

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	$I_D$ max $T_A = 25^\circ\text{C}$
30V	15m $\Omega$ @ $V_{GS} = 10\text{V}$	10.7A
	18.5m $\Omega$ @ $V_{GS} = 4.5\text{V}$	9.6A

## 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.

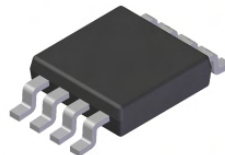
- DC-DC Converters
- Power management functions

## Features

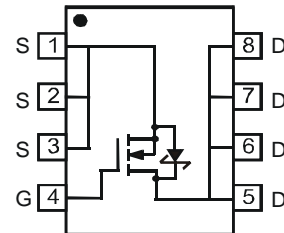
- DIOFET utilizes a unique patented process to monolithically integrate a MOSFET and a Schottky in a single die to deliver:
  - Low  $R_{DS(ON)}$  - minimizes conduction losses
  - Low  $V_{SD}$  - reducing the losses due to body diode conduction
  - Low  $Q_{rr}$  - lower  $Q_{rr}$  of the integrated 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**

## 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)

Top View



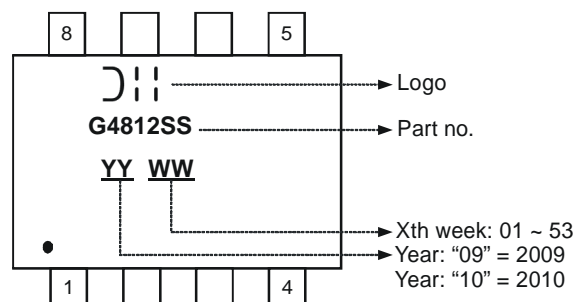
Top View  
Internal Schematic

## 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<sub>A</sub> = 25°C unless otherwise specified

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	30	V
Gate-Source Voltage			V <sub>GSS</sub>	±12	V
Continuous Drain Current (Note 4) V <sub>GS</sub> = 10V	Steady State	T <sub>A</sub> = 25°C	I <sub>D</sub>	8	A
		T <sub>A</sub> = 85°C		6.4	
Continuous Drain Current (Note 5) V <sub>GS</sub> = 10V	t ≤ 10 sec	T <sub>A</sub> = 25°C	I <sub>D</sub>	10.7	A
		T <sub>A</sub> = 85°C		8.6	
Continuous Drain Current (Note 5) V <sub>GS</sub> = 4.5V	t ≤ 10 sec	T <sub>A</sub> = 25°C	I <sub>D</sub>	9.6	A
		T <sub>A</sub> = 85°C		7.7	
Pulsed Drain Current (Note 6)			I <sub>DM</sub>	45	A
Avalanche Current (Notes 6 & 7)			I <sub>AR</sub>	13	A
Repetitive Avalanche Energy (Notes 6 & 7) L = 0.3mH			E <sub>AR</sub>	25.4	mJ

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 4)	P <sub>D</sub>	1.54	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = 25°C (Note 4)	R <sub>θJA</sub>	81	°C/W
Power Dissipation (Note 5)	P <sub>D</sub>	2.8	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = 25°C (Note 5)	R <sub>θJA</sub>	45	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** @ T<sub>A</sub> = 25°C unless otherwise stated

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	30	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 1mA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	-	-	150	μA	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	1.0	-	2.3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	-	11	15	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 10.7A
		-	16.5	18.5		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 9.6A
Forward Transfer Admittance	Y <sub>fs</sub>	-	20	-	S	V <sub>DS</sub> = 5V, I <sub>D</sub> = 10.7A
Diode Forward Voltage	V <sub>SD</sub>	-	0.36	0.5	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A
Maximum Body-Diode + Schottky Continuous Current	I <sub>S</sub>	-	-	5	A	-
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	-	1849	-	pF	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	158	-	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	-	123	-	pF	
Gate Resistance	R <sub>g</sub>	0.54	2.0	4.0	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge V <sub>GS</sub> = 4.5V	Q <sub>g</sub>	-	18.5	-	nC	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 9.6A
Total Gate Charge V <sub>GS</sub> = 10V	Q <sub>g</sub>	-	43	-	nC	
Gate-Source Charge	Q <sub>gs</sub>	-	4.7	-	nC	
Gate-Drain Charge	Q <sub>gd</sub>	-	4.0	-	nC	
Turn-On Delay Time	t <sub>D(on)</sub>	-	6.62	-	ns	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 15V, R <sub>G</sub> = 3Ω, R <sub>L</sub> = 15Ω, I <sub>D</sub> = 1A
Turn-On Rise Time	t <sub>r</sub>	-	8.73	-	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	-	36.41	-	ns	
Turn-Off Fall Time	t <sub>f</sub>	-	4.69	-	ns	

- Notes:
- 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.
  - Device mounted on 1" x 1" FR-4 PCB with high coverage 1 oz. Copper, single sided, device is measured at t ≤ 10 sec.
  - Repetitive rating, pulse width limited by junction temperature.
  - I<sub>AR</sub> and E<sub>AR</sub> rating are based on low frequency and duty cycles to keep T<sub>J</sub> = 25°C
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

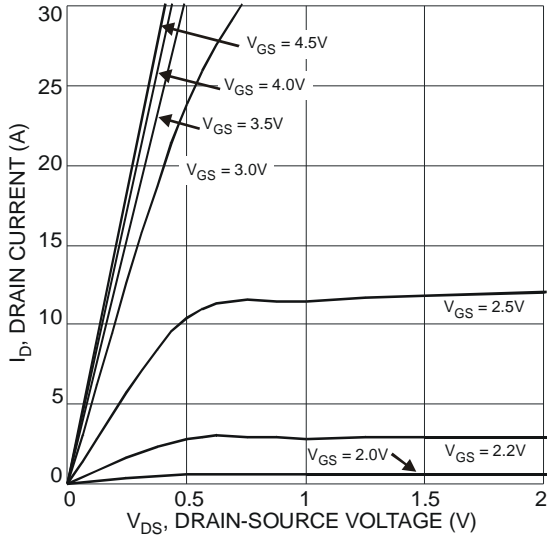


Fig. 1 Typical Output Characteristic

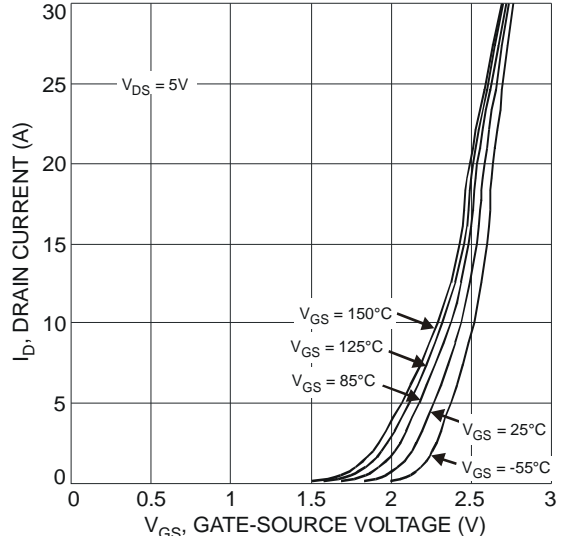


Fig. 2 Typical Transfer Characteristic

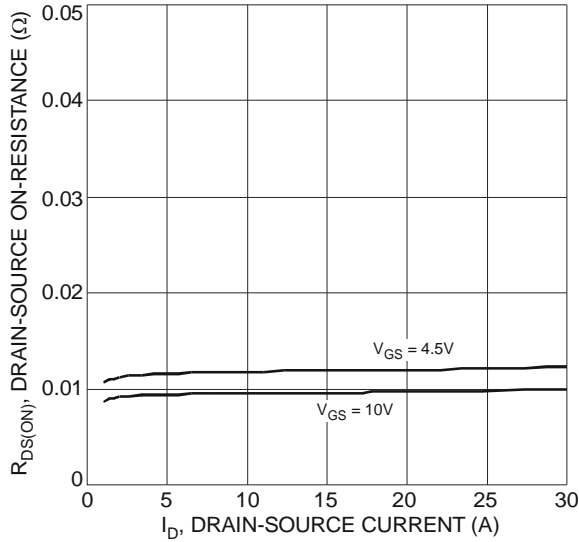


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

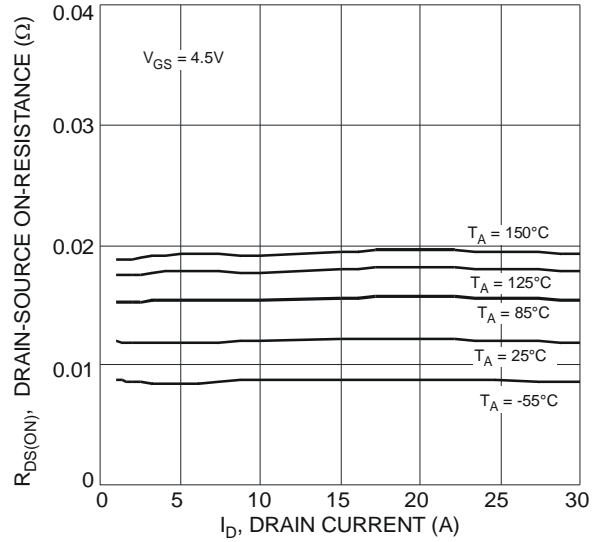


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

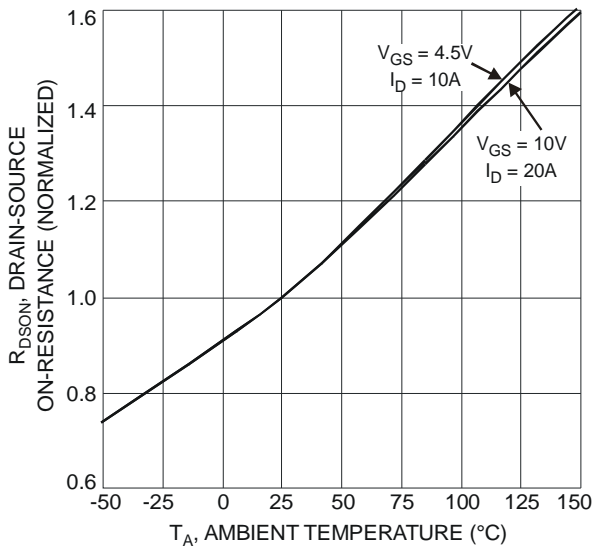


Fig. 5 On-Resistance Variation with Temperature

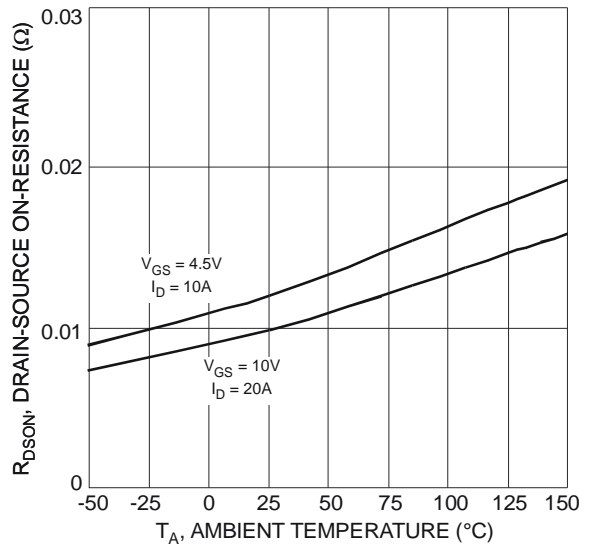


Fig. 6 On-Resistance Variation with Temperature

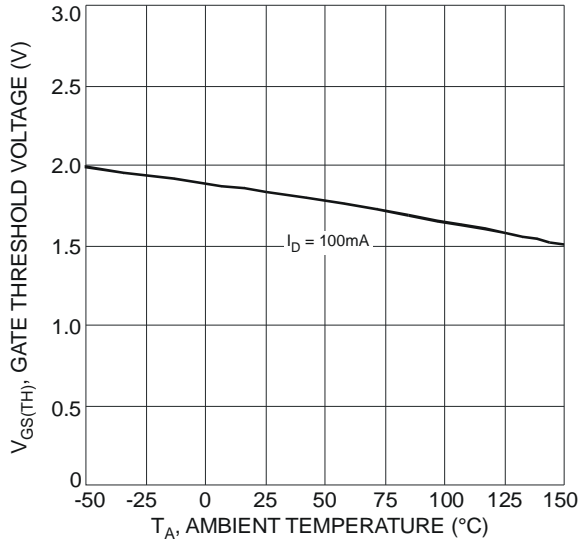


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

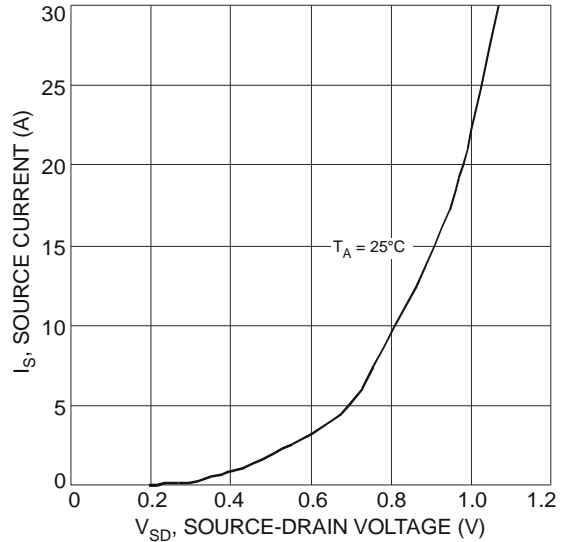


Fig. 8 Diode Forward Voltage vs. Current

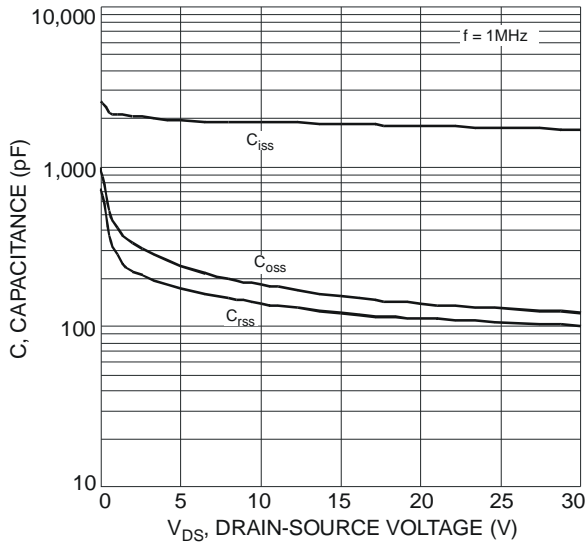


Fig. 9 Typical Total Capacitance

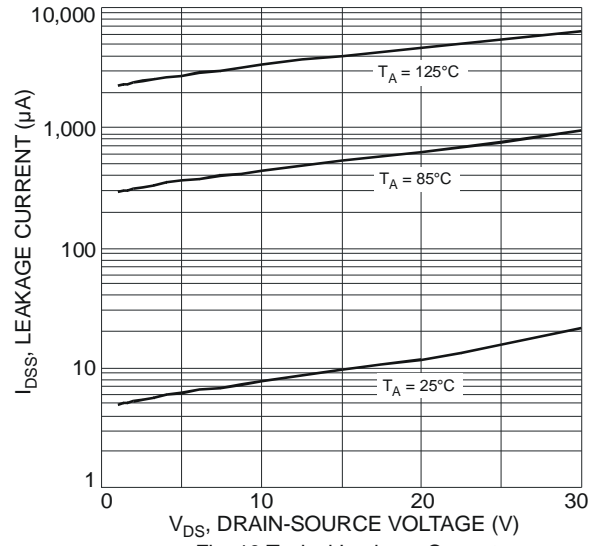


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

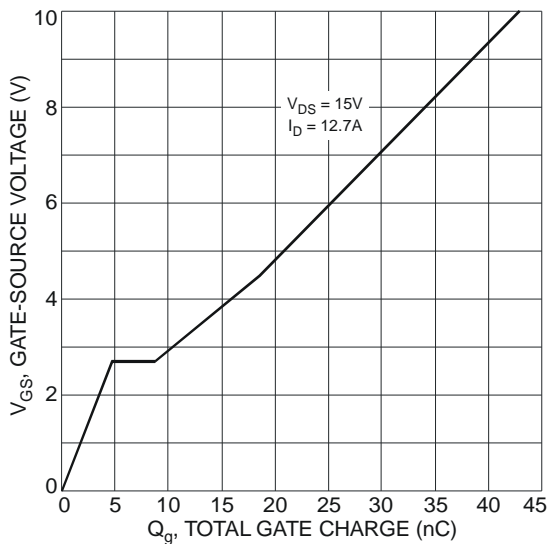


Fig. 11 Gate-Charge Characteristics

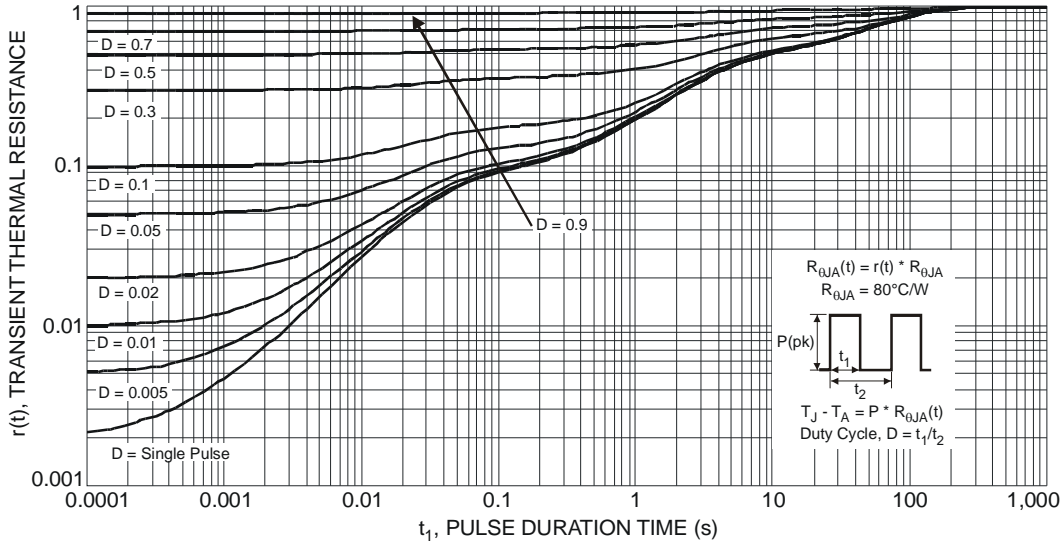
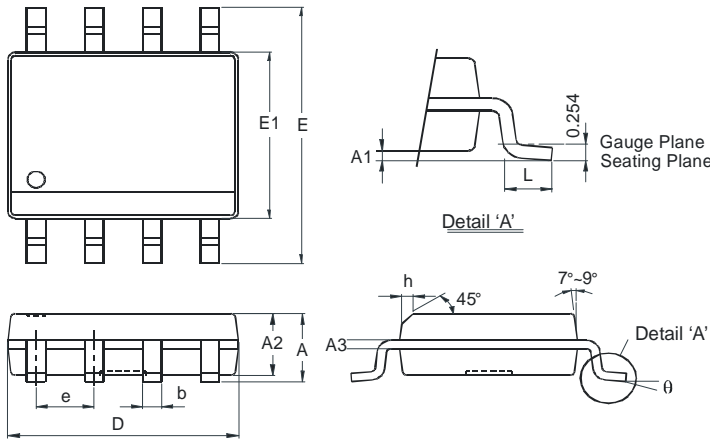


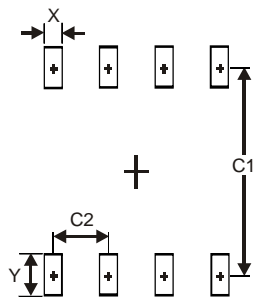
Fig. 12 Transient Thermal Response

**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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