

Product Summary

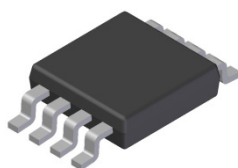
Device	$V_{(BR)DSS}$	$R_{DS(on) \max}$	I_D $T_A = +25^\circ\text{C}$
Q2	40V	24m Ω @ $V_{GS} = 10\text{V}$	6.9A
		32m Ω @ $V_{GS} = 4.5\text{V}$	6.0A
Q1	-40V	45m Ω @ $V_{GS} = -10\text{V}$	-5.1A
		55m Ω @ $V_{GS} = -4.5\text{V}$	-4.5A

Description

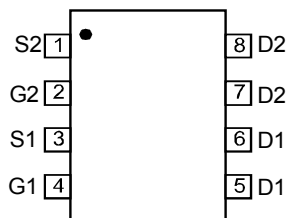
This new generation MOSFET has been designed to minimize the on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

- DC-DC Converters
- Power Management Functions
- Backlighting



Top View



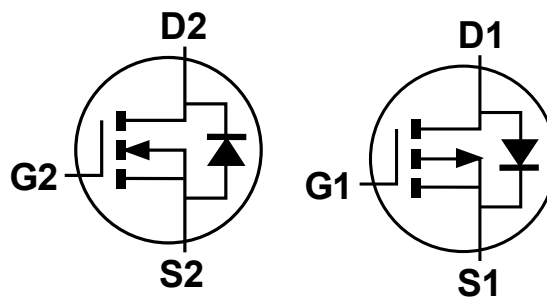
TOP VIEW
Internal Schematic

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 – Matte Tin annealed over Copper leadframe
Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.074 grams (approximate)



N-Channel MOSFET

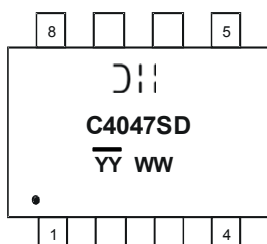
P-Channel MOSFET

Ordering Information (Note 4)

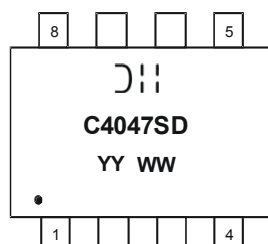
Part Number	Case	Packaging
DMC4047LSD-13	SO-8	2,500/Tape & Reel

- 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



Chengdu A/T Site



Shanghai A/T Site

☺|| = Manufacturer's Marking
 C4047SD = Product Type Marking Code
 YYWW = Date Code Marking
 YY or YY = Year (ex: 13 = 2013)
 WW = Week (01 - 53)
 YY = Date Code Marking for SAT (Shanghai Assembly/ Test site)
 YY = Date Code Marking for CAT (Chengdu Assembly/ Test site)

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, 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 6) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D 7.0 5.6	-5.1 -4.1	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D 9.0 7.2	-6.5 -5.2	A
Maximum Body Diode Forward Current (Note 6)		I_S	2.5	-2.5	A
Pulsed Drain Current (10 μs pulse, duty cycle = 1%)		I_{DM}	70	-40	A
Avalanche Current (Notes 7) $L = 0.1\text{mH}$		I_{AR}	20	20	A
Repetitive Avalanche Energy (Notes 7) $L = 0.1\text{mH}$		E_{AR}	20	20	mJ

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	P_D	1.3	W
	$T_A = +70^\circ\text{C}$		0.8	
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	$R_{\theta JA}$	98	$^\circ\text{C/W}$
	$t < 10\text{s}$		59	
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$	P_D	1.8	W
	$T_A = +70^\circ\text{C}$		1.1	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	$R_{\theta JA}$	71	$^\circ\text{C/W}$
	$t < 10\text{s}$		43	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	11.8	$^\circ\text{C}$
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Electrical Characteristics N-Channel Q2 (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	40	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 40\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	1.4	—	2.4	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	15	24	m Ω	$V_{GS} = 10\text{V}, I_D = 6\text{A}$
		—	20	32		$V_{GS} = 4.5\text{V}, I_D = 5\text{A}$
Diode Forward Voltage	V_{SD}	—	0.7	1.0	V	$V_{GS} = 0\text{V}, I_S = 1.0\text{A}$
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1060	—	pF	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	84	—		
Reverse Transfer Capacitance	C_{rss}	—	58	—		
Gate Resistance	R_G	—	1.6	—	Ω	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Total Gate Charge ($V_{GS} = 4.5\text{V}$)	Q_g	—	8.8	—	nC	$V_{DS} = 20\text{V}, I_D = 8\text{A}$
Total Gate Charge ($V_{GS} = 10\text{V}$)	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	$V_{DD} = 25\text{V}, R_L = 2.5\Omega, V_{GS} = 10\text{V}, R_G = 3\Omega$
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	$I_F = 8\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	Q_{rr}	—	4.15	—	nC	$I_F = 8\text{A}, di/dt = 100\text{A}/\mu\text{s}$

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	—	-2.2	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}	—	3.30	—	nC	I _S = -3.9A, dI/dt = 100A/μs

- 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. IAR and EAR 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.

N-Channel Q2

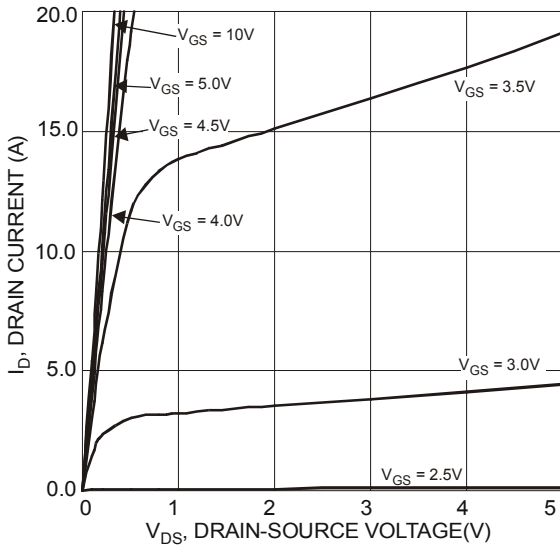


Figure 1 Typical Output Characteristics

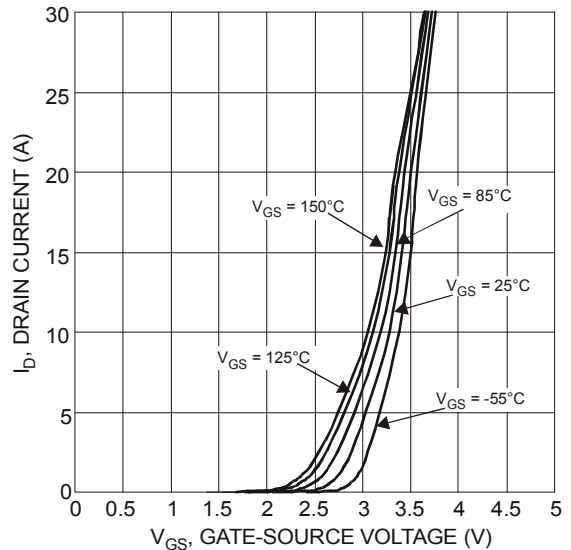


Figure 2 Typical Transfer Characteristics

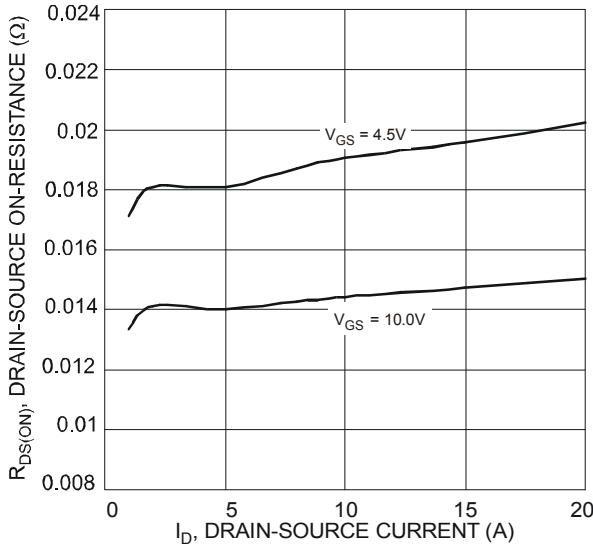


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

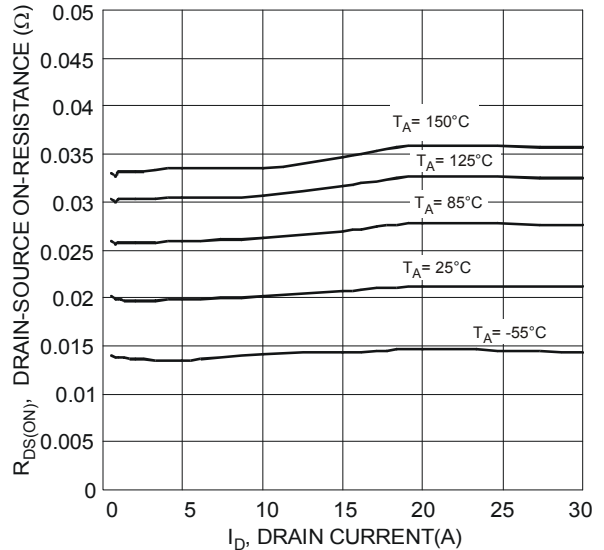


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

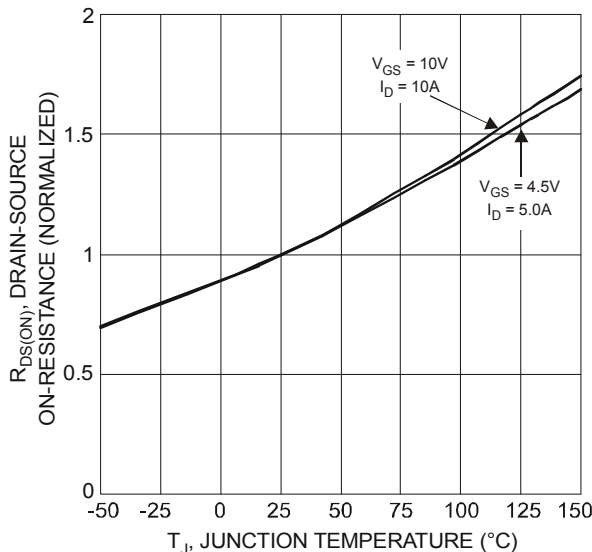


Figure 5 On-Resistance Variation with Temperature

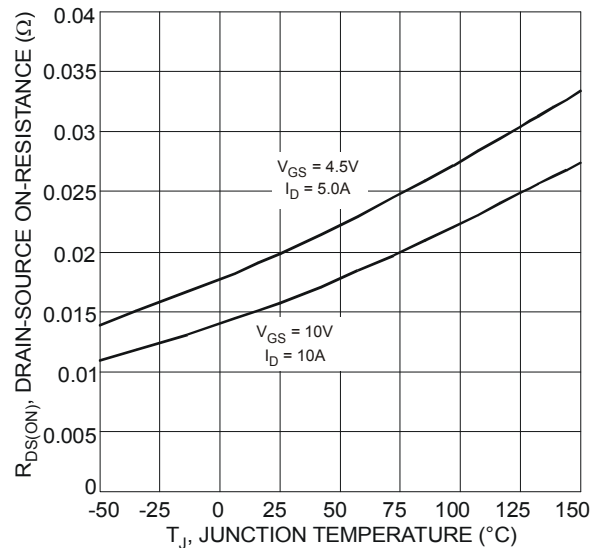


Figure 6 On-Resistance Variation with Temperature

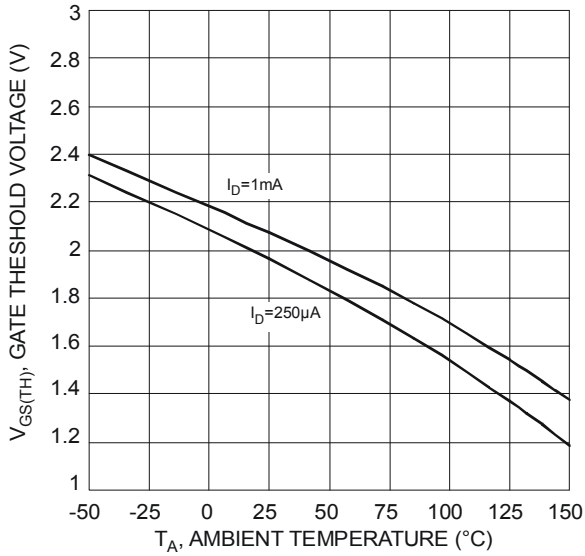


Figure 7 Gate Threshold Variation vs Ambient Temperature

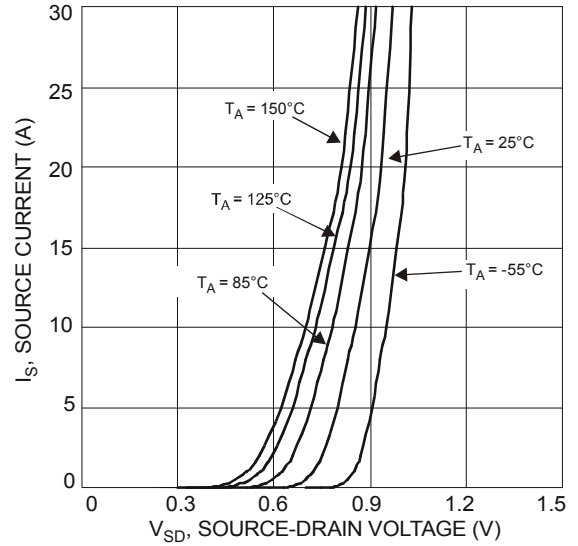


Figure 8 Diode Forward Voltage vs. Current

P-Channel Q1

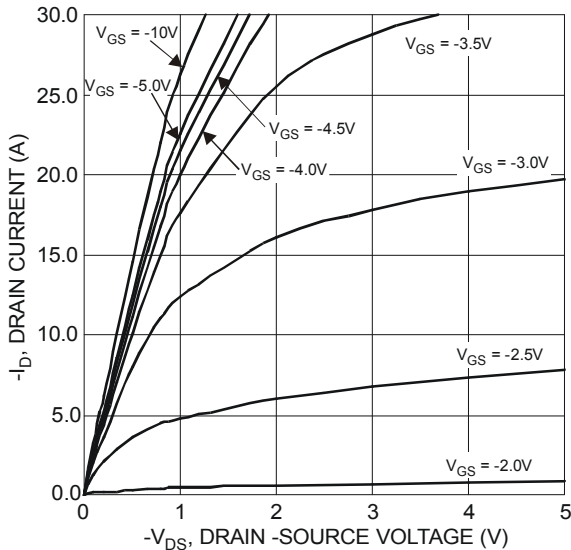


Figure 9 Typical Output Characteristics

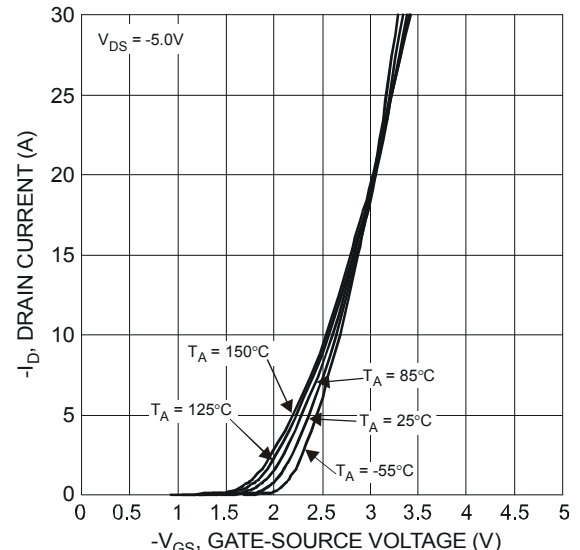


Figure 10 Typical Transfer Characteristics

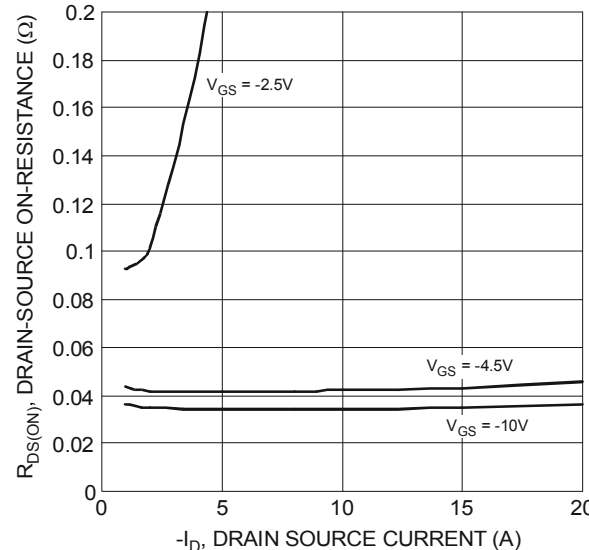


Figure 11 Typical On-Resistance vs. Drain Current and Gate Voltage

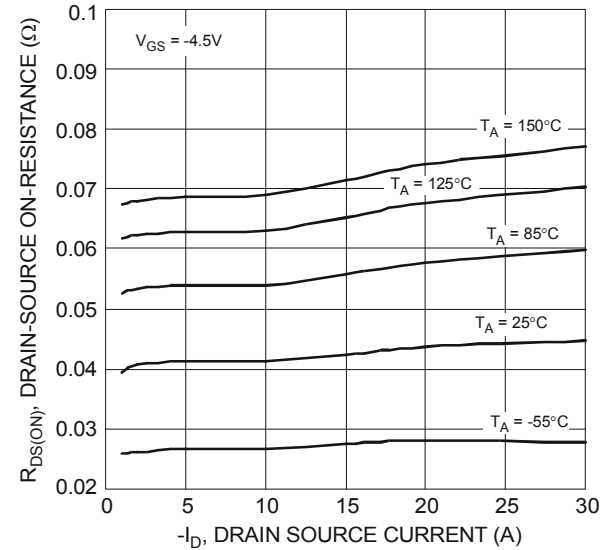


Figure 12 Typical On-Resistance vs. Drain Current and Temperature

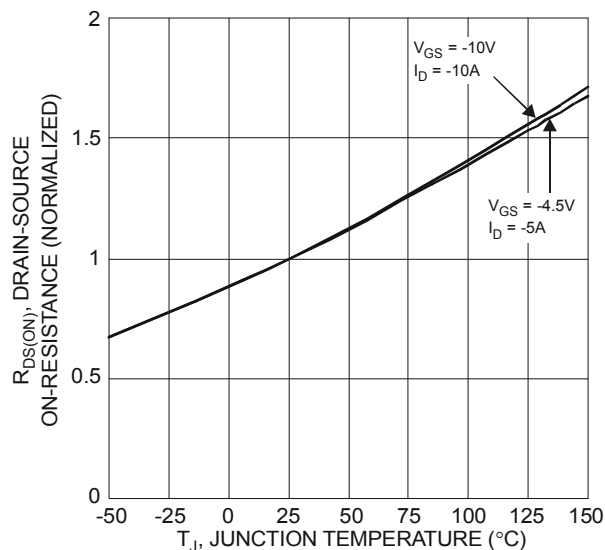


Figure 13 On-Resistance Variation with Temperature

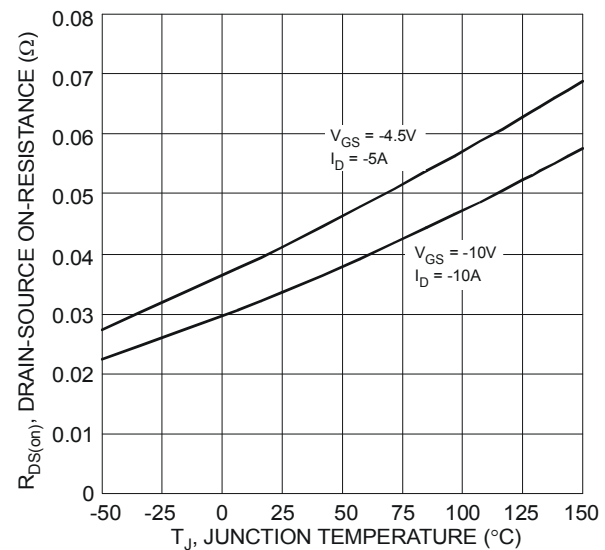


Figure 14 On-Resistance Variation with Temperature

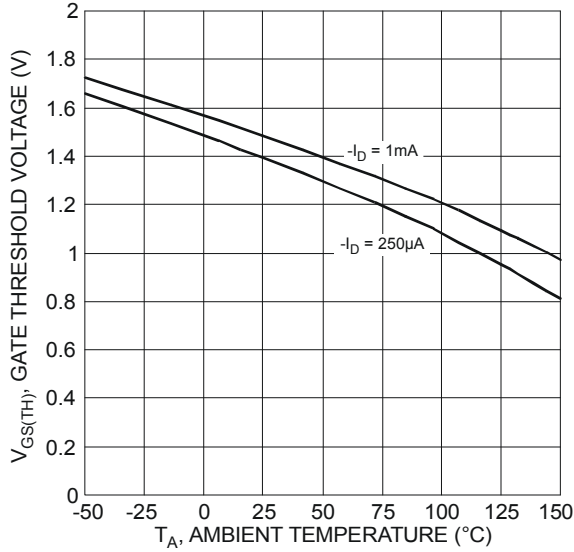


Figure 15 Gate Threshold Variation vs. Ambient Temperature

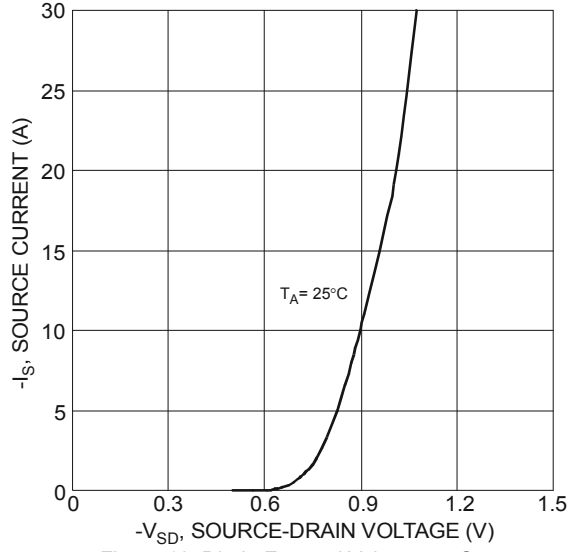


Figure 16 Diode Forward Voltage vs. Current

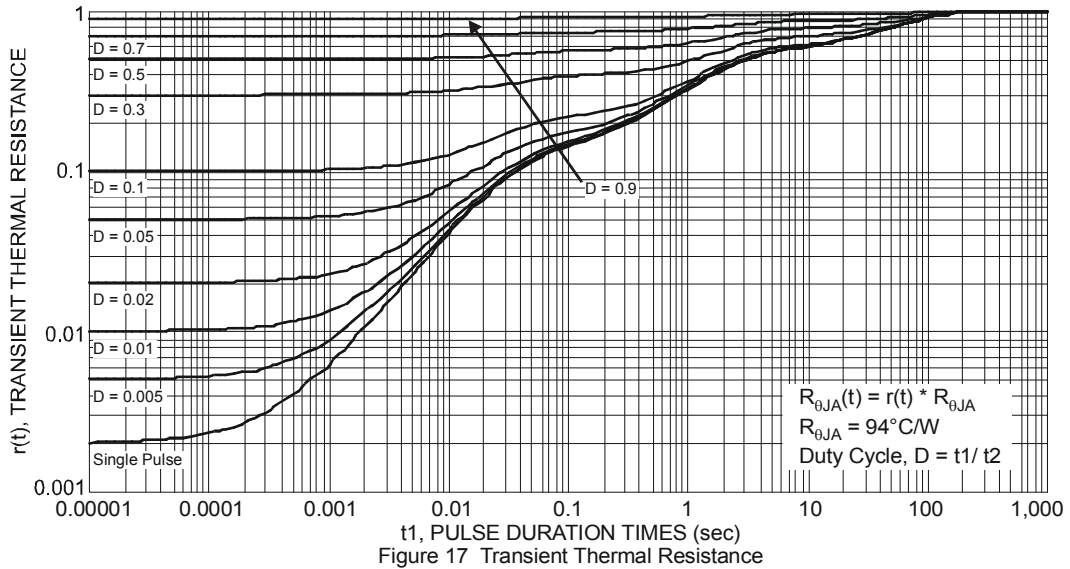
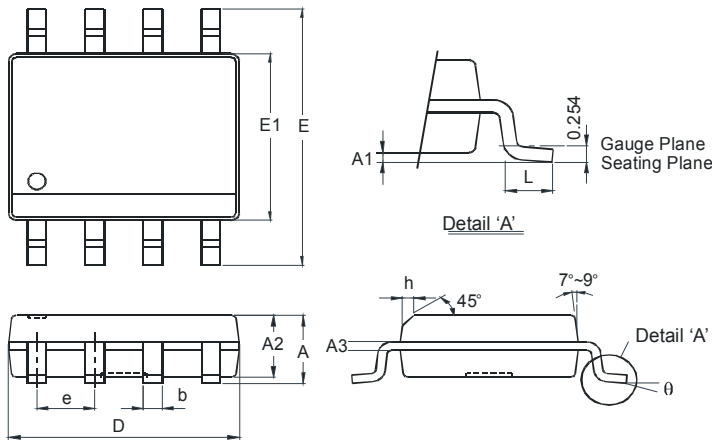


Figure 17 Transient Thermal Resistance

Package Outline Dimensions

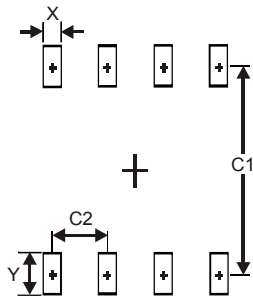
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



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 the latest version.



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

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