Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max T_A = +25°C
-30V	7.5mΩ @ V_{GS} = -10V	-12A
	10.2mΩ @ V_{GS} = -4.5V	-10A

Description

This 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

- Backlighting
- Power Management Functions
- DC-DC Converters

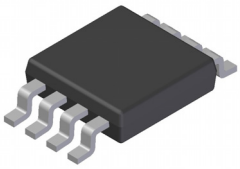
Features and Benefits

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

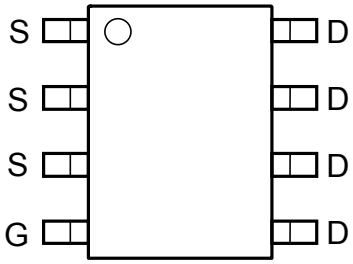
Mechanical Data

- 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 Indicator: See diagram below
- Terminals: Finish — Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.074 grams (approximate)

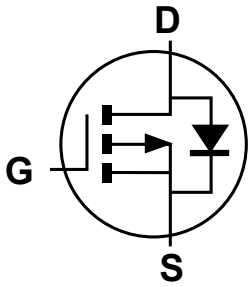
SO-8



Top View



Top View
Pin-out



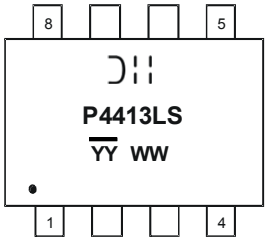
Equivalent Circuit

Ordering Information (Note 4)

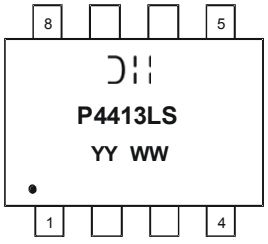
Part Number	Case	Packaging
DMG4413LSS-13	SO-8	2500/Tape & Reel

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
P4413LS = Product Type Marking Code
YYWW = Date Code Marking
YY or $\overline{YY}$ = Year (ex: 13 = 2013)
WW = Week (01 - 53)
$\underline{YY}$ = Date Code Marking for SAT (Shanghai Assembly/ Test site)
$\overline{YY}$ = Date Code Marking for CAT (Chengdu Assembly/ Test site)

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-30	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 6) V_{GS} = -10V	Steady State	T_A = +25°C T_A = +70°C	I_D	-12 -10	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	-22 -17	A
Continuous Drain Current (Note 6) V_{GS} = -4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-10 -8	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	-18 -14	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	-100	A
Maximum Body Diode continuous Current			I_S	-4	A

Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	1.7	W
	T_A = +70°C		1.1	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	74	°C/W
	t<10s		22	
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	2.2	W
	T_A = +70°C		1.4	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	56	°C/W
	t<10s		17	
Thermal Resistance, Junction to Case (Note 6)	Steady State	$R_{\theta JC}$	2.5	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	-30	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	µA	V_{DS} = -30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±1	µA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	-1.1	1.6	-2.1	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	— —	6.3 7.9	7.5 10.2	mΩ	V_{GS} = -10V, I_D = -13A V_{GS} = -4.5V, I_D = -10A
Forward Transconductance	g_{fs}	—	26	—	S	V_{DS} = -15V, I_D = -13A
Diode Forward Voltage	V_{SD}	—	-0.7	-1.0	V	V_{GS} = 0V, I_S = -2.7A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	4965	—	pF	V_{DS} = -15V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	1487	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	711	—	pF	
Gate Resistance	R_G	—	7.3	—	Ω	V_{DS} = 0V, V_{GS} = 0V f = 1.0MHz
SWITCHING CHARACTERISTICS (Note 8)						
Total Gate Charge	Q_G	—	46	—	nC	V_{DS} = -15V, V_{GS} = -5V I_D = -13A
Gate-Source Charge	Q_{GS}	—	17	—		
Gate-Drain Charge	Q_{GD}	—	16	—		
Turn-On Delay Time	$t_{d(on)}$	—	15	—	ns	V_{DS} = -15V, V_{GS} = -10V, I_D = -1A, R_G = 6.0Ω
Rise Time	t_r	—	9	—		
Turn-Off Delay Time	$t_{d(off)}$	—	160	—		
Fall Time	t_f	—	66	—		

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

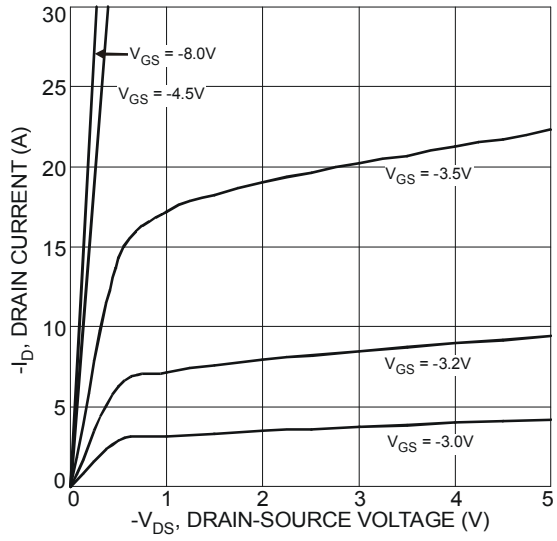


Fig. 1 Typical Output Characteristic

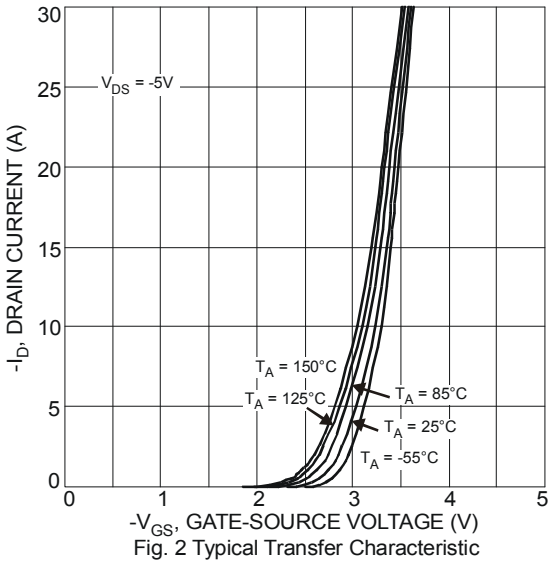


Fig. 2 Typical Transfer Characteristic

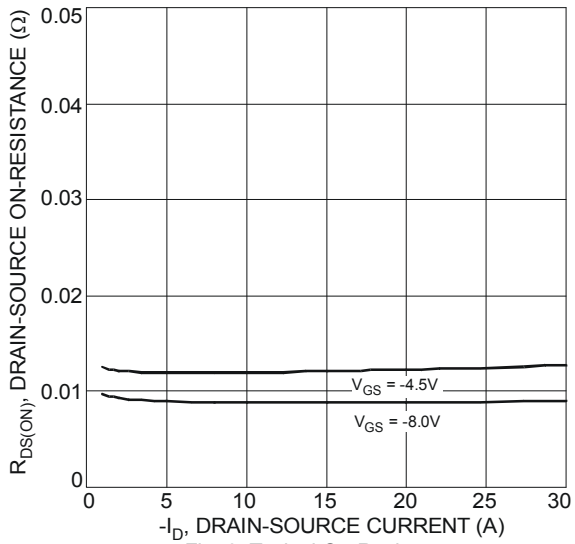


Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

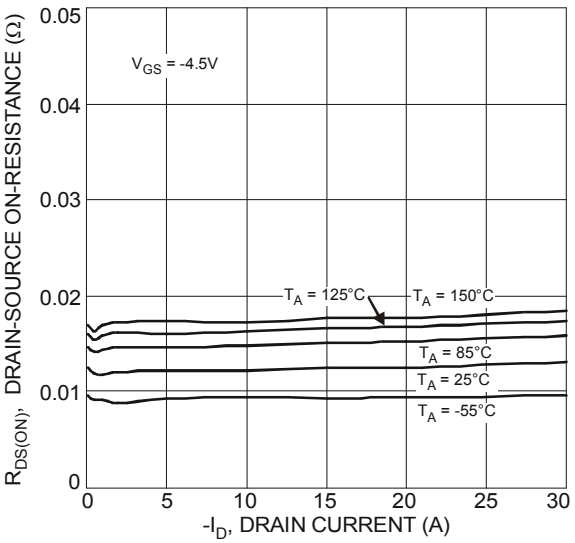


Fig. 4 Typical On-Resistance
vs. Drain Current and Temperature

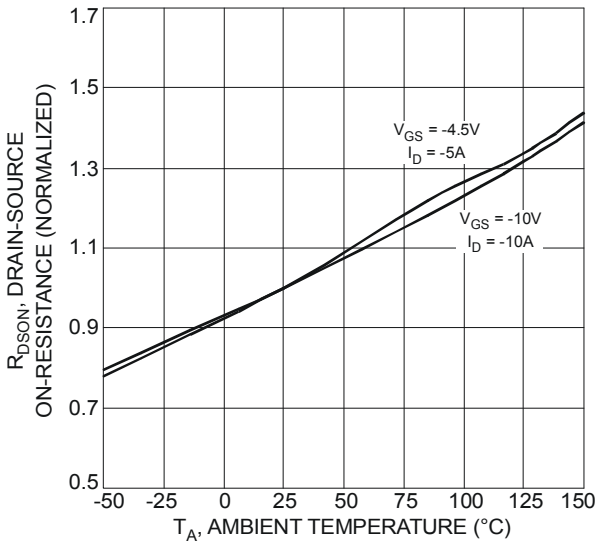


Fig. 5 On-Resistance Variation with Temperature

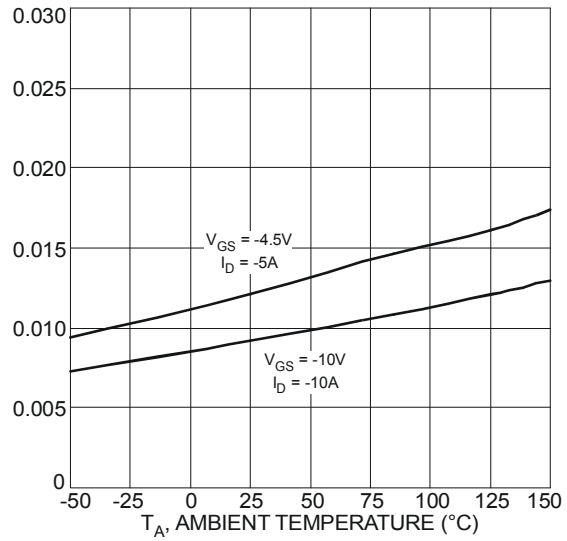


Fig. 6 On-Resistance Variation with Temperature

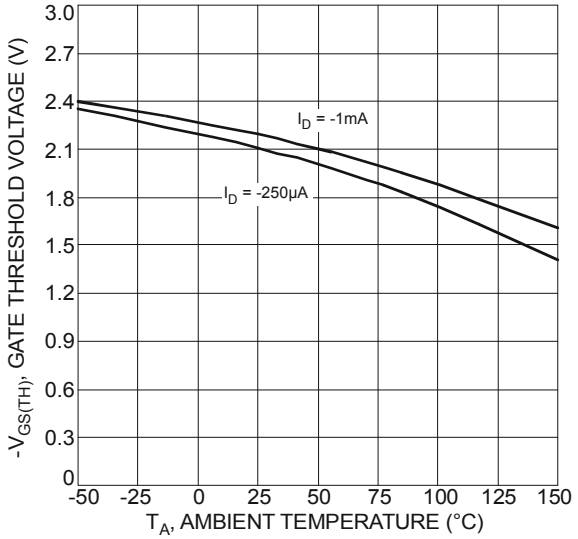


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

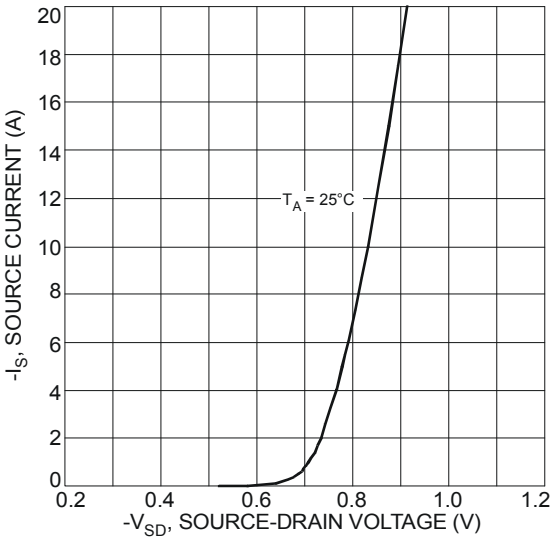


Fig. 8 Diode Forward Voltage vs. Current

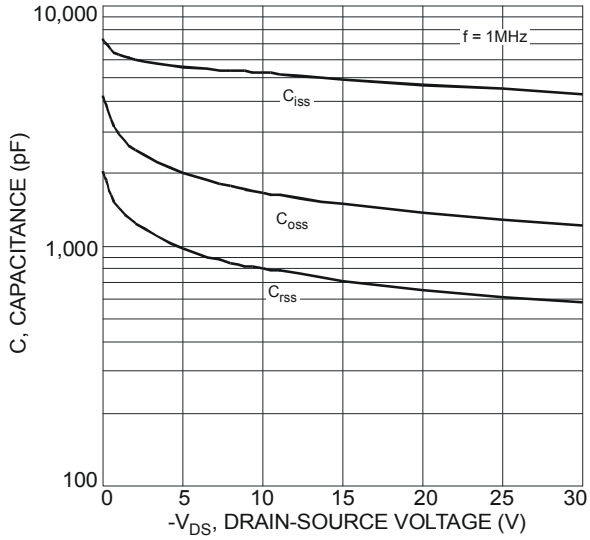
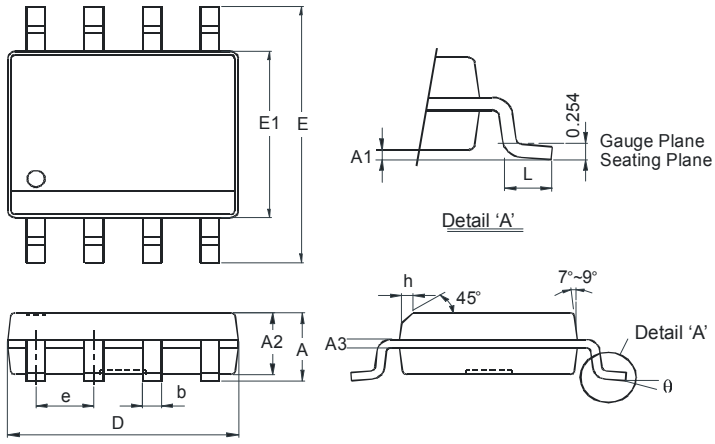


Fig. 9 Typical Total Capacitance

Package Outline Dimensions

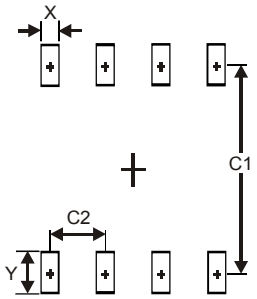
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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 AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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