

**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.

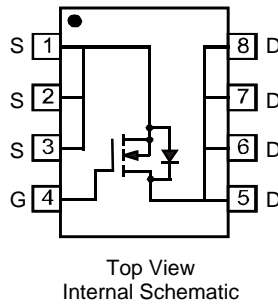
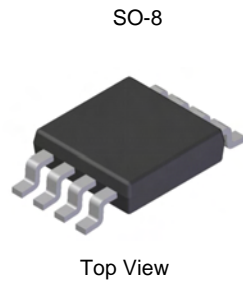
- Backlighting
- Power Management Functions
- DC-DC Converters

**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)

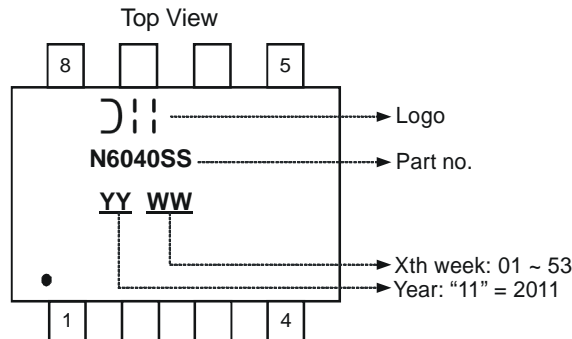


**Ordering Information** (Note 4)

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<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V <sub>DSS</sub>	60	V
Gate-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	I <sub>D</sub>	T <sub>A</sub> = 25°C	5.5
		T <sub>A</sub> = 70°C	4.4
	I <sub>D</sub>	T <sub>A</sub> = 25°C	7.0
		T <sub>A</sub> = 70°C	5.5
Maximum Continuous Body Diode Forward Current (Note 6)	I <sub>S</sub>	2.5	A
Pulsed Drain Current (10μs pulse, duty cycle = 1%)	I <sub>DM</sub>	30	A
Avalanche Current (Note 7) L = 0.1mH	I <sub>AR</sub>	14.2	A
Repetitive Avalanche Energy (Note 7) L = 0.1mH	E <sub>AR</sub>	10	mJ

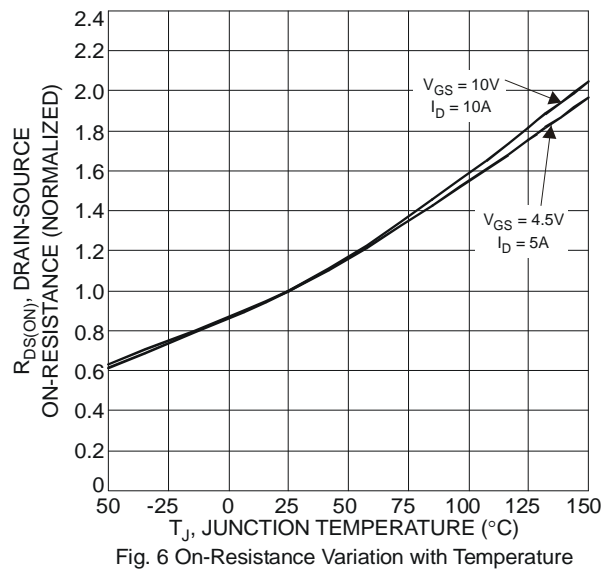
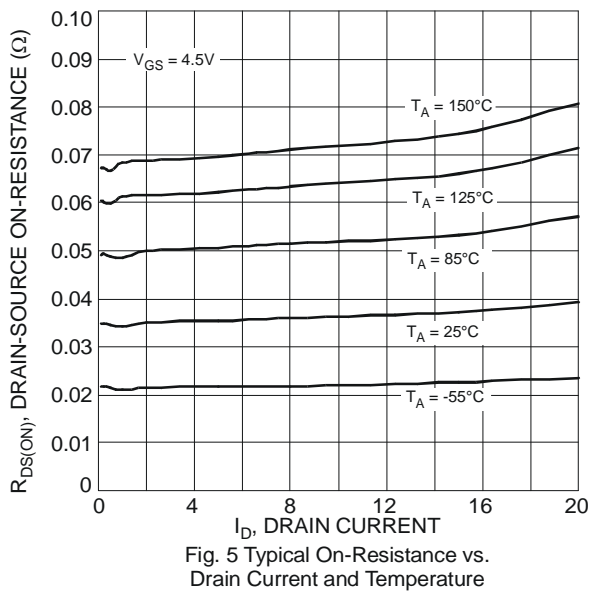
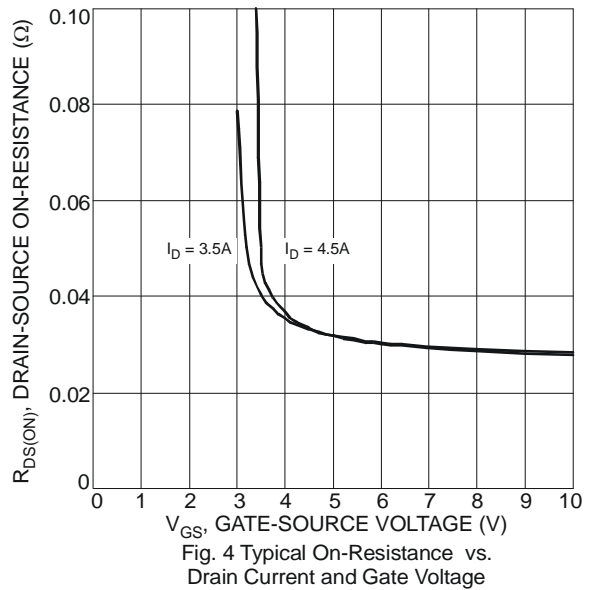
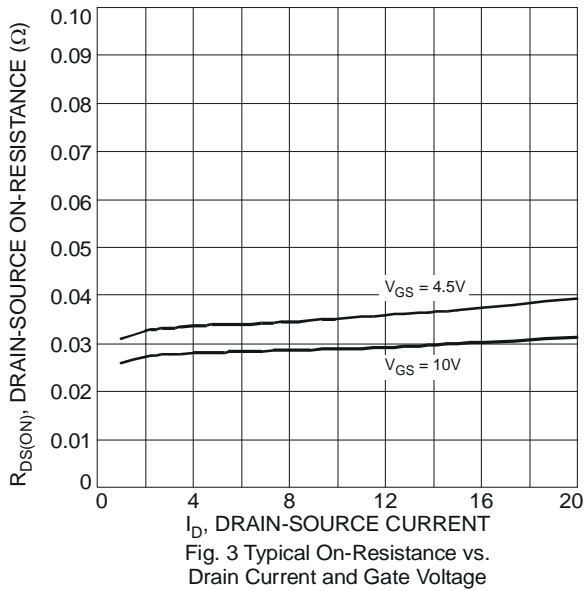
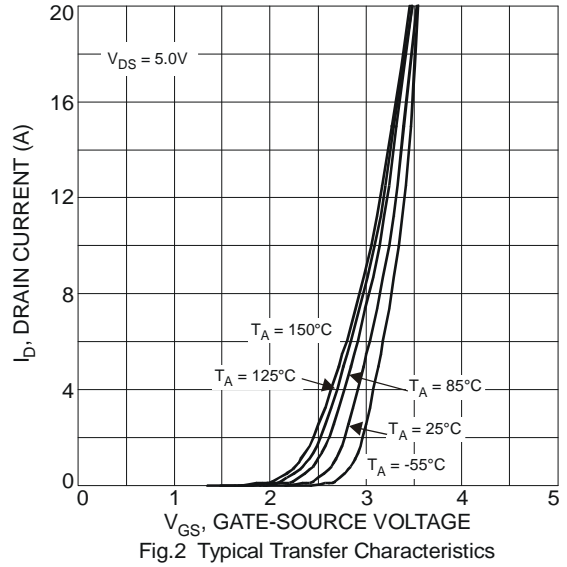
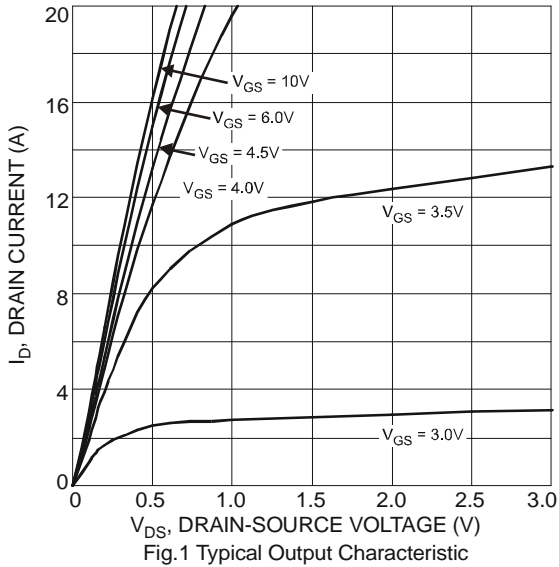
**Thermal Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P <sub>D</sub>	T <sub>A</sub> = 25°C	1.5
		T <sub>A</sub> = 70°C	1
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	Steady State	80
		t < 10s	48
Total Power Dissipation (Note 6)	P <sub>D</sub>	T <sub>A</sub> = 25°C	2.0
		T <sub>A</sub> = 70°C	1.3
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	Steady State	61
		t < 10s	37
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	6.4	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C

**Electrical Characteristics** T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	100	nA	V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	1	—	3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	30	40	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 4.5A
		—	35	55		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3.5A
Forward Transfer Admittance	Y <sub>fs</sub>	—	4.5	—	S	V <sub>DS</sub> = 10V, I <sub>D</sub> = 4.3A
Diode Forward Voltage	V <sub>SD</sub>	—	0.7	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	1287	—	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	57	—		
Reverse Transfer Capacitance	C <sub>riss</sub>	—	44	—		
Gate Resistance	R <sub>G</sub>	—	1.2	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	22.4	—	nC	V <sub>DS</sub> = 30V, I <sub>D</sub> = 4.3A
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	10.4	—		
Gate-Source Charge	Q <sub>gs</sub>	—	4.9	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	3.0	—		
Turn-On Delay Time	t <sub>D(on)</sub>	—	6.6	—	nS	V <sub>GS</sub> = 10V, V <sub>DD</sub> = 30V, R <sub>G</sub> = 6Ω, I <sub>D</sub> = 4.3A
Turn-On Rise Time	t <sub>r</sub>	—	8.1	—		
Turn-Off Delay Time	t <sub>D(off)</sub>	—	20.1	—		
Turn-Off Fall Time	t <sub>f</sub>	—	4.0	—		
Body Diode Reverse Recovery Time	t <sub>rr</sub>	—	18	—	nS	I <sub>S</sub> = 4.3A, dI/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	—	11.9	—	nC	I <sub>S</sub> = 4.3A, dI/dt = 100A/μs

- 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<sub>AR</sub> and E<sub>AR</sub> rating are based on low frequency and duty cycles to keep T<sub>J</sub> = 25°C
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.



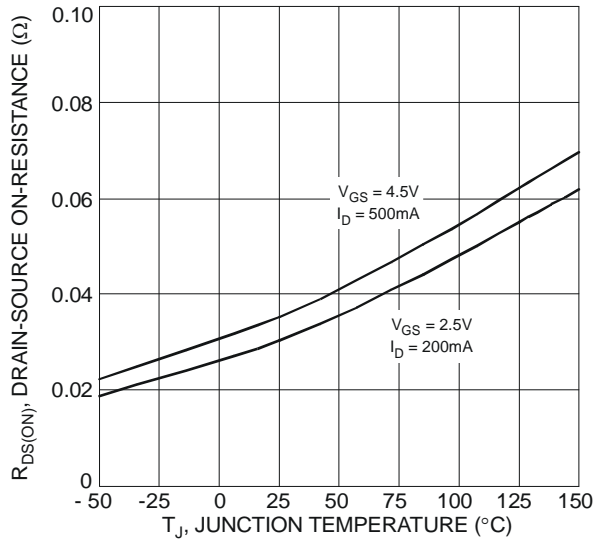


Fig. 7 On-Resistance Variation with Temperature

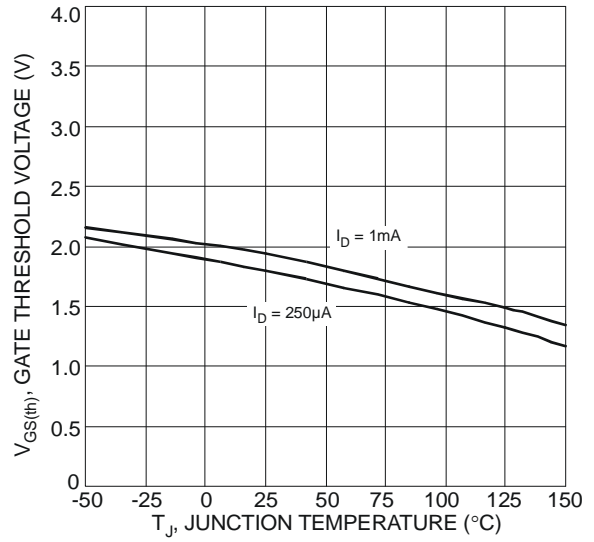


Fig. 8 Gate Threshold Variation vs. Ambient Temperature

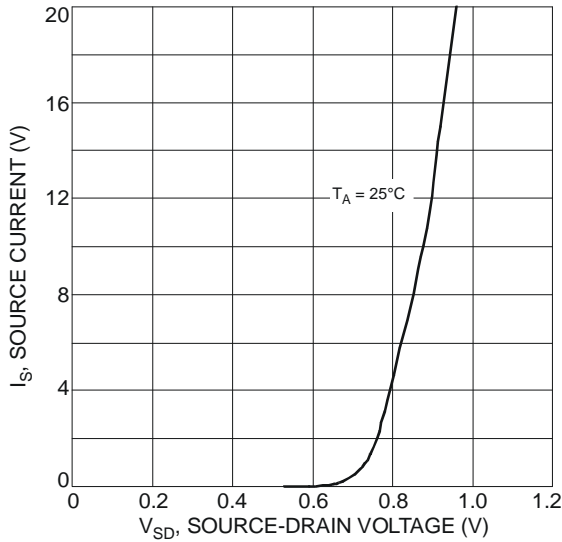


Fig.9 Diode Forward Voltage vs. Current

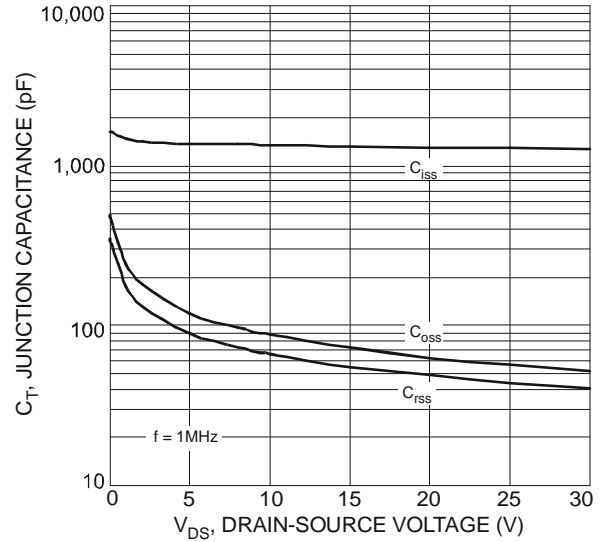


Fig. 10 Typical Junction Capacitance

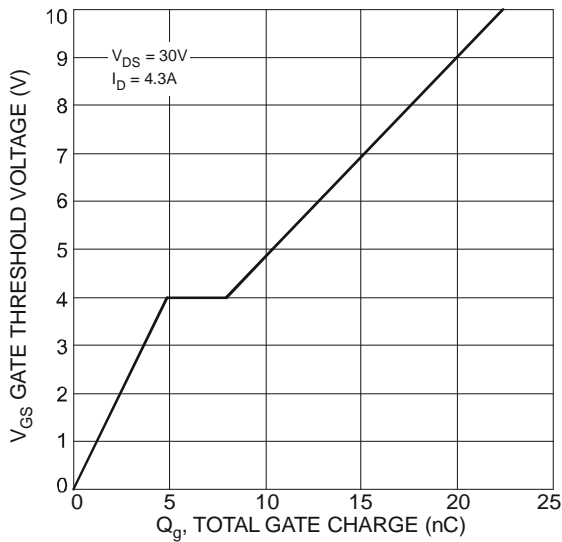
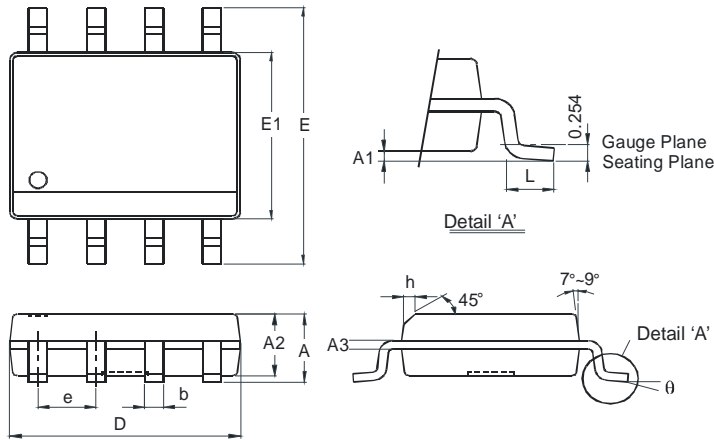


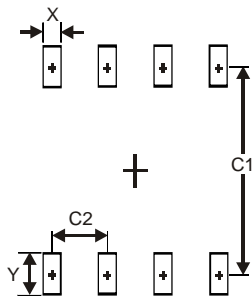
Fig. 11 Gate Charge

**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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