

Product Summary

V_{DSS}	$R_{DS(ON)}$ max	I_D $T_A = +25^\circ C$
-50V	10 Ω @ $V_{GS} = -5V$	-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

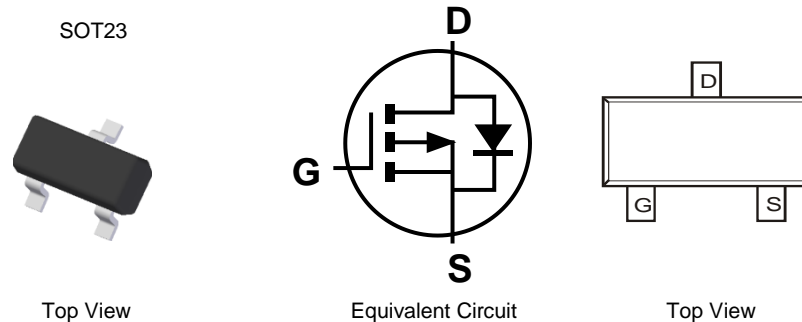
- General Purpose Interfacing Switch
- Power Management Functions
- Analog Switch

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 $\text{\textcircled{3}}$
- Terminal Connections: See Diagram
- Weight: 0.008 grams (Approximate)

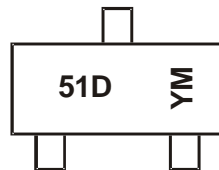


Ordering Information (Note 4)

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



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

Date Code Key

Year	2015	2016	2017	2018	2019	2020	2021	2022
Code	C	D	E	F	G	H	I	J

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-50	V
Gate-Source Voltage			V_{GSS}	± 30	V
Continuous Drain Current (Note 6) $V_{GS} = -5V$	Steady State	$T_A = +25^\circ\text{C}$	I_D	-180	mA
		$T_A = +70^\circ\text{C}$		-130	
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	-0.5	A
Pulsed Drain Current (10 μs Pulse, Duty Cycle = 1%)			I_{DM}	-1.2	A

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, 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		$R_{\theta JA}$	405	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)			P_D	500	mW
Thermal Resistance, Junction to Ambient (Note 6)	Steady State		$R_{\theta JA}$	251	$^\circ\text{C/W}$
Operating and Storage Temperature Range			T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	-50	—	—	V	$V_{GS} = 0V, I_D = -250\mu\text{A}$
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	$V_{DS} = V_{GS}, I_D = -1\text{mA}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	10	Ω	$V_{GS} = -5V, I_D = -0.1\text{A}$
Forward Transconductance	g_{FS}	—	0.25	—	S	$V_{DS} = -25V, I_D = -0.1\text{A}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	24.6	—	pF	$V_{DS} = -25V, V_{GS} = 0V, f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	4.8	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	2.8	—	pF	
Turn-On Delay Time	$t_{D(ON)}$	—	2.8	—	ns	$V_{DD} = -30V, I_D = -0.27\text{A}, R_{GEN} = 50\Omega, V_{GS} = -10V$
Turn-On Rise Time	t_R	—	2.6	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	11.1	—	ns	
Turn-Off Fall Time	t_F	—	7.2	—	ns	

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

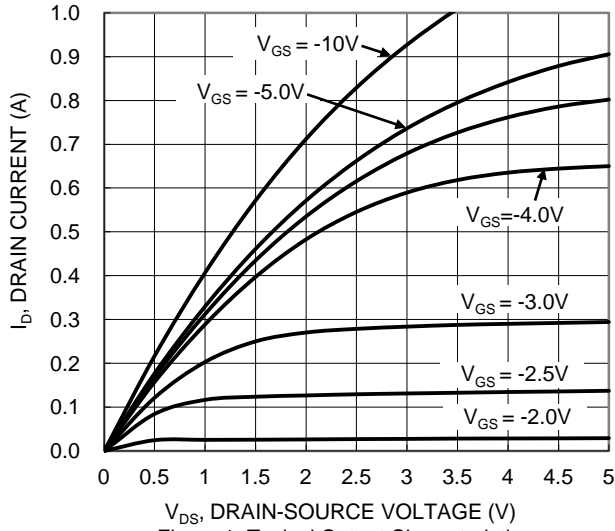


Figure 1. Typical Output Characteristic

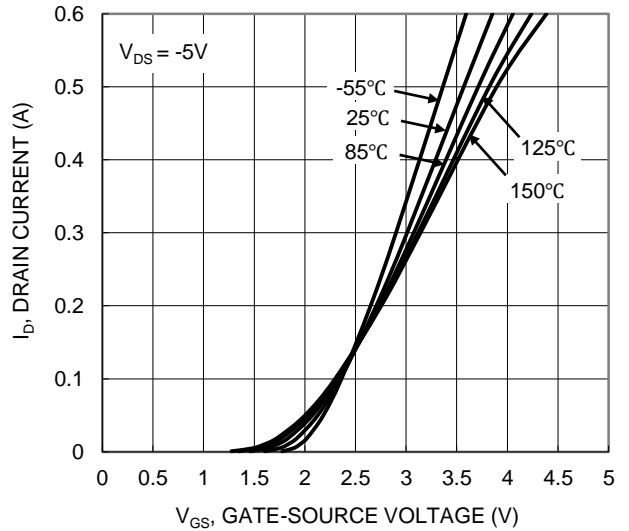


Figure 2. Typical Transfer Characteristic

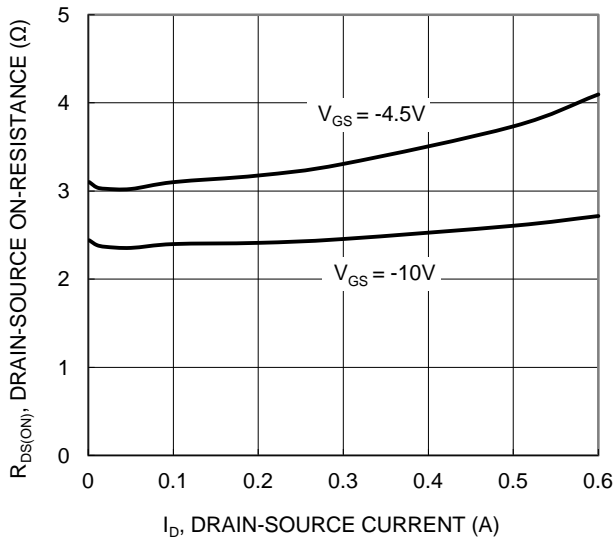


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

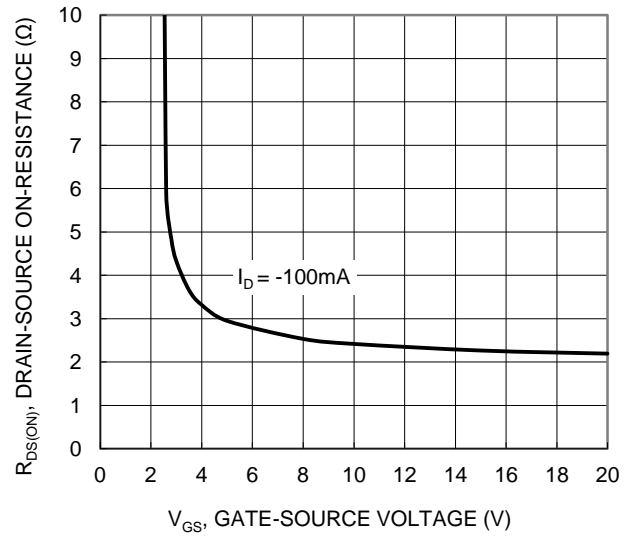


Figure 4. Typical Transfer Characteristic

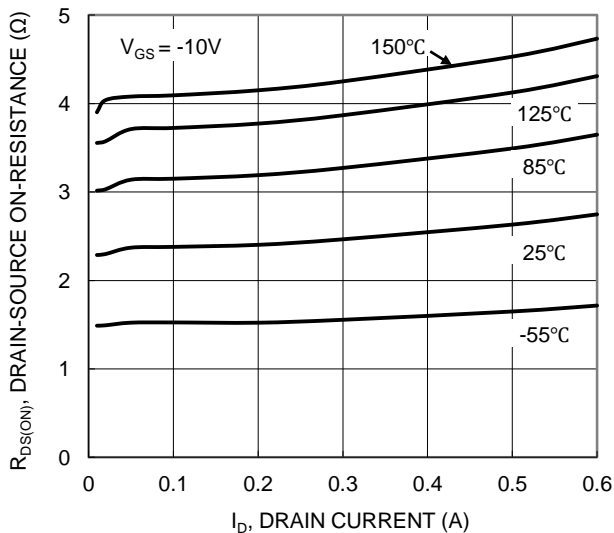


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

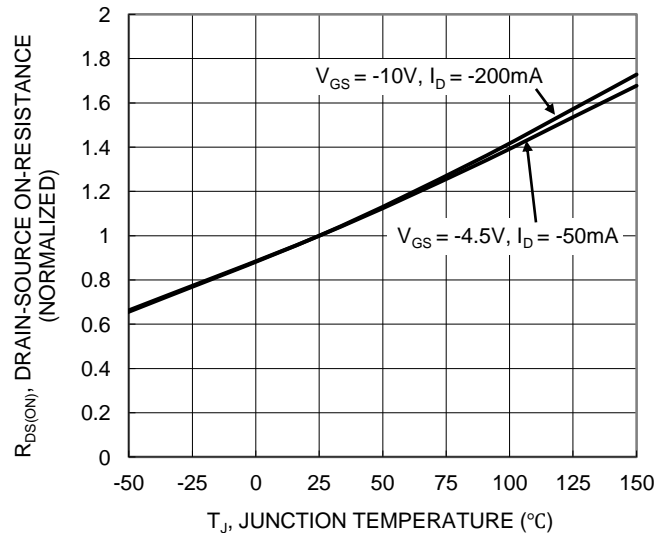
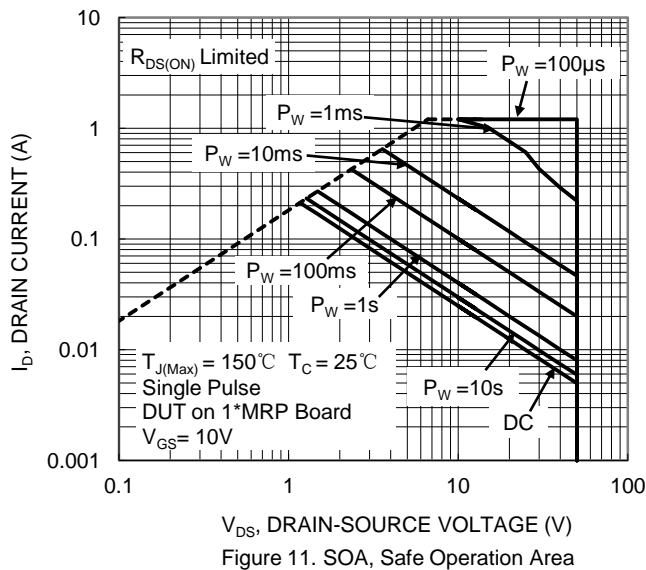
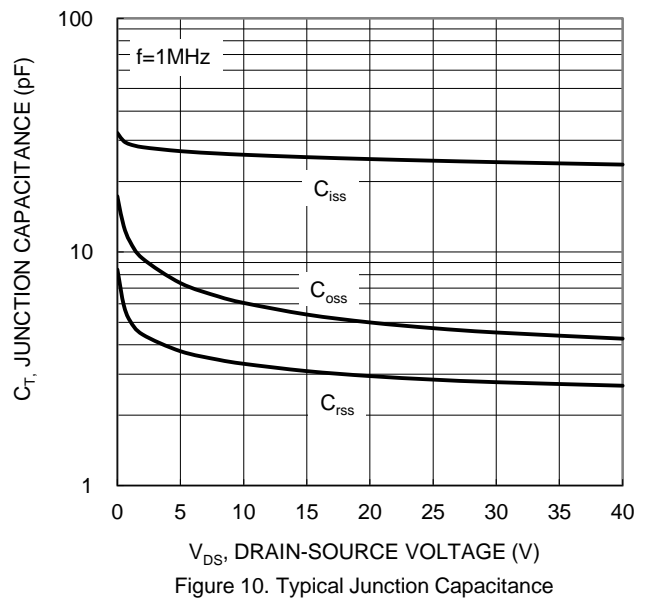
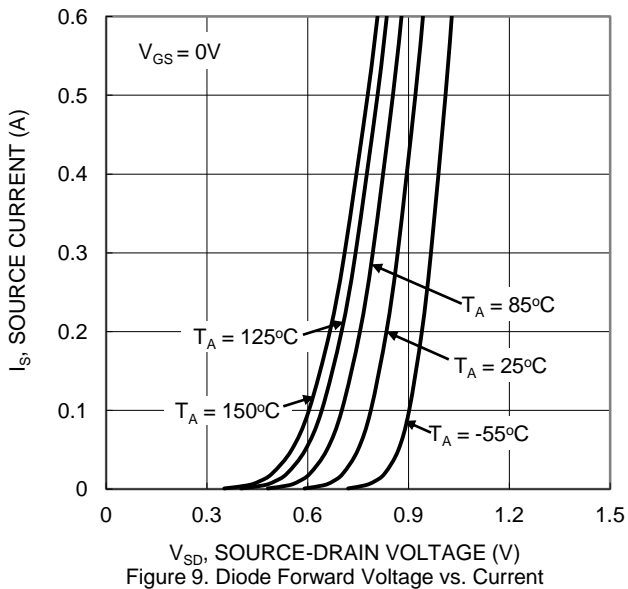
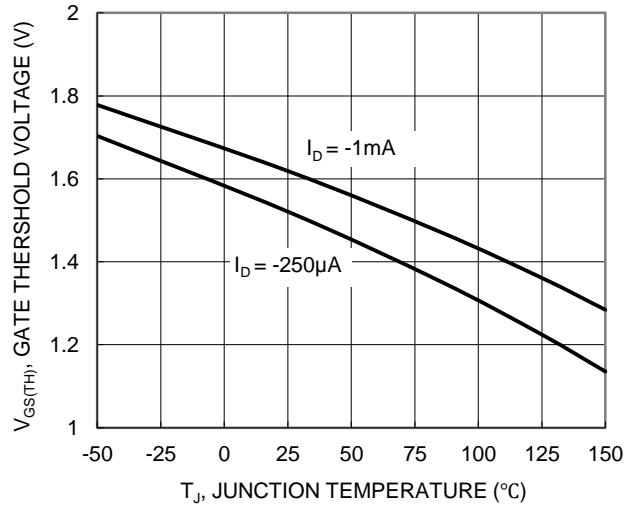
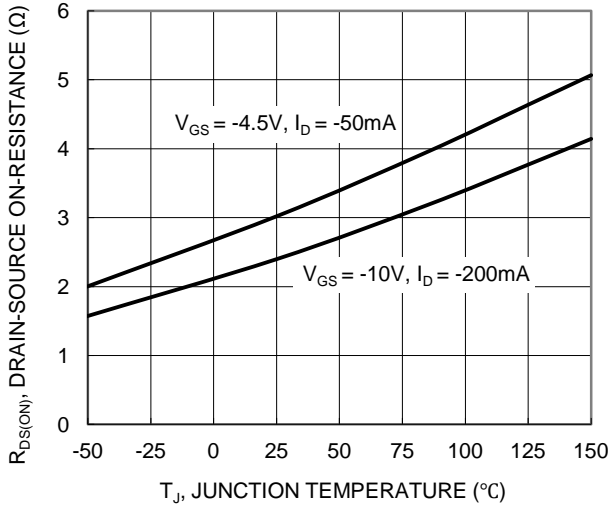


Figure 6. On-Resistance Variation with Temperature



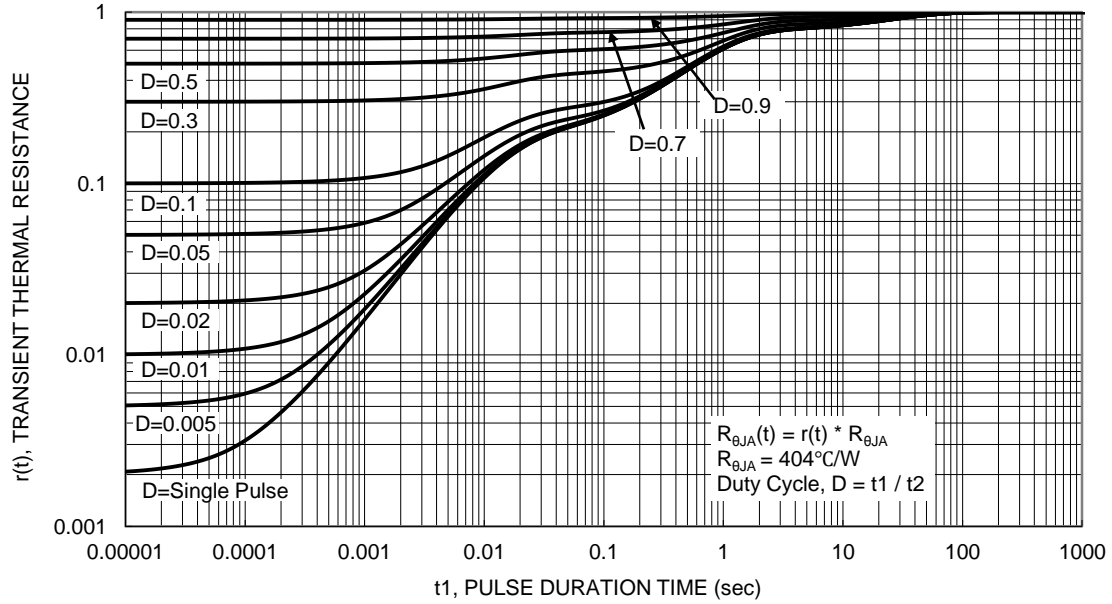
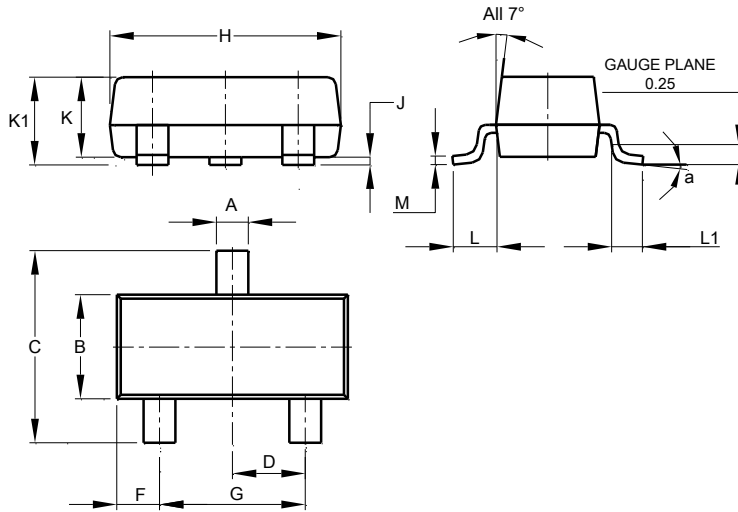


Figure 12. Transient Thermal Resistance

Package Outline Dimensions

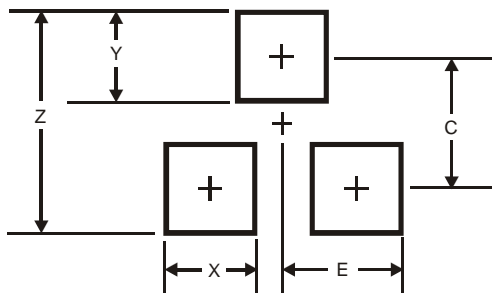
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	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
H	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
M	0.085	0.150	0.110
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
X	0.8
Y	0.9
C	2.0
E	1.35

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