

60V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D $T_A = 25^\circ C$
60V	68m Ω @ $V_{GS} = 10V$	5.6A
	100m Ω @ $V_{GS} = 4.5V$	4.7A

Description and Applications

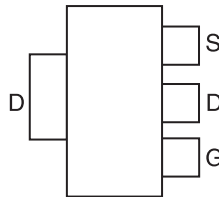
This MOSFET has been designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Motor control
- Transformer driving switch
- DC-DC Converters
- Power management functions
- Uninterrupted power supply

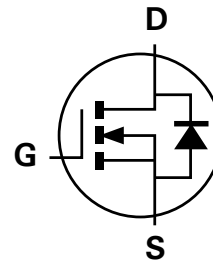
SOT223



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
- "Green" component and RoHS compliant (Note 1)
- Qualified to AEC-Q101 Standards for High Reliability

Mechanical Data

- Case: SOT223
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- 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 1)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMN6068SE-13	N6068	13	12	4,000

Notes: 1. Diodes, Inc. defines "Green" products as those which are RoHS compliant and contain no halogens or antimony compounds; further information about Diodes Inc.'s "Green" Policy can be found on our website. For packaging details, go to our website.

Marking Information



311 = Manufacturer's Marking
N6068 = Product Type Marking Code
YWW = Date Code Marking
Y = Year (ex: 9 = 2009)
WW = Week (01 - 53)

Maximum Ratings @T_A = 25°C unless otherwise specified

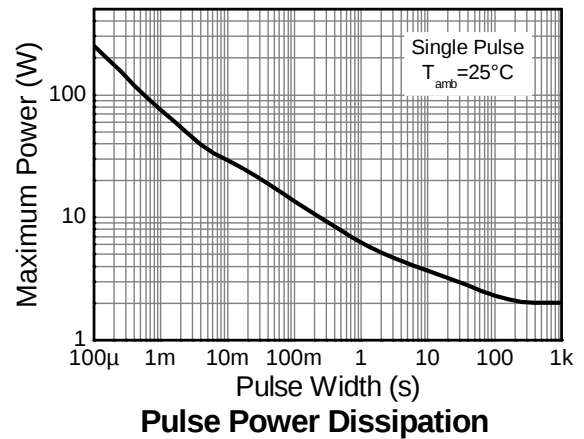
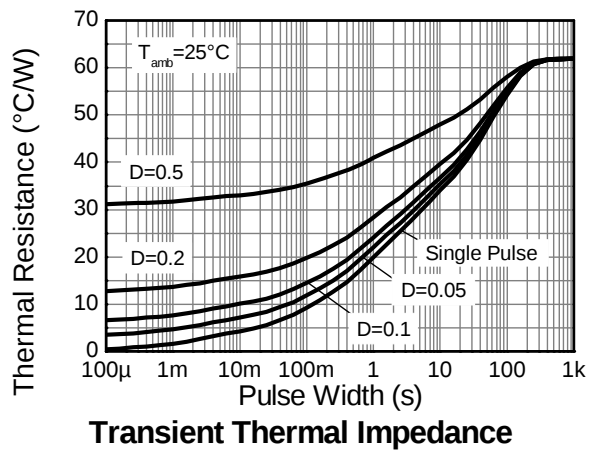
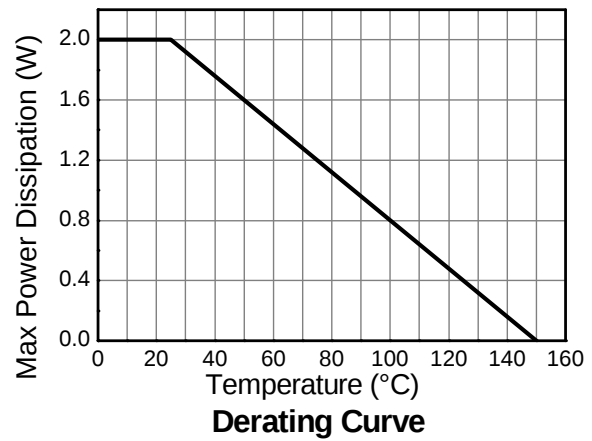
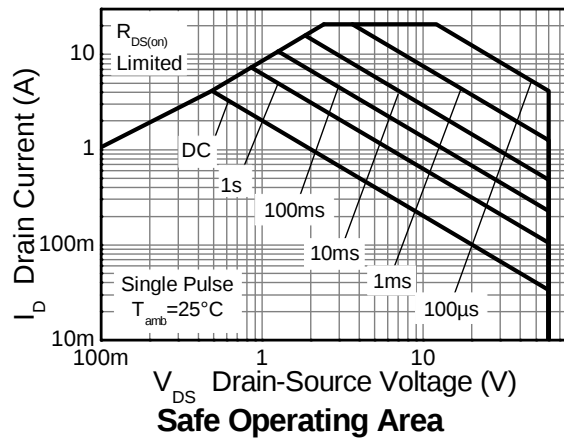
Characteristic		Symbol	Value	Unit
Drain-Source voltage		V _{DSS}	60	V
Gate-Source voltage	(Note 2)	V _{GS}	±20	V
Single Pulsed Avalanche Energy	(Note 7)	E _{AS}	37.5	mJ
Single Pulsed Avalanche Current	(Note 7)	I _{AS}	5.0	A
Continuous Drain current	V _{GS} = 10V	I _D	(Note 4)	A
			5.6	
			4.5	
Pulsed Drain current	V _{GS} = 10V	I _{DM}	(Note 3)	A
			4.1	
Continuous Source current (Body diode)	(Note 4)	I _S	4.9	A
Pulsed Source current (Body diode)	(Note 5)	I _{SM}	20.8	A

Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Power dissipation	(Note 3)	P _D	2.0	W
	(Note 4)		16.0	
Linear derating factor	(Note 4)		3.7	mW/°C
	(Note 4)		29.5	
Thermal Resistance, Junction to Ambient	(Note 3)	R _{θJA}	62.5	°C/W
	(Note 4)		34	
Thermal Resistance, Junction to Lead	(Note 6)	R _{θJL}	11.5	°C/W
Operating and storage temperature range		T _J , T _{STG}	-55 to 150	°C

- Notes:
- AEC-Q101 V_{GS} maximum is ±16V.
 - 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.
 - Same as note (3), except the device is measured at t ≤ 10 sec.
 - Same as note (3), except the device is pulsed with D= 0.02 and pulse width 300 μs. The pulse current is limited by the maximum junction temperature.
 - Thermal resistance from junction to solder-point (at the end of the drain lead).
 - UIS in production with L = 3.0mH, I_{AS} = 5.0A, R_G = 25Ω, V_{DD}=50V, starting T_J = 25°C.

Thermal Characteristics

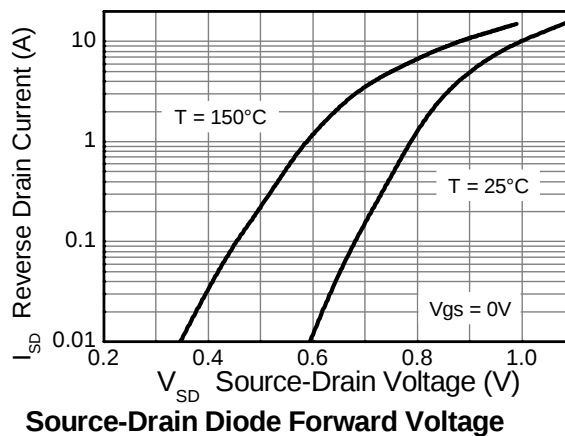
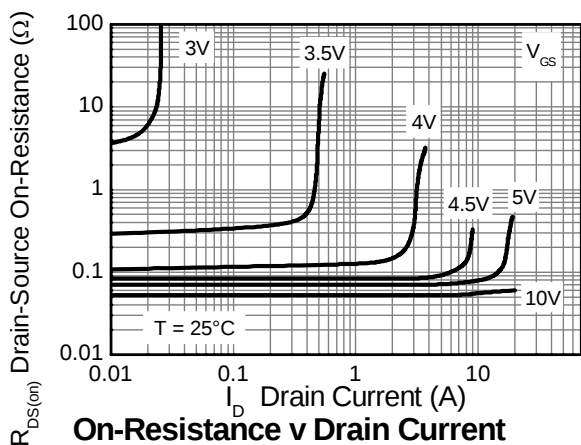
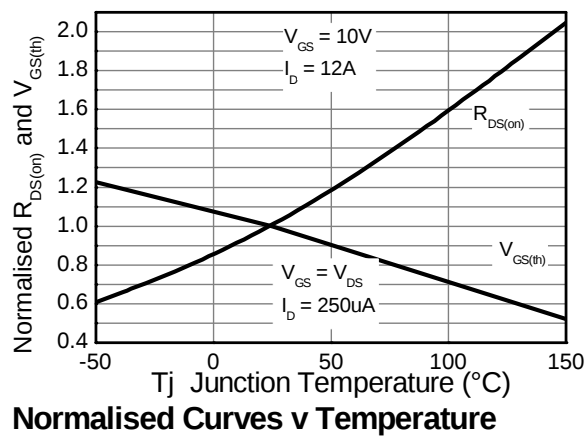
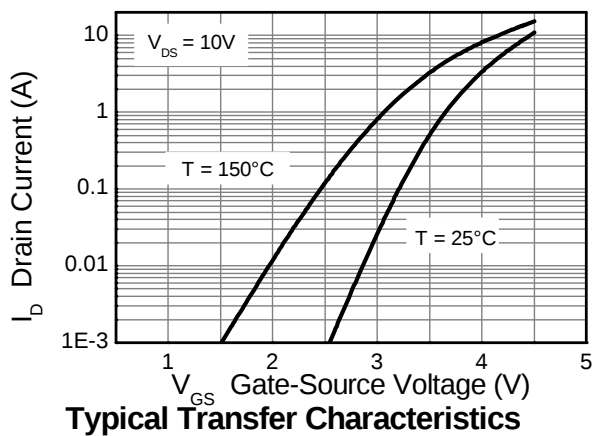
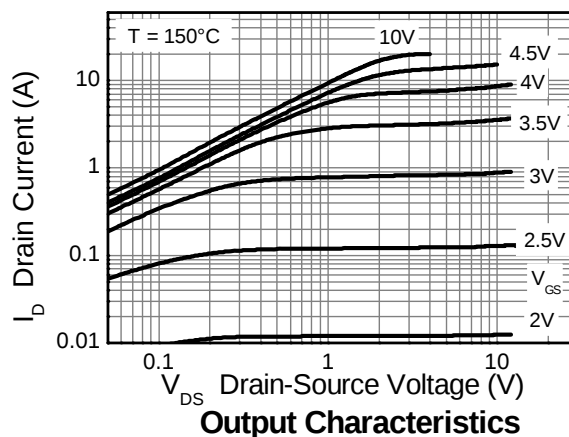
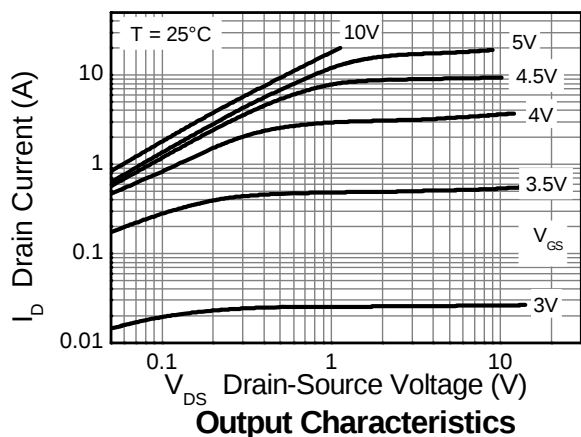


Electrical Characteristics @T_A = 25°C unless otherwise specified

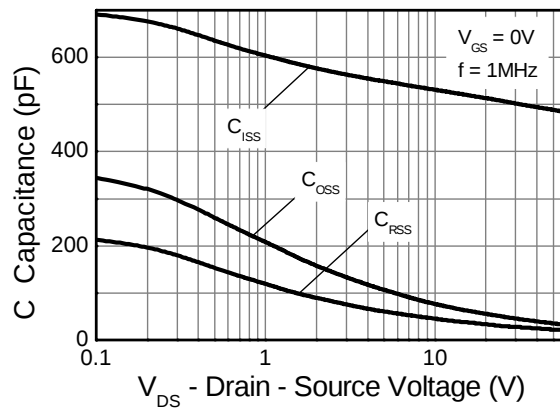
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV _{DSS}	60	—	—	V	I _D = 250μA, V _{GS} = 0V	
Zero Gate Voltage Drain Current	I _{DSS}	—	—	0.5	μA	V _{DS} = 60V, V _{GS} = 0V	
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 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 8)	R _{DS (ON)}	—	—	0.068	Ω	V _{GS} = 10V, I _D = 12A	
				0.100		V _{GS} = 4.5V, I _D = 6A	
Forward Transconductance (Notes 8 & 9)	g _{fs}	—	19.7	—	S	V _{DS} = 15V, I _D = 12A	
Diode Forward Voltage (Note 8)	V _{SD}	—	0.98	1.15	V	I _S = 12A, V _{GS} = 0V	
Reverse recovery time (Note 9)	t _{rr}	—	145	—	ns	I _S = 12A, di/dt= 100A/μs	
Reverse recovery charge (Note 9)	Q _{rr}	—	929	—	nC		
DYNAMIC CHARACTERISTICS (Note 9)							
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 10)	Q _g	—	5.55	—	nC	V _{GS} = 4.5V	V _{DS} = 30V I _D = 12A
Total Gate Charge (Note 10)	Q _g	—	10.3	—	nC	V _{GS} = 10V	
Gate-Source Charge (Note 10)	Q _{gs}	—	1.6	—	nC		
Gate-Drain Charge (Note 10)	Q _{gd}	—	3.5	—	nC		
Turn-On Delay Time (Note 10)	t _{D(on)}	—	3.6	—	ns	V _{DD} = 30V, V _{GS} = 10V I _D = 12A, R _G ≅ 6.0Ω	
Turn-On Rise Time (Note 10)	t _r	—	10.8	—	ns		
Turn-Off Delay Time (Note 10)	t _{D(off)}	—	11.9	—	ns		
Turn-Off Fall Time (Note 10)	t _f	—	8.7	—	ns		

Notes: 8. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%
9. For design aid only, not subject to production testing.
10. Switching characteristics are independent of operating junction temperatures.

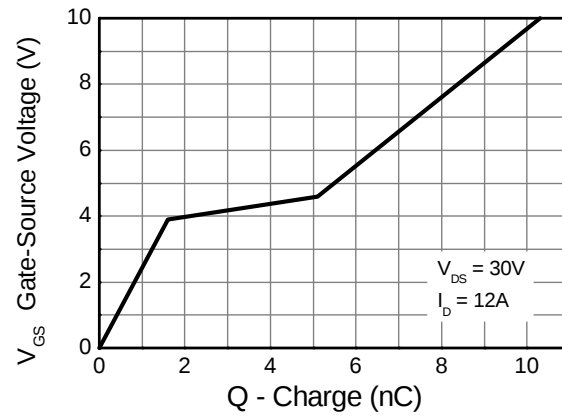
Typical Characteristics



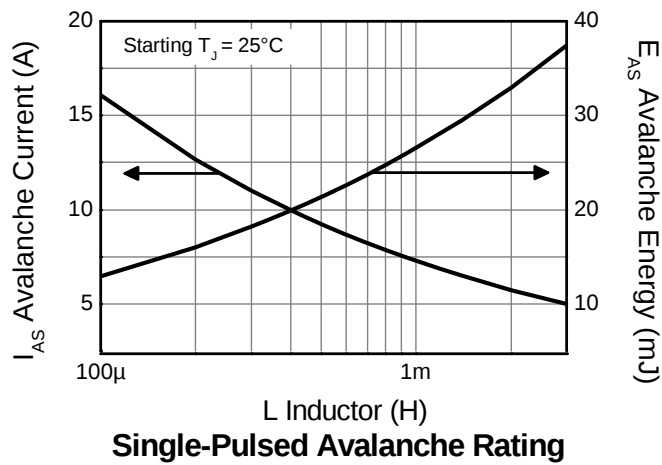
Typical Characteristics - continued



Capacitance v Drain-Source Voltage

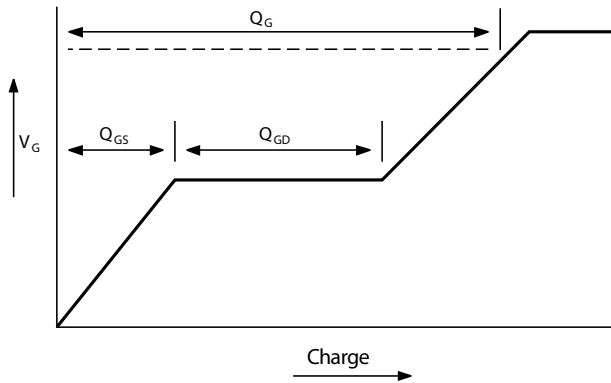


Gate-Source Voltage v Gate Charge

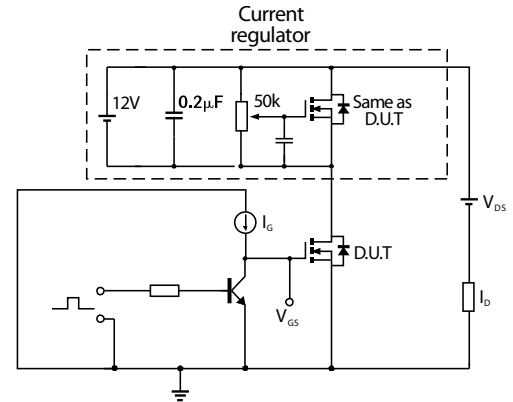


Single-Pulsed Avalanche Rating

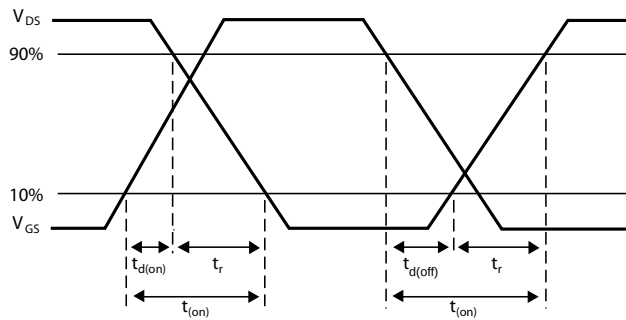
Test Circuits



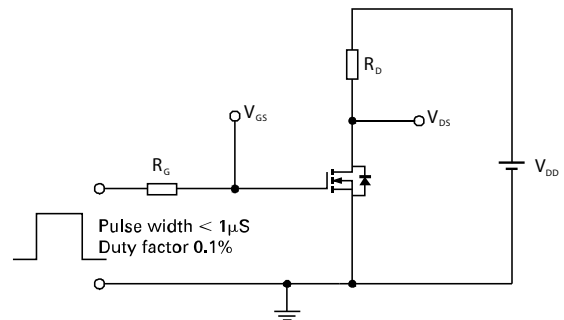
Basic gate charge waveform



Gate charge test circuit

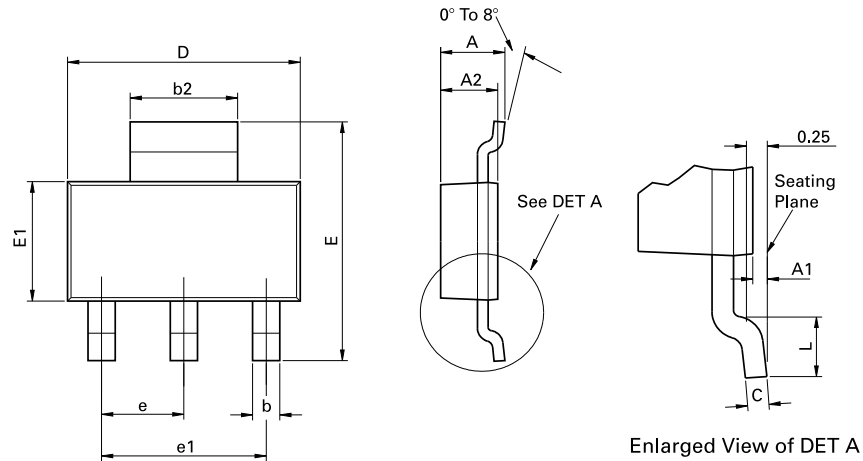


Switching time waveforms



Switching time test circuit

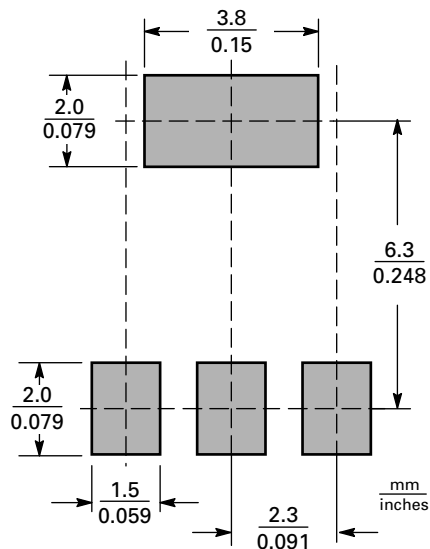
Package Outline Dimensions



Conforms to JEDEC TO-261 AA Issue B

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	-	1.80	-	0.071	D	6.30	6.70	0.248	0.264
A1	0.02	0.10	0.0008	0.004	e	2.30 BSC		0.0905 BSC	
A2	1.55	1.65	0.0610	0.0649	e1	4.60 BSC		0.181 BSC	
b	0.66	0.84	0.026	0.033	E	6.70	7.30	0.264	0.287
b2	2.90	3.10	0.114	0.122	E1	3.30	3.70	0.130	0.146
C	0.23	0.33	0.009	0.013	L	0.90	-	0.355	-

Suggested Pad Layout



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