



Description

The DMN2009USS-13 uses advanced trench technology to provide excellent $R_{DS(ON)}$, 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.

General Features

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

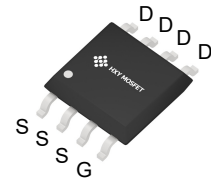
$R_{DS(ON)} < 5.5m\Omega$ @ $V_{GS}=4.5V$

Application

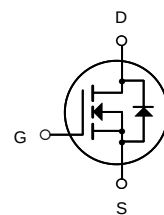
Battery protection

Load switch

Uninterruptible power supply



SOP-8
(SO-8)



N-Channel MOSFET

Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
DMN2009USS-13	SOP-8(SO-8)	HXY MOSFET	3000

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	± 12	V
I_D	Drain Current – Continuous ($T_C=25^{\circ}C$)	20	A
	Drain Current – Continuous ($T_C=70^{\circ}C$)	16	A
I_{DM}	Drain Current – Pulsed ¹	140	A
EAS	Single Pulse Avalanche Energy ²	162	mJ
IAS	Single Pulse Avalanche Current ²	57	A
P_D	Power Dissipation ($T_C=25^{\circ}C$)	3.1	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 to ambient	40	$^{\circ}C/W$



Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V_{DS}	$I_D=250\text{ }\mu\text{A}$, $V_{GS}=0\text{V}$	20			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=20\text{V}$, $V_{GS}=0\text{V}$			1	μA
		$V_{DS}=20\text{V}$, $V_{GS}=0\text{V}$, $T_J=55^{\circ}\text{C}$			5	
Gate-Body Leakage Current	I_{GSS}	$V_{DS}=0\text{V}$, $V_{GS}=\pm 12\text{V}$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	0.5		1.6	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=4.5\text{V}$, $I_D=20\text{A}$			5.5	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$, $I_D=20\text{A}$, $T_J=125^{\circ}\text{C}$			7	
		$V_{GS}=2.5\text{V}$, $I_D=18\text{A}$			7	
On State Drain Current	$I_{D(on)}$	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	140			A
Forward Transconductance	g_{FS}	$V_{DS}=5\text{V}$, $I_D=20\text{A}$		105		S
Input Capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=10\text{V}$, $f=1\text{MHz}$	3080		4630	pF
Output Capacitance	C_{oss}		520		960	
Reverse Transfer Capacitance	C_{rss}		350		810	
Gate Resistance	R_g	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$	0.6		2.1	Ω
Total Gate Charge	Q_g	$V_{GS}=10\text{V}$, $V_{DS}=10\text{V}$, $I_D=20\text{A}$	28		43	nC
Gate Source Charge	Q_{gs}		7		11	
Gate Drain Charge	Q_{gd}		7		17	
Turn-On DelayTime	$t_{d(on)}$	$V_{GS}=10\text{V}$, $V_{DS}=10\text{V}$, $R_L=0.5\Omega$, $R_{GEN}=3\Omega$		7		ns
Turn-On Rise Time	t_r			8		
Turn-Off DelayTime	$t_{d(off)}$			70		
Turn-Off Fall Time	t_f			18		
Body Diode Reverse Recovery Time	t_{rr}	$I_F=20\text{A}$, $di/dt=500\text{A}/\mu\text{s}$	13		20	nC
Body Diode Reverse Recovery Charge	Q_{rr}		29		43	
Maximum Body-Diode Continuous Current	I_S				4	A
Diode Forward Voltage	V_{SD}	$I_S=1\text{A}$, $V_{GS}=0\text{V}$			1	V

Note : The static characteristics in Figures 1 to 6 are obtained using $<300\text{ }\mu\text{s}$ pulses, duty cycle 0.5% max.



Typical Characteristics

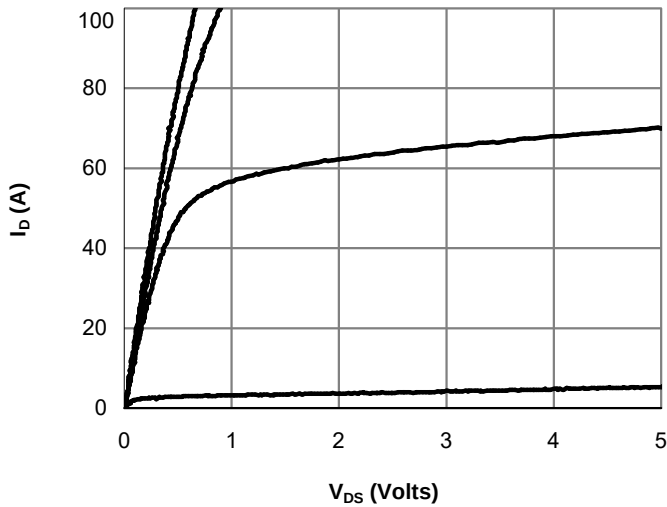


Fig 1: On-Region Characteristics (Note E)

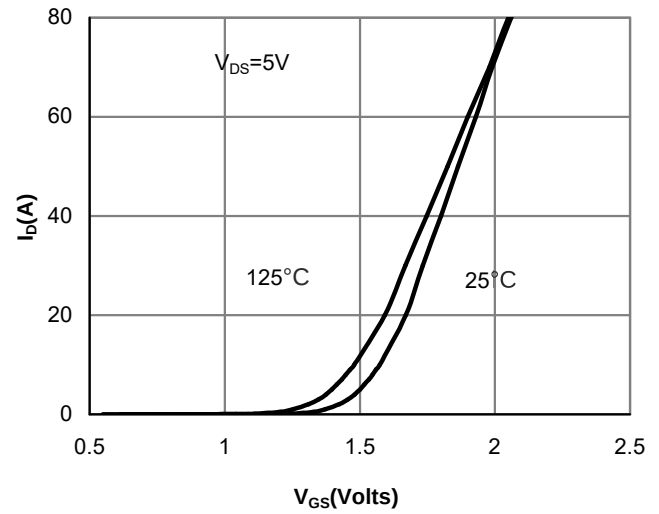


Figure 2: Transfer Characteristics (Note E)

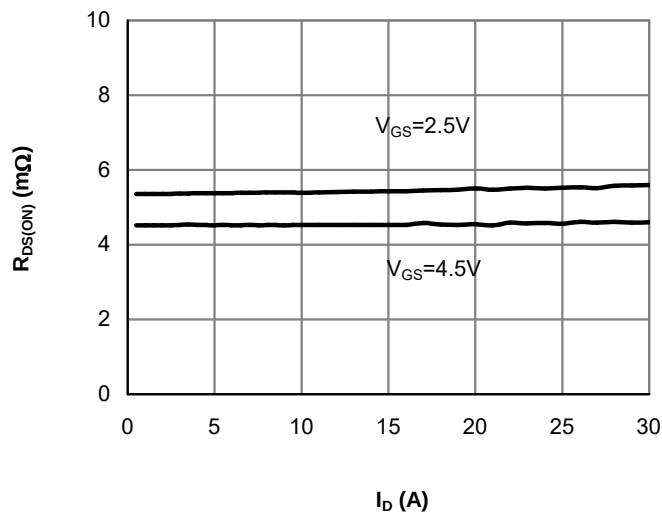


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

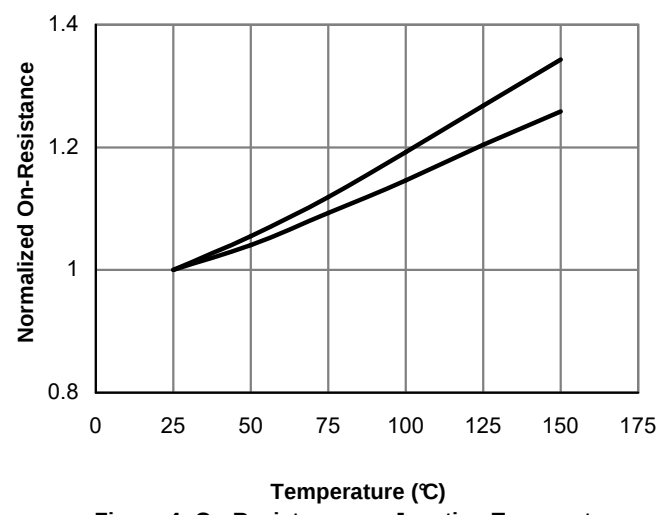


Figure 4: On-Resistance vs. Junction Temperature (Note E)

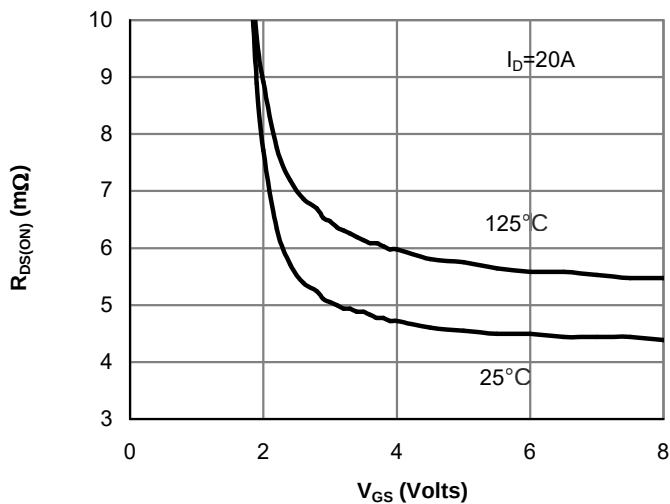


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

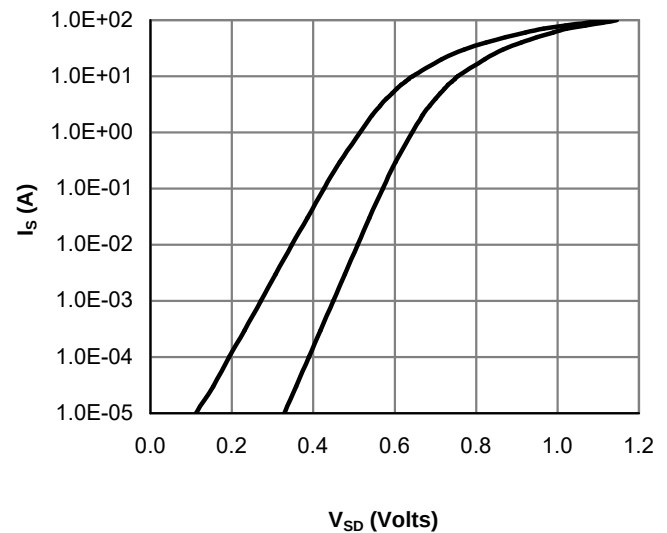


Figure 6: Body-Diode Characteristics (Note E)

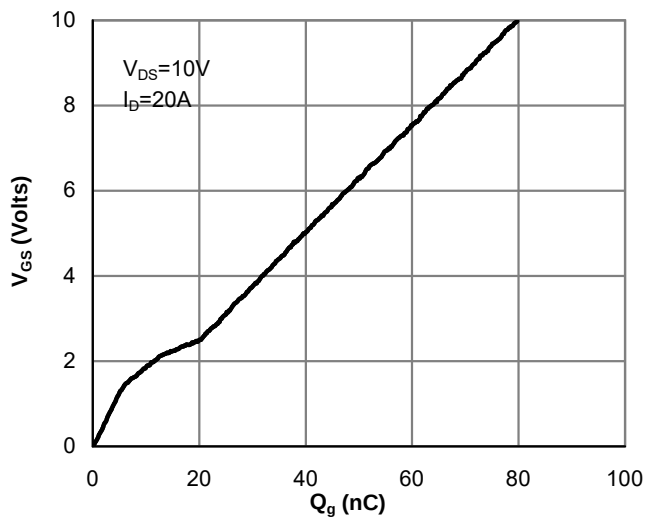


Figure 7: Gate-Charge Characteristics

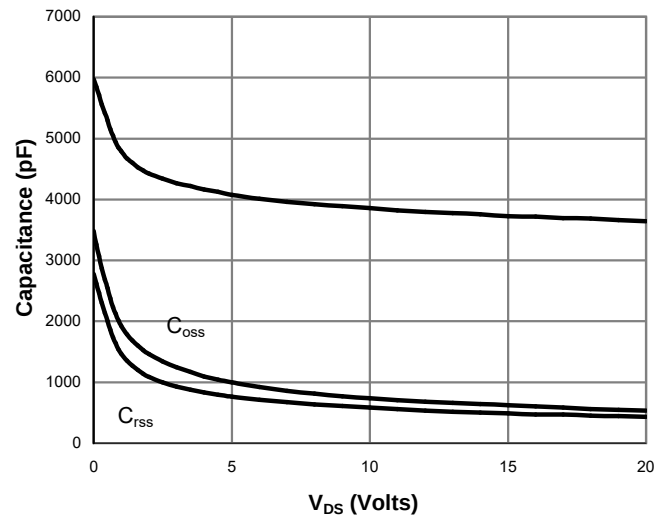


Figure 8: Capacitance Characteristics

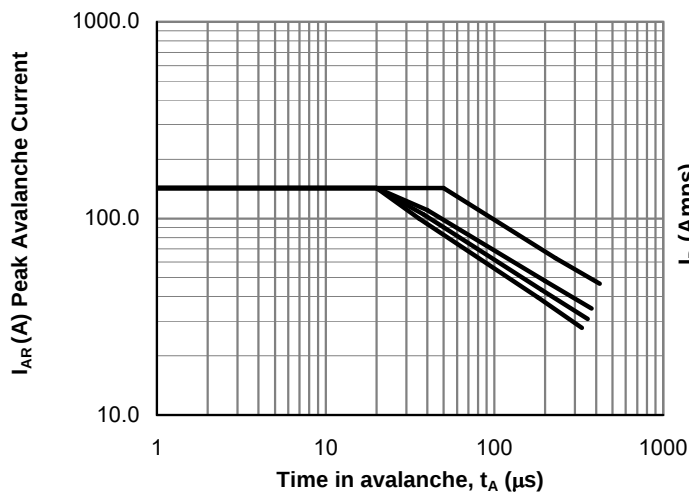


Figure 9: Single Pulse Avalanche capability (Note C)

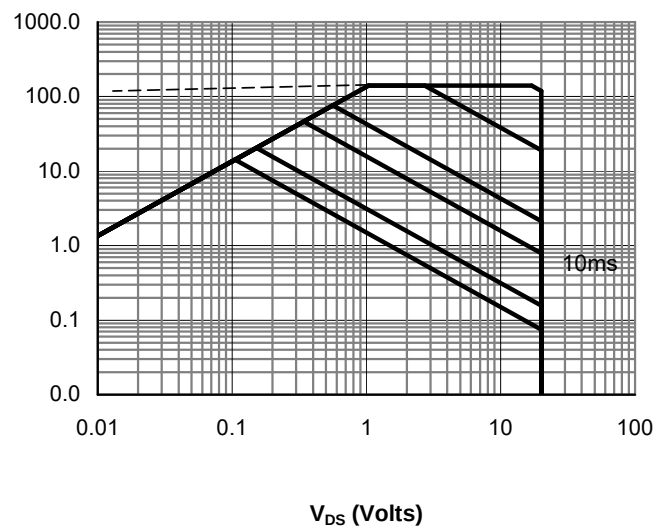


Figure 11: Single Pulse Power Rating Junction-to-Ambient (Note F)

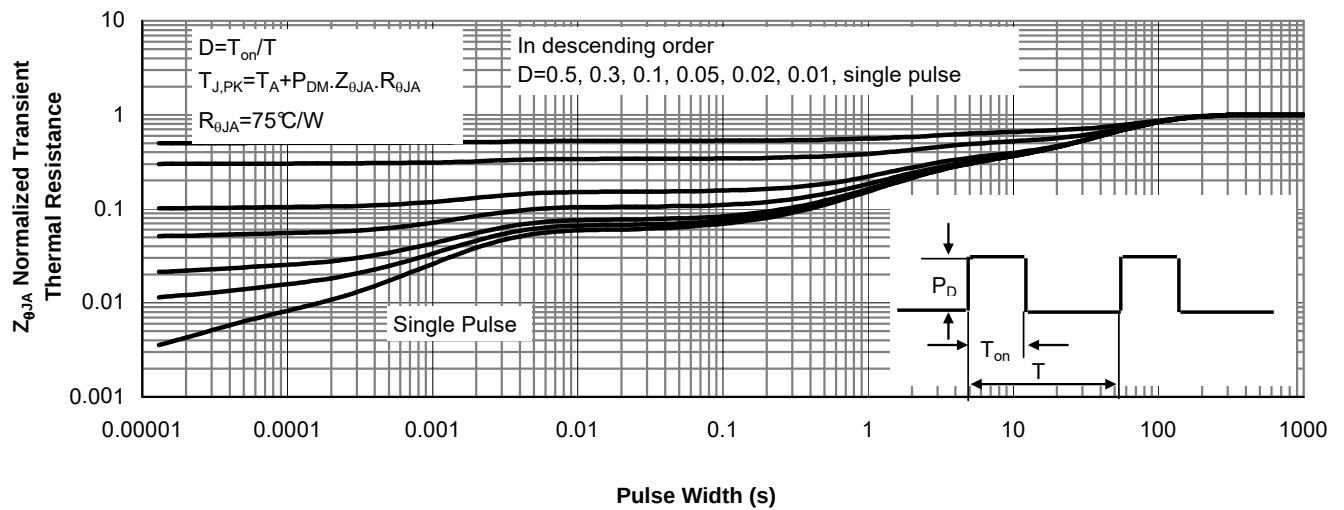
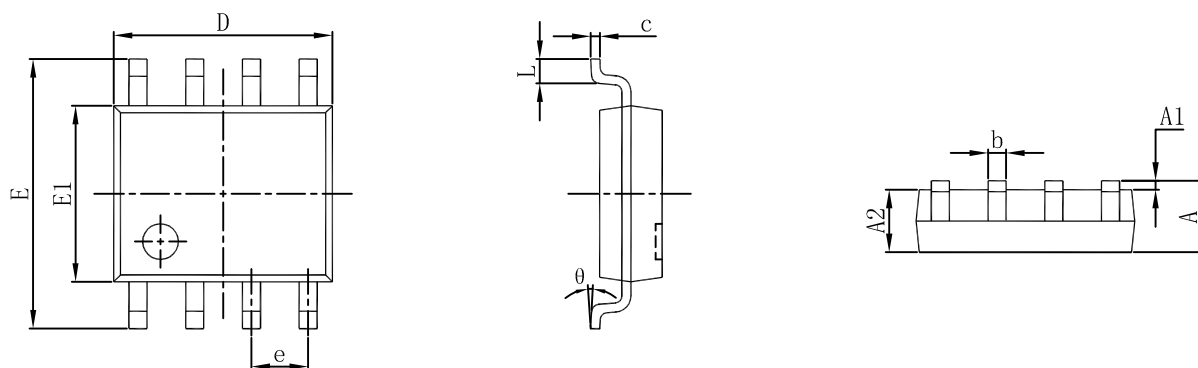


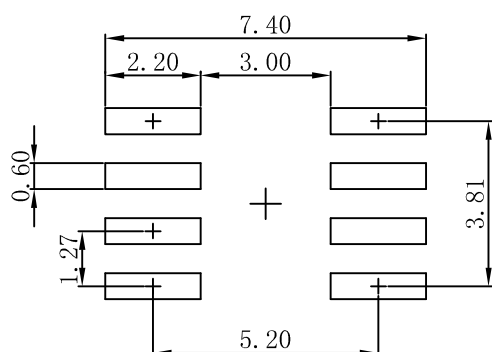
Figure 12: Normalized Maximum Transient Thermal Impedance (Note F)



SOP-8(SO-8) Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Note:
1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.



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