



40V N-Channel MOSFETs

**General Description**

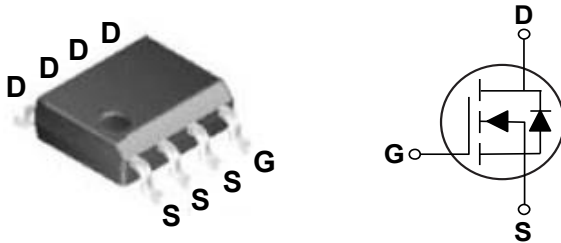
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

<b>BV<sub>DSS</sub></b>	<b>R<sub>DS(ON)</sub></b>	<b>I<sub>D</sub></b>
40 V	5.8 mΩ	12 A

**Features**

- $R_{DS(ON)} \leq 5.8m\Omega @ V_{GS}=10V$
- Improved dv/dt Capability
- Fast Switching
- Green Device Available

SOP-8 Pin Configuration



**Applications**

- Notebook
- Load Switch
- LED Applications
- Hand-Held Device

**Absolute Maximum Ratings  $T_c=25^\circ C$  unless otherwise noted**

Symbol	Parameter	Value	Units
$V_{DS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current - Continuous ( $T_A=25^\circ C$ )	12	A
	Drain Current - Continuous ( $T_A=70^\circ C$ )	9.6	A
$I_{DM}$	Drain Current - Pulsed (NOTE 1)	48	A
EAS	Single Pulse Avalanche Energy (NOTE 2)	101	mJ
IAS	Single Pulse Avalanche Current (NOTE 2)	45	A
$P_D$	Power Dissipation ( $T_A=25^\circ C$ )	1.47	W
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
Marking Code		ND5P8 , DS4904	

**Thermal Characteristics**

Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	85	$^\circ C/W$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	40	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V	---	---	1	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA

**On Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =10A	---	---	5.8	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =8A	---	---	7.8	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.2	---	2.5	V
gfs	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =10A	---	16	---	S

**Dynamic and switching Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =32V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	---	25	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	6.4	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	12.1	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =20V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =1A	---	14.2	---	nS
T <sub>r</sub>	Rise Time		---	18.3	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	38.8	---	
T <sub>f</sub>	Fall Time		---	13.9	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, F=1MHz	---	2410	---	pF
C <sub>oss</sub>	Output Capacitance		---	233	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	152	---	
R <sub>g</sub>	Gate Resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	---	1.6	---	Ω

**Drain-Source Diode Characteristics and Ratings**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	12	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =1A	---	---	1	V

**NOTES :**

1. Repetitive rating : pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub>=30V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=45A, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C.
3. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
4. Essentially independent of operating temperature.



Characteristics Curves

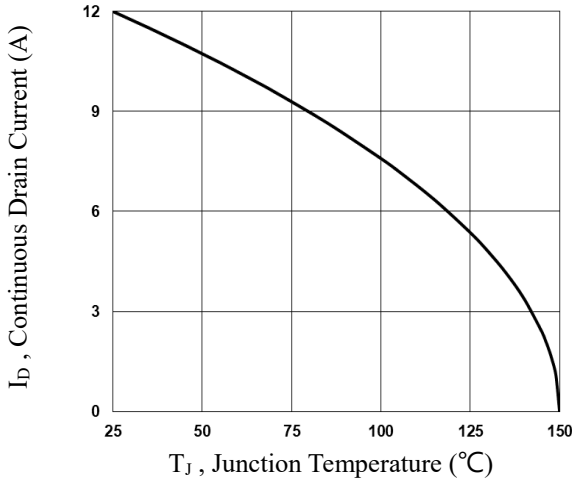


Fig.1 Continuous Drain Current vs.  $T_J$

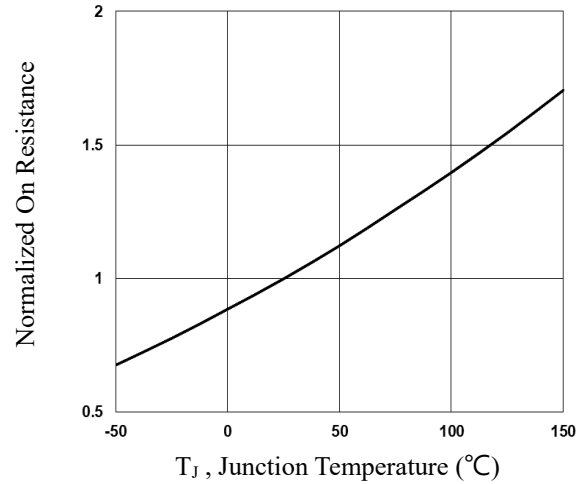


Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_J$

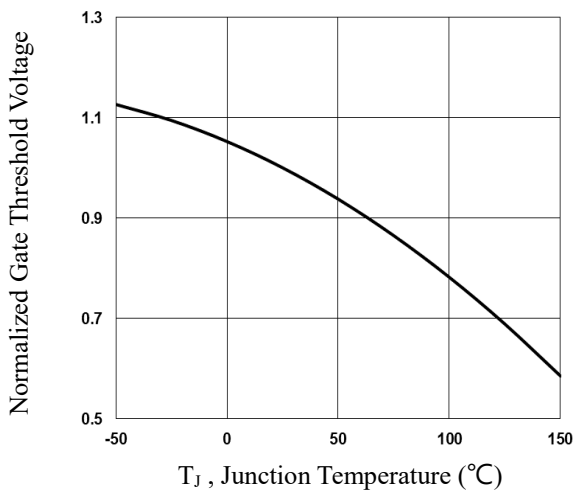


Fig.3 Normalized  $V_{th}$  vs.  $T_J$

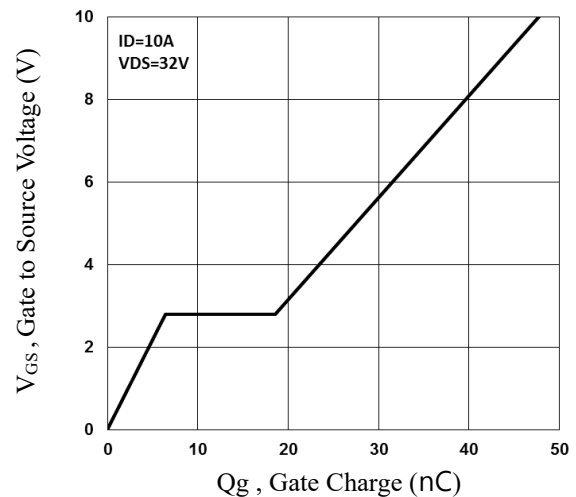


Fig.4 Gate Charge Waveform

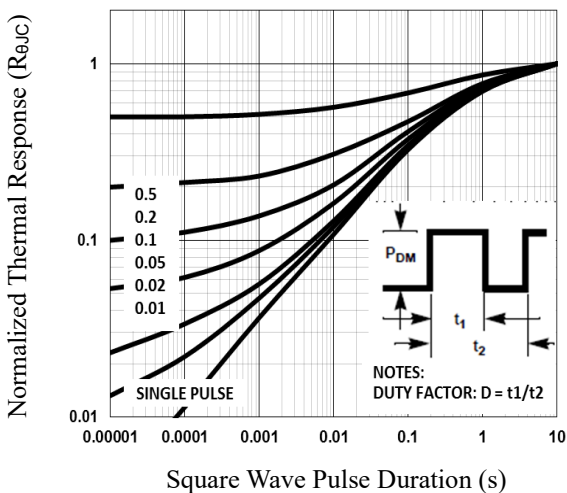


Fig.5 Normalized Transient Impedance

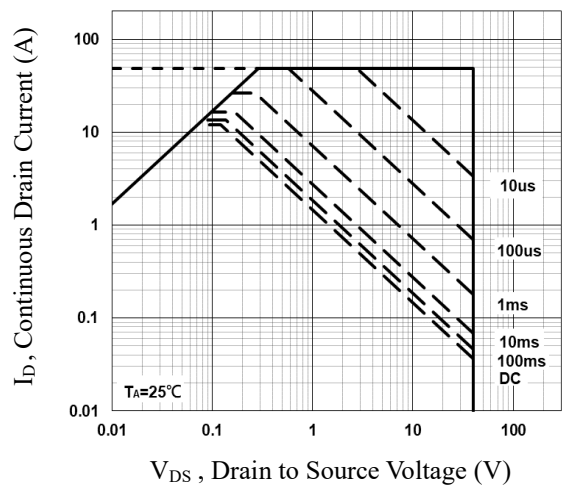


Fig.6 Maximum Safe Operation Area



Characteristics Curves

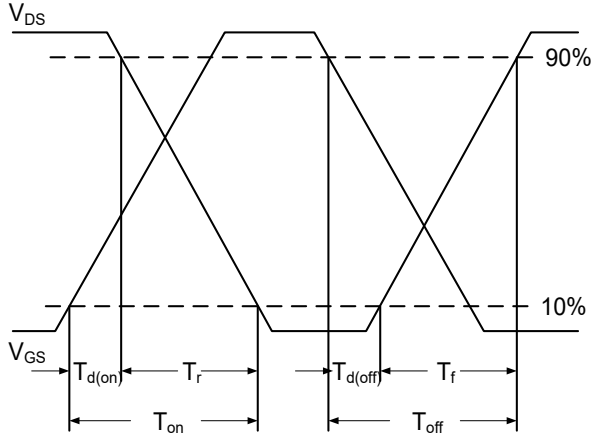
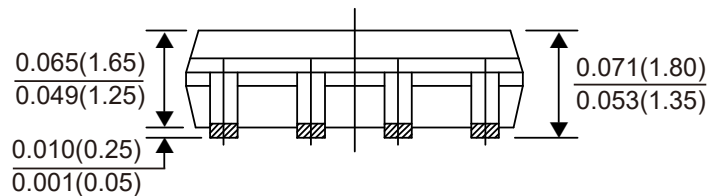
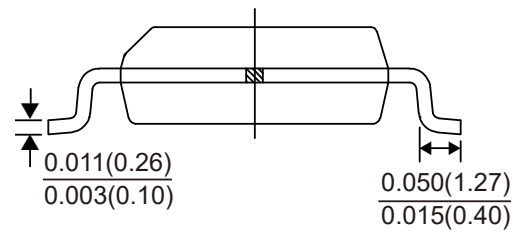
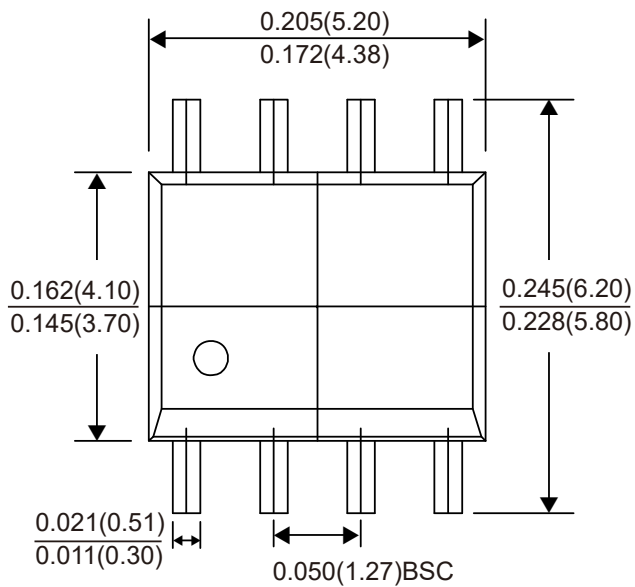


Fig.7 Switching Time Waveform

Package Outline Dimensions



SOP-8

Dimensions in inches and (millimeters)



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