

## Product Summary

Device	$V_{(BR)DSS}$	$R_{DS(on)}$ max	$I_D$ Max $T_A = +25^\circ\text{C}$
Q2	30V	21m $\Omega$ @ $V_{GS} = 10\text{V}$	8.5A
		32m $\Omega$ @ $V_{GS} = 4.5\text{V}$	7.2A
Q1	-30V	39m $\Omega$ @ $V_{GS} = -10\text{V}$	-7A
		53m $\Omega$ @ $V_{GS} = -4.5\text{V}$	-5.6A

## 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.

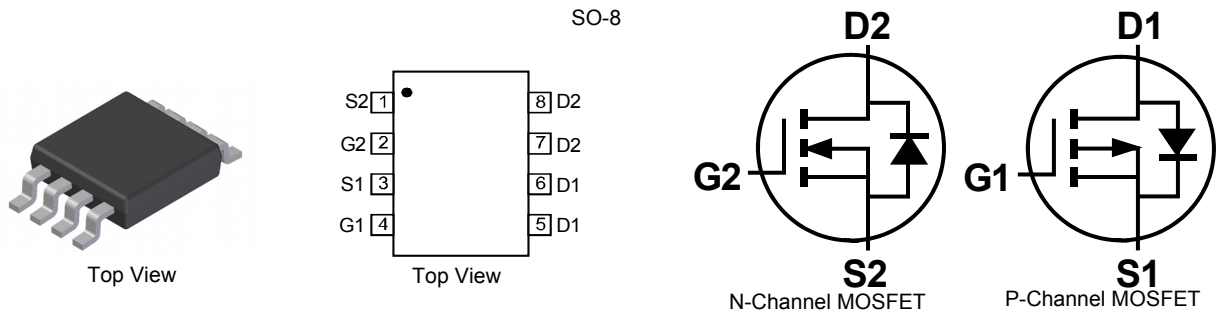
- Power Management Functions
- Analog Switch
- Load Switch

## Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Complementary Pair MOSFET
- **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**
- **PPAP Capable (Note 4)**

## 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
- Terminals Connections: See Diagram
- Terminals: Finish - Matte Tin annealed over Copper lead frame  
Solderable per MIL-STD-202, Method 208 <sup>(e3)</sup>
- Weight: 0.072 grams (approximate)

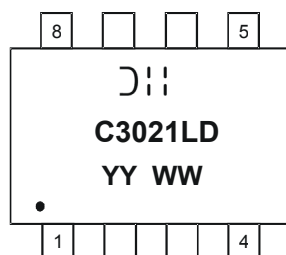


## Ordering Information (Note 5)

Part Number	Case	Packaging
DMC3021LSDQ-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](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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_grade\\_definitions/](http://www.diodes.com/quality/product_grade_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



☺☺☺ = Manufacturer's Marking  
 C3021LD = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Year (ex: 14 = 2014)  
 WW = Week (01 - 53)  
 YY = Date Code Marking

**Maximum Ratings N-CHANNEL – Q2** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	30	V
Gate-Source Voltage			V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 6)	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	8.5	A
		T <sub>A</sub> = +85°C		7.1	
Pulsed Drain Current (Note 7)			I <sub>DM</sub>	26	A

**Maximum Ratings P-CHANNEL – Q1** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	-30	V
Gate-Source Voltage			V <sub>GSS</sub>	±20	V
Continuous Drain Current (Note 6)	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	-7.0	A
		T <sub>A</sub> = +85°C		-4.5	
Pulsed Drain Current (Note 7)			I <sub>DM</sub>	-25	A

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Power Dissipation (Note 6)			P <sub>D</sub>	2.5	W
Thermal Resistance, Junction to Ambient (Note 6)			R <sub>θJA</sub>	50	°C/W
Operating and Storage Temperature Range			T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics N-CHANNEL – Q2** (@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>	30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	—	—	1.0	μA	V <sub>DS</sub> = 30V, 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	1.45	2.1	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>C</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	—	14	21	mΩ	V <sub>GS</sub> = 10V, I <sub>C</sub> = 7A
		—	18	32		V <sub>GS</sub> = 4.5V, I <sub>C</sub> = 5.6A
Forward Transfer Admittance	Y <sub>fs</sub>	—	8.1	—	S	V <sub>DS</sub> = 5V, I <sub>C</sub> = 7A
Diode Forward Voltage (Note 8)	V <sub>SD</sub>	—	0.7	1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	767	—	pF	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	110	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	105	—	pF	
Gate Resistance	R <sub>g</sub>	—	1.4	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	7.8	—	nC	V <sub>DS</sub> = 15V, I <sub>D</sub> = 9A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	16.1	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	1.8	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	2.5	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	5.0	—	ns	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 15V, R <sub>G</sub> = 6Ω, I <sub>D</sub> = 1A
Turn-On Rise Time	t <sub>r</sub>	—	4.5	—	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	26.3	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	8.55	—	ns	

- Notes:
6. Device mounted on FR-4 PCB, with minimum recommended pad layout.
  7. Repetitive rating, pulse width limited by junction temperature.
  8. Short duration pulse test used to minimize self-heating effect.
  9. Guaranteed by design. Not subject to production testing.

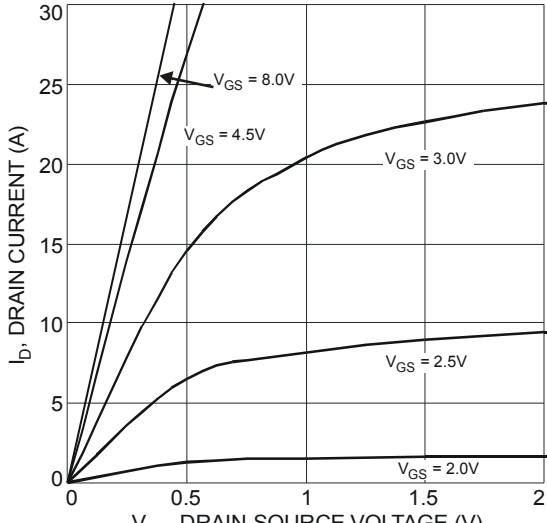


Fig. 1 Typical Output Characteristics

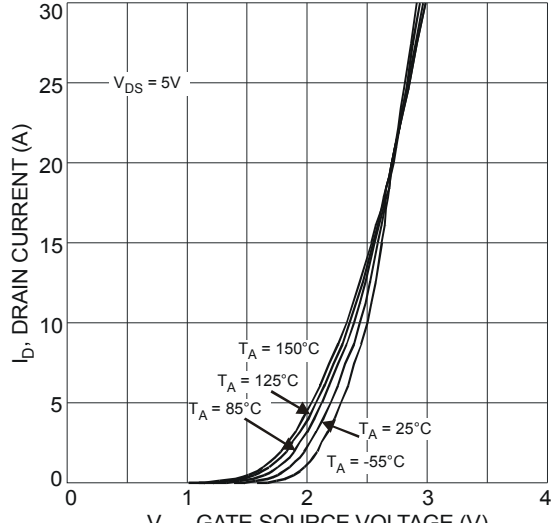


Fig. 2 Typical Transfer Characteristics

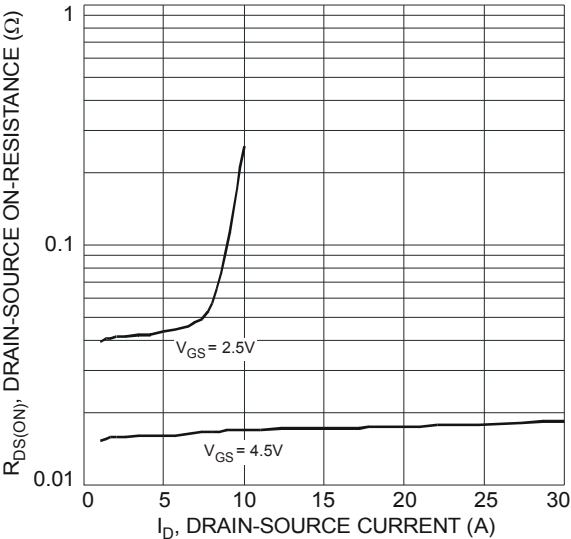


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

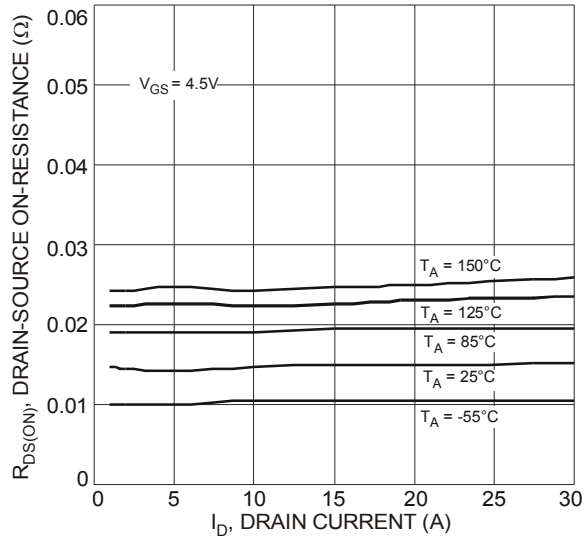


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

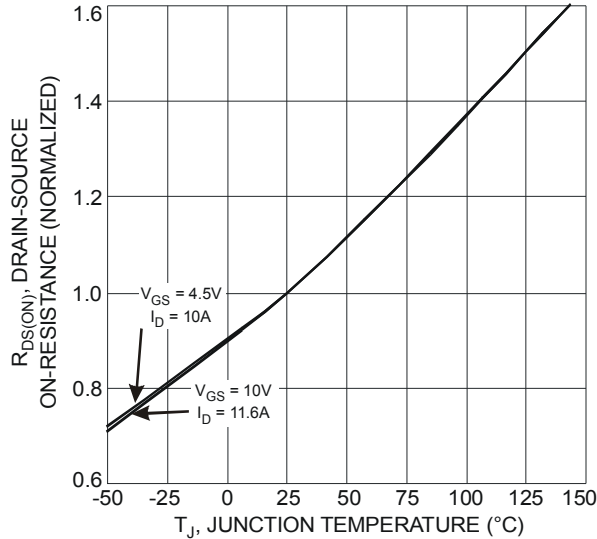


Fig. 5 On-Resistance Variation with Temperature

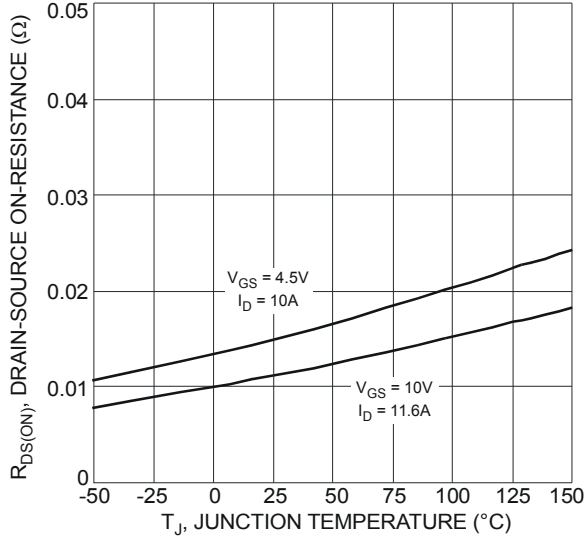


Fig. 6 On-Resistance Variation with Temperature

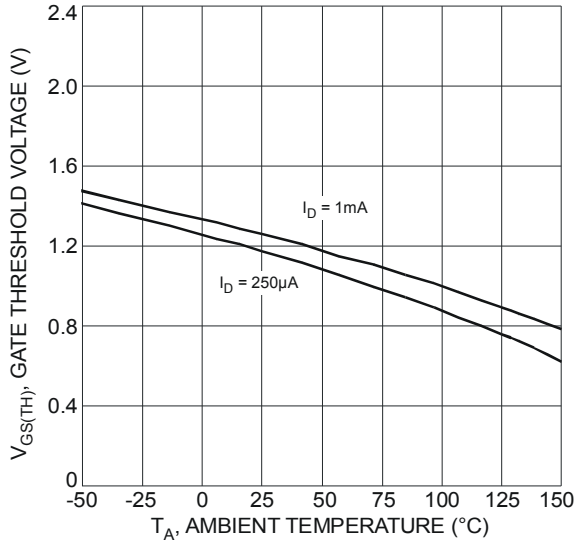


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

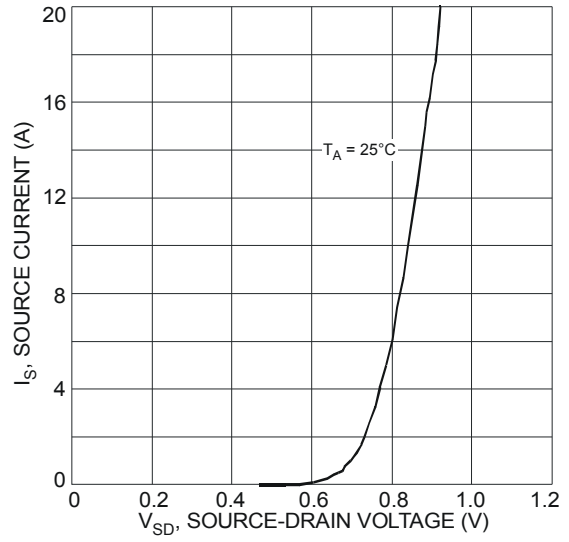


Fig. 8 Diode Forward Voltage vs. Current

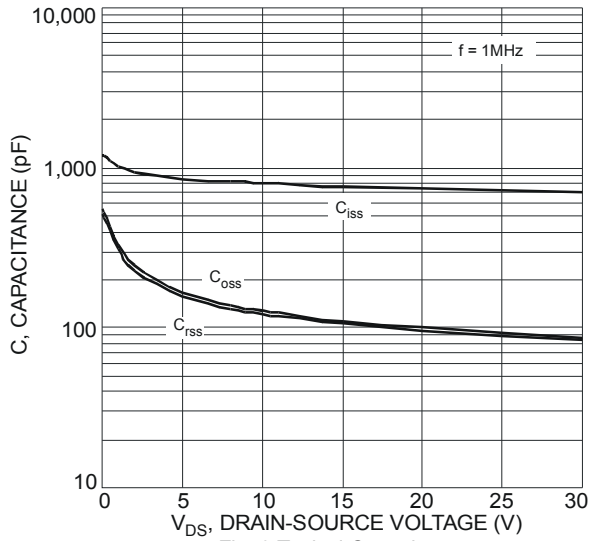


Fig. 9 Typical Capacitance

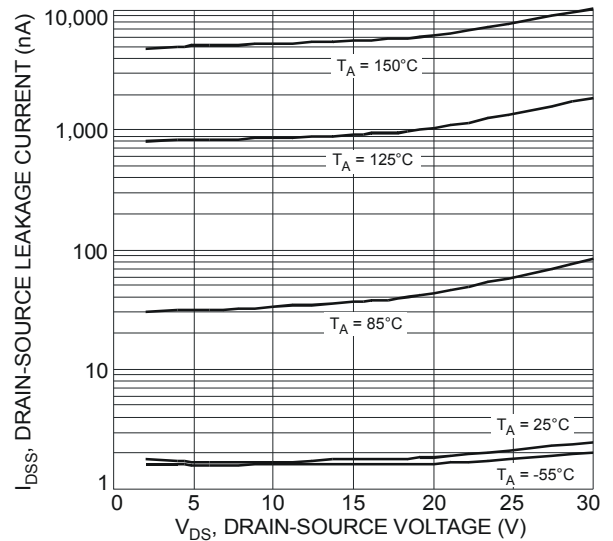


Fig. 10 Typical Drain-Source Leakage Current vs. Drain-Source Voltage

**Electrical Characteristics P-CHANNEL – Q1** (@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>	-30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	—	—	-1.0	μA	V <sub>DS</sub> = -30V, 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	-1.7	-2.2	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	39	mΩ	V <sub>GS</sub> = -10V, I <sub>D</sub> = -4.3A
		—	42	53		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3.7A
Forward Transfer Admittance	Y <sub>fs</sub>	—	7	—	S	V <sub>DS</sub> = -5V, I <sub>D</sub> = -4.3A
Diode Forward Voltage (Note 8)	V <sub>SD</sub>	—	-0.75	-1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1.7A
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	1002	—	pF	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	125	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	118	—	pF	
Gate Resistance	R <sub>g</sub>	—	13	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	10.1	—	nC	V <sub>DS</sub> = -15V, I <sub>D</sub> = -6A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	21.1	—	nC	
Gate-Source Charge	Q <sub>gs</sub>	—	2.8	—	nC	
Gate-Drain Charge	Q <sub>gd</sub>	—	3.2	—	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	—	10.1	—	ns	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -15V, R <sub>G</sub> = 6Ω, I <sub>D</sub> = -1A
Turn-On Rise Time	t <sub>r</sub>	—	6.5	—	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	—	50.1	—	ns	
Turn-Off Fall Time	t <sub>f</sub>	—	22.2	—	ns	

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

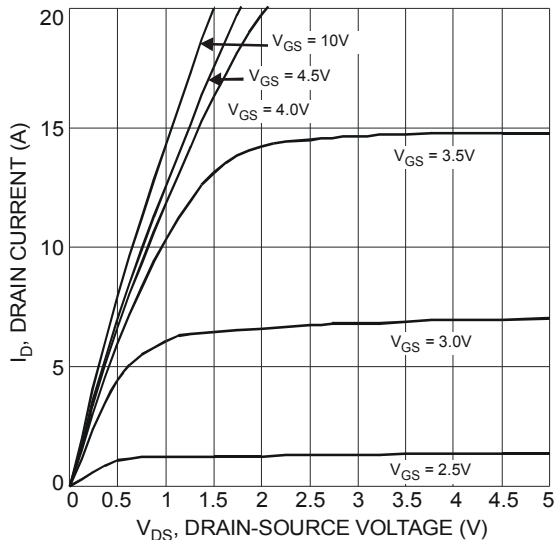


Fig. 11 Typical Output Characteristics

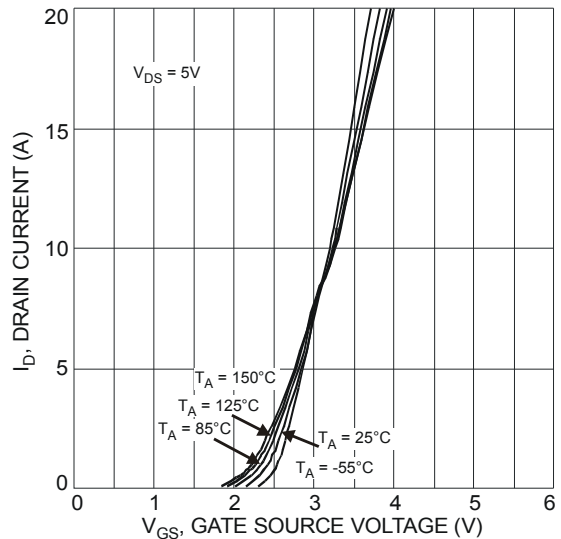


Fig. 12 Typical Transfer Characteristics

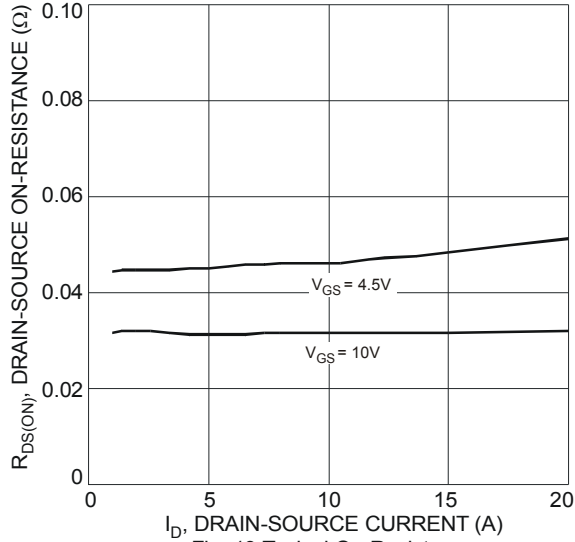


Fig. 13 Typical On-Resistance vs. Drain Current and Gate Voltage

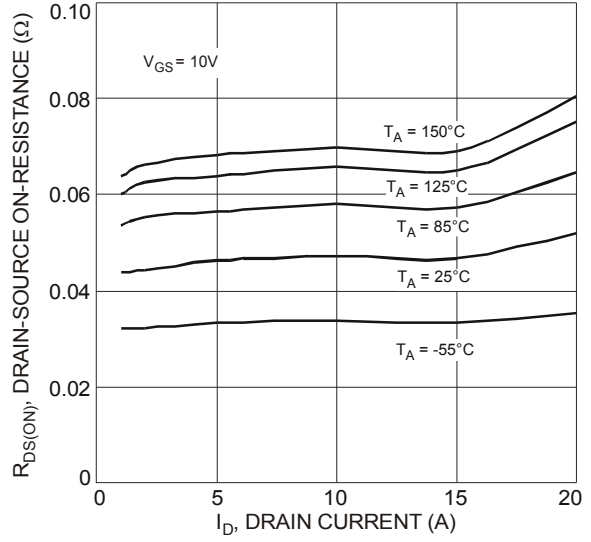


Fig. 14 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

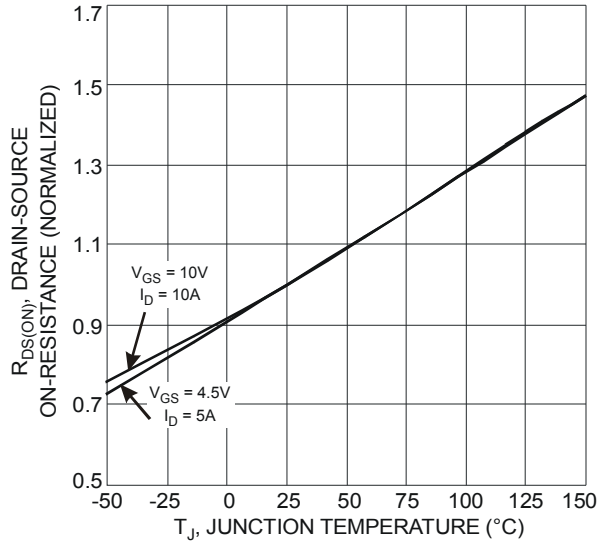


Fig. 15 On-Resistance Variation with Temperature

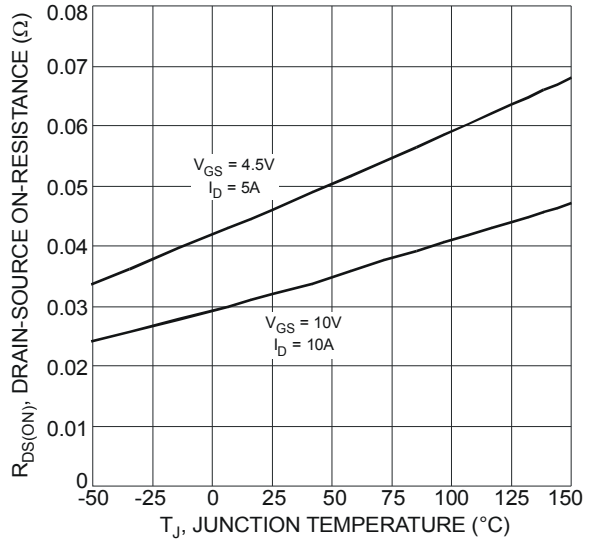


Fig. 16 On-Resistance Variation with Temperature

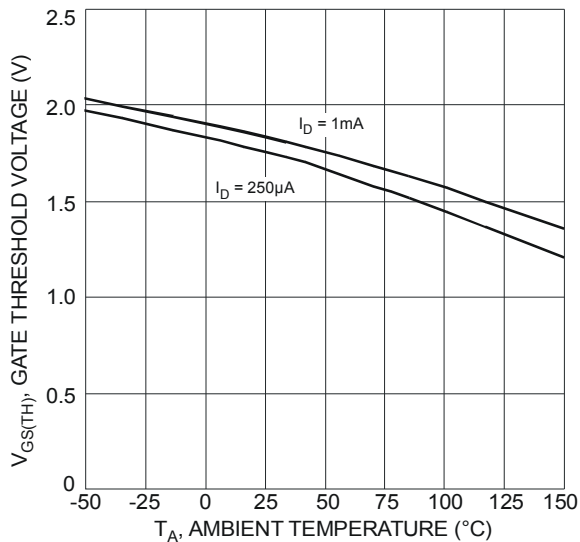


Fig. 17 Gate Threshold Variation vs. Ambient Temperature

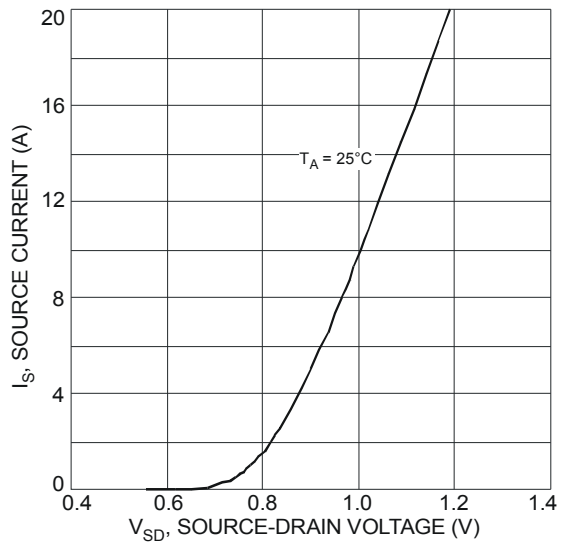


Fig. 18 Diode Forward Voltage vs. Current

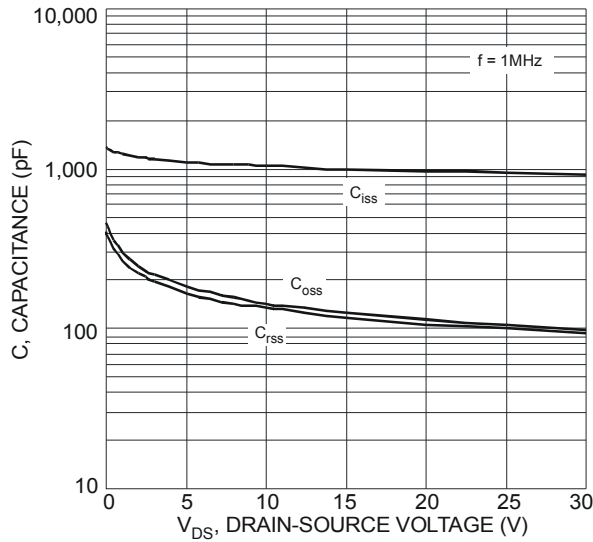


Fig. 19 Typical Capacitance

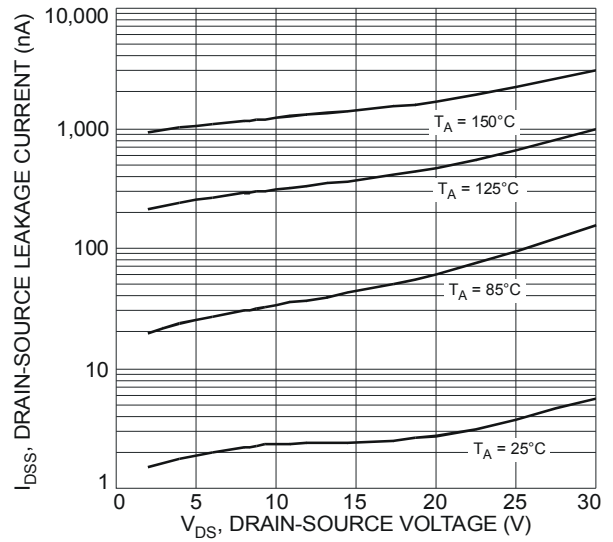
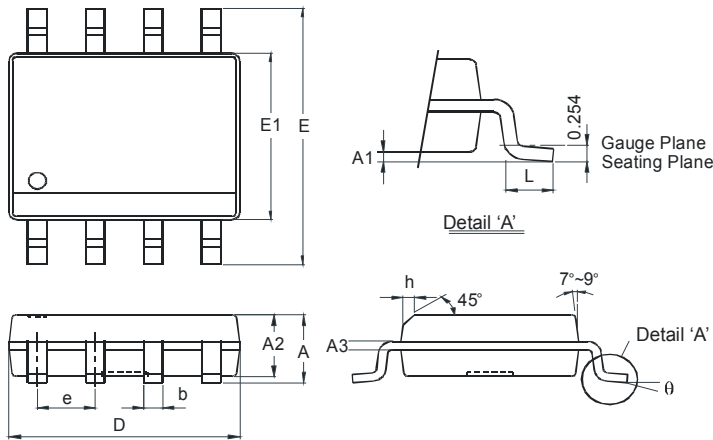


Fig. 20 Typical Drain-Source Leakage Current vs. Drain-Source Voltage

**Package Outline Dimensions**

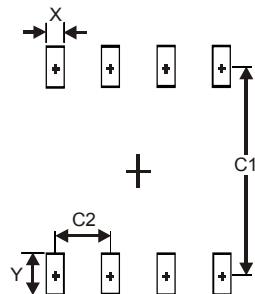
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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 latest version.



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

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