

Product Summary

Device	V _{(BR)DSS}	R _{DS(on)} max	I _D T _A = +25°C
Q2	40V	24mΩ @ V _{GS} = 10V	9.0A
		32mΩ @ V _{GS} = 4.5V	7.8A
Q1	-40V	45mΩ @ V _{GS} = -10V	-6.5A
		55mΩ @ V _{GS} = -4.5V	-5.9A

Description

This new generation MOSFET has been 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.


Applications

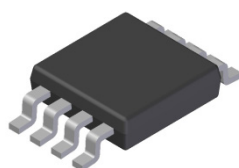
- DC-DC Converters
- Power Management Functions
- Backlighting

Features and Benefits

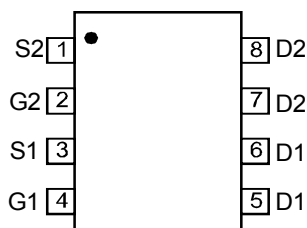
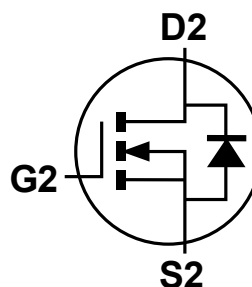
- Low Input Capacitance
- Low On-Resistance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

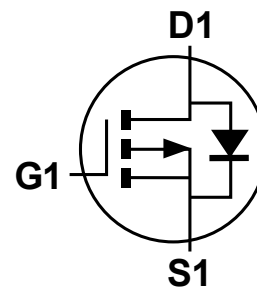
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208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



Top View


 TOP VIEW
Internal Schematic


N-Channel MOSFET



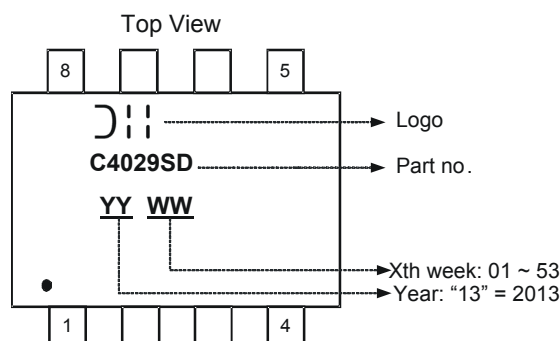
P-Channel MOSFET

Ordering Information (Note 4 & 5)

Part Number	Compliance	Case	Packaging
DMC4029SSD-13	Standard	SO-8	2,500/Tape & Reel
DMC4029SSDQ-13	Automotive	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



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

Characteristic			Symbol	Value_Q2	Value_Q1	Units
Drain-Source Voltage			V _{DSS}	40	-40	V
Gate-Source Voltage			V _{GSS}	±20	±20	V
Continuous Drain Current (Note 7) V _{GS} = 10V	Steady State	T _A = +25°C T _A = +70°C	I _D	7.0 5.6	-5.1 -4.1	A
	t < 10s	T _A = +25°C T _A = +70°C	I _D	9.0 7.2	-6.5 -5.2	A
Maximum Body Diode Forward Current (Note 7)			I _S	2.5	-2.5	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I _{DM}	70	-40	A

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	1.3	W
	T _A = +70°C		0.8	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	R _{θJA}	98	°C/W
	t < 10s		59	
Total Power Dissipation (Note 7)	T _A = +25°C	P _D	1.8	W
	T _A = +70°C		1.1	
Thermal Resistance, Junction to Ambient (Note 7)	Steady state	R _{θJA}	71	°C/W
	t < 10s		43	
Thermal Resistance, Junction to Case (Note 7)		R _{θJC}	11.8	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

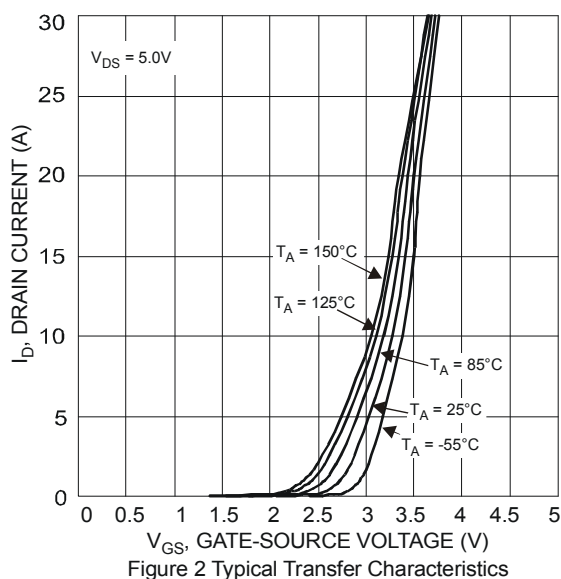
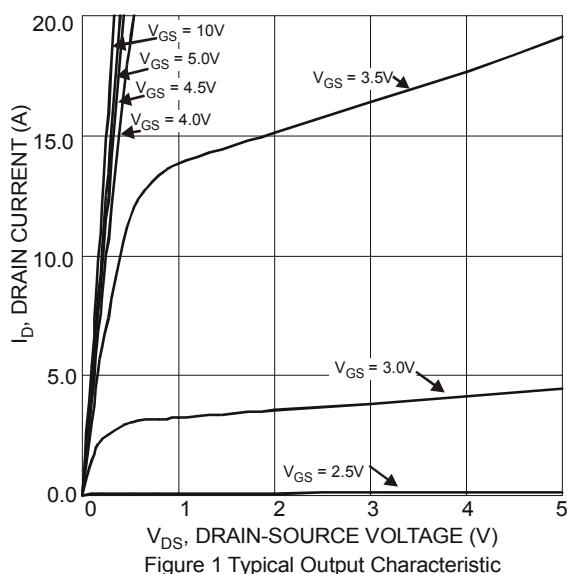
Electrical Characteristics N-Channel Q2 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV _{DSS}	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)}	1.0	—	3.0	V	V _{DS} = V _{GS} , I _D = 250µA
Static Drain-Source On-Resistance	R _{DS(on)}	—	15	24	mΩ	V _{GS} = 10V, I _D = 6A
		—	20	32		V _{GS} = 4.5V, I _D = 5A
Diode Forward Voltage	V _{SD}	—	0.7	1.0	V	V _{GS} = 0V, I _S = 1.0A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	1060	—	pF	V _{DS} = 20V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	84	—		
Reverse Transfer Capacitance	C _{rss}	—	58	—		
Gate Resistance	R _G	—	1.6	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	8.8	—	nC	V _{DS} = 20V, I _D = 8A
Total Gate Charge (V _{GS} = 10V)	Q _g	—	19.1	—		
Gate-Source Charge	Q _{gs}	—	3.0	—		
Gate-Drain Charge	Q _{gd}	—	2.5	—		
Turn-On Delay Time	t _{D(on)}	—	5.3	—	nS	V _{DD} = 25V, R _L = 2.5Ω V _{GS} = 10V, R _G = 3Ω
Turn-On Rise Time	t _r	—	7.1	—		
Turn-Off Delay Time	t _{D(off)}	—	15.1	—		
Turn-Off Fall Time	t _f	—	4.8	—		
Body Diode Reverse Recovery Time	t _{rr}	—	10.5	—	nS	I _F = 8A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q _{rr}	—	4.15	—	nC	I _F = 8A, di/dt = 100A/µs

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}	-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)}	-1.0	—	-3.0	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	33	45	mΩ	V _{GS} = -10V, I _D = -5A
		—	40	55		V _{GS} = -4.5V, I _D = -4A
Diode Forward Voltage	V _{SD}	—	-0.7	-1.0	V	V _{GS} = 0V, I _S = -1.0A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	1154	—	pF	V _{DS} = -20V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oss}	—	84	—		
Reverse Transfer Capacitance	C _{rss}	—	66	—		
Gate Resistance	R _G	—	12.6	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	10.6	—	nC	V _{DS} = -20V, I _D = -4.9A
Total Gate Charge (V _{GS} = -10V)	Q _g	—	21.5	—		
Gate-Source Charge	Q _{gs}	—	2.2	—		
Gate-Drain Charge	Q _{gd}	—	3.3	—		
Turn-On Delay Time	t _{D(on)}	—	8.7	—	nS	V _{DS} = -20V, I _D = -3.9A V _{GS} = -4.5V, R _G = 1Ω
Turn-On Rise Time	t _r	—	19.6	—		
Turn-Off Delay Time	t _{D(off)}	—	34.9	—		
Turn-Off Fall Time	t _f	—	25.5	—		
Body Diode Reverse Recovery Time	t _{rr}	—	9.61	—	nS	I _S = -3.9A, dI/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q _{rr}	—	3.3	—	nC	I _S = -3.9A, dI/dt = 100A/μs

- Notes:
6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 7. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 8. Short duration pulse test used to minimize self-heating effect.
 9. Guaranteed by design. Not subject to product testing.

N-Channel Q2


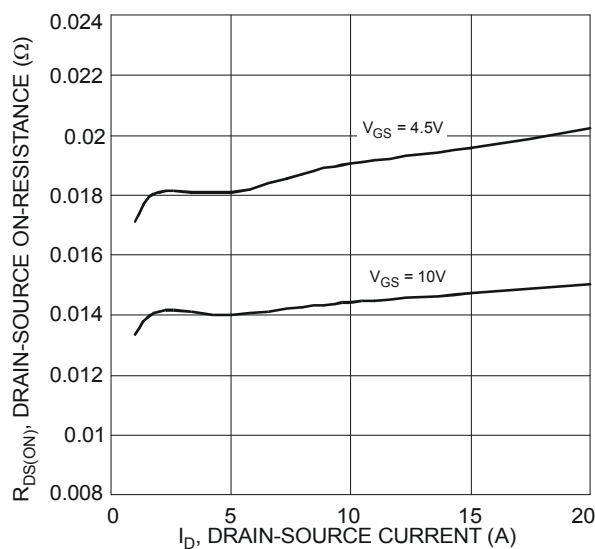


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

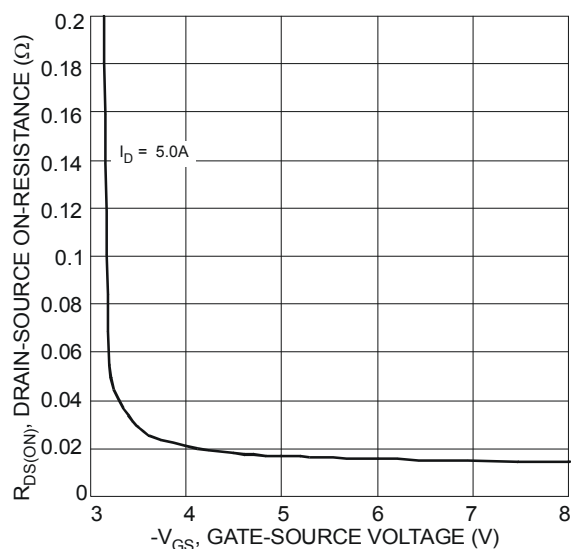


Figure 4 Typical Transfer Characteristic

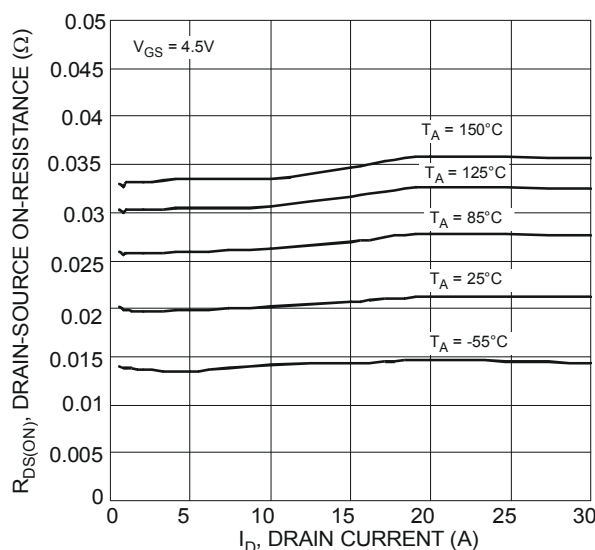


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

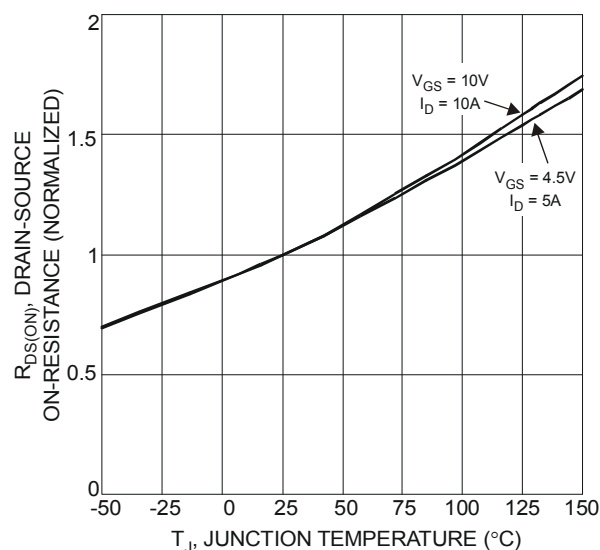


Figure 6 On-Resistance Variation with Temperature

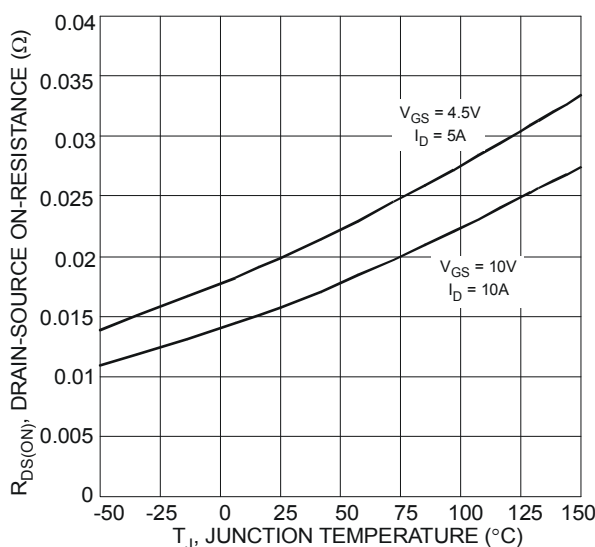


Figure 7 On-Resistance Variation with Temperature

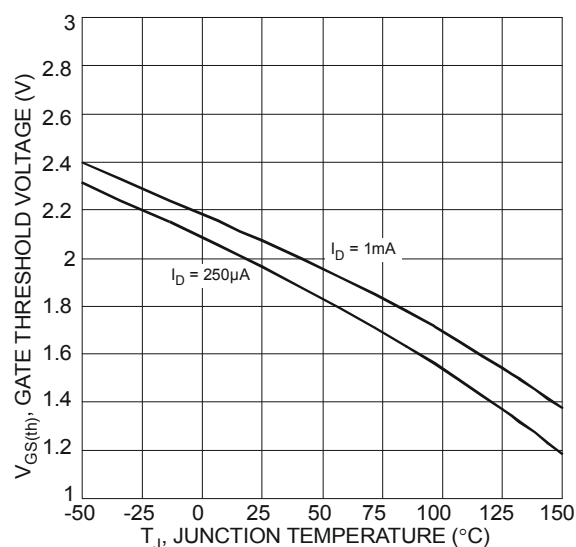


Figure 8 Gate Threshold Variation vs. Ambient Temperature

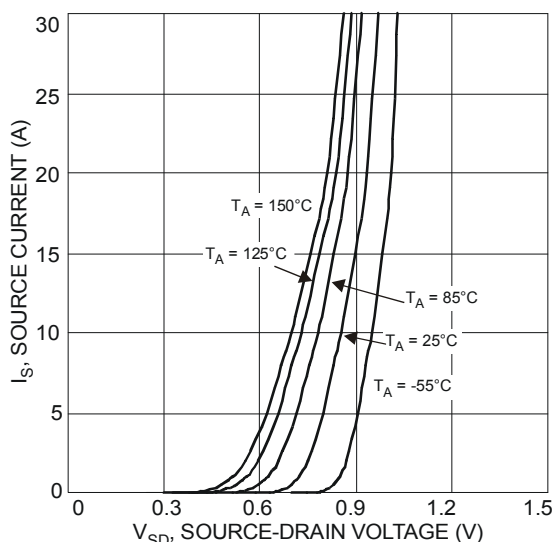


Figure 9 Diode Forward Voltage vs. Current

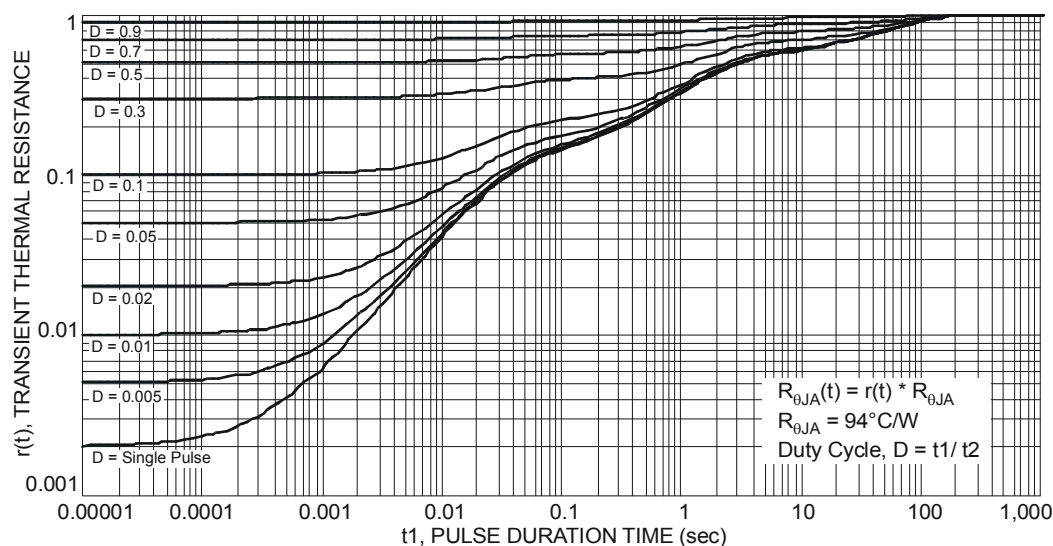


Figure 10 Transient Thermal Resistance

P-Channel Q1

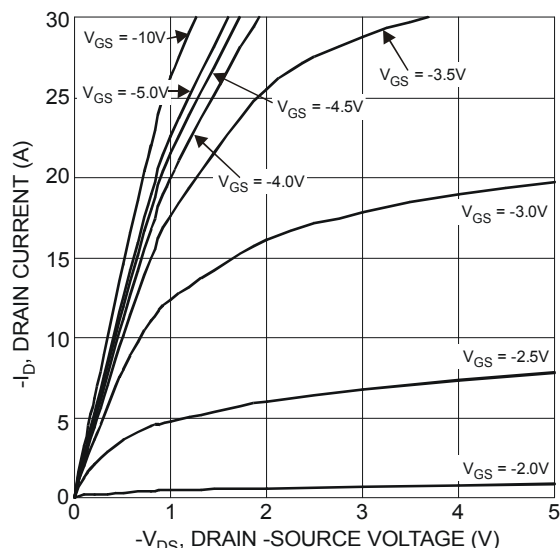


Figure 1 Typical Output Characteristics

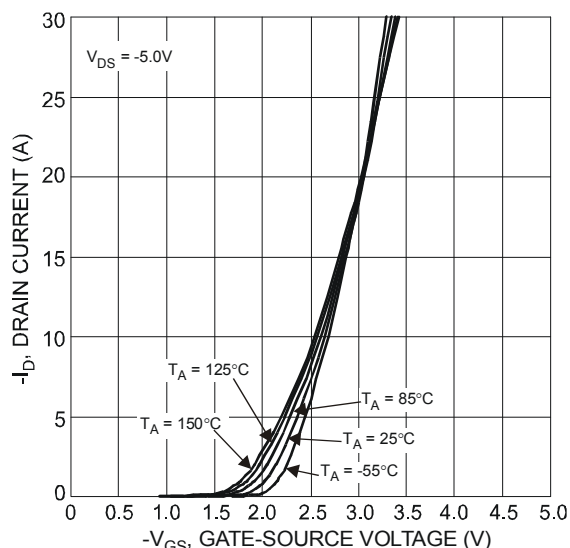


Figure 2 Typical Transfer Characteristics

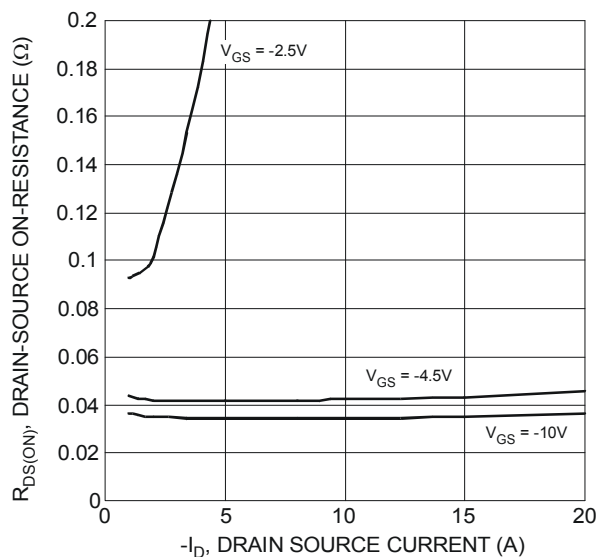


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

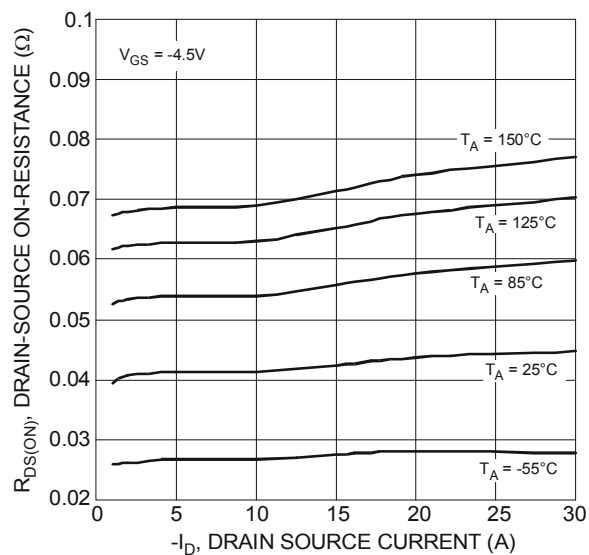


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

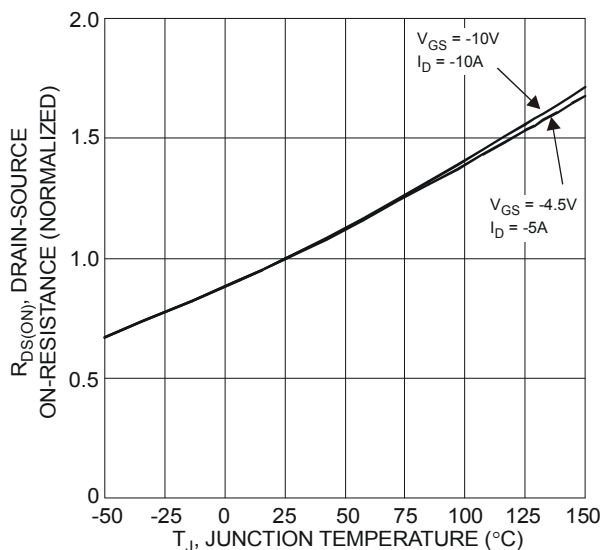


Figure 5 On-Resistance Variation with Temperature

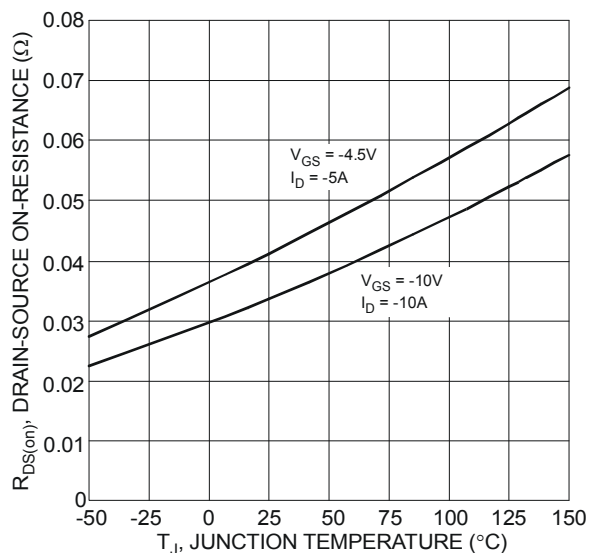


Figure 6 On-Resistance Variation with Temperature

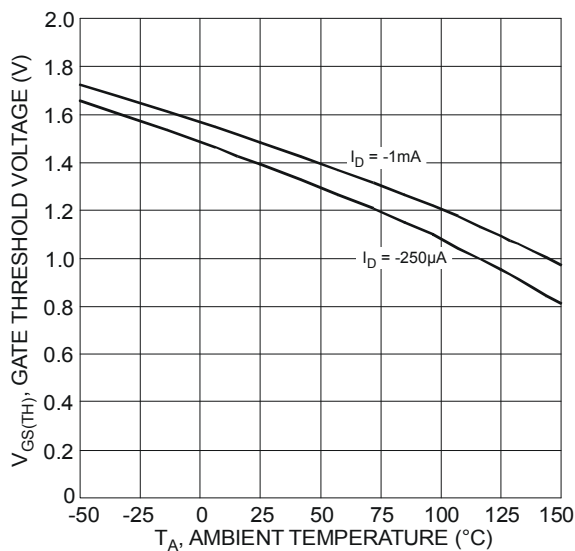


Figure 7 Gate Threshold Variation vs. Ambient Temperature

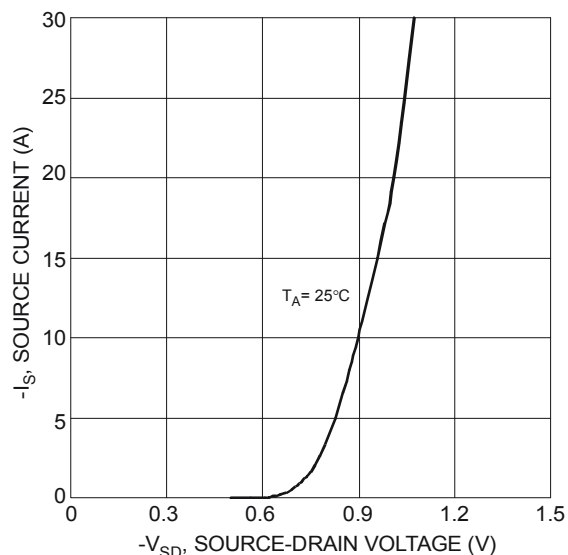
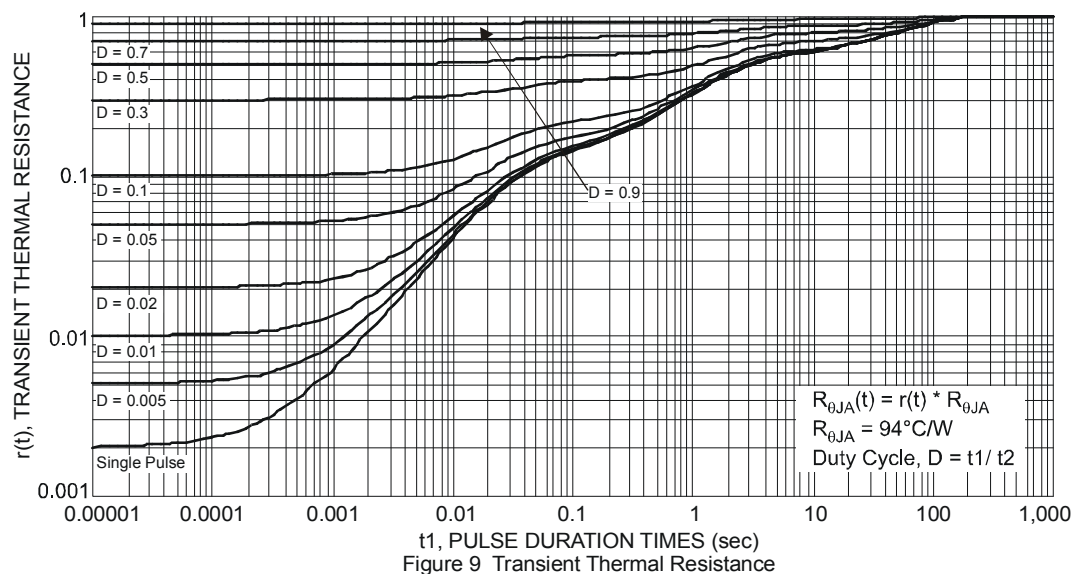
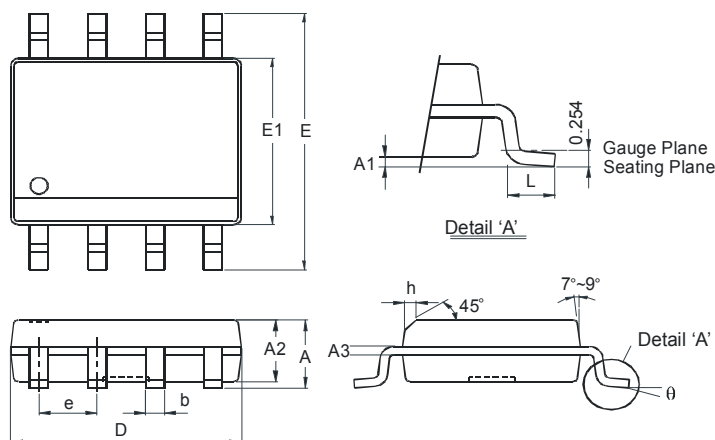


Figure 8 Diode Forward Voltage vs. Current



Package Outline Dimensions

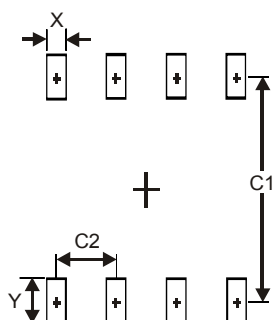
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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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