

**Product Summary**

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	$I_D$ max $T_A = 25^{\circ}C$
60V	40m $\Omega$ @ $V_{GS} = 10V$	5.5A
	55m $\Omega$ @ $V_{GS} = 4.5V$	4.7A

**Description and Applications**

This 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.

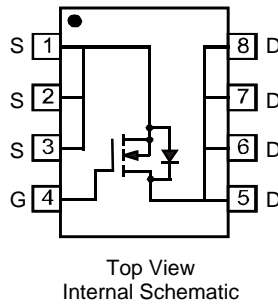
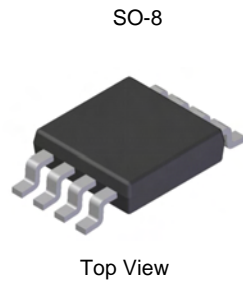
- Backlighting
- Power Management Functions
- DC-DC Converters

**Features and Benefits**

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 standards for High Reliability**

**Mechanical Data**

- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See diagram
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 **e3**
- Weight: 0.008 grams (approximate)

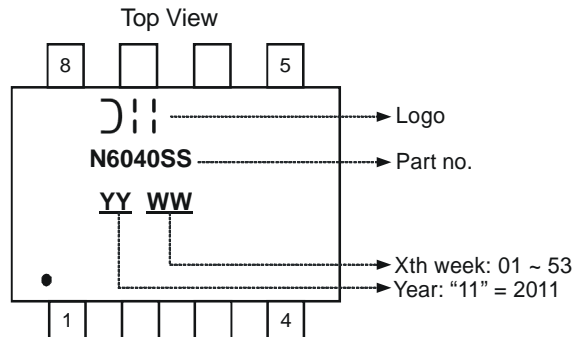


**Ordering Information** (Note 4)

Part Number	Case	Packaging
DMN6040SSS-13	SO-8	2500/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See <http://www.diodes.com> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. For packaging details, go to our website at <http://www.diodes.com>.

**Marking Information**



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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			$V_{DS}$	60	V
Gate-Source Voltage			$V_{GS}$	$\pm 20$	V
Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$	Steady State	$T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$	$I_D$	5.5 4.4	A
	$t < 10\text{s}$	$T_A = 25^\circ\text{C}$ $T_A = 70^\circ\text{C}$	$I_D$	7.0 5.5	A
Maximum Continuous Body Diode Forward Current (Note 6)			$I_S$	2.5	A
Pulsed Drain Current (10 $\mu\text{s}$ pulse, duty cycle = 1%)			$I_{DM}$	30	A
Avalanche Current (Note 7) $L = 0.1\text{mH}$			$I_{AR}$	14.2	A
Repetitive Avalanche Energy (Note 7) $L = 0.1\text{mH}$			$E_{AR}$	10	mJ

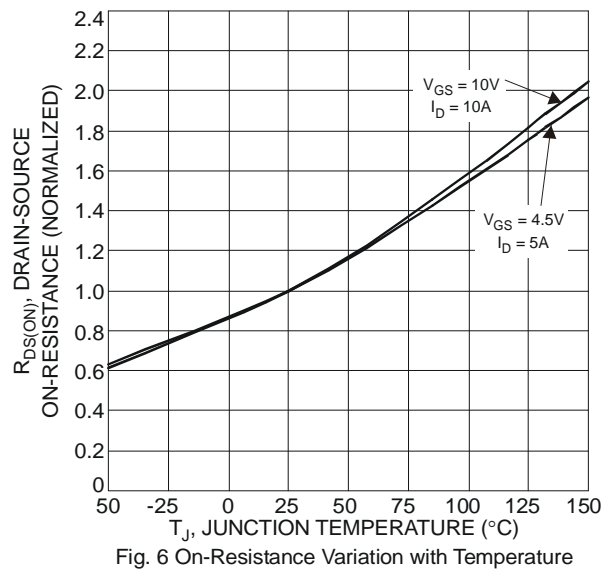
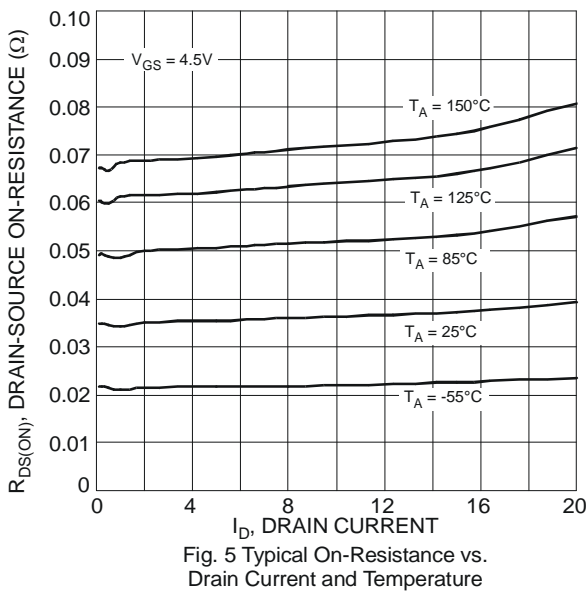
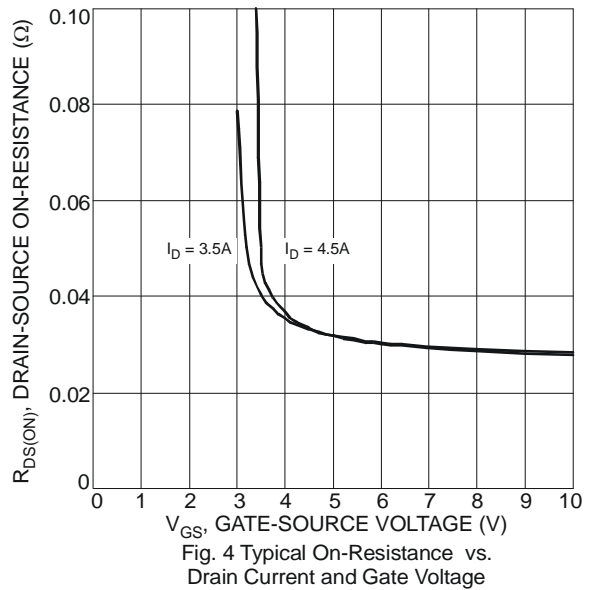
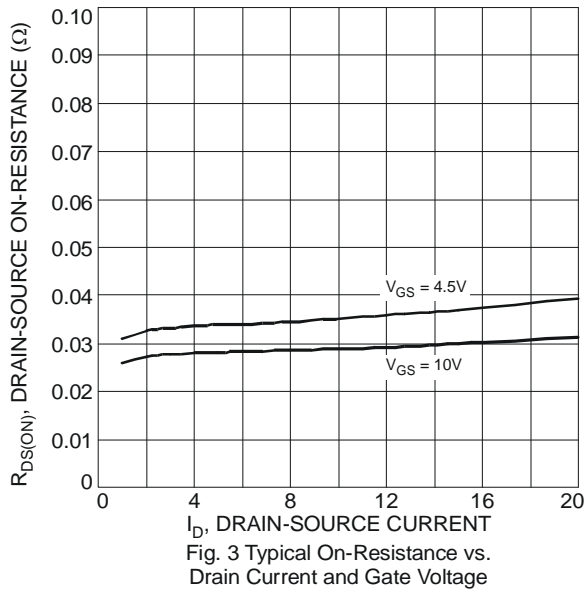
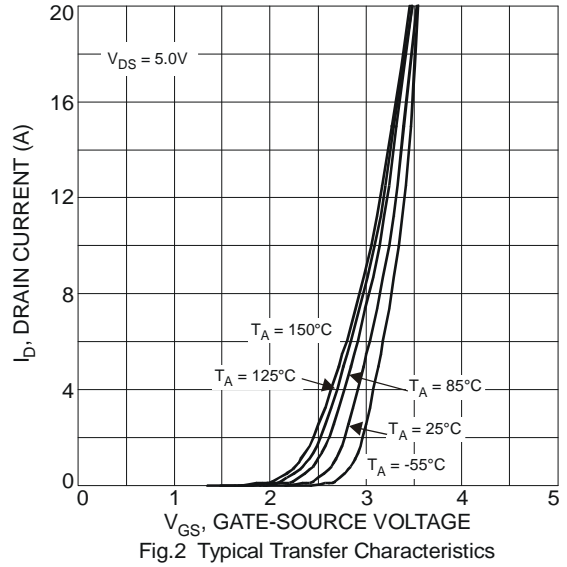
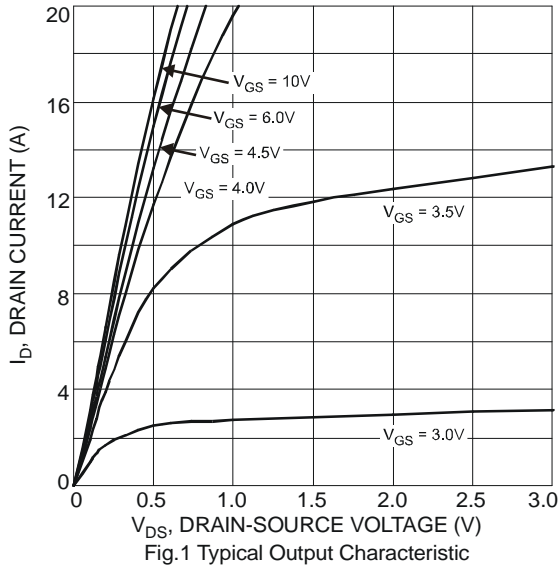
**Thermal Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	$T_A = 25^\circ\text{C}$	$P_D$	1.5	W
	$T_A = 70^\circ\text{C}$		1	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	80	$^\circ\text{C}/\text{W}$
	$t < 10\text{s}$		48	
Total Power Dissipation (Note 6)	$T_A = 25^\circ\text{C}$	$P_D$	2.0	W
	$T_A = 70^\circ\text{C}$		1.3	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	61	$^\circ\text{C}/\text{W}$
	$t < 10\text{s}$		37	
Thermal Resistance, Junction to Case		$R_{\theta JC}$	6.4	$^\circ\text{C}/\text{W}$
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 specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	60	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	100	nA	$V_{DS} = 60\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	1	—	3	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	30	40	m $\Omega$	$V_{GS} = 10\text{V}, I_D = 4.5\text{A}$
		—	35	55		$V_{GS} = 4.5\text{V}, I_D = 3.5\text{A}$
Forward Transfer Admittance	$ Y_{fs} $	—	4.5	—	S	$V_{DS} = 10\text{V}, I_D = 4.3\text{A}$
Diode Forward Voltage	$V_{SD}$	—	0.7	1.2	V	$V_{GS} = 0\text{V}, I_S = 1\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	$C_{iss}$	—	1287	—	pF	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	57	—		
Reverse Transfer Capacitance	$C_{riss}$	—	44	—		
Gate Resistance	$R_G$	—	1.2	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge ( $V_{GS} = 10\text{V}$ )	$Q_g$	—	22.4	—	nC	$V_{DS} = 30\text{V}, I_D = 4.3\text{A}$
Total Gate Charge ( $V_{GS} = 4.5\text{V}$ )	$Q_g$	—	10.4	—		
Gate-Source Charge	$Q_{gs}$	—	4.9	—		
Gate-Drain Charge	$Q_{gd}$	—	3.0	—		
Turn-On Delay Time	$t_{D(on)}$	—	6.6	—	nS	$V_{GS} = 10\text{V}, V_{DD} = 30\text{V}, R_G = 6\Omega,$ $I_D = 4.3\text{A}$
Turn-On Rise Time	$t_r$	—	8.1	—		
Turn-Off Delay Time	$t_{D(off)}$	—	20.1	—		
Turn-Off Fall Time	$t_f$	—	4.0	—		
Body Diode Reverse Recovery Time	$t_{rr}$	—	18	—	nS	$I_S = 4.3\text{A}, dI/dt = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	$Q_{rr}$	—	11.9	—	nC	$I_S = 4.3\text{A}, dI/dt = 100\text{A}/\mu\text{s}$

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - $I_{AR}$  and  $E_{AR}$  rating are based on low frequency and duty cycles to keep  $T_J = 25^\circ\text{C}$
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.



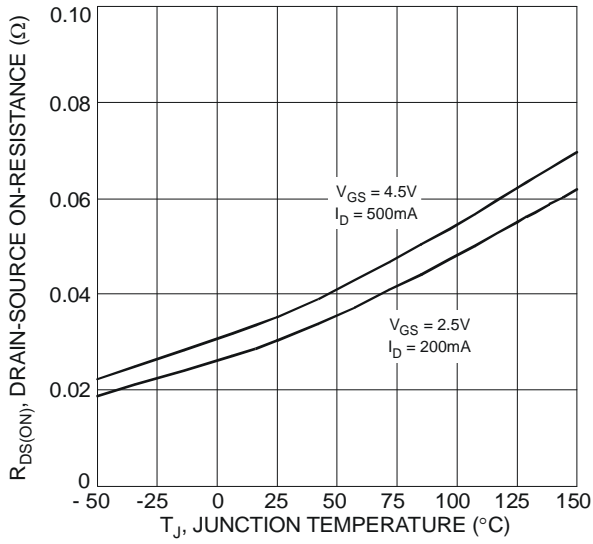


Fig. 7 On-Resistance Variation with Temperature

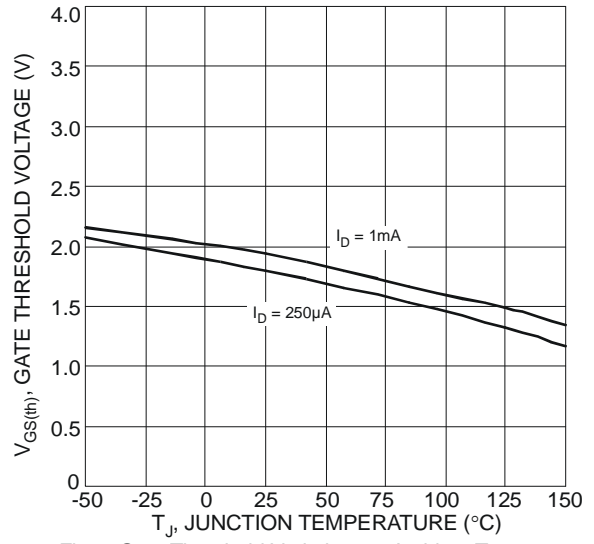


Fig. 8 Gate Threshold Variation vs. Ambient Temperature

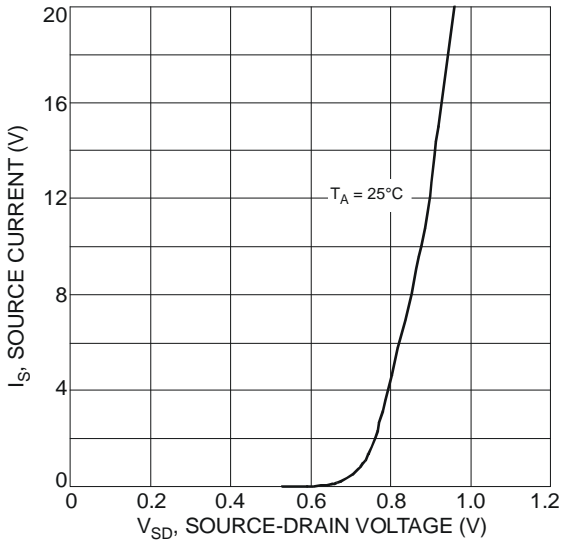


Fig.9 Diode Forward Voltage vs. Current

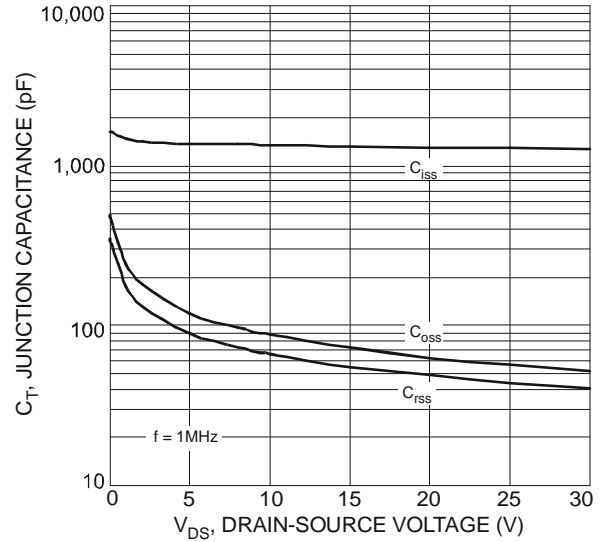


Fig. 10 Typical Junction Capacitance

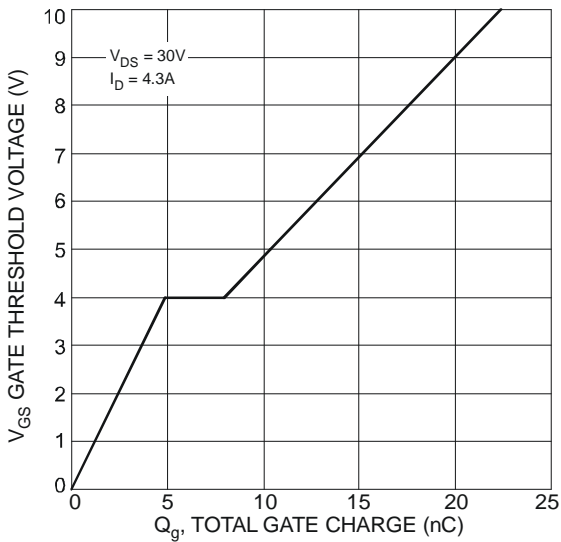
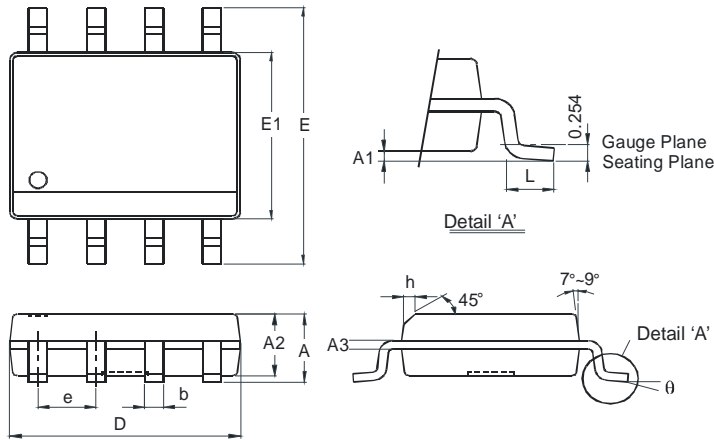


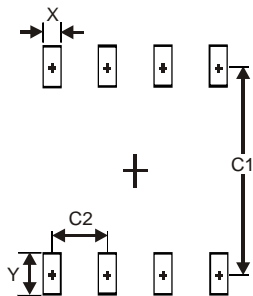
Fig. 11 Gate Charge

**Package Outline Dimensions**



SO-8		
Dim	Min	Max
A	-	1.75
A1	0.10	0.20
A2	1.30	1.50
A3	0.15	0.25
b	0.3	0.5
D	4.85	4.95
E	5.90	6.10
E1	3.85	3.95
e	1.27 Typ	
h	-	0.35
L	0.62	0.82
θ	0°	8°
All Dimensions in mm		

**Suggested Pad Layout**



Dimensions	Value (in mm)
X	0.60
Y	1.55
C1	5.4
C2	1.27

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