



SOLID STATE DEVICES, INC

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

**SFFR450M
SFFD450M**

**10 AMP
500 VOLTS
0.60 Ω
RADIATION HARDENED
N-CHANNEL MOSFET**

**SFFR450M: 100KRad(Si) Gamma
SFFD450M: 10KRad (Si) Gamma**

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

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.

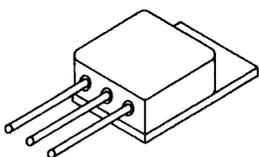
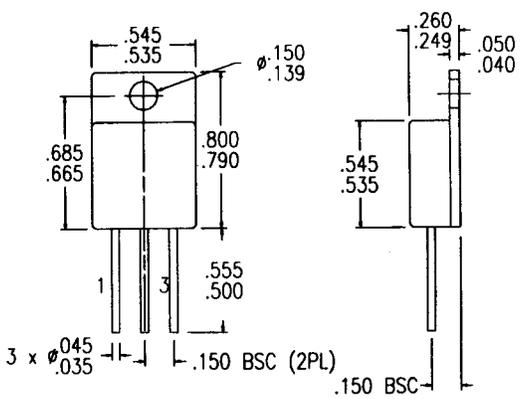
This part may be supplied as a die or in other packages. Reliability screening is performed in SSDI's JANS and Space Station Freedom approved facility.

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	Top & Tstg	-55 to +150	°C
Thermal Resistance, Junction to Case	RθJC	1.0	°C/W
Total Device Dissipation @ TA=25°C Derate above 25°C @ 1 W/°C	PD	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 (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(τ)
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 Gate to Source Leakage Reverse	At rated V _{GS}	I _{GSS}	---		100 -100	nA
Total Gate Charge Gate to Source Charge Gate to Drain Charge	0 ≤ V _{GS} ≤ 20 I _{GS1} =I _{GS2} I _D =10 A V _{DD} =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	V _{DD} =50% rated V _{DS} I _D =10 A R _G =25Ω 0 ≤ V _{GS} ≤ 10	t _{d(on)} t _r t _{d(off)} t _f	---		160 260 750 180	nsec
Diode Forward Voltage (I _S =10 A, V _{GD} =0 V)		V _{SD}	0.6		1.8	V
Diode Reverse Recovery Time Reverse Recovery Charge	I _F =10 A di/dt=100 A/μsec	t _{rr} Q _{RR}	---		---	nsec μC

For thermal derating curves and other characteristic 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 (V _{GS} =0 V, I _D =1mA) <i>note 4, 6</i>		BV_{DSS}	500		---	V
Drain to Source on State Resistance (V _{GS} =10 V, I _D =6 A) <i>note 1, 4, 6</i>		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) <i>note 4, 6</i>		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} =400 V) <i>note 4, 6</i>		I_{DSS}	---		25	μA
Gate to Source Leakage Forward Gate to Source Leakage Reverse	At rated V _{GS} <i>note 2, 4, 6</i>	I_{GSS}	---		100 -100	nA
Total Gate Charge Gate to Source Charge Gate to Drain Charge	0 ≤ V _{GS} ≤ 20 I _{GS1} =I _{GS2} I _D =10 A V _{DD} =250 V	Q_g Q_{gs} Q_{gd}	---		120 60 63	nC
Turn on Delay Time Rise Time Turn Off Delay Time Fall Time	V _{DD} =50% rated V _{DS} I _D =10 A R _G =25Ω 0 ≤ V _{GS} ≤ 10	t_{d(on)} t_r t_{d(off)} t_f	---		100 200 200 200	nsec
Diode Forward Voltage (I _S =10 A, V _{GS} =0 V, T _J =25 °C)		V_{SD}	---		---	V
Diode Reverse Recovery Time Reverse Recovery Charge	T _J =25 °C I _F =10 A di/dt=100 A/μsec	t_{rr} Q_{RR}	---		---	nsec μC

NOTES:

- Pulse Test, 300 μs max.
- Absolute Value
- Gamma = 300 KRad(Si)
- Gamma = 100 KRad(Si) and/or Neutron = 3E12
- Gamma = 1000 KRad(Si) and/or Neutron = 3E12
- In situ Gamma bias must be sampled for both:
V_{GS} = +10V, V_{DS}= 0V and
V_{GS} = 0 V, V_{DS}= 80% BVDSS