

Product Summary

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

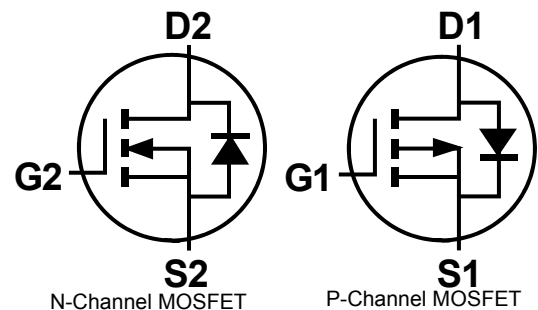
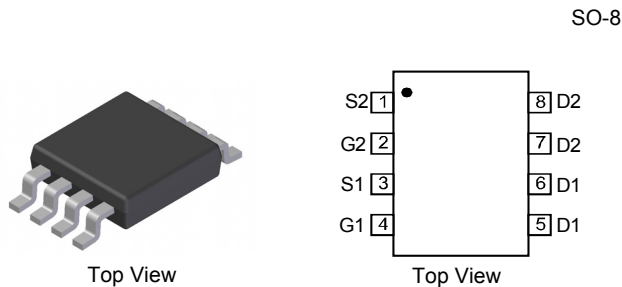
- Power Management Functions
- Analog Switch
- Load Switch

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 
- Weight: 0.072 grams (approximate)

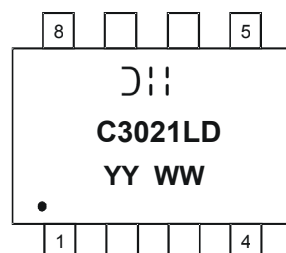


Ordering Information (Note 5)

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 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/.
 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_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	30	V
Gate-Source Voltage			V _{GSS}	±20	V
Continuous Drain Current (Note 6)	Steady State	T _A = +25°C	I _D	8.5	A
		T _A = +85°C		7.1	
Pulsed Drain Current (Note 7)			I _{DM}	26	A

Maximum Ratings P-CHANNEL – Q1 (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	-30	V
Gate-Source Voltage			V _{GSS}	±20	V
Continuous Drain Current (Note 6)	Steady State	T _A = +25°C	I _D	-7.0	A
		T _A = +85°C		-4.5	
Pulsed Drain Current (Note 7)			I _{DM}	-25	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P _D	2.5	W
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	50	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

Electrical Characteristics N-CHANNEL – 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 T _J = +25°C	I _{DSS}	—	—	1.0	μA	V _{DS} = 30V, 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	1.45	2.1	V	V _{DS} = V _{GS} , I _C = 250μA
Static Drain-Source On-Resistance	R _{DS(on)}	—	14	21	mΩ	V _{GS} = 10V, I _C = 7A
			18	32		V _{GS} = 4.5V, I _C = 5.6A
Forward Transfer Admittance	Y _{fs}	—	8.1	—	S	V _{DS} = 5V, I _C = 7A
Diode Forward Voltage (Note 8)	V _{SD}	—	0.7	1.0	V	V _{GS} = 0V, I _S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	767	—	pF	V _{DS} = 10V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	110	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	105	—	pF	
Gate Resistance	R _g	—	1.4	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	7.8	—	nC	V _{DS} = 15V, I _D = 9A
Total Gate Charge (V _{GS} = 10V)	Q _g	—	16.1	—	nC	
Gate-Source Charge	Q _{gs}	—	1.8	—	nC	
Gate-Drain Charge	Q _{gd}	—	2.5	—	nC	
Turn-On Delay Time	t _{D(on)}	—	5.0	—	ns	V _{GS} = 10V, V _{DS} = 15V, R _G = 6Ω, I _D = 1A
Turn-On Rise Time	t _r	—	4.5	—	ns	
Turn-Off Delay Time	t _{D(off)}	—	26.3	—	ns	
Turn-Off Fall Time	t _f	—	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.

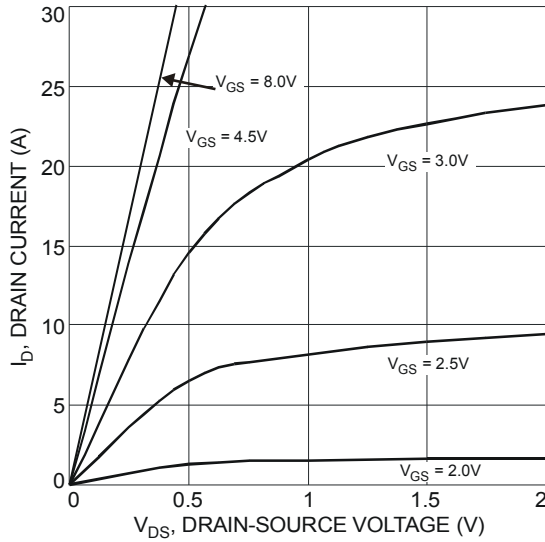


Fig. 1 Typical Output Characteristics

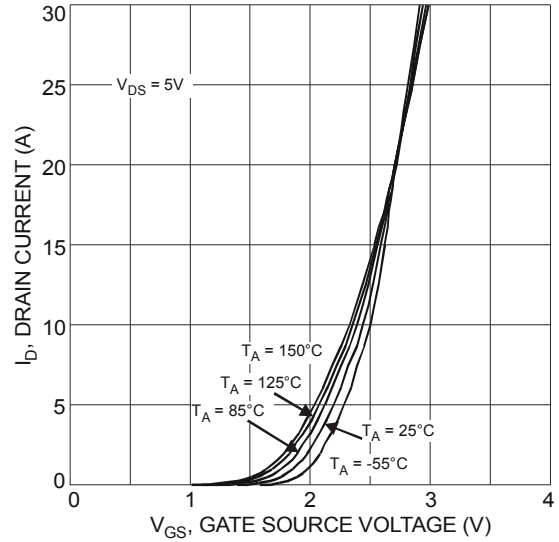


Fig. 2 Typical Transfer Characteristics

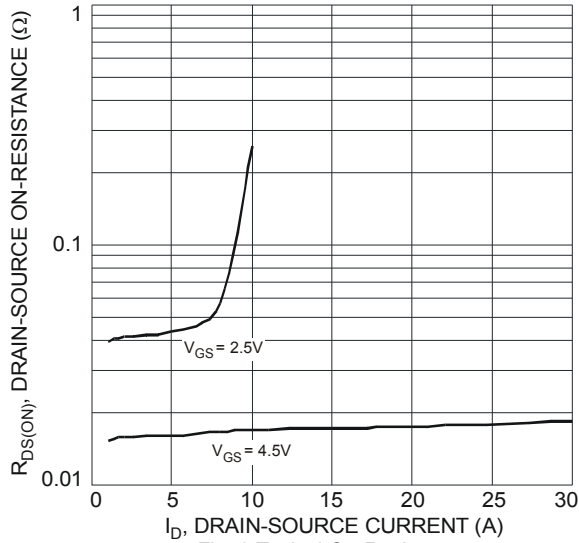


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

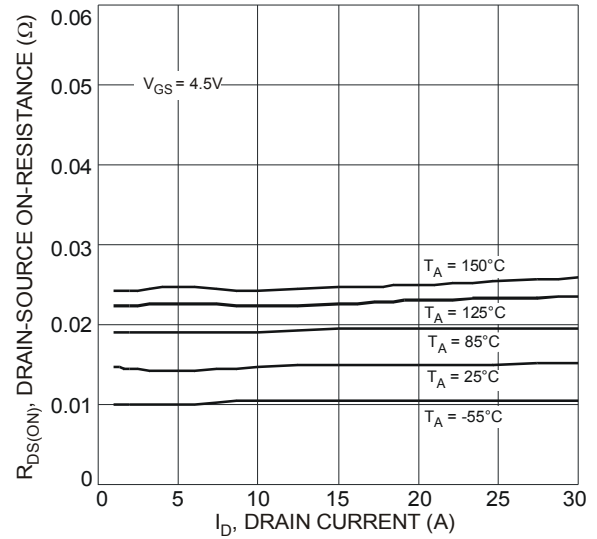


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

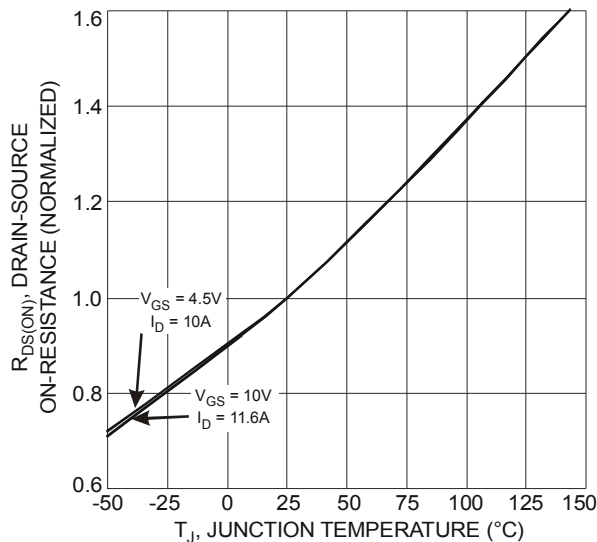


Fig. 5 On-Resistance Variation with Temperature

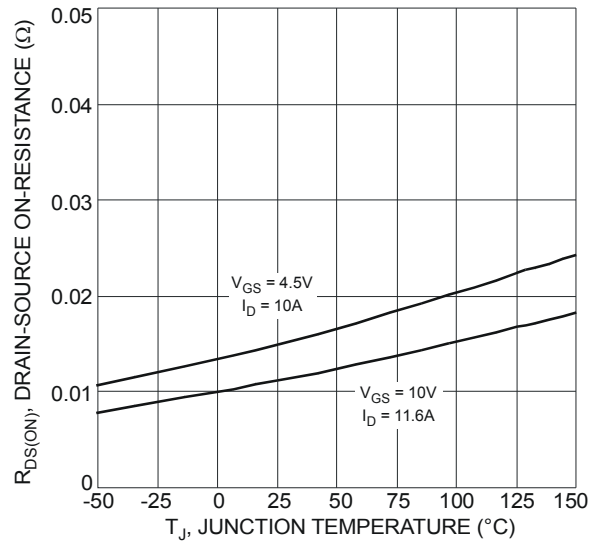


Fig. 6 On-Resistance Variation with Temperature

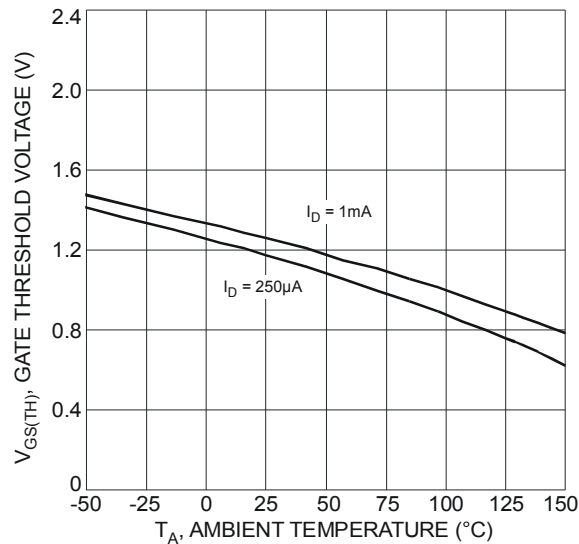


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

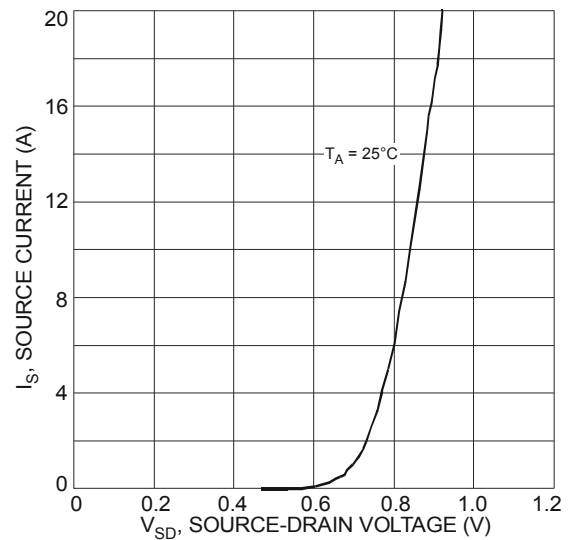


Fig. 8 Diode Forward Voltage vs. Current

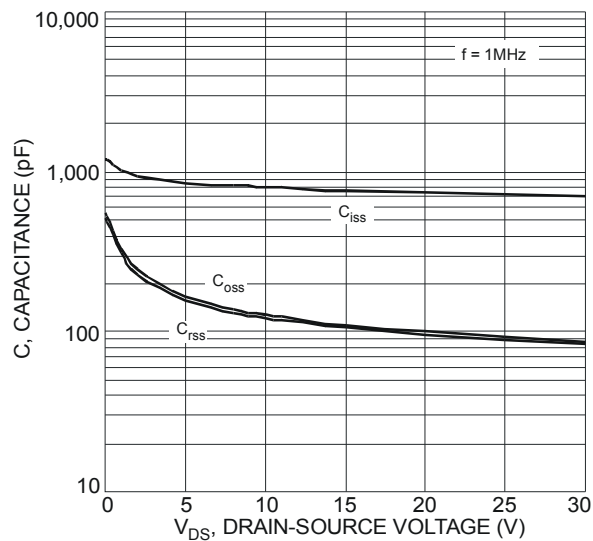


Fig. 9 Typical Capacitance

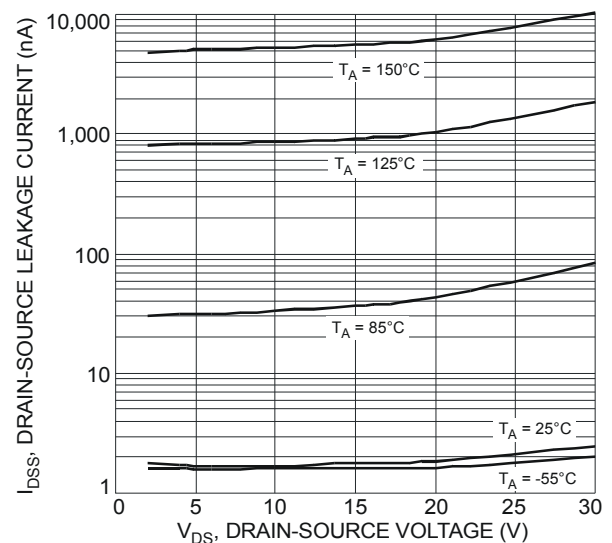
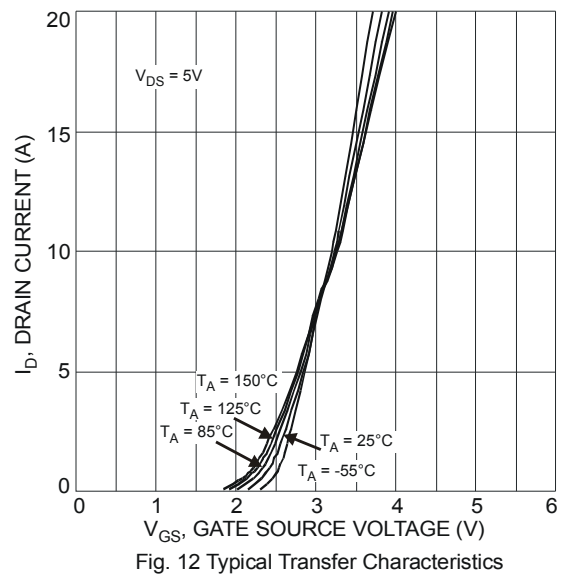
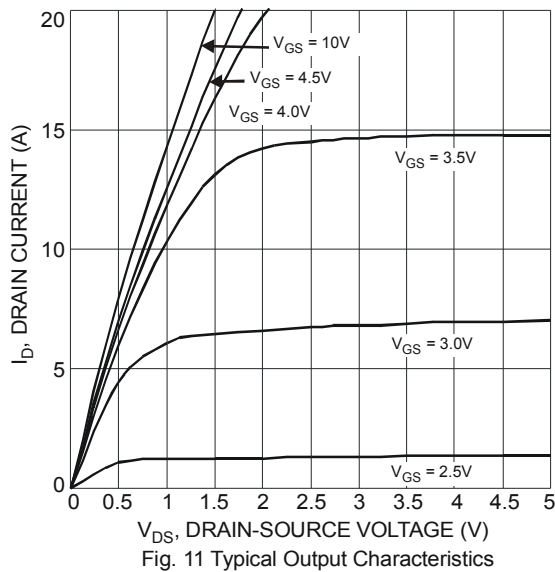


Fig. 10 Typical Drain-Source Leakage Current vs. Drain-Source Voltage

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

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



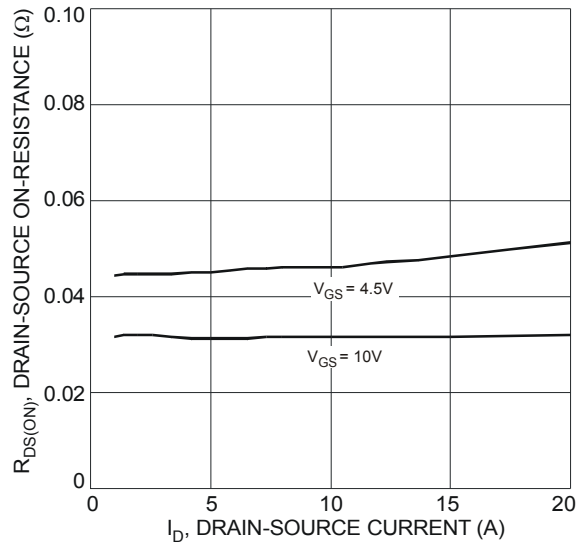


Fig. 13 Typical On-Resistance vs. Drain Current and Gate Voltage

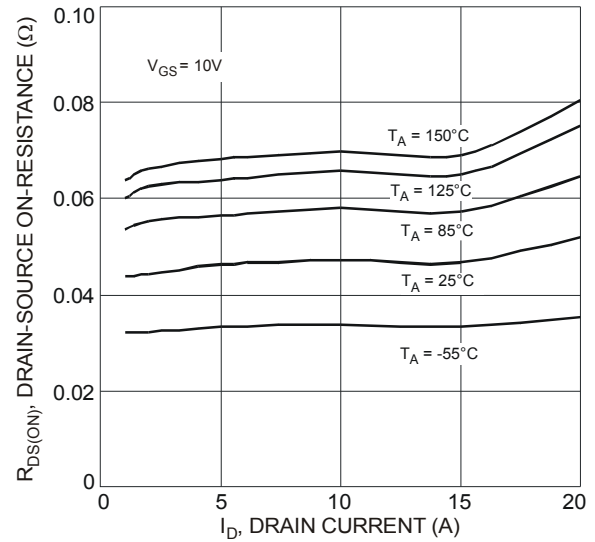


Fig. 14 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

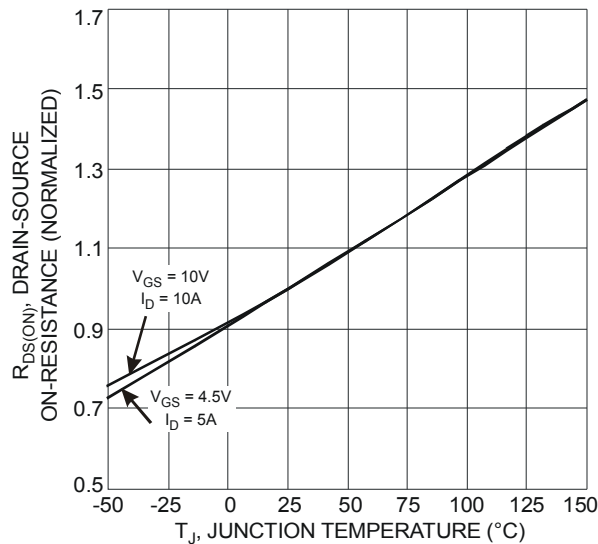


Fig. 15 On-Resistance Variation with Temperature

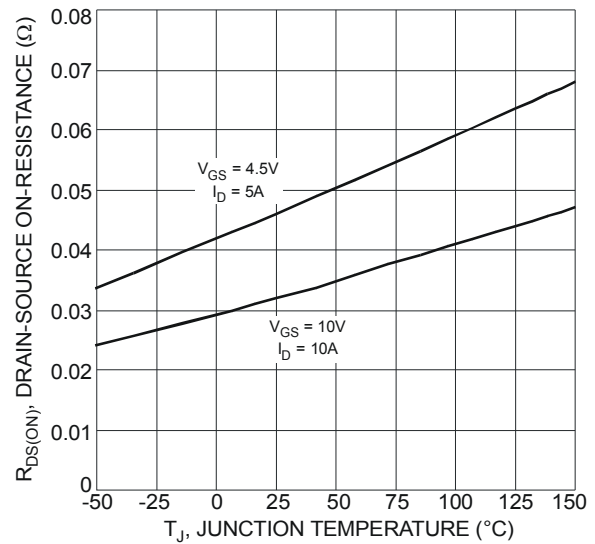


Fig. 16 On-Resistance Variation with Temperature

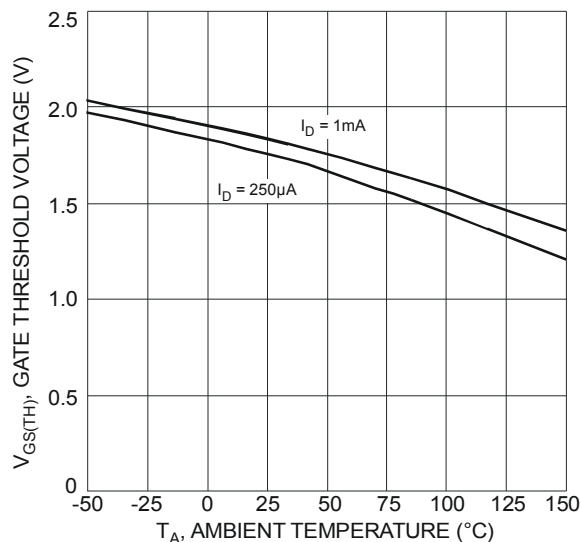


Fig. 17 Gate Threshold Variation vs. Ambient Temperature

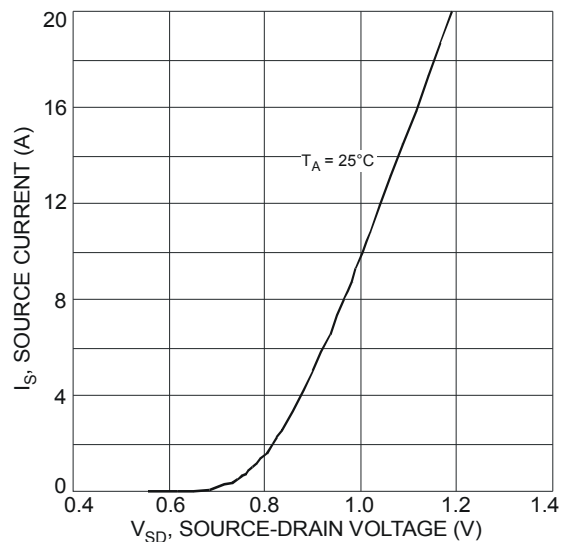


Fig. 18 Diode Forward Voltage vs. Current

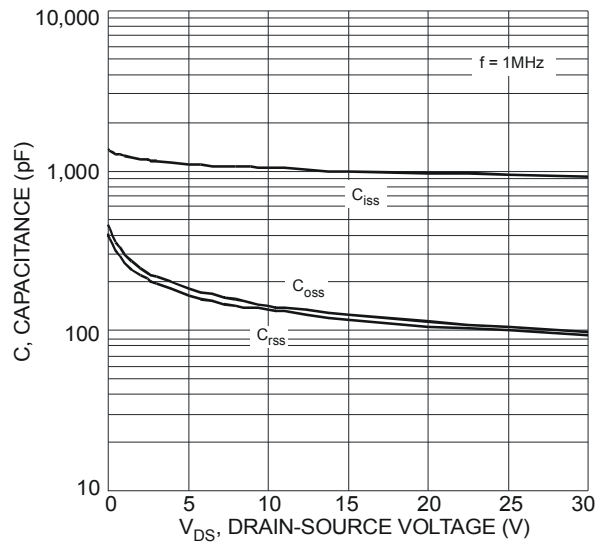


Fig. 19 Typical Capacitance

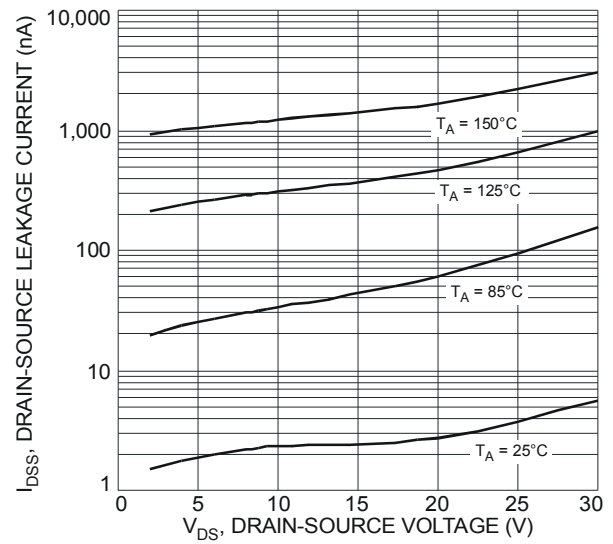
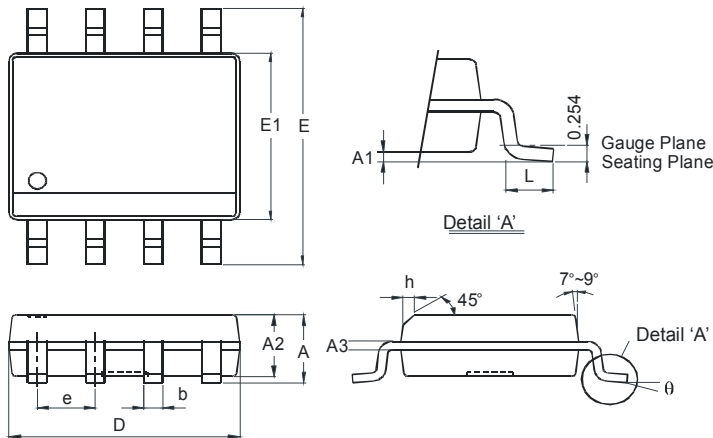


Fig. 20 Typical Drain-Source Leakage Current vs. Drain-Source Voltage

Package Outline Dimensions

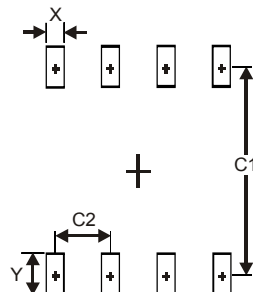
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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