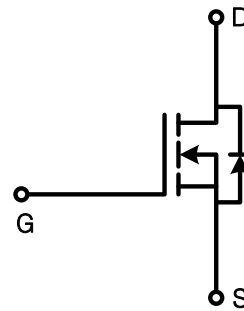


### General Description

The MDU1531 uses advanced MagnaChip's MOSFET Technology, which provides high performance in on-state resistance, fast switching performance and excellent quality. MDU1531 is suitable device for DC/DC Converter and general purpose applications.

### Features

- $V_{DS} = 30V$
- $I_D = 64A @ V_{GS} = 10V$
- $R_{DS(ON)} < 2.4 m\Omega @ V_{GS} = 10V$
- $R_{DS(ON)} < 3.3 m\Omega @ V_{GS} = 4.5V$
- 100% UIL Tested
- 100% Rg Tested



PDFN56

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

| Characteristics                              |                                    | Symbol         | Rating   | Unit       |
|--|------------------------------------|----------------|----------|------------|
| Drain-Source Voltage                         |                                    | $V_{DSS}$      | 30       | V          |
| Gate-Source Voltage                          |                                    | $V_{GSS}$      | $\pm 20$ | V          |
| Continuous Drain Current <sup>(1)</sup>      | $T_C=25^\circ C$ (Silicon Limited) | $I_D$          | 163      | A          |
|  | $T_C=25^\circ C$ (Package Limited) |                | 64       |            |
|  | $T_A=70^\circ C$ (Silicon Limited) |                | 130      |            |
|  | $T_A=25^\circ C$                   |                | 42       |            |
|  | $T_A=70^\circ C$                   |                | 33       |            |
| Pulsed Drain Current                         |                                    | $I_{DM}$       | 256      |            |
| Power Dissipation                            | $T_C=25^\circ C$                   | $P_D$          | 83       | W          |
|  | $T_C=70^\circ C$                   |                | 53       |            |
|  | $T_A=25^\circ C$                   |                | 5.5      |            |
|  | $T_A=70^\circ C$                   |                | 3.5      |            |
| Single Pulse Avalanche Energy <sup>(2)</sup> |                                    | $E_{AS}$       | 57       | 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 <sup>(1)</sup> | $R_{\theta JA}$ | 22.7   | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Case                   | $R_{\theta JC}$ | 1.5    |              |

## Ordering Information

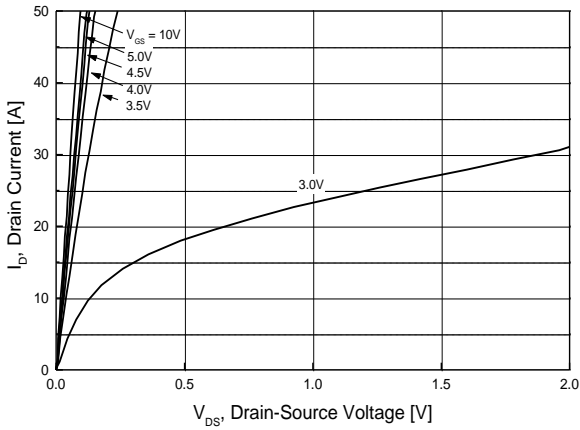
| Part Number | Temp. Range | Package | Packing     | RoHS Status  |
|-------------|-------------|---------|-------------|--------------|
| MDU1531RH   | -55~150°C   | PDFN56  | Tape & Reel | Halogen Free |

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

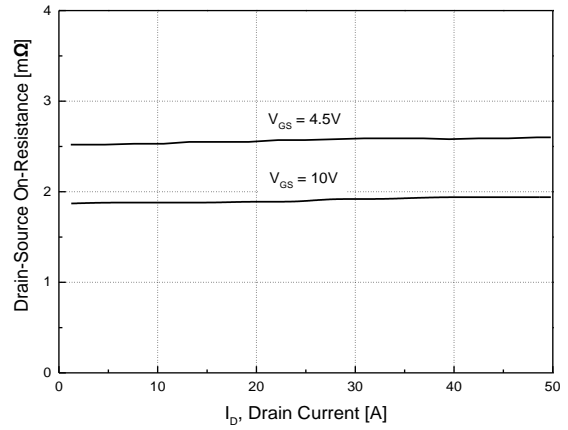
| Characteristics                                | Symbol               | Test Condition   | Min  | Typ. | Max  | Unit |
|--|----------------------|--|------|------|------|------|
| <b>Static Characteristics</b>                  |                      |  |      |      |      |      |
| Drain-Source Breakdown 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                                     | 1.3  | 1.8  | 2.7  |      |
| 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> = ±20V, V <sub>DS</sub> = 0V   | -    | -    | ±100 | nA   |
| Drain-Source ON Resistance                     | R <sub>DS(ON)</sub>  | V <sub>GS</sub> = 10V, I <sub>D</sub> = 28A  | -    | 2.0  | 2.4  | mΩ   |
|  |                      | T <sub>J</sub> =125°C  | -    | 2.6  | 3.1  |      |
|  |                      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 24A   | -    | 2.7  | 3.3  |      |
| Forward Transconductance                       | g <sub>fs</sub>      | V <sub>DS</sub> = 5V, I <sub>D</sub> = 10A   | -    | 63   | -    | S    |
| <b>Dynamic Characteristics</b>                 |                      |  |      |      |      |      |
| Total Gate Charge                              | Q <sub>g(10V)</sub>  | V <sub>DD</sub> = 15V, I <sub>D</sub> = 28A,<br>V <sub>GS</sub> = 10V                          | 47.6 | 63.6 | 79.6 | nC   |
| Total Gate Charge                              | Q <sub>g(4.5V)</sub> |  | 21.9 | 29.3 | 36.7 |      |
| Gate-Source Charge                             | Q <sub>gs</sub>      |  | -    | 8.6  | -    |      |
| Gate-Drain Charge                              | Q <sub>gd</sub>      |  | -    | 11.8 | -    |      |
| Input Capacitance                              | C <sub>iss</sub>     | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                     | 2827 | 3770 | 4712 | pF   |
| Reverse Transfer Capacitance                   | C <sub>rss</sub>     |  | 130  | 174  | 217  |      |
| Output Capacitance                             | C <sub>oss</sub>     |  | 980  | 1310 | 1639 |      |
| Turn-On Delay Time                             | t <sub>d(on)</sub>   | V <sub>GS</sub> = 10V, V <sub>DD</sub> = 15.0V,<br>I <sub>D</sub> = 28A, R <sub>G</sub> = 3.0Ω | -    | 14.1 | -    | ns   |
| Rise Time                                      | t <sub>r</sub>       |  | -    | 8.2  | -    |      |
| Turn-Off Delay Time                            | t <sub>d(off)</sub>  |  | -    | 58.2 | -    |      |
| Fall Time                                      | t <sub>f</sub>       |  | -    | 11.7 | -    |      |
| Gate Resistance                                | R <sub>g</sub>       | f=1 MHz  | -    | 1.0  | 2.0  | Ω    |
| <b>Drain-Source Body Diode Characteristics</b> |                      |  |      |      |      |      |
| Source-Drain Diode Forward Voltage             | V <sub>SD</sub>      | I <sub>S</sub> = 28A, V <sub>GS</sub> = 0V   | -    | 0.8  | 1.1  | V    |
| Body Diode Reverse Recovery Time               | t <sub>rr</sub>      | I <sub>F</sub> = 28A, di/dt = 100A/μs  | -    | 49   | 73   | ns   |
| Body Diode Reverse Recovery Charge             | Q <sub>rr</sub>      |  | -    | 62   | 93   | nC   |

### Note :

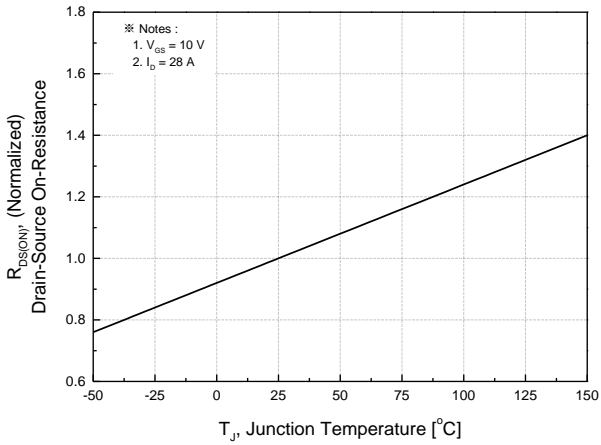
- Surface mounted FR-4 board by JEDEC (jesd51-7). Continuous current at T<sub>C</sub>=25°C is silicon limited
- E<sub>AS</sub> is tested at starting T<sub>J</sub> = 25°C, L = 0.1mH, I<sub>AS</sub> = 35A, V<sub>DD</sub> = 27V, V<sub>GS</sub> = 10V



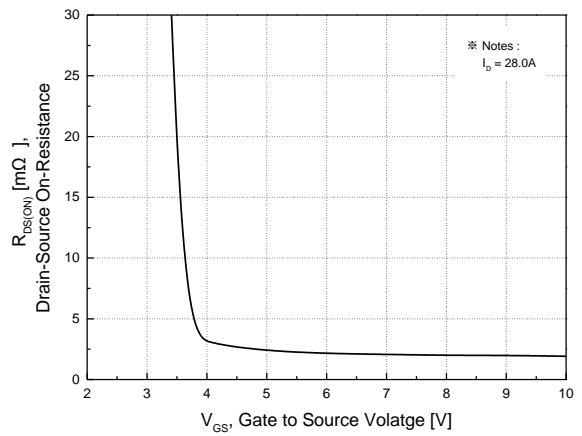
**Fig.1 On-Region Characteristics**



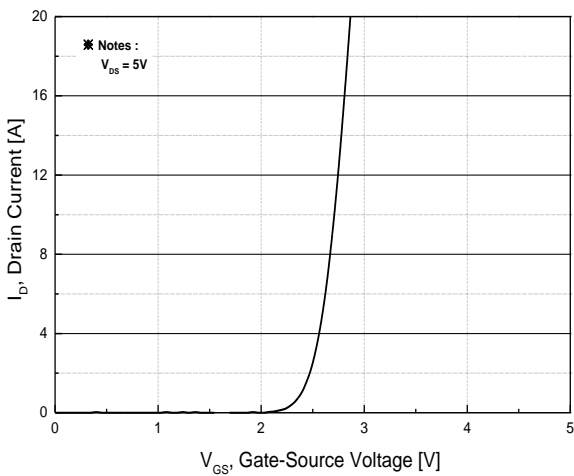
**Fig.2 On-Resistance Variation with Drain Current and Gate Voltage**



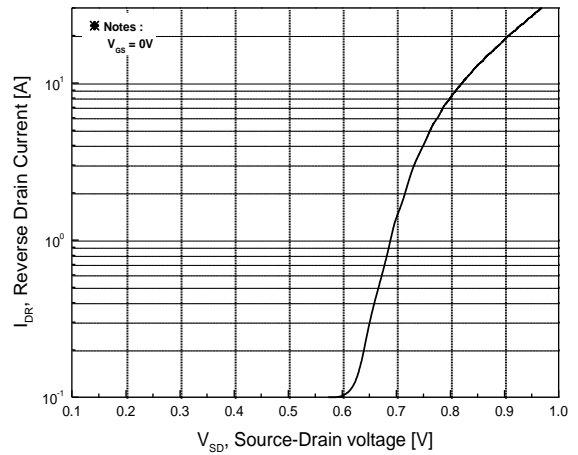
**Fig.3 On-Resistance Variation with Temperature**



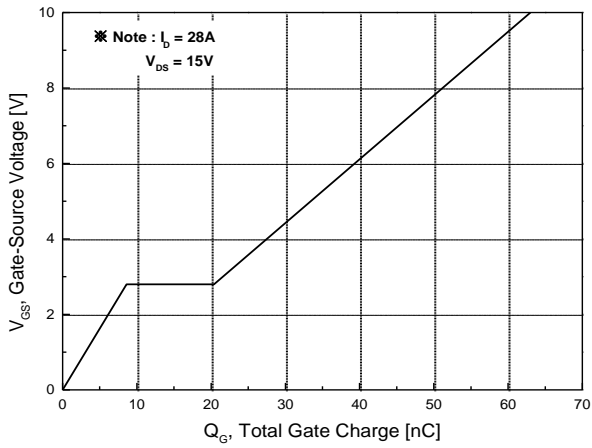
**Fig.4 On-Resistance Variation with Gate to Source Voltage**



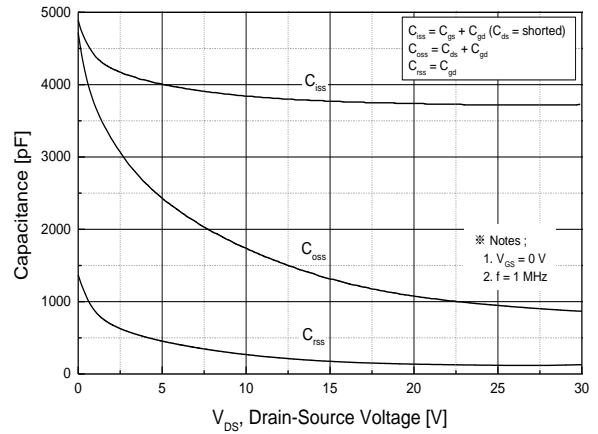
**Fig.5 Transfer Characteristics**



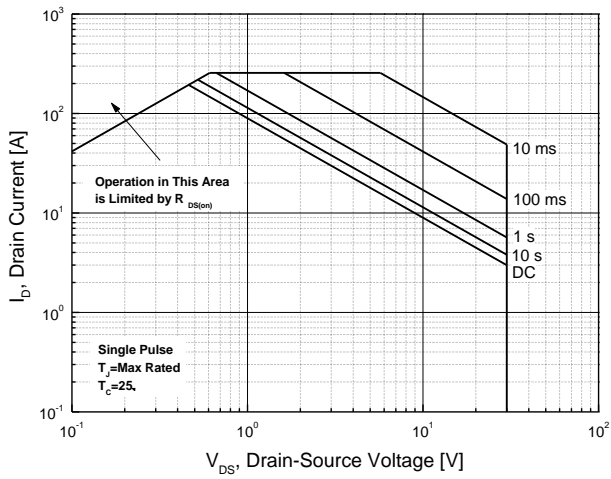
**Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature**



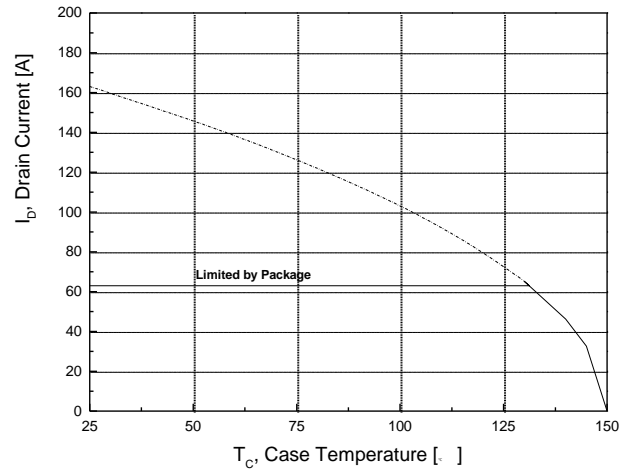
**Fig.7 Gate Charge Characteristics**



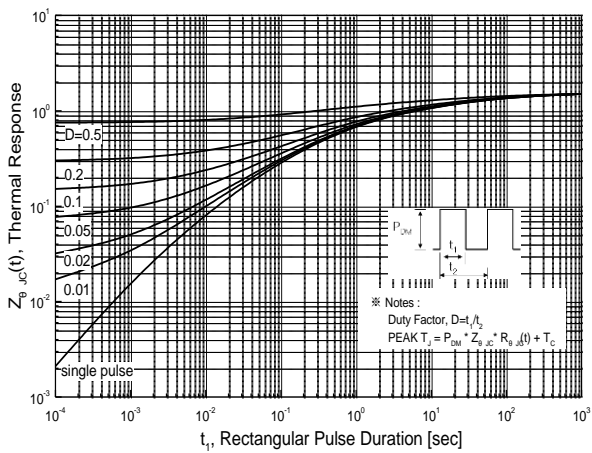
**Fig.8 Capacitance Characteristics**



**Fig.9 Maximum Safe Operating Area**



**Fig.10 Maximum Drain Current vs. Case Temperature**

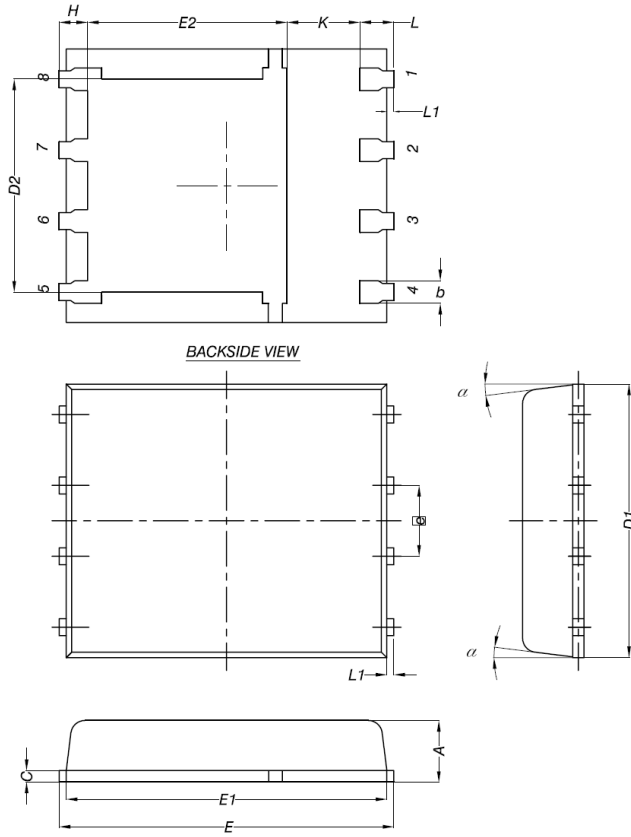


**Fig.11 Transient Thermal Response Curve**

**Package Dimension**

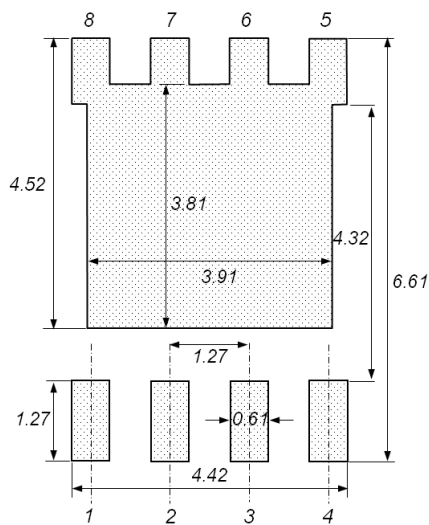
**PDFN56 (5x6mm<sup>2</sup>)**

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 |
| α         | 0°          | 12°  |

**Land Pattern**



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