Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D T_A = +25°C
-30V	0.9Ω @ V_{GS} = -10V	-0.81 A
	1.7Ω @ V_{GS} = -4.5V	-0.58 A

Description and Applications

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

- Load Switch

Features and Benefits

- 0.6mm^2 Footprint—Thirteen Times Smaller than SOT23
- Low Gate Threshold Voltage
- Fast Switching Speed
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMP31D7LFBQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

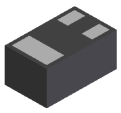
Mechanical Data

- Package: X1-DFN1006-3
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish—NiPdAu over Copper Lead-Frame. Solderable per MIL-STD-202, Method 208 e4
- Weight: 0.001 grams (Approximate)

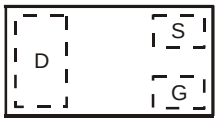


ESD Protected Gate

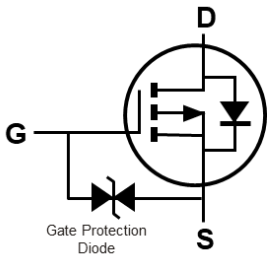
X1-DFN1006-3



Bottom View



Top View
Internal Schematic



Equivalent Circuit

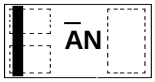
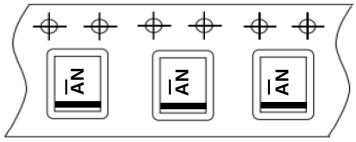
Ordering Information (Note 4)

Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Tape Pitch (mm)	Packing	
						Qty.	Carrier
DMP31D7LFBQ-7B	X1-DFN1006-3	$\overline{A}$N	7	8	2	10,000	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/.

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Marking Information

DMP31D7LFBQ-7B	 Top View Bar Denotes Gate and Source Side $\overline{A}N$ = Product Type Marking Code 

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}	±20	V
Continuous Drain Current (Note 6) V_{GS} = -10V	Steady State	T_A = +25°C T_A = +70°C	I_D	-0.81 -0.64	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	-2.4	A

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P_D	0.53	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\Theta JA}$	236	°C/W
Total Power Dissipation (Note 6)	P_D	0.89	W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\Theta JA}$	141	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 25mm × 25mm square copper plate.

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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}	-30	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	-1	µA	V_{DS} = -24V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	µA	V_{GS} = ±16V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-1	—	-2.6	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	0.5	0.9	Ω	V_{GS} = -10V, I_D = -0.42A
		—	0.8	1.7		V_{GS} = -4.5V, I_D = -0.2A
Diode Forward Voltage	V_{SD}	—	-0.8	-1.2	V	V_{GS} = 0V, I_S = -0.23A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	19	—	pF	V_{DS} = -15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	16	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	3	—	pF	
Gate Resistance	R_g	—	729	—	Ω	V_{DS} = V_{GS} = 0V, f = 1.0MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	0.36	—	nC	V_{GS} = -4.5V, V_{DS} = -10V, I_D = -250mA
Gate-Source Charge	Q_{gs}	—	0.1	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.1	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	30	—	ns	V_{DD} = -10V, V_{GS} = -4.5V, R_L = 47Ω, R_G = 10Ω, I_D = -200mA
Turn-On Rise Time	t_R	—	74	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	28	—	ns	
Turn-Off Fall Time	t_F	—	31	—	ns	

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

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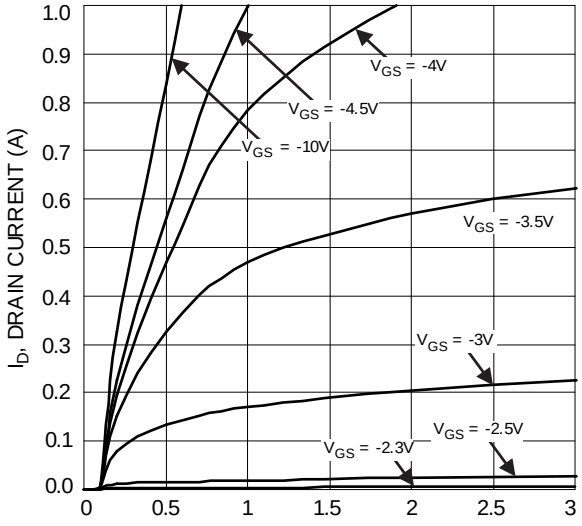


Figure 1 Typical Output Characteristics

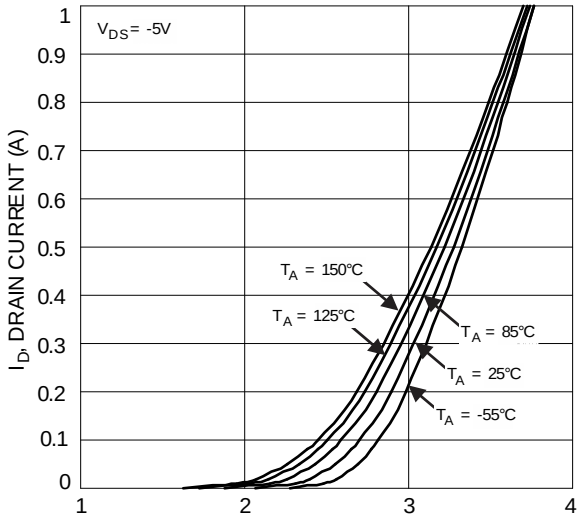


Figure 2 Typical Transfer Characteristics

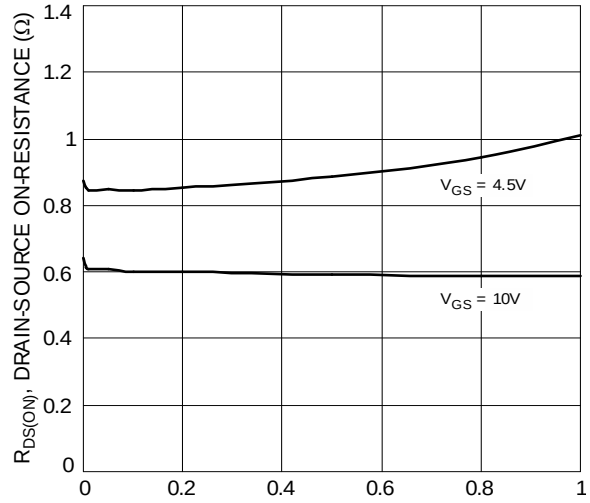


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

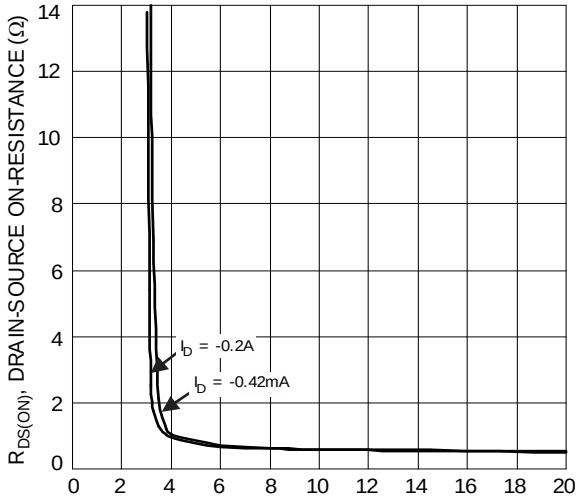


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

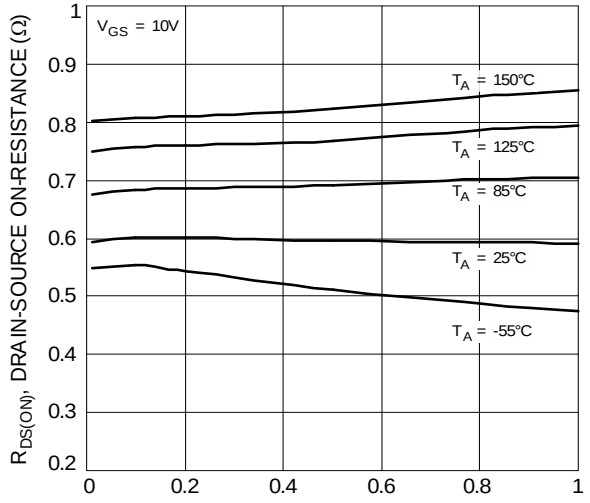


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

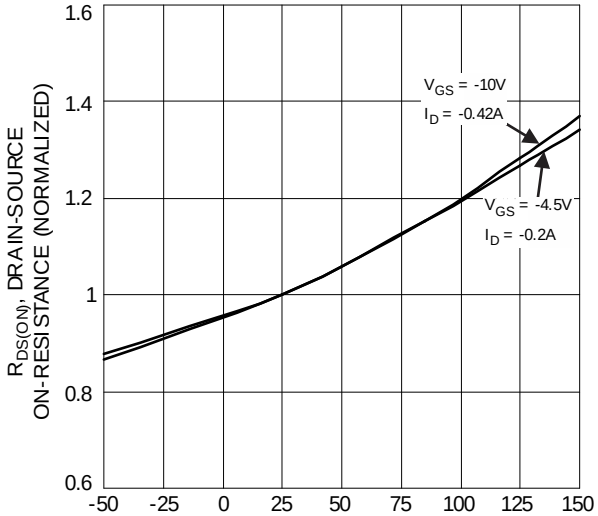


Figure 6 On-Resistance Variation with Temperature

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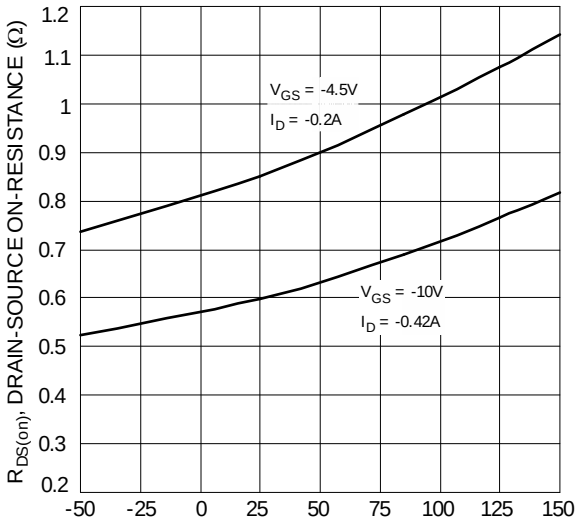


Figure 7 On-Resistance Variation with Temperature

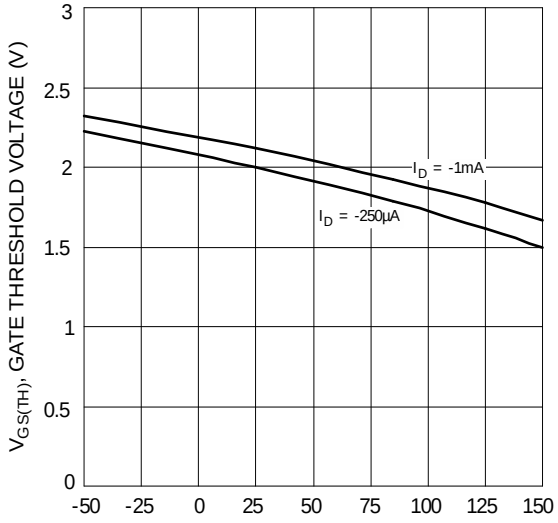


Figure 8 Gate Threshold Variation vs. Ambient Temperature

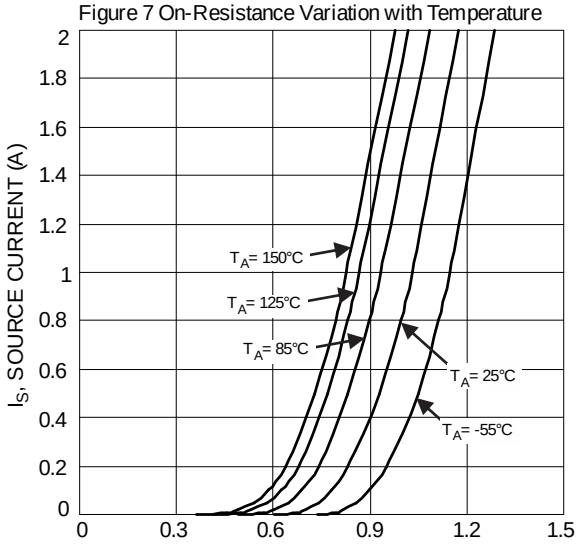


Figure 9 Diode Forward Voltage vs. Current

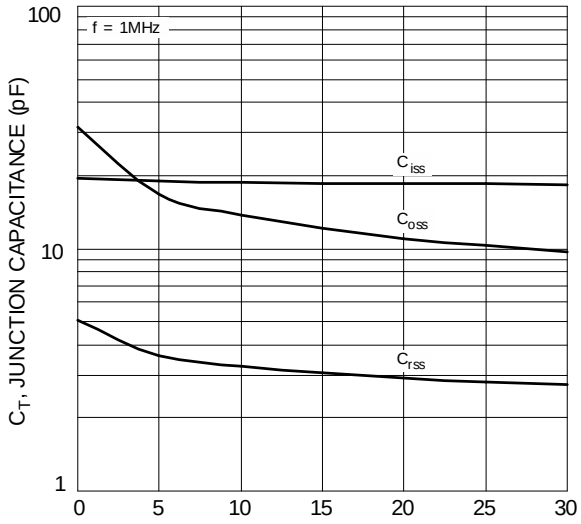


Figure 10 Typical Junction Capacitance

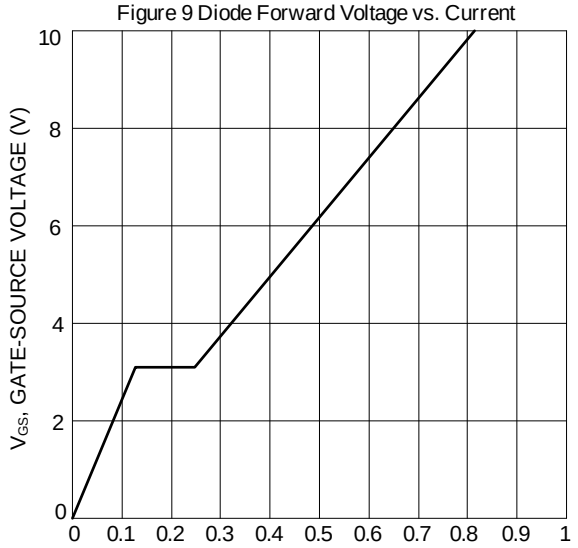


Figure 11 Gate Charge

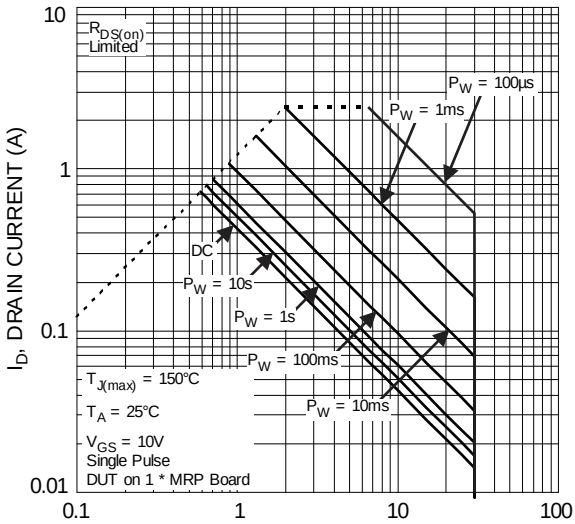


Figure 12 SOA, Safe Operation Area

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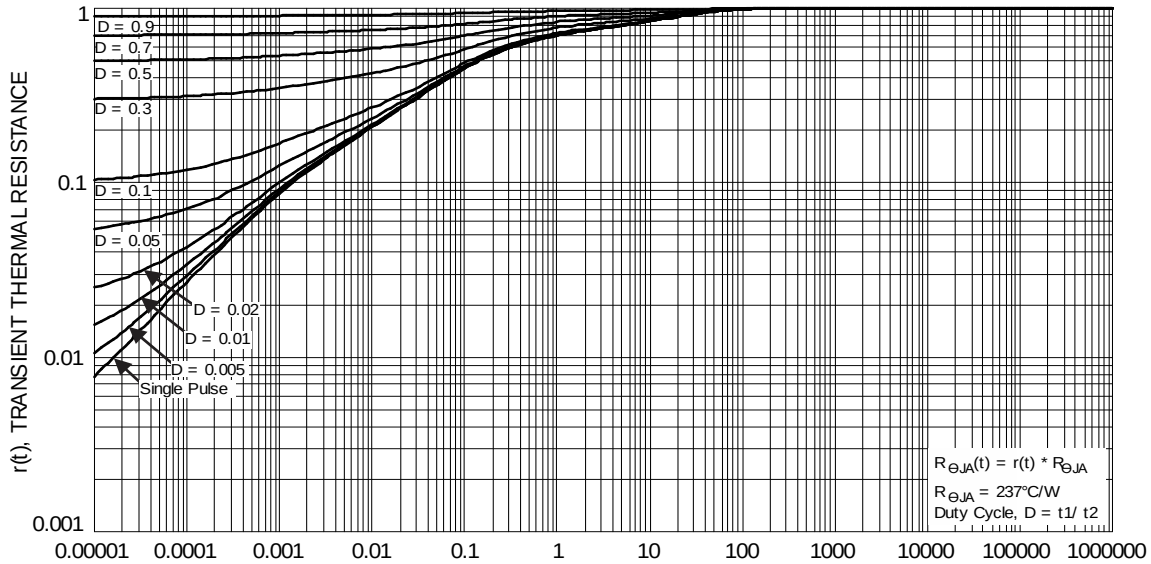


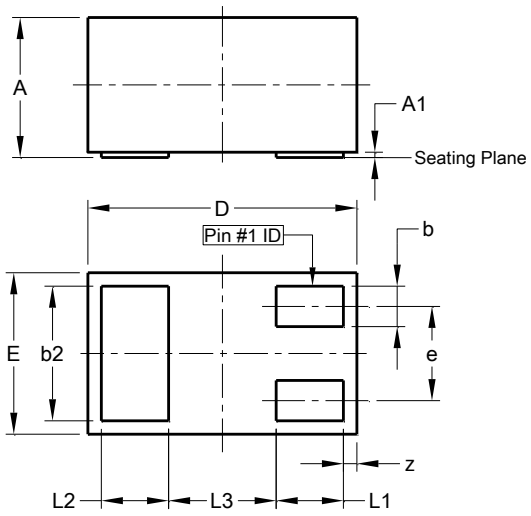
Figure 13 Transient Thermal Resistance

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Package Outline Dimensions

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

X1-DFN1006-3

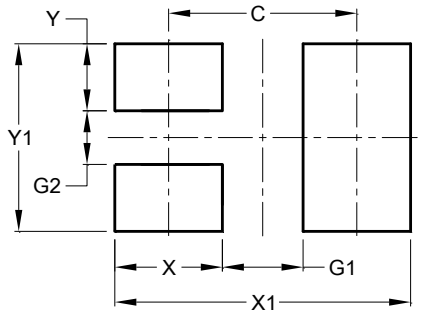


X1-DFN1006-3			
Dim	**Min**	**Max**	**Typ**
A	0.47	0.53	0.50
A1	0.00	0.05	0.03
b	0.10	0.20	0.15
b2	0.45	0.55	0.50
D	0.95	1.075	1.00
E	0.55	0.675	0.60
e	-	-	0.35
L1	0.20	0.30	0.25
L2	0.20	0.30	0.25
L3	-	-	0.40
z	0.02	0.08	0.05
All Dimensions in mm			

Suggested Pad Layout

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

X1-DFN1006-3



Dimensions	Value (in mm)
C	0.70
G1	0.30
G2	0.20
X	0.40
X1	1.10
Y	0.25
Y1	0.70

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