

### General Description

The MDI1752 uses advanced MagnaChip's trench MOSFET Technology to provide high performance in on-state resistance, switching performance and reliability

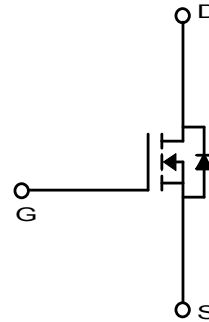
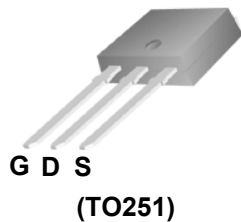
Low  $R_{DS(ON)}$ , low gate charge can be offering superior benefit in the application.

### Features

- $V_{DS} = 40V$
- $I_D = 50A$  @  $V_{GS} = 10V$
- $R_{DS(ON)} < 8.0m\Omega$  @  $V_{GS} = 10V$
- $R_{DS(ON)} < 10.5m\Omega$  @  $V_{GS} = 4.5V$

### Applications

- Inverters
- General purpose applications



### Absolute Maximum Ratings ( $T_C = 25^\circ C$ unless otherwise noted)

| Characteristics                        |                        | Symbol         | Rating   | Unit       |
|--|------------------------|----------------|----------|------------|
| Drain-Source Voltage                   |                        | $V_{DSS}$      | 40       | V          |
| Gate-Source Voltage                    |                        | $V_{GSS}$      | $\pm 20$ | V          |
| Continuous Drain Current               | $T_C = 25^\circ C$ (a) | $I_D$          | 50       | A          |
|  | $T_A = 25^\circ C$ (b) |                | 9.9      | A          |
| Pulsed Drain Current                   |                        | $I_{DM}$       | 100      | A          |
| Power Dissipation for Single Operation | $T_C = 25^\circ C$     | $P_D$          | 45       | W          |
|  | $T_A = 25^\circ C$     |                | 1.25     |            |
| Single Pulse Avalanche Energy          |                        | $E_{AS}$       | 153      | 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 | $R_{\theta JA}$ | 100    | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 2.8    |              |

## Ordering Information

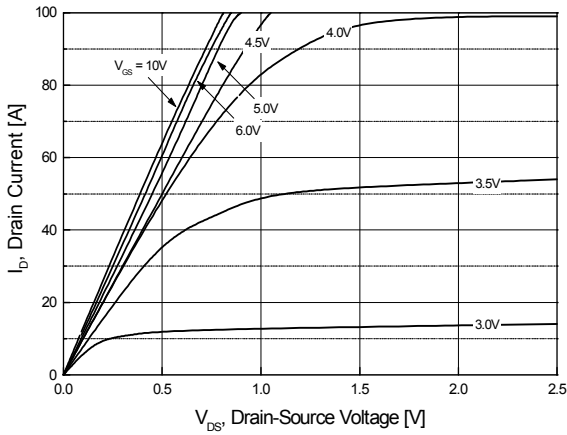
| Part Number | Temp. Range | Package | Packing | RoHS Status  |
|-------------|-------------|---------|---------|--------------|
| MDI1752TH   | -55~150°C   | TO-251  | Tube    | Halogen Free |

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

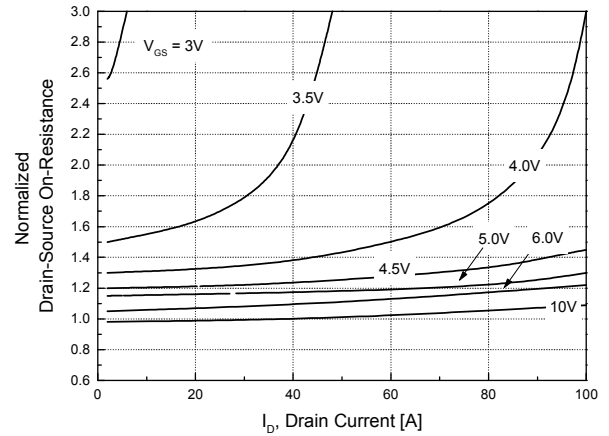
| Characteristics                                | Symbol              | Test Condition   | Min | Typ  | Max  | Unit |
|--|---------------------|--|-----|------|------|------|
| <b>Static Characteristics</b>                  |                     |  |     |      |      |      |
| Drain-Source Breakdown Voltage                 | BV <sub>DSS</sub>   | I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V   | 40  | -    | -    | V    |
| Gate Threshold Voltage                         | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                               | 1.0 | 1.7  | 3.0  |      |
| Zero Gate Voltage Drain Current                | I <sub>DSS</sub>    | V <sub>DS</sub> = 32V, V <sub>GS</sub> = 0V  | -   | -    | 1    | μA   |
| Gate Leakage Current                           | I <sub>GSS</sub>    | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V   | -   | -    | 0.1  |      |
| Drain-Source ON Resistance                     | R <sub>DS(ON)</sub> | V <sub>GS</sub> = 10V, I <sub>D</sub> = 14A  | -   | 6.1  | 8.0  | mΩ   |
|  |                     | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 11A   | -   | 8.2  | 10.5 |      |
| Forward Transconductance                       | g <sub>FS</sub>     | V <sub>DS</sub> = 5V, I <sub>D</sub> = 14A   | -   | 58   | -    | S    |
| <b>Dynamic Characteristics</b>                 |                     |  |     |      |      |      |
| Total Gate Charge                              | Q <sub>g</sub>      | V <sub>DS</sub> = 20V, I <sub>D</sub> = 14A, V <sub>GS</sub> = 10V                       | -   | 26.4 | -    | nC   |
| Gate-Source Charge                             | Q <sub>gs</sub>     |  | -   | 3.6  | -    |      |
| Gate-Drain Charge                              | Q <sub>gd</sub>     |  | -   | 6.8  | -    |      |
| Input Capacitance                              | C <sub>iss</sub>    | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V, f = 1.0MHz                                  | -   | 1480 | -    | pF   |
| Reverse Transfer Capacitance                   | C <sub>rss</sub>    |  | -   | 113  | -    |      |
| Output Capacitance                             | C <sub>oss</sub>    |  | -   | 243  | -    |      |
| Turn-On Delay Time                             | t <sub>d(on)</sub>  | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 20V, I <sub>D</sub> = 1A, R <sub>GEN</sub> = 6Ω | -   | 9    | -    | ns   |
| Turn-On Rise Time                              | t <sub>r</sub>      |  | -   | 21   | -    |      |
| Trun-Off Delay Time                            | t <sub>d(off)</sub> |  | -   | 31   | -    |      |
| Trun-Off Fall Time                             | t <sub>f</sub>      |  | -   | 18   | -    |      |
| <b>Drain-Source Body Diode Characteristics</b> |                     |  |     |      |      |      |
| Source-Drain Diode Forward Voltage             | V <sub>SD</sub>     | I <sub>S</sub> = 14A, V <sub>GS</sub> = 0V   | -   | 0.8  | 1.2  | V    |
| Body Diode Reverse Recovery Time               | t <sub>rr</sub>     | I <sub>F</sub> = 14A, di/dt = 100A/μs  | -   | 26   | -    | ns   |
| Body Diode Reverse Recovery Charge             | Q <sub>rr</sub>     |  | -   | 11   | -    | nC   |

Note :

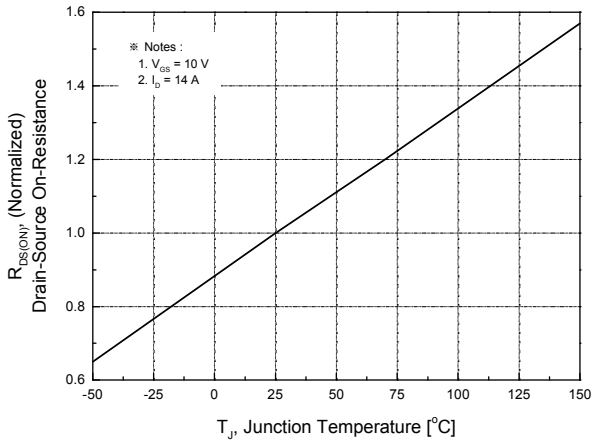
- P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150°C
  - P<sub>D</sub> (T<sub>C</sub>=25°C) is based on R<sub>θJC</sub>,
  - P<sub>D</sub> (T<sub>A</sub>=25°C) is based on R<sub>θJA</sub>
- Starting T<sub>J</sub>=25°C, L=1mH, I<sub>AS</sub>=17.5A, V<sub>DD</sub>=40V, V<sub>GS</sub>=10V



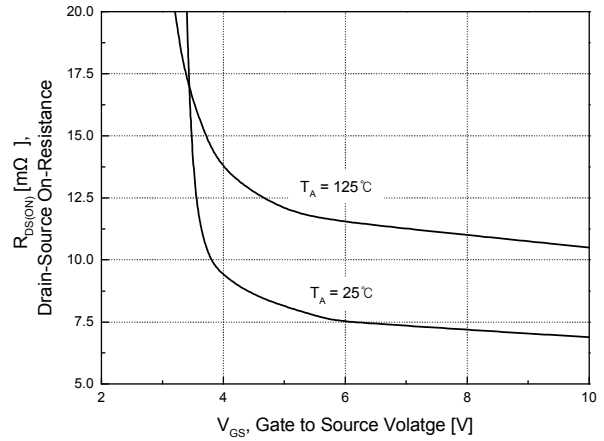
**Fig.1 On-Region Characteristics**



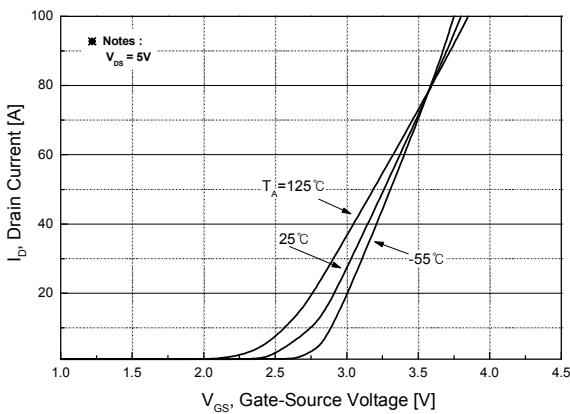
**Fig.2 On-Resistance Variation with Drain Current and Gate Voltage**



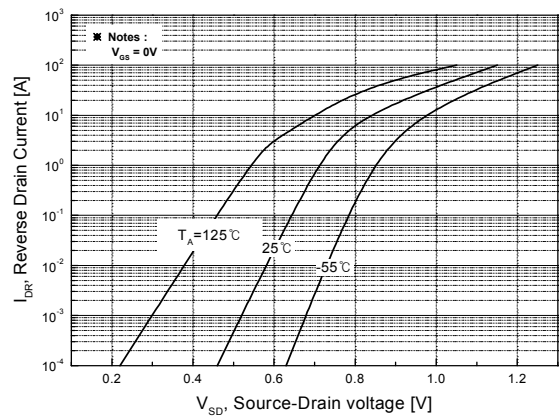
**Fig.3 On-Resistance Variation with Temperature**



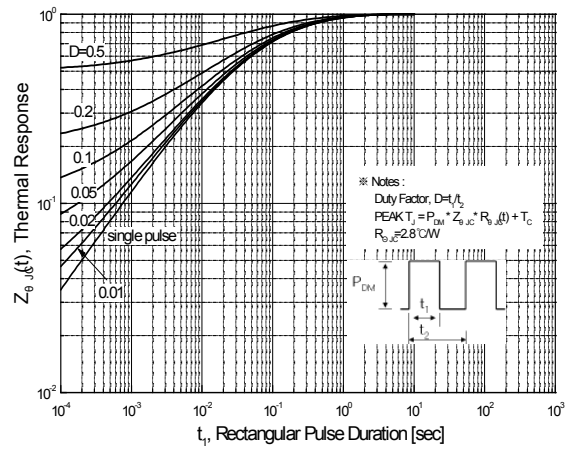
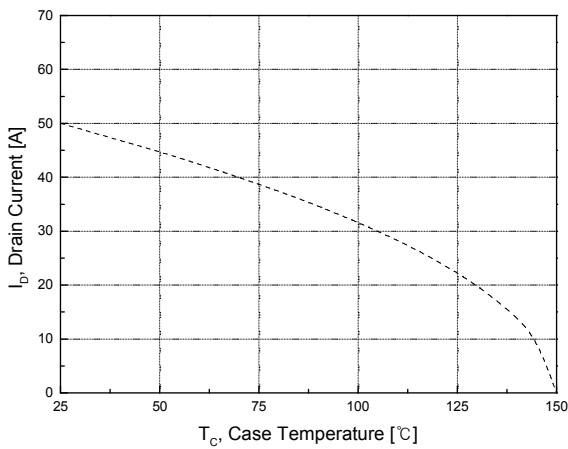
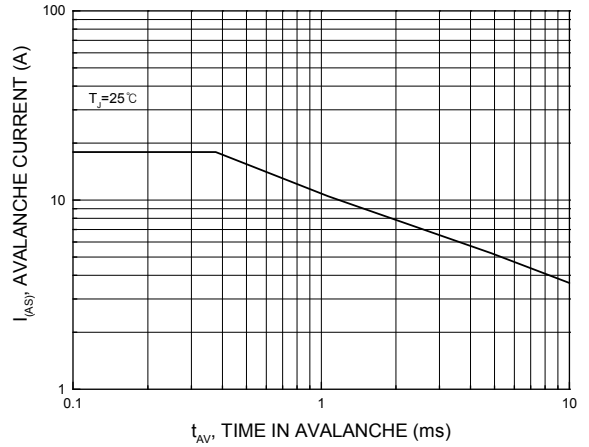
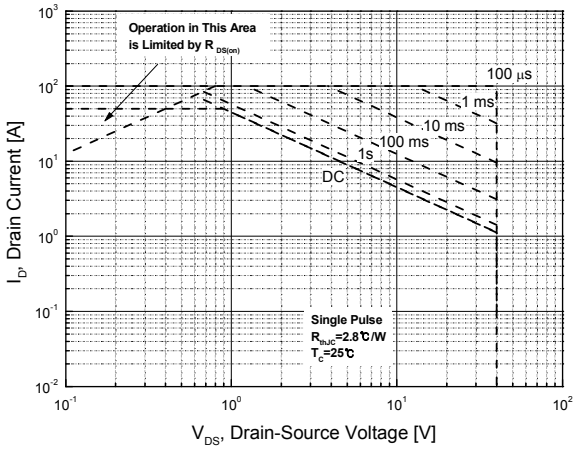
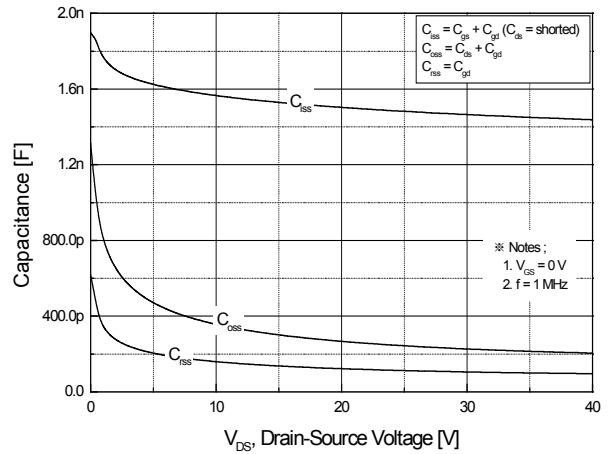
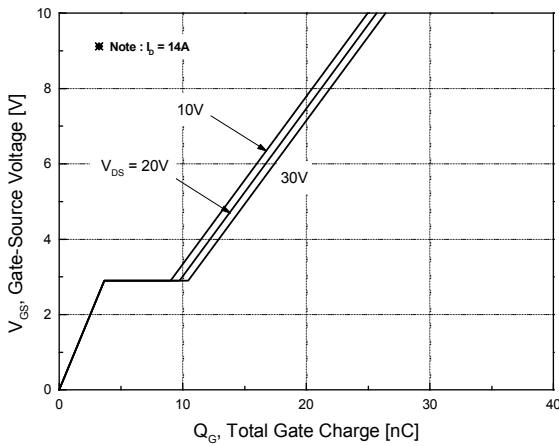
**Fig.4 On-Resistance Variation with Gate to Source Voltage**



**Fig.5 Transfer Characteristics**



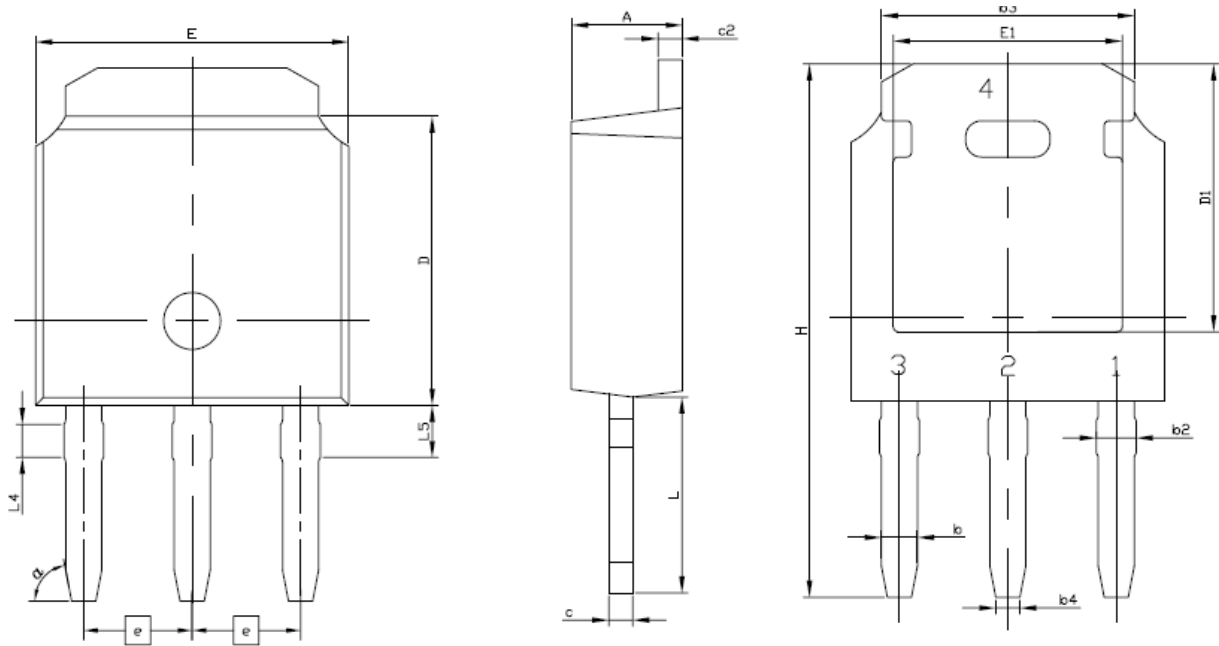
**Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature**



**Physical Dimension**

**TO251 (IPAK)**

Dimensions are in millimeters unless otherwise specified



| SYMBOL | DIMENSIONAL REQMTS |       |       |
|--------|--------------------|-------|-------|
|        | MIN                | NOM   | MAX   |
| E      | 6.40               | 6.60  | 6.731 |
| L      | 3.98               | 4.13  | 4.28  |
| L4     | 0.698 REF          |       |       |
| L5     | 0.972              | 1.099 | 1.226 |
| D      | 6.00               | 6.10  | 6.223 |
| H      | 11.05              | 11.25 | 11.45 |
| b      | 0.64               | 0.76  | 0.88  |
| b2     | 0.77               | 0.84  | 1.14  |
| b3     | 5.21               | 5.34  | 5.46  |
| b4     | 0.45               | 0.50  | 0.55  |
| e      | 2.286 BSC          |       |       |
| A      | 2.20               | 2.30  | 2.38  |
| c      | 0.40               | 0.50  | 0.60  |
| c2     | 0.40               | 0.50  | 0.60  |
| D1     | 5.10               | --    | --    |
| E1     | 4.40               | --    | --    |
| a      | 79° REF            |       |       |

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