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## FDMC510P-MS

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Product specification

## Description

The FDMC510P-MS uses advanced trench technology to provide excellent RDS(ON), low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

## Features

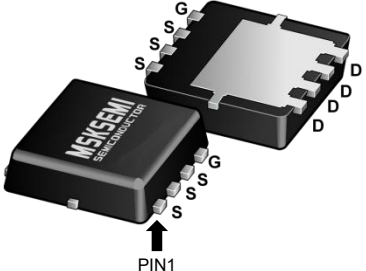
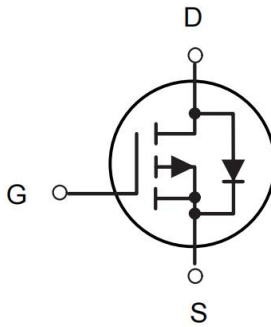

$V_{DS} = -20V$   $I_D = -60 A$

$R_{DS(ON)} < 10m\Omega @ V_{GS} = -4.5V$

## Application

- Battery protection
- Load switch
- Uninterruptible power supply

## Reference News

PACKAGE OUTLINE	P-Channel MOSFET	Marking
 <p>PIN1</p> <p>DFN3X3-8L</p>		

## Absolute Maximum Ratings (TC=25°C unless otherwise specified)

Symbol	Parameter	Rating	Units
VDS	Drain-Source Voltage	-20	V
VGS	Gate-Source Voltage	± 12	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	-60	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	-30	A
IDM	Pulsed Drain Current <sup>2</sup>	-78	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation <sup>4</sup>	22	W
TSTG	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C
R <sub>θJA</sub>	Thermal Resistance Junction-ambient <sup>1</sup>	75	°C/ W
R <sub>θJC</sub>	Thermal Resistance Junction-Case <sup>1</sup>	4.2	°C/ W

**Electrical Characteristics** (T<sub>J</sub>=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
B <sub>V</sub> DSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-20	---	---	V
Δ B <sub>V</sub> DSS/ Δ T <sub>J</sub>	B <sub>V</sub> DSS Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =-1mA	---	-0.012	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A	---	7	10	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-8A	---	9	12	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-0.4	-0.7	-1.0	V
Δ V <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	2.94	---	MV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> = ± 12V, V <sub>DS</sub> =0V	---	---	± 100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-10A	---	43	---	S
Q <sub>g</sub>	Total Gate Charge (-4.5V)	V <sub>DS</sub> =-10V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A	---	35	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	5.0	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	10	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =-10V, V <sub>GS</sub> =-4.5V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =-10A	---	12.0	---	ns
T <sub>r</sub>	Rise Time		---	40.0	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	30	---	
T <sub>f</sub>	Fall Time		---	10	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz	---	2800	---	pF
C <sub>oss</sub>	Output Capacitance		---	690	---	
C <sub>riss</sub>	Reverse Transfer Capacitance		---	590	---	

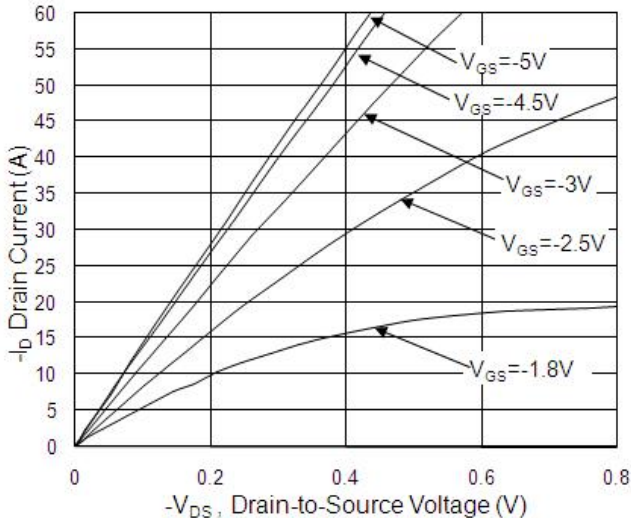
**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,4</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-60.0	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,4</sup>		---	---	---	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =- 1A, T <sub>J</sub> =25°C	---	---	-1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =-10A, dI/dt=100A/μs, T <sub>J</sub> =25°C	---	27	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	17.8	---	nC

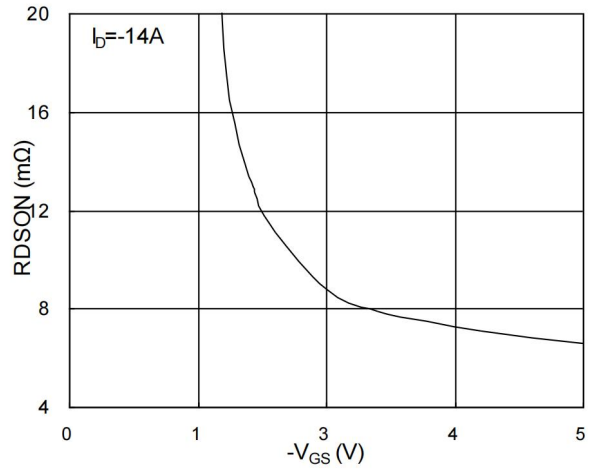
**Note :**

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed, pulse width ≦ 300us, duty cycle ≦ 2%
- 3.The power dissipation is limited by 150C junction temperature
- 4.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

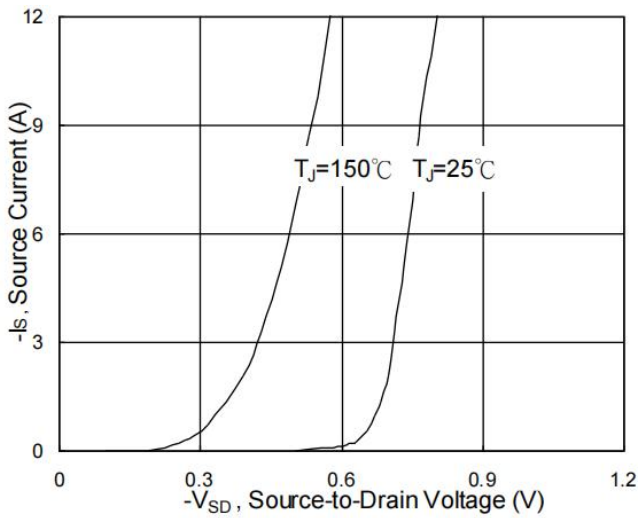
**Typical Characteristics**



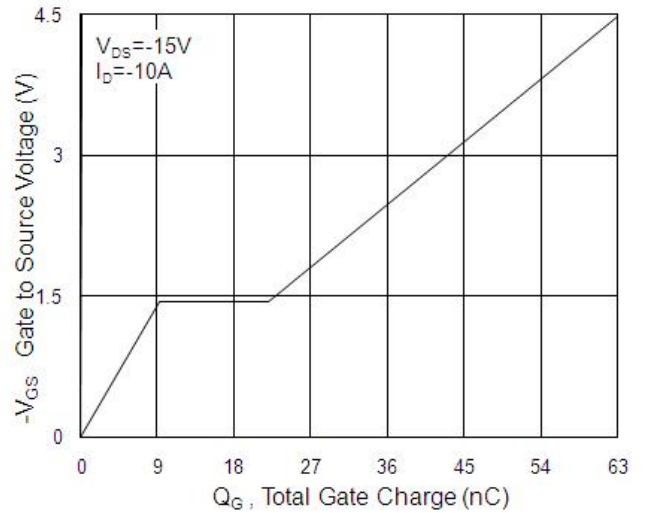
**Fig.1 Typical Output Characteristics**



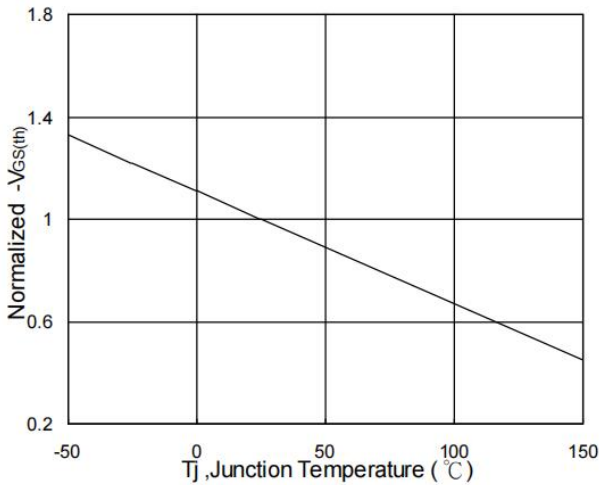
**Fig.2 On-Resistance vs. G-S Voltage**



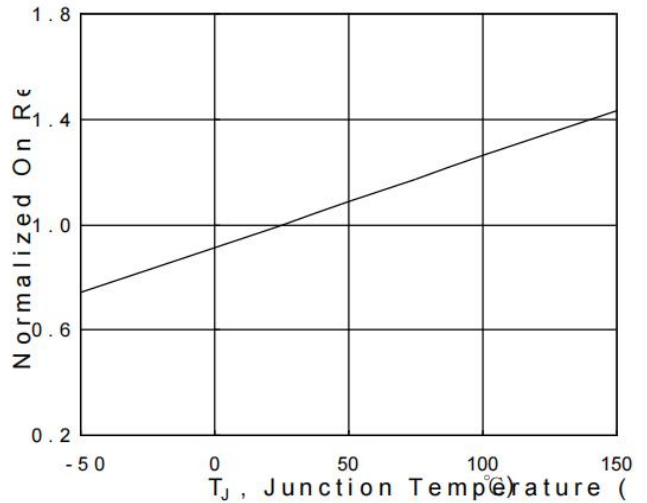
**Fig.3 Forward Characteristics of Reverse**



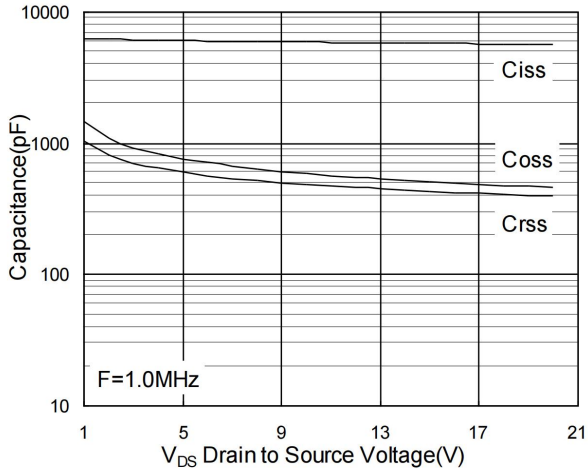
**Fig.4 Gate-charge Characteristics**



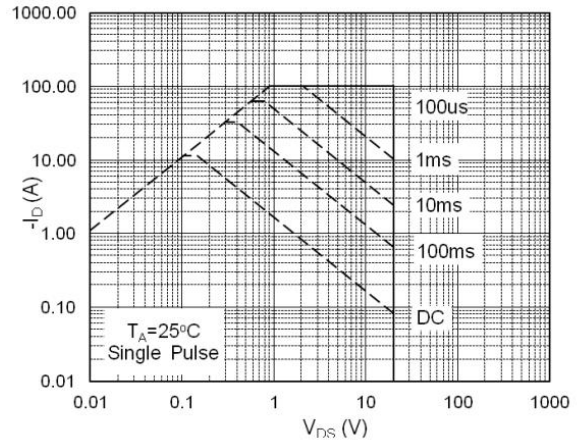
**Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$**



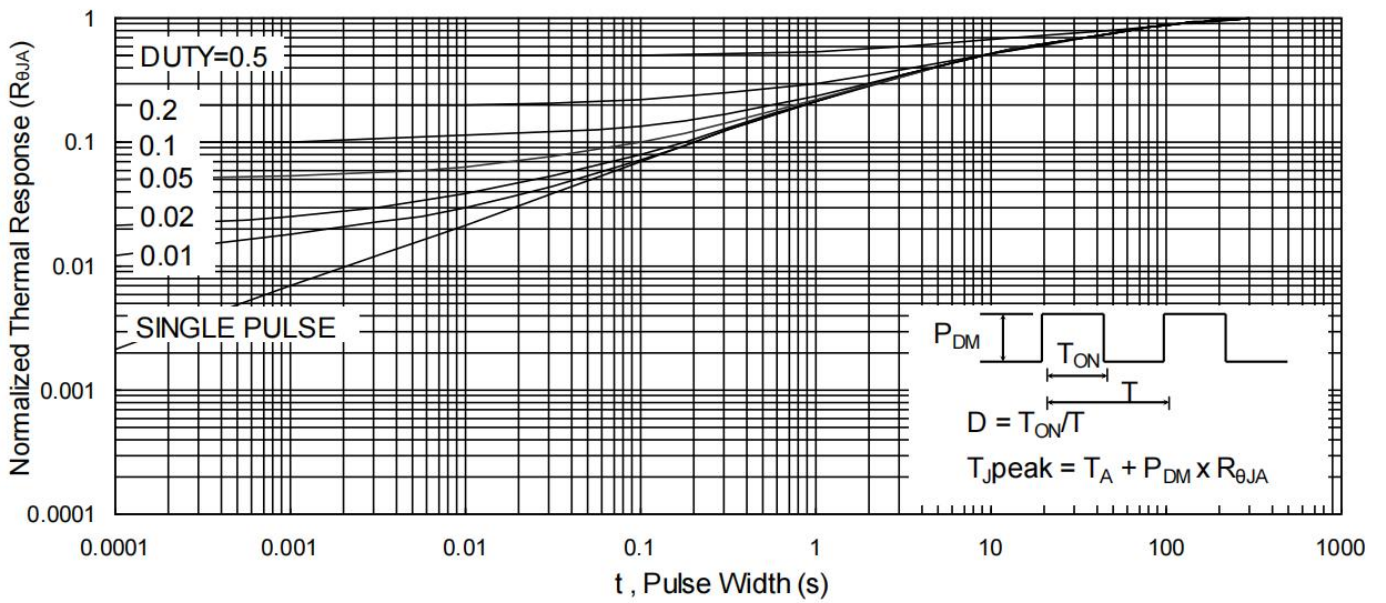
**Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$**



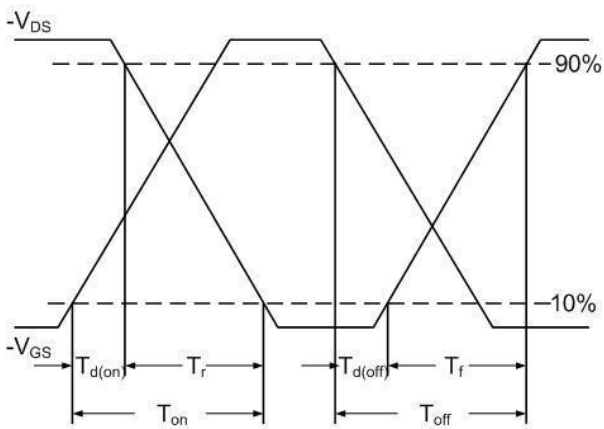
**Fig.7 Capacitance**



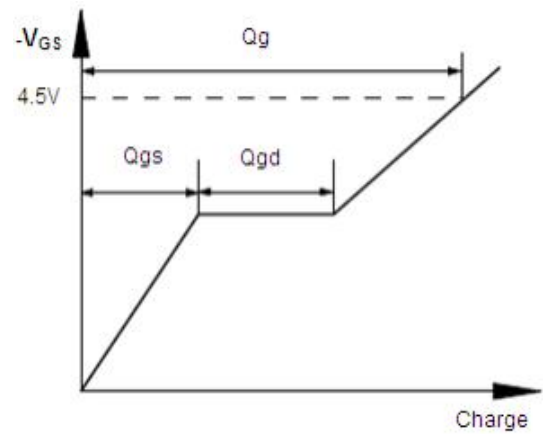
**Fig.8 Safe Operating Area**



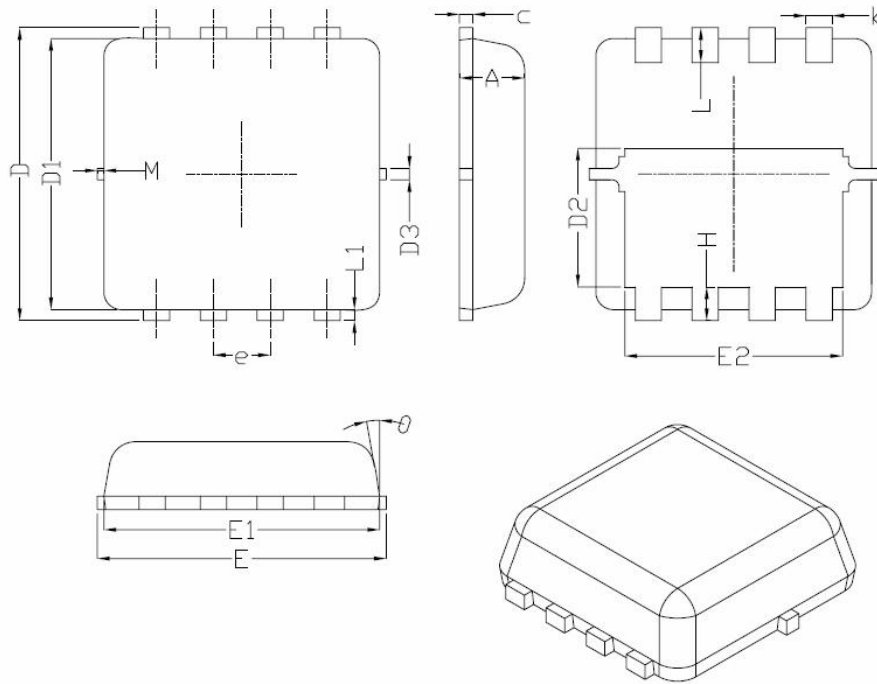
**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**



**Fig.11 Gate Charge Waveform**

**DFN3X3-8L Package Information**


Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.48	1.58	1.68
D3	-	0.13	-
E	3.20	3.30	3.40
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	-	0.13	-
M	*	*	0.15
θ		10°	12°

**REEL SPECIFICATION**

P/N	PKG	QTY
FDMC510P-MS	DFN3X3-8L	5000

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