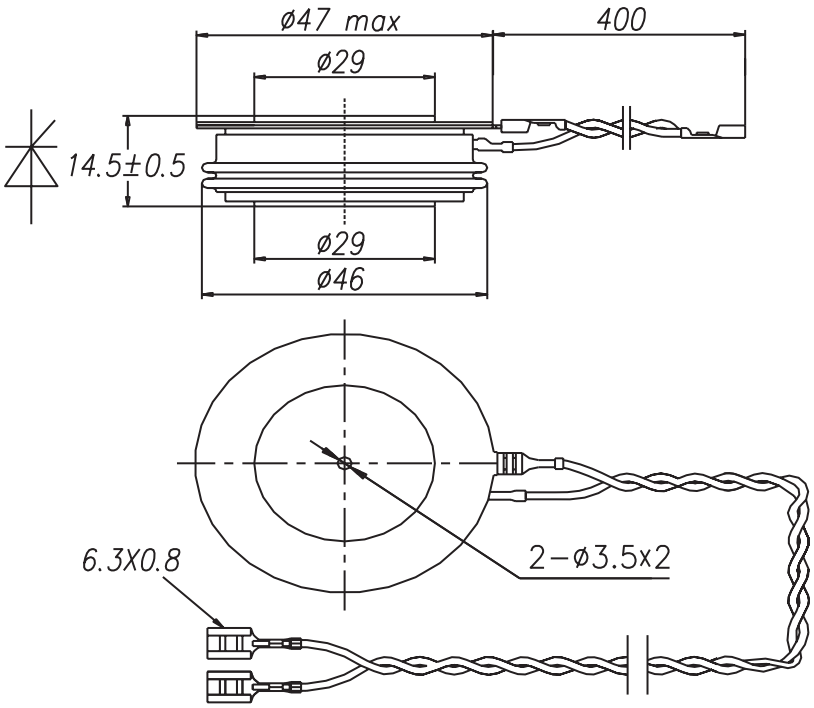


A is Recommended Triggering Area.
B is Unreliable Triggering Area.
C is Recommended Gate Load Line.

Gate characteristics

Rectifier Diode Module

Diagram



Package outline type code: D

Part Number Table

Description	Part Number
Rectifier Diode Module, 1800V, 520A, D Case Code	MPRD520T140

Dimensions : Millimetres