



PRELIMINARY

SOLID STATE DEVICES, INC14849 Firestone Boulevard · La Mirada, CA 90638
Phone: (714) 670-SSDI (7734) · Fax: (714) 522-7424**Designer's Data Sheet****FEATURES:**

- Hermetically Sealed, Isolated Package
- Ceramic Seals
- Available with formed leads
- TX, TXV and S Level
- Replaces: IRFM7450/8450, FRF450 R/H
- Second Generation Radiation Hardened Mosfet results from new design concepts.
- Gamma: A) Meets pre-rad specifications to 100 KRad(Si)
B) Defined end-point specs at 300 and 1000 KRad(Si)
C) Performance permits limited use to 3000 KRad(Si)
- Gamma Dot survives 3E9 Rad(Si)/sec at 500 BVDSS typically and survives 2E12 typically if current limited to IDM.
- Photo Current is typically 30nA per Rad(Si)/sec.
- Neutron: A) Pre-rad specifications for 3E12 neutrons/cm²
B) Usable to 3E13 neutrons
- Single Event: typically survives 1E3 ions/cm² having an LET < 35 MeV/mg/cm² and a range ≥ 30μm at 500 BVDSS

**SFFR450M
SFFD450M****10 AMP
500 VOLTS
0.60 Ω****RADIATION HARDENED
N-CHANNEL MOSFET****SFFR450M: 100KRad(Si) Gamma
SFFD450M: 10KRad (Si) Gamma**

This MOSFET is well suited for applications exposed to radiation environments such as switching regulation, switching converters, synchronous rectification, motor drives, relay drivers and drivers for high-power bipolar switching transistors requiring high speed and low gate drive power. This type can be operated directly from integrated circuits.

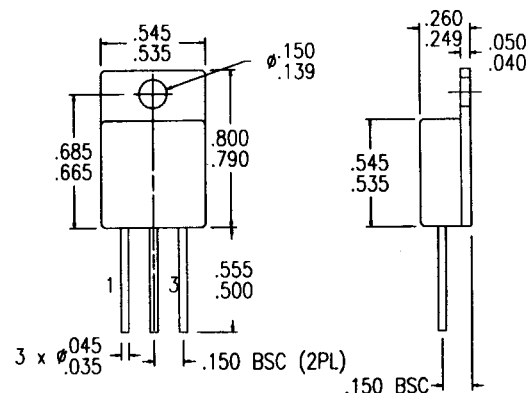
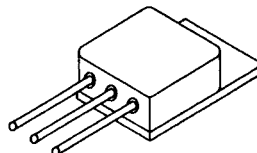
This part may be supplied as a die or in other packages. Reliability screening is performed in SSDI's JANS and Space Station Freedom approved facility.

MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	VALUE	UNIT
Drain to Source Voltage	V _{DS}	500	Volts
Gate to Source Voltage	V _{GS}	± 20	Volts
Continuous Drain Current	I _D	10	Amps
Operating and Storage Temperature	T _{OP} & T _{STG}	-55 to +150	°C
Thermal Resistance, Junction to Case	R _{θJC}	1.0	°C/W
Total Device Dissipation @ TA=25°C Derate above 25°C @ 1 W/°C	P _D	125	Watts

PACKAGE OUTLINE: TO-254**PIN OUT:**

**PIN 1: DRAIN
PIN 2: SOURCE
PIN 3: GATE**



NOTE: All specifications are subject to change without notification. SCD's for these devices should be reviewed by SSDI prior to release.

DATA SHEET #: FR0005 B**MED**

SFFR450M SFFD450M

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PRE RADIATION ELECTRICAL CHARACTERISTICS @ T _J =25 C (Unless Otherwise Specified)						
RATING		SYMBOL	MIN	TYP	MAX	UNIT
Drain to Source Breakdown Voltage (V _{GS} =0 V, I _D =1mA)		BV _{DSS}	500		---	V
Drain to Source on State Resistance (V _{GS} =10 V, I _D =6 A)		R _{DS(on)}	---		0.60	Ω
On State Drain Voltage (V _{GS} =10 V, I _D =10 A)		V _{DS(on)}	---		6.3	V
Gate Threshold Voltage (V _{DS} =V _{GS} , I _D =1mA)		V _{GS(th)}	2.0		4.0	V
Forward Transconductance (V _{DS} > I _{D(on)} X R _{DS(on)} Max, I _{DS} =6 A)		g _{fs}	---		---	S(Ω)
Zero Gate Voltage Drain Current (V _{DS} =max rated voltage, V _{GS} =0 V) (V _{DS} =80% rated V _{DS} , V _{GS} =0 V, T _A =125° C)		I _{DSS}	---		1 0.25	mA
Gate to Source Leakage Forward	At rated V _{GS}	I _{GSS}	---		100	nA
Gate to Source Leakage Reverse			---		-100	
Total Gate Charge	0 ≤ V _{GS} ≤ 20 I _{GS1} =I _{GS2} I _D =10 A V _{DD} =250 V	Q _g	125		502	nC
Gate to Source Charge		Q _{gs}	8		34	
Gate to Drain Charge		Q _{gd}	30		123	
Turn on Delay Time	V _{DD} =50% rated V _{DS} I _D =10 A R _G =25Ω 0 ≤ V _{GS} ≤ 10	t _{d(on)}	---		160	nsec
Rise Time		t _r	---		260	
Turn Off Delay Time		t _{d(off)}	---		750	
Fall Time		t _f	---		180	
Diode Forward Voltage (I _S =10 A, V _{GD} =0 V)		V _{SD}	0.6		1.8	V
Diode Reverse Recovery Time	I _F =10 A di/dt=100 A/μsec	t _{rr}	---		---	nsec
Reverse Recovery Charge		Q _{RR}	---		---	μC

For thermal derating curves and other characteristic curves please contact SSDI Marketing Department.



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SFFR450M
SFFD450M**SOLID STATE DEVICES, INC**14849 Firestone Boulevard · La Mirada, CA 90638
Phone: (714) 670-SSDI (7734) · Fax: (714) 522-7424**POST RADTATION ELECTRICAL CHARACTERISTICS @ T_J=25 °C (Unless Otherwise Specified)**

RATING		SYMBOL	MIN	TYP	MAX	UNIT
Drain to Source Breakdown Voltage (VGS=0 V, ID=1mA) <i>note 4, 6</i>		BVDSS	500		---	V
Drain to Source on State Resistance (VGS=10 V, ID=6 A) <i>note 1, 4, 6</i>		RDS(on)	---		0.60	Ω
On State Drain Voltage (VGS=10 V, ID=10 A)		VDS(on)	---		6.3	V
Gate Threshold Voltage (VDS=VGS, ID=1mA) <i>note 4, 6</i>		VGS(th)	2.0		4.0	V
Forward Transconductance (VDS > ID(on) X RDS(on) Max, IDS=6 A)		gfs	---		---	S(Ω)
Zero Gate Voltage Drain Current (VDS=max rated voltage, VGS=400 V) <i>note 4, 6</i>		IDSS	---		25	μA
Gate to Source Leakage Forward	At rated VGS <i>note 2, 4, 6</i>	IGSS	---		100	nA
Gate to Source Leakage Reverse			---		-100	
Total Gate Charge	0 ≤ VGS ≤ 20	Qg	---		120	nC
Gate to Source Charge	IGS1=IGS2	Qgs	---		60	
Gate to Drain Charge	ID=10 A VDD=250 V	Qgd	---		63	
Turn on Delay Time	VDD=50%	td(on)	---		100	nsec
Rise Time	rated VDS	tr	---		200	
Turn Off Delay Time	ID=10 A	td(off)	---		200	
Fall Time	RG=25Ω 0 ≤ VGS ≤ 10	tf	---		200	
Diode Forward Voltage (IS=10 A, VGS=0 V, T _J =25°C)		VSD	---		---	V
Diode Reverse Recovery Time	T _J =25°C	t_{rr}	---		---	nsec
Reverse Recovery Charge	IF=10 A di/dt=100 A/μsec	QRR	---		---	μC

NOTES:

1. Pulse Test, 300 μs max.
2. Absolute Value
3. Gamma = 300 KRad(Si)
4. Gamma = 100 KRad(Si) and/or Neutron = 3E12
5. Gamma = 1000 KRad(Si) and/or Neutron = 3E12
6. Insitu Gamma bias must be sampled for both:
VGS = +10V, VDS= 0V and
VGS = 0 V, VDS= 80% BVDSS