Product Summary

Device	$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D T_A = +25°C
Q1	40V	15mΩ @ V_{GS} = 10V	12.2A
		20mΩ @ V_{GS} = 4.5V	10.6A
Q2	-40V	29mΩ @ V_{GS} = -10V	-8.8A
		45mΩ @ V_{GS} = -4.5V	-7.1A

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)**

Description

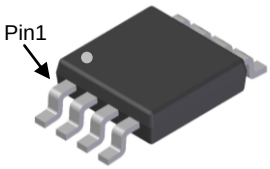
This new generation MOSFET is designed to minimize the on-state resistance ($R_{DS(ON)}$) yet maintain superior switching performance, which makes it ideal for high-efficiency power management applications.

Mechanical Data

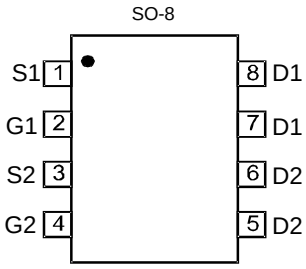
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish—Matte Tin Annealed over Copper Leadframe Solderable per MIL-STD-202, Method 208 e3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

Applications

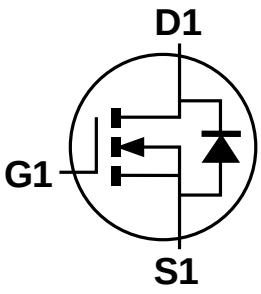
- DC-DC Converters
- Power Management Functions
- Backlighting



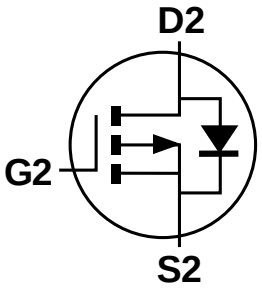
Top View



Top View
Pin Configuration



Q N-Channel MOSFET



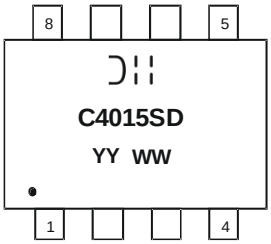
Q2 P-Channel MOSFET

Ordering Information (Note 4)

Part Number	Case	Packaging
DMC4015SSD-13	SO-8	2500/Tape & Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ 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, see http://www.diodes.com/products/packages.html.

Marking Information



C4015SD = Product Type Marking Code
YYWW = Date Code Marking
YY or YY = Year (ex: 18 = 2018)
WW = Week (01 - 53)

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

Characteristic			Symbol	Value_Q1	Value_Q2	Units
Drain-Source Voltage			V_{DSS}	40	-40	V
Gate-Source Voltage			V_{GSS}	±20	±20	V
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +70°C	I_D	8.6 6.8	-6.2 -4.9	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	12.2 9.8	-8.8 -7.1	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	80	-50	A
Maximum Body Diode Forward Current (Note 6)			I_S	2.5	-2.2	A
Pulsed Source Current (10µs Pulse, Duty Cycle = 1%)			I_{SM}	80	-50	A
Avalanche Current (Note 7) L = 0.1mH			I_{AS}	27	-25	A
Avalanche Energy (Note 7) L = 0.1mH			E_{AS}	37	32	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		0.9	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\Theta JA}$	106	°C/W
	t<10s		45	
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	1.7	W
	T_A = +70°C		1.1	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\Theta JA}$	76	°C/W
	t<10s		37	
Thermal Resistance, Junction to Case (Note 6)		$R_{\Theta JC}$	12	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics N-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}	40	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 40V, 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	$R_{DS(ON)}$	—	—	15	mΩ	V_{GS} = 10V, I_D = 3A
		—	—	20		V_{GS} = 4.5V, I_D = 3A
Diode Forward Voltage	V_{SD}	—	0.7	1.0	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1810	—	pF	V_{DS} = 20V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	135	—		
Reverse Transfer Capacitance	C_{rss}	—	112	—		
Gate Resistance	R_G	—	1.7	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	19	—	nC	V_{DS} = 20V, I_D = 3A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	40	—		
Gate-Source Charge	Q_{gs}	—	5.5	—		
Gate-Drain Charge	Q_{gd}	—	6.3	—		
Turn-On Delay Time	$t_{D(on)}$	—	5.1	—	nS	V_{DD} = 20V, I_D = 3A V_{GS} = 10V, R_G = 3Ω,
Turn-On Rise Time	t_r	—	5.7	—		
Turn-Off Delay Time	$t_{D(off)}$	—	23	—		
Turn-Off Fall Time	t_f	—	6.3	—		
Body Diode Reverse Recovery Time	t_{rr}	—	12.2	—	nS	I_S = 3A, dI/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q_{rr}	—	5.4	—	nC	I_S = 3A, dI/dt = 100A/µs

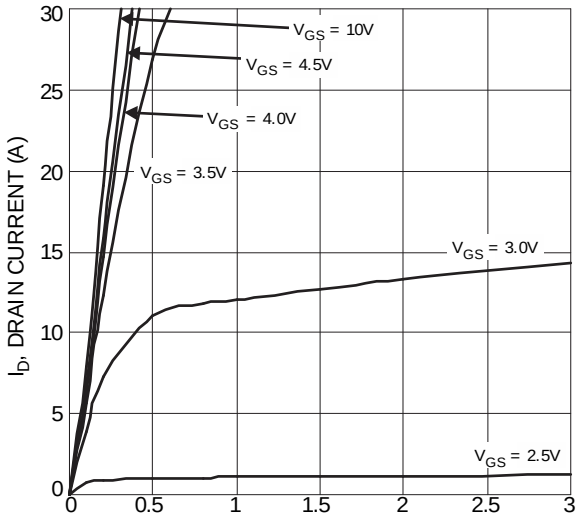


Figure 1 Typical Output Characteristics

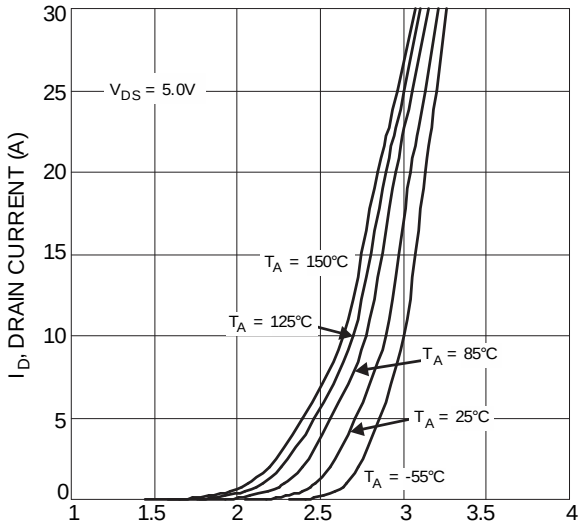


Figure 2 Typical Transfer Characteristics

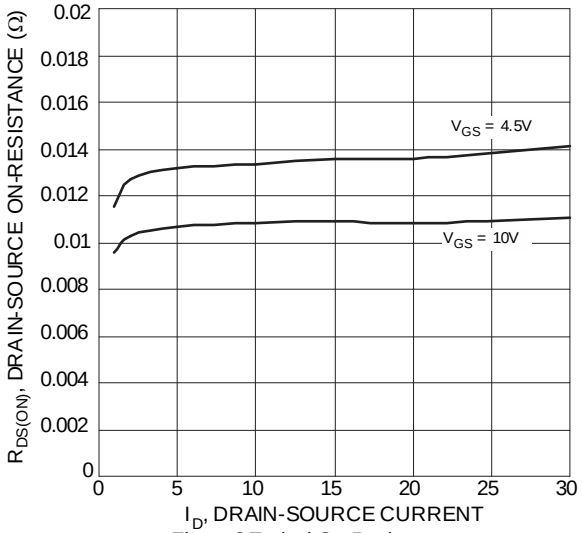


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

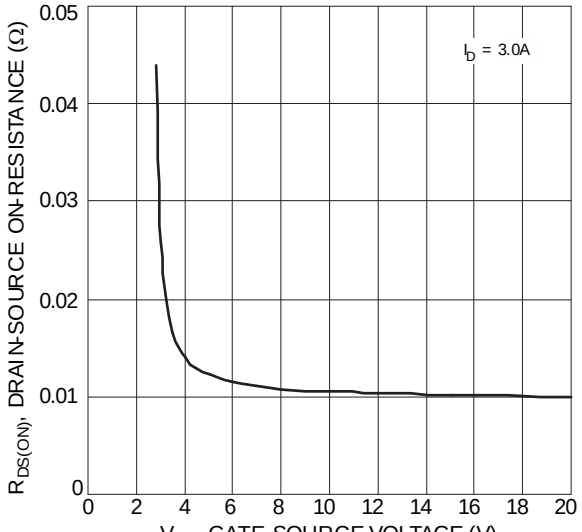


Figure 4 Typical Transfer Characteristic

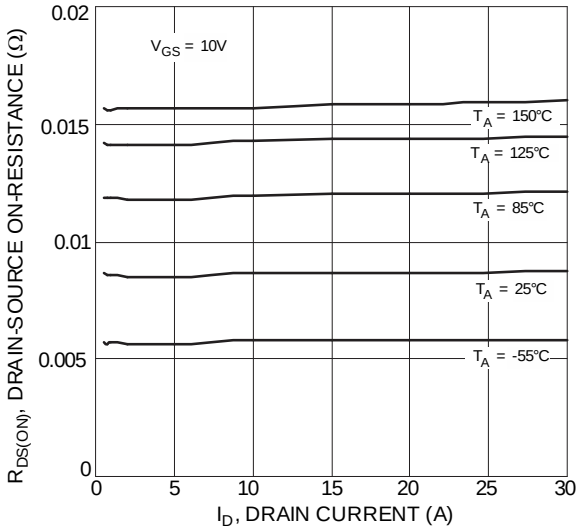


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

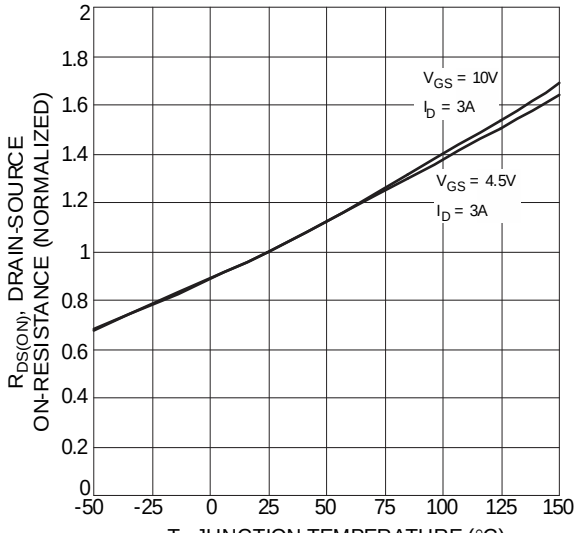


Figure 6 On-Resistance Variation with Temperature

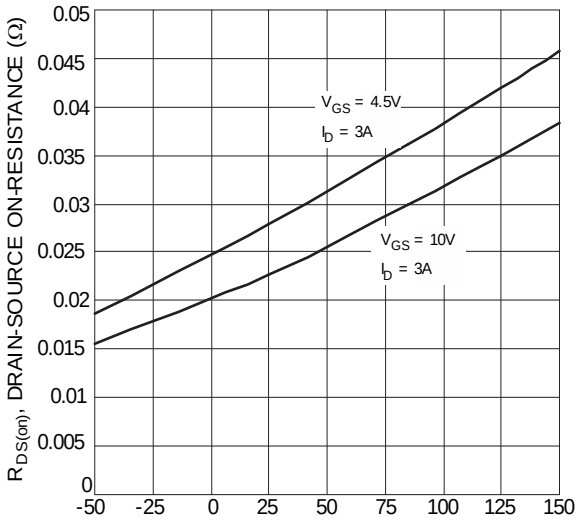


Figure 7 On-Resistance Variation with Temperature

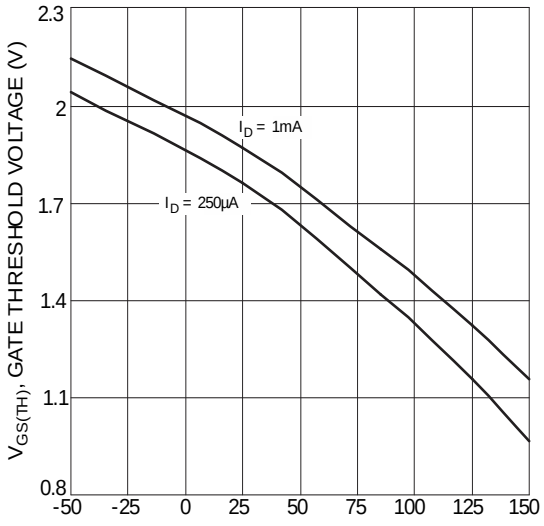


Figure 8 Gate Threshold Variation vs. Ambient Temperature

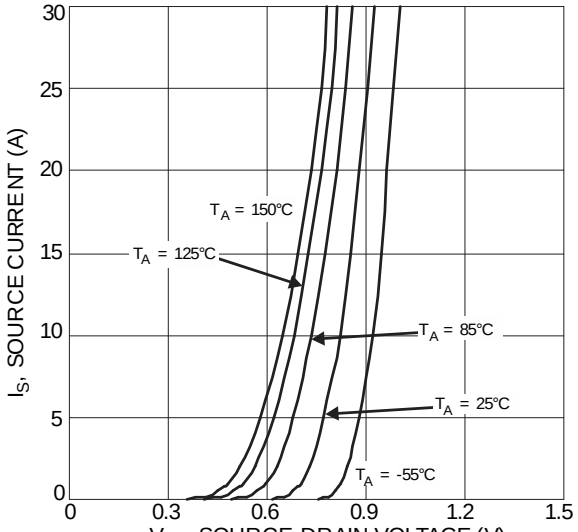


Figure 9 Diode Forward Voltage vs. Current

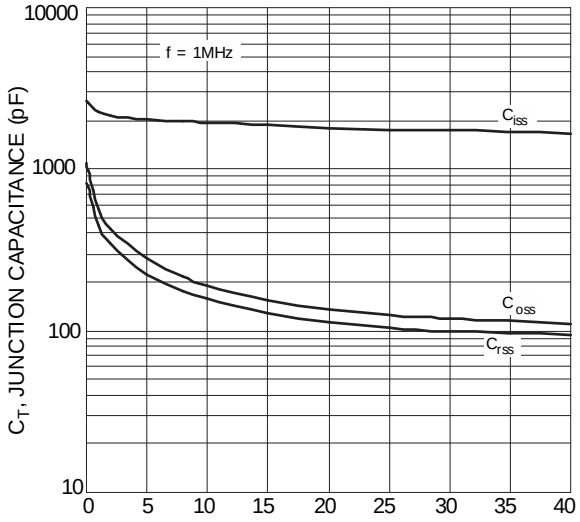


Figure 10 Typical Junction Capacitance

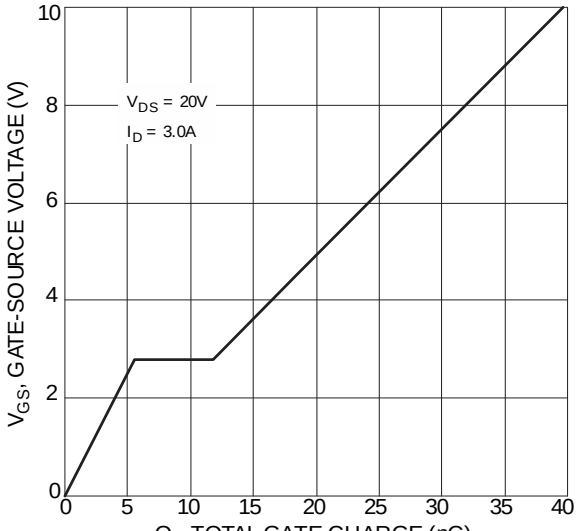


Figure 11 Gate-Charge Characteristics

Electrical Characteristics P-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}	-40	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	µA	V_{DS} = -40V, 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	$R_{DS(ON)}$	—	—	29	mΩ	V_{GS} = -10V, I_D = -3A
		—	—	45		V_{GS} = -4.5V, I_D = -3A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.2	V	V_{GS} = 0V, I_S = -1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1626	—	pF	V_{DS} = -20V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	135	—		
Reverse Transfer Capacitance	C_{rss}	—	107	—		
Gate Resistance	R_G	—	11	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = -4.5V)	Q_g	—	17	—	nC	V_{DS} = -20V, I_D = -3A
Total Gate Charge (V_{GS} = -10V)	Q_g	—	34	—		
Gate-Source Charge	Q_{gs}	—	3.7	—		
Gate-Drain Charge	Q_{gd}	—	6.0	—		
Turn-On Delay Time	$t_{D(on)}$	—	3.9	—	nS	V_{DD} = -20V, R_L = 1.6Ω, V_{GS} = -10V, R_G = 3Ω, I_D = -3A
Turn-On Rise Time	t_r	—	2.8	—		
Turn-Off Delay Time	$t_{D(off)}$	—	83	—		
Turn-Off Fall Time	t_f	—	30	—		
Body Diode Reverse Recovery Time	t_{rr}	—	17.3	—	nS	I_S = -3A, dI/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q_{rr}	—	7.2	—	nC	I_S = -3A, dI/dt = 100A/µs

Notes:
5. Device mounted on FR-4 substrate PCB, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PCB, 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.

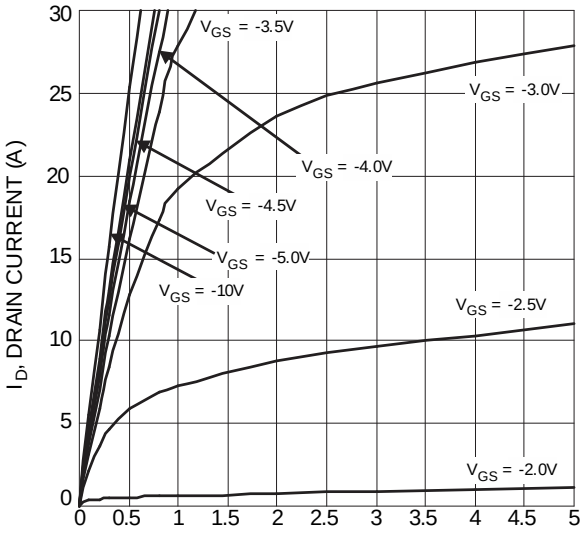


Figure 12 Typical Output Characteristics

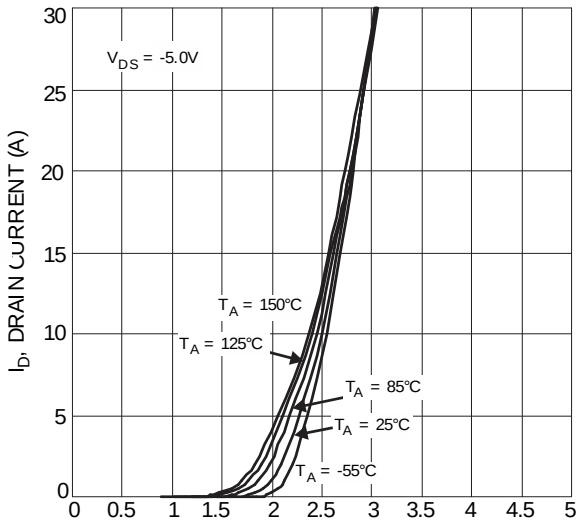


Figure 13 Typical Transfer Characteristics

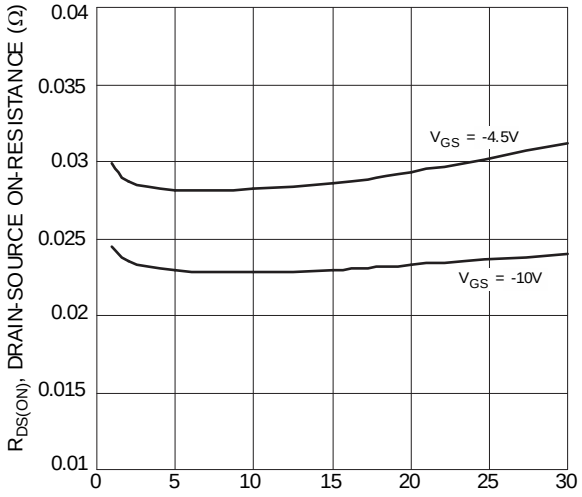


Figure 14 Typical On-Resistance vs. Drain Current and Gate Voltage

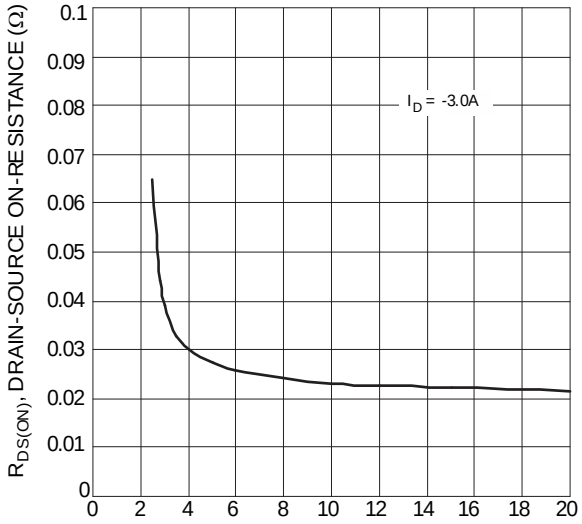


Figure 15 Typical Transfer Characteristic

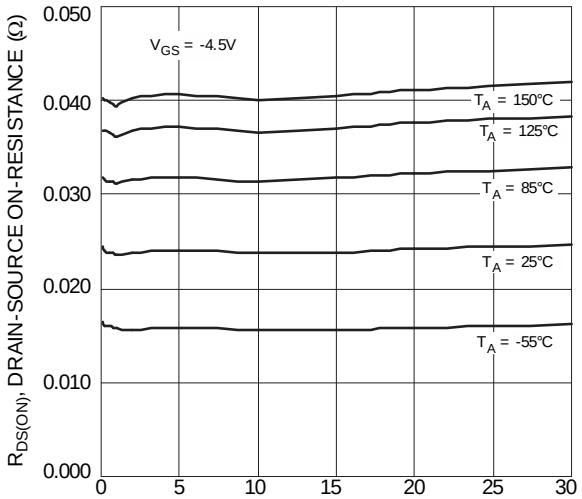


Figure 16 Typical On-Resistance vs. Drain Current and Temperature

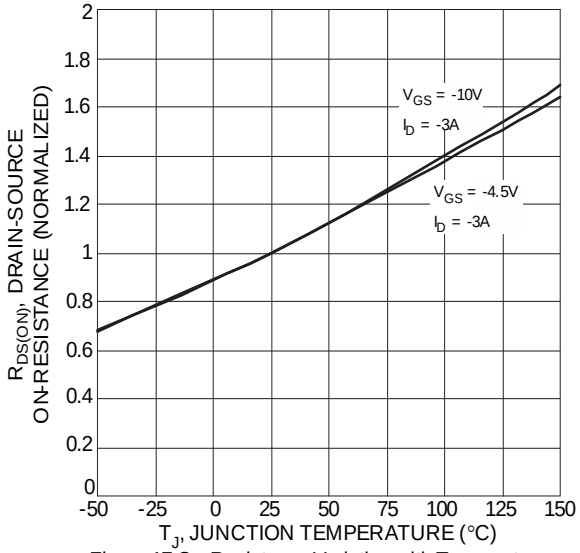


Figure 17 On-Resistance Variation with Temperature

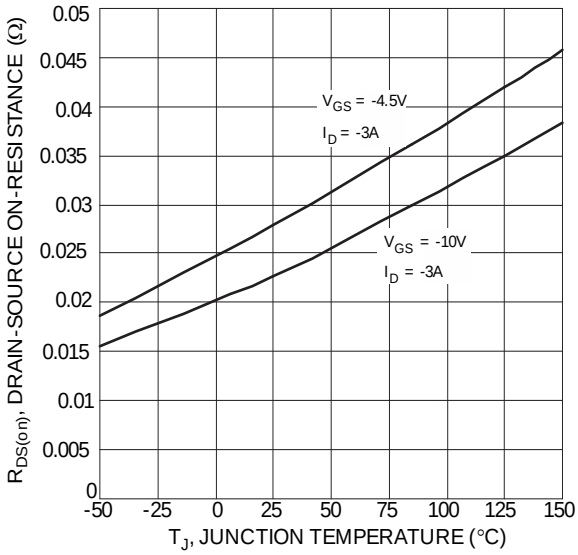


Figure 18 On-Resistance Variation with Temperature

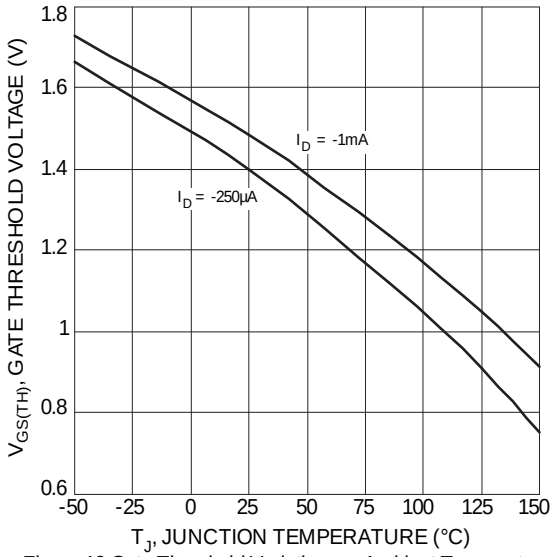


Figure 19 Gate Threshold Variation vs. Ambient Temperature

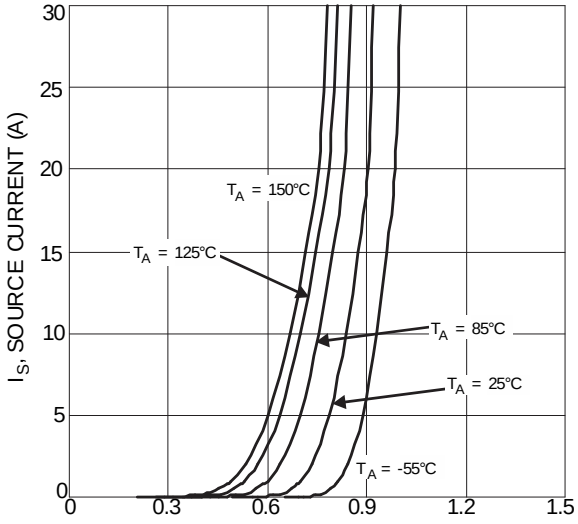


Figure 20 Diode Forward Voltage vs. Current

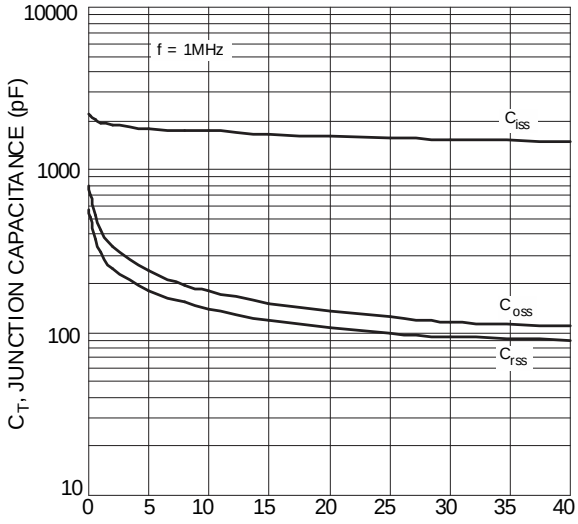


Figure 21 Typical Junction Capacitance

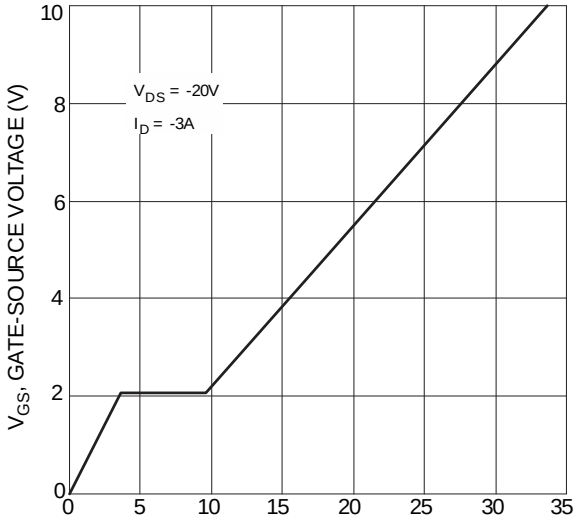
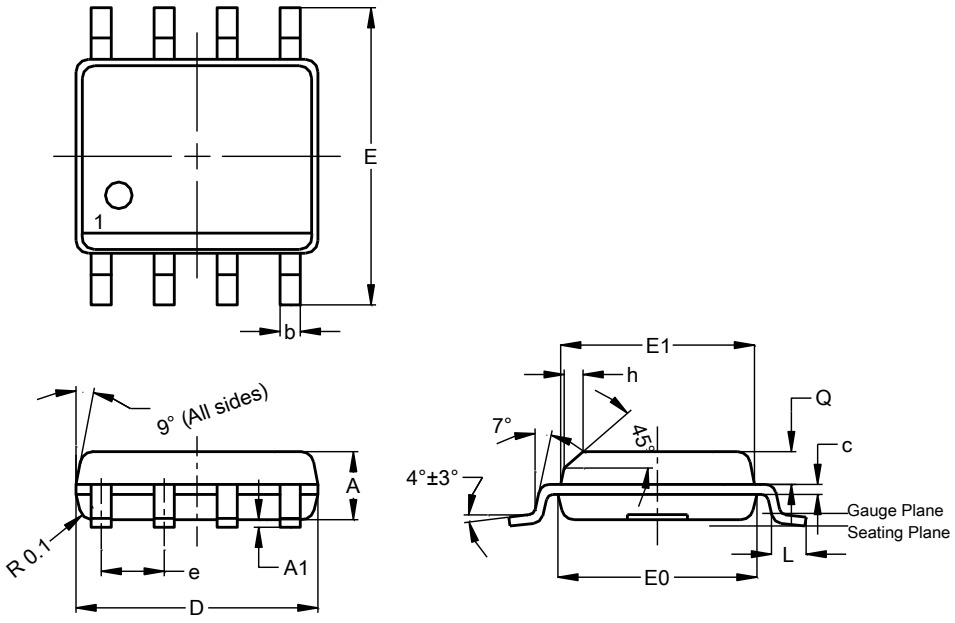


Figure 22 Gate-Charge Characteristics

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version

SO-8

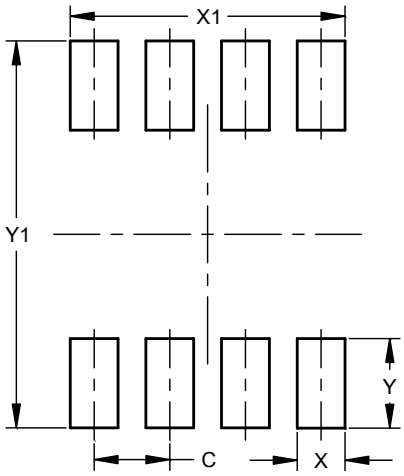


SO-8			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.50	1.45
A1	0.10	0.20	0.15
b	0.30	0.50	0.40
c	0.15	0.25	0.20
D	4.85	4.95	4.90
E	5.90	6.10	6.00
E1	3.80	3.90	3.85
E0	3.85	3.95	3.90
e	—	—	1.27
h	—	—	0.35
L	0.62	0.82	0.72
Q	0.60	0.70	0.65
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

SO-8



Dimensions	Value (in mm)
C	1.27
X	0.802
X1	4.612
Y	1.505
Y1	6.50

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1. are intended to implant into the body, or

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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