N-CHANNEL ENHANCEMENT MODE MOSFET WITH SCHOTTKY DIODE

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D max T_A = 25°C
30V	15mΩ @ V_{GS}= 10V	10.7A
	18.5mΩ @ V_{GS}= 4.5V	9.6A

Features

- DIOFET utilizes a unique patented process to monolithically integrate a MOSFET and a Schottky in a single die to deliver:
  - Low $R_{DS(ON)}$ - minimizes conduction losses
  - Low V_{SD} - reducing the losses due to body diode conduction
  - Low Q_{rr} - lower Q_{rr} of the integrated Schottky reduces body diode switching losses
  - Low gate capacitance (Q_g/Q_{gs}) ratio – reduces risk of shoot-through or cross conduction currents at high frequencies
  - Avalanche rugged – I_{AR} and E_{AR} rated
- **Lead Free, RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**
- **ESD Protected**
- **Qualified to AEC-Q101 Standards for High Reliability**

Description and Applications

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.

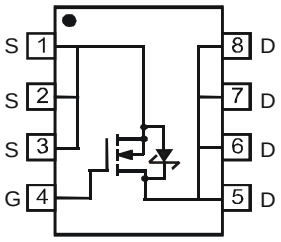
- DC-DC Converters
- Power management functions

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 Below
- Weight: 0.072 grams (approximate)

ESD PROTECTED

Top View



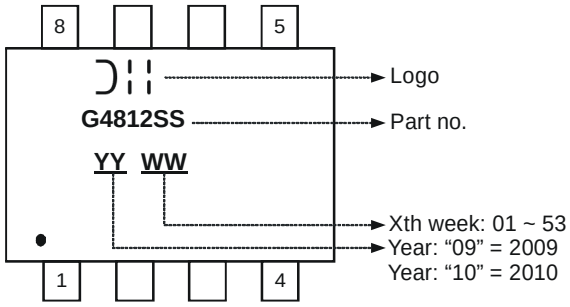
Top View
Internal Schematic

Ordering Information (Note 3)

Part Number	Case	Packaging
DMG4812SSS-13	SO-8	2500 / Tape & Reel

Notes: 1. No purposefully added lead.
2. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com.
3. For packaging details, go to our website at http://www.diodes.com.

Marking Information



Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	30	V
Gate-Source Voltage			V_{GSS}	±12	V
Continuous Drain Current (Note 4) V_{GS} = 10V	Steady State	T_A = 25°C T_A = 85°C	I_D	8 6.4	A
Continuous Drain Current (Note 5) V_{GS} = 10V	t ≤ 10 sec	T_A = 25°C T_A = 85°C	I_D	10.7 8.6	A
Continuous Drain Current (Note 5) V_{GS} = 4.5V	t ≤ 10 sec	T_A = 25°C T_A = 85°C	I_D	9.6 7.7	A
Pulsed Drain Current (Note 6)			I_{DM}	45	A
Avalanche Current (Notes 6 & 7)			I_{AR}	13	A
Repetitive Avalanche Energy (Notes 6 & 7) L = 0.3mH			E_{AR}	25.4	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 4)	P_D	1.54	W
Thermal Resistance, Junction to Ambient @T_A = 25°C (Note 4)	$R_{\theta JA}$	81	°C/W
Power Dissipation (Note 5)	P_D	2.8	W
Thermal Resistance, Junction to Ambient @T_A = 25°C (Note 5)	$R_{\theta JA}$	45	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics @ T_A = 25°C unless otherwise stated

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	30	-	-	V	V_{GS} = 0V, I_D = 1mA
Zero Gate Voltage Drain Current	I_{DSS}	-	-	150	μA	V_{DS} = 30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±100	nA	V_{GS} = ±12V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	-	2.3	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	-	11	15	mΩ	V_{GS} = 10V, I_D = 10.7A
		-	16.5	18.5		V_{GS} = 4.5V, I_D = 9.6A
Forward Transfer Admittance	$\|Y_{fs}\|$	-	20	-	S	V_{DS} = 5V, I_D = 10.7A
Diode Forward Voltage	V_{SD}	-	0.36	0.5	V	V_{GS} = 0V, I_S = 1A
Maximum Body-Diode + Schottky Continuous Current	I_S	-	-	5	A	-
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	-	1849	-	pF	V_{DS} =15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	158	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	123	-	pF	
Gate Resistance	R_g	0.54	2.0	4.0	Ω	V_{DS} =0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge V_{GS} = 4.5V	Q_g	-	18.5	-	nC	V_{DS} = 15V, V_{GS} = 10V, I_D = 9.6A
Total Gate Charge V_{GS} = 10V	Q_g	-	43	-	nC	
Gate-Source Charge	Q_{gs}	-	4.7	-	nC	
Gate-Drain Charge	Q_{gd}	-	4.0	-	nC	
Turn-On Delay Time	$t_{D(on)}$	-	6.62	-	ns	V_{GS} = 10V, V_{DS} = 15V, R_G = 3Ω, R_L = 15Ω, I_D = 1A
Turn-On Rise Time	t_r	-	8.73	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	36.41	-	ns	
Turn-Off Fall Time	t_f	-	4.69	-	ns	

Notes:
4. Device mounted on FR-4 PCB with minimum recommended pad layout. The value in any given application depends on the user's specific board design.
5. Device mounted on 1" x 1" FR-4 PCB with high coverage 1 oz. Copper, single sided , device is measured at t ≤ 10 sec.
6. Repetitive rating, pulse width limited by junction temperature.
7. I_{AR} and E_{AR} 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 production testing.

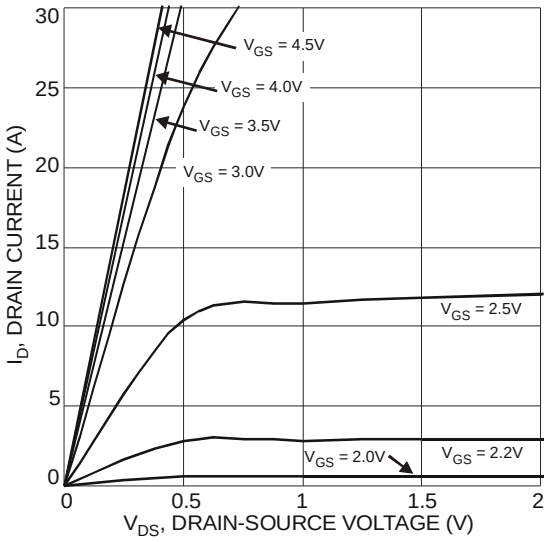


Fig. 1 Typical Output Characteristic

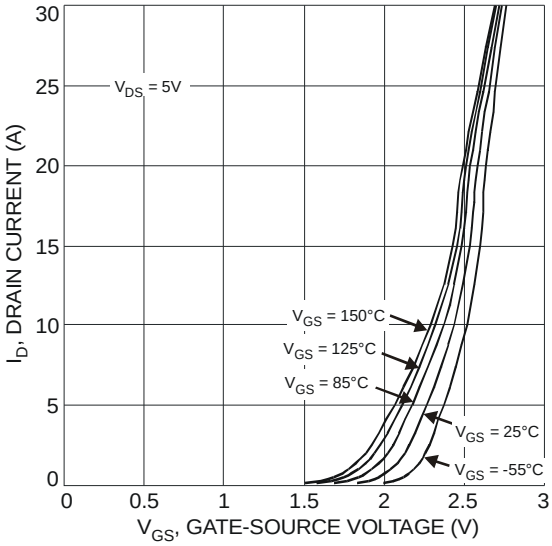


Fig. 2 Typical Transfer Characteristic

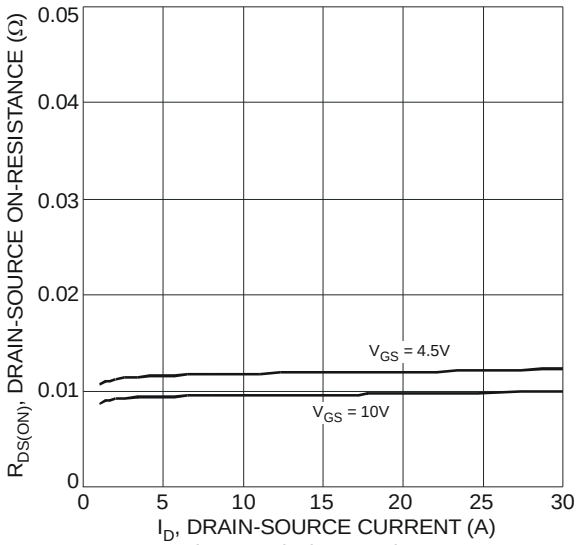


Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

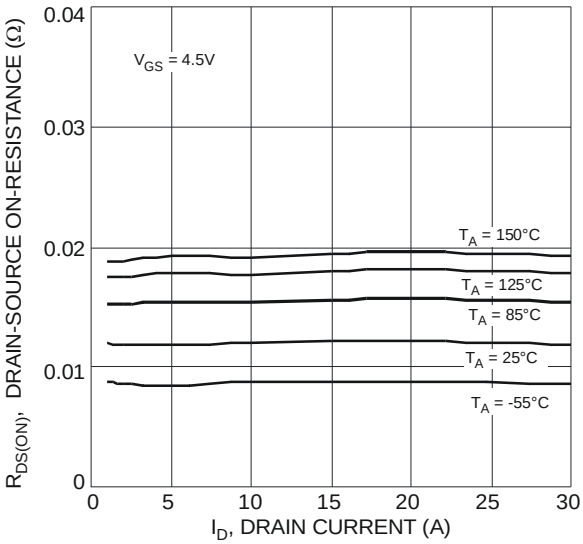


Fig. 4 Typical On-Resistance
vs. Drain Current and Temperature

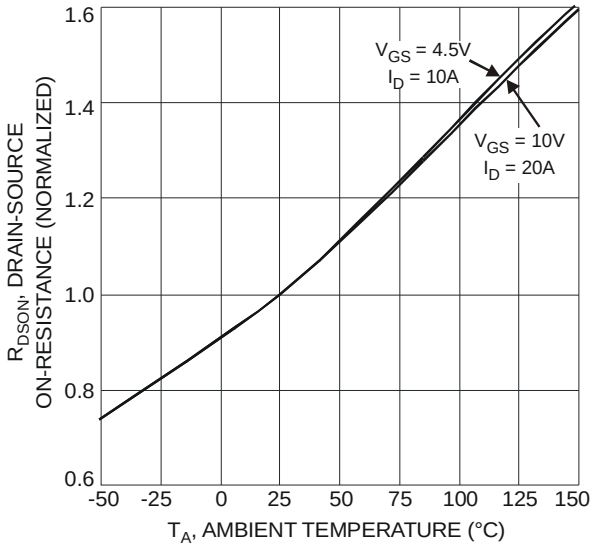


Fig. 5 On-Resistance Variation with Temperature

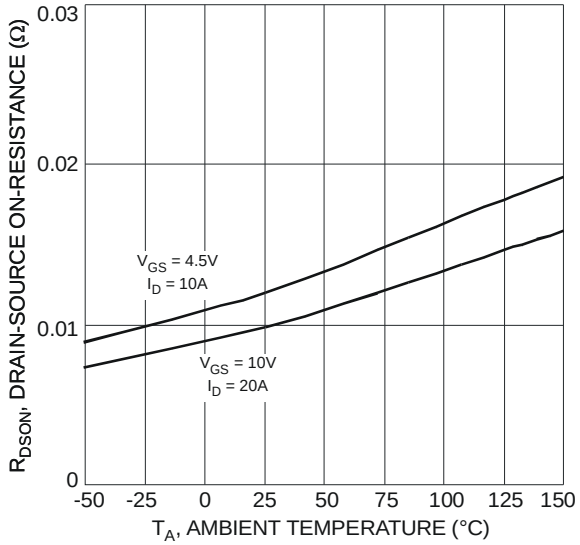


Fig. 6 On-Resistance Variation with Temperature

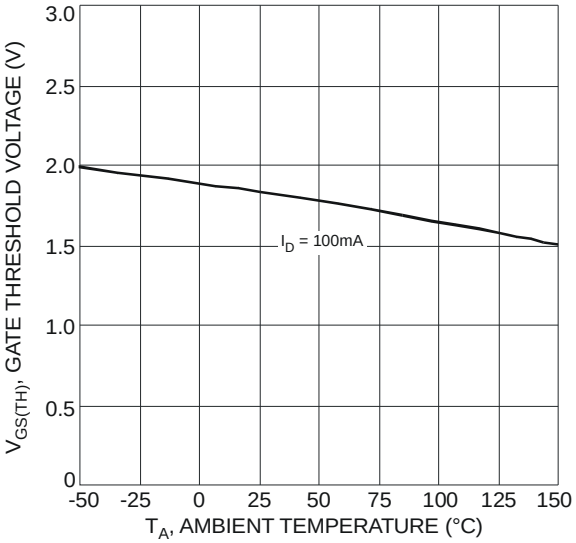


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

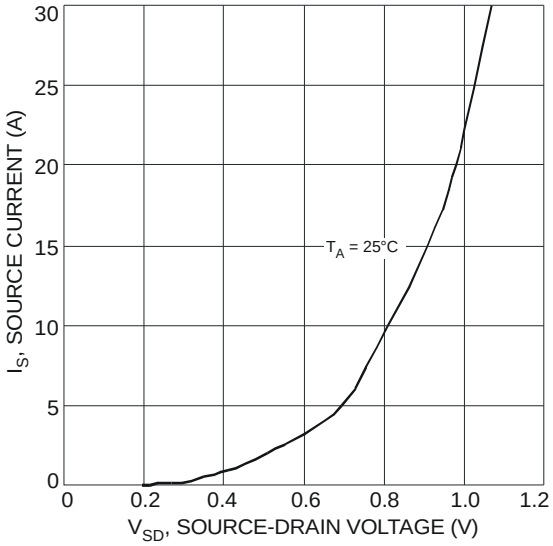


Fig. 8 Diode Forward Voltage vs. Current

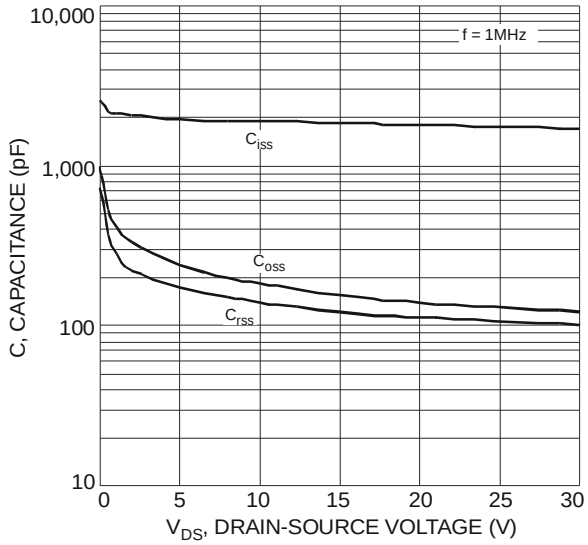


Fig. 9 Typical Total Capacitance

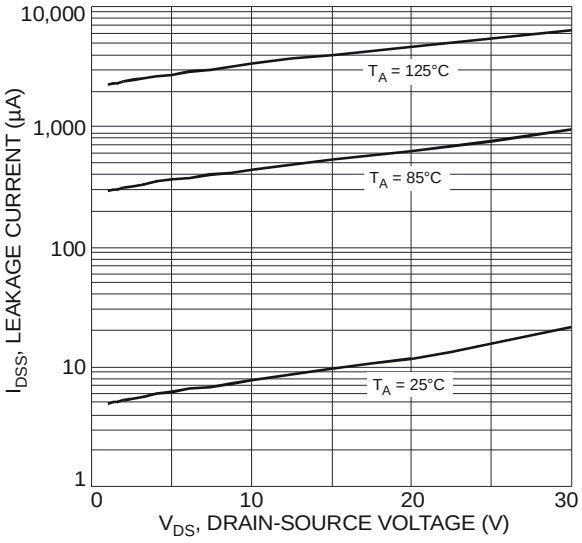


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

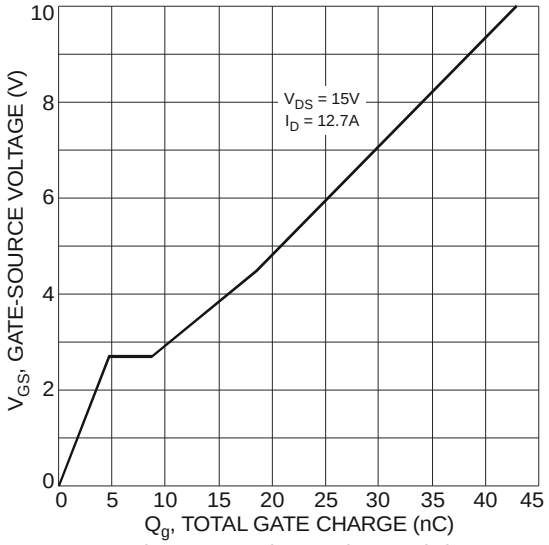


Fig. 11 Gate-Charge Characteristics

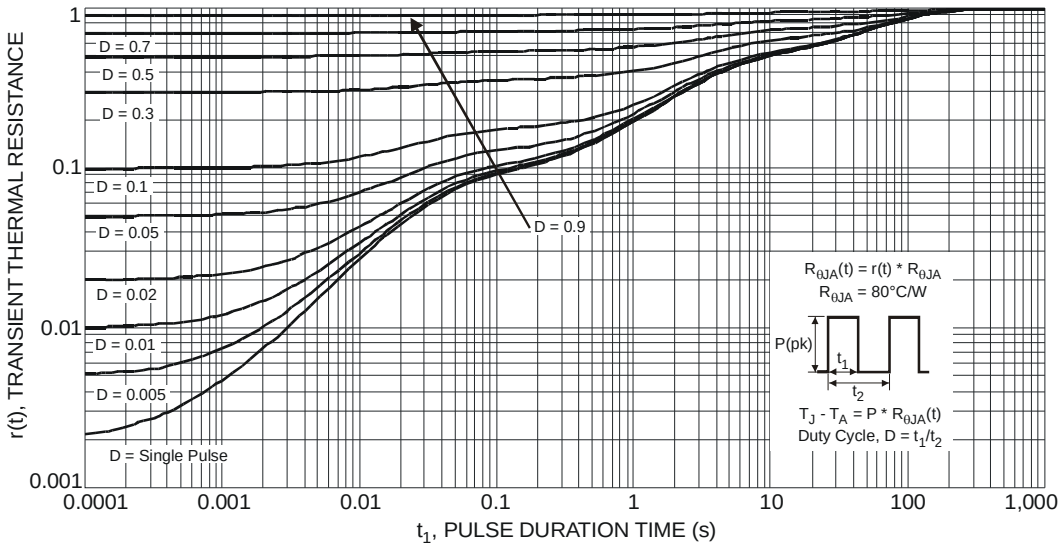
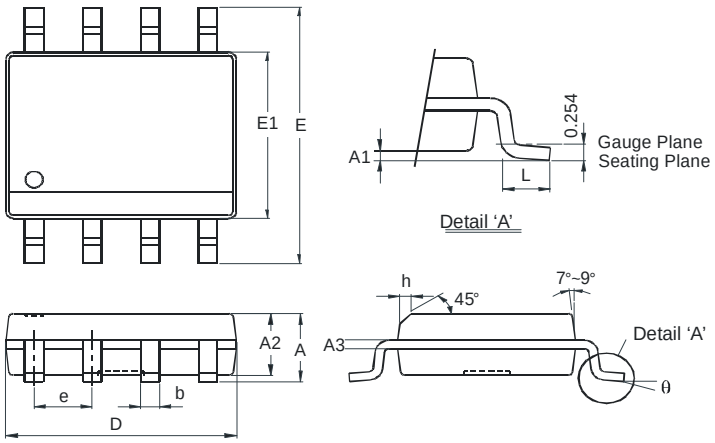


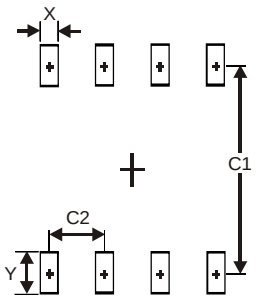
Fig. 12 Transient Thermal Response

Package Outline Dimensions



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



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

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