

N-CHANNEL ENHANCEMENT MODE MOSFET WITH SCHOTTKY DIODE

Product Summary

BV _{DSS}	R _{DS(ON)} MAX	I _D MAX T _A = +25°C (Note 6)
30V	12.5mΩ @ V _{GS} = 10V	11.7A
	14.8mΩ @ V _{GS} = 4.5V	10.8A

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
- **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**

Description and Applications

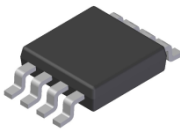
This new generation MOSFET is designed to minimize the on-state resistance (R_{DS(ON)}) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- DC-DC Converters
- Power Management Functions

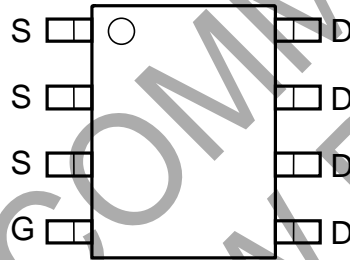
Mechanical Data

- 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)

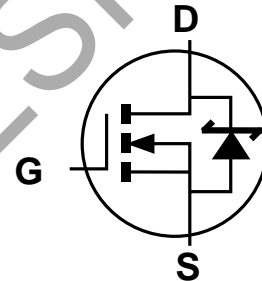
DIOFET



Top View



Top View



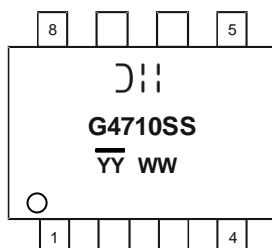
Equivalent circuit

Ordering Information (Note 4)

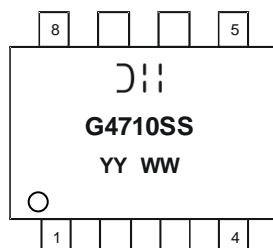
Part Number	Case	Packaging
DMG4710SSS-13	SO-8	2500 / Tape & Reel

- 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



Chengdu A/T Site



Shanghai A/T Site

- ⌋|| = Manufacturer's Marking
- G4710SS = Product Type Marking Code
- YYWW = Date Code Marking
- YY or YY = Year (ex: 18 = 2018)
- WW = Week (01 to 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°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 5) V _{GS} = 10V	Steady State	T _A = +25°C	I _D	8.8	A
		T _A = +85°C		6.3	
Continuous Drain Current (Note 6) V _{GS} = 10V	t ≤ 10s	T _A = +25°C	I _D	11.7	A
		T _A = +85°C		8.5	
Continuous Drain Current (Note 6) V _{GS} = 4.5V	t ≤ 10s	T _A = +25°C	I _D	10.8	A
		T _A = +85°C		7.8	
Pulsed Drain Current (Note 7)			I _{DM}	90	A
Avalanche Current (Notes 7 & 8)			I _{AR}	13	A
Repetitive Avalanche Energy (Notes 7 & 8) L = 0.3mH			E _{AR}	25.4	mJ

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P _D	1.54	W
Thermal Resistance, Junction to Ambient @T _A = +25°C (Note 5)	R _{θJA}	81	°C/W
Power Dissipation (Note 6)	P _D	2.8	W
Thermal Resistance, Junction to Ambient @ T _A = +25°C (Note 6)	R _{θJA}	45	°C/W
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 9)						
Drain-Source Breakdown Voltage	BV _{DSS}	30	-	-	V	V _{GS} = 0V, I _D = 1mA
Zero Gate Voltage Drain Current	I _{DSS}	-	-	0.1	mA	V _{DS} = 30V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	-	-	±100	nA	V _{GS} = ±12V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
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)}	-	9.5	12.5	mΩ	V _{GS} = 10V, I _D = 11.7A
		-	11.5	14.8		V _{GS} = 4.5V, I _D = 10.8A
Forward Transfer Admittance	Y _{fs}	-	22	-	s	V _{DS} = 5V, I _D = 11.7A
Diode Forward Voltage	V _{SD}	-	0.38	0.6	V	V _{GS} = 0V, I _S = 1A
Maximum Body-Diode + Schottky Continuous Current	I _S	-	-	5	A	-
DYNAMIC CHARACTERISTICS (Note 10)						
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	2.68	4.82	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	-	18.5	-	nC	V _{DS} = 15V, I _D = 11.7A
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} = 10V, R _g = 3Ω, R _L = 1.2Ω
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:
5. 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.
 6. Device mounted on 1" x 1" FR-4 PCB with high coverage 1 oz. Copper, single sided, device is measured at t ≤ 10s.
 7. Repetitive rating, pulse width limited by junction temperature.
 8. I_{AR} and E_{AR} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
 9. Short duration pulse test used to minimize self-heating effect.
 10. Guaranteed by design. Not subject to production testing.

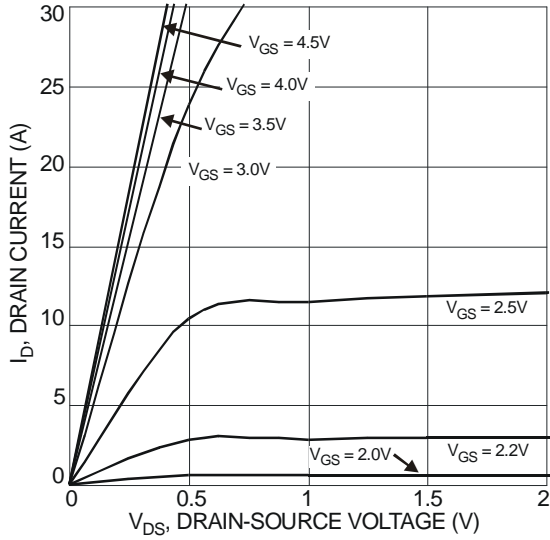


Fig. 1 Typical Output Characteristic

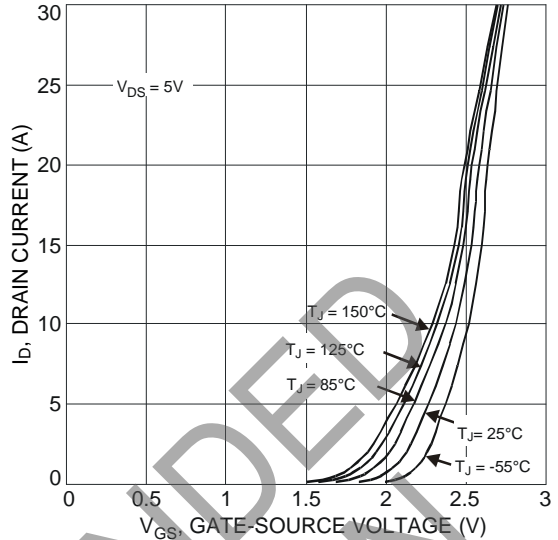


Fig. 2 Typical Transfer Characteristic

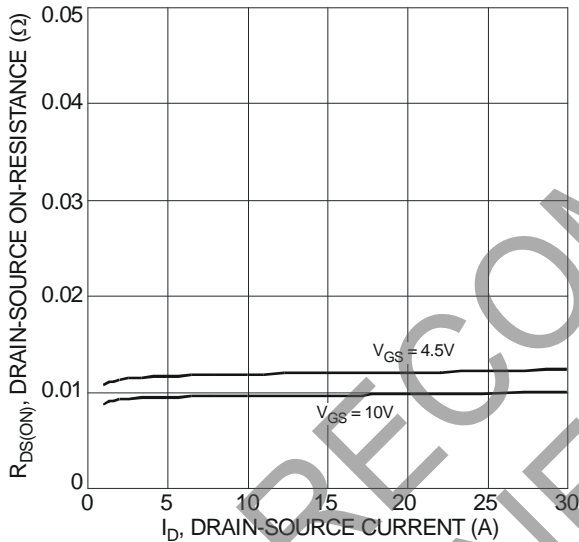


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

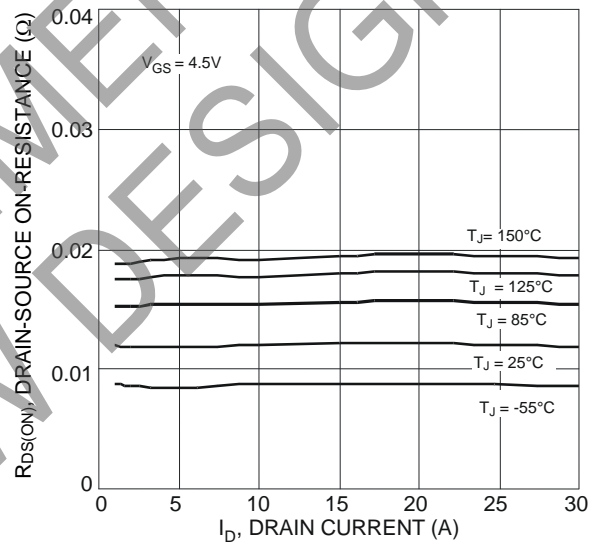


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

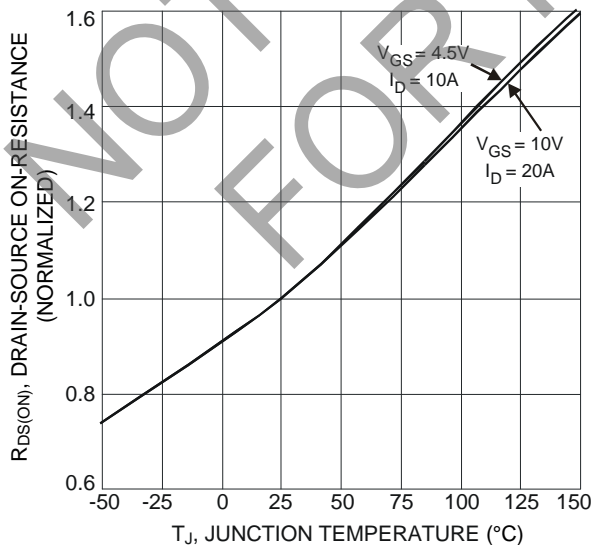


Fig. 5 On-Resistance Variation with Temperature

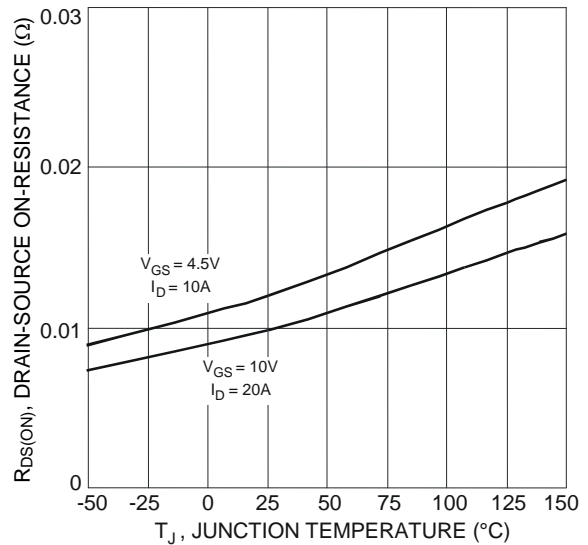


Fig. 6 On-Resistance Variation with Temperature

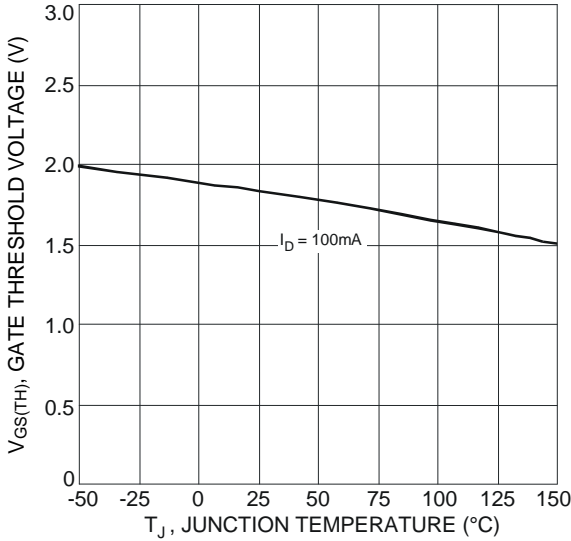


Fig. 7 Gate Threshold Variation vs. Junction Temperature

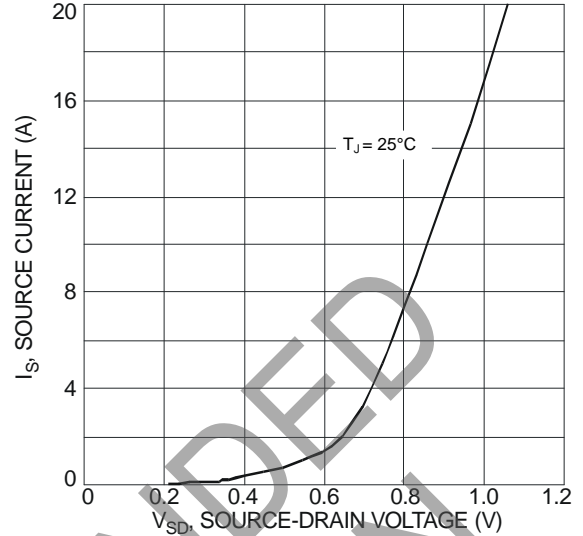


Fig. 8 Diode Forward Voltage vs. Current

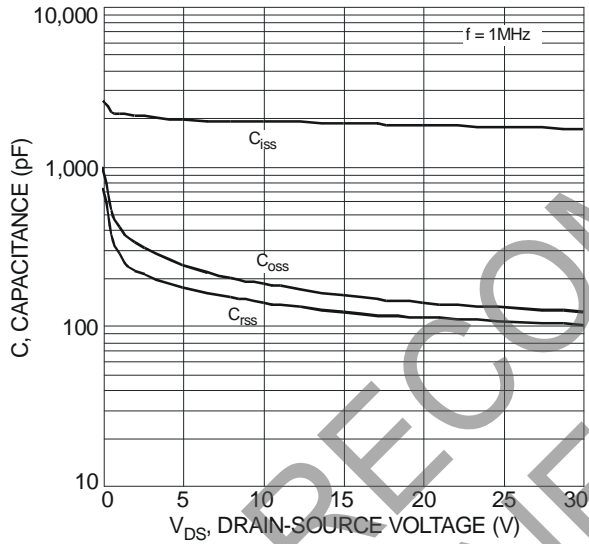


Fig. 9 Typical Total Capacitance

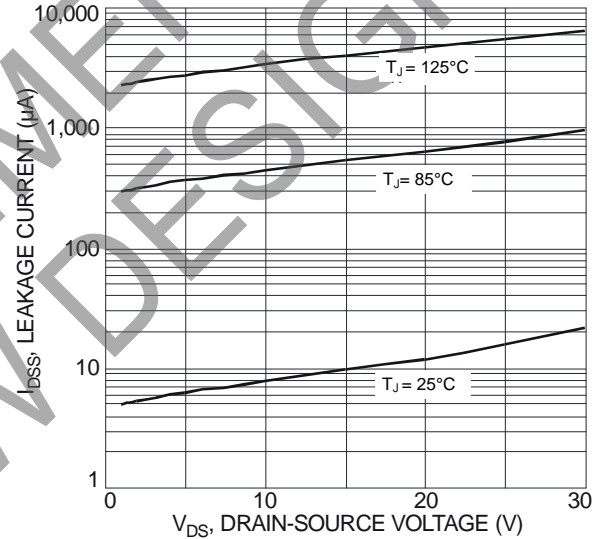


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

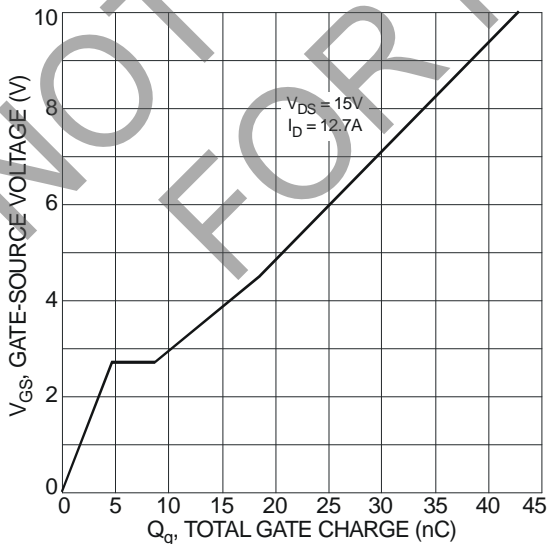


Fig. 11 Gate-Charge Characteristics

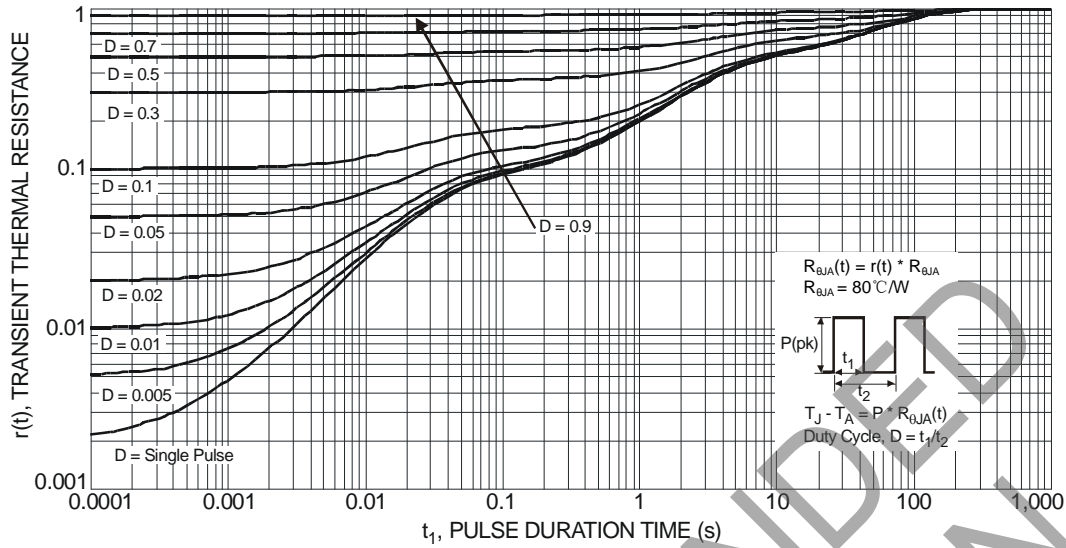
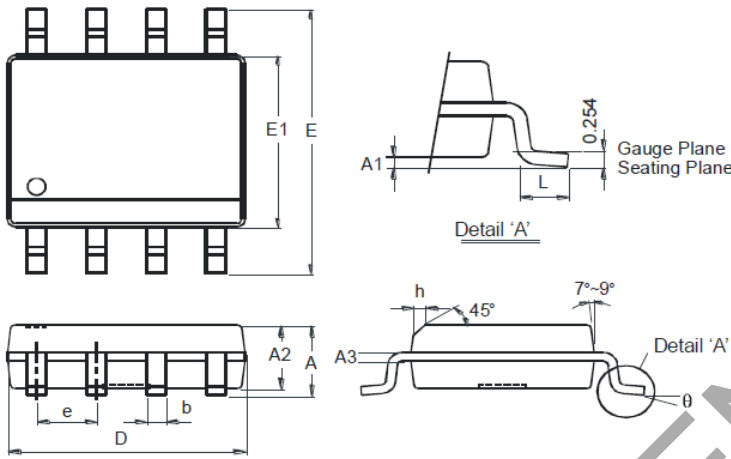


Fig. 12 Transient Thermal Response

NOT RECOMMENDED FOR NEW DESIGN

Package Outline Dimensions

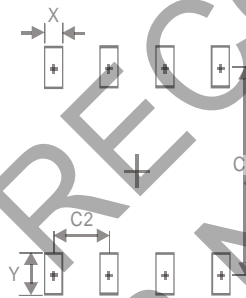
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



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



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

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