MSF4N65

650V N-Channel MOSFET

Description

The MSF4N65 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 ITO-220AB package is universally preferred for all commercial-industrial applications

Features

- Originative New Design
- 100% EAS Test
- Rugged Gate Oxide Technology
- Extremely Low Intrinsic Capacitances
- Remarkable Switching Characteristics
- Unequalled Gate Charge: 15 nC (Typ.)
- Extended Safe Operating Area
- Lower RDS(ON) : 2.4 Ω (Typ.) @VGS=10V

Application

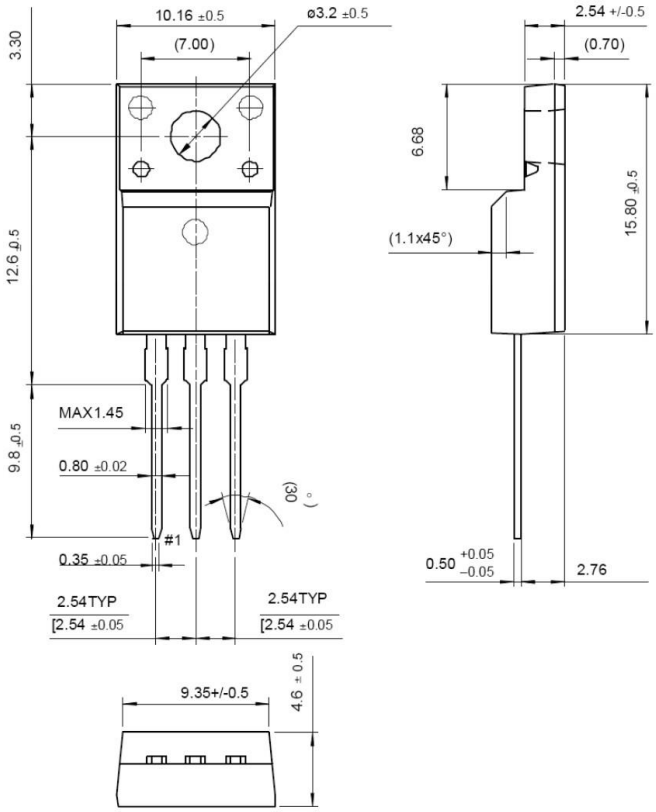
- Low power battery chargers
- Switch mode power supply (SMPS)
- DC-AC converters

Package type：ITO-220AB

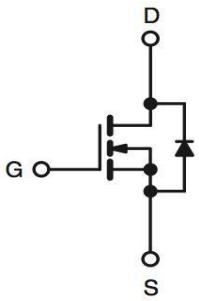
Packing & Order Information

50/Tube ; 1,000/Box

RoHS COMPLIANT



Graphic symbol



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-Source Voltage	650	V
V_{GS}	Gate-Source Voltage	±30	V
I_D	Drain Current -Continuous (TC=25°C)	4.0	A
	Drain Current -Continuous (TC=100°C)	2.3	A
I_{DM}	Drain Current Pulsed	14.4	A
I_{AR}	Avalanche Current	4.5	A
E_{AS}	Single Pulsed Avalanche Energy	240	mJ

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Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
E_{AR}	Repetitive Avalanche Energy	3.6	mJ
dv/dt	Peak Diode Recovery dv/dt	5.5	V/ns
P_D	Total Power Dissipation (TC=25°C)	33	W
	Derating Factor above 25 °C	0.26	W/°C
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	3.3	°C/W
$R_{\theta JA}$	Junction-to-Ambient	62.5	

On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$V_{GS(th)}$	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} = 10 V,I_D = 3.0 A	--	2.0	2.5	Ω

Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V , I_D = 250μA	600	710	--	V
ΔBV_{DSS} /ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25°C	--	0.6	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 600 V , V_{GS} = 0 V V_{DS} = 480 V , T_C = 125°C	--	--	1 10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V , V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V , V_{DS} = 0 V	--	--	-100	nA

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
C_{ISS}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0MHz	--	545	710	pF
C_{OSS}	Output Capacitance		--	60	80	pF
C_{RSS}	Reverse Transfer Capacitance		--	8	11	pF

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Switching Characteristics						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Time	V_{DS} = 325 V, I_D = 4.0 A, R_G = 25 Ω	--	10	30	ns
t_r	Turn-On Time		--	35	80	ns
$t_{d(off)}$	Turn-Off Delay Time		--	45	100	ns
tf	Turn-Off Fall Time		--	40	90	ns
Q_g	Total Gate Charge	V_{DS} = 520 V, I_D = 4.0 A, V_{GS} = 10 V	--	15	20	nC
Q_{gs}	Gate-Source Charge		--	2.8	--	nC
Q_{gd}	Gate-Drain Charge		--	6.0	--	nC

Source-Drain Diode Maximum Ratings and Characteristics						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
I_S	Continuous Source-Drain Diode Forward Current		--	--	3.6	A
I_{SM}	Pulsed Source-Drain Diode Forward Current		--	--	16	
V_{SD}	Source-Drain Diode Forward Voltage	I_S = 4.0 A , V_{GS} = 0 V	--	--	1.5	V
t_{rr}	Reverse Recovery Time	I_F = 4.0 A , V_{GS} = 0 V diF/dt=100A/μs	--	300	--	ns
Q_{rr}	Reverse Recovery Charge		--	2.2	--	μC

Notes;

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. I_{AS}=4A, V_{DD}=50V, R_G=25W, Starting T_J=25℃
3. I_{SD}≦4A, di/dt≦300A/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

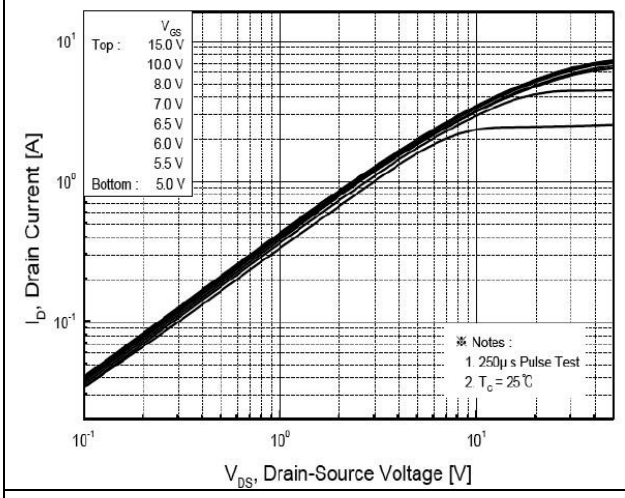

FIG.1-ON REGION CHARACTERISTICS

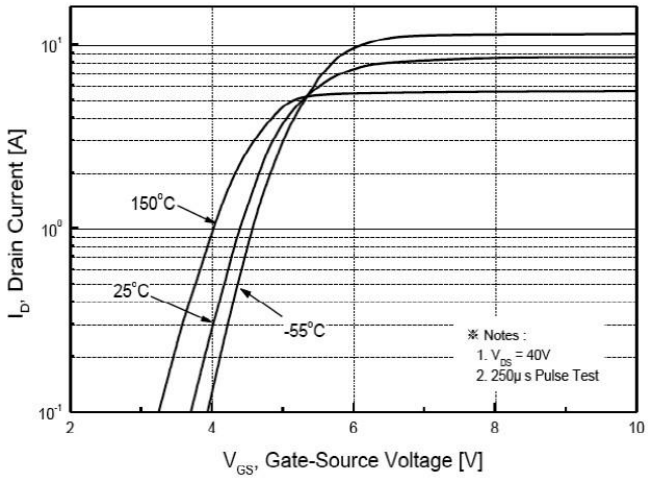

FIG.2-TRANSFER CHARACTERISTICS

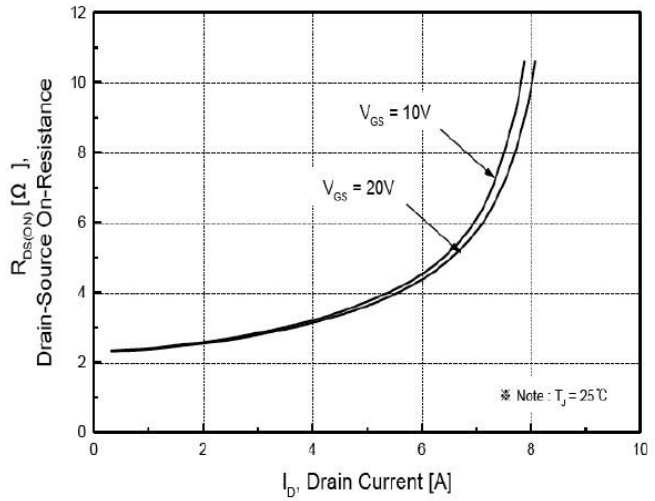

FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

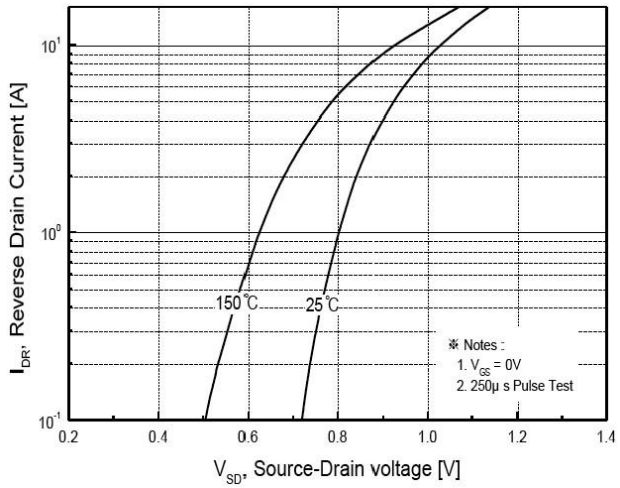

FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

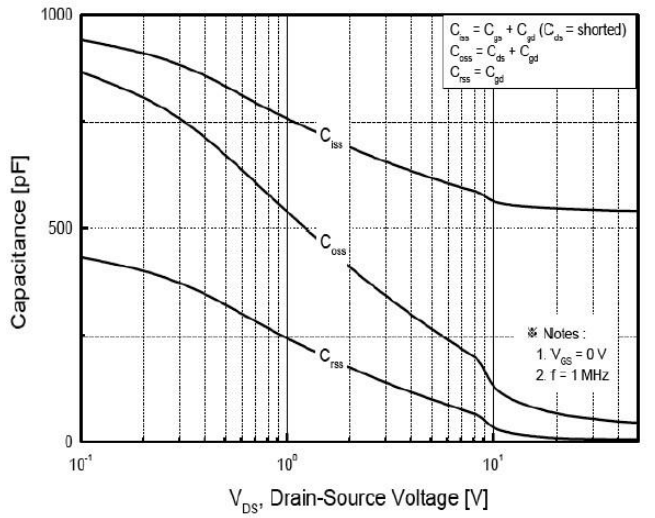

FIG.5-CAPACITANCE CHARACTERISTICS

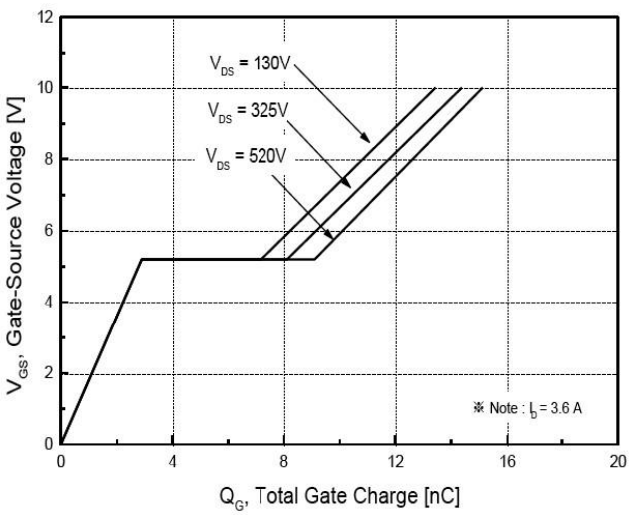

FIG.6-GATE CHARGE CHARACTERISTICS

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■Characteristics Curve

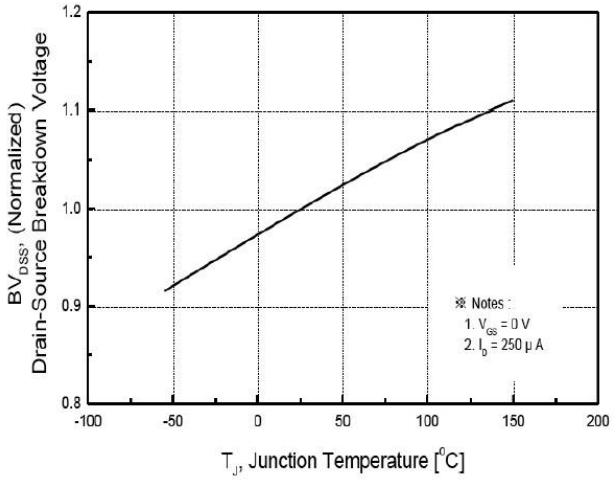

FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

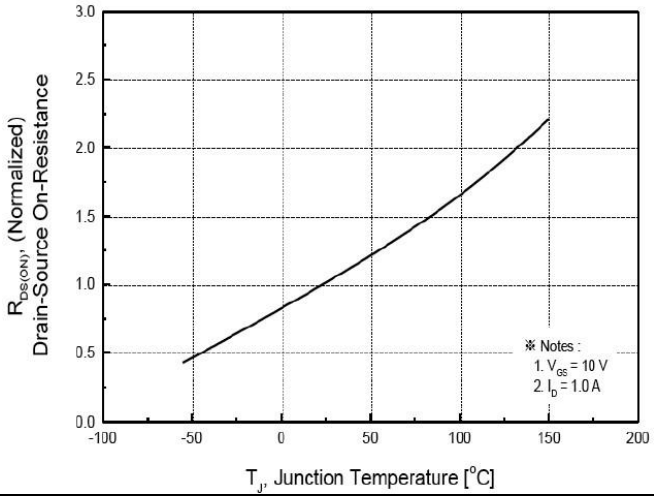

FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE

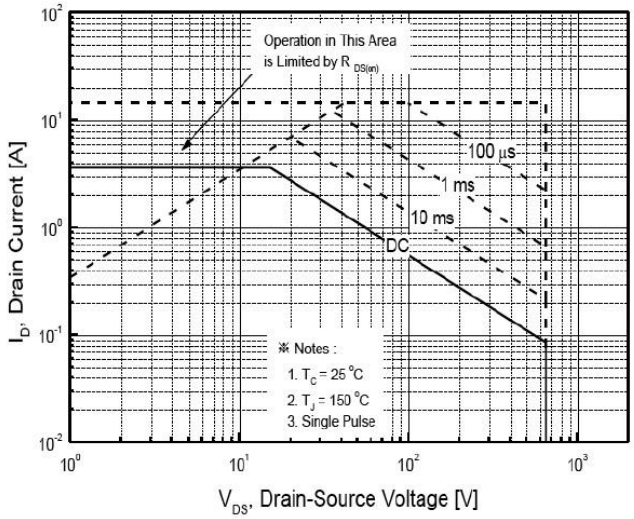

FIG.9-MAXIMUM SAFE OPERATING AREA

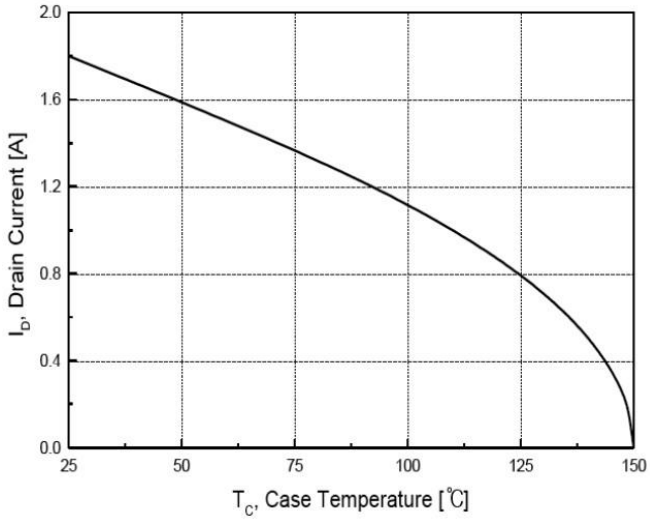

FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

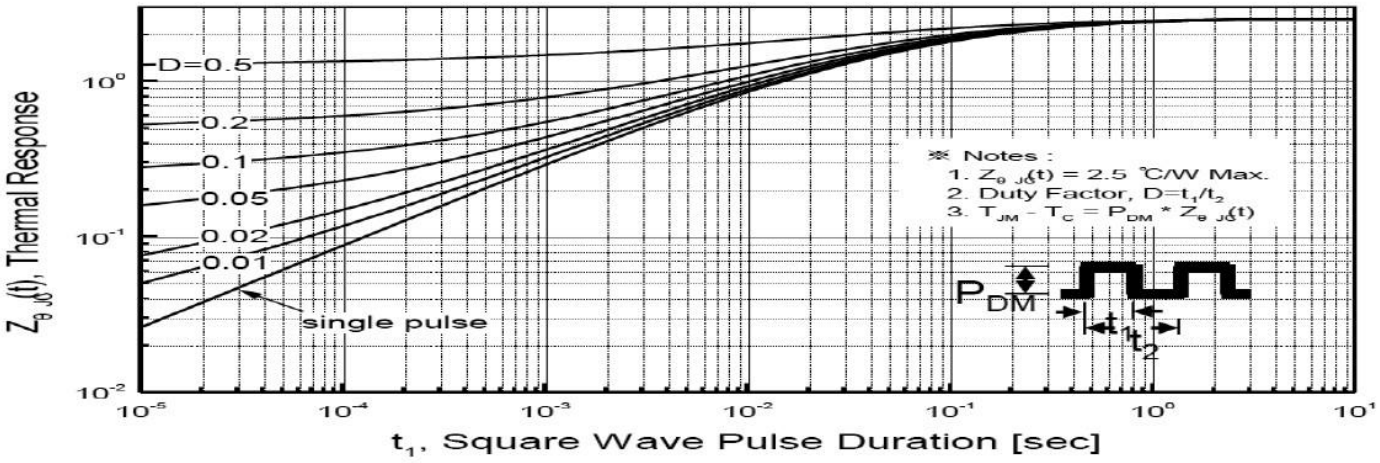

FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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