

### General Description

The MDU3603 uses advanced Magnachip's MOSFET Technology to provide low on-state resistance.

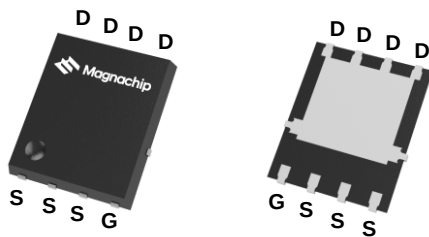
This device is suited for Power Management and load switching applications common in Notebook Computers and Portable Battery Packs.

### Features

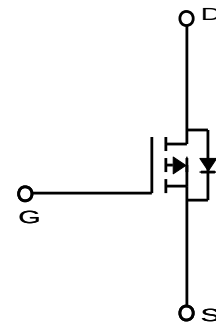
- $V_{DS} = -30V$
- $I_D = -67A$  @  $V_{GS} = -10V$
- $R_{DS(ON)}$ 
  - < 7.5mΩ @  $V_{GS} = -20V$
  - < 9.1mΩ @  $V_{GS} = -10V$
  - < 13.6mΩ @  $V_{GS} = -5V$

### Applications

- Load Switch
- General purpose applications
- Smart Module for Note PC Battery



PDFN56



### Absolute Maximum Ratings ( $T_J = 25^\circ C$ )

| Characteristics                        |                                      | Symbol         | Rating  | Unit       |
|----------------------------------------|--------------------------------------|----------------|---------|------------|
| Drain-Source Voltage                   |                                      | $V_{DSS}$      | -30     | V          |
| Gate-Source Voltage                    |                                      | $V_{GSS}$      | ±25     | V          |
| Continuous Drain Current               | $T_C = 25^\circ C$ (Silicon limited) | $I_D$          | -67.0   | A          |
|                                        | $T_C = 25^\circ C$ (Package limited) |                | -43.5   |            |
|                                        | $T_C = 70^\circ C$                   |                | -53.6   |            |
|                                        | $T_A = 25^\circ C$                   |                | -13.4   |            |
|                                        | $T_A = 70^\circ C$                   |                | -10.7   |            |
| Pulsed Drain Current                   |                                      | $I_{DM}$       | -120    | A          |
| Power Dissipation (Note 1)             | $T_C = 25^\circ C$                   | $P_D$          | 62.5    | W          |
|                                        | $T_C = 70^\circ C$                   |                | 40.0    |            |
|                                        | $T_A = 25^\circ C$                   |                | 2.5     |            |
|                                        | $T_A = 70^\circ C$                   |                | 1.6     |            |
| Single Pulse Avalanche Energy (Note 2) |                                      | $E_{AS}$       | 112.5   | mJ         |
| Junction and Storage Temperature Range |                                      | $T_J, T_{stg}$ | -55~150 | $^\circ C$ |

### Thermal Characteristics

| Characteristics                                  | Symbol          | Rating | Unit         |
|--------------------------------------------------|-----------------|--------|--------------|
| Thermal Resistance, Junction-to-Ambient (Note 1) | $R_{\theta JA}$ | 50     | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Case             | $R_{\theta JC}$ | 2      |              |

## Ordering Information

| Part Number | Temp. Range | Package    | Packing     | Quantity   | RoHS Status  |
|-------------|-------------|------------|-------------|------------|--------------|
| MDU3603RH   | -55~150°C   | PowerDFN56 | Tape & Reel | 3000 units | Halogen Free |

## Electrical Characteristics (T<sub>J</sub> = 25°C)

| Characteristics                         | Symbol              | Test Condition                                                                                   | Min  | Typ   | Max  | Unit |
|-----------------------------------------|---------------------|--------------------------------------------------------------------------------------------------|------|-------|------|------|
| Static Characteristics                  |                     |                                                                                                  |      |       |      |      |
| Drain-Source Breakdown Voltage          | BV <sub>DSS</sub>   | I <sub>D</sub> = -250μA, V <sub>GS</sub> = 0V                                                    | -30  | -     | -    | V    |
| Gate Threshold Voltage                  | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                      | -1.0 | -1.8  | -3.0 |      |
| Drain Cut-Off Current                   | I <sub>DSS</sub>    | V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V                                                     | -    |       | -1   | μA   |
| Gate Leakage Current                    | I <sub>GSS</sub>    | V <sub>GS</sub> = ±25V, V <sub>DS</sub> = 0V                                                     | -    | -     | ±0.1 |      |
| Drain-Source ON Resistance              | R <sub>DS(ON)</sub> | V <sub>GS</sub> = -20V, I <sub>D</sub> = -12A                                                    | -    | 6.4   | 7.5  | mΩ   |
|                                         |                     | V <sub>GS</sub> = -10V, I <sub>D</sub> = -12A                                                    | -    | 7.5   | 9.1  |      |
|                                         |                     | V <sub>GS</sub> = -5V, I <sub>D</sub> = -10A                                                     |      | 10.8  | 13.6 |      |
| Forward Transconductance                | g <sub>FS</sub>     | V <sub>DS</sub> = -5V, I <sub>D</sub> = -10A                                                     |      | 34    | -    | S    |
| Dynamic Characteristics                 |                     |                                                                                                  |      |       |      |      |
| Total Gate Charge                       | Q <sub>g</sub>      | V <sub>DS</sub> = -15V, I <sub>D</sub> = -12A<br>V <sub>GS</sub> = -10V                          | -    | 38.4  | -    | nC   |
| Gate-Source Charge                      | Q <sub>gs</sub>     |                                                                                                  | -    | 5.9   | -    |      |
| Gate-Drain Charge                       | Q <sub>gd</sub>     |                                                                                                  | -    | 8.2   | -    |      |
| Input Capacitance                       | C <sub>iss</sub>    | V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                      | -    | 1788  | -    | pF   |
| Reverse Transfer Capacitance            | C <sub>rss</sub>    |                                                                                                  | -    | 268   | -    |      |
| Output Capacitance                      | C <sub>oss</sub>    |                                                                                                  | -    | 445   | -    |      |
| Turn-On Delay Time                      | t <sub>d(on)</sub>  | V <sub>GS</sub> = -10V, V <sub>DS</sub> = -15V,<br>R <sub>L</sub> = 1.25Ω, R <sub>GEN</sub> = 3Ω | -    | 15.3  | -    | ns   |
| Turn-On Rise Time                       | t <sub>r</sub>      |                                                                                                  | -    | 13.0  | -    |      |
| Turn-Off Delay Time                     | t <sub>d(off)</sub> |                                                                                                  | -    | 61.6  | -    |      |
| Turn-Off Fall Time                      | t <sub>f</sub>      |                                                                                                  | -    | 53.2  | -    |      |
| Drain-Source Body Diode Characteristics |                     |                                                                                                  |      |       |      |      |
| Source-Drain Diode Forward Voltage      | V <sub>SD</sub>     | I <sub>S</sub> = -1A, V <sub>GS</sub> = 0V                                                       | -    | -0.71 | -1.0 | V    |
| Body Diode Reverse Recovery Time        | t <sub>rr</sub>     | I <sub>F</sub> = -12A, di/dt = 100A/μs                                                           | -    | 42.3  |      | ns   |
| Body Diode Reverse Recovery Charge      | Q <sub>rr</sub>     |                                                                                                  | -    | 40.7  | -    | nC   |

Note :

1. Surface mounted FR-4 board by JEDEC (jesd51-7)
2. Starting T<sub>J</sub>=25°C, L=1mH, I<sub>AS</sub>= -15A V<sub>DD</sub>=-20V, V<sub>GS</sub>=-10V.

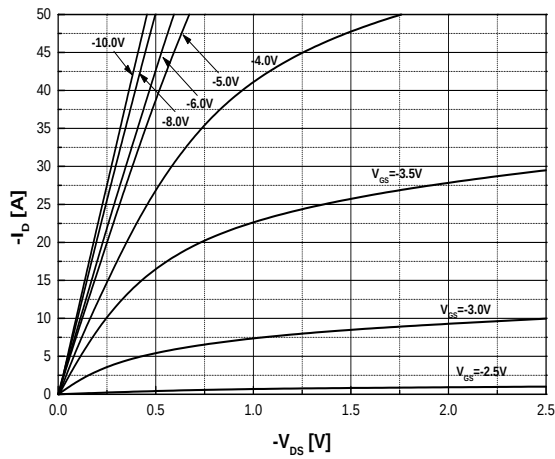


Fig.1 On-Region Characteristics

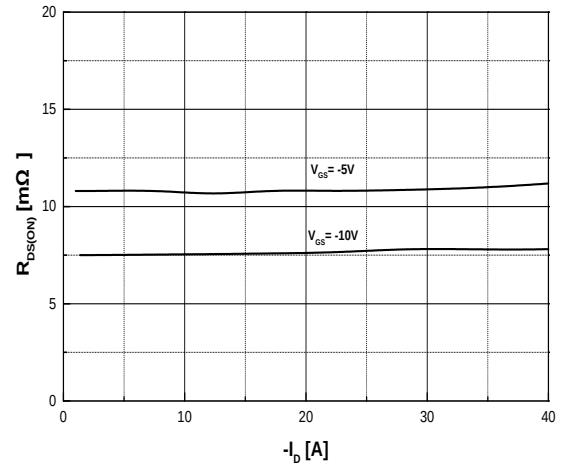


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

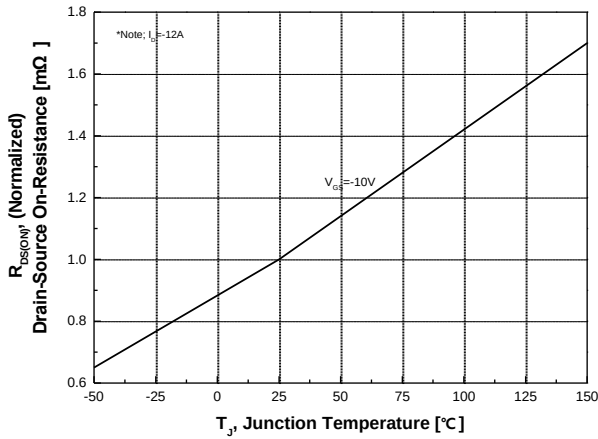


Fig.3 On-Resistance Variation with Temperature

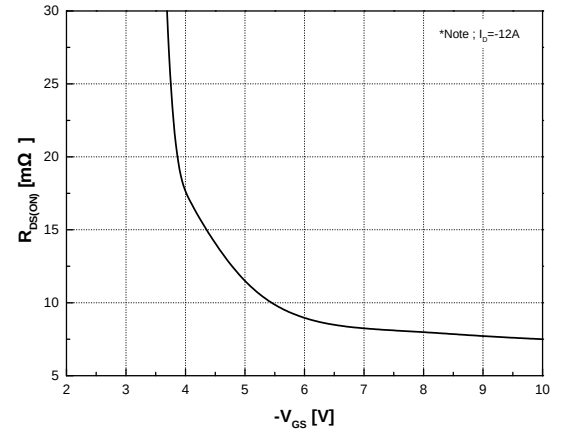


Fig.4 On-Resistance Variation with Gate to Source Voltage

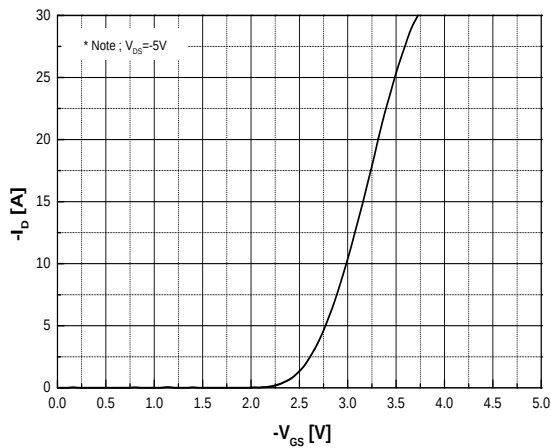


Fig.5 Transfer Characteristics

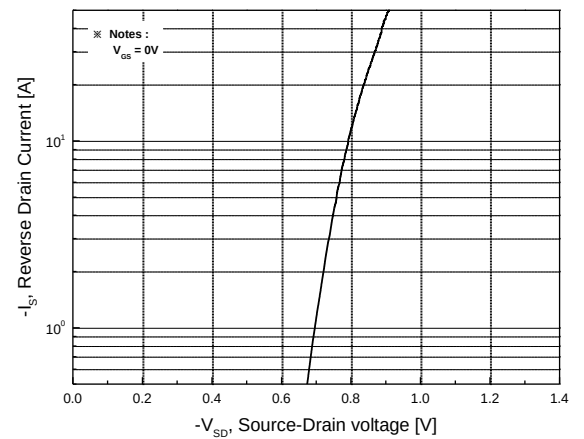


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

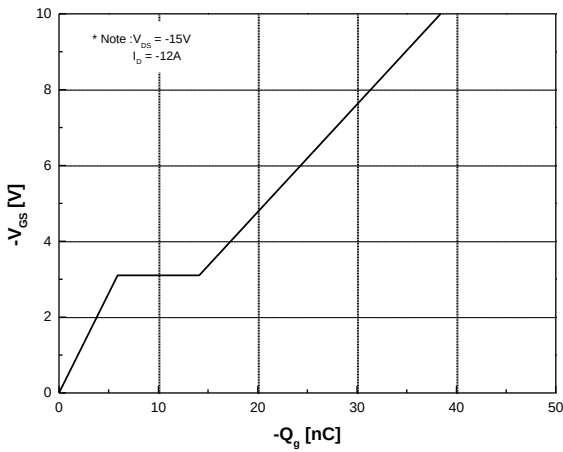


Fig.7 Gate Charge Characteristics

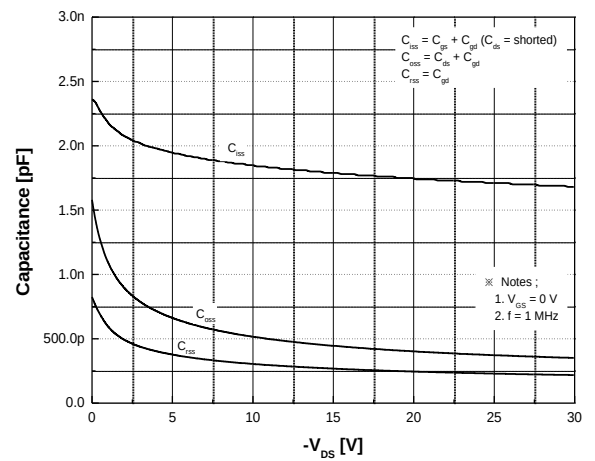


Fig.8 Capacitance Characteristics

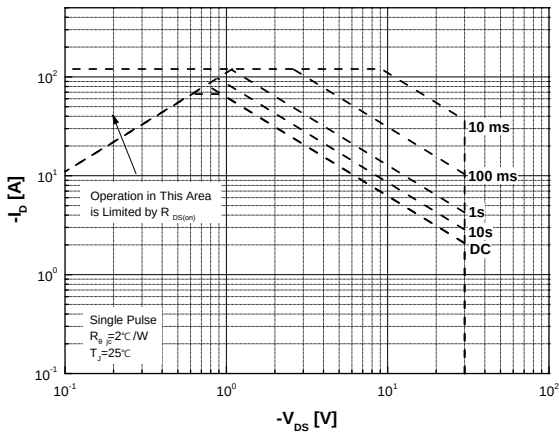


Fig.9 Maximum Safe Operating Area

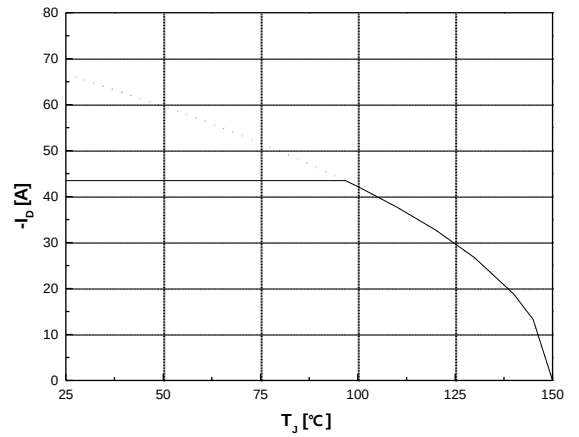


Fig.10 Maximum Drain Current vs. Ambient Temperature

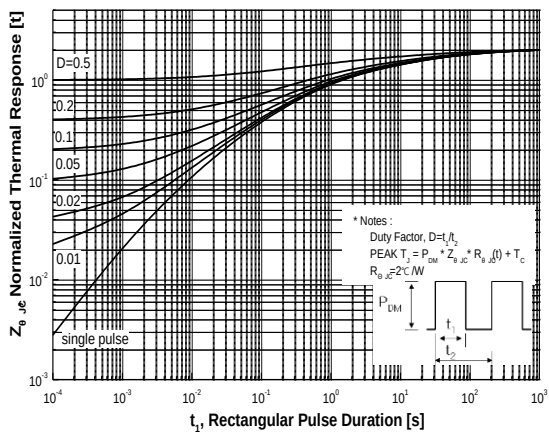
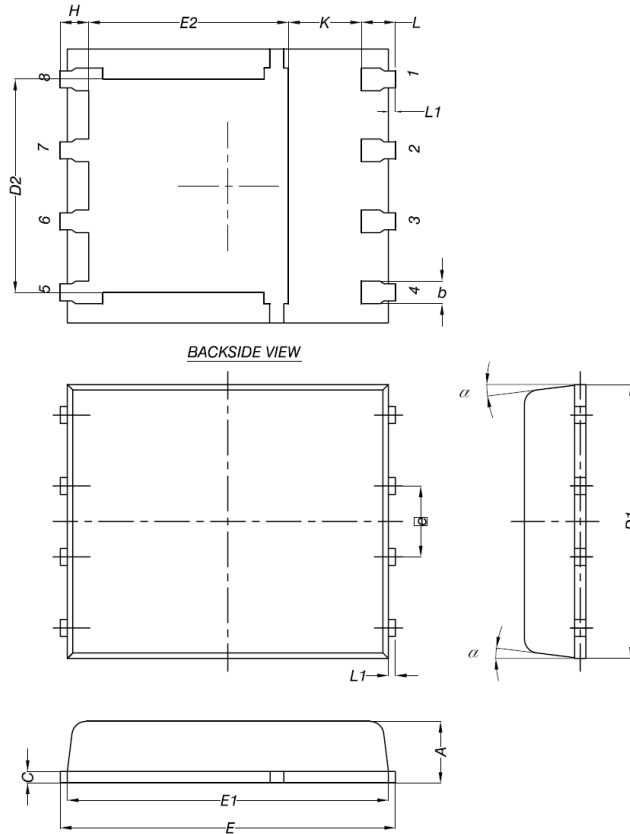


Fig.11 Transient Thermal Response Curve

## Package Dimension

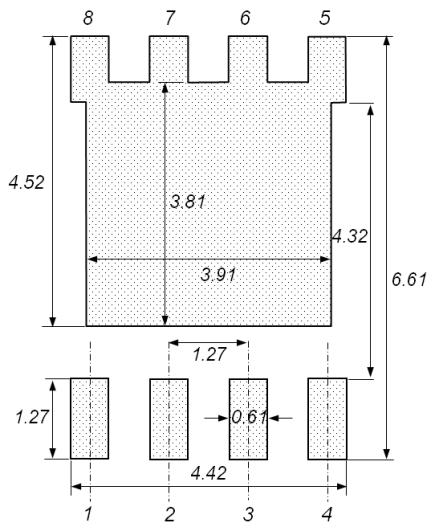
### PowerDFN56 (5x6mm)

Dimensions are in millimeters, unless otherwise specified



| Dimension | MILLIMETERS |      |
|-----------|-------------|------|
|           | Min         | Max  |
| A         | 0.90        | 1.10 |
| b         | 0.33        | 0.51 |
| C         | 0.20        | 0.34 |
| D1        | 4.50        | 5.10 |
| D2        | -           | 4.22 |
| E         | 5.90        | 6.30 |
| E1        | 5.50        | 6.10 |
| E2        | -           | 4.30 |
| e         | 1.27BSC     |      |
| H         | 0.41        | 0.71 |
| K         | 0.20        | -    |
| L         | 0.51        | 0.71 |
| $\alpha$  | 0°          | 12°  |

#### Land Pattern



Note : Package body size, length and width do not include mold flash, protrusions and gate burrs.

**DISCLAIMER:**

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