

### General Description

The MDP7N60 uses advanced MagnaChip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent quality.

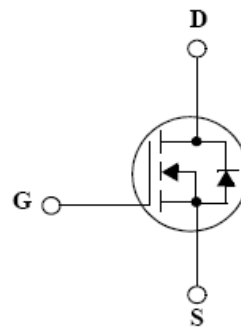
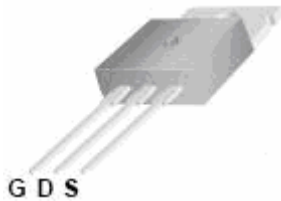
MDP7N60 is suitable device for SMPS, high Speed switching and general purpose applications.

### Features

- $V_{DS} = 600V$
- $V_{DS} = 660V$  @  $T_{jmax}$
- $I_D = 7.0A$  @  $V_{GS} = 10V$
- $R_{DS(ON)} \leq 1.15\Omega$  @  $V_{GS} = 10V$

### Applications

- Power Supply
- PFC
- High Current, High Speed Switching



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

| Characteristics                              |                           | Symbol               | Rating   | Unit          |
|----------------------------------------------|---------------------------|----------------------|----------|---------------|
| Drain-Source Voltage                         |                           | $V_{DSS}$            | 600      | V             |
| Drain-Source Voltage @ $T_{jmax}$            |                           | $V_{DSS} @ T_{jmax}$ | 660      | V             |
| Gate-Source Voltage                          |                           | $V_{GSS}$            | $\pm 30$ | V             |
| Continuous Drain Current (※)                 | $T_C = 25^\circ C$        | $I_D$                | 7.0      | A             |
|                                              | $T_C = 100^\circ C$       |                      | 4.4      | A             |
| Pulsed Drain Current <sup>(1)</sup>          |                           | $I_{DM}$             | 28       | A             |
| Power Dissipation                            | $T_C = 25^\circ C$        | $P_D$                | 131      | W             |
|                                              | Derate above $25^\circ C$ |                      | 1.05     | W/ $^\circ C$ |
| Repetitive Avalanche Energy $E_{AR}^{(1)}$   |                           | $E_{AR}$             | 13.1     | mJ            |
| Peak Diode Recovery $dv/dt^{(3)}$            |                           | $Dv/dt$              | 4.5      | V/ns          |
| Single Pulse Avalanche Energy <sup>(4)</sup> |                           | $E_{AS}$             | 220      | 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> | $R_{\theta JA}$ | 62.5   | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Case <sup>(1)</sup>    | $R_{\theta JC}$ | 0.95   |              |

## Ordering Information

| Part Number | Temp. Range | Package | Packing | RoHS Status  |
|-------------|-------------|---------|---------|--------------|
| MDP7N60TH   | -55~150°C   | TO-220  | Tube    | Halogen Free |

## Electrical Characteristics (Ta =25°C)

| Characteristics                                          | Symbol       | Test Condition                                                  | Min | Typ  | Max  | Unit     |
|----------------------------------------------------------|--------------|-----------------------------------------------------------------|-----|------|------|----------|
| Static Characteristics                                   |              |                                                                 |     |      |      |          |
| Drain-Source Breakdown Voltage                           | $BV_{DSS}$   | $I_D = 250\mu A, V_{GS} = 0V$                                   | 600 | -    | -    | V        |
| Gate Threshold Voltage                                   | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$                               | 3.0 | -    | 5.0  |          |
| Drain Cut-Off Current                                    | $I_{DSS}$    | $V_{DS} = 600V, V_{GS} = 0V$                                    | -   | -    | 1    | $\mu A$  |
| Gate Leakage Current                                     | $I_{GSS}$    | $V_{GS} = \pm 30V, V_{DS} = 0V$                                 | -   | -    | 100  | nA       |
| Drain-Source ON Resistance                               | $R_{DS(ON)}$ | $V_{GS} = 10V, I_D = 3.5A$                                      |     | 1.0  | 1.15 | $\Omega$ |
| Forward Transconductance                                 | $g_{fs}$     | $V_{DS} = 30V, I_D = 3.5A$                                      | -   | 8.5  | -    | S        |
| Dynamic Characteristics                                  |              |                                                                 |     |      |      |          |
| Total Gate Charge                                        | $Q_g$        | $V_{DS} = 480V, I_D = 7.0A, V_{GS} = 10V^{(3)}$                 | -   | 17.8 | -    | nC       |
| Gate-Source Charge                                       | $Q_{gs}$     |                                                                 | -   | 4.9  | -    |          |
| Gate-Drain Charge                                        | $Q_{gd}$     |                                                                 | -   | 7.3  | -    |          |
| Input Capacitance                                        | $C_{iss}$    | $V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz$                         | -   | 750  |      | pF       |
| Reverse Transfer Capacitance                             | $C_{rss}$    |                                                                 | -   | 5    |      |          |
| Output Capacitance                                       | $C_{oss}$    |                                                                 | -   | 95   |      |          |
| Turn-On Delay Time                                       | $t_{d(on)}$  | $V_{GS} = 10V, V_{DS} = 300V, I_D = 7.0A, R_G = 25\Omega^{(3)}$ | -   | 22   |      | ns       |
| Rise Time                                                | $t_r$        |                                                                 | -   | 36   |      |          |
| Turn-Off Delay Time                                      | $t_{d(off)}$ |                                                                 | -   | 35   |      |          |
| Fall Time                                                | $t_f$        |                                                                 | -   | 25   |      |          |
| Drain-Source Body Diode Characteristics                  |              |                                                                 |     |      |      |          |
| Maximum Continuous Drain to Source Diode Forward Current | $I_S$        |                                                                 | -   | 7.0  | -    | A        |
| Source-Drain Diode Forward Voltage                       | $V_{SD}$     | $I_S = 7.0A, V_{GS} = 0V$                                       | -   |      | 1.4  | V        |
| Body Diode Reverse Recovery Time                         | $t_{rr}$     | $I_F = 7.0A, di/dt = 100A/\mu s^{(3)}$                          | -   | 345  |      | ns       |
| Body Diode Reverse Recovery Charge                       | $Q_{rr}$     |                                                                 | -   | 3.2  |      | $\mu C$  |

Note :

- 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  $T_{J(MAX)} = 150^\circ C$ .
- $I_{SD} \leq 7.0A$ ,  $di/dt \leq 200A/\mu s$ ,  $V_{DD} = 50V$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ C$
- $L = 8.2mH$ ,  $I_{AS} = 7.0A$ ,  $V_{DD} = 50V$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ C$

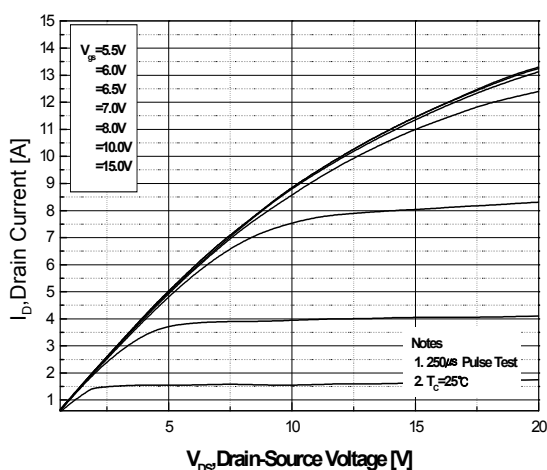


Fig.1 On-Region Characteristics

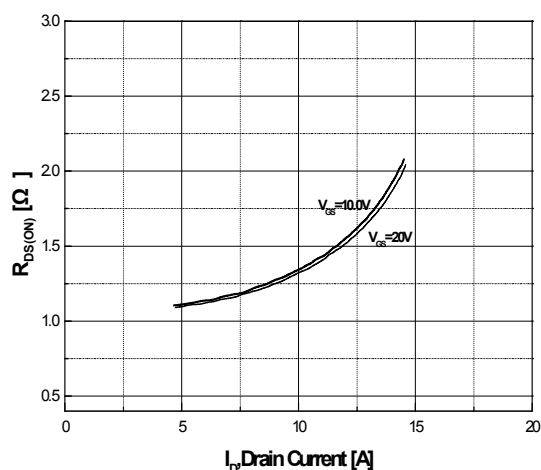


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

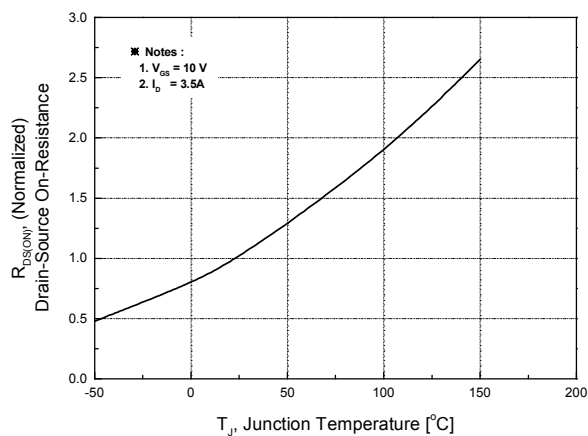


Fig.3 On-Resistance Variation with Temperature

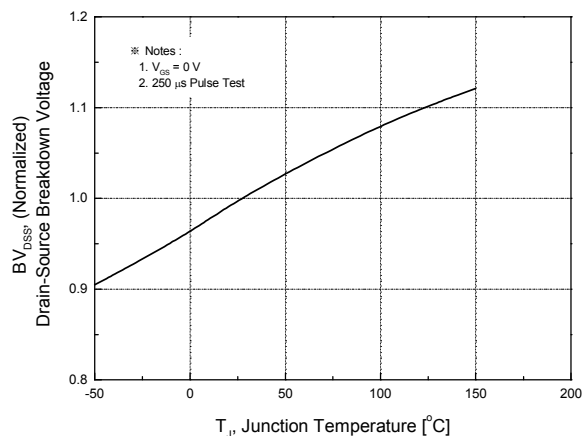


Fig.4 Breakdown Voltage Variation vs. Temperature

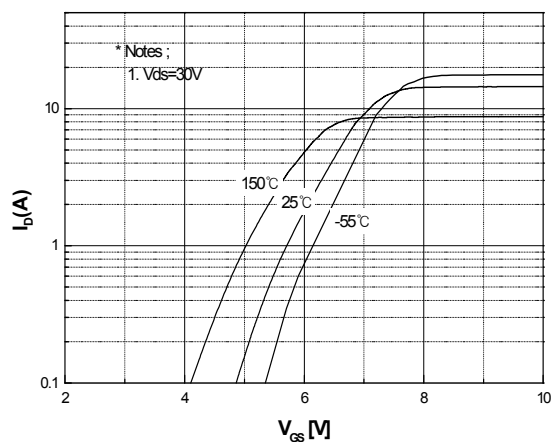


Fig.5 Transfer Characteristics

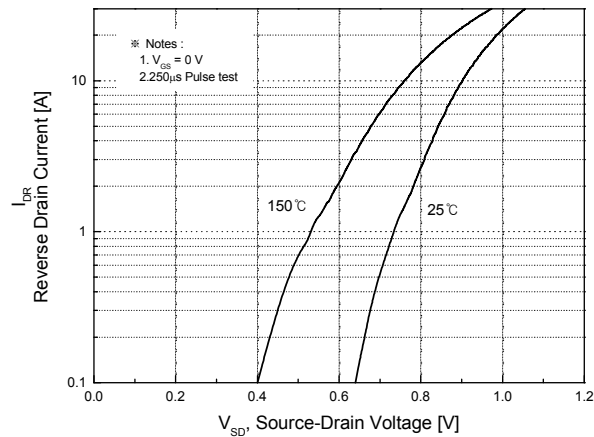


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

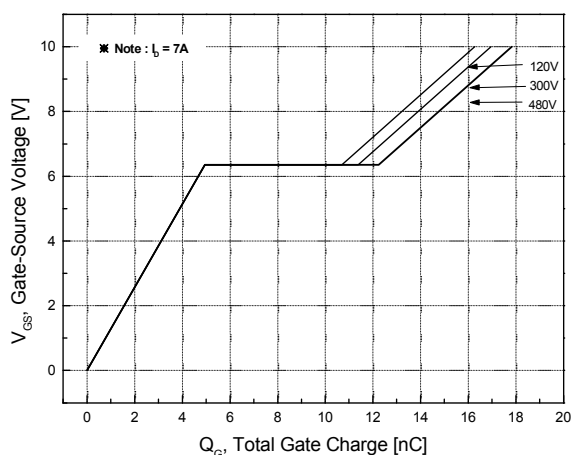


Fig.7 Gate Charge Characteristics

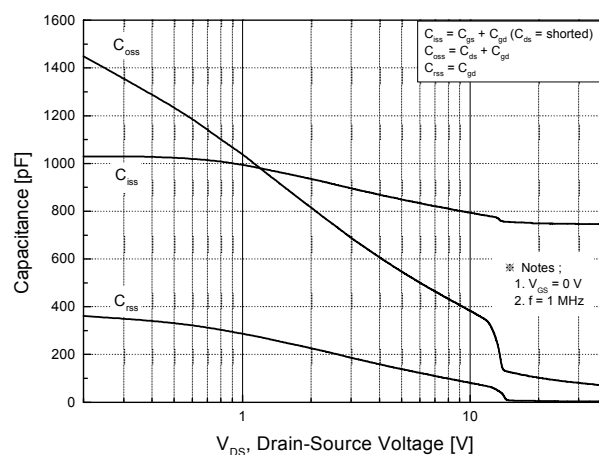


Fig.8 Capacitance Characteristics

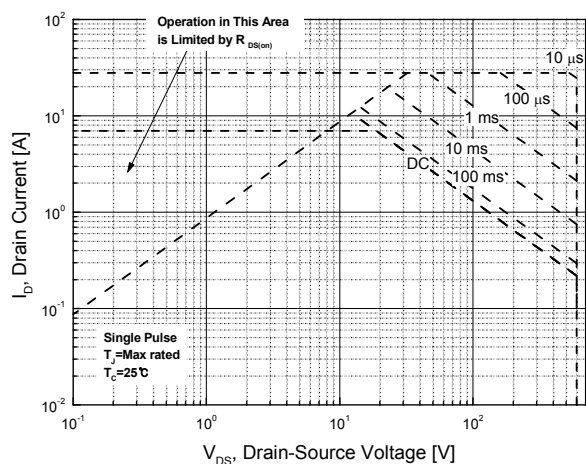


Fig.9 Maximum Safe Operating Area

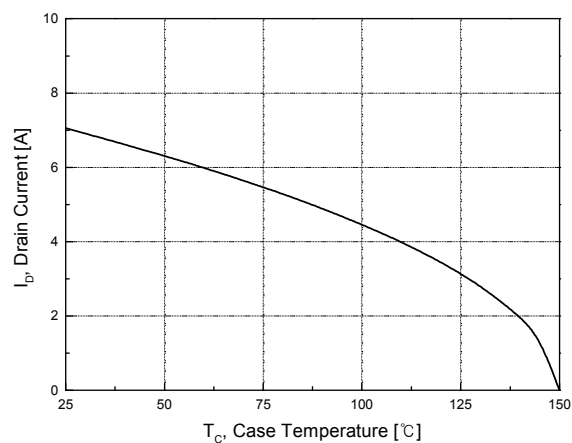


Fig.10 Maximum Drain Current vs. Case Temperature

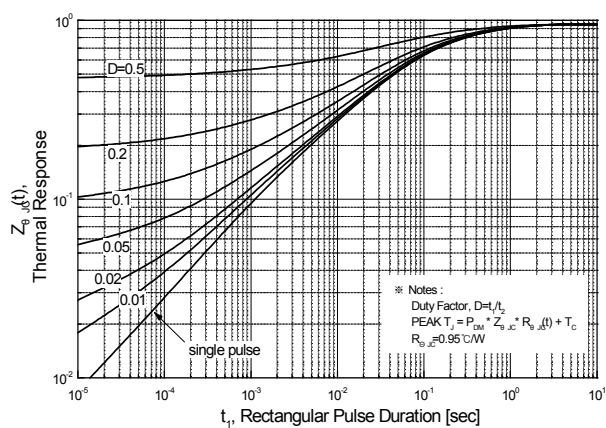


Fig.11 Transient Thermal Response Curve

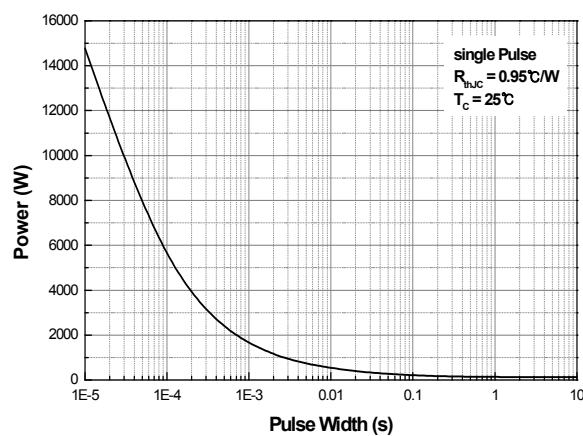
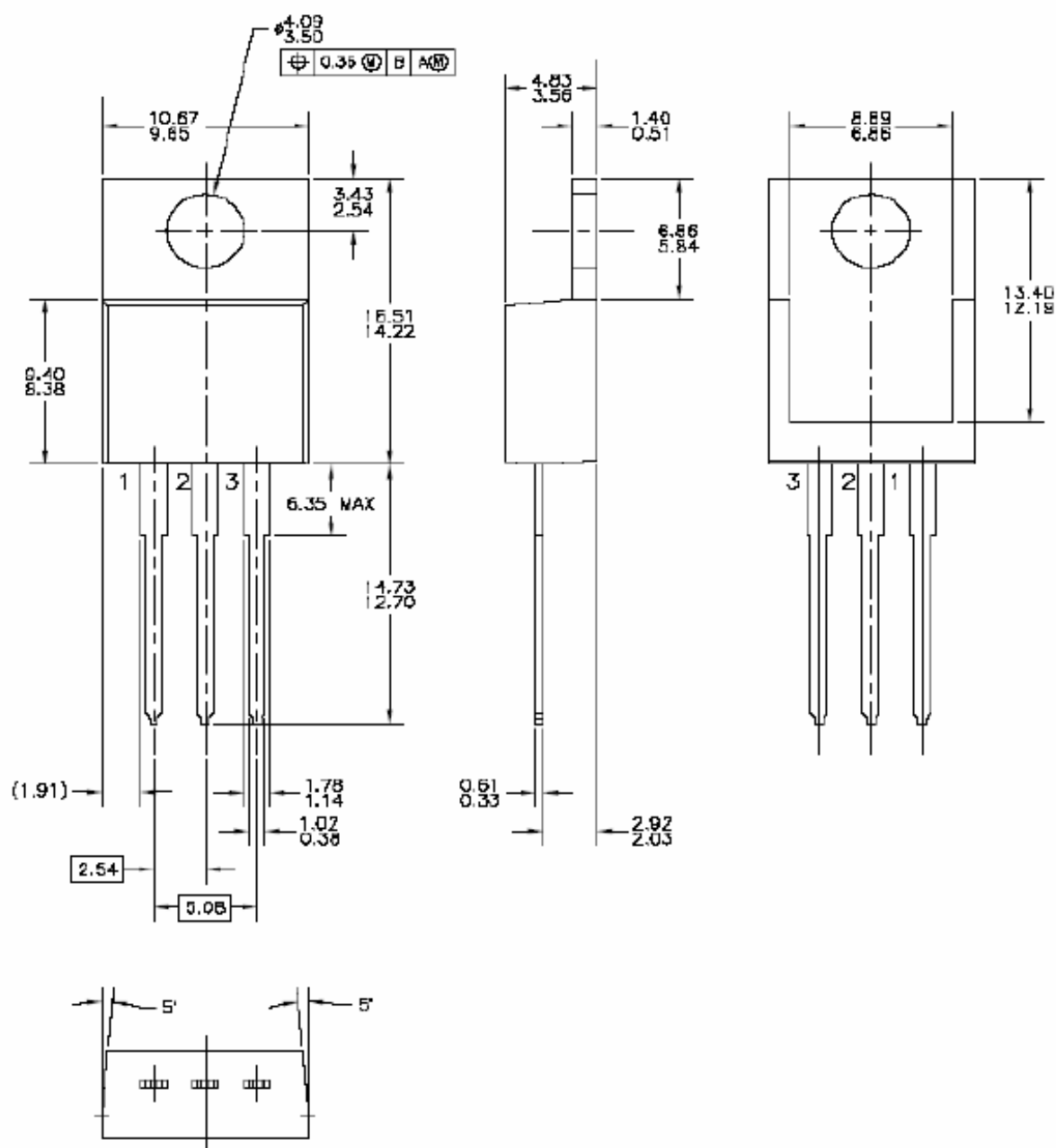


Fig.12 Single Pulse Maximum Power Dissipation

## Physical Dimensions

## TO-220



## Worldwide Sales Support Locations

### U.S.A

#### Sunnyvale Office

787 N. Mary Ave. Sunnyvale  
CA 94085 U.S.A  
Tel : 1-408-636-5200  
Fax : 1-408-213-2450  
E-Mail : [usasales@magnachip.com](mailto:usasales@magnachip.com)

### U.K

Knyvett House The Causeway,  
Staines Middx, TW18 3BA, U.K.  
Tel : +44 (0) 1784-895-000  
Fax : +44 (0) 1784-895-115  
E-Mail : [uksales@magnachip.com](mailto:uksales@magnachip.com)

### Japan

#### Osaka Office

3F, Shin-Osaka MT-2 Bldg 3-5-36  
Miyahara Yodogawa-Ku  
Osaka, 532-0003 Japan  
Tel : 81-6-6394-9160  
Fax : 81-6-6394-9150  
E-Mail : [osakasales@magnachip.com](mailto:osakasales@magnachip.com)

### Taiwan R.O.C

2F, No.61, Chowize Street, Nei Hu  
Taipei, 114 Taiwan R.O.C  
Tel : 886-2-2657-7898  
Fax : 886-2-2657-8751  
E-Mail : [taiwansales@magnachip.com](mailto:taiwansales@magnachip.com)

### China

#### Hong Kong Office

Suite 1024, Ocean Centre 5 Canton Road,  
Tsim Sha Tsui Kowloon, Hong Kong  
Tel : 852-2828-9700  
Fax : 852-2802-8183  
E-Mail : [chinasales@magnachip.com](mailto:chinasales@magnachip.com)

#### Shenzhen Office

Room 1803, 18/F  
International Chamber of Commerce Tower  
Fuhua Road3 CBD, Futian District, China  
Tel : 86-755-8831-5561  
Fax : 86-755-8831-5565  
E-Mail : [chinasales@magnachip.com](mailto:chinasales@magnachip.com)

#### Shanghai Office

Room E, 8/F, Liaoshen International Building 1068  
Wuzhong Road, (C) 201103  
Shanghai, China  
Tel : 86-21-6405-1521  
Fax : 86-21-6505-1523  
E-Mail : [chinasales@magnachip.com](mailto:chinasales@magnachip.com)

### Korea

891, Daechi-Dong, Kangnam-Gu  
Seoul, 135-738 Korea  
Tel : 82-2-6903-3451  
Fax : 82-2-6903-3668 ~9  
Email : [koreasales@magnachip.com](mailto:koreasales@magnachip.com)

### DISCLAIMER:

The Products are not designed for use in hostile environments, including, without limitation, aircraft, nuclear power generation, medical appliances, and devices or systems in which malfunction of any Product can reasonably be expected to result in a personal injury. Seller's customers using or selling Seller's products for use in such applications do so at their own risk and agree to fully defend and indemnify Seller.

MagnaChip reserves the right to change the specifications and circuitry without notice at any time. MagnaChip does not consider responsibility for use of any circuitry other than circuitry entirely included in a MagnaChip product. [MagnaChip](http://www.magnachip.com) is a registered trademark of MagnaChip Semiconductor Ltd.