Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_A = +25°C
-50V	10.0Ω @ V_{GS} = -5V	-174mA

Features and Benefits

- Low On-Resistance
- 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)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

Description and Applications

This 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.

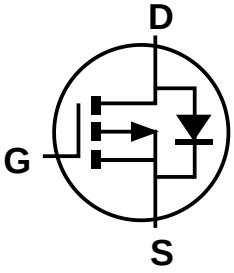
- Motor Control
- Power Management Functions
- Backlighting

Mechanical Data

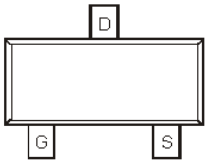
- Case: SOT323
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Annealed over Alloy 42 Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.006 grams (Approximate)

SOT323

Top View



Equivalent Circuit



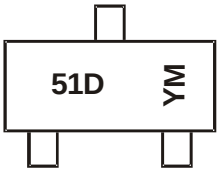
Top View

Ordering Information (Note 4)

Part Number	Case	Packaging
DMP510DLW-7	SOT323	3000/Tape & Reel
DMP510DLW-13	SOT323	10000/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



51D= Product Type Marking Code
$\overline{Y}$M = Date Code Marking
Y or $\overline{Y}$ = Year (ex: H = 2020)
M = Month (ex: 9 = September)

Date Code Key

Year	2017	…	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Code	E	…	H	I	J	K	L	M	N	O	P	R

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°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-50	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 6) V_{GS} = -5V	Steady State	T_A = +25°C T_A = +70°C	I_D	-174 -139	mA
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	-65	mA
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) (Note 6)			I_{DM}	-1.0	A

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P_D	320	mW
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	398	°C/W
Total Power Dissipation (Note 6)		P_D	470	mW
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	273	°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 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	-50	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1.0	µA	V_{DS} = -50V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±16V, 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
Diode Forward Voltage	V_{SD}	—	-0.78	-1.5	V	V_{GS} = 0V, I_S = -100mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	24.6	—	pF	V_{DS} = -25V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	4.8	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	2.8	—	pF	
Gate Resistance	R_g	—	2000	—	Ω	f = 1.0MHz , V_{GS} = 0V, V_{DS} = 0V
Total Gate Charge (V_{GS} = -4.5V)	Q_g	—	280	—	pC	V_{GS} = -4.5V, V_{DS} = -10V, I_D = -100mA
Total Gate Charge (V_{GS} = -10V)	Q_g	—	560	—	pC	
Gate-Source Charge	Q_{gs}	—	90	—	pC	
Gate-Drain Charge	Q_{gd}	—	77	—	pC	
Turn-On Delay Time	$t_{D(ON)}$	—	2.8	—	ns	V_{DD} = -30V, I_D = -0.27A, R_{GEN} = 50Ω, 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:
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.

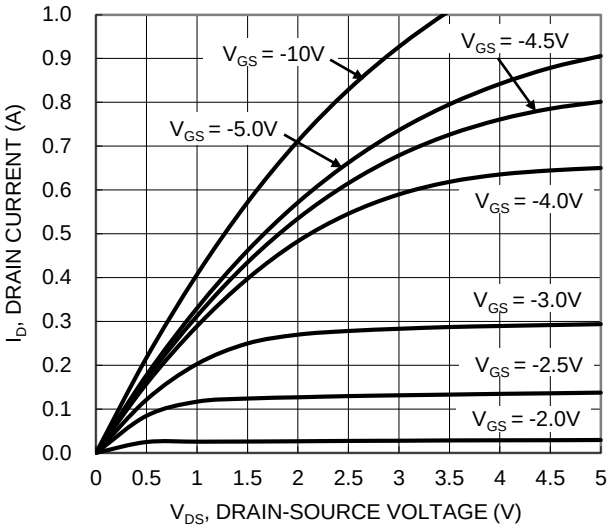


Figure 1. Typical Output Characteristic

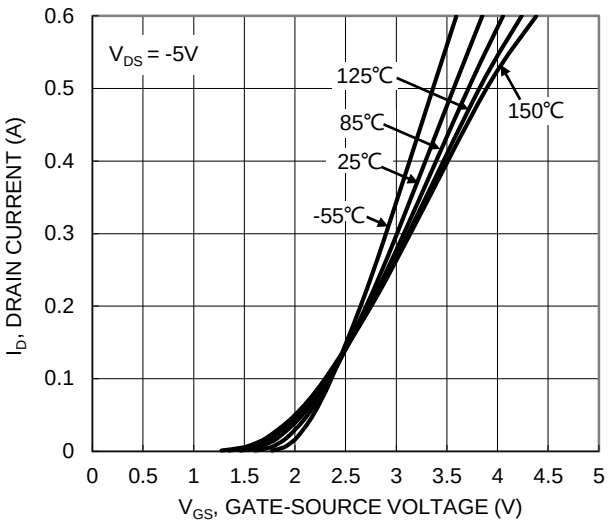


Figure 2. Typical Transfer Characteristic

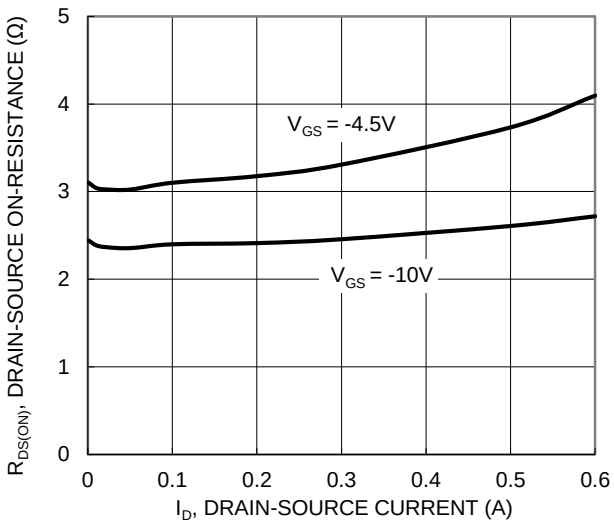


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

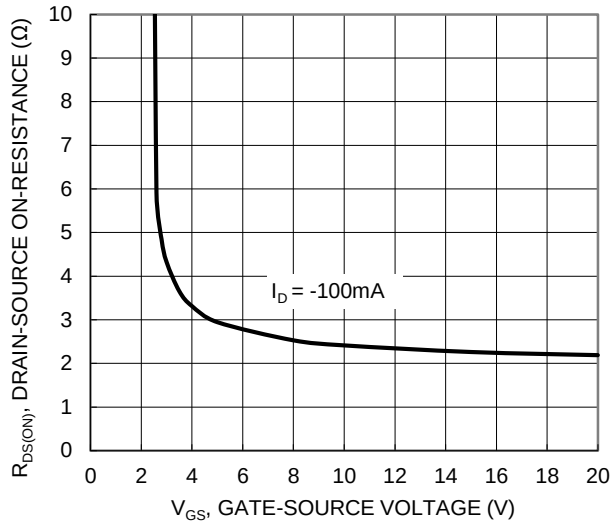


Figure 4. Typical Transfer Characteristic

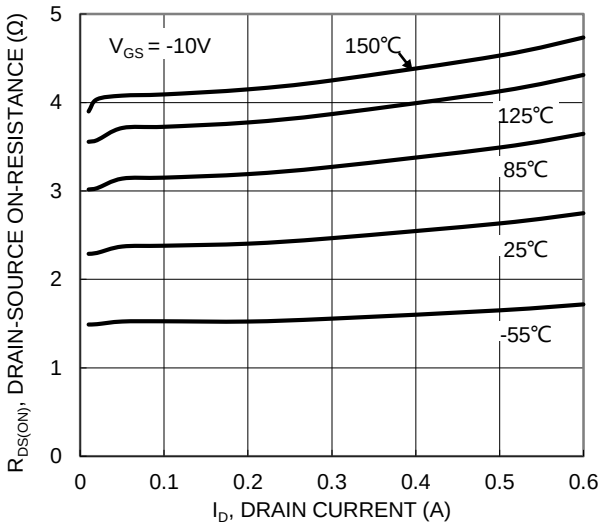


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

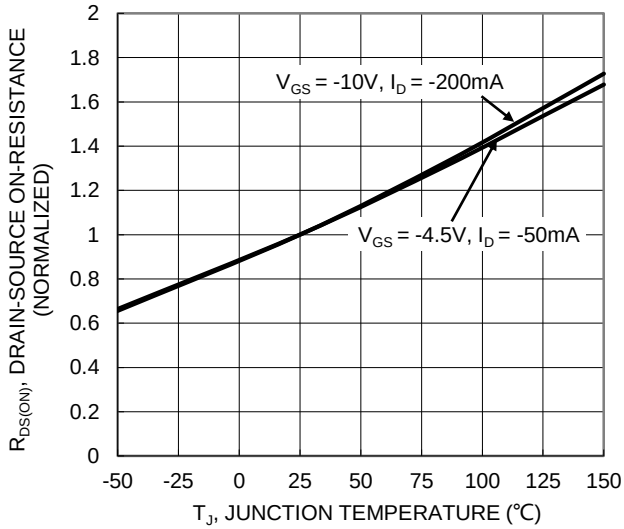


Figure 6. On-Resistance Variation with Temperature

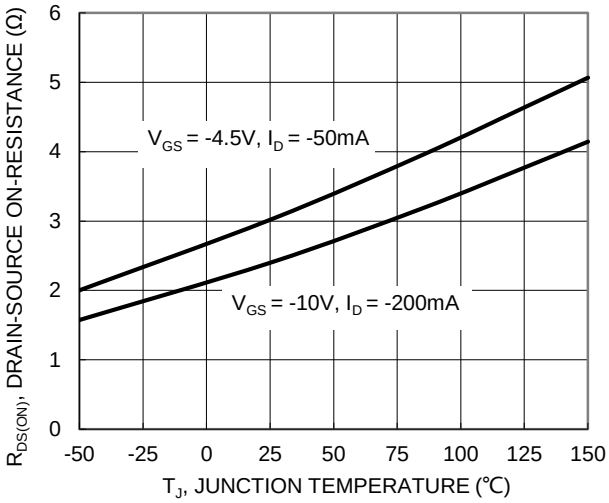


Figure 7. On-Resistance Variation with Temperature

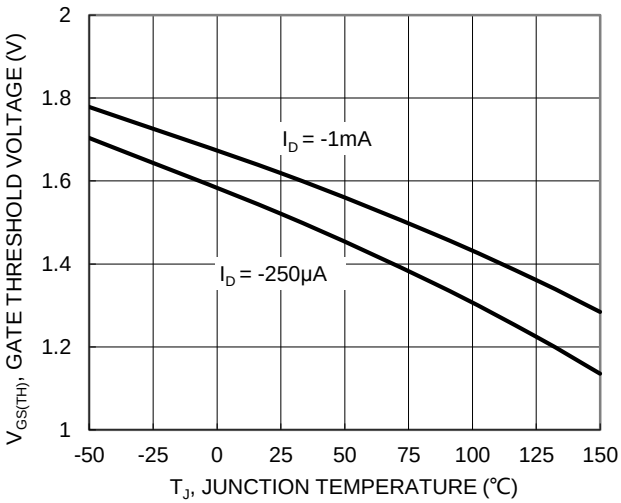


Figure 8. Gate Threshold Variation vs. Junction Temperature

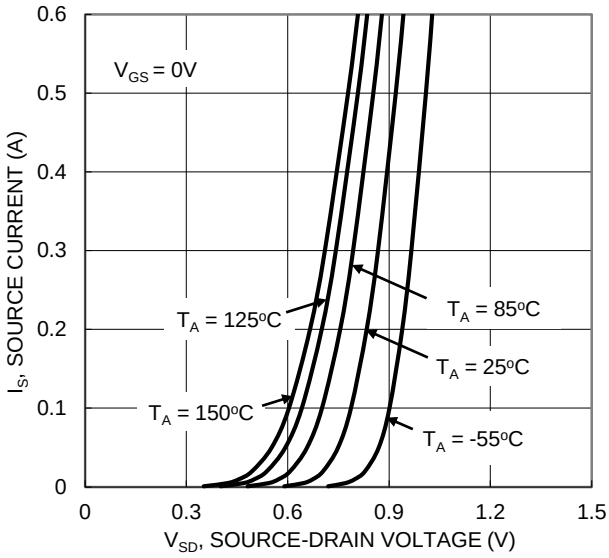


Figure 9. Diode Forward Voltage vs. Current

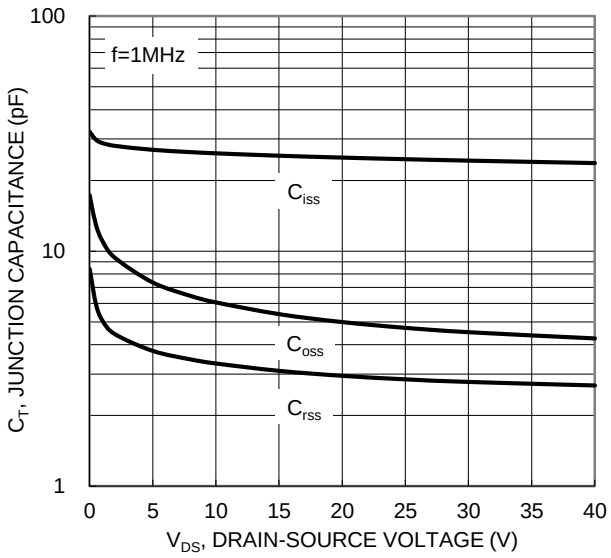


Figure 10. Typical Junction Capacitance

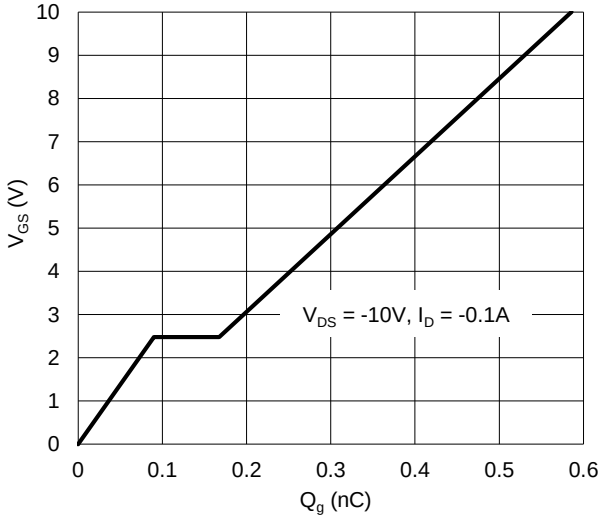


Figure 11. Gate Charge

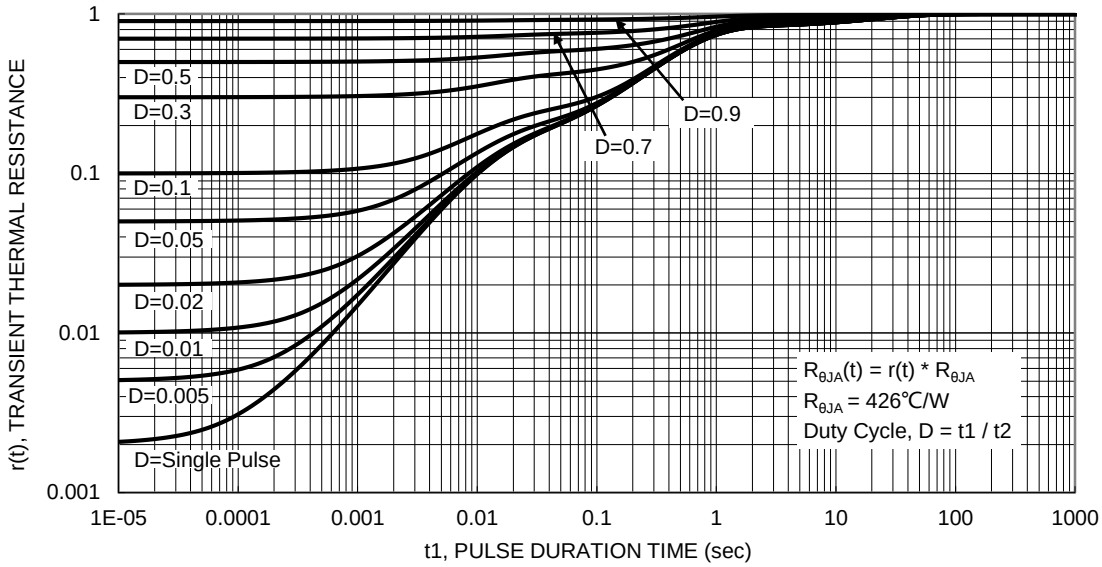
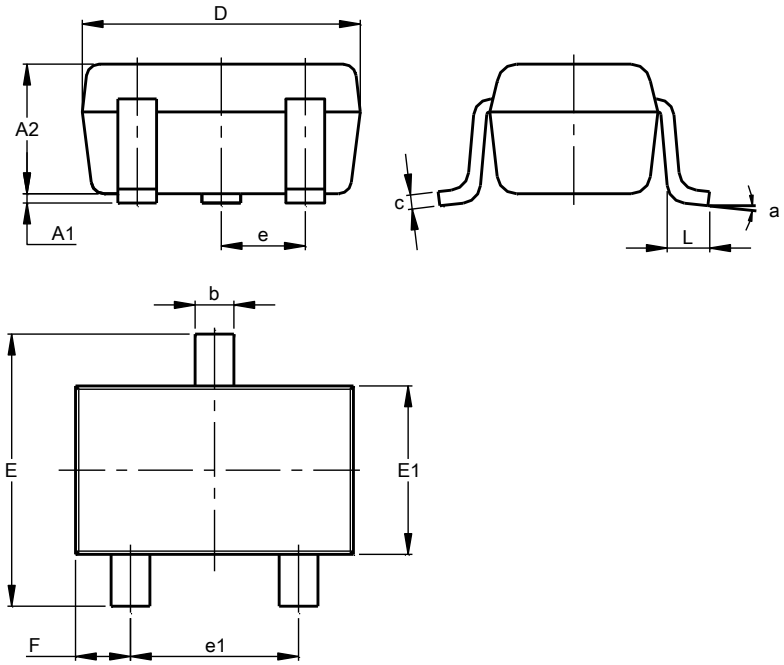


Figure 12. Transient Thermal Resistance

Package Outline Dimensions

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

SOT323

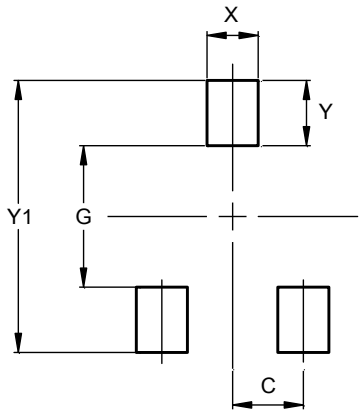


SOT323			
Dim	**Min**	**Max**	**Typ**
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.25	0.40	0.30
c	0.10	0.18	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
e1	1.20	1.40	1.30
F	0.375	0.475	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

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

SOT323



Dimensions	Value (in mm)
C	0.650
G	1.300
X	0.470
Y	0.600
Y1	2.500

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