

P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

V _{DSS}	RDS(ON) max	I _D Τ _A = +25°C
-50V	10Ω @ V _{GS} = -5V	-180mA

Description

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.

Applications

- General Purpose Interfacing Switch
- **Power Management Functions**
- Analog Switch

Features and Benefits

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- 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

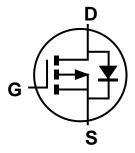
Mechanical Data

- Case: SOT23
- Case Material: UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish (Lead Free Plating). Solderable per MIL-STD-202, Method 208 @3
- Terminal Connections: See Diagram
- Weight: 0.008 grams (Approximate)

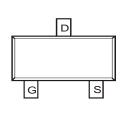








Equivalent Circuit



Top View

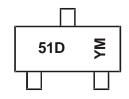
Ordering Information (Note 4)

Part Number	Case	Packaging
DMP510DL-7	SOT23	3,000/Tape & Reel
DMP510DL-13	SOT23	10,000/Tape & Reel

Notes:

- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 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



51D = Product Type Marking Code YM = Date Code Marking for SAT (Shanghai Assembly/ Test site) Y or \overline{Y} = Year (ex: C = 2015) M = Month (ex: 9 = September)

Date Code Key

Year	2015		2016	2017		2018	2019		2020	2021		2022
Code	С		D	Е		F	G		Н	- 1		J
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	0	N	D



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

Characteristic	Symbol	Value	Units		
Drain-Source Voltage			V_{DSS}	-50	V
Gate-Source Voltage			V_{GSS}	±30	V
II Continuous Drain Current (Note 6) Vac5V		$T_A = +25$ °C $T_A = +70$ °C	I _D	-180 -130	mA
Maximum Continuous Body Diode Forward Curren	I _S	-0.5	Α		
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I _{DM}	-1.2	Α

Thermal Characteristics (@TA = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)		P_{D}	310	mW
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{0JA}	405	°C/W
Total Power Dissipation (Note 6)		P _D	500	mW
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	251	°C/W
Operating and Storage Temperature Range		$T_{J_i} T_{STG}$	-55 to +150	°C

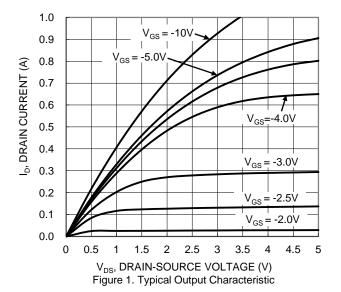
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

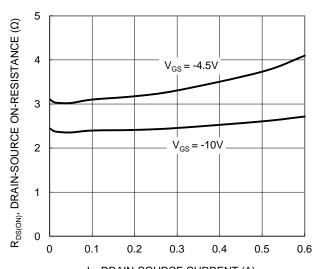
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)	Cymbol		. , , ,	mux	Onic	rest condition
Drain-Source Breakdown Voltage	BV _{DSS}	-50	_	_	V	$V_{GS} = 0V, I_D = -250\mu A$
Zero Gate Voltage Drain Current	I _{DSS}	_	_	-1	μA	$V_{DS} = -50V, V_{GS} = 0V$
Gate-Source Leakage	I _{GSS}	_	_	±100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$
ON CHARACTERISTICS (Note 7)			•	•		
Gate Threshold Voltage	V _{GS(TH)}	-0.8	_	-2.0	V	$V_{DS} = V_{GS}$, $I_D = -1mA$
Static Drain-Source On-Resistance	R _{DS} (ON)	_	_	10	Ω	$V_{GS} = -5V, I_{D} = -0.1A$
Forward Transconductance	g _{FS}	_	0.25	_	S	$V_{DS} = -25V, I_{D} = -0.1A$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	_	24.6	_	pF	
Output Capacitance	Coss	_	4.8	_	pF	$V_{DS} = -25V$, $V_{GS} = 0V$, $f = 1.0MHz$
Reverse Transfer Capacitance	Crss	_	2.8	_	pF	
Turn-On Delay Time	t _{D(ON)}	_	2.8	_	ns	
Turn-On Rise Time	t _R	_	2.6	_	ns	$V_{DD} = -30V, I_D = -0.27A,$
Turn-Off Delay Time	t _{D(OFF)}	_	11.1	_	ns	$R_{GEN} = 50\Omega$, $V_{GS} = -10V$
Turn-Off Fall Time	t _F	_	7.2	_	ns	

Notes:

- 5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
- 6. Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided. 7. Short duration pulse test used to minimize self-heating effect.
- 8. Guaranteed by design. Not subject to product testing.







I_D, DRAIN-SOURCE CURRENT (A) Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

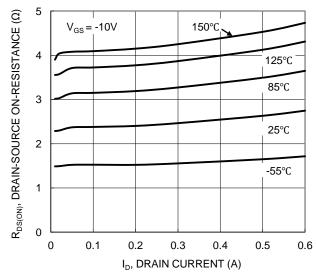


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

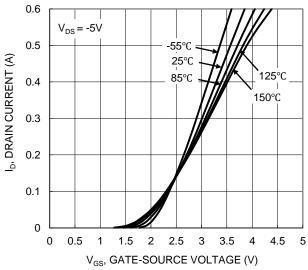


Figure 2. Typical Transfer Characteristic

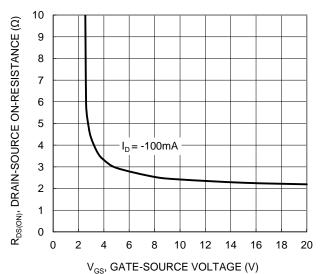


Figure 4. Typical Transfer Characteristic

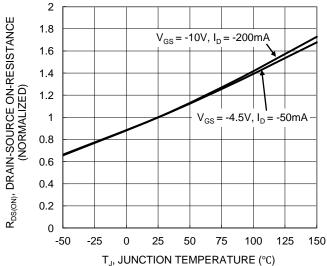


Figure 6. On-Resistance Variation with Temperature



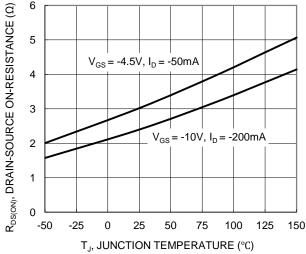
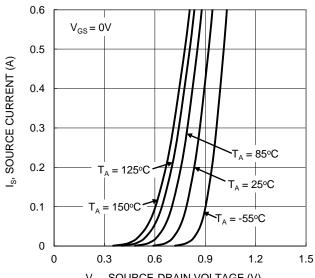


Figure 7. On-Resistance Variation with Temperature



 $\rm V_{SD},\,SOURCE\text{-}DRAIN\,VOLTAGE}$ (V) Figure 9. Diode Forward Voltage vs. Current

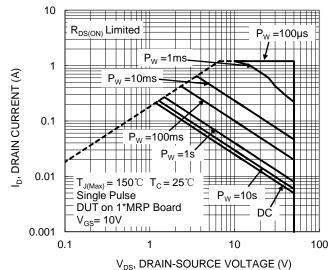


Figure 11. SOA, Safe Operation Area

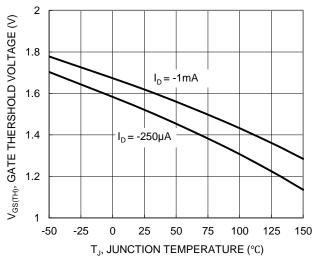


Figure 8. Gate Threshold Variation vs. Ambient Temperature

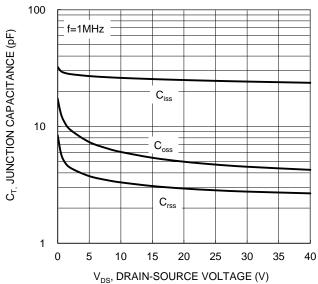


Figure 10. Typical Junction Capacitance



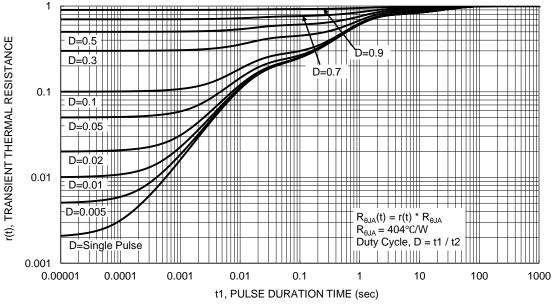
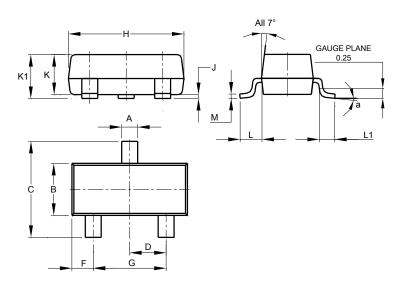


Figure 12. Transient Thermal Resistance

Package Outline Dimensions

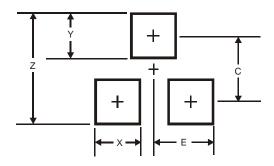
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



SOT23								
Dim	Min	Max	Тур					
Α	0.37	0.51	0.40					
В	1.20	1.40	1.30					
С	2.30	2.50	2.40					
D	0.89	1.03	0.915					
F	0.45	0.60	0.535					
G	1.78	2.05	1.83					
Н	2.80	3.00	2.90					
J	0.013	0.10	0.05					
K	0.890	1.00	0.975					
K1	0.903	1.10	1.025					
L	0.45	0.61	0.55					
L1	0.25	0.55	0.40					
М	0.085	0.150	0.110					
α	α 8°							
All Dimensions in mm								

Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



Dimensions	Value (in mm)
Z	2.9
Х	0.8
Y	0.9
С	2.0
E	1.35



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