

FRED Pt[®] Gen 4 Doubler Ultrafast Diode, 500 A (INT-A-PAK Power Modules)



INT-A-PAK


**RoHS
COMPLIANT**

FEATURES

- Gen 4 FRED Pt[®] dices technology
- Ultrasoft reverse recovery characteristics
- Low I_{RRM} and reverse recovery charge
- Very low forward voltage drop
- 175 °C operating junction temperature
- UL approved file E78996 for application with maximum case temperature up to 140 °C
- Large creepage distances
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

DESCRIPTION

Gen 4 FRED Pt technology, state of the art, ultra low V_F , soft switching optimized for IGBT F/W diode.

The minimized conduction loss, optimized storage charge, and low recovery current, minimized the switching losses and reduce the over dissipation in the switching element and snubbers.

PRIMARY CHARACTERISTICS	
V_R	600 V
$I_{F(AV)}$ at T_C	500 A at 55 °C
t_{rr} at 25 °C	104 ns
Type	Modules - diode, FRED Pt [®]
Package	INT-A-PAK
Circuit configuration	Diode doubler circuit

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	V_R		600	V
Continuous forward current	I_F	$T_C = 25\text{ °C}$	772	A
		$T_C = 90\text{ °C}$	519	
Single pulse forward current	I_{FSM}	$t_p = 10\text{ ms}$, 50 Hz, sine half wave, initial $T_J = 175\text{ °C}$	4140	
Maximum power dissipation	P_D	$T_C = 25\text{ °C}$	1363	W
		$T_C = 90\text{ °C}$	772	
Operating junction temperature range	T_J		-40 to +175	°C
Storage temperature range	T_{Stg}		-40 to +150	
RMS insulation voltage	V_{INS}	50 Hz, circuit to base, all terminals shorted, $t = 1\text{ s}$	3500	V

ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ °C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Cathode to anode breakdown voltage	V_{BR}	$I_R = 500\text{ }\mu\text{A}$	600	-	-	V
Forward voltage drop	V_{FM}	$I_F = 250\text{ A}$	-	1.25	-	
		$I_F = 500\text{ A}$	-	1.45	1.66	
		$I_F = 250\text{ A}$, $T_J = 150\text{ °C}$	-	1.06	-	
		$I_F = 500\text{ A}$, $T_J = 150\text{ °C}$	-	1.35	-	
Reverse leakage current	I_{RM}	$V_R = 600\text{ V}$	-	10	-	μA
		$T_J = 150\text{ °C}$, $V_R = 600\text{ V}$	-	2.5	-	mA



DYNAMIC RECOVERY CHARACTERISTICS (T _J = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t _{rr}	T _J = 25 °C	I _F = 150 A dI/dt = 1000 A/μs V _R = 400 V	-	104	-	ns
		T _J = 125 °C		-	193	-	
Peak recovery current	I _{rr}	T _J = 25 °C		-	59	-	A
		T _J = 125 °C		-	122	-	
Reverse recovery charge	Q _{rr}	T _J = 25 °C		-	3.5	-	μC
		T _J = 125 °C		-	13.8	-	

THERMAL - MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum thermal resistance, junction to case per leg	R _{thJC}	DC operation	0.11	K/W
Typical thermal resistance, case to heat sink	R _{thCS}	Mounting surface, flat, smooth, and greased	0.035	
Mounting torque ± 10 %		A mounting compound is recommended and the torque should be rechecked after a period of 3 hours to allow the spread of the compound	4 to 6	Nm
Approximate weight			200	g
			7.1	oz.
Case style			INT-A-PAK	

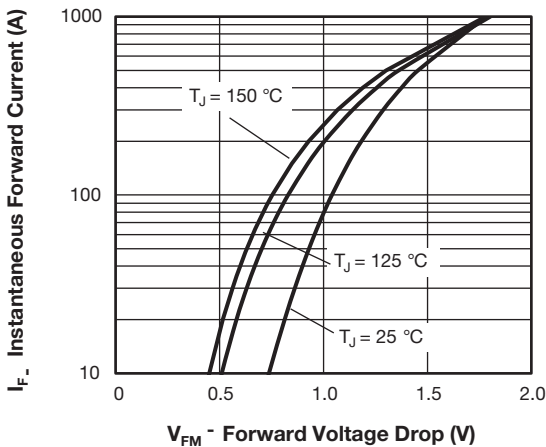


Fig. 1 - Typical Forward Voltage Drop Characteristics

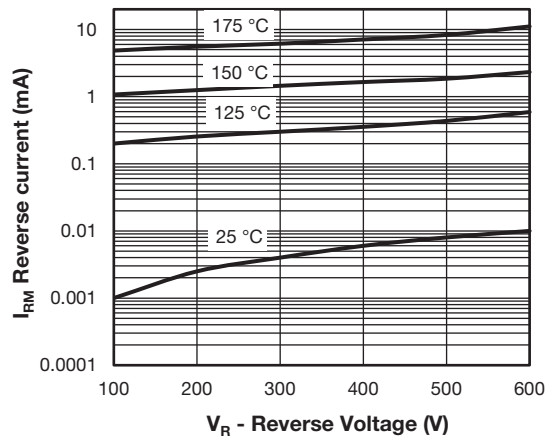


Fig. 2 - Typical Value of Reverse Current vs. Reverse Voltage

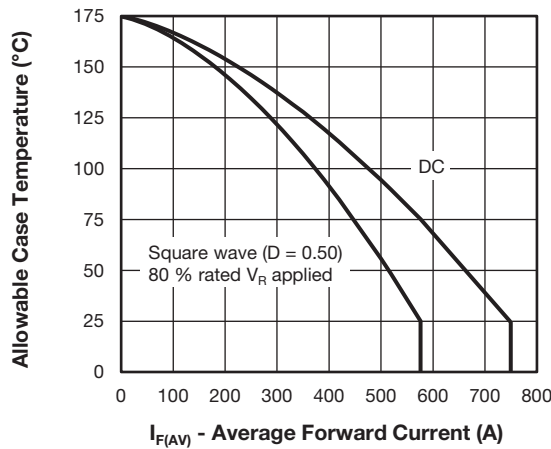


Fig. 3 - Maximum Allowable Case Temperature vs. Average Forward Current

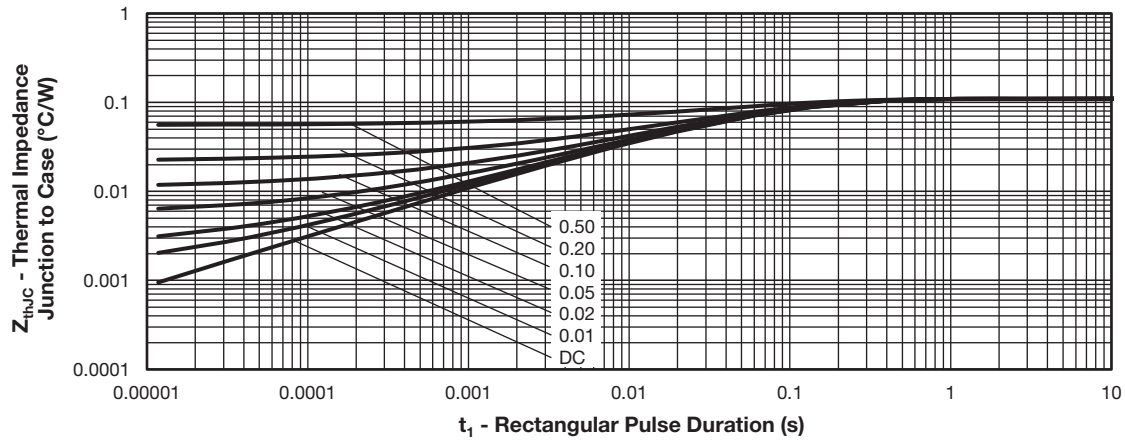


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

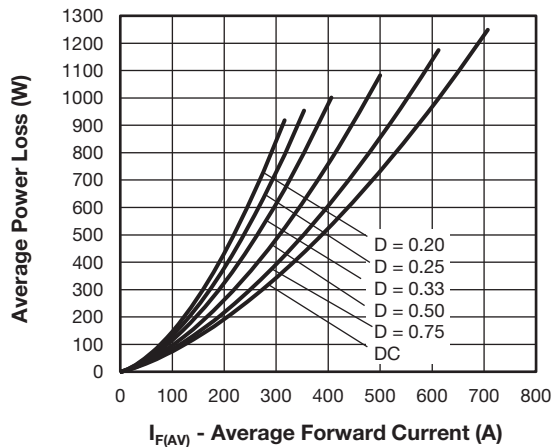


Fig. 5 - Forward Power Loss Characteristics

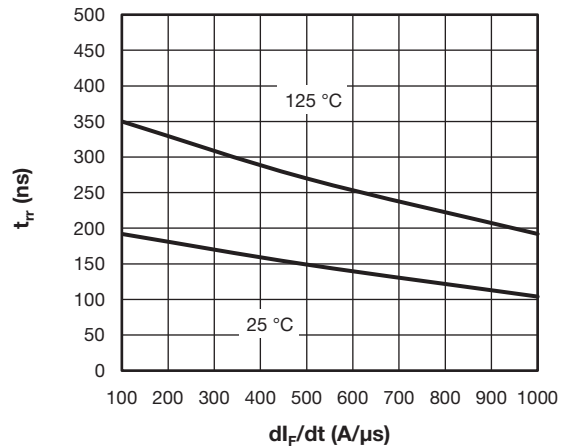
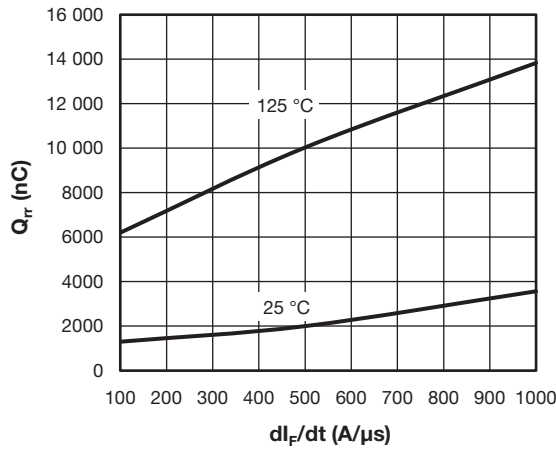
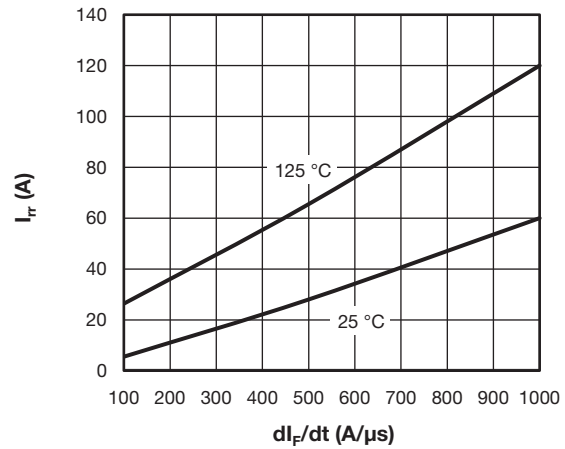


Fig. 6 - Typical Reverse Recovery Time vs. di_F/dt
 $I_{FM} = 150 \text{ A}, V_R = 300 \text{ V}$


 Fig. 7 - Typical Reverse Recovery Charge vs. di_F/dt
 $I_{FM} = 150\text{ A}$, $V_R = 300\text{ V}$

 Fig. 8 - Typical Reverse Recovery Current vs. di_F/dt
 $I_{FM} = 150\text{ A}$, $V_R = 300\text{ V}$
ORDERING INFORMATION TABLE

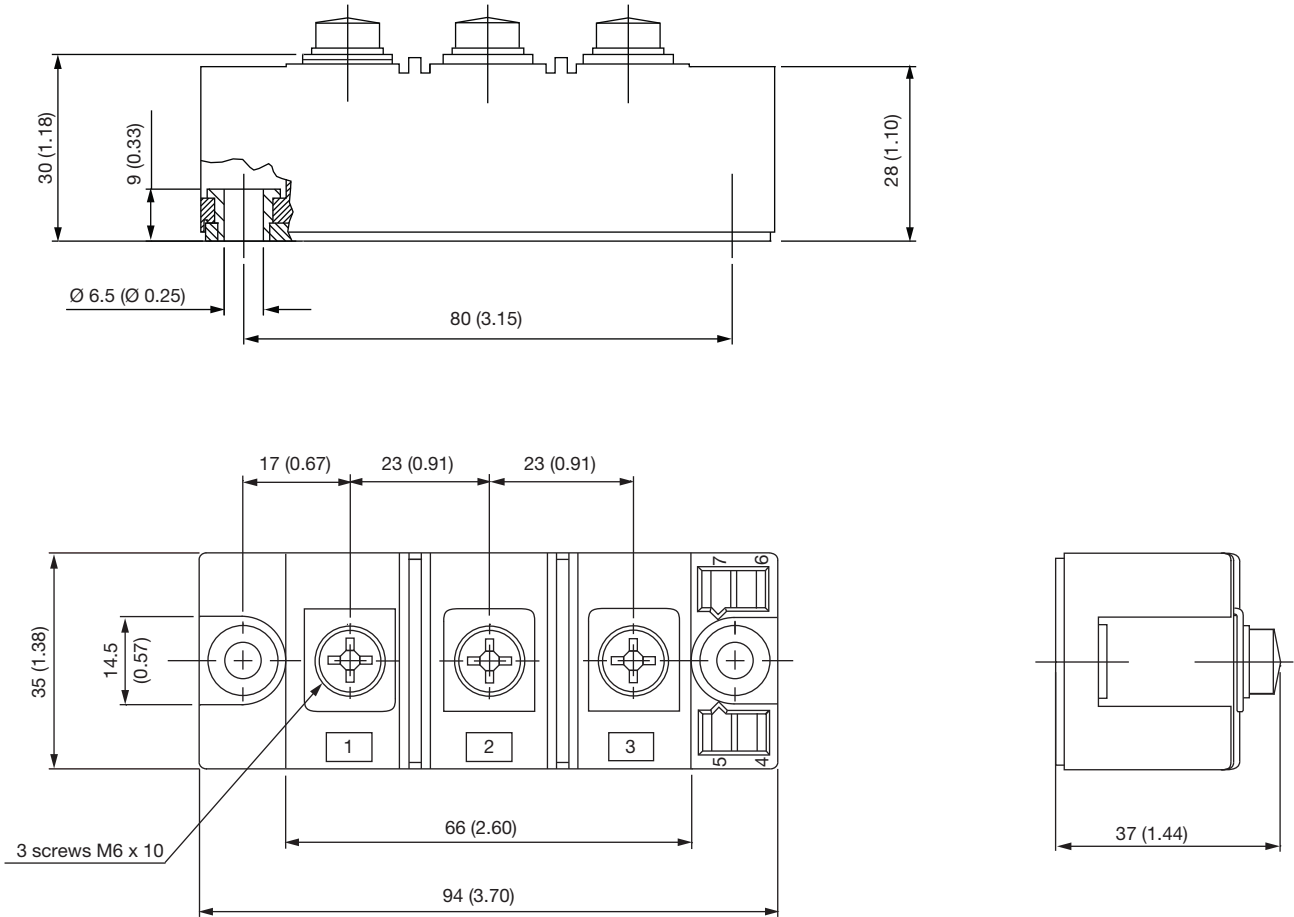
Device code	VS-VS	KD	F	500	06	PbF
	①	②	③	④	⑤	⑥

- 1** - Vishay Semiconductors product
- 2** - Circuit configuration: KD = doubler circuit
- 3** - F = FRED Pt[®] ultrafast diode
- 4** - Current rating (500 = 500 A)
- 5** - Voltage rating (06 = 600 V)
- 6** - PbF = lead (Pb)-free

CIRCUIT CONFIGURATION		
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Diode doubler circuit	KD	KD reversed polarity



DIMENSIONS in millimeters (inches)



INT-A-PAK DBC

DIMENSIONS in millimeters (inches)





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