

STARPOWER

SEMICONDUCTOR

Rectifier Diode

RD100FPS180K6S

1800V/100A in one-package

General Description

STARPOWER Rectifier Diode Power Module provides ultra low conduction loss. They are designed for the applications such as SMPS.

Features

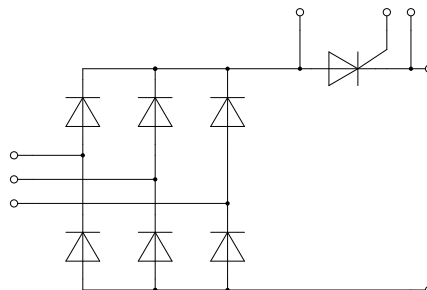
- Low forward voltage drop
- Small temperature coefficient
- High Surge Capacity
- Low inductance
- Isolated Copper Baseplate Using DBC Technology



Typical Applications

- Input bridge rectifier
- AC/DC motor control
- Power supply

Equivalent Circuit Schematic



Absolute Maximum Ratings $T_C=25^{\circ}\text{C}$ unless otherwise noted**Rectifier Diode**

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1800	V
V_{RSM}	Non-repetitive Peak Reverse Voltage	1900	V
I_F	Forward Current $T_C=100^{\circ}\text{C}$	100	A
I_{FSM}	Surge Forward Current $V_R=0\text{V}, t_p=10\text{ms}, T_j=45^{\circ}\text{C}$ $V_R=0\text{V}, t_p=8.3\text{ms}, T_j=45^{\circ}\text{C}$	1100	A
		1200	
I^2t	I^2t -value $V_R=0\text{V}, t_p=10\text{ms}, T_j=45^{\circ}\text{C}$ $V_R=0\text{V}, t_p=8.3\text{ms}, T_j=45^{\circ}\text{C}$	6050	A^2s
		6000	

Thyristor

Symbol	Description	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1800	V
V_{RSM}	Non-repetitive Peak Reverse Voltage	1900	V
I_T	On-state Current $T_C=100^{\circ}\text{C}$	100	A
I_{TSM}	Surge Forward Current $V_R=0\text{V}, t_p=10\text{ms}, T_j=45^{\circ}\text{C}$ $V_R=0\text{V}, t_p=8.3\text{ms}, T_j=45^{\circ}\text{C}$	1150	A
		1230	
I^2t	I^2t -value $V_R=0\text{V}, t_p=10\text{ms}, T_j=45^{\circ}\text{C}$ $V_R=0\text{V}, t_p=8.3\text{ms}, T_j=45^{\circ}\text{C}$	6610	A^2s
		6300	
$(di/dt)_{cr}$	Critical Rate of Rise of On-State Current $f=50\text{Hz}, I_G=0.45\text{A}, di_G/dt=0.45\text{A}/\mu\text{s}, T_j=150^{\circ}\text{C}$	150	$\text{A}/\mu\text{s}$
$(dv/dt)_{cr}$	Critical Rate of Rise of On-State Voltage $V_D=0.67V_{DRM}, T_j=150^{\circ}\text{C}$	1000	$\text{V}/\mu\text{s}$

Module

Symbol	Description	Value	Unit
T_{jmax}	Maximum Junction Temperature	150	$^{\circ}\text{C}$
T_{jop}	Operating Junction Temperature	-40 to +150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-40 to +125	$^{\circ}\text{C}$
V_{ISO}	Isolation Voltage RMS, $f=50\text{Hz}, t=1\text{min}$	4000	V

Rectifier Diode $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	$I_F=150\text{A}$	$T_j=25^\circ\text{C}$			1.31	V
			$T_j=150^\circ\text{C}$			1.28	
$V_{(TO)}$	Threshold Voltage	$T_j=150^\circ\text{C}$				0.87	V
r_T	Forward Slope Resistance	$T_j=150^\circ\text{C}$				2.7	$\text{m}\Omega$
I_R	Diode Reverse Current	$V_R=V_{RRM}$	$T_j=25^\circ\text{C}$			0.05	mA
			$T_j=150^\circ\text{C}$			2.00	

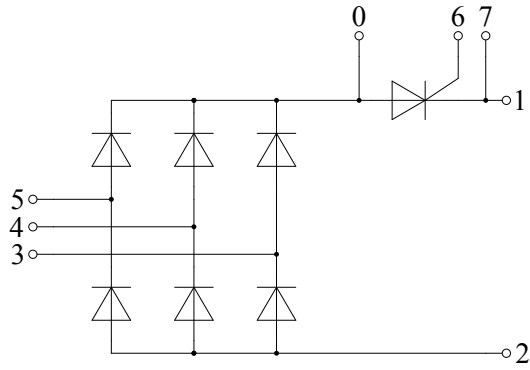
Thyristor Diode $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
V_T	Forward Voltage	$I_T=200\text{A}$	$T_j=25^\circ\text{C}$			1.53	V
			$T_j=150^\circ\text{C}$			1.60	
$V_{(TO)}$	Threshold Voltage	$T_j=150^\circ\text{C}$				0.92	V
r_T	Forward Slope Resistance	$T_j=150^\circ\text{C}$				3.3	$\text{m}\Omega$
I_R	Diode Reverse Current	$V_R=V_{RRM}$	$T_j=25^\circ\text{C}$			0.05	mA
			$T_j=150^\circ\text{C}$			20.0	
V_{GT}	Gate Trigger Current	$V_D=6\text{V}, T_j=25^\circ\text{C}$				1.5	V
I_{GT}	Gate Trigger Voltage	$V_D=6\text{V}, T_j=25^\circ\text{C}$				95	mA
V_{GD}	Gate Non-trigger Current	$V_D=0.67V_{DRM}, T_j=150^\circ\text{C}$				0.2	V
I_{GD}	Gate Non-trigger Voltage	$V_D=0.67V_{DRM}, T_j=150^\circ\text{C}$				10	mA
I_H	Holding Current	$V_D=6\text{V}, R_{GK}=\infty, T_j=25^\circ\text{C}$				450	mA
I_L	Latching Current	$t_p=10\mu\text{s}, I_G=0.45\text{A}, di_G/dt=0.45\text{A}/\mu\text{s}, T_j=25^\circ\text{C}$				200	mA
t_{gd}	Gate Controlled Delay Time	$I_G=0.5\text{A}, di_G/dt=0.5\text{A}/\mu\text{s}, T_j=25^\circ\text{C}$				2	μs
t_q	Circuit Commutated Turn-off Time	$V_R=100\text{V}, V_D=0.67V_{DRM}, I_T=72\text{A}, t_p=200\mu\text{s}, di/dt=10\text{A}/\mu\text{s}, dv/dt=20\text{V}/\mu\text{s}, T_j=125^\circ\text{C}$			150		μs

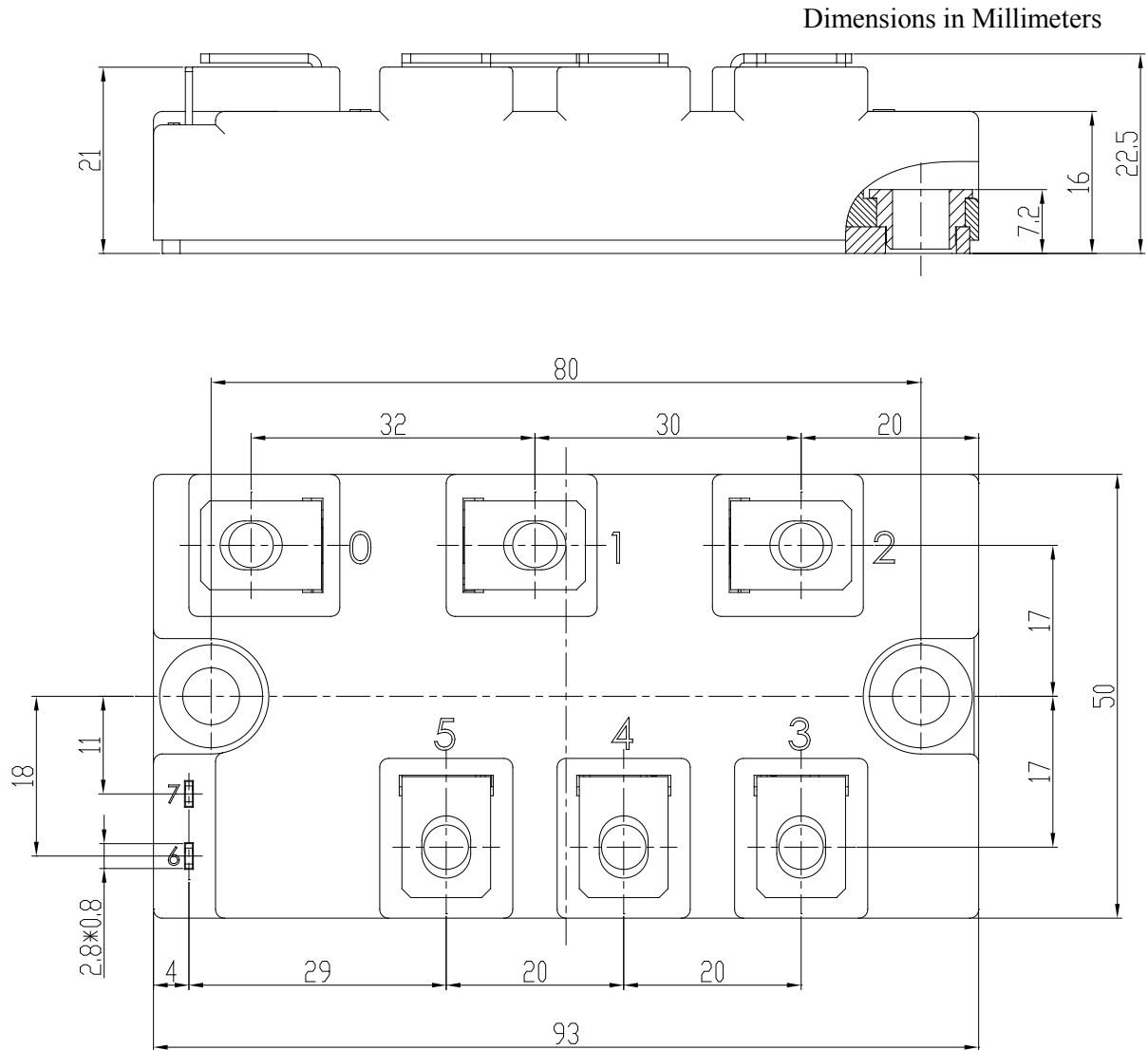
Module Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit
$R_{\theta JC}$	Junction-to-Case (per Rectifier)			0.504	K/W
	Junction-to-Case (per Thyristor)			0.284	
$R_{\theta CS}$	Case-to-Sink (per Rectifier)		0.350		K/W
	Case-to-Sink (per Thyristor)		0.197		
$R_{\theta CS}$	Case-to-Sink		0.045		K/W
M	Terminal Connection Torque, Screw M5 Mounting Torque, Screw M5		2.7		N.m
G	Weight of Module		150		g

Circuit Schematic



Package Dimensions



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