

### General Description

These N-channel MOSFET are produced using advanced MagnaChip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent quality.

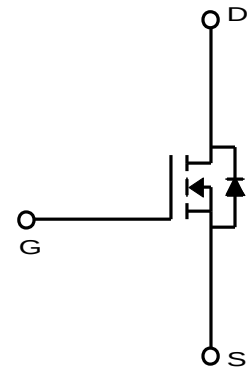
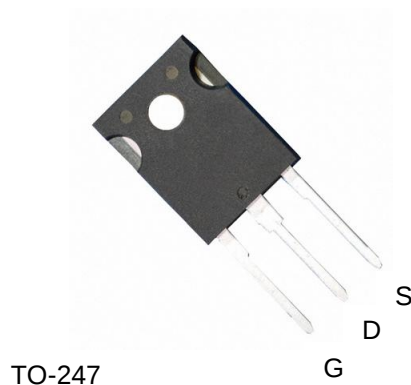
These devices are suitable device for SMPS, high Speed switching and general purpose applications.

### Features

- $V_{DS} = 500V$
- $I_D = 20.0A$  @  $V_{GS} = 10V$
- $R_{DS(ON)} \leq 0.27\Omega$  @  $V_{GS} = 10V$

### Applications

- Power Supply
- HID
- Lighting



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

| Characteristics                              |                           | Symbol         | Rating   | Unit          |
|----------------------------------------------|---------------------------|----------------|----------|---------------|
| Drain-Source Voltage                         |                           | $V_{DSS}$      | 500      | V             |
| Gate-Source Voltage                          |                           | $V_{GSS}$      | $\pm 30$ | V             |
| Continuous Drain Current                     | $T_C = 25^\circ C$        | $I_D$          | 20       | A             |
|                                              | $T_C = 100^\circ C$       |                | 12.5     | A             |
| Pulsed Drain Current <sup>(1)</sup>          |                           | $I_{DM}$       | 80       | A             |
| Power Dissipation                            | $T_C = 25^\circ C$        | $P_D$          | 245      | W             |
|                                              | Derate above $25^\circ C$ |                | 1.96     | W/ $^\circ C$ |
| Repetitive Avalanche Energy <sup>(1)</sup>   |                           | $E_{AR}$       | 24.5     | mJ            |
| Peak Diode Recovery $dv/dt$ <sup>(3)</sup>   |                           | $dv/dt$        | 4.5      | V/ns          |
| Single Pulse Avalanche Energy <sup>(4)</sup> |                           | $E_{AS}$       | 950      | mJ            |
| Junction and Storage Temperature Range       |                           | $T_J, T_{stg}$ | -55~150  | $^\circ C$    |

\*  $I_D$  limited by maximum junction temperature

### Thermal Characteristics

| Characteristics                                        | Symbol          | Rating | Unit         |
|--------------------------------------------------------|-----------------|--------|--------------|
| Thermal Resistance, Junction-to-Ambient <sup>(1)</sup> | $R_{\theta JA}$ | 40     | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Case <sup>(1)</sup>    | $R_{\theta JC}$ | 0.51   |              |

## Ordering Information

| Part Number | Temp. Range | Package | Packing | RoHS Status  |
|-------------|-------------|---------|---------|--------------|
| MDQ18N50GTP | -55~150°C   | TO-247  | Tube    | Pb Free      |
| MDQ18N50GTH | -55~150°C   | TO-247  | Tube    | Halogen Free |

## Electrical Characteristics (Ta =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                                                             | 500 | -    | -    | V    |
| Gate Threshold Voltage                                  | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                               | 3.0 | -    | 5.0  |      |
| Drain Cut-Off Current                                   | I <sub>DSS</sub>    | V <sub>DS</sub> = 500V, V <sub>GS</sub> = 0V                                                             | -   | -    | 1    | μA   |
| Gate Leakage Current                                    | I <sub>GSS</sub>    | V <sub>GS</sub> = ±30V, 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> = 10A                                                              | -   | 0.22 | 0.27 | Ω    |
| Forward Transconductance                                | g <sub>fs</sub>     | V <sub>DS</sub> = 30V, I <sub>D</sub> = 10A                                                              | -   | 13   | -    | S    |
| Dynamic Characteristics                                 |                     |                                                                                                          |     |      |      |      |
| Total Gate Charge                                       | Q <sub>g</sub>      | V <sub>DS</sub> = 400V, I <sub>D</sub> = 18A, V <sub>GS</sub> = 10V <sup>(3)</sup>                       | -   | 48   | -    | nC   |
| Gate-Source Charge                                      | Q <sub>gs</sub>     |                                                                                                          | -   | 12   | -    |      |
| Gate-Drain Charge                                       | Q <sub>gd</sub>     |                                                                                                          | -   | 15   | -    |      |
| Input Capacitance                                       | C <sub>iss</sub>    | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz                                                  | -   | 2430 | -    | pF   |
| Reverse Transfer Capacitance                            | C <sub>rss</sub>    |                                                                                                          | -   | 10   | -    |      |
| Output Capacitance                                      | C <sub>oss</sub>    |                                                                                                          | -   | 302  | -    |      |
| Turn-On Delay Time                                      | t <sub>d(on)</sub>  | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 250V, I <sub>D</sub> = 18A, R <sub>G</sub> = 25Ω <sup>(3)</sup> | -   | 87   | -    | ns   |
| Rise Time                                               | t <sub>r</sub>      |                                                                                                          | -   | 80   | -    |      |
| Turn-Off Delay Time                                     | t <sub>d(off)</sub> |                                                                                                          | -   | 174  | -    |      |
| Fall Time                                               | t <sub>f</sub>      |                                                                                                          | -   | 45   | -    |      |
| Drain-Source Body Diode Characteristics                 |                     |                                                                                                          |     |      |      |      |
| Maximum Continuos Drain to Source Diode Forward Current | I <sub>S</sub>      |                                                                                                          | -   | -    | 20   | A    |
| Source-Drain Diode Forward Voltage                      | V <sub>SD</sub>     | I <sub>S</sub> = 20A, V <sub>GS</sub> = 0V                                                               | -   | -    | 1.4  | V    |
| Body Diode Reverse Recovery Time                        | t <sub>rr</sub>     | I <sub>F</sub> = 18A, dI/dt = 100A/μs <sup>(3)</sup>                                                     | -   | 375  | -    | ns   |
| Body Diode Reverse Recovery Charge                      | Q <sub>rr</sub>     |                                                                                                          | -   | 4.2  | -    | μC   |

Notes :

- Pulse width is based on  $R_{\theta JC}$  &  $R_{\theta JA}$  and the maximum allowed junction temperature of 150°C.
- Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ , pulse width limited by junction temperature  $T_{J(MAX)} = 150^\circ C$ .
- $I_{SD} \leq 18.0A$ ,  $di/dt \leq 200A/\mu s$ ,  $V_{DD} \leq BV_{DSS}$ ,  $R_g = 25\Omega$ , Starting  $T_J = 25^\circ C$
- $L = 4.28mH$ ,  $I_{AS} = 20A$ ,  $V_{DD} = 50V$ ,  $R_g = 25\Omega$ , Starting  $T_J = 25^\circ C$

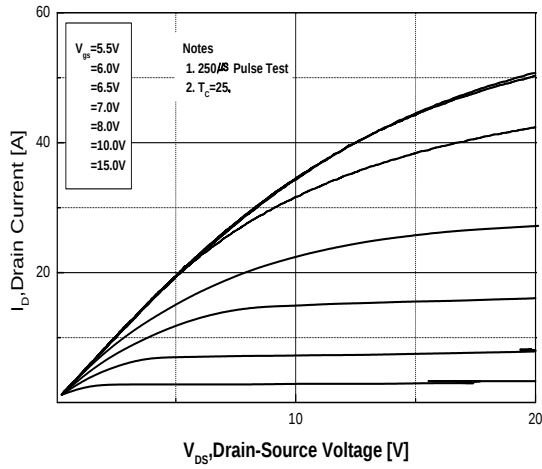


Fig.1 On-Region Characteristics

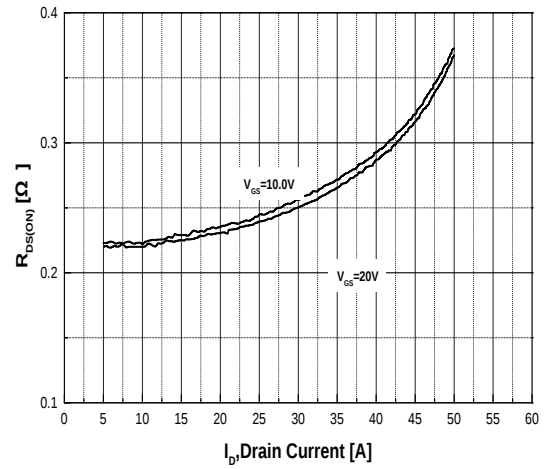


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

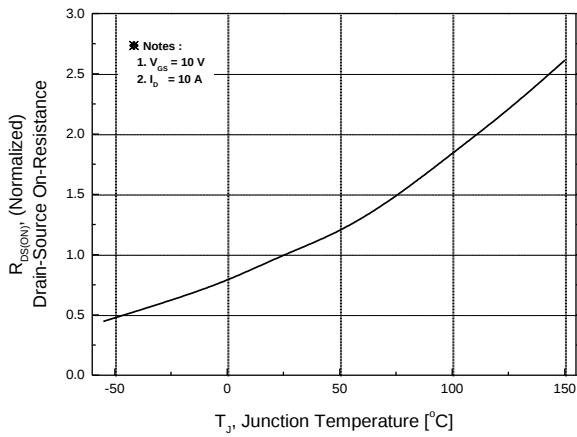


Fig.3 On-Resistance Variation with Temperature

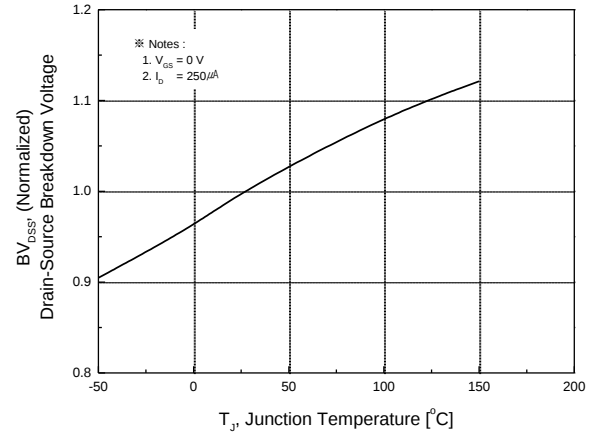


Fig.4 Breakdown Voltage Variation vs. Temperature

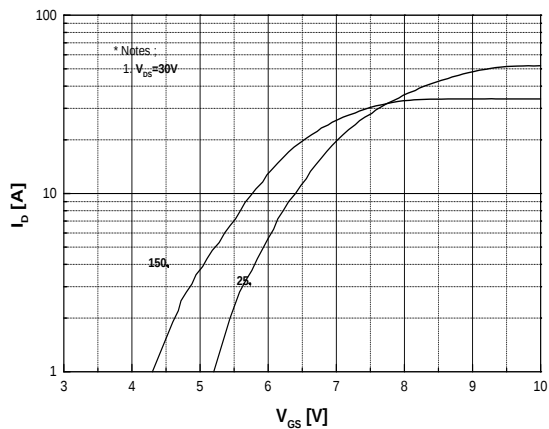


Fig.5 Transfer Characteristics

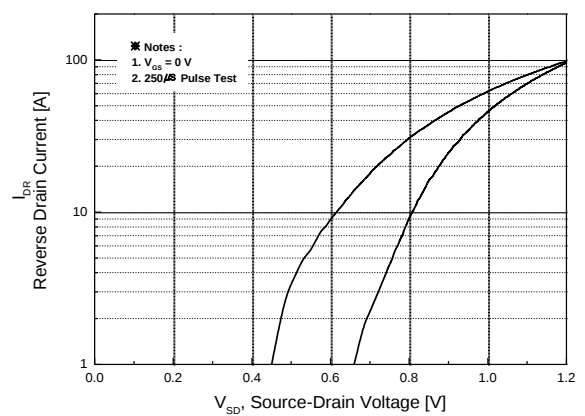
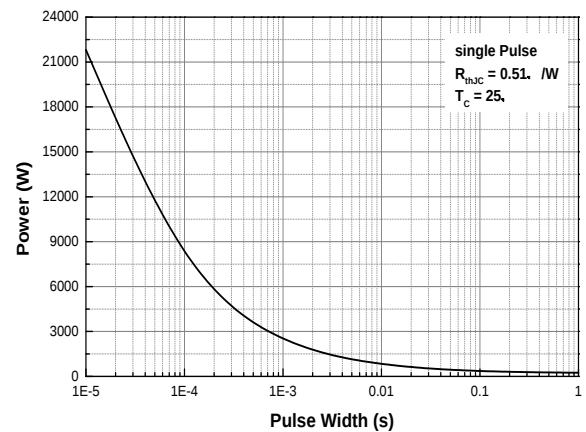
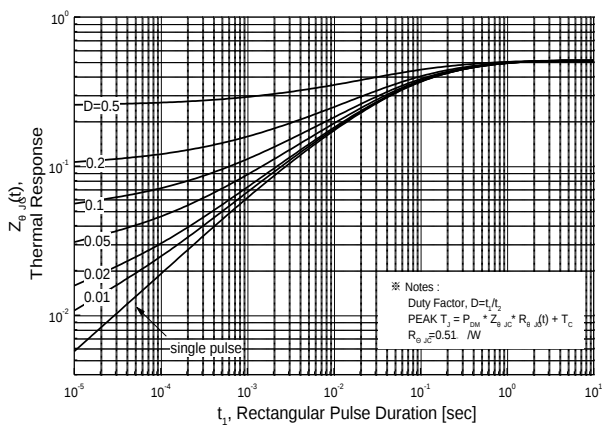
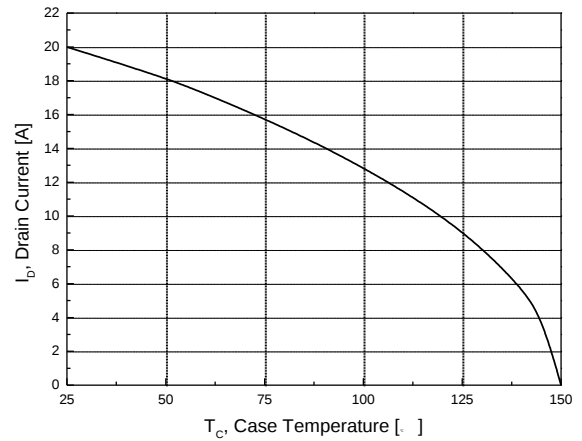
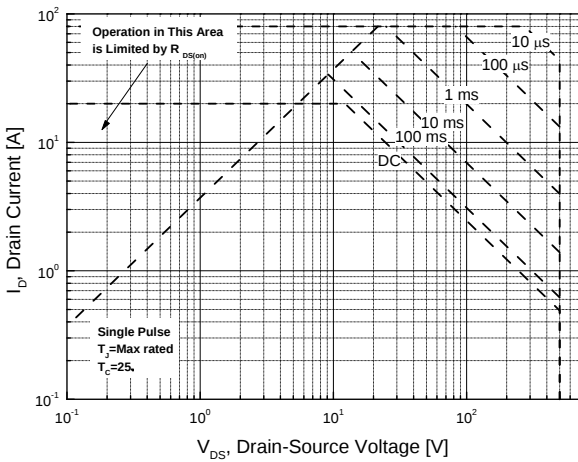
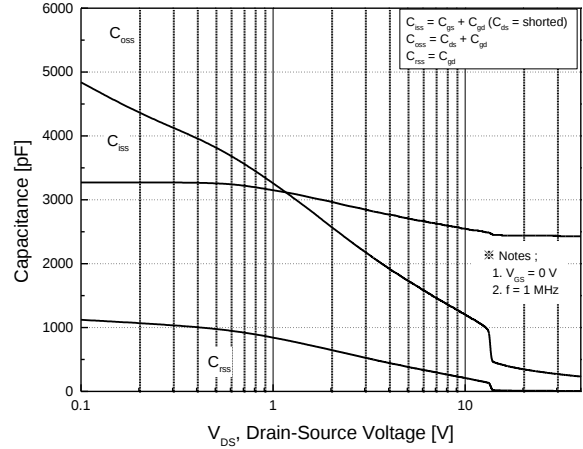
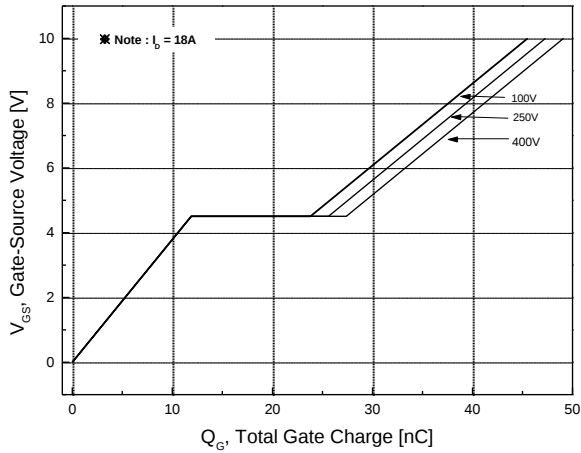


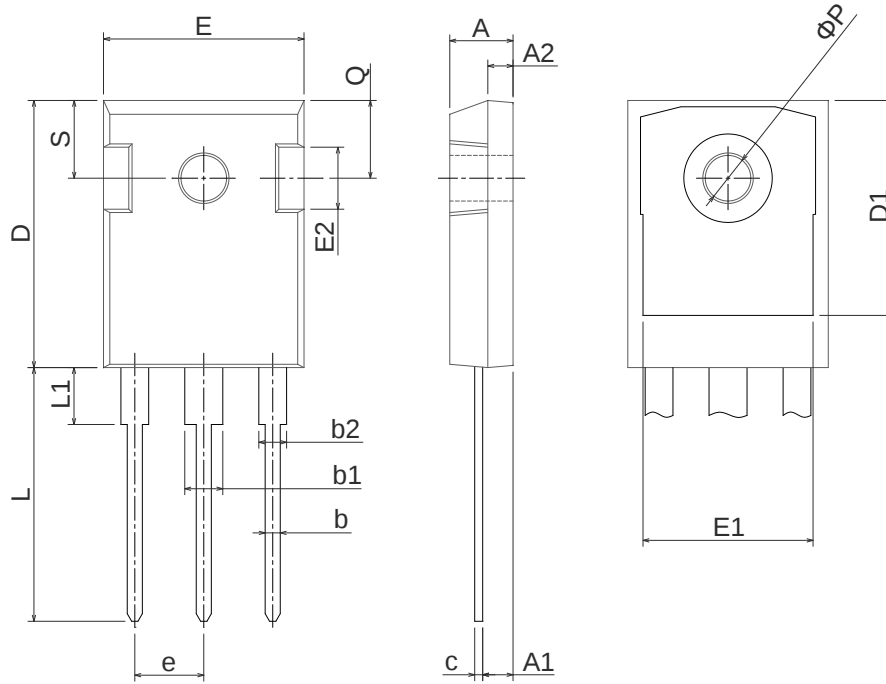
Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature



# Physical Dimension

## TO-247

Dimensions are in millimeters, unless otherwise specified



| Dimension | Min(mm) | Max(mm) |
|-----------|---------|---------|
| A         | 4.70    | 5.31    |
| A1        | 2.20    | 2.60    |
| A2        | 1.50    | 2.49    |
| b         | 0.99    | 1.40    |
| b1        | 2.59    | 3.43    |
| b2        | 1.65    | 2.39    |
| c         | 0.38    | 0.89    |
| D         | 20.30   | 21.46   |
| D1        | 13.08   | -       |
| E         | 15.45   | 16.26   |
| E1        | 13.06   | 14.02   |
| E2        | 4.32    | 5.49    |
| e         | 5.45BSC |         |
| L         | 19.81   | 20.57   |
| L1        | -       | 4.50    |
| ΦP        | 3.50    | 3.70    |
| Q         | 5.38    | 6.20    |
| S         | 6.15BSC |         |

**DISCLAIMER:**

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