60V DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max T_A = +25°C
60V	80mΩ @ V_{GS} = 10V	4.1A
	100mΩ @ V_{GS} = 4.5V	3.6A

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**

Description and Applications

This MOSFET is 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.

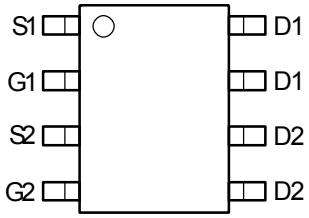
- Backlighting
- Power Management Functions
- DC-DC Converters

Mechanical Data

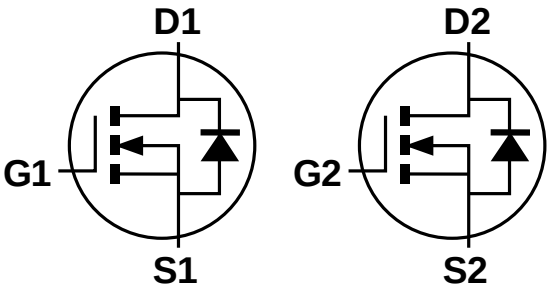
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe Solderable per MIL-STD-202, Method 208
- Weight: 0.074 grams (Approximate)

SO-8

Top View



Top View
Pin Configuration



Equivalent Circuit

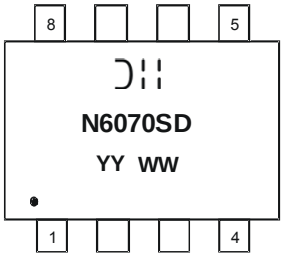
Ordering Information (Note 4)

Part Number	Case	Packaging
DMN6070SSD-13	SO-8	2,500/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/quality/lead_free.html 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/products/packages.html.

Marking Information

SO-8



= Manufacturer's Marking
N6070SD = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 13 = 2013)
WW = Week (01 - 53)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	60	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +70°C	I_D	3.3 2.6	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	4.1 3.4	A
Maximum Continuous Body Diode Forward Current (Note 5)			I_S	2.0	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	12	A
Avalanche Current (Note 7) L=0.1mH			I_{AS}	10	A
Avalanche Energy (Note 7) L=0.1mH			E_{AS}	5.9	mJ

Thermal Characteristics (@T_A= +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)		P_D	1.2	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	104	°C/W
	t<10s		61	
Total Power Dissipation (Note 6)		P_D	1.5	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	83	°C/W
	t<10s		50	
Thermal Resistance, Junction to Case		$R_{\theta JC}$	14.5	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics (@T_A= +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	60	—	—	V	I_D = 250µA, V_{GS}= 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS}= 60V, V_{GS}= 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS}= ±16V, V_{DS}= 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	—	3.0	V	I_D= 250µA, V_{DS}= V_{GS}
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	68	80	mΩ	V_{GS}= 10V, I_D= 4.5A
			70	100		V_{GS}= 4.5V, I_D= 3.5A
Diode Forward Voltage	V_{SD}	—	0.75	1.1	V	I_S= 12A, V_{GS}= 0V
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	588	—	pF	V_{DS}= 30V, V_{GS}= 0V f= 1MHz
Output Capacitance	C_{oss}	—	26.5	—		
Reverse Transfer Capacitance	C_{rss}	—	20	—		
Gate Resistance	R_g	—	1.5	—	Ω	Vgs= 0V, Vds= 0V, f=1MHz,
Total Gate Charge (V_{GS}= 4.5V)	Q_g	—	5.6	—	nC	V_{DS}= 30V, I_D= 3A
Total Gate Charge (V_{GS}= 10V)	Q_g	—	12.3	—		
Gate-Source Charge	Q_{gs}	—	1.7	—		
Gate-Drain Charge	Q_{gd}	—	1.9	—		
Turn-On Delay Time	$t_{D(on)}$	—	3.5	—	nS	V_{DD}= 30V, V_{GS}= 10V $R_L \cong 50\Omega$, $R_G \cong 20\Omega$
Turn-On Rise Time	t_r	—	4.1	—		
Turn-Off Delay Time	$t_{D(off)}$	—	35	—		
Turn-Off Fall Time	t_f	—	11	—		
Body Diode Reverse Recovery Time	trr	—	18	—	nS	I_S = 12A, dI/dt = 100A/µs
Body Diode Reverse Recovery Charge	Qrr	—	12	—	nC	I_S = 12A, dI/dt = 100A/µs

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

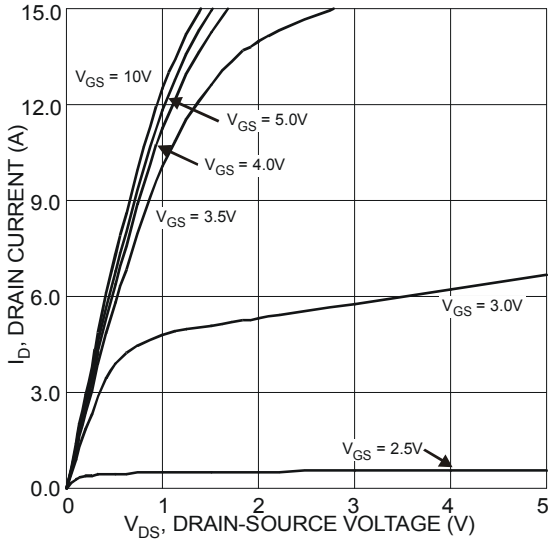


Figure 1 Typical Output Characteristic

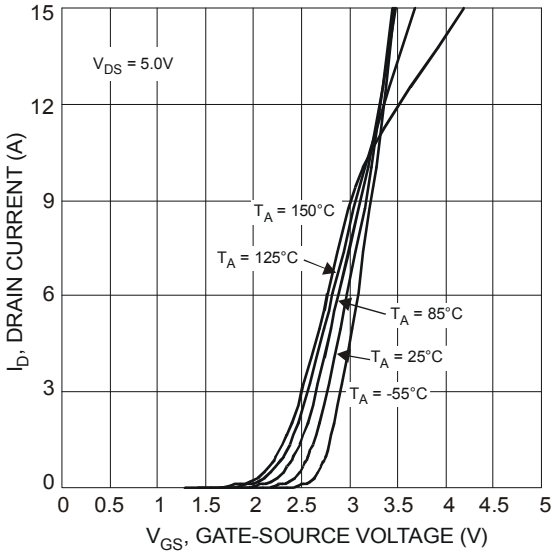


Figure 2 Typical Transfer Characteristics

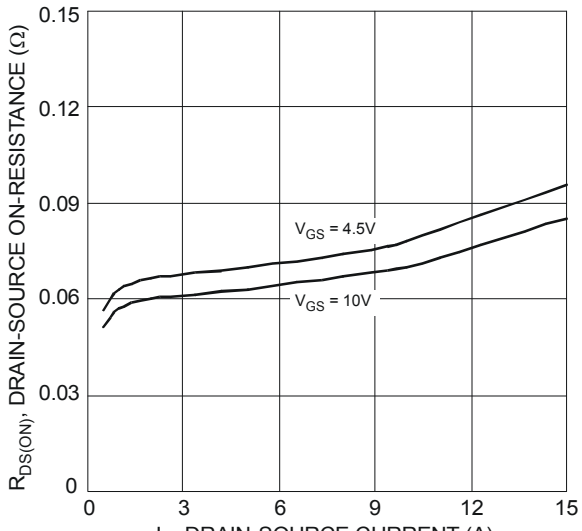


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

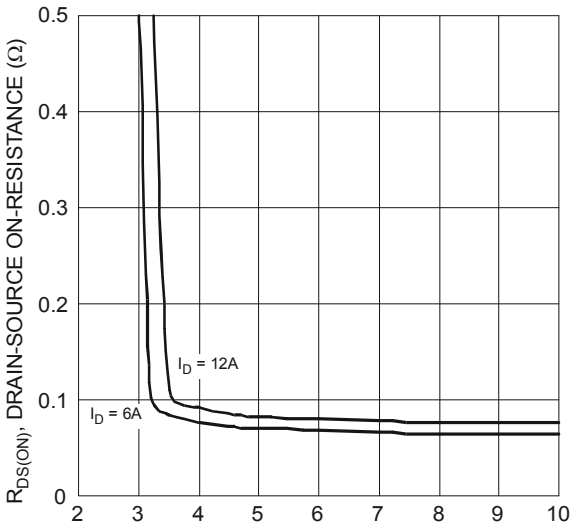


Figure 4 Typical Transfer Characteristics

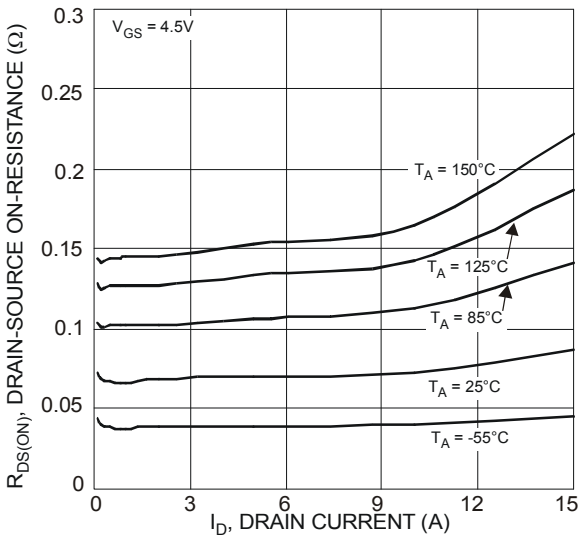


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

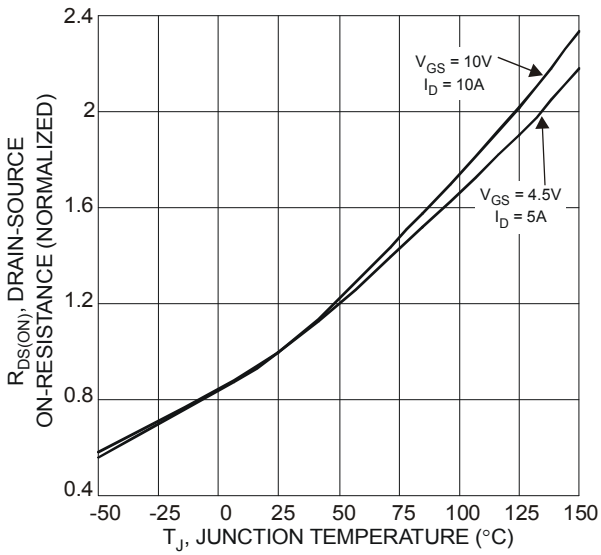


Figure 6 On-Resistance Variation with Temperature

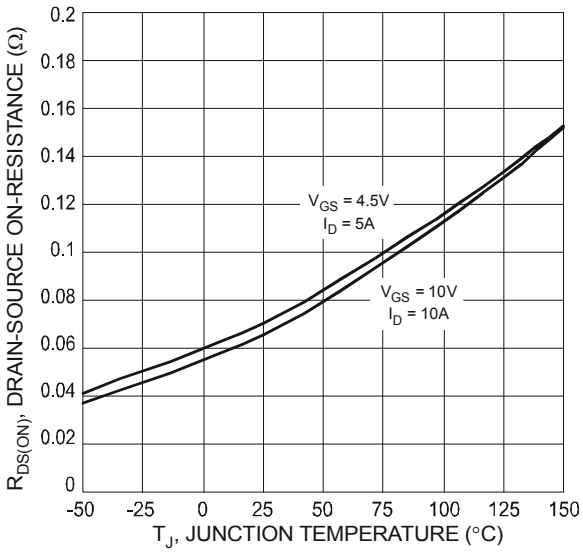


Figure 7 On-Resistance Variation with Temperature

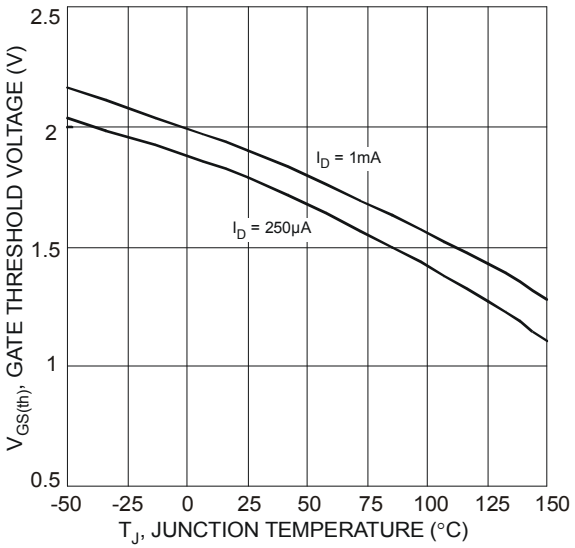


Figure 8 Gate Threshold Variation vs. Ambient Temperature

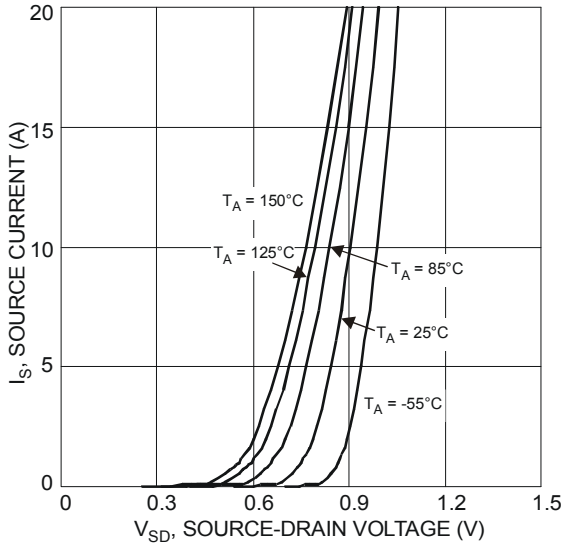


Figure 9 Diode Forward Voltage vs. Current

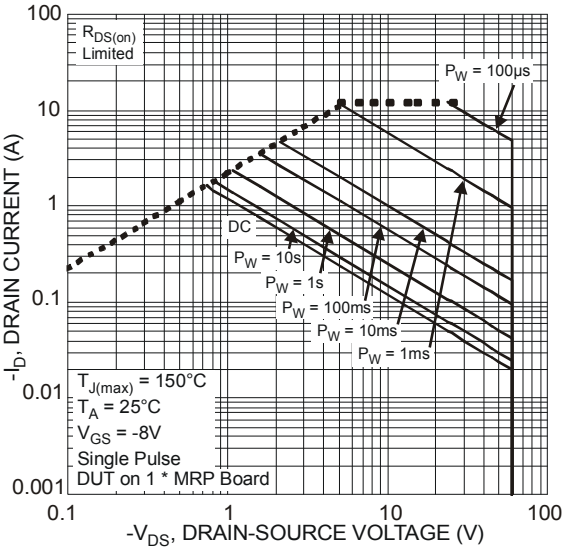


Figure 10 SOA, Safe Operation Area

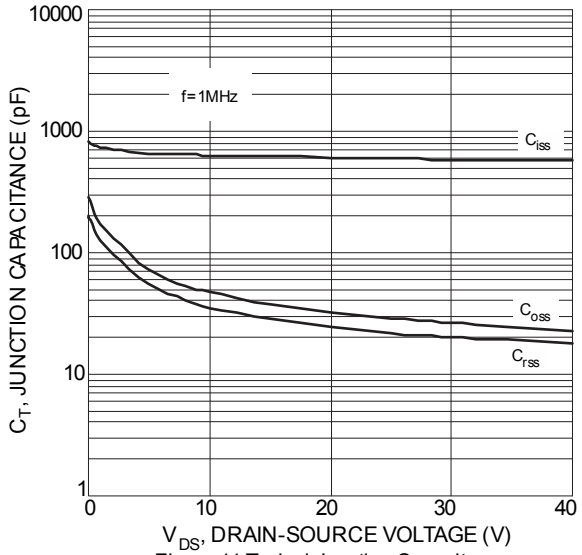


Figure 11 Typical Junction Capacitance

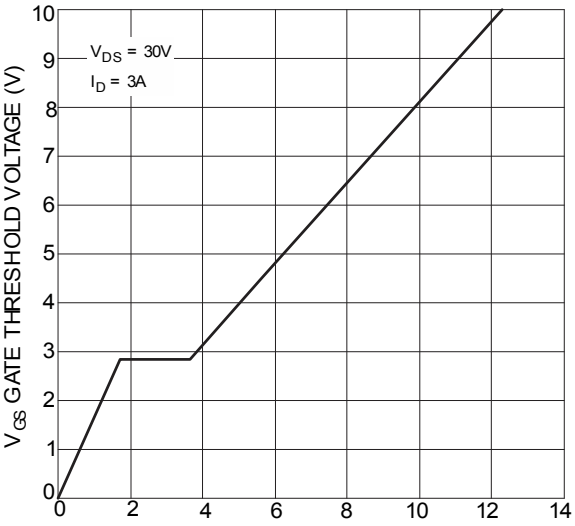


Figure 12 Gate Charge

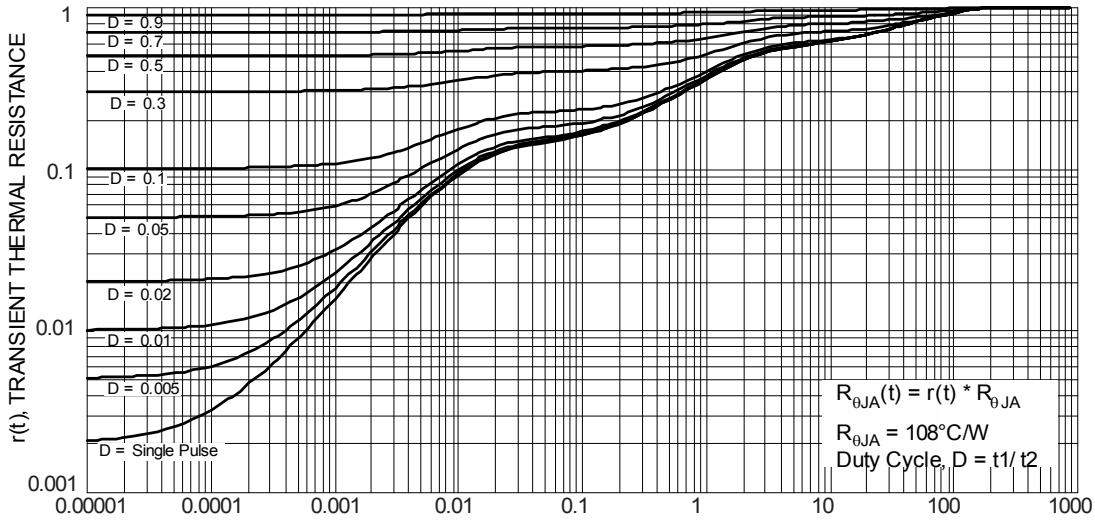
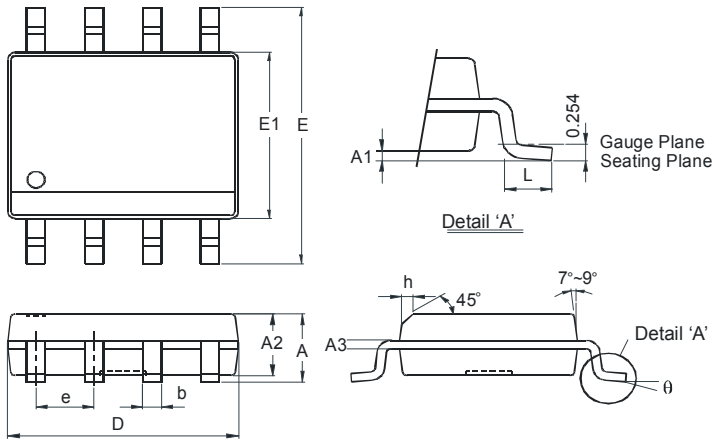


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

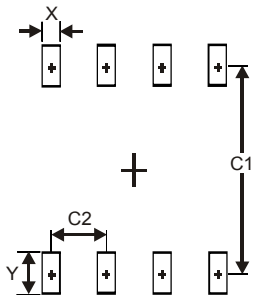
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



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

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



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

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