

60V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV _{DSS}	R _{DS(ON)}	I _D T _A = +25°C
60V	68mΩ @ V _{GS} = 10V	5.6A
	100mΩ @ V _{GS} = 4.5V	4.7A

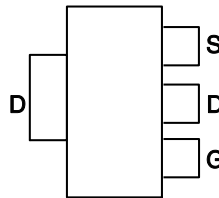
Description and Applications

This MOSFET has been designed to minimize the on-state resistance yet maintain superior switching performance, making it ideal for high-efficiency power-management applications.

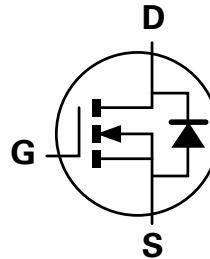
- Motor controls
- Transformer driving switches
- DC-DC converters
- Power-management functions
- Uninterrupted power supplies



Top View



Pin Out – Top View



Equivalent Circuit

Features and Benefits

- 100% Unclamped Inductive Switch (UIS) Test in Production
- Low On-Resistance
- Fast Switching Speed
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability.
<https://www.diodes.com/quality/product-definitions/>
- An automotive-compliant part is available under separate datasheet ([DMN6068SEQ](#))

Mechanical Data

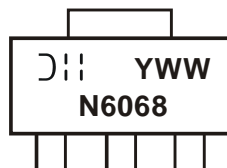
- Package: SOT223
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See diagram below
- Terminals: Finish - Matte Tin Annealed over Copper Lead Frame. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.112 grams (Approximate)

Ordering Information (Note 4)

Part Number	Package	Packing	
		Qty.	Carrier
DMN6068SE-13	SOT223	4000	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



- $\text{D}|||$ = Manufacturer's Marking
- N6068 = Product Type Marking Code
- YWW = Date Code Marking
- Y or \bar{Y} = Year (ex: 4 = 2024)
- WW = Week (01 to 53)

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

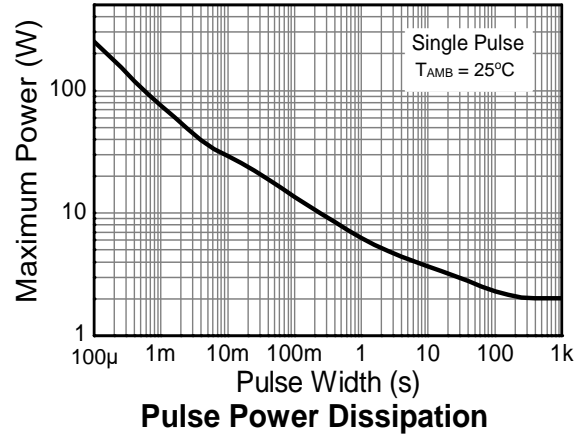
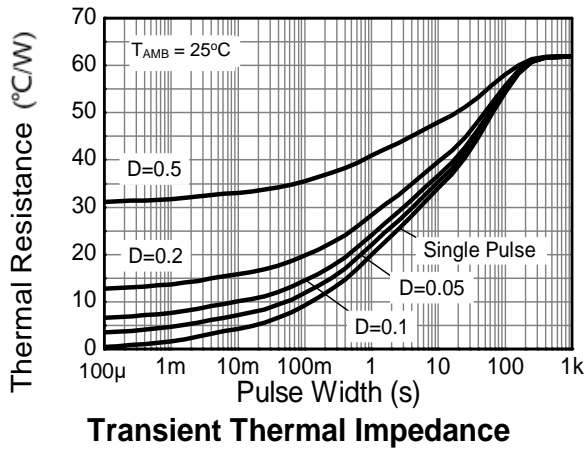
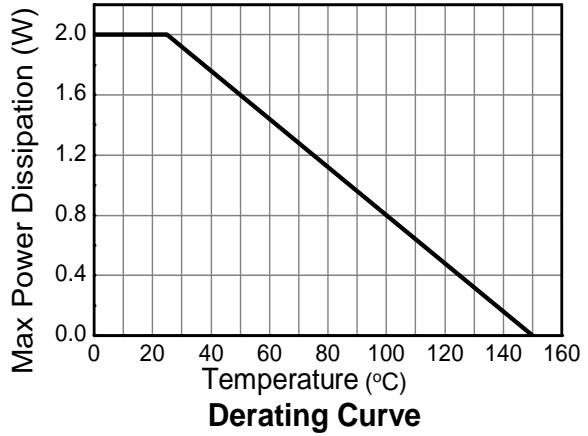
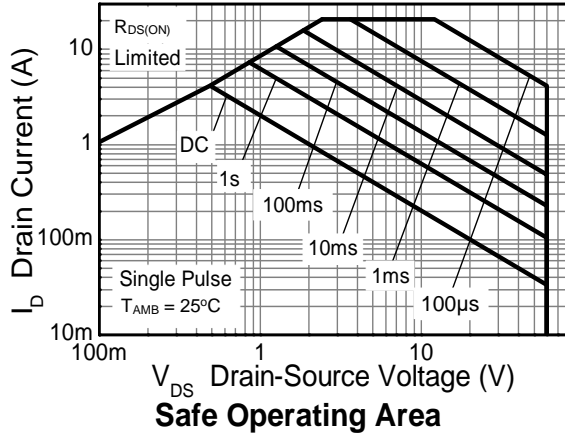
Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	60	V
Gate-Source Voltage		(Note 5)	V _{GS}	±20	V
Single Pulsed Avalanche Energy		(Note 10)	E _{AS}	37.5	mJ
Single Pulsed Avalanche Current		(Note 10)	I _{AS}	5.0	A
Continuous Drain Current	V _{GS} = 10V	(Note 7)	I _D	5.6	A
		T _A = +70°C (Note 7)		4.5	
		(Note 6)		4.1	
Pulsed Drain Current	V _{GS} = 10V	(Note 8)	I _{DM}	20.8	A
Continuous Source Current (Body Diode)			I _S	4.9	A
Pulsed Source Current (Body Diode)			I _{SM}	20.8	A

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

Characteristic			Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Note 6)		P _D	2.0	W mW/°C
				16.0	
				3.7 29.5	
Thermal Resistance, Junction to Ambient	(Note 6)		R _{θJA}	62.5	°C/W
	(Note 7)			34	
Thermal Resistance, Junction to Lead	(Note 9)		R _{θJL}	11.5	
Operating and Storage Temperature Range			T _J , T _{STG}	-55 to +150	°C

- Notes:
5. AEC-Q101 V_{GS} maximum is ±16V.
 6. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
 7. Same as note (6), except the device is measured at t ≤ 10 sec.
 8. Same as note (6), except the device is pulsed with D = 0.02 and pulse width 300μs. The pulse current is limited by the maximum junction temperature.
 9. Thermal resistance from junction to solder-point (at the end of the drain lead).
 10. UIS in production with L = 3.0mH, I_{AS} = 5.0A, R_G = 25Ω, V_{DD} = 50V, starting T_J = +25°C.

Thermal Characteristics

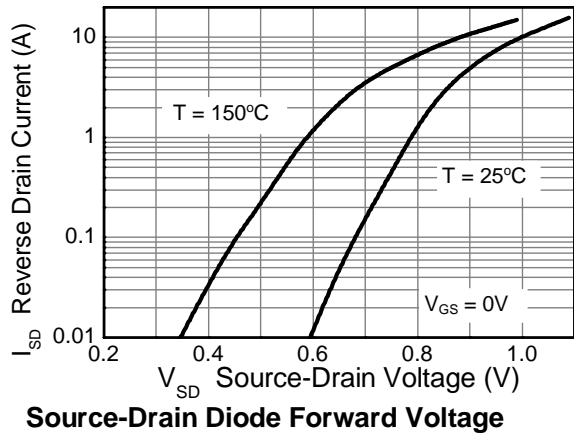
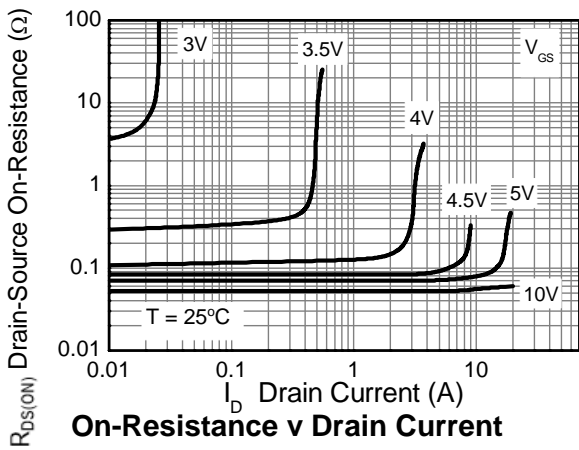
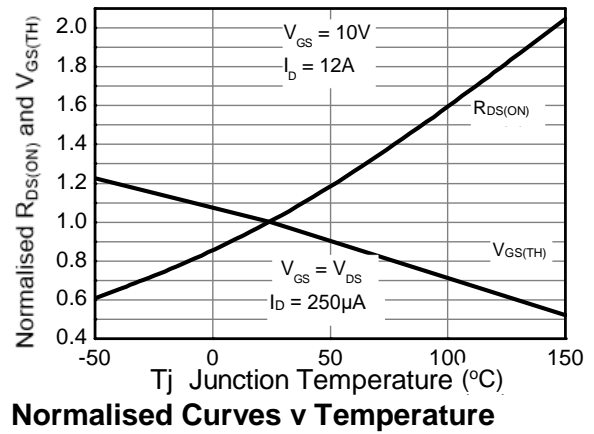
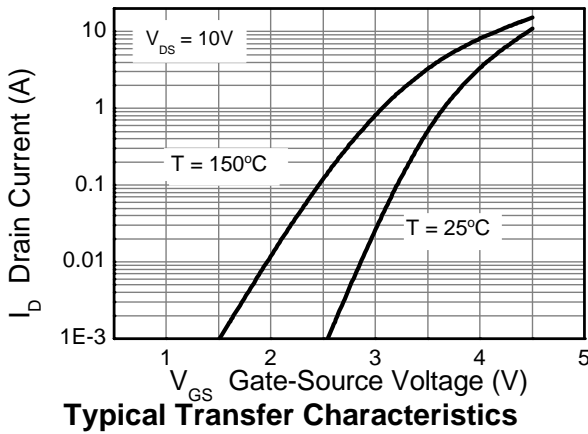
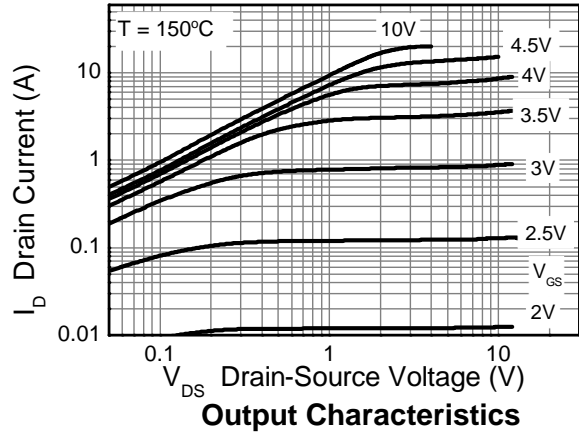
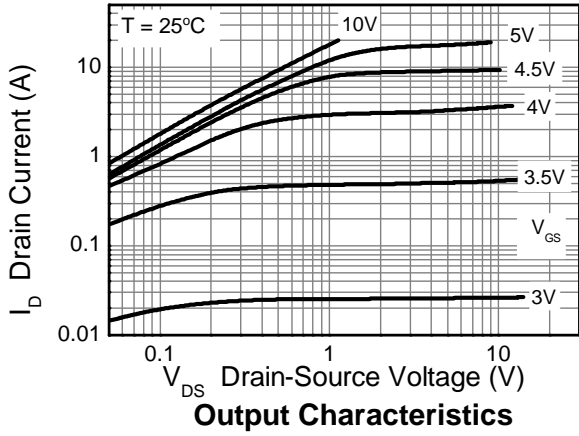


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

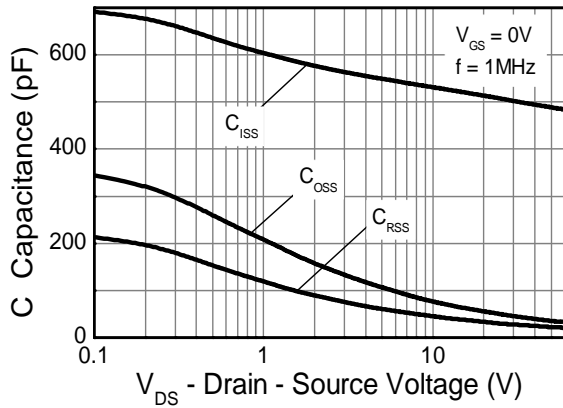
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	60	—	—	V	I _D = 250μA, V _{GS} = 0V
Zero Gate Voltage Drain Current	I _{DSS}	—	—	0.5	μA	V _{DS} = 60V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	1.0	—	3.0	V	I _D = 250μA, V _{DS} = V _{GS}
Static Drain-Source On-Resistance (Note 11)	R _{DS(ON)}	—	—	0.068	Ω	V _{GS} = 10V, I _D = 12A
				0.100		V _{GS} = 4.5V, I _D = 6A
Forward Transconductance (Notes 11 & 12)	g _{fs}	—	19.7	—	S	V _{DS} = 15V, I _D = 12A
Diode Forward Voltage (Note 11)	V _{SD}	—	0.98	1.15	V	I _S = 12A, V _{GS} = 0V
Reverse recovery time (Note 12)	t _{RR}	—	145	—	ns	I _S = 12A, di/dt = 100A/μs
Reverse recovery charge (Note 12)	Q _{RR}	—	929	—	nC	
DYNAMIC CHARACTERISTICS (Note 12)						
Input Capacitance	C _{iss}	—	502	—	pF	V _{DS} = 30V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{oss}	—	45.7	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	27.1	—	pF	
Total Gate Charge (Note 13)	Q _g	—	5.55	—	nC	V _{GS} = 4.5V
Total Gate Charge (Note 13)	Q _g	—	10.3	—	nC	V _{GS} = 10V
Gate-Source Charge (Note 13)	Q _{gs}	—	1.6	—	nC	
Gate-Drain Charge (Note 13)	Q _{gd}	—	3.5	—	nC	
Turn-On Delay Time (Note 13)	t _{d(ON)}	—	3.6	—	ns	V _{DD} = 30V, V _{GS} = 10V I _D = 12A, R _G ≅ 6.0Ω
Turn-On Rise Time (Note 13)	t _r	—	10.8	—	ns	
Turn-Off Delay Time (Note 13)	t _{d(OFF)}	—	11.9	—	ns	
Turn-Off Fall Time (Note 13)	t _f	—	8.7	—	ns	

Notes: 11. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.
12. For design aid only, not subject to production testing.
13. Switching characteristics are independent of operating junction temperatures.

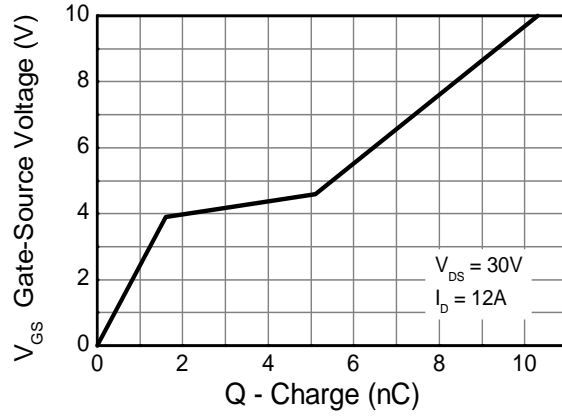
Typical Characteristics



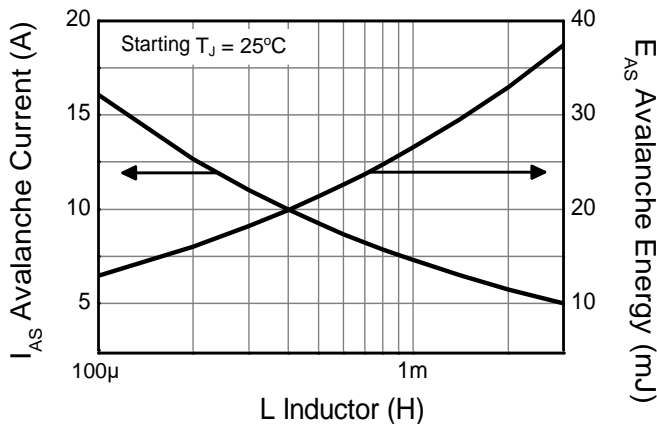
Typical Characteristics (continued)



Capacitance v Drain-Source Voltage

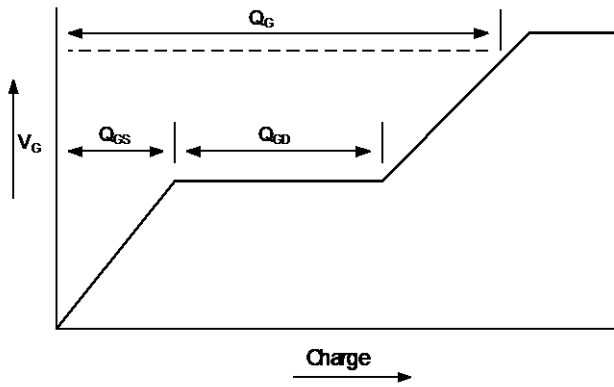


Gate-Source Voltage v Gate Charge

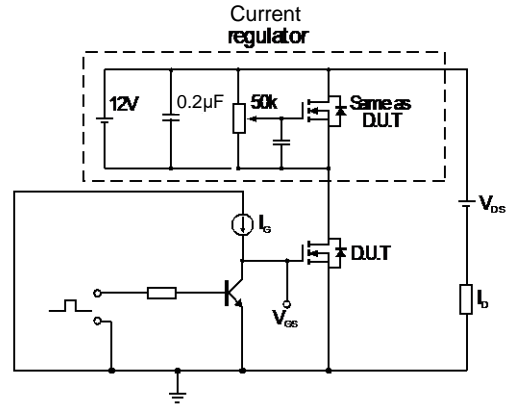


Single-Pulsed Avalanche Rating

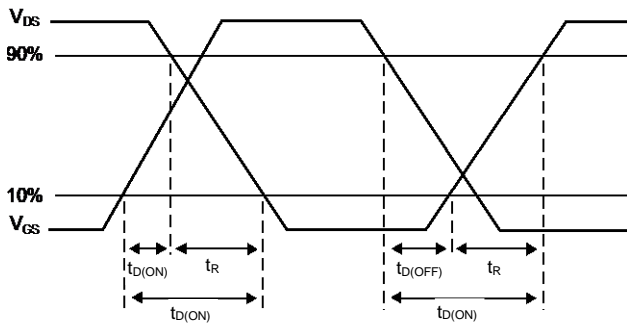
Test Circuits



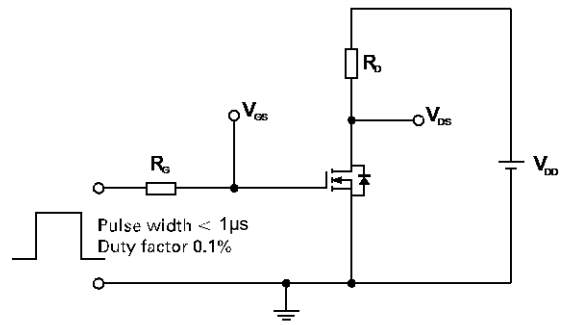
Basic gate charge waveform



Gate charge test circuit



Switching time waveforms

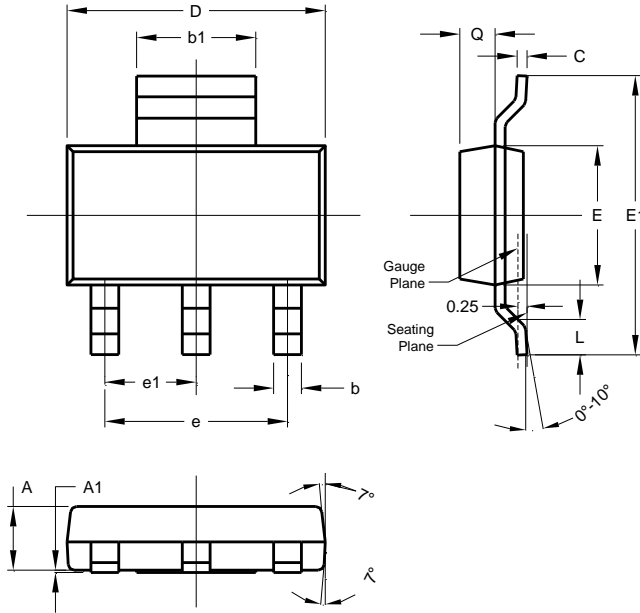


Switching time test circuit

Package Outline Dimensions

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

SOT223

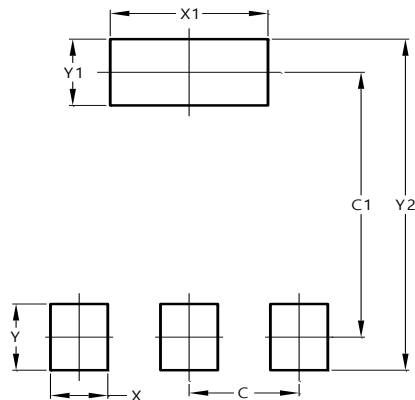


SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

Suggested Pad Layout

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

SOT223



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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