RoHS Compliant

MagnaChip

# MDU1515

## Single N-channel Trench MOSFET 30V, 57.4A, 7.2mΩ

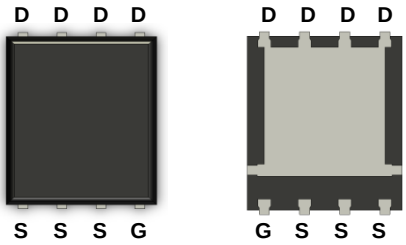


### General Description

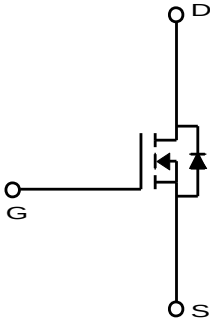
The MDU1515 uses advanced MagnaChip's MOSFET Technology, which provides high performance in on-state resistance, fast switching performance and excellent quality. MDU1515 is suitable device for DC/DC Converter and general purpose applications.

### Features

- $V_{DS}$ = 30V
- $I_D$ = 57.4A @$V_{GS}$ = 10V
- $R_{DS(ON)}$
  < 7.2 mΩ @$V_{GS}$ = 10V
  < 11.0 mΩ @$V_{GS}$ = 4.5V
- 100% UIL Tested
- 100% Rg Tested




**PowerDFN56**




### Absolute Maximum Ratings (Ta = 25°C)

| Characteristics | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 30 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current [1] | $T_C$=25°C | $I_D$ | 57.4 | A |
| | $T_C$=70°C | | 45.9 | |
| | $T_A$=25°C | | 20.8[3] | |
| | $T_A$=70°C | | 16.6[3] | |
| Pulsed Drain Current | | $I_{DM}$ | 100 | A |
| Power Dissipation | $T_C$=25°C | $P_D$ | 41.6 | W |
| | $T_C$=70°C | | 26.6 | |
| | $T_A$=25°C | | 5.5[3] | |
| | $T_A$=70°C | | 3.5[3] | |
| Single Pulse Avalanche Energy [2] | | $E_{AS}$ | 65.0 | mJ |
| Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | -55~150 | °C |

### Thermal Characteristics

| Characteristics | Symbol | Rating | Unit |
|---|---|---|---|
| Thermal Resistance, Junction-to-Ambient [1] | $R_{\theta JA}$ | 22.7 | °C/W |
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 3.0 | |

## Ordering Information

| Part Number | Temp. Range | Package | Packing | Quantity | Rohs Status |
|---|---|---|---|---|---|
| MDU1515URH | -55~150°C | PowerDFN56 | Tape & Reel | 3000 units | Halogen Free |

## Electrical Characteristics ($T_J$ =25°C)

| Characteristics | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $I_D$ = 250μA, $V_{GS}$ = 0V | 30 | - | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 1.3 | 1.9 | 2.7 | |
| Drain Cut-Off Current | $I_{DSS}$ | $V_{DS}$ = 30V, $V_{GS}$ = 0V | - | - | 1 | μA |
| | | $T_J$=55°C | - | - | 5 | |
| Gate Leakage Current | $I_{GSS}$ | $V_{GS}$ = ±20V, $V_{DS}$ = 0V | - | - | ±0.1 | |
| Drain-Source ON Resistance | $R_{DS(ON)}$ | $V_{GS}$ = 10V, $I_D$ = 16A | - | 6.3 | 7.2 | mΩ |
| | | $T_J$=125°C | - | 9.1 | 10.5 | |
| | | $V_{GS}$ = 4.5V, $I_D$ = 13A | - | 9.2 | 11.0 | |
| Forward Transconductance | $g_{fs}$ | $V_{DS}$ = 5V, $I_D$ = 10A | - | 35 | - | S |
| **Dynamic Characteristics** | | | | | | |
| Total Gate Charge | $Q_{g(10V)}$ | $V_{DS}$ = 15.0V, $I_D$ = 16A, $V_{GS}$ = 10V | 13.1 | 17.5 | 21.9 | nC |
| Total Gate Charge | $Q_{g(4.5V)}$ | | 6.3 | 8.4 | 10.5 | |
| Gate-Source Charge | $Q_{gs}$ | | - | 3.6 | - | |
| Gate-Drain Charge | $Q_{gd}$ | | - | 2.8 | - | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = 15.0V, $V_{GS}$ = 0V, f = 1.0MHz | 816 | 1088 | 1360 | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | 79 | 105 | 131 | |
| Output Capacitance | $C_{oss}$ | | 164 | 218 | 273 | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{GS}$ = 10V, $V_{DS}$ = 15.0V, $I_D$ = 16A , $R_G$ = 3.0Ω | - | 3.0 | - | ns |
| Rise Time | $t_r$ | | - | 8.6 | - | |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 24.3 | - | |
| Fall Time | $t_f$ | | - | 8.2 | - | |
| Gate Resistance | Rg | f=1 MHz | 1.0 | 3.0 | 4.5 | Ω |
| **Drain-Source Body Diode Characteristics** | | | | | | |
| Source-Drain Diode Forward Voltage | $V_{SD}$ | $I_S$ = 16A, $V_{GS}$ = 0V | - | 0.8 | 1.1 | V |
| Body Diode Reverse Recovery Time | $t_{rr}$ | $I_F$ = 16A, dI/dt = 100A/μs | - | 24.9 | 37.4 | ns |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | | - | 16.5 | 24.8 | nC |

Note :

1. Surface mounted FR-4 board by JEDEC (jesd51-7)
2. $E_{AS}$ is tested at starting Tj = 25℃, L = 0.1mH, $I_{AS}$ = 18A, $V_{DD}$ = 27V, $V_{GS}$ = 10V
3. T < 10sec.

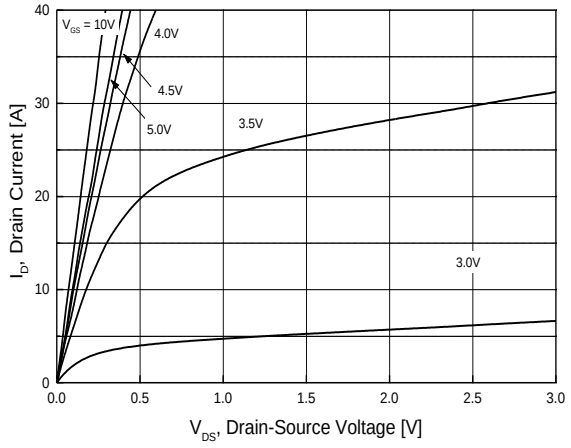



**Fig.1 On-Region Characteristics**

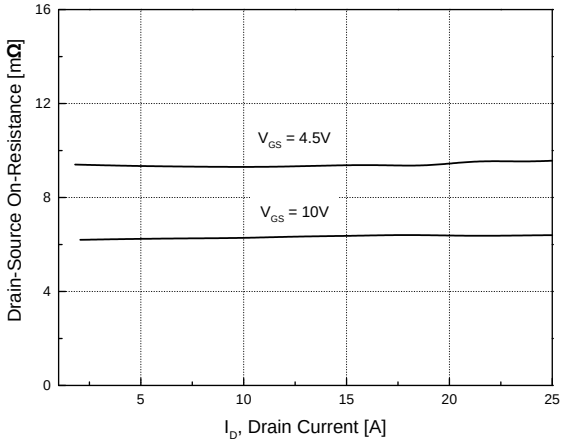



**Fig.2 On-Resistance Variation with Drain Current and Gate Voltage**

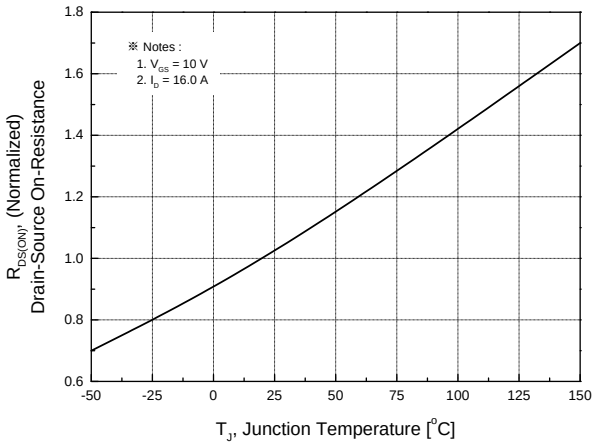



**Fig.3 On-Resistance Variation with Temperature**

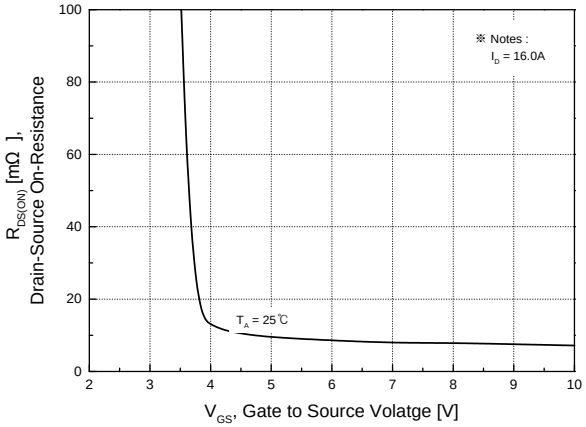



**Fig.4 On-Resistance Variation with Gate to Source Voltage**

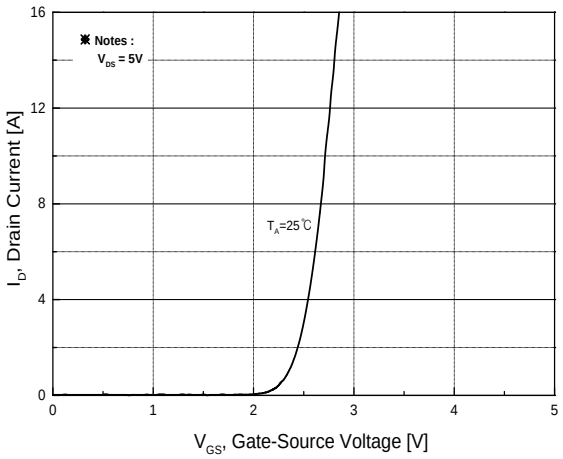



**Fig.5 Transfer Characteristics**

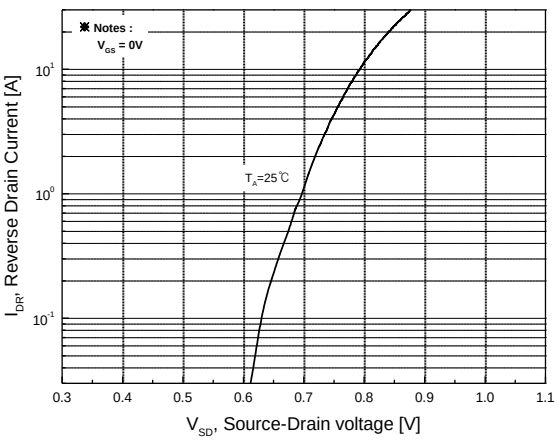



**Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature**

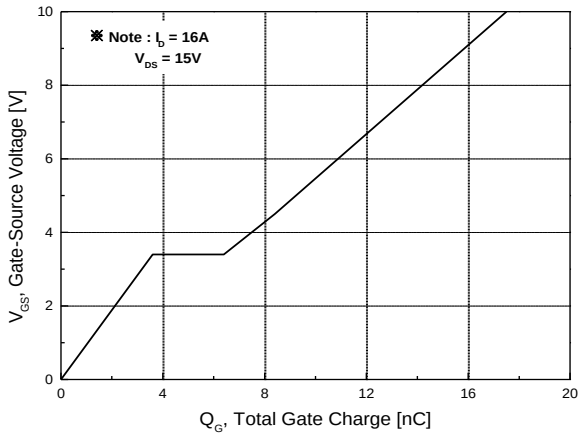



**Fig.7 Gate Charge Characteristics**

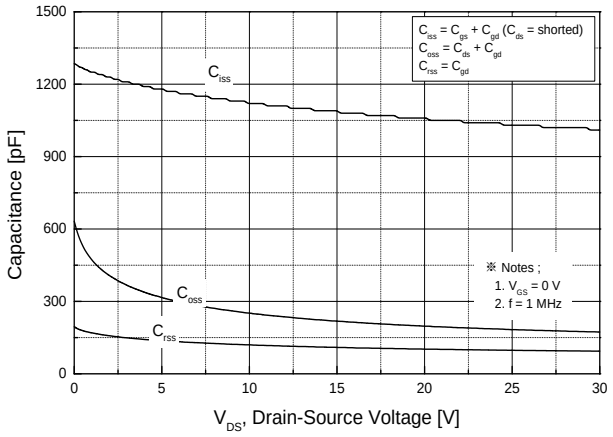



**Fig.8 Capacitance Characteristics**

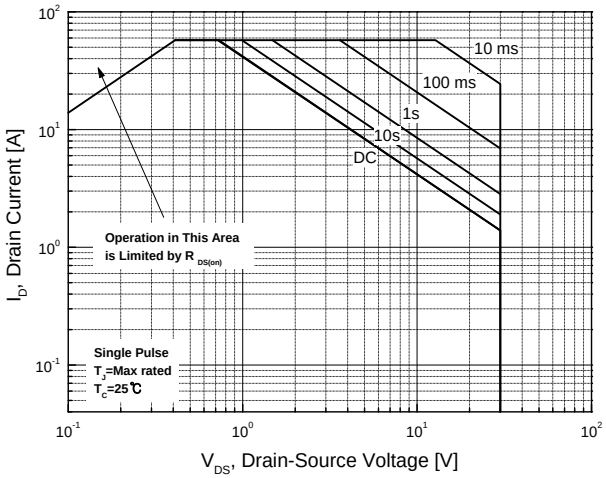



**Fig.9 Maximum Safe Operating Area**

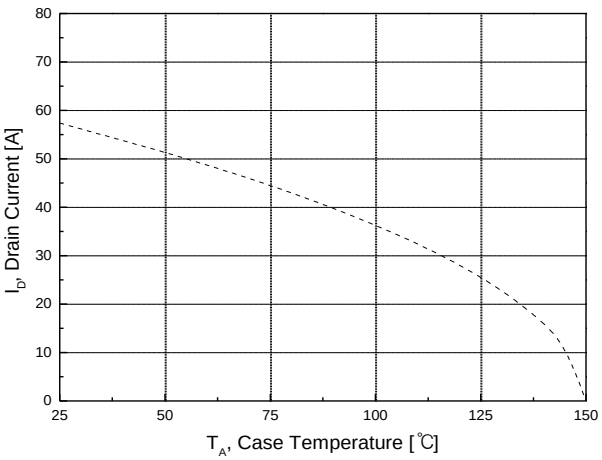



**Fig.10 Maximum Drain Current vs. Case Temperature**

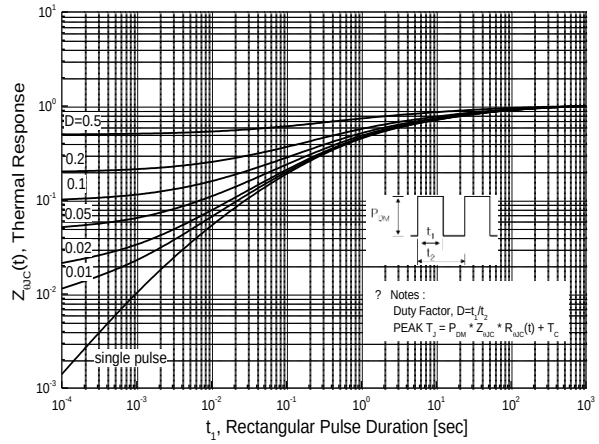



**Fig.11 Transient Thermal Response Curve (Junction-to-Case)**

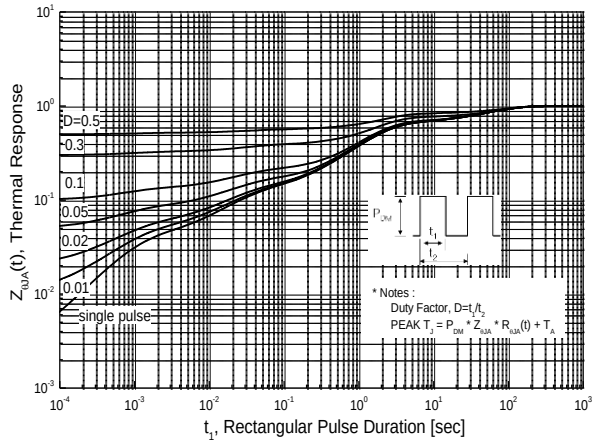
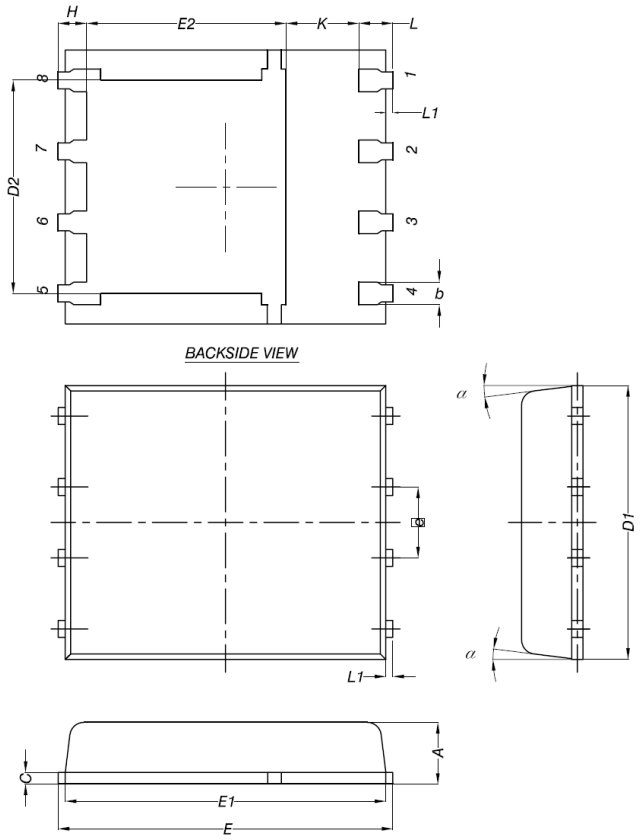



**Fig.12 Transient Thermal Response Curve (Junction-to-Ambient)**

## Package Dimension

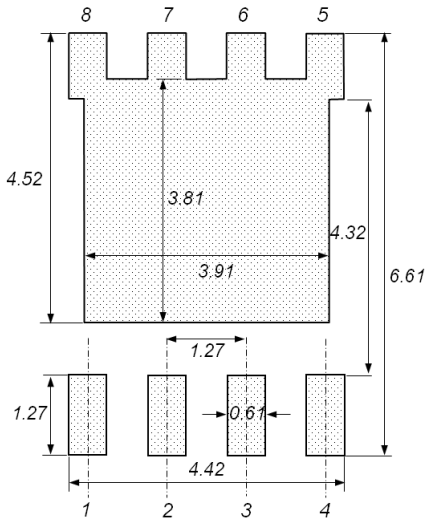
### PowerDFN56 (5x6mm)

**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 |
| α | 0° | 12° |

***Land Pattern***



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