

MSD4N70

700V N-Channel MOSFET

Description

The MSD4N70 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-252 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) : 2.5 Ω (Typ.) @VGS=10V
- RoHS compliant package

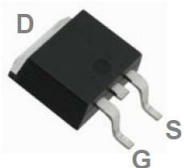
Application

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

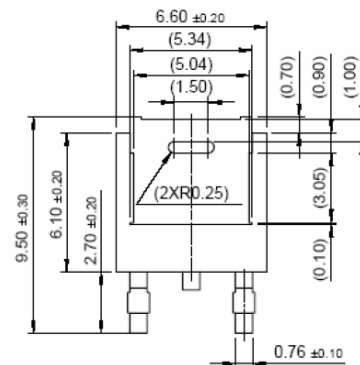
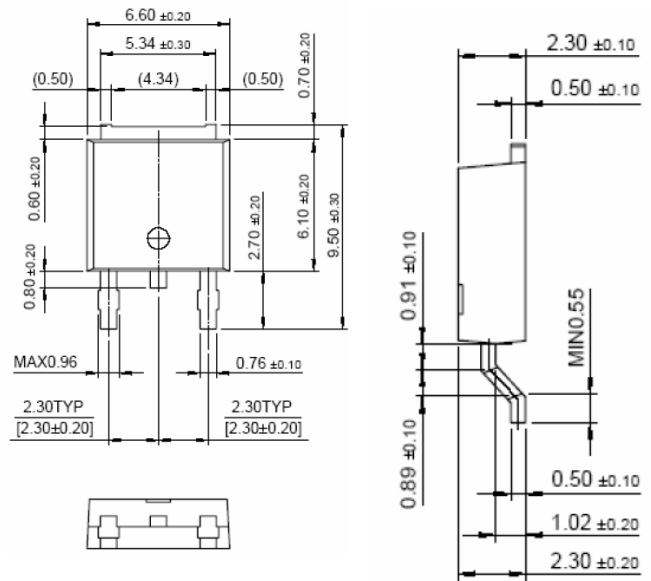
Packing & Order Information

Part No./ T : 2,500/Tape&Reel

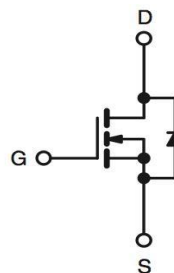
Part No./ R : 80/Tube , 4,000/Box



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	700	V
V _{GS}	Gate-Source Voltage	±30	V
I _D	Continuous Drain Current (TC=25°C)	3.6	A
	Continuous Drain Current (T _C =100°C)	2.3	A

MSD4N70

700V N-Channel MOSFET

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

Symbol	Parameter	Value	Unit
I_{DM}	Pulsed Drain Current	14.4	A
EAS	Single Pulsed Avalanche Energy	240	mJ
EAR	Repetitive Avalanche Energy	4.4	mJ
dV/dt	Peak Diode Recovery dV/dt	5.5	V/ns
P_D	Power Dissipation (T _C =25°C)	55	W
	-Derate above 25C	0.4	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 Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
R _{θJC}	Junction-to-Case	--	2.5	°C/W
R _{θJA}	Junction-to- Ambient	--	110	

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} = 10 V, I _D = 2.25 A	--	2.2	2.4	Ω

Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D =250μA	700	--	--	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} = 700 V, V _{GS} = 0 V V _{DS} = 560 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

MSD4N70

700V N-Channel MOSFET

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
C_{ISS}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $F = 1.0\text{ MHz}$	--	550	730	pF
C_{OSS}	Output Capacitance		--	60	80	pF
C_{RSS}	Reverse Transfer Capacitance		--	8	11	pF
$t_{d(on)}$	Turn-On Time	$V_{DS} = 325\text{ V}, I_D = 3.6\text{ A},$ $R_G = 25\ \Omega$	--	10	20	ns
t_r	Turn-On Time		--	35	70	ns
$t_{d(off)}$	Turn-Off Delay Time		--	45	90	ns
t_f	Turn-Off Fall Time		--	40	80	ns
Q_g	Total Gate Charge	$V_{DS} = 520\text{ V}, I_D = 3.6\text{ A},$ $V_{GS} = 10\text{ V}$	--	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	$I_S = 4.0\text{ A}, V_{GS} = 0\text{ V}$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S = 4.0\text{ A}, V_{GS} = 0\text{ V}$ $diF/dt = 100\text{ A}/\mu\text{s}$	--	300	--	ns
Q_{rr}	Reverse Recovery Charge		--	2.2	--	μC

Notes;

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS}=4\text{ A}, V_{DD}=50\text{ V}, R_G=25\text{ W},$ Starting $T_J=25^\circ\text{C}$
3. $I_{SD}\leq 4\text{ A}, di/dt\leq 300\text{ A}/\mu\text{s}, V_{DD}\leq BV_{DSS},$ Starting $T_J=25^\circ\text{C}$
4. Pulse Test: Pulse Width $\leq 300\mu\text{s},$ Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature

MSD4N70

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Characteristics Curve

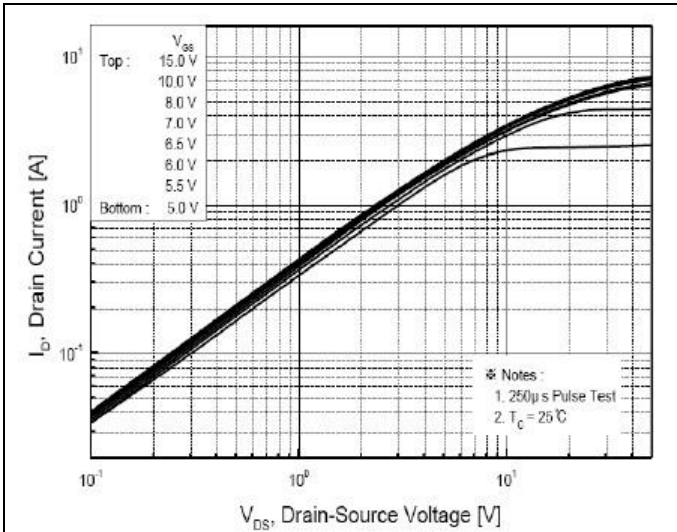


FIG.1-ON REGION CHARACTERISTICS

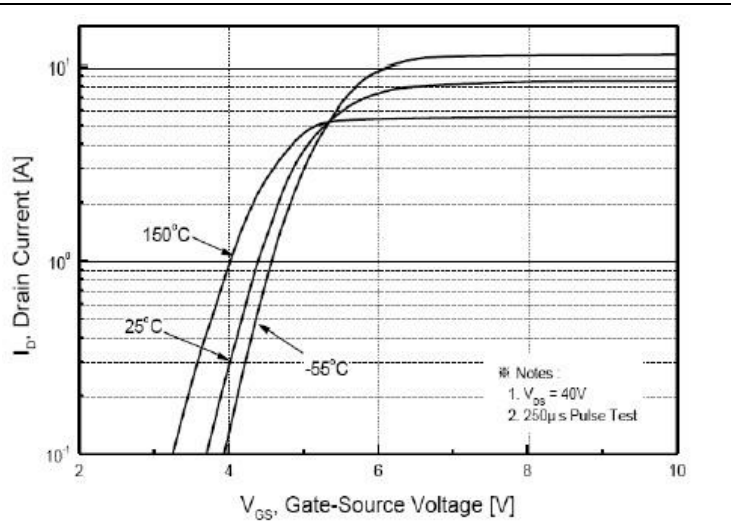


FIG.2-TRANSFER CHARACTERISTICS

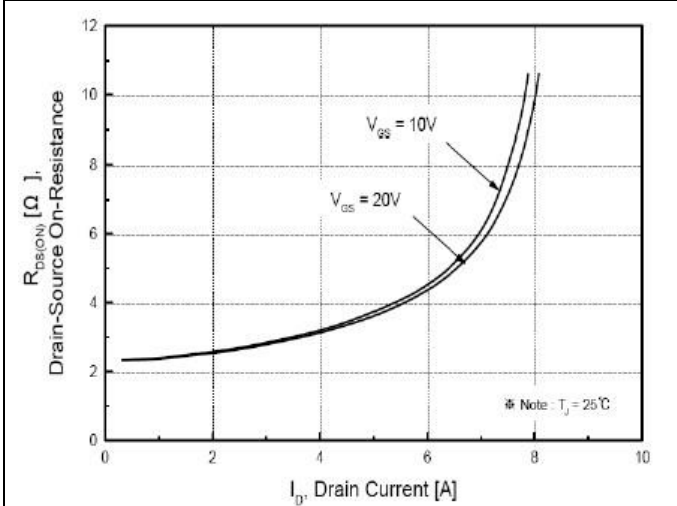


FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

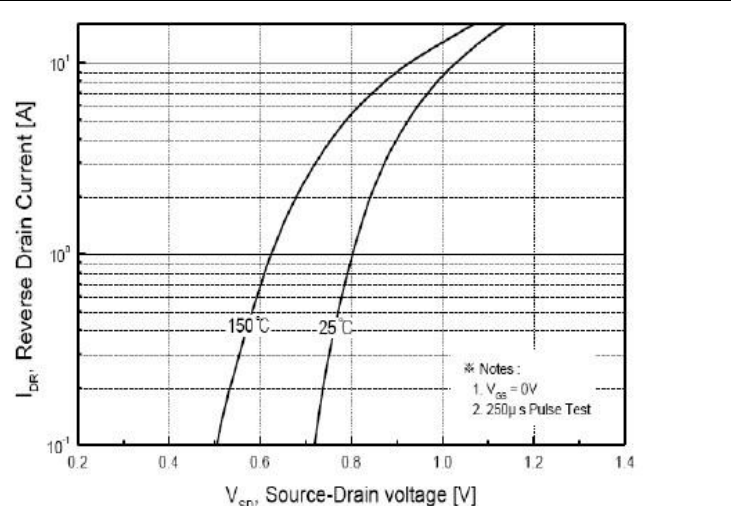


FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

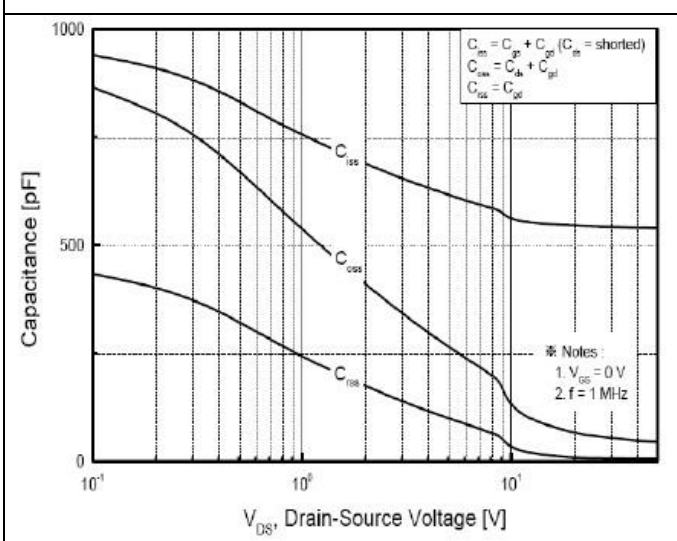


FIG.5-CAPACITANCE CHARACTERISTICS

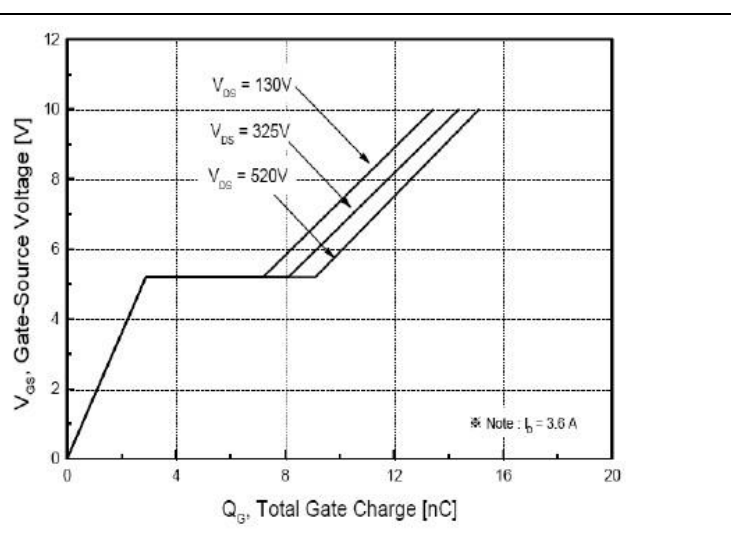


FIG.6-GATE CHARGE CHARACTERISTICS

MSD4N70

700V N-Channel MOSFET

Characteristics Curve

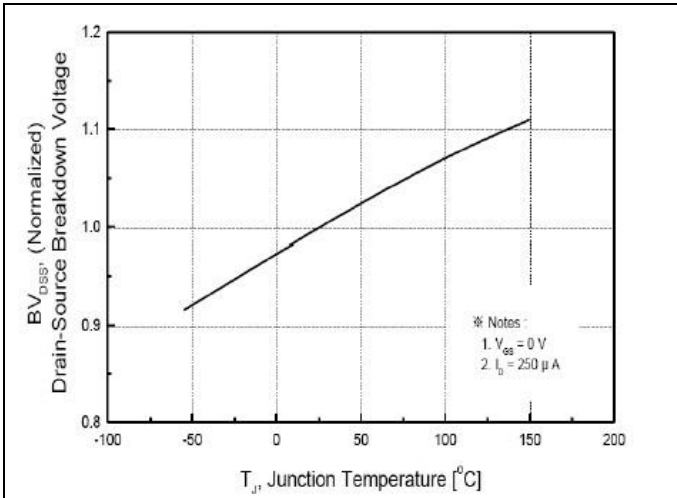


FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

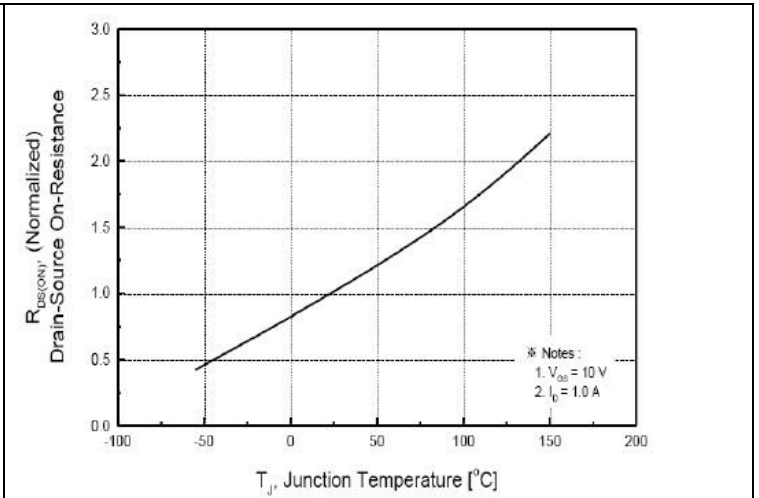


FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE

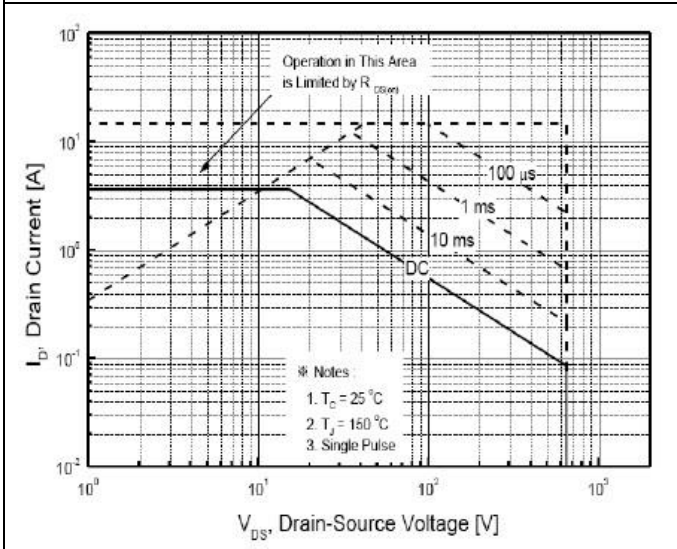


FIG.9-MAXIMUM SAFE OPERATING AREA

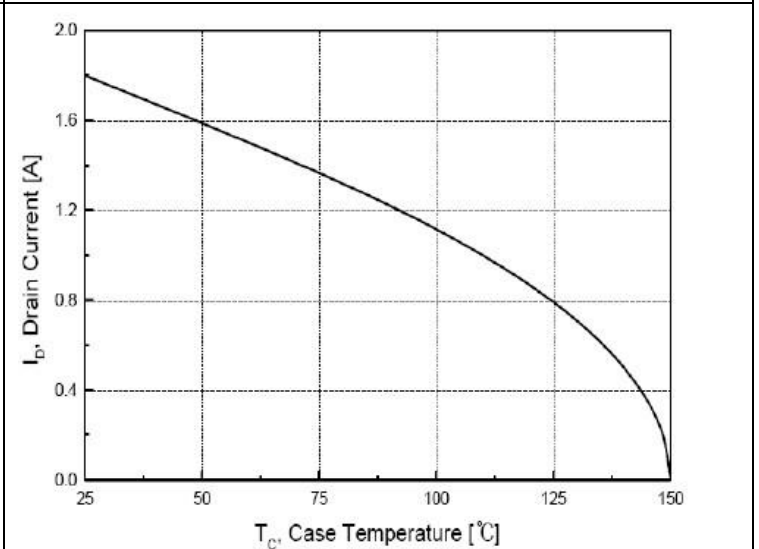


FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

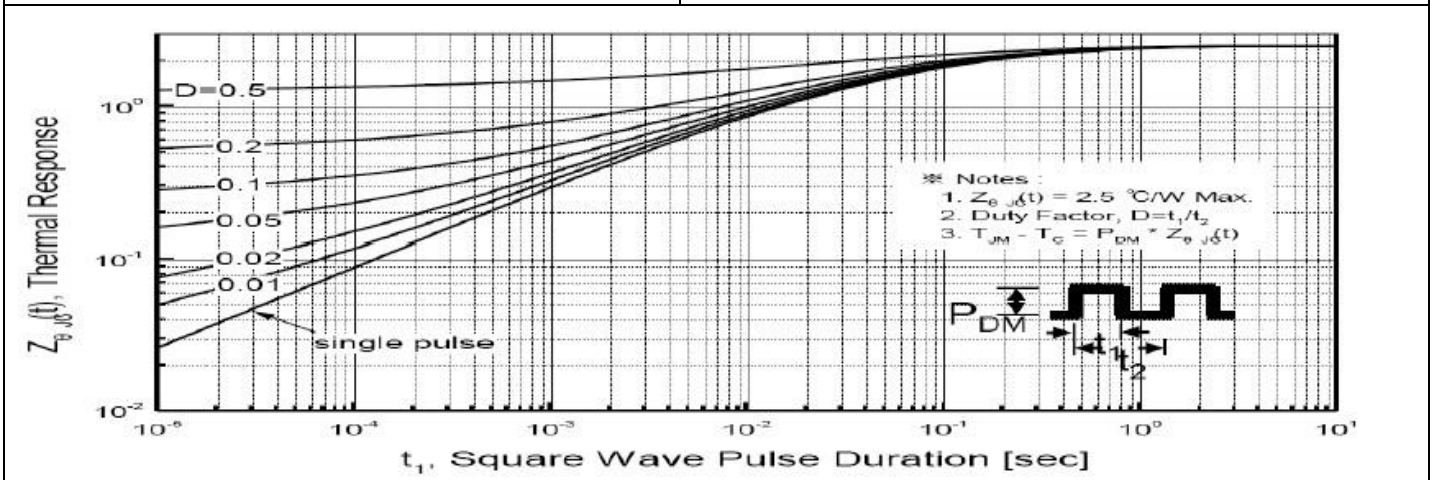


FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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