PRELIMINARY

SOLID STATE DEVICES, INC

14849 Firestone Boulevard · La Mirada,CA 90638
Phone: (714) 670-SSDI (7734) · Fax: (714) 522-7424

SFFR450M
SFFD450M

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/cm^2
  B)Usable to 3E13 neutrons
- Single Event: typically survives 1E3 ions/cm^2 having an LET<35 MeV/mg/cm^2 and a range ≥ 30μm at 500 BVDSS

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.

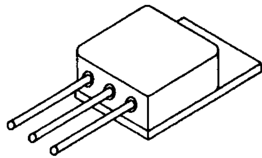
MAXIMUM RATINGS

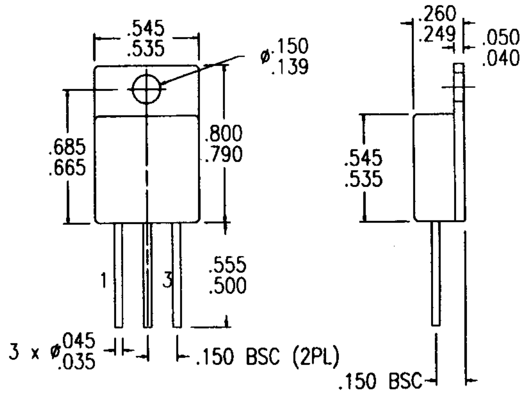
CHARACTERISTIC	SYMBOL	VALUE	UNIT
Drain to Source Voltage	V_{DS}	500	Volts
Gate to Source Voltage	V_{GS}	± 20	Volts
Continuous Drain Current	I_D	10	Amps
Operating and Storage Temperature	T_{op} & T_{stg}	-55 to +150	°C
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.0	°C/W
Total Device Dissipation @ 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

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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 (VGS=0 V, ID=1mA)		BV_{DSS}	500		---	V
Drain to Source on State Resistance (VGS=10 V, ID=6 A)		$R_{DS(on)}$	---		0.60	Ω
On State Drain Voltage (VGS=10 V, ID=10 A)		$V_{DS(on)}$	---		6.3	V
Gate Threshold Voltage (VDS=VGS, ID=1mA)		$V_{GS(th)}$	2.0		4.0	V
Forward Transconductance (VDS >ID(on) X RDS(on) Max, IDS=6 A)		g_{fs}	---		---	S(℧)
Zero Gate Voltage Drain Current (VDS=max rated voltage, VGS=0 V) (VDS=80% rated VDS, VGS=0 V, TA=125°C)		I_{DSS}	--- ---		1 0.25	mA
Gate to Source Leakage Forward **Gate to Source Leakage Reverse**	At rated VGS	I_{GSS}	--- ---		100 -100	nA
Total Gate Charge **Gate to Source Charge** **Gate to Drain Charge**	0≤VGS≤20 IGS1=IGS2 ID=10 A VDD=250 V	Q_g Q_{gs} Q_{gd}	125 8 30		502 34 123	nC
Turn on Delay Time **Rise Time** **Turn Off Delay Time** **Fall Time**	VDD=50% rated VDS ID=10 A RG=25Ω 0≤ VGS ≤10	$t_{d(on)}$ t_r $t_{d(off)}$ t_f	--- --- --- ---		160 260 750 180	nsec
Diode Forward Voltage (IS=10 A, VGD=0 V)		V_{SD}	0.6		1.8	V
Diode Reverse Recovery Time **Reverse Recovery Charge**	IF=10 A di/dt=100 A/μsec	t_{rr} Q_{RR}	--- ---		--- ---	nsec μC

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

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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) *note 4, 6*		BV_{DSS}	500		---	V
Drain to Source on State Resistance (VGS=10 V, ID=6 A) *note 1,4, 6*		$R_{DS(on)}$	---		0.60	Ω
On State Drain Voltage (VGS=10 V, ID=10 A)		$V_{DS(on)}$	---		6.3	V
Gate Threshold Voltage (VDS=VGS, ID=1mA) *note 4, 6*		$V_{GS(th)}$	2.0		4.0	V
Forward Transconductance (VDS >ID(on) X RDS(on) Max, IDS=6 A)		gfs	---		---	S(℧)
Zero Gate Voltage Drain Current (VDS=max rated voltage, VGS=400 V) *note 4, 6*		I_{DSS}	--- ---		25	µA
Gate to Source Leakage Forward **Gate to Source Leakage Reverse**	At rated VGS *note 2, 4, 6*	I_{GSS}	--- ---		100 -100	nA
Total Gate Charge **Gate to Source Charge** **Gate to Drain Charge**	0≤VGS≤20 IGS1=IGS2 ID=10 A VDD=250 V	Q_g Q_{gs} Q_{gd}	--- --- ---		120 60 63	nC
Turn on Delay Time **Rise Time** **Turn Off Delay Time** **Fall Time**	VDD=50% rated VDS ID=10 A RG=25Ω 0≤ VGS ≤10	$t_{d(on)}$ t_r $t_{d(off)}$ t_f	--- --- --- ---		100 200 200 200	nsec
Diode Forward Voltage (IS=10 A, VGS=0 V, TJ=25°C)		V_{SD}	---		---	V
Diode Reverse Recovery Time **Reverse Recovery Charge**	TJ=25°C IF=10 A di/dt=100 A/µsec	t_{rr} Q_{RR}	--- ---		--- ---	nsec 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