

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$                  | $I_D$<br>$T_A = +25^\circ\text{C}$ |
|---------------|-------------------------------|------------------------------------|
| -50V          | 6Ω @ $V_{GS} = -4\text{ V}$   | -160mA                             |
|               | 8Ω @ $V_{GS} = -2.5\text{ V}$ | -120mA                             |

## Descriptions and Applications

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

- DC-DC Converters
- Power Management Functions
- Battery Operated Systems and Solid-State Relays

## Features and Benefits

- Low On-Resistance
- ESD Protected Gate
- Low Input Capacitance
- Fast Switching Speed
- **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](mailto:contact@diodes.com) or your local Diodes representative.**

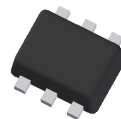
<https://www.diodes.com/quality/product-definitions/>

## Mechanical Data

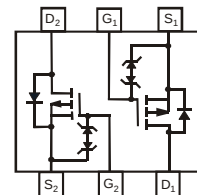
- Package: SOT563
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Finish — Matte Tin annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.006 grams (Approximate)



SOT563



TOP VIEW



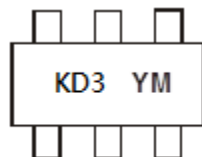
TOP VIEW  
Internal Schematic

## Ordering Information (Note 4)

| Part Number   | Package | Packing |             |
|---------------|---------|---------|-------------|
|               |         | Qty.    | Carrier     |
| DMP56D0UV -7  | SOT563  | 3000    | Tape & Reel |
| DMP56D0UV -13 | SOT563  | 10000   | 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



KD3 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: H = 2021)  
 M = Month (ex: 9 = September)

### Date Code Key

| Year | 2008 | ..... | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|------|------|-------|------|------|------|------|------|------|------|------|------|------|
| Code | V    | ..... | I    | J    | K    | L    | M    | N    | O    | P    | R    | S    |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | O   | N   | D   |

**Maximum Ratings** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                                           | Symbol    | Value   | Units |
|----------------------------------------------------------|-----------|---------|-------|
| Drain-Source Voltage                                     | $V_{DSS}$ | -50     | V     |
| Gate-Source Voltage Continuous                           | $V_{GSS}$ | $\pm 8$ | V     |
| Drain Current (Note 5) Continuous                        | $I_D$     | -160    | mA    |
| Pulsed Drain Current (10 $\mu$ s pulse, duty cycle = 1%) | $I_{DM}$  | -700    | mA    |

**Thermal Characteristics** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                                   | Symbol          | Value       | Units              |
|--------------------------------------------------|-----------------|-------------|--------------------|
| Total Power Dissipation (Note 5)                 | $P_D$           | 400         | mW                 |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 313         | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range          | $T_J, T_{STG}$  | -55 to +150 | $^\circ\text{C}$   |

**Electrical Characteristics** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

| Characteristic                          | Symbol       | Min  | Typ        | Max     | Unit     | Test Condition                                                  |
|-----------------------------------------|--------------|------|------------|---------|----------|-----------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 6)</b>     |              |      |            |         |          |                                                                 |
| Drain-Source Breakdown Voltage          | $BV_{DSS}$   | -50  | —          | —       | V        | $V_{GS} = 0V, I_D = -250\mu A$                                  |
| Zero Gate Voltage Drain Current         | $I_{DSS}$    | —    | —          | -10     | $\mu A$  | $V_{DS} = -50V, V_{GS} = 0V$                                    |
| Gate-Body Leakage                       | $I_{GSS}$    | —    | —          | $\pm 1$ | $\mu A$  | $V_{GS} = \pm 8V, V_{DS} = 0V$                                  |
| <b>ON CHARACTERISTICS (Note 6)</b>      |              |      |            |         |          |                                                                 |
| Gate Threshold Voltage                  | $V_{GS(th)}$ | -0.5 | —          | -1.2    | V        | $V_{DS} = V_{GS}, I_D = -250\mu A$                              |
| Static Drain-Source On-Resistance       | $R_{DS(on)}$ | —    | 4.6<br>6.0 | 6<br>8  | $\Omega$ | $V_{GS} = -4V, I_D = -100mA$<br>$V_{GS} = -2.5V, I_D = -80mA$   |
| Forward Transfer Admittance             | $ Y_{fs} $   | 100  | —          | —       | mS       | $V_{DS} = -5V, I_D = -100mA$                                    |
| Diode Forward Voltage                   | $V_{SD}$     | —    | -0.8       | -1.2    | V        | $V_{GS} = 0V, I_S = -100mA$                                     |
| <b>DYNAMIC CHARACTERISTICS (Note 7)</b> |              |      |            |         |          |                                                                 |
| Input Capacitance                       | $C_{iss}$    | —    | 50.54      | —       | pF       | $V_{DS} = -25V, V_{GS} = 0V, f = 1.0MHz$                        |
| Output Capacitance                      | $C_{oss}$    | —    | 3.49       | —       | pF       |                                                                 |
| Reverse Transfer Capacitance            | $C_{rss}$    | —    | 2.42       | —       | pF       |                                                                 |
| Gate Resistance                         | $R_G$        | —    | 201        | —       | $\Omega$ | $V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$                          |
| Total Gate Charge $V_{GS} = 4.5V$       | $Q_g$        | —    | 0.58       | —       | nC       | $V_{DS} = -25V, I_D = -100mA$                                   |
| Gate-Source Charge                      | $Q_{gs}$     | —    | 0.09       | —       | nC       |                                                                 |
| Gate-Drain Charge                       | $Q_{gd}$     | —    | 0.14       | —       | nC       |                                                                 |
| Turn-On Delay Time                      | $t_{D(on)}$  | —    | 4.46       | —       | nS       | $V_{DD} = -30V, I_D = -0.27A, V_{GEN} = -4V, R_{GEN} = 6\Omega$ |
| Turn-On Rise Time                       | $t_r$        | —    | 6.63       | —       | nS       |                                                                 |
| Turn-Off Delay Time                     | $t_{D(off)}$ | —    | 21.9       | —       | nS       |                                                                 |
| Turn-Off Fall Time                      | $t_f$        | —    | 15.0       | —       | nS       |                                                                 |

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

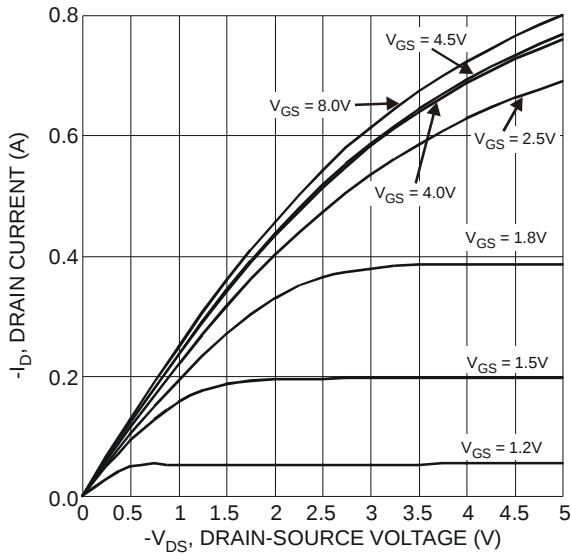


Figure 1 Typical Output Characteristics

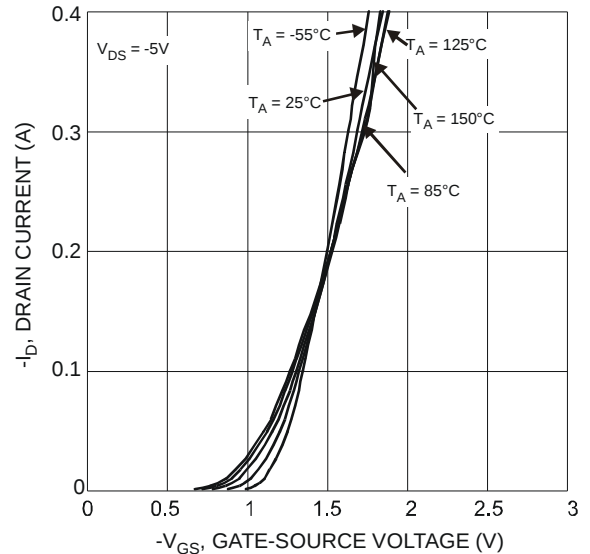


Figure 2 Typical Transfer Characteristics

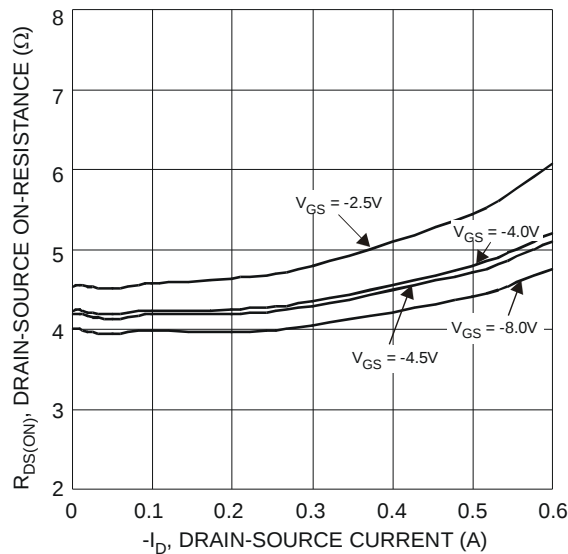


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

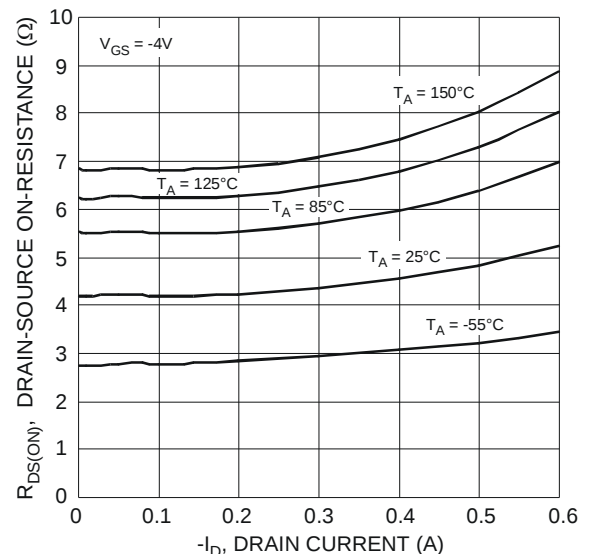


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

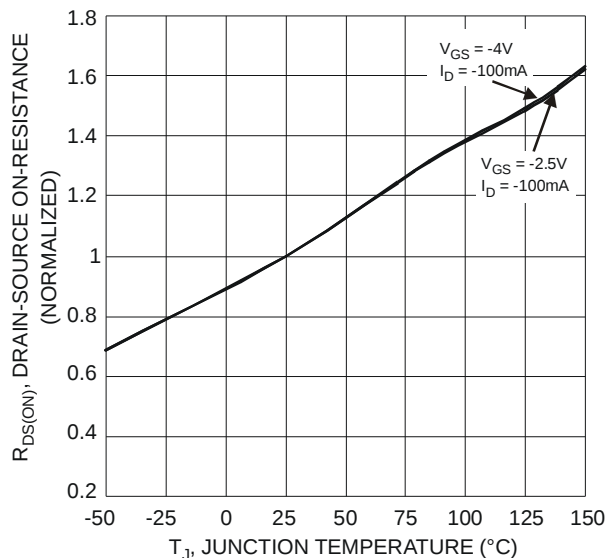


Figure 5 On-Resistance Variation with Temperature

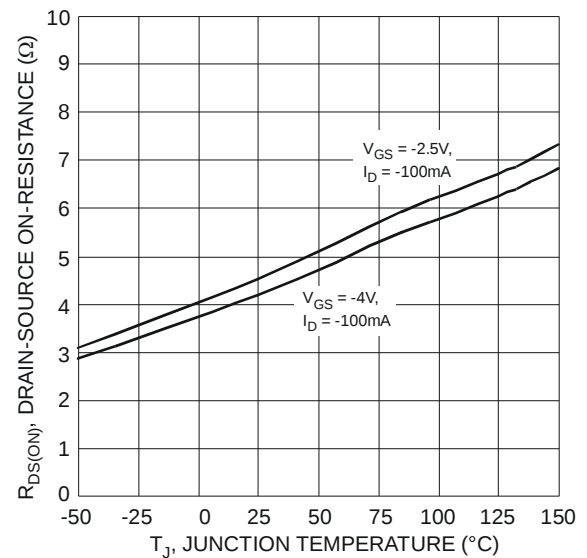


Figure 6 On-Resistance Variation with Temperature

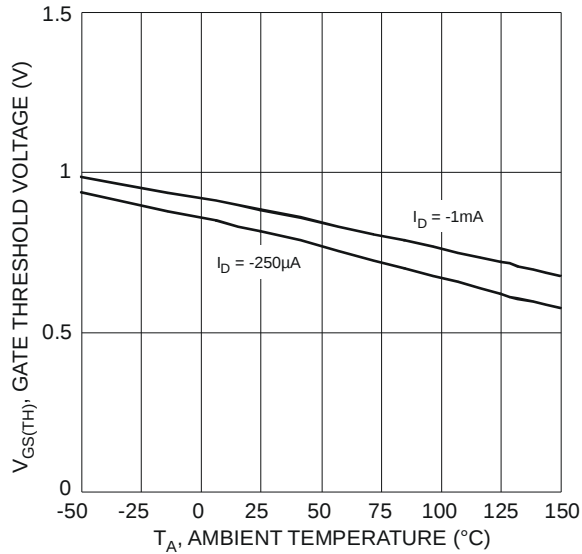


Figure 7 Gate Threshold Variation vs. Ambient Temperature

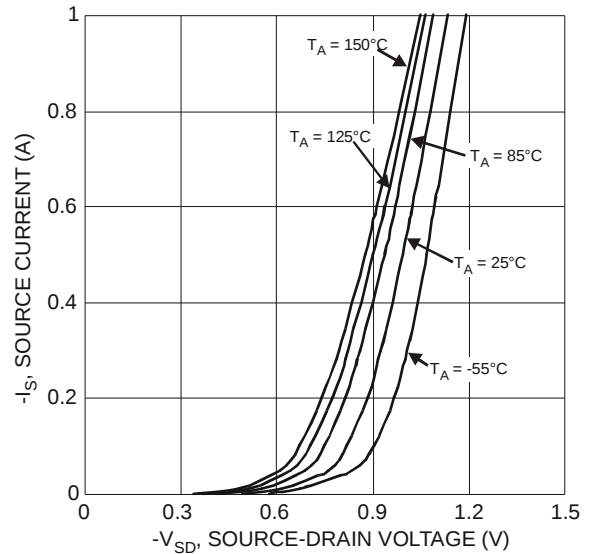


Figure 8 Diode Forward Voltage vs. Current

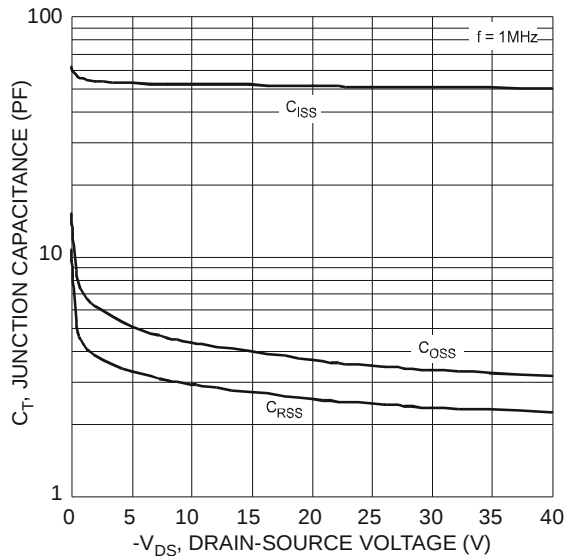


Figure 9 Typical Junction Capacitance

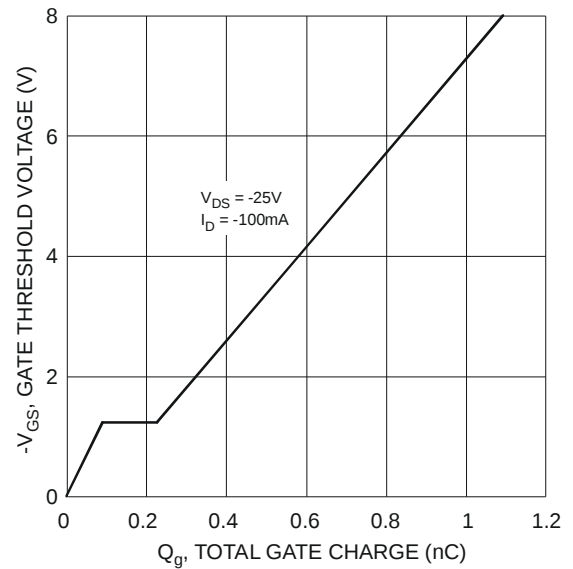
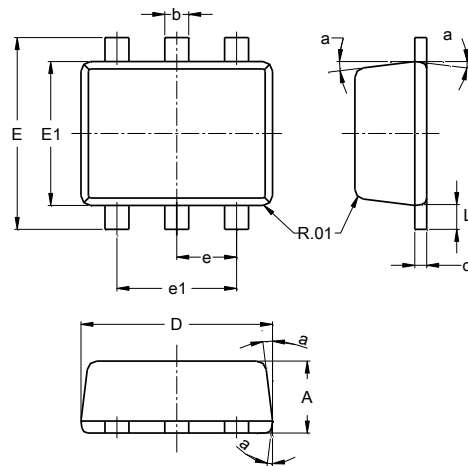


Figure 10 Gate Charge Characteristics

## Package Outline Dimensions

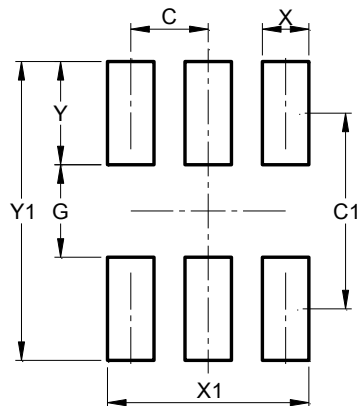
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



| SOT563               |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | 0.55 | 0.60 | --   |
| b                    | 0.15 | 0.30 | 0.20 |
| c                    | 0.10 | 0.18 | 0.11 |
| D                    | 1.50 | 1.70 | 1.60 |
| E                    | 1.55 | 1.70 | 1.60 |
| E1                   | 1.10 | 1.25 | 1.20 |
| e                    | --   | --   | 0.50 |
| e1                   | 0.90 | 1.10 | 1.00 |
| L                    | 0.10 | 0.30 | 0.20 |
| a                    | 8°   | 9°   | 7°   |
| 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          | 0.500         |
| C1         | 1.270         |
| G          | 0.600         |
| X          | 0.300         |
| X1         | 1.300         |
| Y          | 0.670         |
| Y1         | 1.940         |

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