

## Product Summary

BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> T <sub>A</sub> = +25°C
60V	69mΩ @ V <sub>GS</sub> = 10V	4.3A
	100mΩ @ V <sub>GS</sub> = 4.5V	3.5A

## Description and Applications

This new generation MOSFET has been designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) yet maintain superior switching performance, making it ideal for high efficiency power management applications.

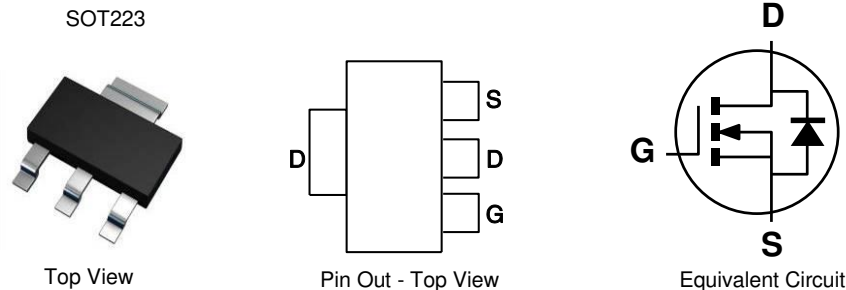
- Motor Control
- Transformer Driving Switch
- DC-DC Converters
- Power Management Functions
- Uninterrupted Power Supply

## Features and Benefits

- 100% Unclamped Inductive Switch (UIS) Test in Production
- Fast Switching Speed
- Low On-Resistance
- **Lead-Free Finish; 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/>**

## Mechanical Data

- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram Below
- Terminals: Finish - Matte Tin Annealed over Copper Lead Frame. Solderable per MIL-STD-202, Method 208(Ⓔ)
- Weight: 0.112 grams (Approximate)

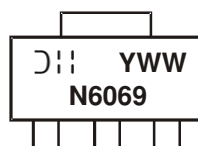


## Ordering Information (Note 4)

Part Number	Case	Packaging
DMN6069SE-13	SOT223	2,500 / Tape & Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  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



YWW = Manufacturer's Marking  
 N6069 = Marking Code  
 YWW = Date Code Marking  
 Y or Y = Year (ex: 1 = 2021)  
 WW = Week (01 to 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit	
Drain-Source Voltage	V <sub>DSS</sub>	60	V	
Gate-Source Voltage	V <sub>GSS</sub>	±20	V	
Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V	I <sub>D</sub>	T <sub>A</sub> = +25°C	4.3	A
		T <sub>A</sub> = +70°C	3.3	A
	I <sub>D</sub>	T <sub>C</sub> = +25°C	10	A
		T <sub>C</sub> = +70°C	8	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	25	A	
Maximum Body Diode Continuous Current	I <sub>S</sub>	4.3	A	

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit	
Total Power Dissipation (Note 6)	P <sub>D</sub>	T <sub>A</sub> = +25°C	2.2	W
		T <sub>A</sub> = +70°C	1.4	
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	58	°C/W	
Total Power Dissipation (Note 5)	P <sub>D</sub>	1.2	W	
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	100	°C/W	
Total Power Dissipation (Note 6)	P <sub>D</sub>	11	W	
Thermal Resistance, Junction to Case (Note 6)	R <sub>θJC</sub>	8.9	°C/W	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C	

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	60	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	µA	V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1	—	3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	47	69	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 3A
		—	54	100		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 2.4A
Diode Forward Voltage	V <sub>SD</sub>	—	0.8	1.1	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 2.5A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	—	825	—	pF	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	40	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	29	—		
Gate Resistance	R <sub>G</sub>	—	2.3	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	7.2	—	nC	V <sub>DS</sub> = 30V, I <sub>D</sub> = 12A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	16	—		
Gate-Source Charge	Q <sub>gs</sub>	—	3.2	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	2.8	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	3.8	—	ns	V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V, R <sub>G</sub> = 6Ω, I <sub>D</sub> = 12A
Turn-On Rise Time	t <sub>R</sub>	—	6.7	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	16	—		
Turn-Off Fall Time	t <sub>F</sub>	—	5.3	—		

- 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 thermal vias to bottom layer 1inch square copper plate.  
7. Short duration pulse test used to minimize self-heating effect.  
8. Guaranteed by design. Not subject to product testing.

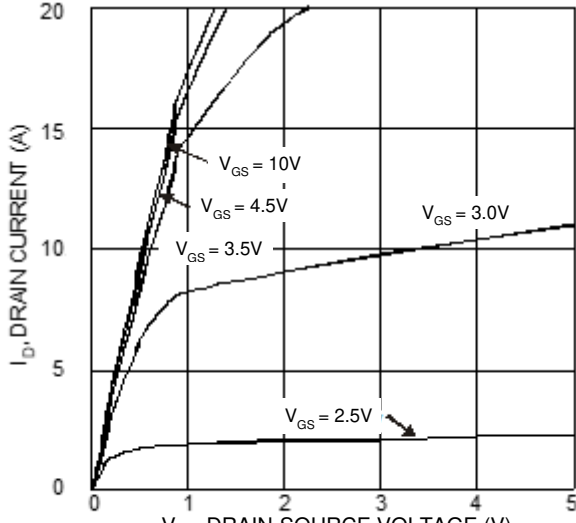


Figure 1 Typical Output Characteristic

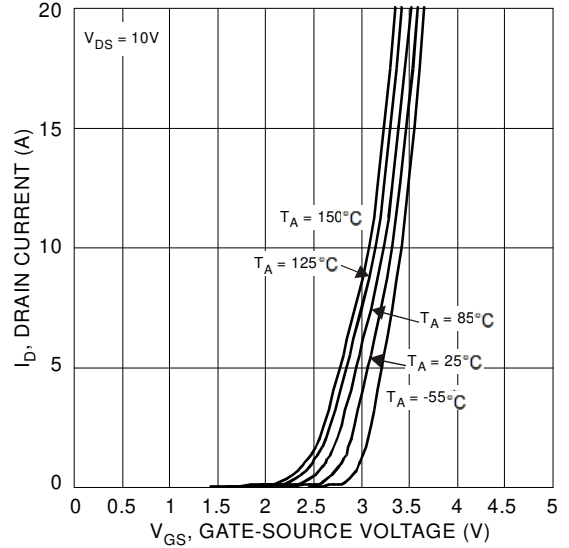


Figure 2 Typical Transfer Characteristic

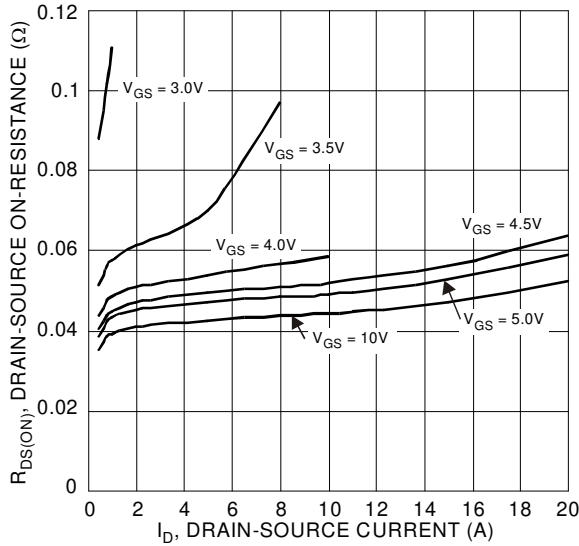


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

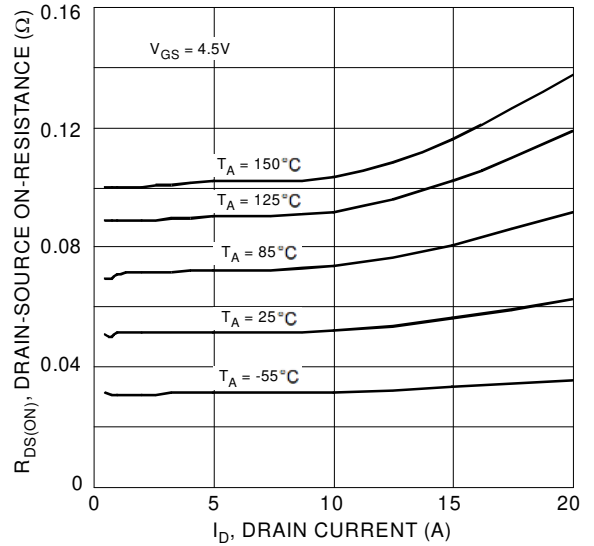


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

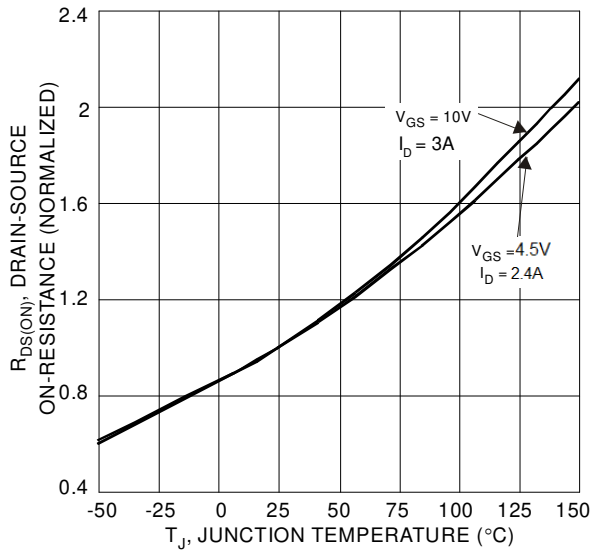


Figure 5 On-Resistance Variation with Temperature

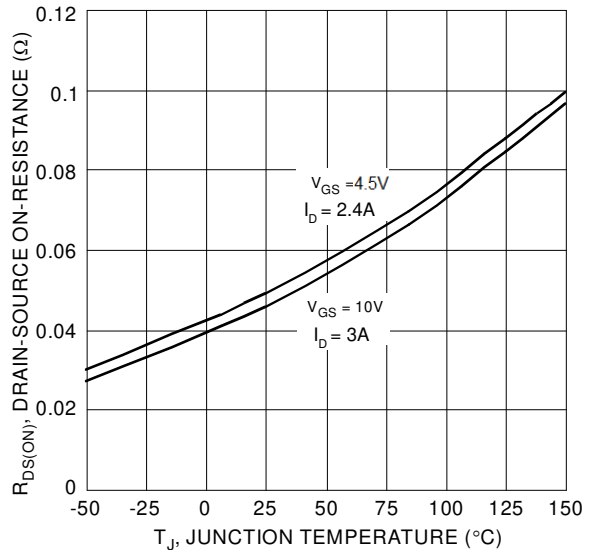


Figure 6 On-Resistance Variation with Temperature

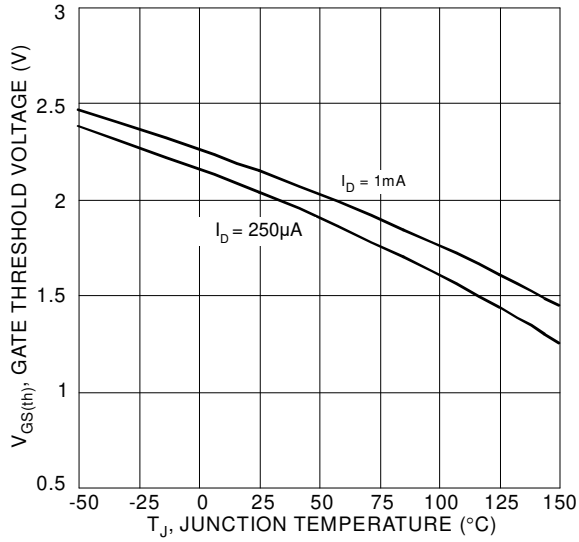


Figure 7 Gate Threshold Variation vs. Junction Temperature

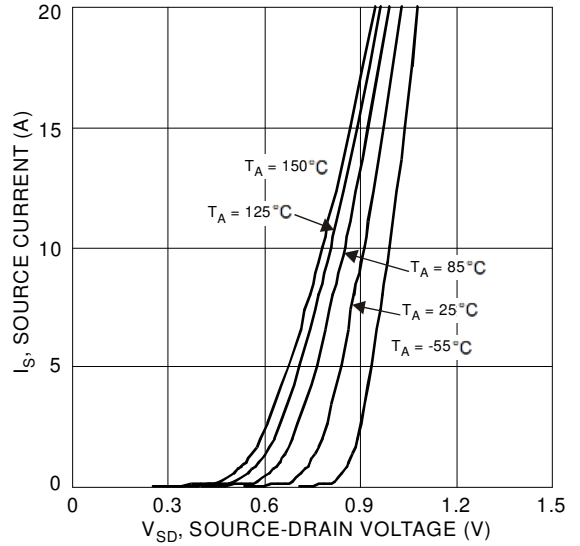


Figure 8 Diode Forward Voltage vs. Current

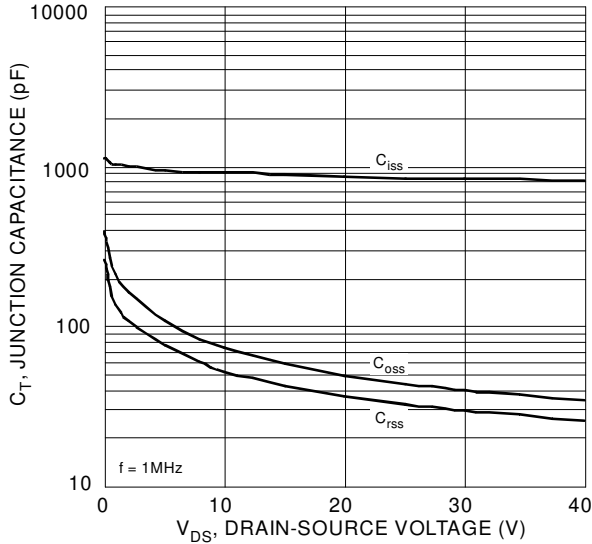


Figure 9 Typical Junction Capacitance

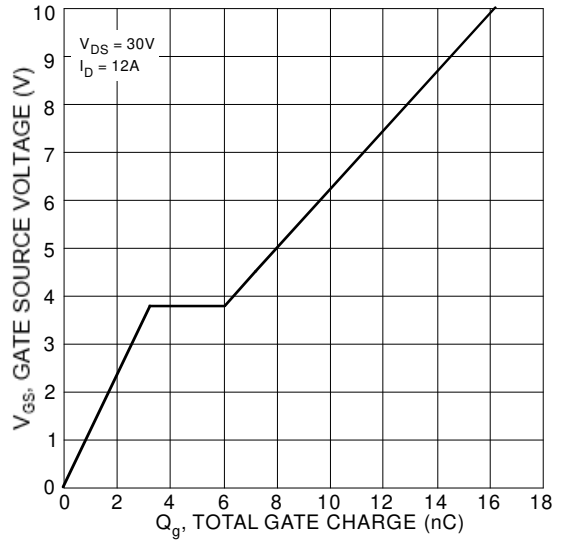


Figure 10 Gate Charge

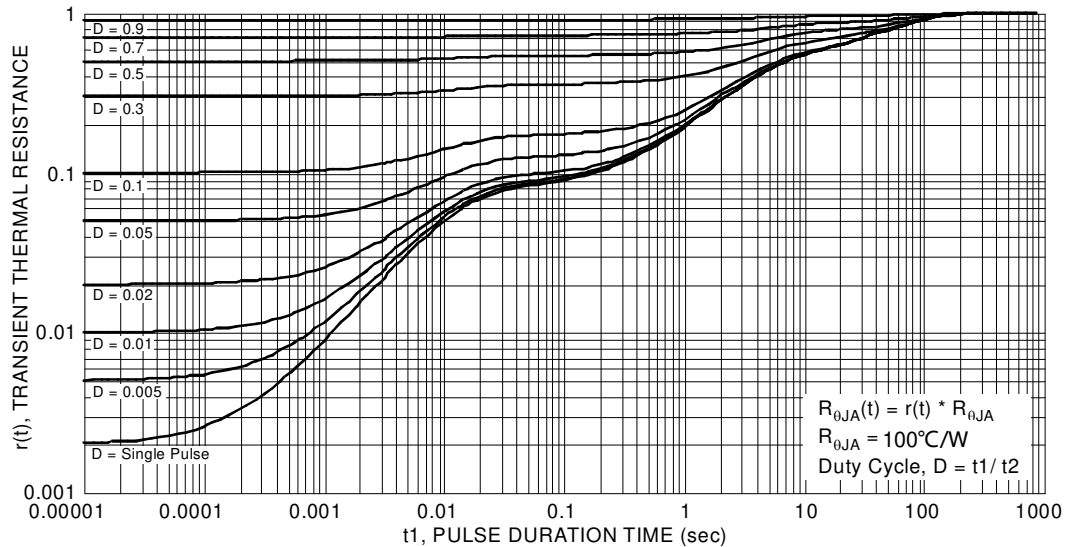


Figure 11 Transient Thermal Resistance

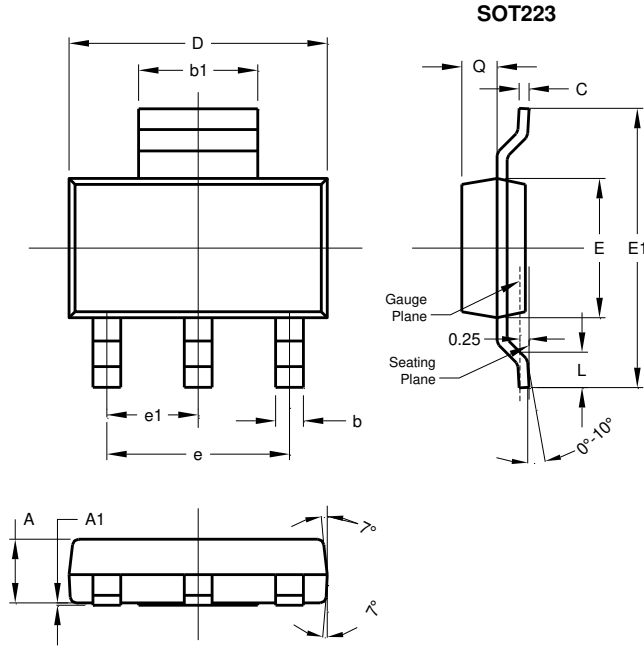
$$R_{\theta JA}(t) = r(t) * R_{\theta JA}$$

$$R_{\theta JA} = 100^{\circ}\text{C/W}$$

$$\text{Duty Cycle, } D = t_1 / t_2$$

**Package Outline Dimensions**

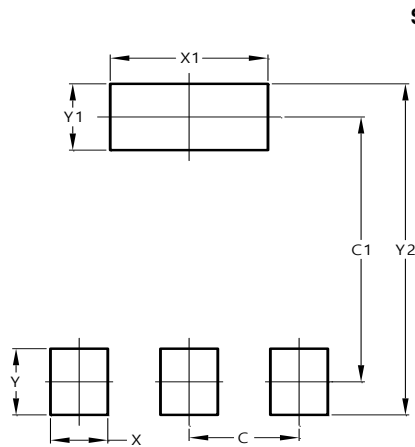
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

**Suggested Pad Layout**

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



Dimensions	Value (in mm)
C	2.30
C1	6.40
X	1.20
X1	3.30
Y	1.60
Y1	1.60
Y2	8.00

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