COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET

Product Summary

Device	$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max T_A = +25°C
Q1	30V	27mΩ @ V_{GS} = 10V	7.2A
		35mΩ @ V_{GS} = 4.5V	6.0A
Q2	-30V	25mΩ @ V_{GS} = -10V	-7.6A
		41mΩ @ V_{GS} = -4.5V	-6.2A

Features and Benefits

- Low Input Capacitance
- Low On-Resistance
- 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**
- **An Automotive-Compliant Part is Available Under Separate Datasheet (DMC3028LSDXQ)**

Description

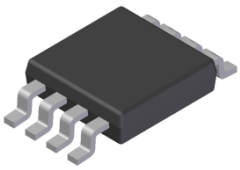
This new generation MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

Mechanical Data

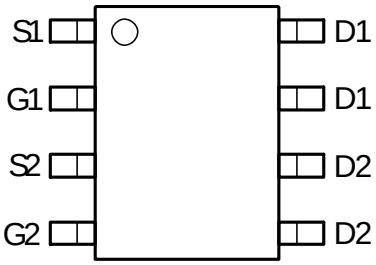
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Tin Finish Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.074 grams (Approximate)

Applications

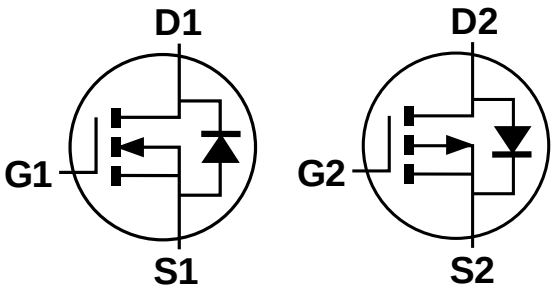
- DC-DC Converters
- Power Management Functions
- Backlighting



Top View



Top View
Pin Configuration



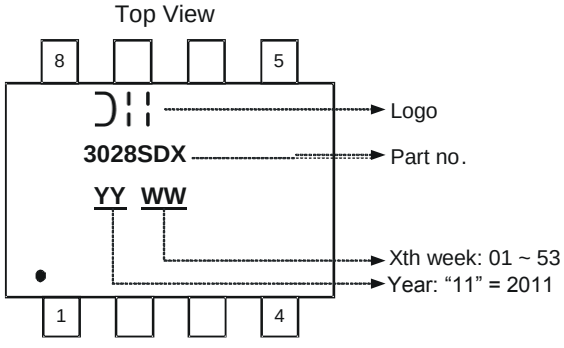
Equivalent Circuit
Q N-Channel MOSFET Q2 P-Channel MOSFET

Ordering Information (Note 4)

Part Number	Case	Packaging
DMC3028LSDX-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



Maximum Ratings – Q1 and Q2 (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Q1	Q2	Units
Drain-Source Voltage			V_{DSS}	30	-30	V
Gate-Source Voltage			V_{GSS}	±20	±20	V
Continuous Drain Current (Note 5) V_{GS} =10V	Steady State	T_A = +25°C T_A = +70°C	I_D	5.5 4.1	-5.8 -4.3	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	7.2 5.7	-7.6 -6.1	A
Maximum Body Diode Forward Current (Note 5)			I_S	2.2	-2.2	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	40	-30	A
Avalanche Current (Note 7) L = 0.1mH			I_{AS}	14.5	-22	A
Avalanche Energy (Note 7) L = 0.1mH			E_{AS}	10.5	25	mJ

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	1.2	W
	T_A = +70°C		0.75	
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	$R_{\theta JA}$	108	°C/W
	t<10s		65	
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	1.5	W
	T_A = +70°C		0.95	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	$R_{\theta JA}$	85	°C/W
	t<10s		50	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	14.5	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics – Q1 (@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}	30	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 24V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	1	—	3	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	19	27	mΩ	V_{GS} = 10V, I_D = 6A
		—	22	35		V_{GS} = 4.5V, I_D = 5A
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	V_{GS} = 0V, I_S = 1.3A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	641	—	pF	V_{DS} = 15V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	66	—		
Reverse Transfer Capacitance	C_{rss}	—	51	—		
Gate Resistance	R_G	—	2.2	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	6	—	nC	V_{DS} = 15V, I_D = 10A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	13.2	—		
Gate-Source Charge	Q_{gs}	—	1.7	—		
Gate-Drain Charge	Q_{gd}	—	2.2	—		
Turn-On Delay Time	$t_{D(on)}$	—	3.3	—	nS	V_{GS} = 10V, V_{DD} = 15V, R_G = 6Ω, I_D = 1A
Turn-On Rise Time	t_r	—	4.4	—		
Turn-Off Delay Time	$t_{D(off)}$	—	22.3	—		
Turn-Off Fall Time	t_f	—	5.3	—		

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.

Electrical Characteristics – Q2 (@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}	-30	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	µA	V_{DS} = -24V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	-1	—	-3	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	21	25	mΩ	V_{GS} = -10V, I_D = -6A
		—	29	41		V_{GS} = -4.5V, I_D = -5A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	V_{GS} = 0V, I_S = -1.3A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1,241	—	pF	V_{DS} = -15V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	146	—		
Reverse Transfer Capacitance	C_{rss}	—	110	—		
Gate Resistance	R_G	—	14.8	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = -4.5V)	Q_g	—	10.9	—	nC	V_{DS} = -15V, I_D = -7A
Total Gate Charge (V_{GS} = -10V)	Q_g	—	22	—		
Gate-Source Charge	Q_{gs}	—	3.5	—		
Gate-Drain Charge	Q_{gd}	—	4.7	—		
Turn-On Delay Time	$t_{D(on)}$	—	9.7	—	nS	V_{GS} = -10V, V_{DD} = -15V, R_{GEN} = 6Ω, I_D = -7A
Turn-On Rise Time	t_r	—	17.1	—		
Turn-Off Delay Time	$t_{D(off)}$	—	60.5	—		
Turn-Off Fall Time	t_f	—	40.4	—		

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

N-Channel – Q1

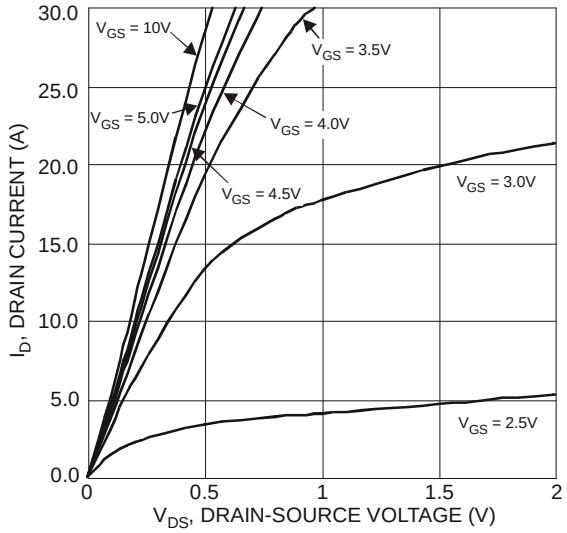


Figure 1 Typical Output Characteristic

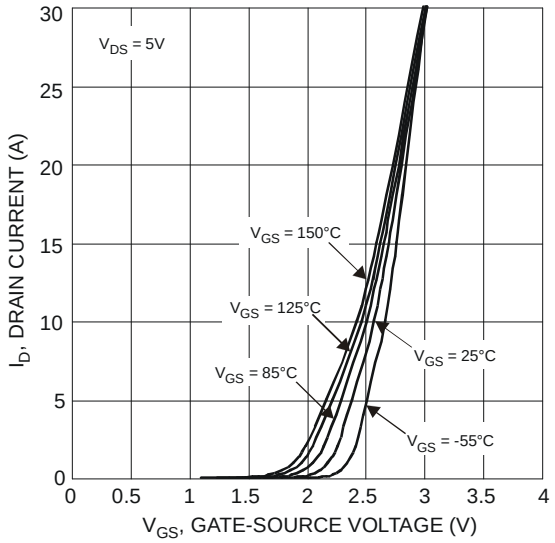


Figure 2 Typical Transfer Characteristic

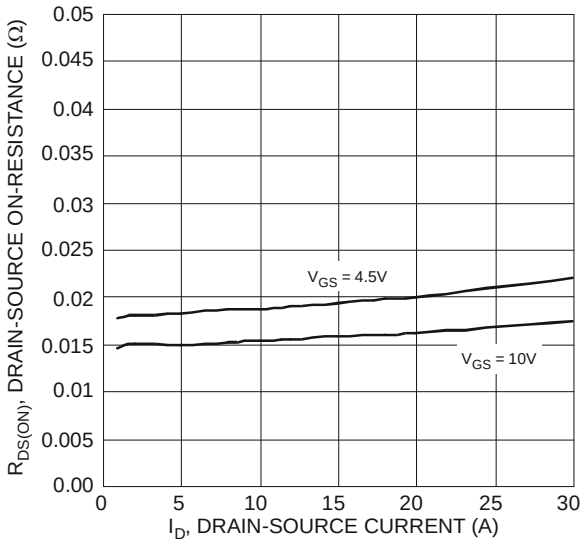


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

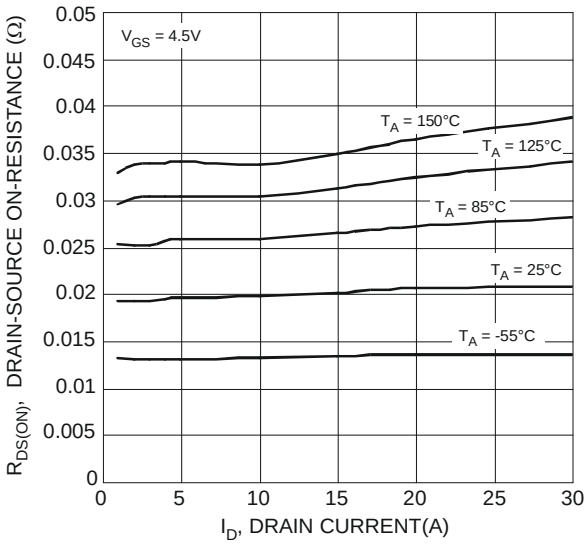


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

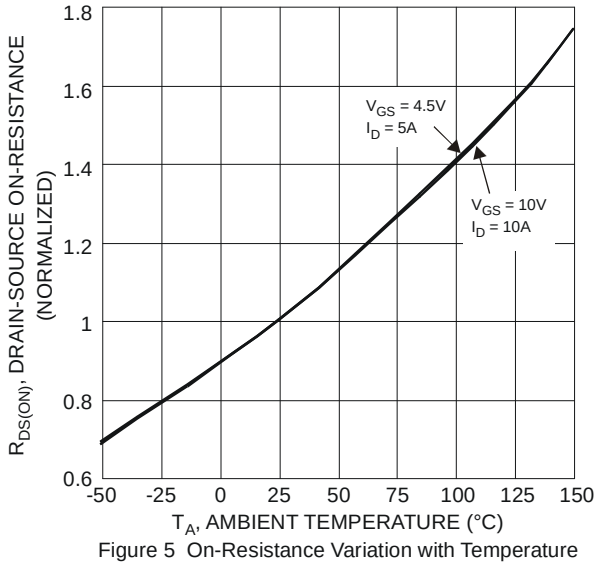


Figure 5 On-Resistance Variation with Temperature

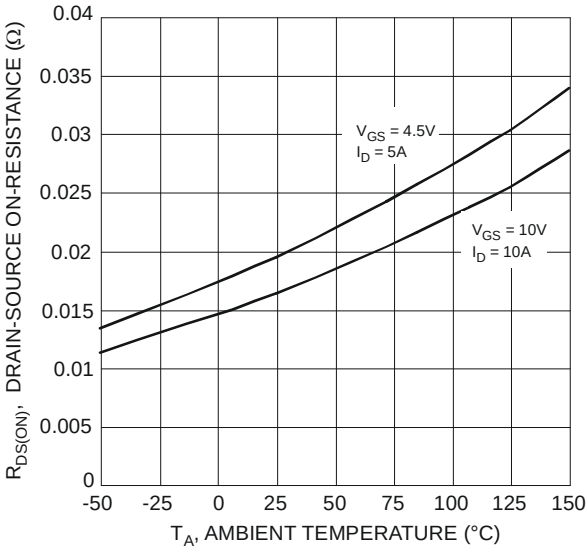


Figure 6 On-Resistance Variation with Temperature

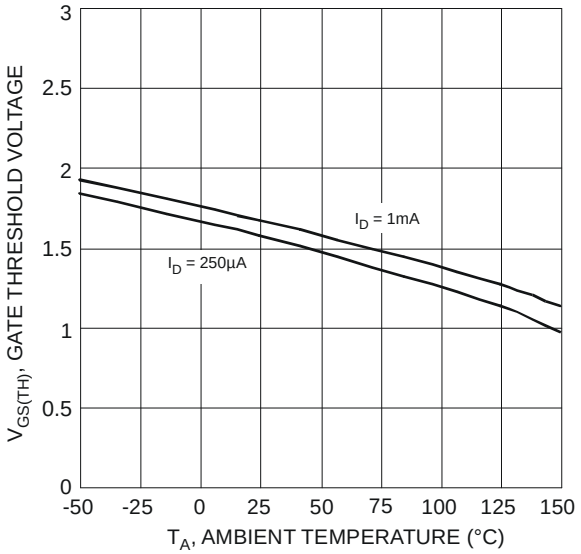


Figure 7 Gate Threshold Variation vs. Ambient Temperature

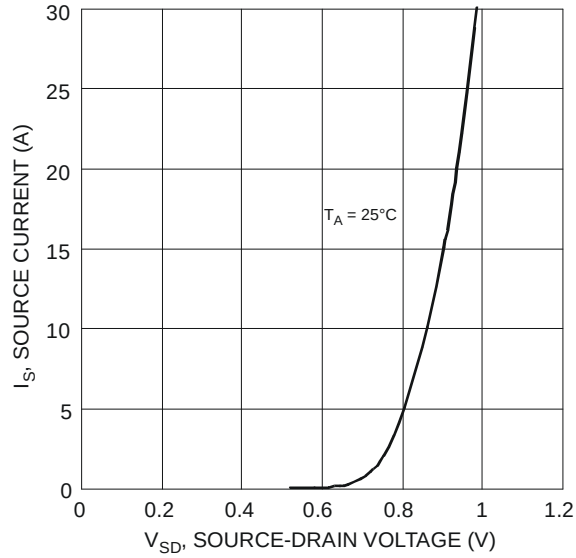


Figure 8 Diode Forward Voltage vs. Current

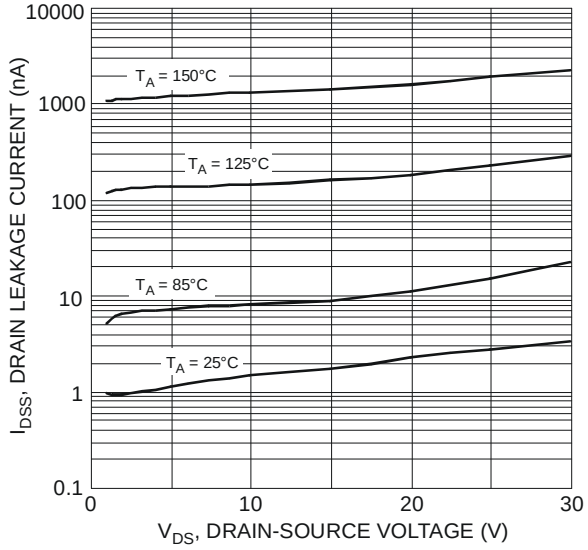


Figure 9 Typical Drain-Source Leakage Current vs. Voltage

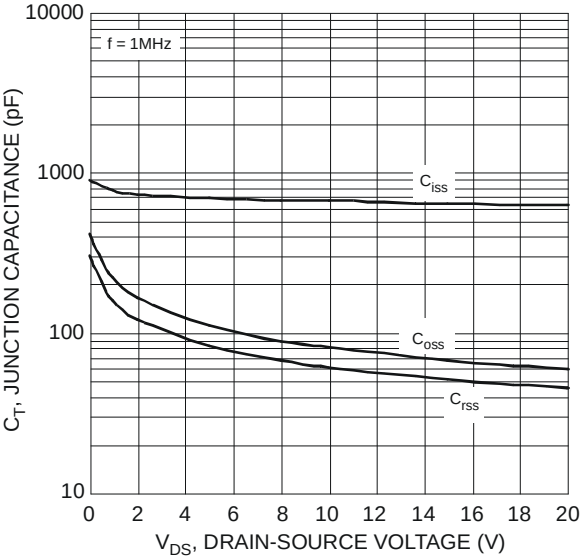


Figure 10 Typical Junction Capacitance

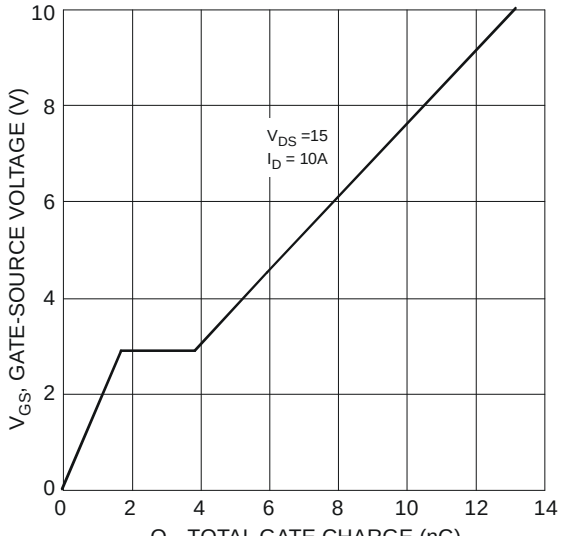


Figure 11 Gate-Source Voltage vs. Total Gate Charge

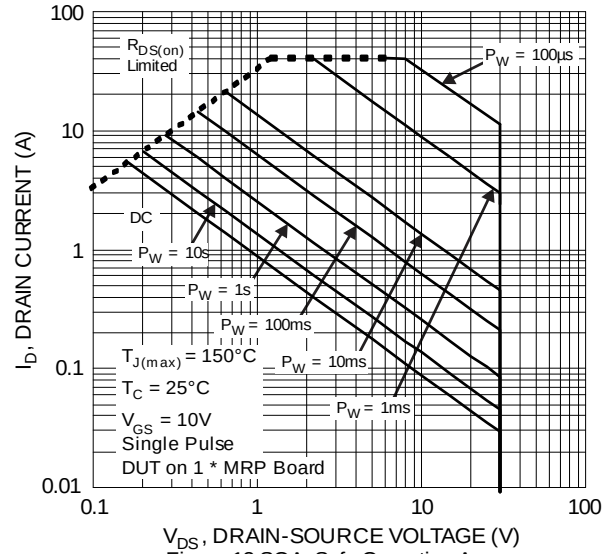


Figure 12 SOA, Safe Operation Area

P-Channel – Q2

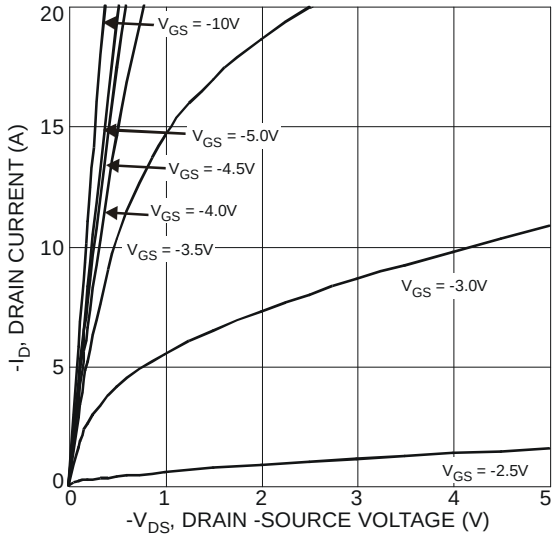


Figure 1 Typical Output Characteristics

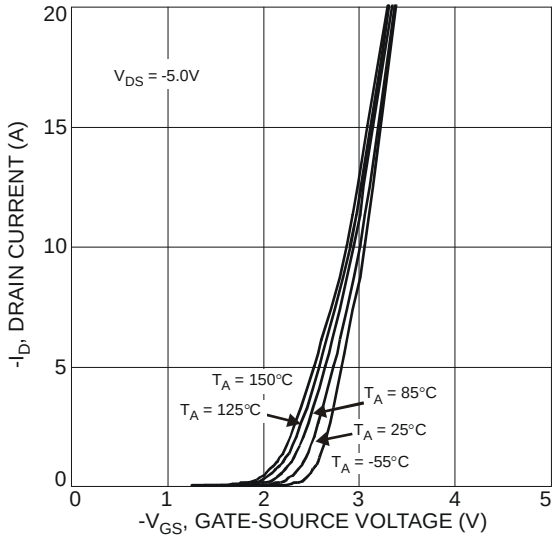


Figure 2 Typical Transfer Characteristics

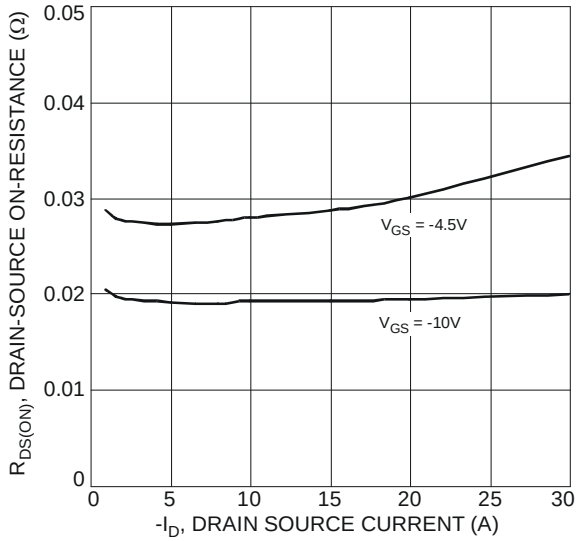


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

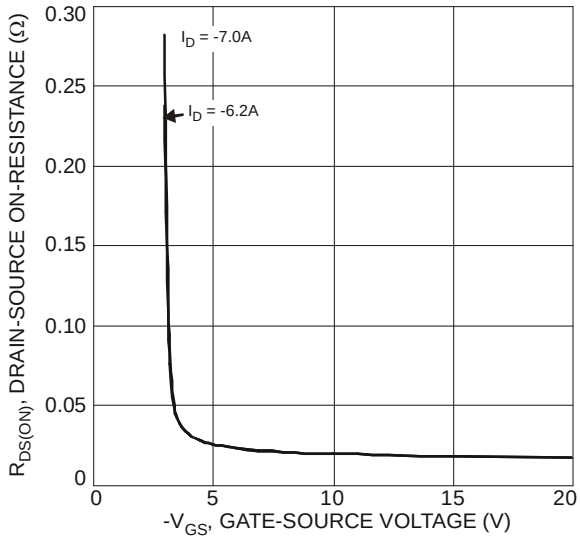


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

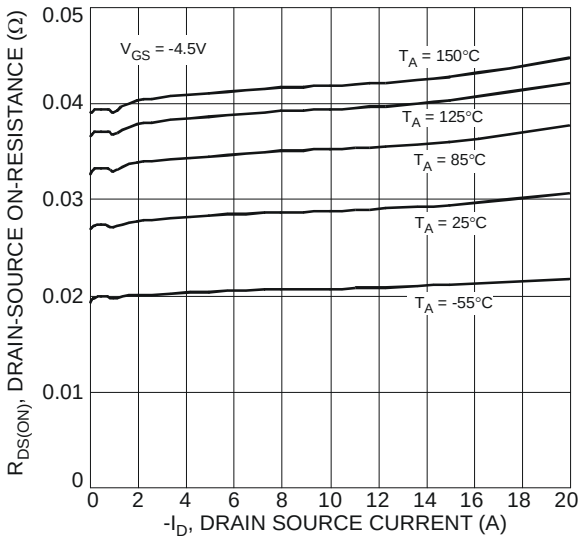


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

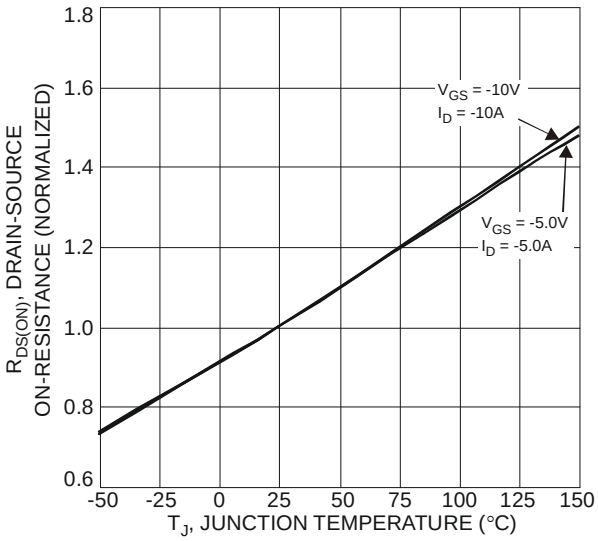


Figure 6 On-Resistance Variation with Temperature

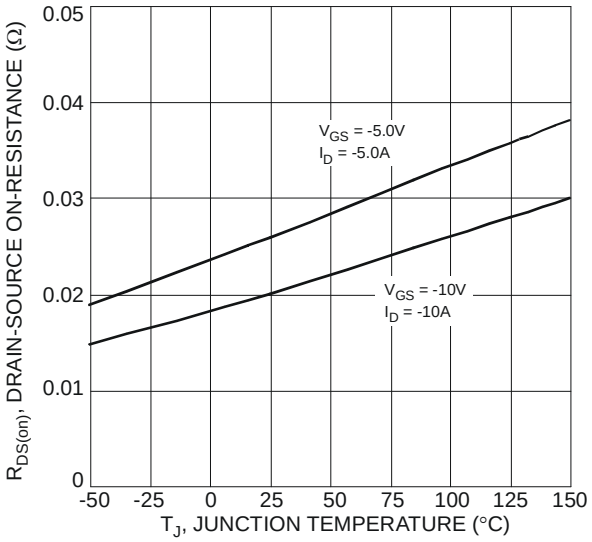


Figure 7 On-Resistance Variation with Temperature

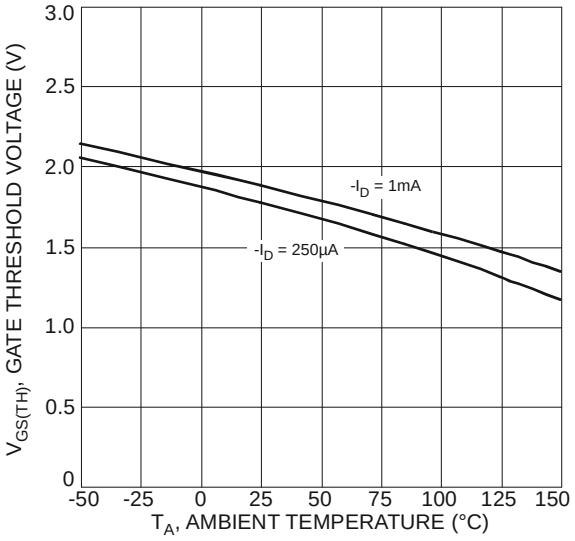


Figure 8 Gate Threshold Variation vs. Ambient Temperature

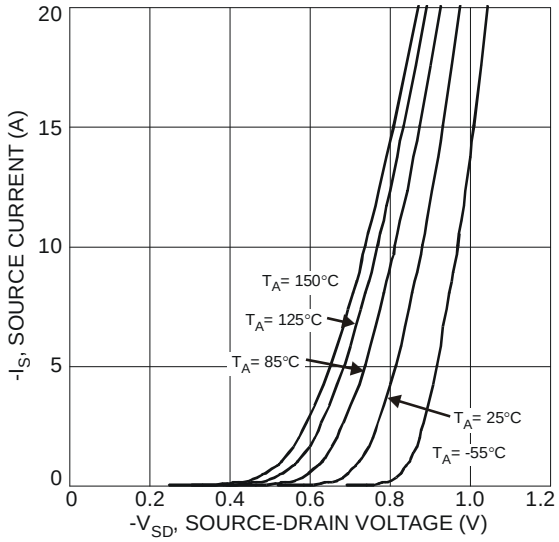


Figure 9 Diode Forward Voltage vs. Current

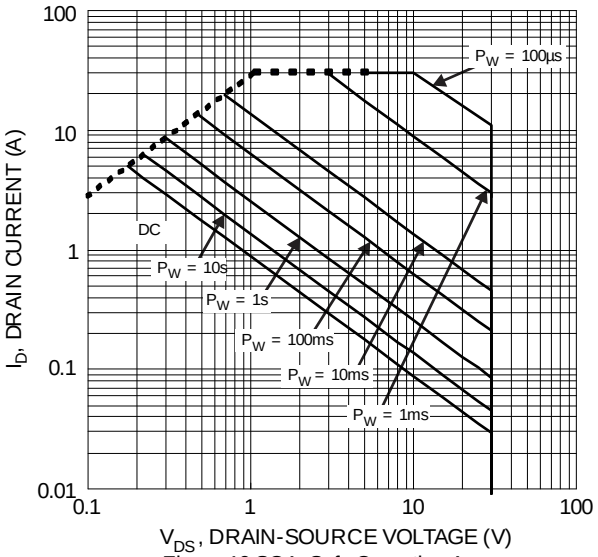


Figure 10 SOA, Safe Operation Area

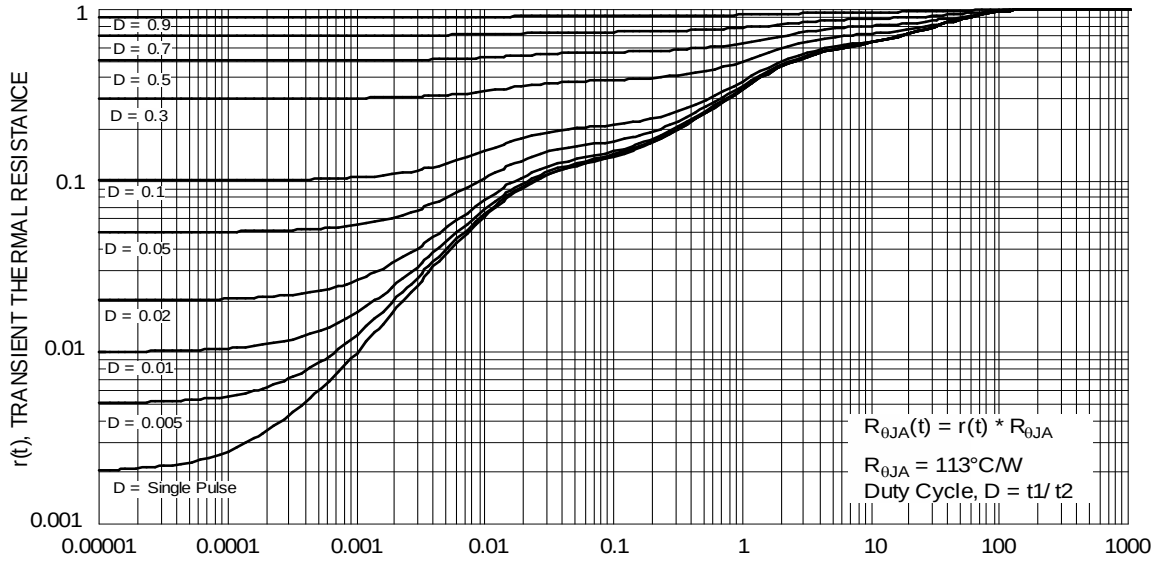
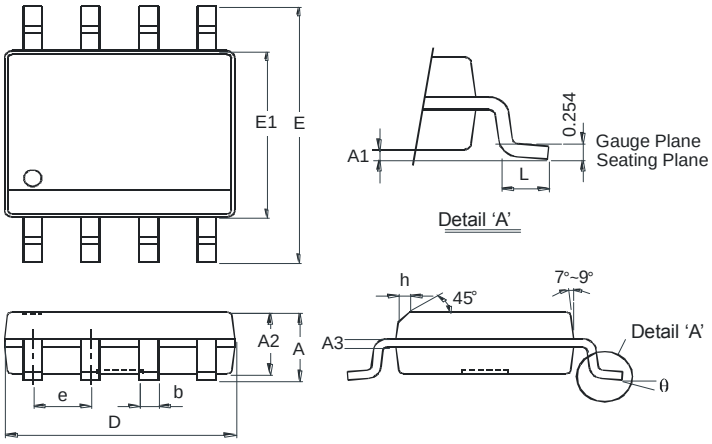


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

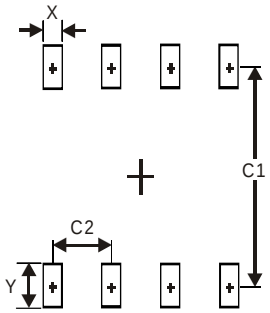
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



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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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

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