

### General Description

The MDF10N65B MOSFET are produced using advanced MagnaChip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent quality.

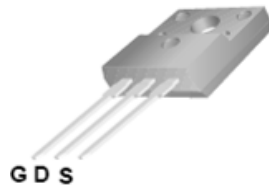
MDF10N65B is suitable device for SMPS, high Speed switching and general purpose applications.

### Features

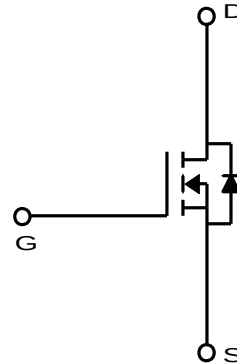
- $V_{DS} = 650V$
- $I_D = 10.0A$  @  $V_{GS} = 10V$
- $R_{DS(ON)} \leq 1.0\Omega$  @  $V_{GS} = 10V$

### Applications

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



TO-220F  
MDF Series



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

| Characteristics                              |                           | Symbol         | Rating   | Unit          |
|----------------------------------------------|---------------------------|----------------|----------|---------------|
| Drain-Source Voltage                         |                           | $V_{DSS}$      | 650      | V             |
| Gate-Source Voltage                          |                           | $V_{GSS}$      | $\pm 30$ | V             |
| Continuous Drain Current                     | $T_C = 25^\circ C$        | $I_D$          | 10.0*    | A             |
|                                              | $T_C = 100^\circ C$       |                | 5.0*     | A             |
| Pulsed Drain Current <sup>(1)</sup>          |                           | $I_{DM}$       | 40*      | A             |
| Power Dissipation                            | $T_C = 25^\circ C$        | $P_D$          | 47.7     | W             |
|                                              | Derate above $25^\circ C$ |                | 0.38     | W/ $^\circ C$ |
| Repetitive Avalanche Energy <sup>(1)</sup>   |                           | $E_{AR}$       | 15       | mJ            |
| Peak Diode Recovery $dv/dt$ <sup>(3)</sup>   |                           | $dv/dt$        | 4.5      | V/ns          |
| Single Pulse Avalanche Energy <sup>(4)</sup> |                           | $E_{AS}$       | 212      | 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>    | $R_{\theta JC}$ | 2.62   |              |

## Ordering Information

| Part Number | Temp. Range | Package | Packing | RoHS Status  |
|-------------|-------------|---------|---------|--------------|
| MDF10N65BTH | -55~150°C   | TO-220F | 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                                                              | 650 | -     | -   | V    |
| Gate Threshold Voltage                                   | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                                | 2.0 | -     | 4.0 |      |
| Drain Cut-Off Current                                    | I <sub>DSS</sub>    | V <sub>DS</sub> = 650V, 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> = 4A                                                                |     | 0.85  | 1.0 | Ω    |
| Forward Transconductance                                 | g <sub>fs</sub>     | V <sub>DS</sub> = 30V, I <sub>D</sub> = 4A                                                                | -   | 10.6  | -   | S    |
| Dynamic Characteristics                                  |                     |                                                                                                           |     |       |     |      |
| Total Gate Charge                                        | Q <sub>g</sub>      | V <sub>DS</sub> = 520V, I <sub>D</sub> = 8.0A, V <sub>GS</sub> = 10V <sup>(3)</sup>                       | -   | 29.3  | -   | nC   |
| Gate-Source Charge                                       | Q <sub>gs</sub>     |                                                                                                           | -   | 7.0   | -   |      |
| Gate-Drain Charge                                        | Q <sub>gd</sub>     |                                                                                                           | -   | 11.2  | -   |      |
| Input Capacitance                                        | C <sub>iss</sub>    | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz                                                   | -   | 1202  | -   | pF   |
| Reverse Transfer Capacitance                             | C <sub>rss</sub>    |                                                                                                           | -   | 7.08  | -   |      |
| Output Capacitance                                       | C <sub>oss</sub>    |                                                                                                           | -   | 128.3 | -   |      |
| Turn-On Delay Time                                       | t <sub>d(on)</sub>  | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 325V, I <sub>D</sub> = 8.0A, R <sub>G</sub> = 25Ω <sup>(3)</sup> | -   | 19.4  | -   | Ns   |
| Rise Time                                                | t <sub>r</sub>      |                                                                                                           | -   | 48    | -   |      |
| Turn-Off Delay Time                                      | t <sub>d(off)</sub> |                                                                                                           | -   | 96.5  | -   |      |
| Fall Time                                                | t <sub>f</sub>      |                                                                                                           | -   | 49    | -   |      |
| Drain-Source Body Diode Characteristics                  |                     |                                                                                                           |     |       |     |      |
| Maximum Continuous Drain to Source Diode Forward Current | I <sub>S</sub>      |                                                                                                           | -   | 8     | -   | A    |
| Source-Drain Diode Forward Voltage                       | V <sub>SD</sub>     | I <sub>S</sub> = 8.0A, V <sub>GS</sub> = 0V                                                               | -   | -     | 1.4 | V    |
| Body Diode Reverse Recovery Time                         | t <sub>rr</sub>     | I <sub>F</sub> = 8.0A, dI/dt = 100A/μs <sup>(3)</sup>                                                     | -   | 326   | -   | ns   |
| Body Diode Reverse Recovery Charge                       | Q <sub>rr</sub>     |                                                                                                           | -   | 5.9   | -   | μC   |

Note :

1. Pulse width is based on  $R_{\theta JC}$  &  $R_{\theta JA}$  and the maximum allowed junction temperature of 150°C.
2. Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ , pulse width limited by junction temperature  $T_{J(MAX)}=150^\circ C$ .
3.  $I_{SD} \leq 8.0A$ ,  $di/dt \leq 200A/\mu s$ ,  $V_{DD}=50V$ ,  $R_g = 25\Omega$ , Starting  $T_J=25^\circ C$
4.  $L=7.0mH$ ,  $I_{AS}=8.0A$ ,  $V_{DD}=50V$ ,  $R_g = 25\Omega$ , Starting  $T_J=25^\circ C$ ,

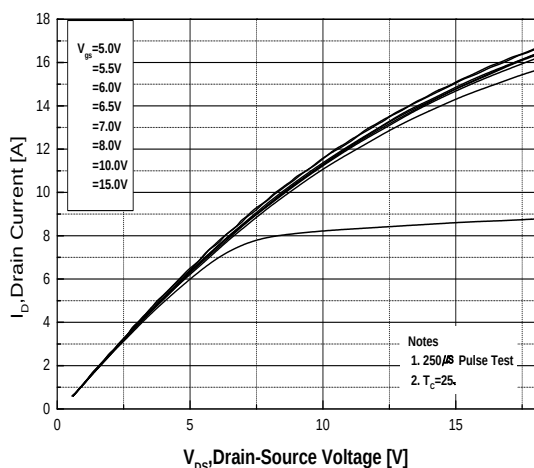


Fig.1 On-Region Characteristics

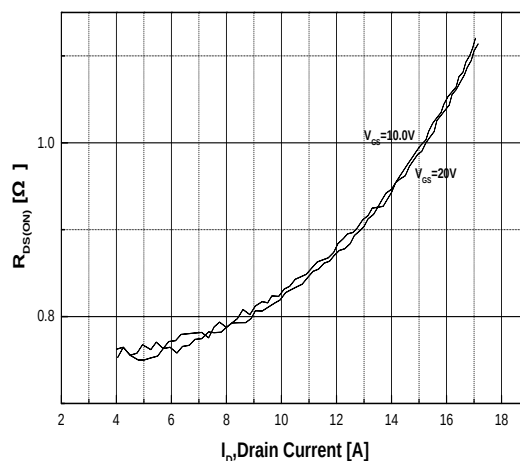


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

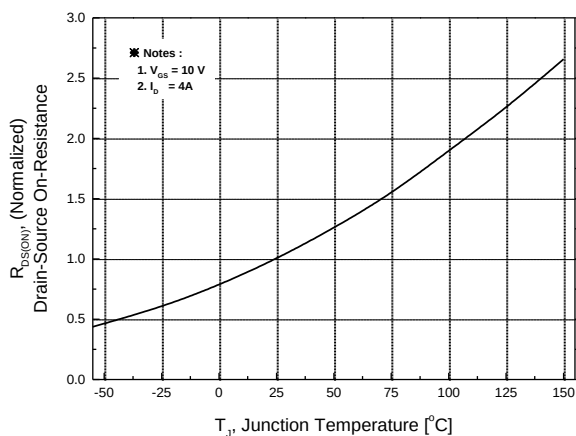


Fig.3 On-Resistance Variation with Temperature

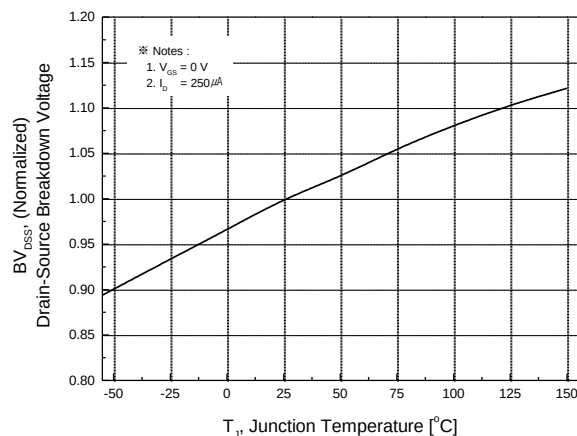


Fig.4 Breakdown Voltage Variation vs. Temperature

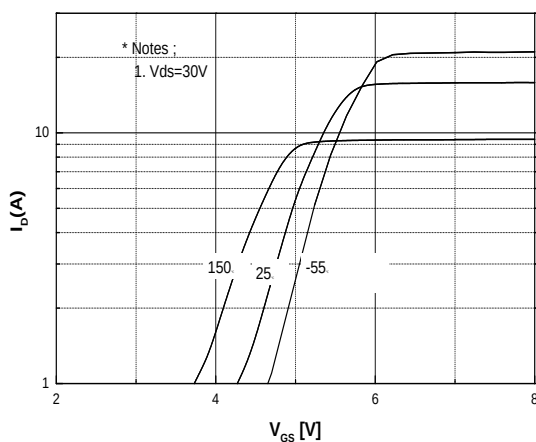


Fig.5 Transfer Characteristics

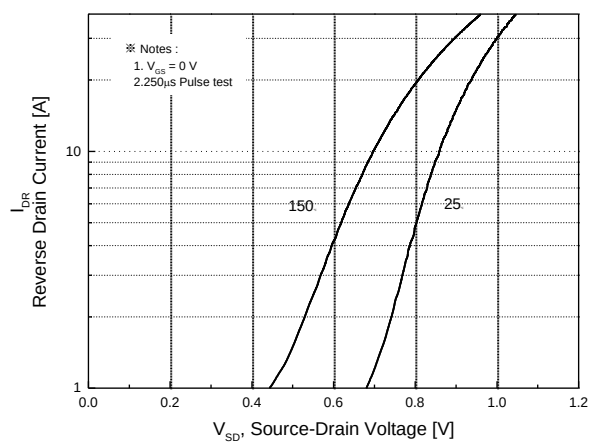
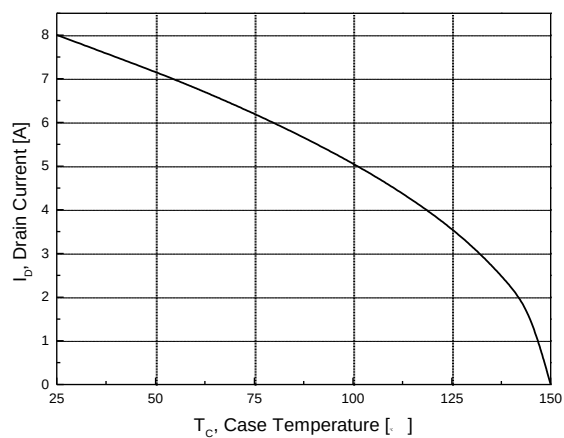
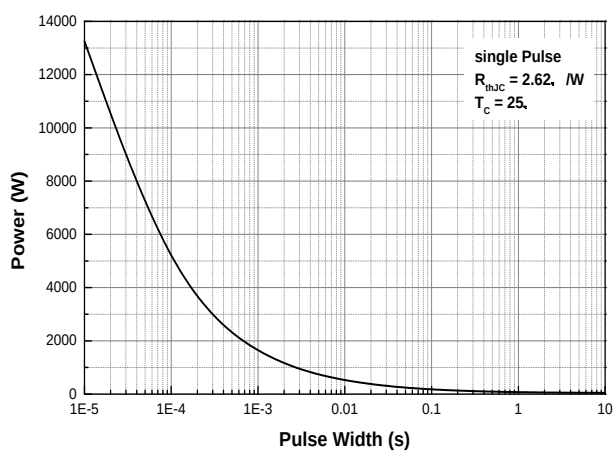
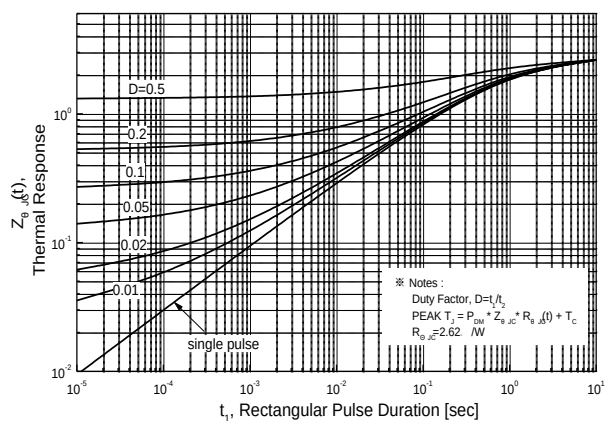
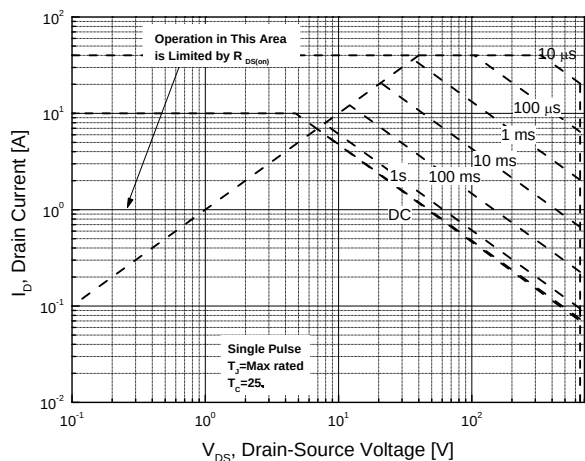
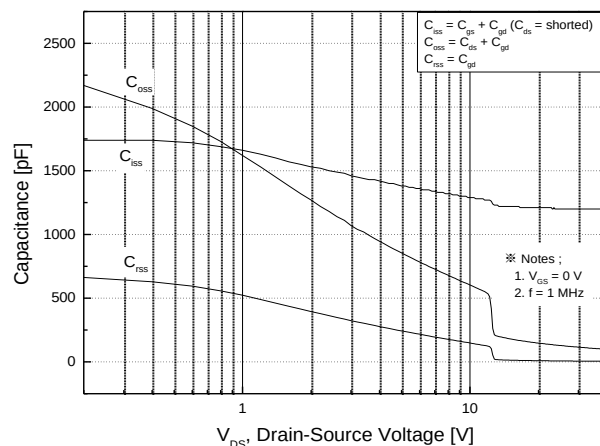
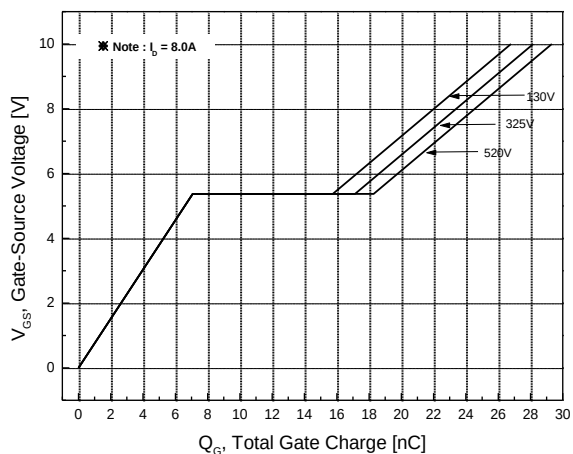


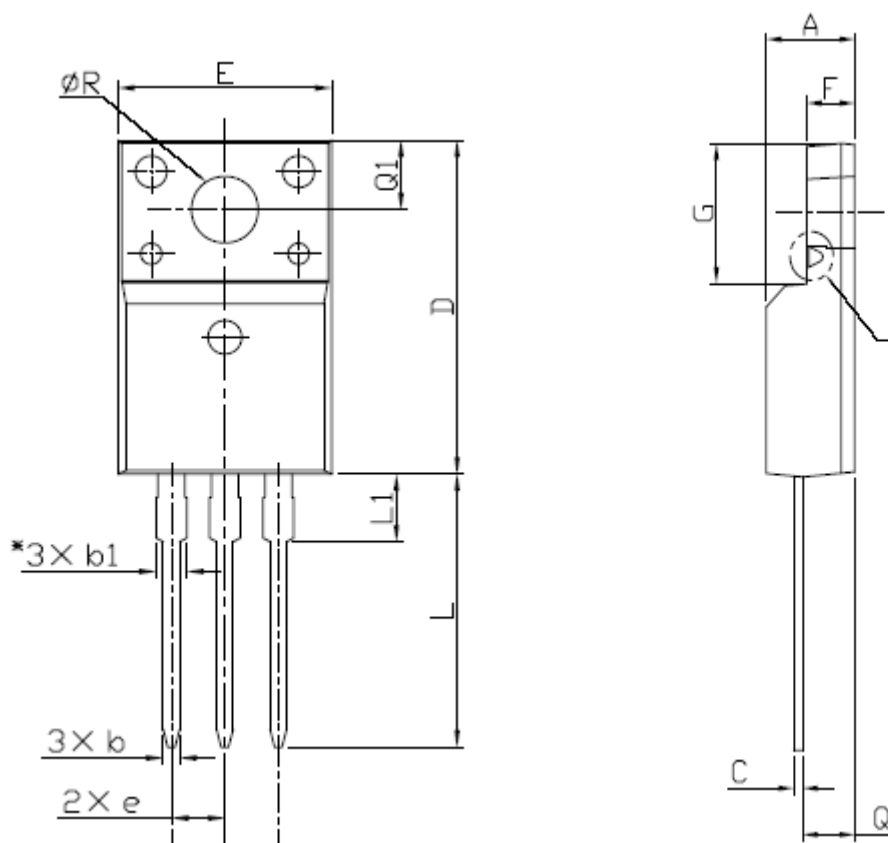
Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature



# Physical Dimensions

## 3 Leads, TO-220F

Dimensions are in millimeters unless otherwise specified



| Symbol | Min   | Nom  | Max   |
|--------|-------|------|-------|
| A      | 4.50  |      | 4.93  |
| b      | 0.63  |      | 0.91  |
| b1     | 1.15  |      | 1.47  |
| C      | 0.33  |      | 0.63  |
| D      | 15.47 |      | 16.13 |
| E      | 9.60  |      | 10.71 |
| e      |       | 2.54 |       |
| F      | 2.34  |      | 2.84  |
| G      | 6.48  |      | 6.90  |
| L      | 12.24 |      | 13.72 |
| L1     | 2.79  |      | 3.67  |
| Q      | 2.52  |      | 2.96  |
| Q1     | 3.10  |      | 3.50  |
| ØR     | 3.00  |      | 3.55  |

**DISCLAIMER:**

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