



## Description

The DMN2020LSN uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

## General Features

$V_{DS} = 20V$   $I_D = 6A$

$R_{DS(ON)} < 21m\Omega$  @  $V_{GS}=4.5V$

$R_{DS(ON)} < 35m\Omega$  @  $V_{GS}=2.5V$

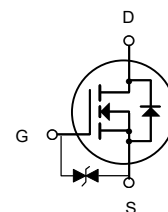
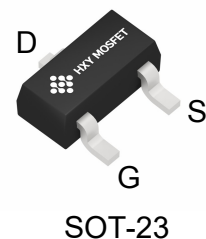
ESD=2000V HBM

## Application

Battery protection

Load switch

Uninterruptible power supply



N-Channel MOSFET

## Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
DMN2020LSN	SOT-23	3416	3000

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

Symbol	Parameter	Limit	Unit
$V_{DS}$	Drain-Source Voltage	20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D$	Drain Current-Continuous	6	A
$I_D$	Drain Current-Continuous @ $T_A=70^{\circ}C$	3.3	A
$I_{DM}$	Drain Current-Pulsed (Note 1)	20.4	A
$P_D$	Maximum Power Dissipation	0.9	W
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55 To 150	$^{\circ}C$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 2)	139	$^{\circ}C/W$



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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V$ , $I_D=250\mu A$	20	---	---	V
$\Delta BV_{DSS} / \Delta T_J$	$BV_{DSS}$ Temperature Coefficient	Reference to $25^{\circ}\text{C}$ , $I_D=1\text{mA}$	---	---	---	$\text{V}/^{\circ}\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=4.5V$ , $I_D=5A$	---	16	21	$\text{m}\Omega$
		$V_{GS}=2.5V$ , $I_D=3A$	---	25	35	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$ , $I_D=250\mu A$	0.4	0.7	1.0	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	---	---	$\text{mV}/^{\circ}\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=20V$ , $V_{GS}=0V$ , $T_J=25^{\circ}\text{C}$	---	---	1	$\mu A$
		$V_{DS}=20V$ , $V_{GS}=0V$ , $T_J=100^{\circ}\text{C}$	---	---	100	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 10V$ , $V_{DS}=0V$	---	---	$\pm 10$	nA
gfs	Forward Transconductance	$V_{DS}=10V$ , $I_D=3A$	---	---	---	S
$R_g$	Gate Resistance	$V_{DS}=0V$ , $V_{GS}=0V$ , $f=1\text{MHz}$	---	---	---	$\Omega$
$Q_g$	Total Gate Charge	$V_{DS}=10V$ , $V_{GS}=4.5V$ , $I_D=5A$	---	8	---	nC
$Q_{gs}$	Gate-Source Charge		---	2.5	---	
$Q_{gd}$	Gate-Drain Charge		---	3	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{GS}=4.5V$ , $V_{DD}=10V$ , $R_G=3\Omega$ , $I_D=5A$	---	0.5	---	ns
$T_r$	Rise Time		---	1	---	
$T_{d(off)}$	Turn-Off Delay Time		---	12	---	
$T_f$	Fall Time		---	4	---	
$C_{iss}$	Input Capacitance	$V_{DS}=10V$ , $V_{GS}=0V$ , $f=1\text{MHz}$	---	545	---	pF
$C_{oss}$	Output Capacitance		---	103	---	
$C_{rss}$	Reverse Transfer Capacitance		---	90	---	
$I_S$	Continuous Source Current <sup>1,5</sup>	$V_G=V_D=0V$ , Force Current	---	---	6	A
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V$ , $I_S=6A$ , $T_J=25^{\circ}\text{C}$	---	---	1.2	V

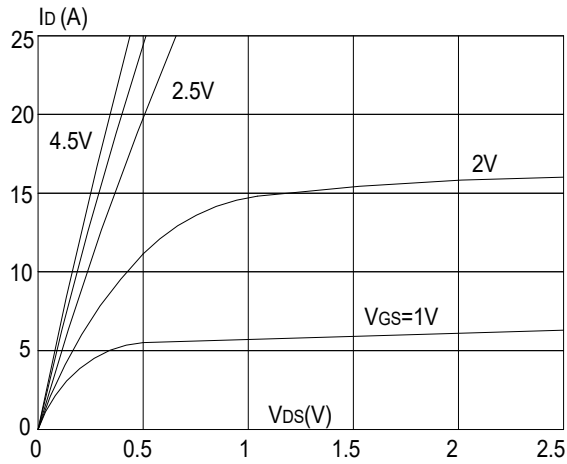
Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$

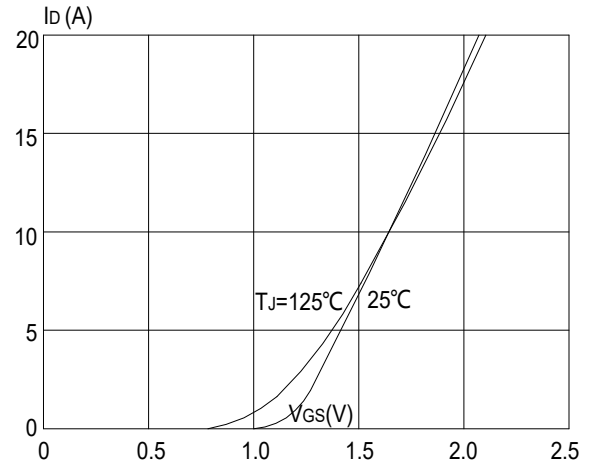


## Typical Characteristics

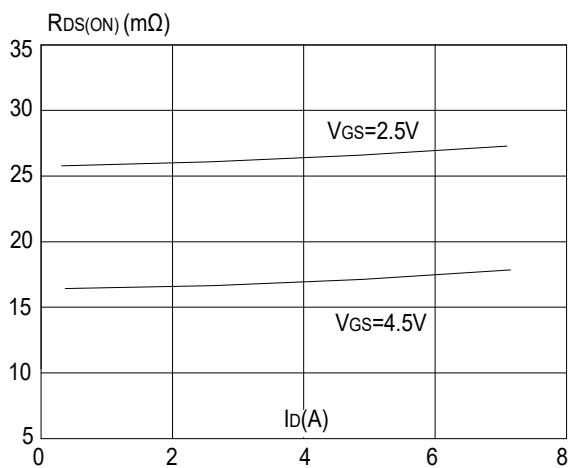
**Figure1: Output Characteristics**



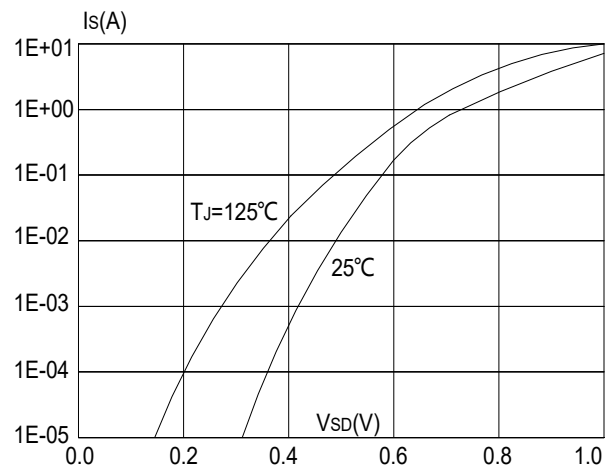
**Figure 2: Typical Transfer Characteristics**



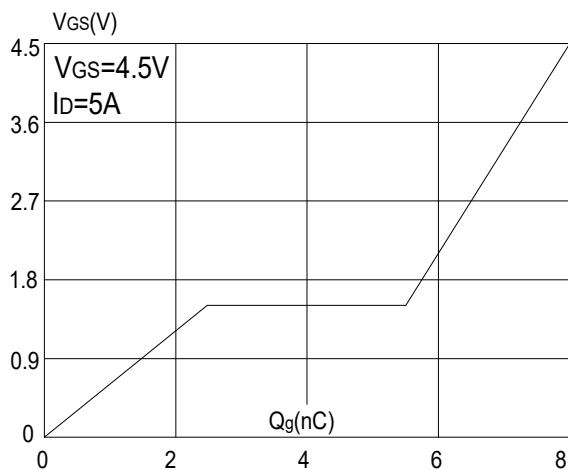
**Figure 3: On-resistance vs. Drain Current**



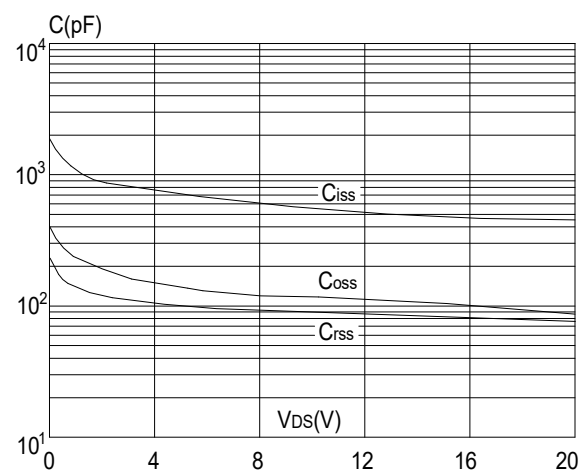
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**

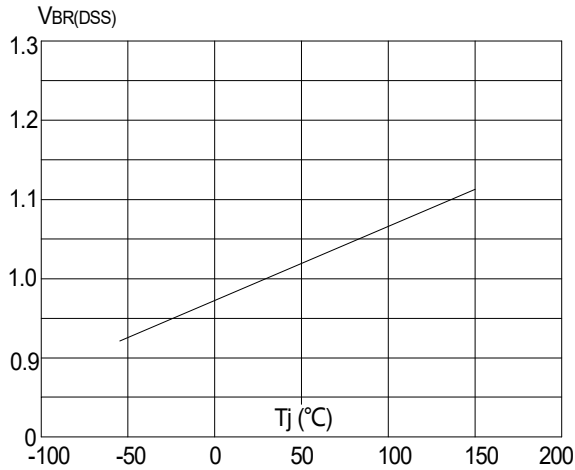


**Figure 6: Capacitance Characteristics**

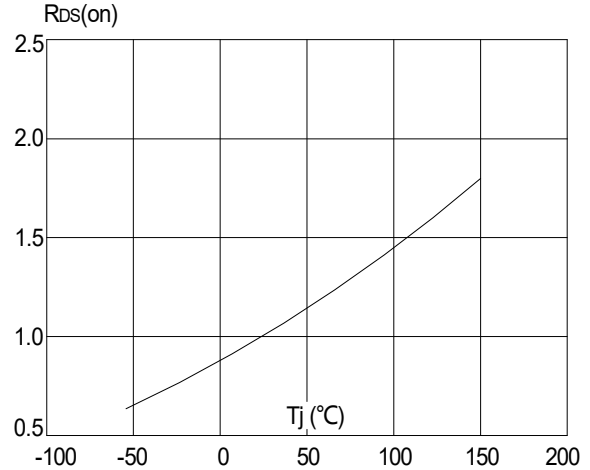




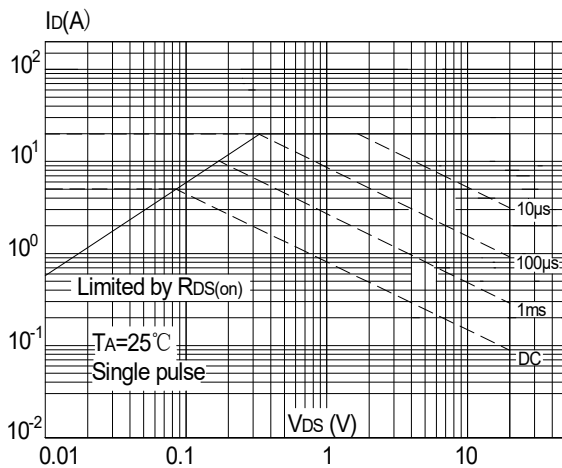
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



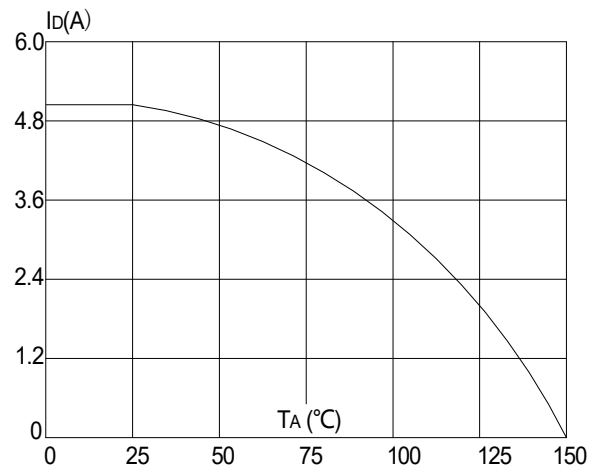
**Figure 8:** Normalized on Resistance vs. Junction Temperature



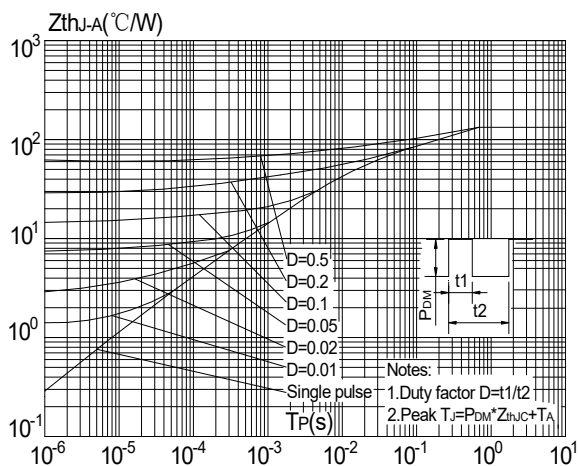
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature

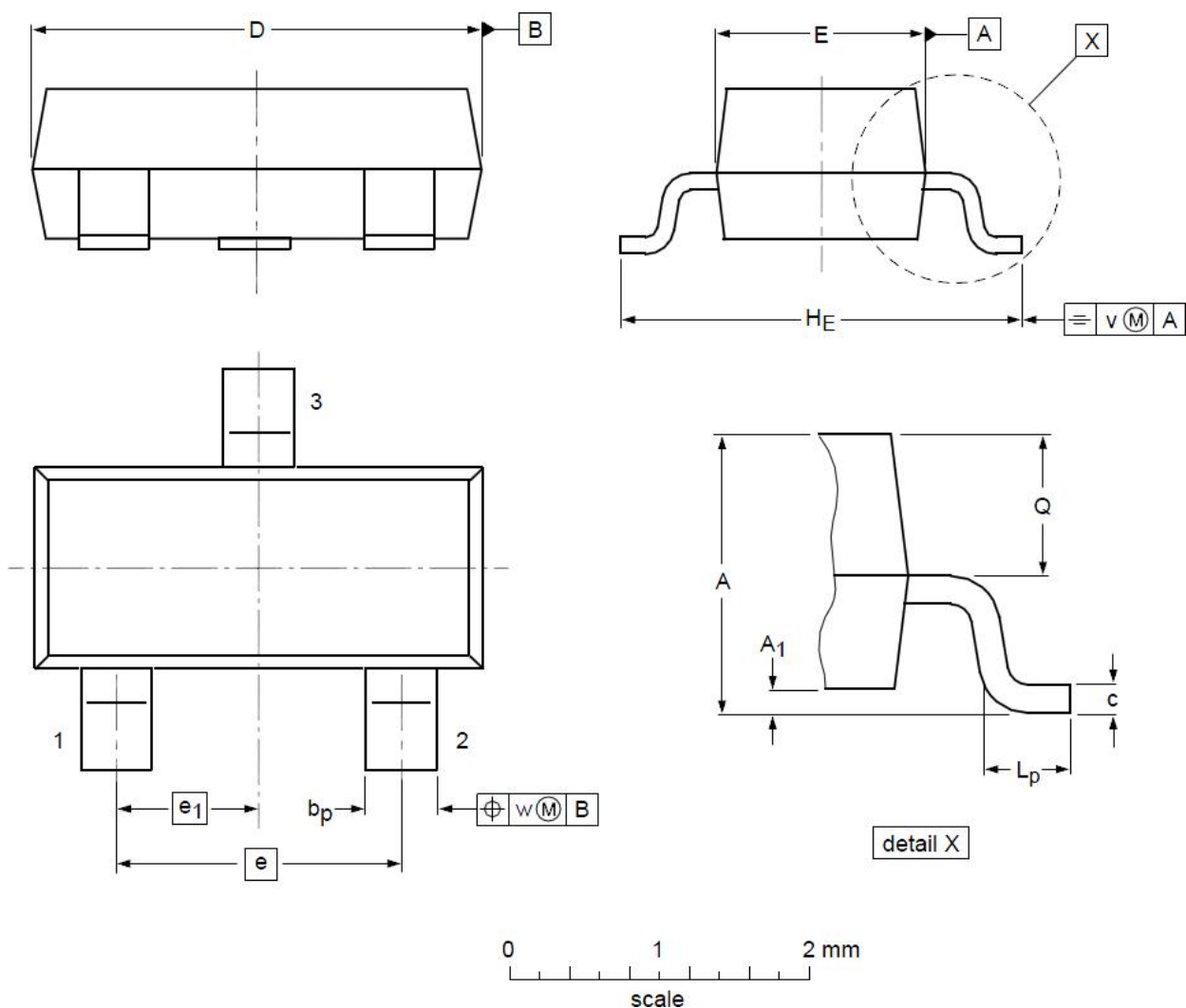


**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient





## SOT-23 Package Outline Dimensions



DIMENSIONS ( unit : mm )

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.90	1.01	1.15	A <sub>1</sub>	0.01	0.05	0.10
b <sub>p</sub>	0.30	0.42	0.50	c	0.08	0.13	0.15
D	2.80	2.92	3.00	E	1.20	1.33	1.40
e	--	1.90	--	e <sub>1</sub>	--	0.95	--
H <sub>E</sub>	2.25	2.40	2.55	L <sub>p</sub>	0.30	0.42	0.50
Q	0.45	0.49	0.55	v	--	0.20	--
w	--	0.10	--				



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