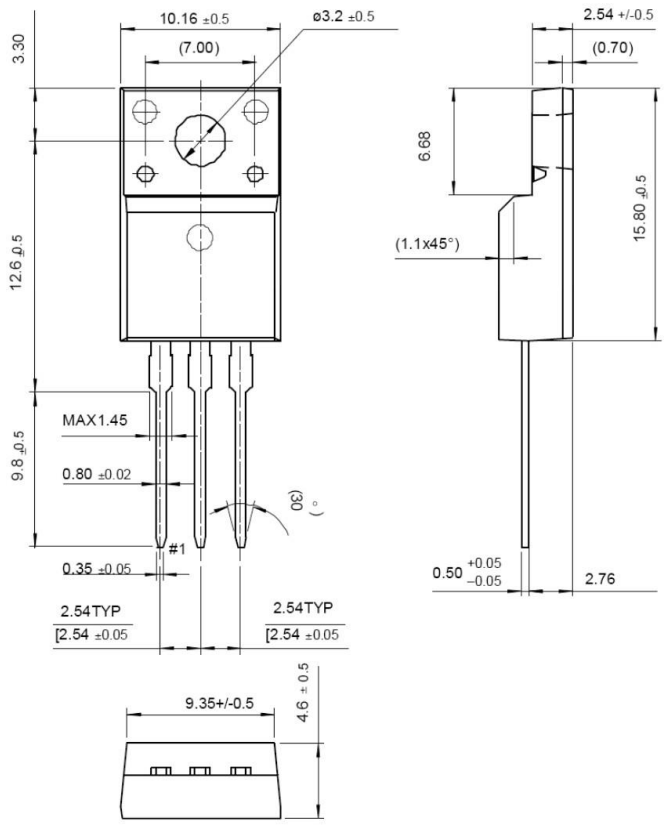
MSF13N50

500V N-Channel MOSFET

Description

The MSF13N50 is a N-channel enhancement-mode MOSFET , providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The TO-220F package is universally preferred for all commercial-industrial applications



Features

- RDS(on) (Typical 0.48 Ω)@VGS=10V
- Gate Charge (Typical 43 nC)
- Improved dv/dt Capability, High Ruggedness
- 100% Avalanche Tested
- Maximum Junction Temperature Range (150°C)
- RoHS compliant package

Application

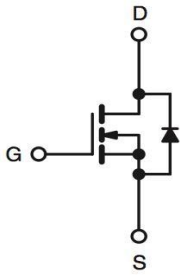
- Open Framed Power Supply
- Adapter
- STB

Packing & Order Information

50/Tube ; 1,000/Box

RoHS COMPLIANT

Graphic symbol



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-Source Voltage	500	V
V_{GS}	Gate-Source Voltage	±30	V
I_D	Drain Current -Continuous (TC=25°C)	13	A
	Drain Current -Continuous (TC=100°C)	8	A
I_{DM}	Drain Current Pulsed	52	A
E_{AS}	Single Pulsed Avalanche Energy	939	mJ
E_{AR}	Repetitive Avalanche Energy	19.5	mJ
dV/dt	Peak Diode Recovery dV/dt	4.5	V/ns
P_D	Power Dissipation (TC = 25 °C)	48	W
	- Derate above 25 °C	0.39	W/°C

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500V N-Channel MOSFET

Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
T_J,T_{STG}	Operating and Storage Temperature Range	-55 to +150	°C
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	°C

• Drain current limited by maximum junction temperature

Thermal characteristics (Tc=25°C unless otherwise noted)

Symbol	Parameter	Max.	Units
$R_{\theta JC}$	Junction-to-Case	2.5	°C/W
$R_{\theta JA}$	Junction-to-Ambient	62.5	

On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
V_{GS}	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	2.0	--	4.0	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V,I_D=6.5A	--	0.39	0.48	Ω

Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0 V , I_D=250μA	500	--	--	V
ΔBV_{DSS} /ΔT_J	Breakdown Voltage Temperature Coefficient	I_D=250μA, Referenced to 25°C	--	0.5	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=500V , V_{GS}= 0 V V_{DS}=400V , T_C= 125°C	--	--	10 100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS}=30V , V_{DS}=0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS}=-30V , V_{DS}=0 V	--	--	-100	nA

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
C_{ISS}	Input Capacitance	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	--	1600	--	pF
C_{OSS}	Output Capacitance		--	180	--	pF
C_{RSS}	Reverse Transfer Capacitance		--	20	--	pF

MSF13N50

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Dynamic Characteristics						
Symbol	**Parameter**	**Test Conditions**	**Min**	**Typ.**	**Max.**	**Units**
$t_{d(on)}$	Turn-On Time	V_{DS}=250 V, I_D=6.5A, R_G=25Ω	--	30	--	ns
t_r	Turn-On Time		--	120	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	120	--	ns
tf	Turn-Off Fall Time		--	100	--	ns
Q_g	Total Gate Charge	V_{DS}=400V,I_D=6.5A, V_{GS}=10 V	--	43	--	nC
Q_{gs}	Gate-Source Charge		--	8	--	nC
Q_{gd}	Gate-Drain Charge		--	19	--	nC

Source-Drain Diode Maximum Ratings and Characteristics						
Symbol	**Parameter**	**Test Conditions**	**Min**	**Typ.**	**Max.**	**Units**
I_S	Continuous Source-Drain Diode Forward Current		--	--	13.0	A
I_{SM}	ISM Pulsed Source-Drain Diode Forward Current		--	--	52.0	
V_{SD}	Source-Drain Diode Forward Voltage	I_S=13A , V_{GS}= 0V	--	--	1.4	V
t_{rr}	Reverse Recovery Time	I_S=13A , V_{GS}= 0V diF/dt=100A/μs	--	400	--	ns
Q_{rr}	Reverse Recovery Charge		--	4.5	--	μC

Notes;

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L=5.0mH, I_{AS}=13A, V_{DD}=50V, R_G=25Ω, Starting T_J=25℃
3. I_{SD}≦13A, di/dt≦200A/μs,V_{DD}≦BV_{DSS}, Starting T_J=25℃
4. Pulse Test: Pulse Width ≦ 300μs, Duty Cycle≦ 2%
5. Essentially Independent of Operating Temperature

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■Characteristics Curve

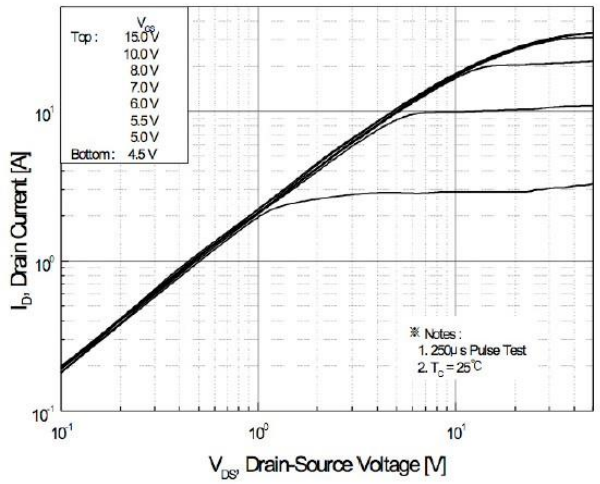

FIG.1-ON REGION CHARACTERISTICS

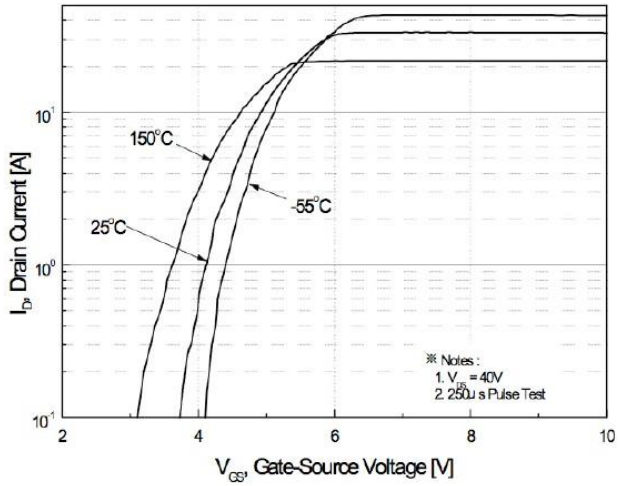

FIG.2-TRANSFER CHARACTERISTICS

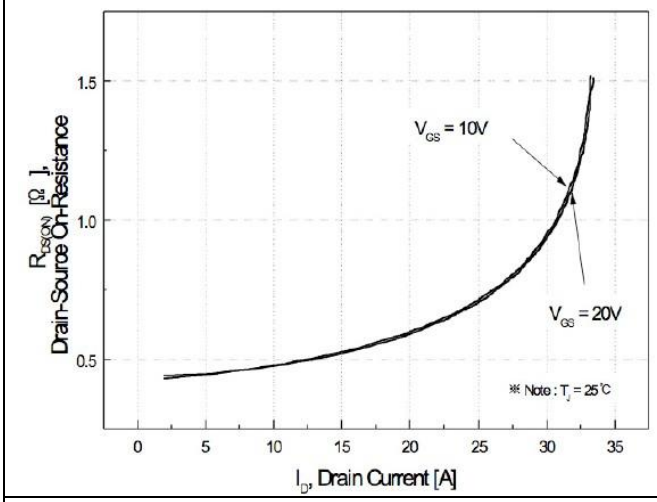

FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

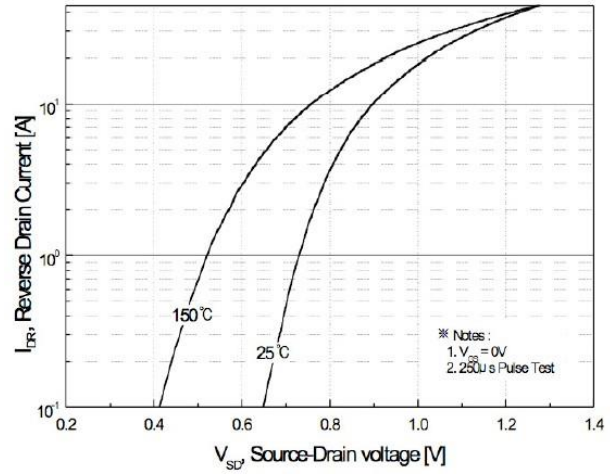

FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

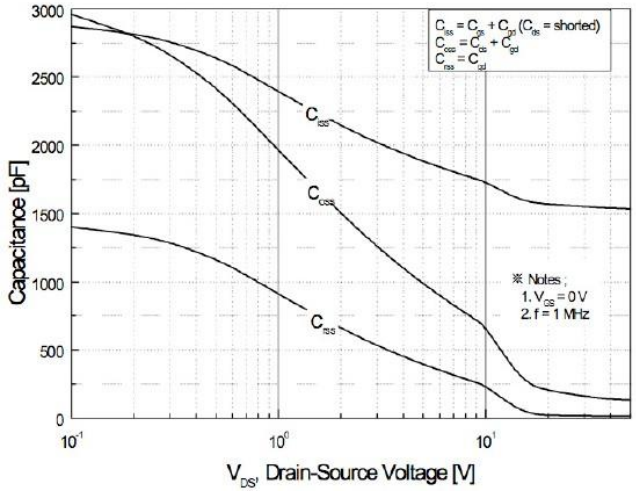

FIG.5-CAPACITANCE CHARACTERISTICS

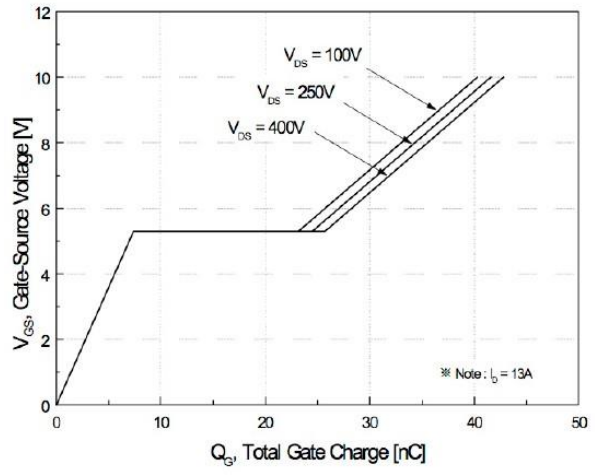

FIG.6-GATE CHARGE CHARACTERISTICS

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■Characteristics Curve

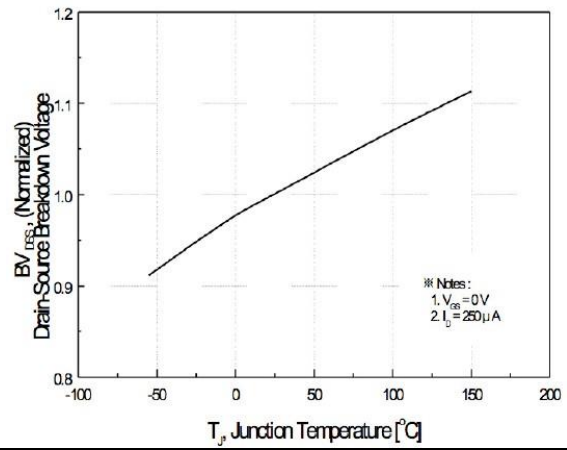

FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

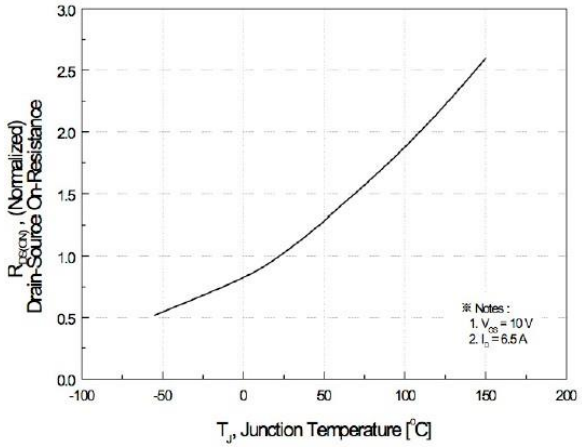

FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE

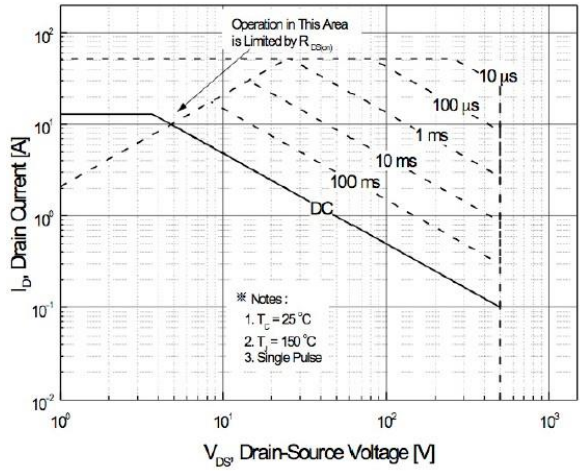

FIG.9-MAXIMUM SAFE OPERATING AREA

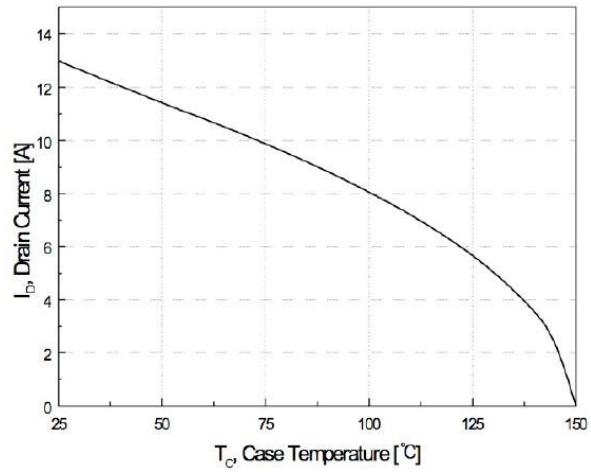

FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

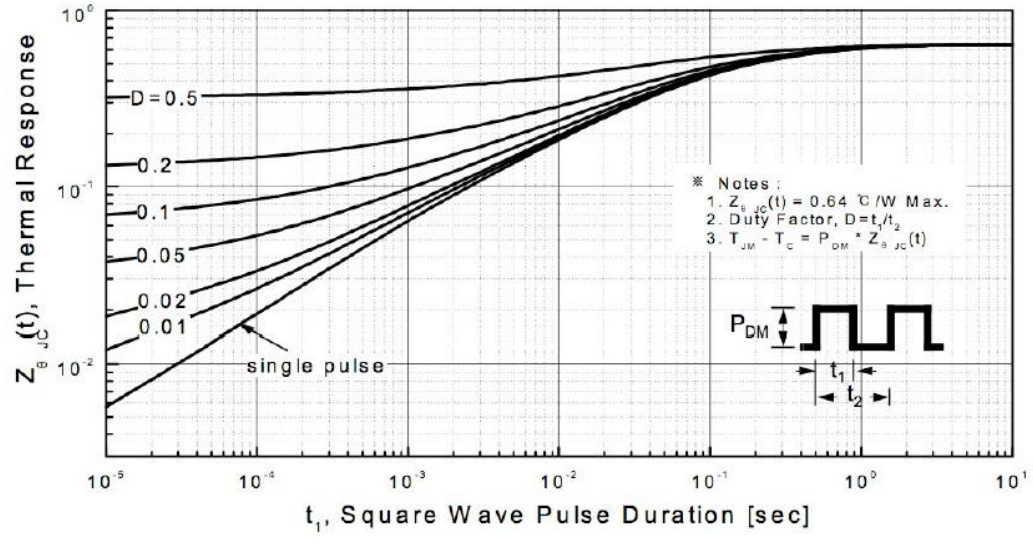

FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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