

**N-CHANNEL ENHANCEMENT MODE MOSFET**
**Product Summary**

$V_{(BR)DSS}$	$R_{DS(ON)}$	$I_D$ $T_A = 25^\circ\text{C}$
30V	$2\Omega @ V_{GS} = 4V$	270mA
	$3.2\Omega @ V_{GS} = 2.5V$	210mA

**Description and Applications**

This new generation MOSFET has been designed to minimize the on-state resistance ( $R_{DS(on)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Backlighting
- DC-DC Converters
- Power management functions

**Features and Benefits**

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Lead Free By Design/RoHS Compliant (Note 1)
- ESD Protected up to 2kV
- "Green" Device (Note 2)
- Qualified to AEC-Q101 Standards for High Reliability

**Mechanical Data**

- Case: SOT-523
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin annealed over Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208
- Terminal Connections: See Diagram
- Weight: 0.002 grams (approximate)

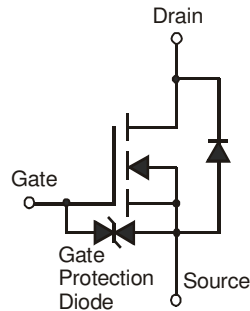


ESD PROTECTED TO 2kV

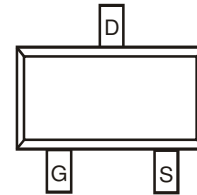
SOT-523



Top View



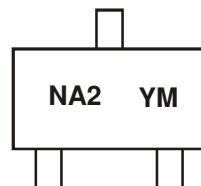
Equivalent Circuit


 Top View  
Pin-Out

**Ordering Information** (Note 3)

Part Number	Case	Packaging
DMN313DLT-7	SOT-523	3000 / Tape & Reel

- Notes:
1. No purposefully added lead.
  2. Diodes Inc.'s "Green" policy can be found on our website at <http://www.diodes.com>.
  3. For packaging details, go to our website at <http://www.diodes.com>.

**Marking Information**


NA2 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: X = 2010)  
 M = Month (ex: 9 = September)

## Date Code Key

Year	2010	2011	2012	2013	2014	2015	2016
Code	X	Y	Z	A	B	C	D

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

**Maximum Ratings** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			$V_{DSS}$	30	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 4) $V_{GS} = 4.0\text{V}$	Steady State	$T_A = 25^\circ\text{C}$	$I_D$	0.27	A
		$T_A = 70^\circ\text{C}$		0.21	
Continuous Drain Current (Note 5) $V_{GS} = 4.0\text{V}$	Steady State	$T_A = 25^\circ\text{C}$	$I_D$	0.31	A
		$T_A = 70^\circ\text{C}$		0.25	
Continuous Drain Current (Note 5) $V_{GS} = 4.0\text{V}$	$t \leq 10\text{s}$	$T_A = 25^\circ\text{C}$	$I_D$	0.38	A
		$T_A = 70^\circ\text{C}$		0.3	
Continuous Drain Current (Note 4) $V_{GS} = 2.5\text{V}$	Steady State	$T_A = 25^\circ\text{C}$	$I_D$	0.21	A
		$T_A = 70^\circ\text{C}$		0.15	
Continuous Drain Current (Note 5) $V_{GS} = 2.5\text{V}$	$t \leq 10\text{s}$	$T_A = 25^\circ\text{C}$	$I_D$	0.29	A
		$T_A = 70^\circ\text{C}$		0.22	
Pulsed Drain Current (Note 6)			$I_{DM}$	1.2	A

**Thermal Characteristics**

Characteristic	Symbol	Max	Unit
Power Dissipation (Note 4)	$P_D$	0.28	W
Thermal Resistance, Junction to Ambient @ $T_A = 25^\circ\text{C}$ (Note 4)	$R_{\theta JA}$	474	$^\circ\text{C/W}$
Power Dissipation (Note 5)	$P_D$	0.36	W
Thermal Resistance, Junction to Ambient @ $T_A = 25^\circ\text{C}$ (Note 5)	$R_{\theta JA}$	361	$^\circ\text{C/W}$
Power Dissipation (Note 5) $t \leq 10\text{s}$	$P_D$	0.52	W
Thermal Resistance, Junction to Ambient @ $T_A = 25^\circ\text{C}$ (Note 5) $t \leq 10\text{s}$	$R_{\theta JA}$	252	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

**Electrical Characteristics** @  $T_A = 25^\circ\text{C}$  unless otherwise stated

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	30	-	-	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = 25^\circ\text{C}$	$I_{DSS}$	-	-	0.1	$\mu\text{A}$	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	-	-	$\pm 1.0$	$\mu\text{A}$	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	0.5	-	1.5	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	-	1.3	2	$\Omega$	$V_{GS} = 4\text{V}, I_D = 10\text{mA}$
		-	1.6	3.2		$V_{GS} = 2.5\text{V}, I_D = 1\text{mA}$
Forward Transfer Admittance	$ Y_{fs} $	-	93	-	mS	$V_{DS} = 3\text{V}, I_D = 10\text{mA}$
Diode Forward Voltage	$V_{SD}$	-	0.7	1.3	V	$V_{GS} = 0\text{V}, I_S = 115\text{mA}$
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	$C_{iss}$	-	36.3	-	pF	$V_{DS} = 5\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	-	7.6	-		
Reverse Transfer Capacitance	$C_{rss}$	-	4.7	-		
Gate Resistance	$R_g$	-	128	-	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge	$Q_g$	-	0.5	-	nC	$V_{GS} = 4.5\text{V}, V_{DS} = 15\text{V}, I_D = 10\text{mA}$
Gate-Source Charge	$Q_{gs}$	-	0.1	-		
Gate-Drain Charge	$Q_{gd}$	-	0.1	-		
Turn-On Delay Time	$t_{D(on)}$	-	4.5	-	ns	$V_{GS} = 4.5\text{V}, V_{DS} = 15\text{V}, R_G = 2\Omega, I_D = 180\text{mA}$
Turn-On Rise Time	$t_r$	-	2.24	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	19.2	-	ns	
Turn-Off Fall Time	$t_f$	-	28.2	-	ns	

- Notes:
- Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
  - Device mounted on 2" x 2" FR-4 PCB with high coverage 2 oz. Copper, single sided.
  - Repetitive rating, pulse width limited by junction temperature.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

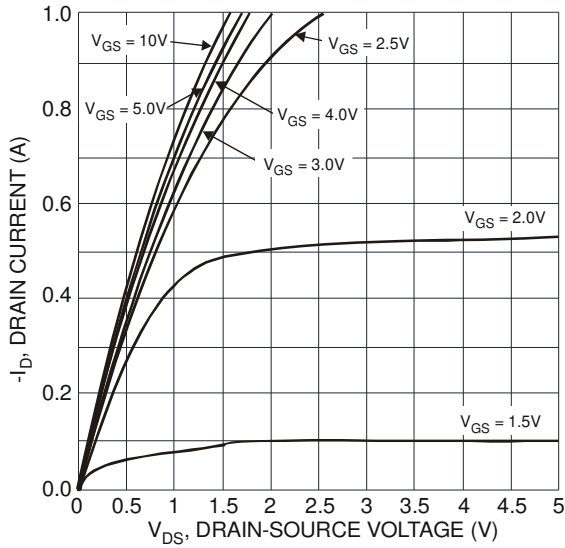


Fig. 1 Typical Output Characteristics

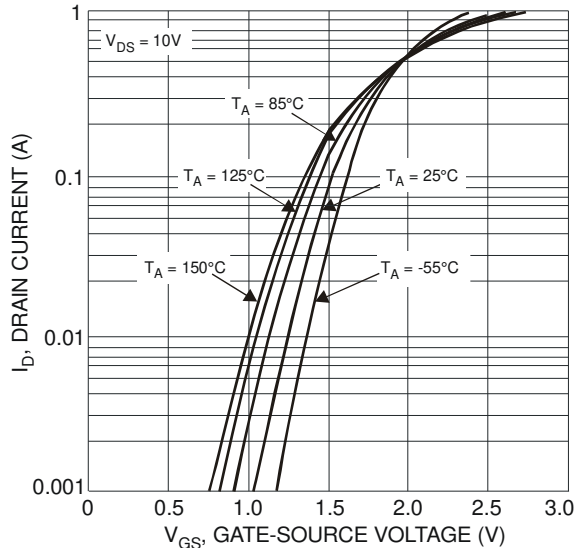


Fig. 2 Typical Transfer Characteristics

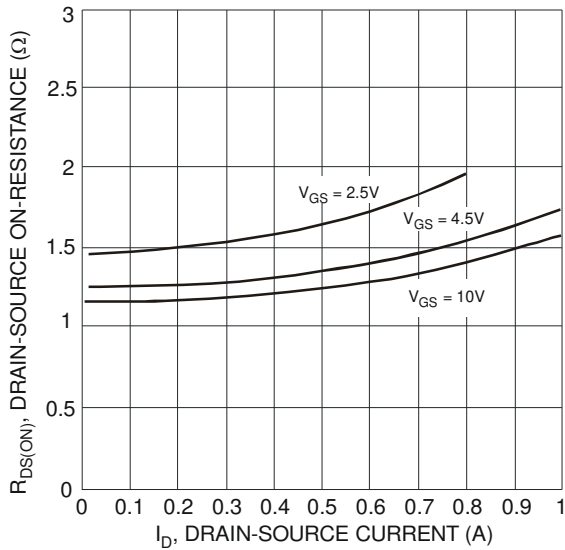


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

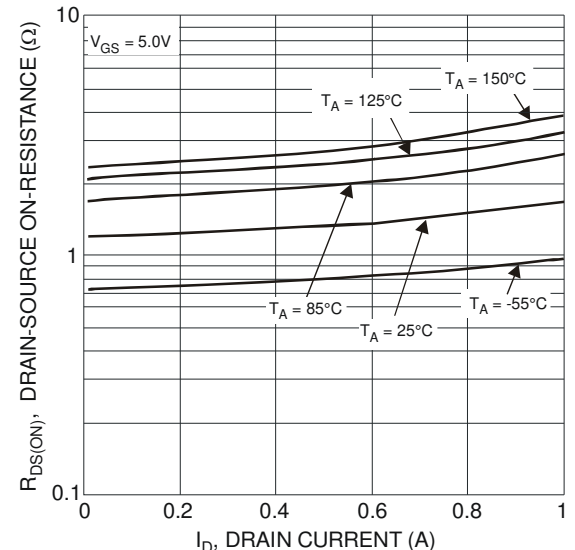


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

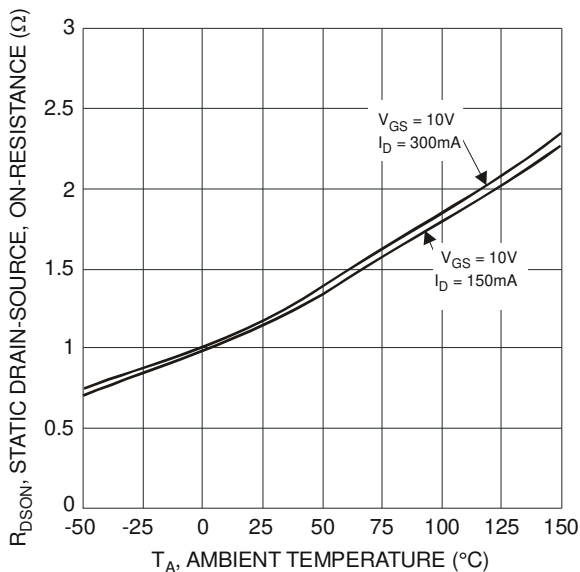


Fig. 5 On-Resistance Variation with Temperature

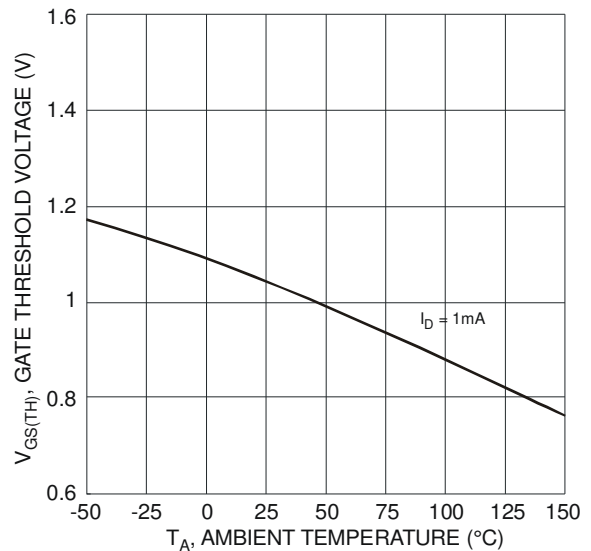
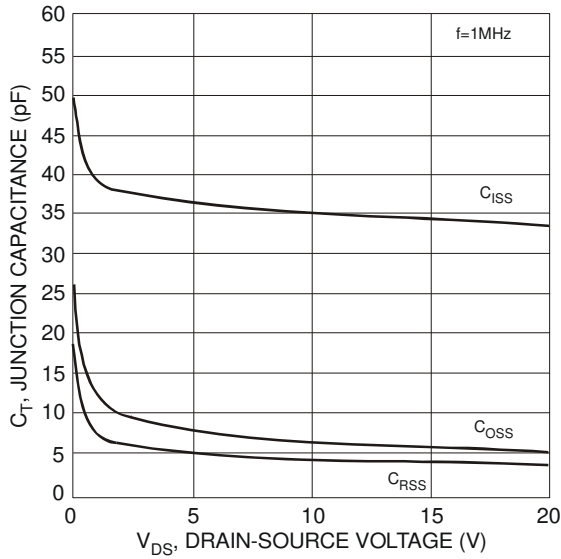


Fig. 6 Gate Threshold Variation vs. Ambient Temperature



$V_{DS}$ : DRAIN-SOURCE VOLTAGE (V)  
Fig. 7 Typical Junction Capacitance

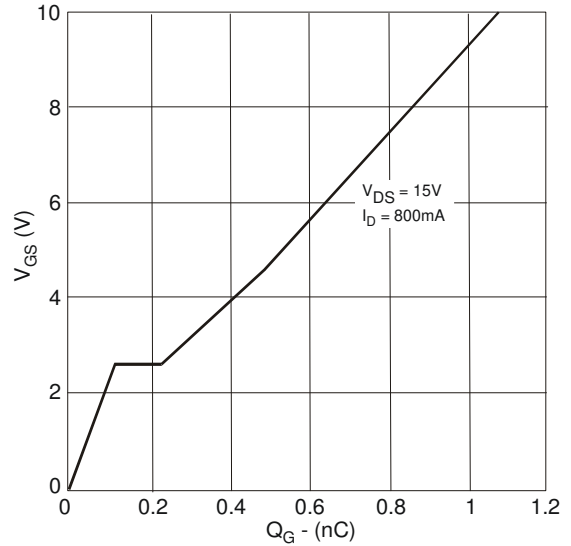


Fig. 08 Gate Charge Characteristics

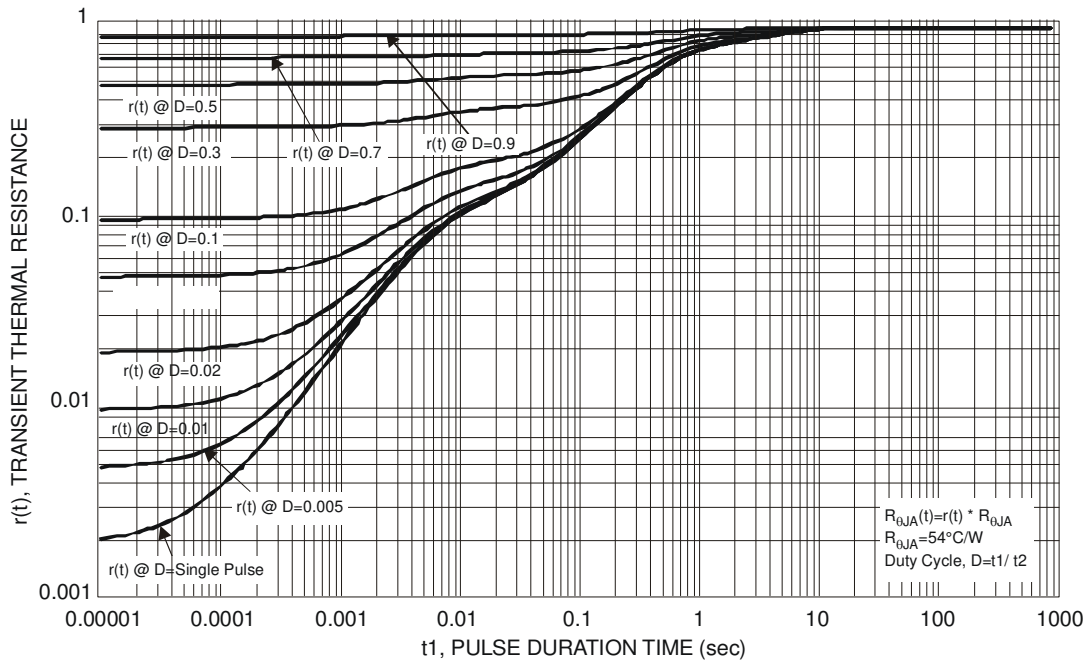
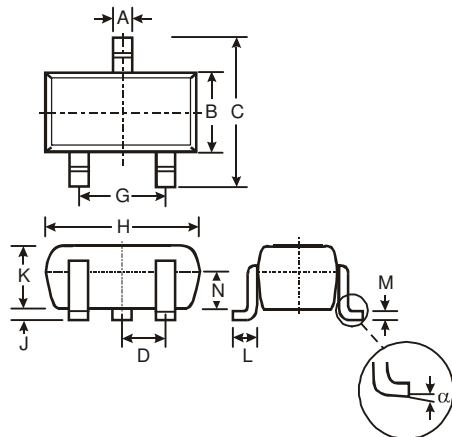


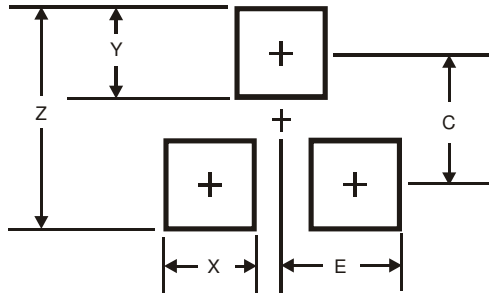
Fig. 9 Transient Thermal Resistance

**Package Outline Dimensions**



SOT-523			
Dim	Min	Max	Typ
A	0.15	0.30	0.22
B	0.75	0.85	0.80
C	1.45	1.75	1.60
D	—	—	0.50
G	0.90	1.10	1.00
H	1.50	1.70	1.60
J	0.00	0.10	0.05
K	0.60	0.80	0.75
L	0.10	0.30	0.22
M	0.10	0.20	0.12
N	0.45	0.65	0.50
$\alpha$	0°	8°	—
All Dimensions in mm			

## Suggested Pad Layout



Dimensions	Value (in mm)
Z	1.8
X	0.4
Y	0.51
C	1.3
E	0.7

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