

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D $T_A = +25^\circ\text{C}$
-40V	45m Ω @ $V_{GS} = -10\text{V}$	-6.5A
	55m Ω @ $V_{GS} = -4.5\text{V}$	-5.9A

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.

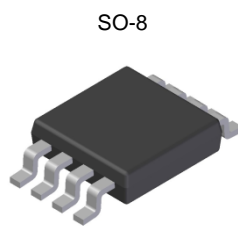
- Backlighting
- DC-DC Converters
- Power Management Functions

Features

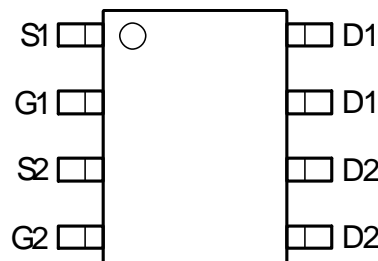
- 100% Unclamped Inductive Switching (UIS) Test in Production
- Low on-resistance
- Fast switching speed
- **Totally Lead-Free & Fully RoHS Compliant (Note 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at <https://www.diodes.com/products/automotive/automotive-products/>.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. <https://www.diodes.com/quality/product-definitions/>**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([DMP4047SSDQ](#))**

Mechanical Data

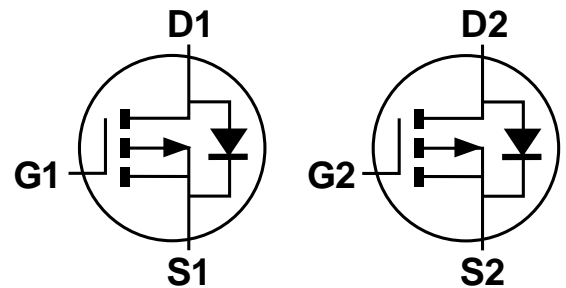
- Package: SO-8
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Tin Finish annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 $\text{\textcircled{3}}$
- Weight: 0.074 grams (Approximate)



Top View



Top View
Pin-Out



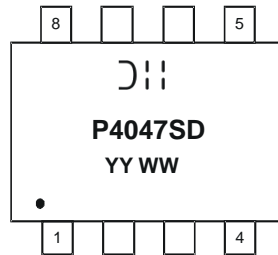
Equivalent Circuit

Ordering Information

Part Number	Package	Packing	
		Qty.	Carrier
DMP4047SSD-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) & 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, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



= Manufacturer's Marking
 P4047SD = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 21 = 2021)
 WW = Week (01 - 53)

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-40	V
Gate-Source Voltage			V_{GSS}	± 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	-5.1 -4.1	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	-6.5 -5.2	A
Continuous Drain Current (Note 6) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	-4.6 -3.7	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	-5.9 -4.7	A
Maximum Body Diode Continuous Current			I_S	-6.5	A
Pulsed Drain Current (10 μs pulse, duty cycle = 1%)			I_{DM}	-26	A
Avalanche Current (Note 7) $L = 0.1\text{mH}$			I_{AS}	-18	A
Avalanche Energy (Note 7) $L = 0.1\text{mH}$			E_{AS}	16.2	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	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep $T_J = +25^\circ\text{C}$.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	-40	-	-	V	$V_{GS} = 0V, I_D = -250\mu A$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	I_{DSS}	-	-	-1	μA	$V_{DS} = -40V, V_{GS} = 0V$
Gate-Source Leakage	I_{GSS}	-	-	± 100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	-1.0	-	-3.0	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
Static Drain-Source On-Resistance	$R_{DS(on)}$	-	33	45	m Ω	$V_{GS} = -10V, I_D = -4.4A$
			40	55		$V_{GS} = -4.5V, I_D = -3.7A$
Diode Forward Voltage	V_{SD}	-	-0.75	-1.2	V	$V_{GS} = 0V, I_S = -3.9A$
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	-	1154	-	pF	$V_{DS} = -20V, V_{GS} = 0V,$ $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	-	84	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	66	-	pF	
Gate Resistance	R_G	-	12.6	-	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1\text{MHz}$
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	-	nC	
Gate-Source Charge	Q_{gs}	-	2.2	-	nC	
Gate-Drain Charge	Q_{gd}	-	3.3	-	nC	
Turn-On Delay Time	$t_{D(on)}$	-	8.7	-	ns	$V_{DS} = -20V, I_D = -3.9A$ $V_{GS} = 4.5V, R_G = 1\Omega$
Turn-On Rise Time	t_r	-	19.6	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	34.9	-	ns	
Turn-Off Fall Time	t_f	-	25.5	-	ns	
Body Diode Reverse Recovery Time	t_{rr}	-	9.61	-	ns	$I_F = -3.9A, di/dt = 100A/\mu s$
Body Diode Reverse Recovery Charge	Q_{rr}	-	3.3	-	nC	

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

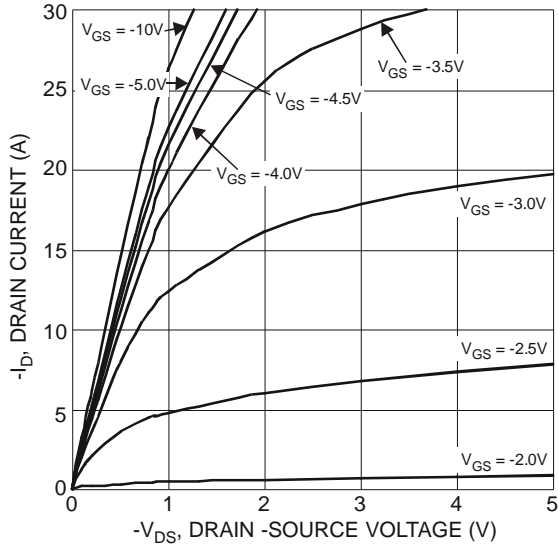


Figure 1 Typical Output Characteristics

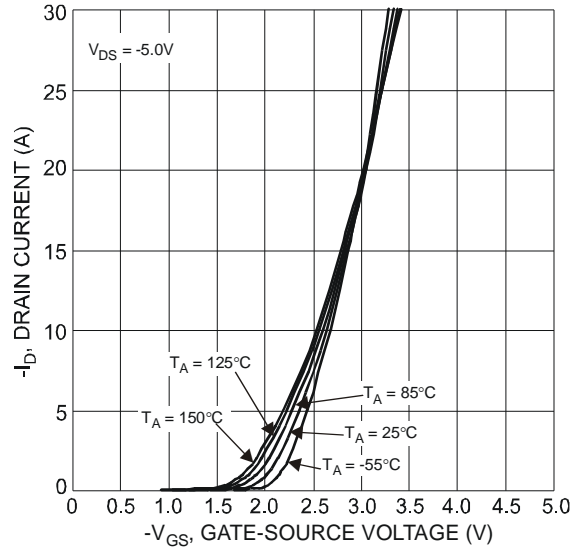


Figure 2 Typical Transfer Characteristics

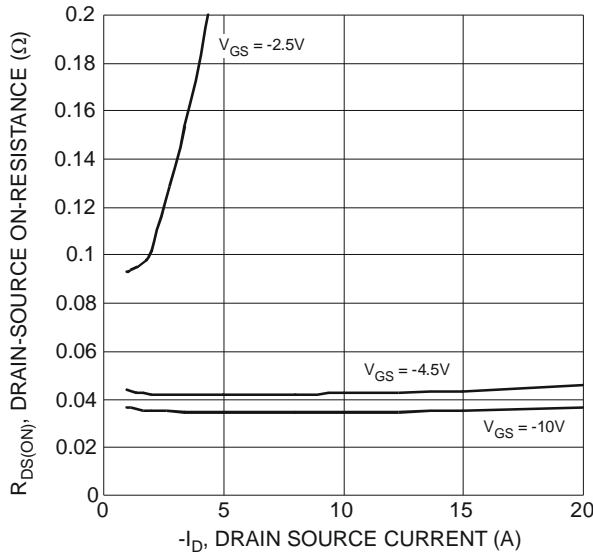


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

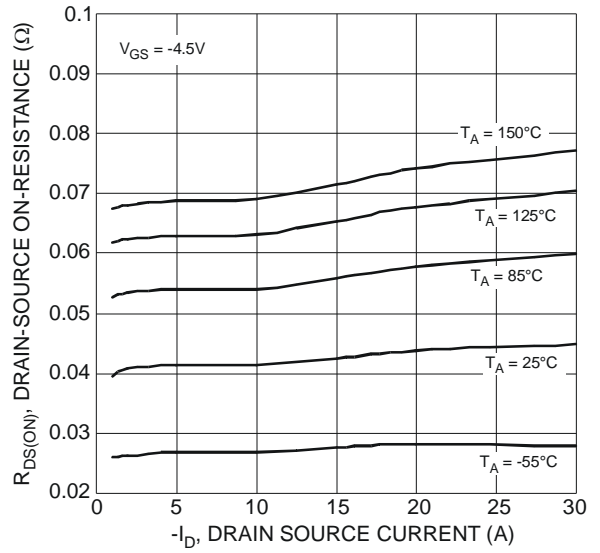


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

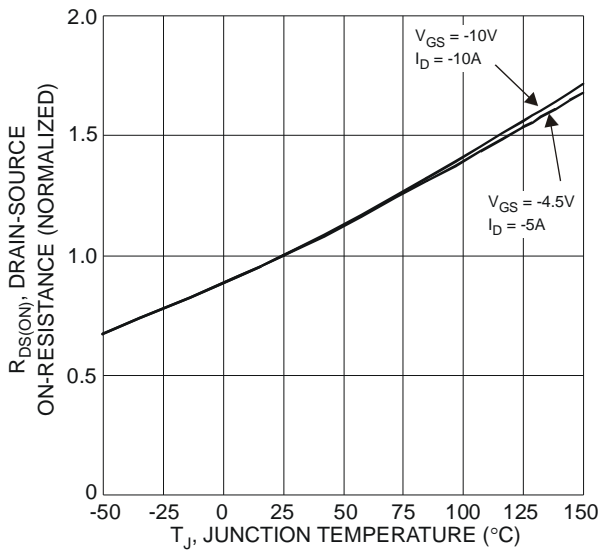


Figure 5 On-Resistance Variation with Temperature

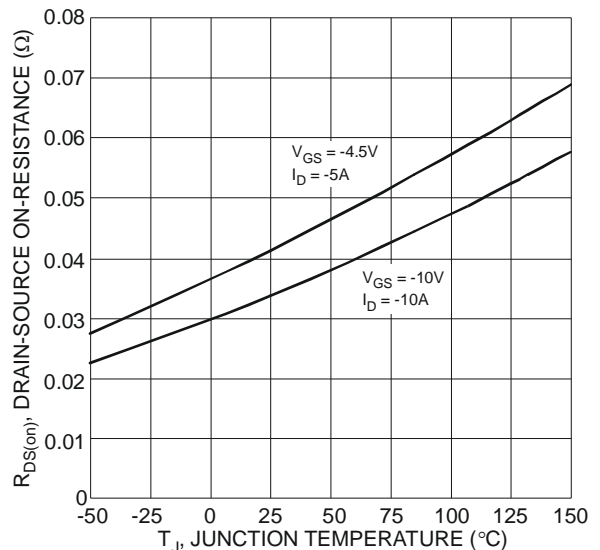


Figure 6 On-Resistance Variation with Temperature

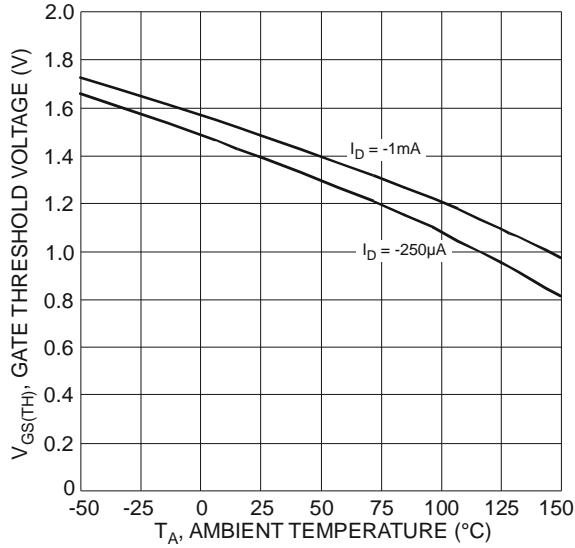


Figure 7 Gate Threshold Variation vs. Ambient Temperature

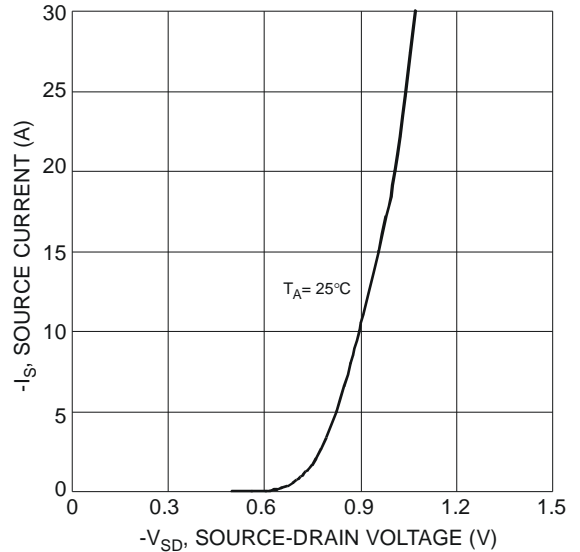


Figure 8 Diode Forward Voltage vs. Current

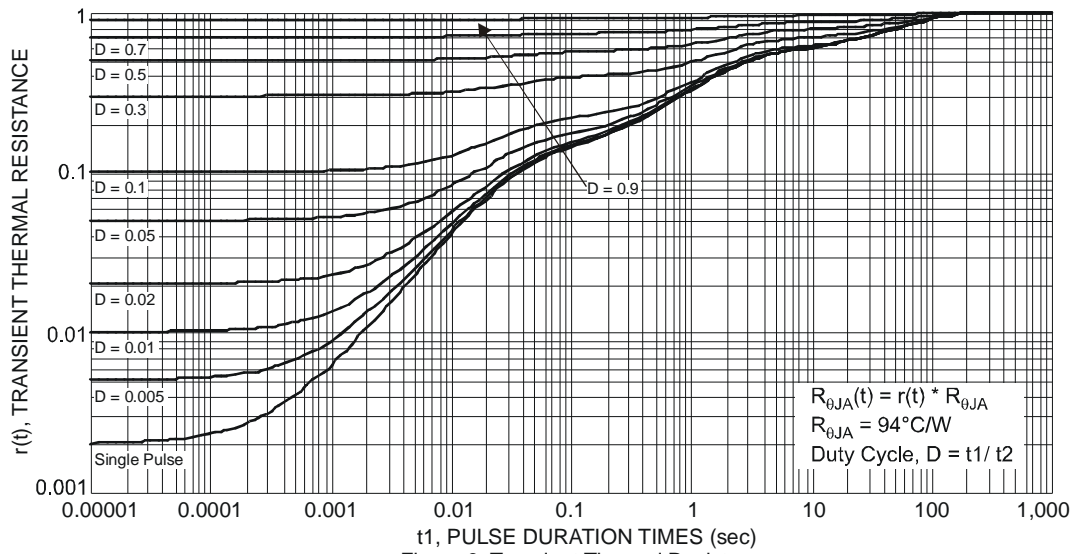
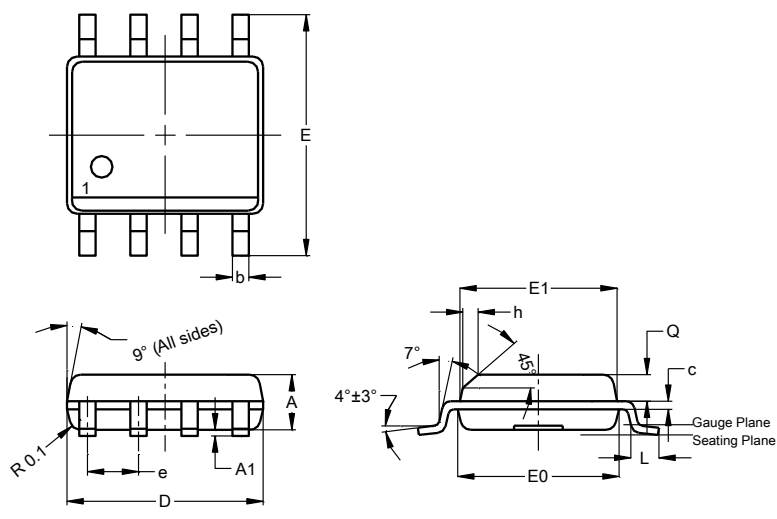


Figure 9 Transient Thermal Resistance

Package Outline Dimensions

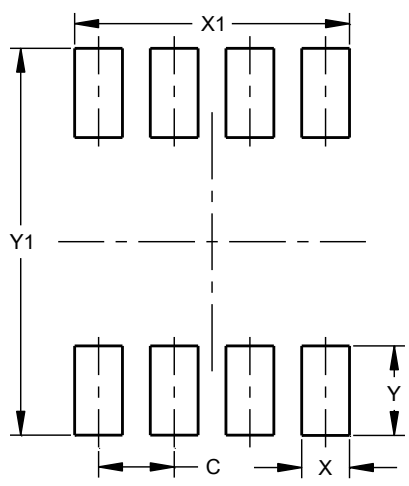
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



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.



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

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