

## 150V N-Channel Enhancement Mode MOSFET

### Description

The 4N15 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 6V. This device is suitable for use as a Battery protection or in other Switching application.

### General Features

$V_{DS} = 150V$   $I_D = 4A$

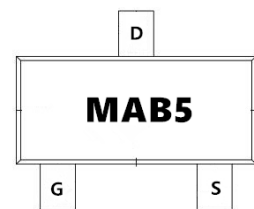
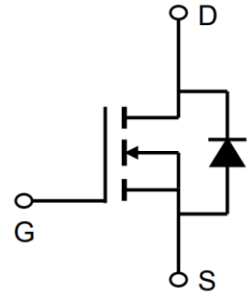
$R_{DS(ON)} < 300m\Omega$  @  $V_{GS}=10V$

### Application

Battery protection

Load switch

Uninterruptible power supply



### Absolute Maximum Ratings ( $T_C=25^\circ C$ unless otherwise noted)

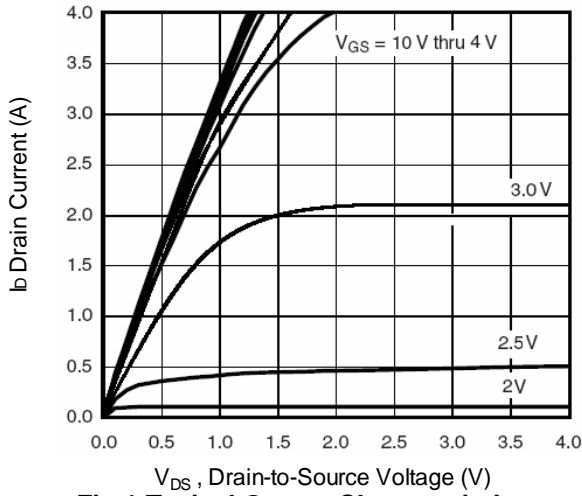
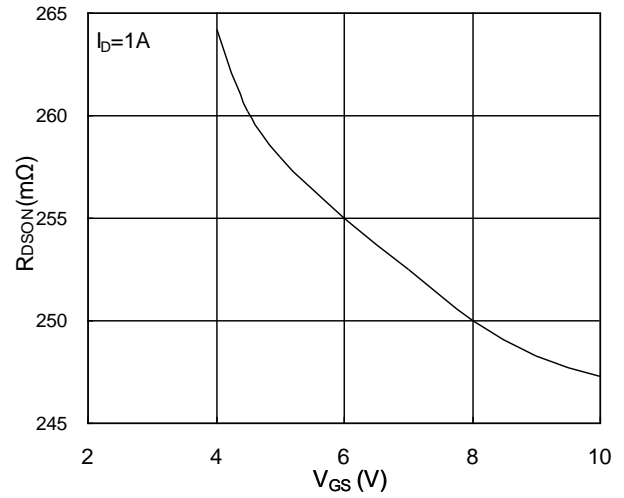
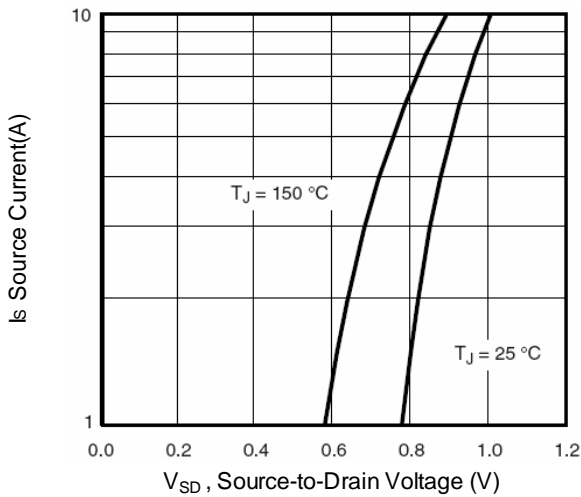
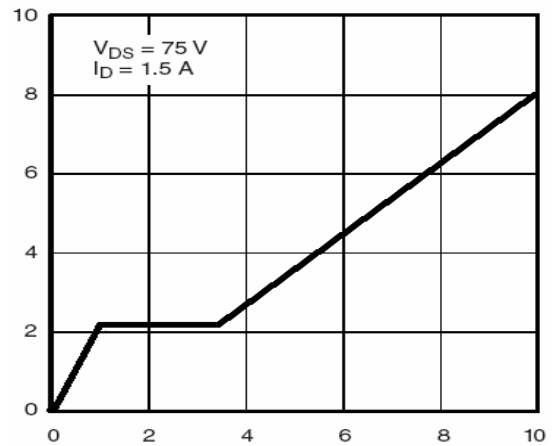
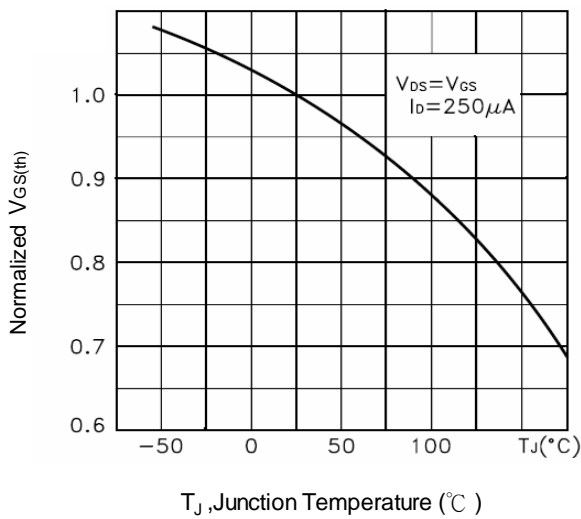
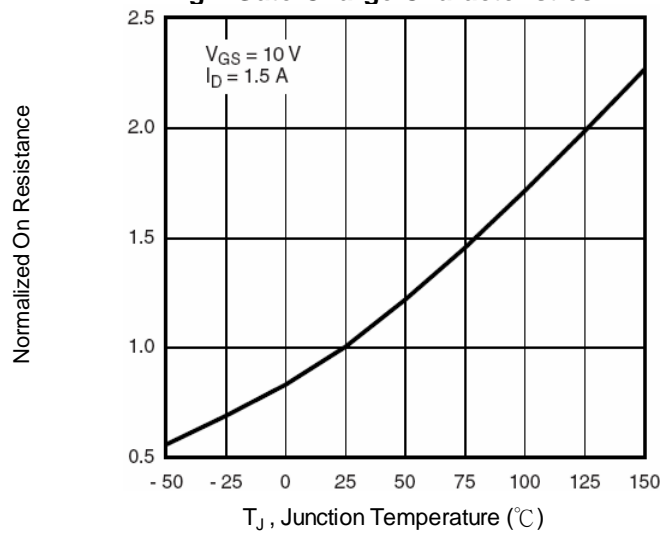
Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	150	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	4	A
$I_D@T_A=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	1.5	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	9	A
$P_D@T_A=25^\circ C$	Total Power Dissipation <sup>3</sup>	2	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup>	125	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	80	$^\circ C/W$

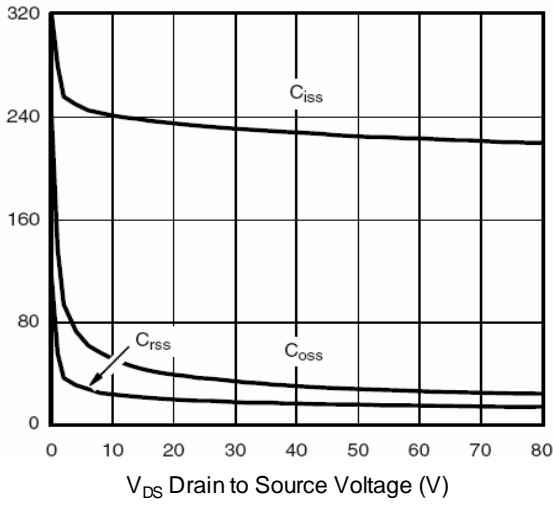
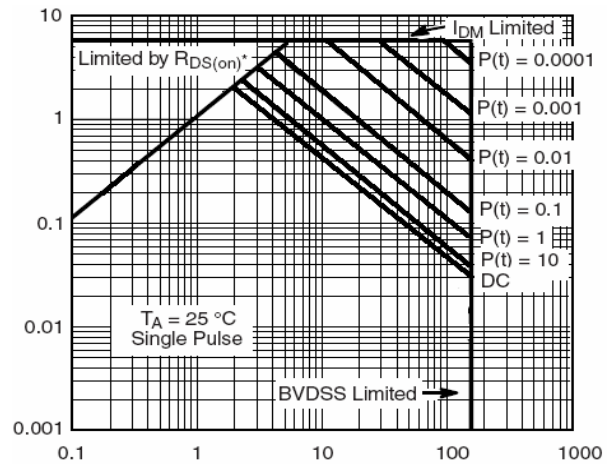
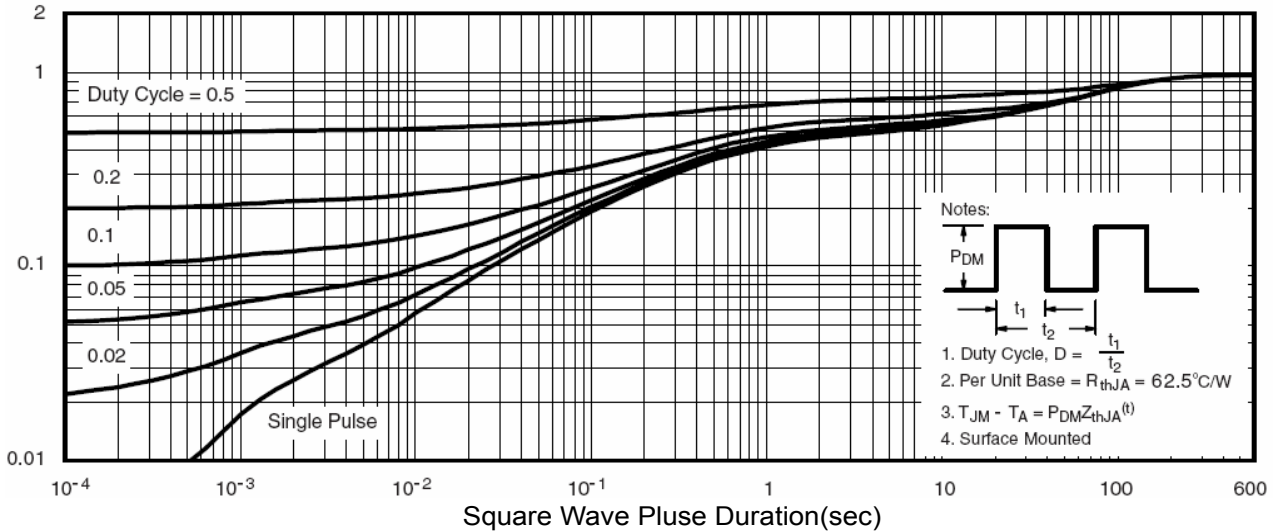
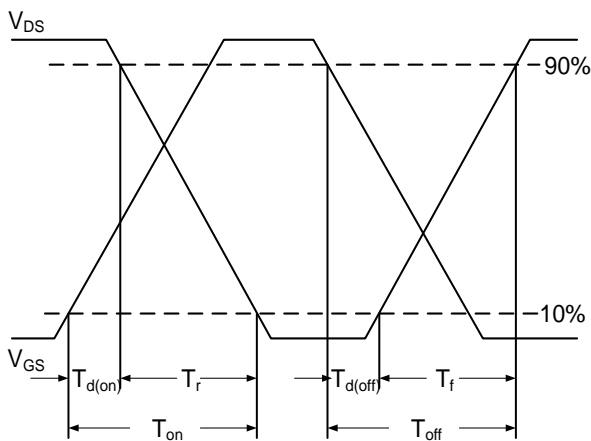
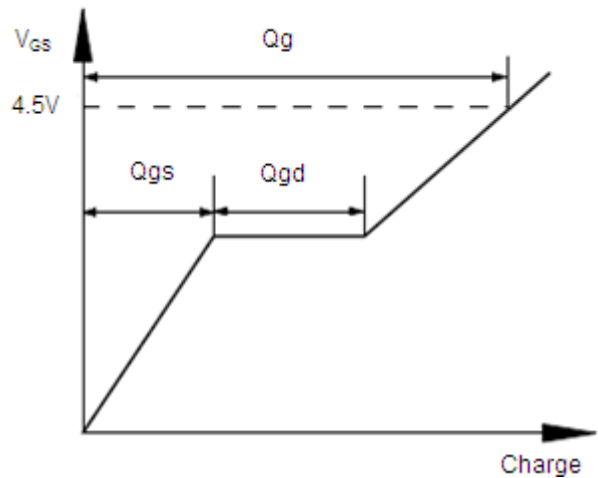
**150V N-Channel Enhancement Mode MOSFET**
**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

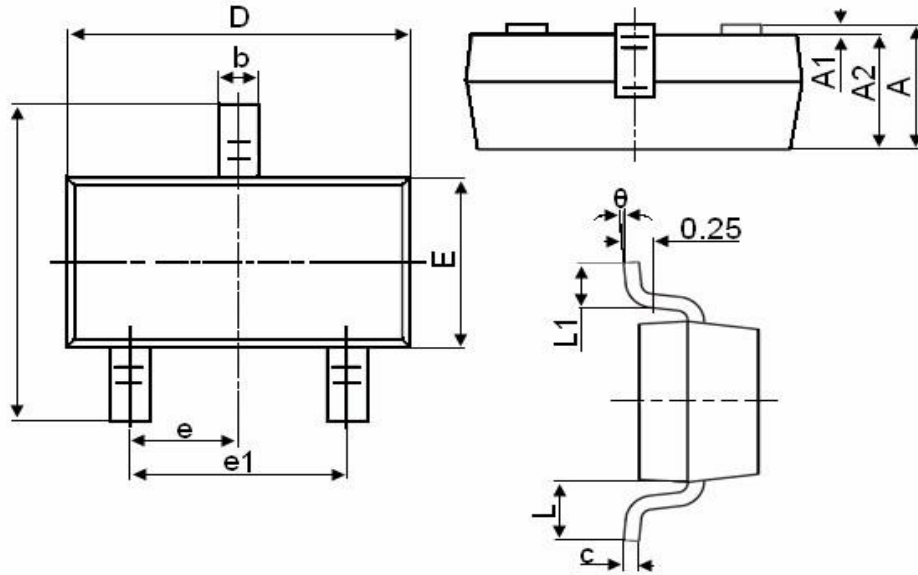
Symbol	Parameter	Condition	Min	Typ	Max	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	150	165	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =150V, V <sub>GS</sub> =0V	-	-	1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	1.8	3.0	V
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =1.5A	-	220	280	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =1.5A	-	230	300	mΩ
G <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =15V, I <sub>D</sub> =1.5A	-	3	-	S
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, F=1.0MHz	-	235	-	PF
C <sub>oss</sub>	Output Capacitance		-	36	-	PF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	20	-	PF
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =75V, I <sub>D</sub> =1A, R <sub>L</sub> =75Ω V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω	-	8	-	nS
t <sub>r</sub>	Turn-on Rise Time		-	10	-	nS
t <sub>d(off)</sub>	Turn-Off Delay Time		-	20	-	nS
t <sub>f</sub>	Turn-Off Fall Time		-	15	-	nS
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =75V, I <sub>D</sub> =1.5A, V <sub>GS</sub> =10V	-	8	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	1.4	-	nC
Q <sub>gd</sub>	Gate-Drain Charge		-	2.1	-	nC
V <sub>SD</sub>	Diode Forward Voltage <sup>(Note 3)</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =2A	-	-	1.2	V
I <sub>S</sub>	Diode Forward Current <sup>(Note 2)</sup>		-	-	2	A

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The power dissipation is limited by 150°C 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.

**150V N-Channel Enhancement Mode MOSFET**
**Typical Characteristics**

**Fig.1 Typical Output Characteristics**

**Fig.2 On-Resistance vs. Gate-Source**

**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.  $T_J$**

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**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**

**Package Mechanical Data: SOT23**


Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°