

40V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ | I_D $T_A = 25^\circ C$ |
|---------------|--------------------------------|-----------------------------|
| 40V | 27m Ω @ $V_{GS} = 10V$ | 8.0A |
| | 47m Ω @ $V_{GS} = 4.5V$ | 6.1A |

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.

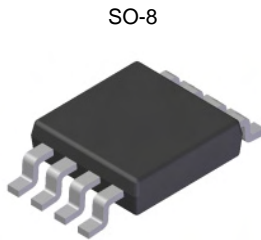
- Motor control
- Backlighting
- DC-DC Converters
- Power management functions

Features and Benefits

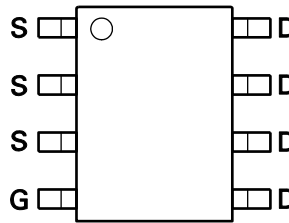
- Low on-resistance
- Fast switching speed
- “Green” component and RoHS compliant (Note 1)
- Qualified to AEC-Q101 Standards for High Reliability

Mechanical Data

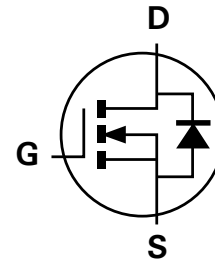
- Case: SO-8
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See diagram below
- Terminals: Finish - Matte Tin annealed over Copper lead frame. Solderable per MIL-STD-202, Method 208
- Weight: 0.074 grams (approximate)



Top View



Top View



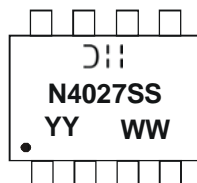
Equivalent Circuit

Ordering Information (Note 1)

| Product | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|---------|--------------------|-----------------|-------------------|
| DMN4027SSS-13 | N4027SS | 13 | 12 | 2,500 |

Note: 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



$\text{D}||$ = Manufacturer's Marking
 N4027SS = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 09 = 2009)
 WW = Week (01-53)

Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

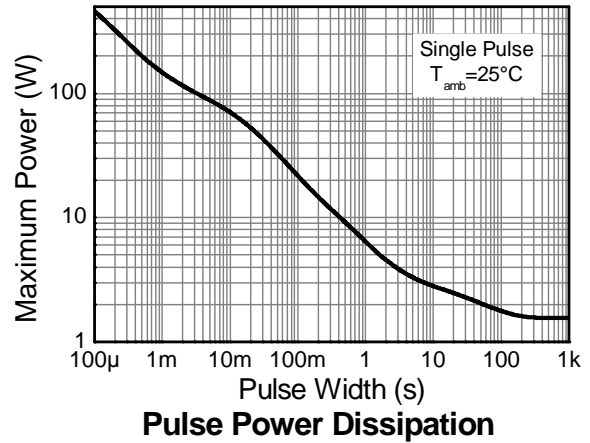
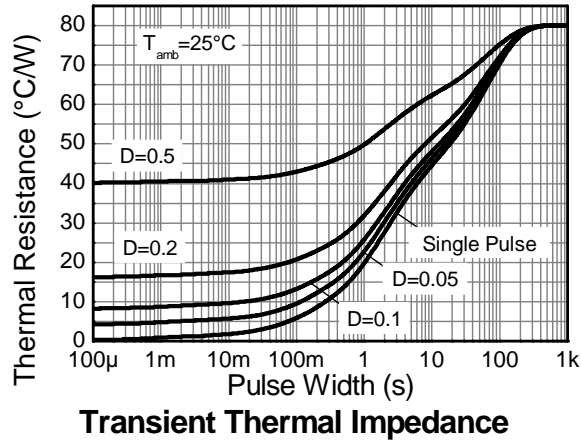
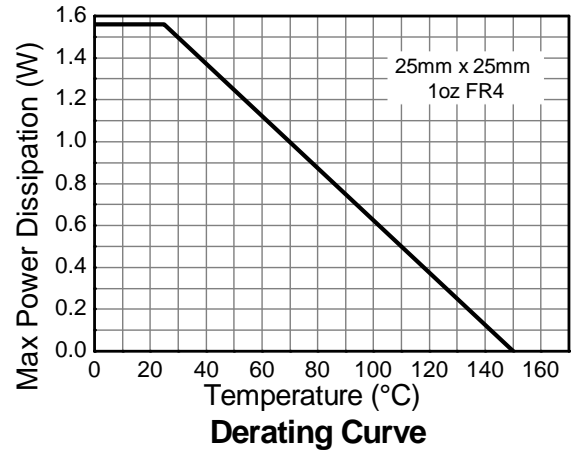
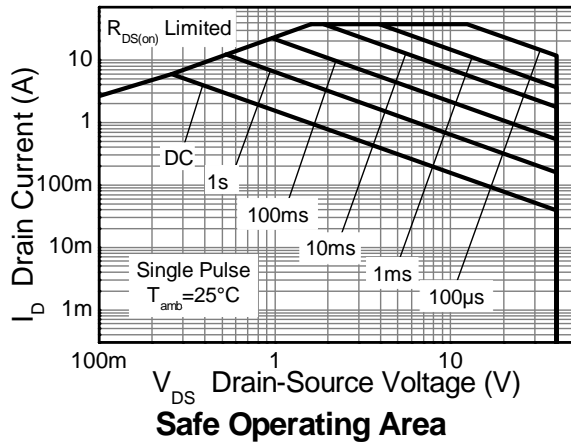
| Characteristic | | | Symbol | Value | Unit |
|--|-----------------------|-----------------------------------|-----------|----------|------|
| Drain-Source voltage | | | V_{DSS} | 40 | V |
| Gate-Source voltage | | | V_{GS} | ± 20 | V |
| Continuous Drain current | $V_{GS} = 10\text{V}$ | (Note 2) | I_D | 8.0 | A |
| | | $T_A = 70^\circ\text{C}$ (Note 4) | | 6.5 | |
| | | (Note 3) | | 6.0 | |
| Pulsed Drain current | $V_{GS} = 10\text{V}$ | (Note 5) | I_{DM} | 37 | A |
| Continuous Source current (Body diode) | | | I_S | 4.2 | A |
| Pulsed Source current (Body diode) | | | I_{SM} | 37 | A |

Thermal Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | | Symbol | Value | Unit |
|---|----------|-----------------|------------|----------------------------|
| Power dissipation | (Note 3) | P_D | 1.56 | W |
| | | | 12.5 | |
| Linear derating factor | (Note 4) | | 2.8 | $\text{mW}/^\circ\text{C}$ |
| | | | 22.5 | |
| Thermal Resistance, Junction to Ambient | (Note 3) | $R_{\theta JA}$ | 80 | $^\circ\text{C}/\text{W}$ |
| | (Note 4) | | 44.5 | |
| Thermal Resistance, Junction to Lead | (Note 6) | $R_{\theta JL}$ | 35 | |
| Operating and storage temperature range | | T_J, T_{STG} | -55 to 150 | $^\circ\text{C}$ |

- Notes:
- AEC-Q101 V_{GS} maximum is $\pm 16\text{V}$.
 - For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz 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 $t \leq 10$ 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).

Thermal Characteristics

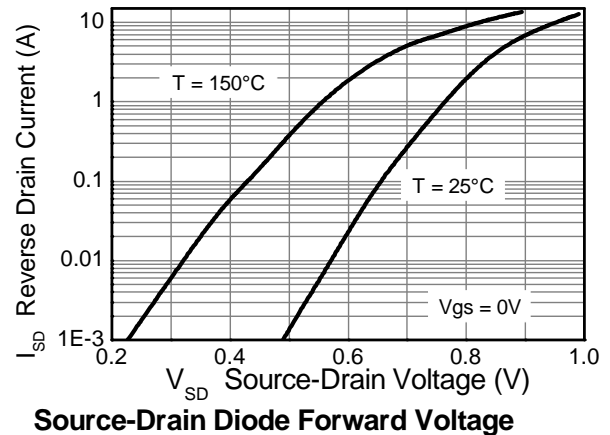
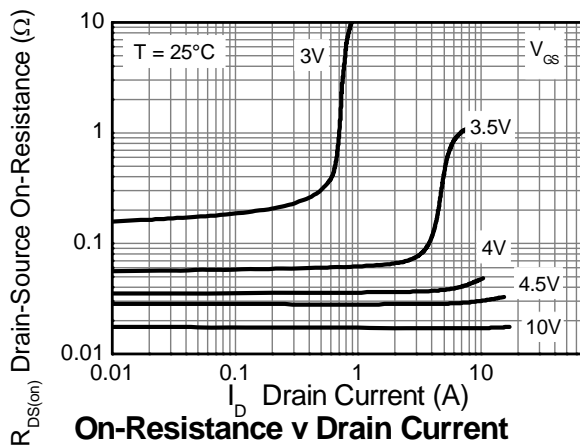
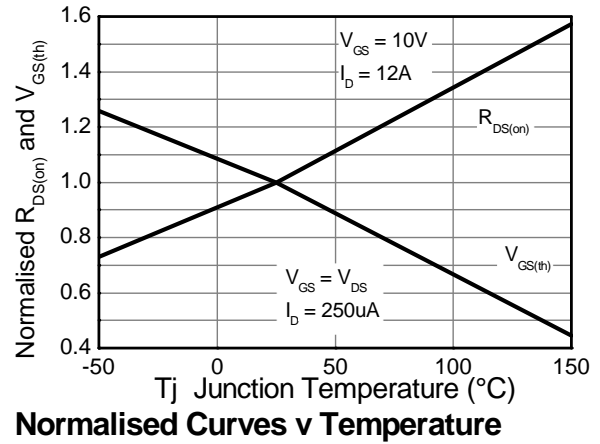
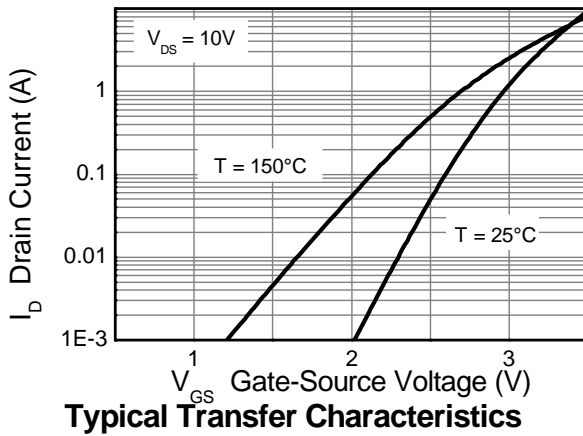
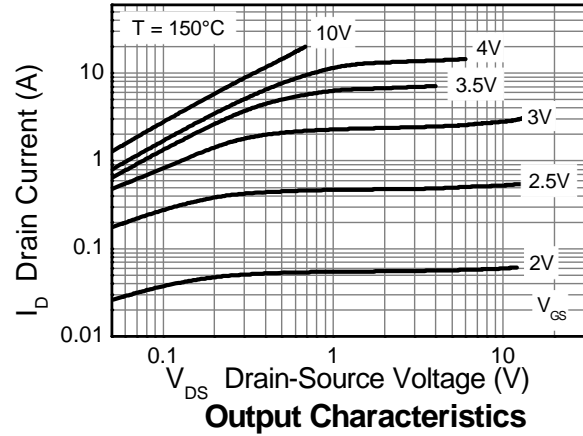
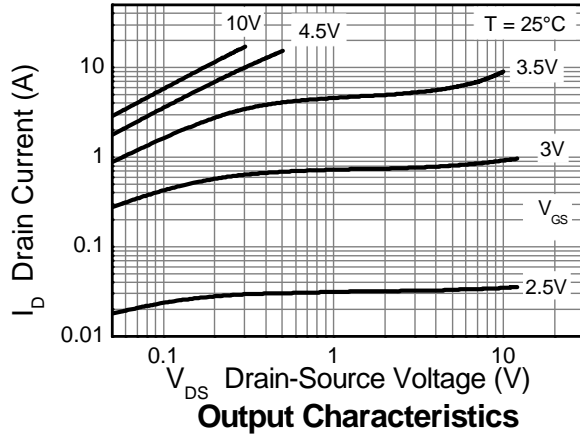


Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

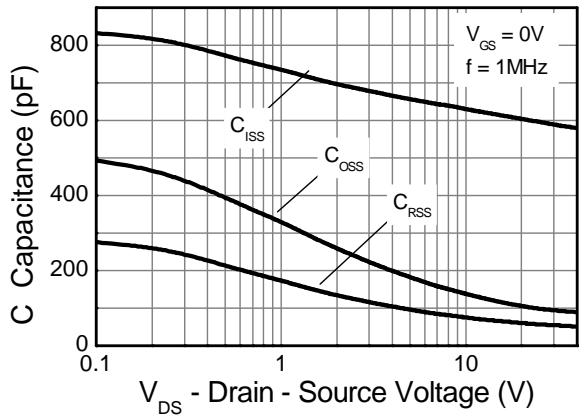
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|--------------|-----|-------|-----------|---------------|--|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 40 | — | — | V | $I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | — | — | 0.5 | μA | $V_{DS} = 40\text{V}, V_{GS} = 0\text{V}$ |
| Gate-Source Leakage | I_{GSS} | — | — | ± 100 | nA | $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 1.0 | — | 3.0 | V | $I_D = 250\mu\text{A}, V_{DS} = V_{GS}$ |
| Static Drain-Source On-Resistance (Note 7) | $R_{DS(on)}$ | — | 0.017 | 0.027 | Ω | $V_{GS} = 10\text{V}, I_D = 7\text{A}$ |
| | | | 0.031 | 0.047 | | $V_{GS} = 4.5\text{V}, I_D = 6\text{A}$ |
| Forward Transconductance (Notes 7 & 8) | g_{fs} | — | 22.8 | — | S | $V_{DS} = 15\text{V}, I_D = 7\text{A}$ |
| Diode Forward Voltage (Note 7) | V_{SD} | — | 0.85 | 1.1 | V | $I_S = 7\text{A}, V_{GS} = 0\text{V}$ |
| Reverse recovery time (Note 8) | t_{rr} | — | 12.2 | — | ns | $I_S = 2.5, di/dt = 100\text{A}/\mu\text{s}$ |
| Reverse recovery charge (Note 8) | Q_{rr} | — | 5.4 | — | nC | |
| DYNAMIC CHARACTERISTICS (Note 8) | | | | | | |
| Input Capacitance | C_{iss} | — | 604 | — | pF | $V_{DS} = 20\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$ |
| Output Capacitance | C_{oss} | — | 106 | — | pF | |
| Reverse Transfer Capacitance | C_{rss} | — | 59.6 | — | pF | |
| Total Gate Charge (Note 9) | Q_g | — | 6.3 | — | nC | $V_{GS} = 4.5\text{V}$ |
| Total Gate Charge (Note 9) | Q_g | — | 12.9 | — | nC | $V_{GS} = 10\text{V}$ |
| Gate-Source Charge (Note 9) | Q_{gs} | — | 2.4 | — | nC | |
| Gate-Drain Charge (Note 9) | Q_{gd} | — | 3 | — | nC | |
| Turn-On Delay Time (Note 9) | $t_{D(on)}$ | — | 3.1 | — | ns | $V_{DD} = 20\text{V}, V_{GS} = 10\text{V}$ $I_D = 1\text{A}, R_G \cong 6.0\Omega$ |
| Turn-On Rise Time (Note 9) | t_r | — | 3.1 | — | ns | |
| Turn-Off Delay Time (Note 9) | $t_{D(off)}$ | — | 15.4 | — | ns | |
| Turn-Off Fall Time (Note 9) | t_f | — | 7.5 | — | ns | |

- Notes:
7. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$
 8. For design aid only, not subject to production testing.
 9. Switching characteristics are independent of operating junction temperatures.

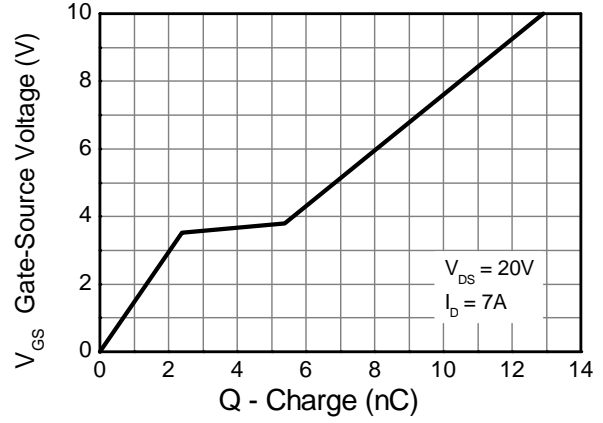
Typical Characteristics



Typical Characteristics - continued

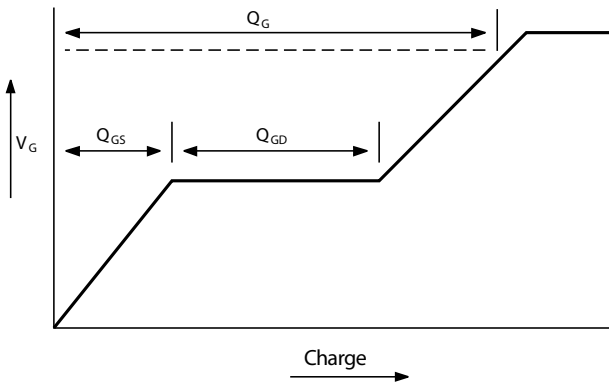


Capacitance v Drain-Source Voltage

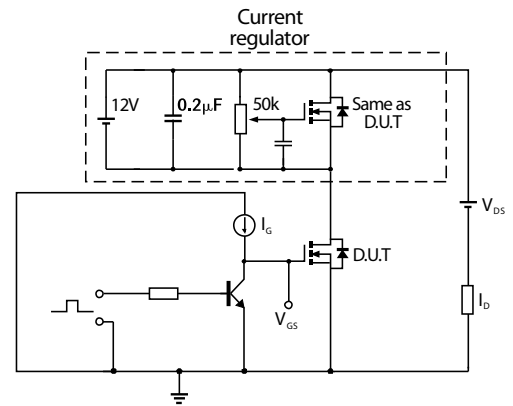


Gate-Source Voltage v Gate Charge

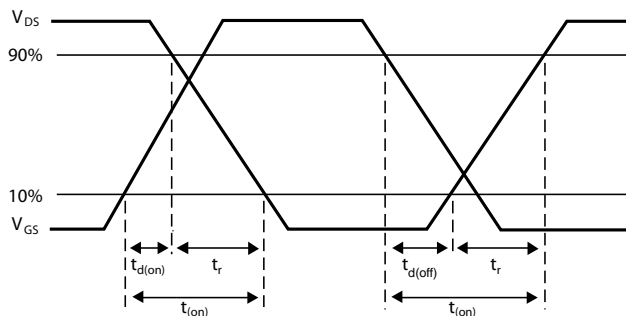
Test Circuits



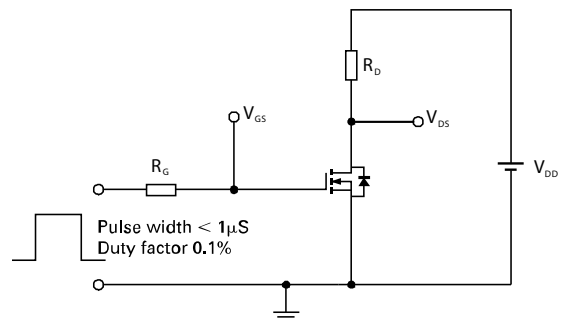
Basic gate charge waveform



Gate charge test circuit

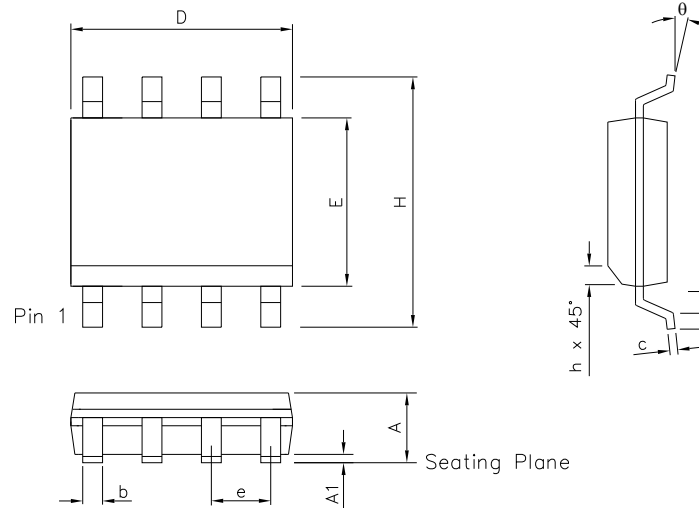


Switching time waveforms



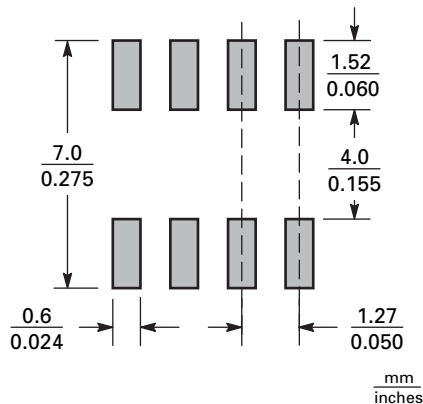
Switching time test circuit

Package Outline Dimensions



| DIM | Inches | | Millimeters | | DIM | Inches | | Millimeters | |
|-----|--------|-------|-------------|------|-------|-----------|-------|-------------|------|
| | Min. | Max. | Min. | Max. | | Min. | Max. | Min. | Max. |
| A | 0.053 | 0.069 | 1.35 | 1.75 | e | 0.050 BSC | | 1.27 BSC | |
| A1 | 0.004 | 0.010 | 0.10 | 0.25 | b | 0.013 | 0.020 | 0.33 | 0.51 |
| D | 0.189 | 0.197 | 4.80 | 5.00 | c | 0.008 | 0.010 | 0.19 | 0.25 |
| H | 0.228 | 0.244 | 5.80 | 6.20 | theta | 0° | 8° | 0° | 8° |
| E | 0.150 | 0.157 | 3.80 | 4.00 | h | 0.010 | 0.020 | 0.25 | 0.50 |
| L | 0.016 | 0.050 | 0.40 | 1.27 | - | - | - | - | - |

Suggested Pad Layout



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