

General Description

The MDD3752 uses advanced MagnaChip's Trench MOSFET Technology to provide high performance in on-state resistance, switching performance and reliability.

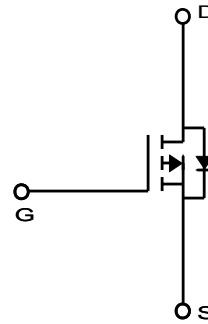
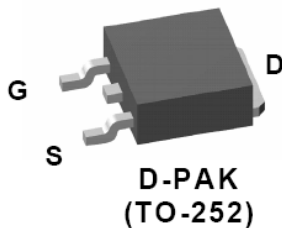
Low $R_{DS(ON)}$, Low Gate Charge can be offering superior benefit in the application.

Features

- $V_{DS} = -40V$
- $I_D = -43A$ @ $V_{GS} = -10V$
- $R_{DS(ON)} < 17m\Omega$ @ $V_{GS} = -10V$
- $R_{DS(ON)} < 25m\Omega$ @ $V_{GS} = -4.5V$

Applications

- Inverters
- General purpose applications



Absolute Maximum Ratings ($T_C = 25^\circ$)

| Characteristics | | Symbol | Rating | Unit |
|--|---------------------|----------------|----------|------------|
| Drain-Source Voltage | | V_{DSS} | -40 | V |
| Gate-Source Voltage | | V_{GSS} | ± 20 | V |
| Continuous Drain Current (Note 2) | $T_C = 25^\circ C$ | I_D | 43 | A |
| | $T_C = 100^\circ C$ | | 27 | A |
| Pulsed Drain Current | | I_{DM} | -90 | A |
| Power Dissipation | $T_C = 25^\circ C$ | P_D | 50 | W |
| | $T_C = 100^\circ C$ | | 20 | |
| Single Pulse Avalanche Energy (Note 3) | | E_{AS} | 128 | 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 (Note 1) | | $R_{\theta JA}$ | 40 | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Case | | $R_{\theta JC}$ | 2.5 | |

Ordering Information

| Part Number | Temp. Range | Package | Packing | RoHS Status |
|-------------|-------------|---------|-------------|--------------|
| MDD3752RH | -55~150°C | D-PAK | Tape & Reel | Halogen Free |

Electrical Characteristics (T_J =25°C unless otherwise noted)

| Characteristics | Symbol | Test Condition | Min | Typ | Max | Unit |
|--|---------------------|--|------|------|------|------|
| Static Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | I _D = -250μA, V _{GS} = 0V | -40 | - | - | V |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = -250μA | -1.0 | -2.0 | -3.0 | |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = -32V, V _{GS} = 0V | - | | -1 | μA |
| 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 = -20A | - | 13 | 17 | mΩ |
| | | V _{GS} = -4.5V, I _D = -10A | | 19 | 25 | |
| Forward Transconductance | g _{FS} | V _{DS} = -10V, I _D = -20A | | 40 | - | S |
| Dynamic Characteristics | | | | | | |
| Total Gate Charge | Q _g | V _{DD} = -20V, I _D = -20A, V _{GS} = -10V | - | 44.1 | - | nC |
| Gate-Source Charge | Q _{gs} | | - | 8.6 | - | |
| Gate-Drain Charge | Q _{gd} | | - | 9.3 | - | |
| Input Capacitance | C _{iss} | V _{DS} = -20V, V _{GS} = 0V, f = 1.0MHz | - | 2088 | - | pF |
| Reverse Transfer Capacitance | C _{rss} | | - | 168 | - | |
| Output Capacitance | C _{oss} | | - | 290 | - | |
| Turn-On Delay Time | t _{d(on)} | V _{GS} = -10V, V _{DD} = -20V, I _D = -1A, R _{GEN} = 6.0Ω | - | 17.6 | - | ns |
| Turn-On Rise Time | t _r | | - | 17.8 | - | |
| Turn-Off Delay Time | t _{d(off)} | | - | 59.0 | - | |
| Turn-Off Fall Time | t _f | | - | 19.8 | - | |
| Drain-Source Body Diode Characteristics | | | | | | |
| Source-Drain Diode Forward Voltage | V _{SD} | I _S = -20A, V _{GS} = 0V | - | - | 1.2 | V |
| Reverse Recovery Time | t _{rr} | I _S = -20A, di/dt=100A/us | - | 40 | - | ns |
| Reverse Recovery Charge | Q _{rr} | | - | 40 | - | nC |

Note :

1. Surface mounted RF4 board with 2oz. Copper.
2. P_D is based on T_{J(MAX)}=150°C, P_D(T_C=25°C) is based on R_{θJC}.
3. Starting T_J=25°C, L=1mH, I_{AS}=-16A V_{DD}=-20V, V_{GS}=-10V

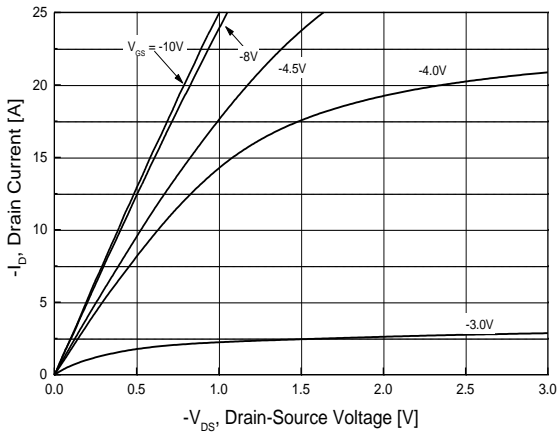


Fig.1 On-Region Characteristics

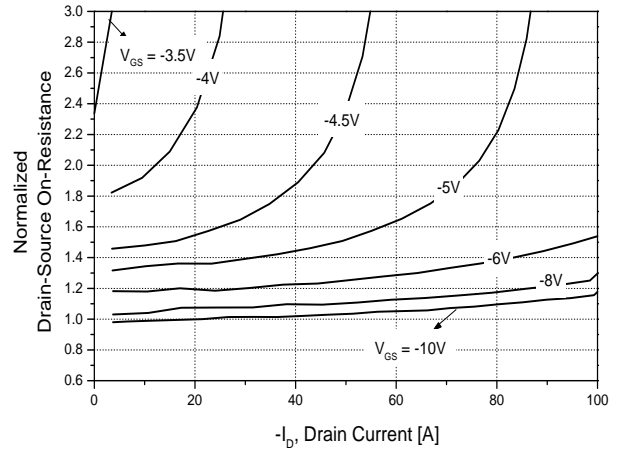


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

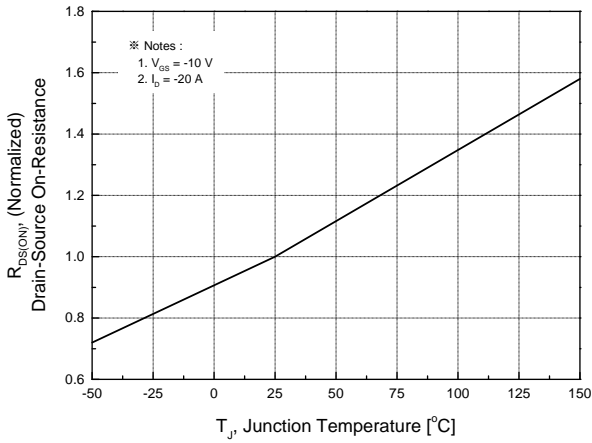


Fig.3 On-Resistance Variation with Temperature

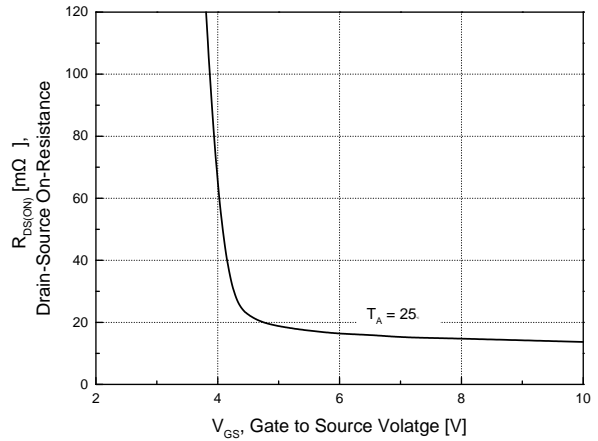


Fig.4 On-Resistance Variation with Gate to Source Voltage

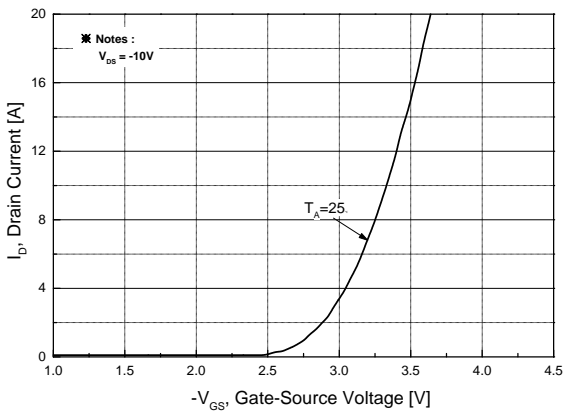


Fig.5 Transfer Characteristics

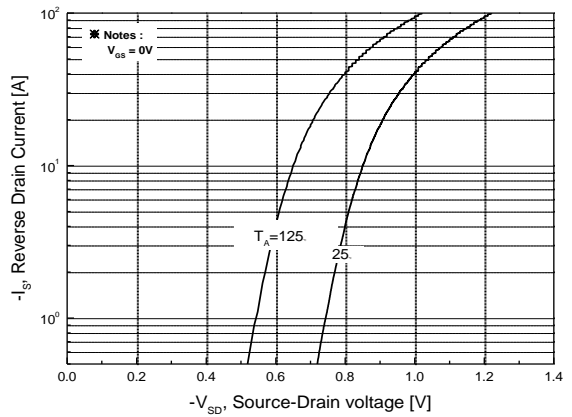


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

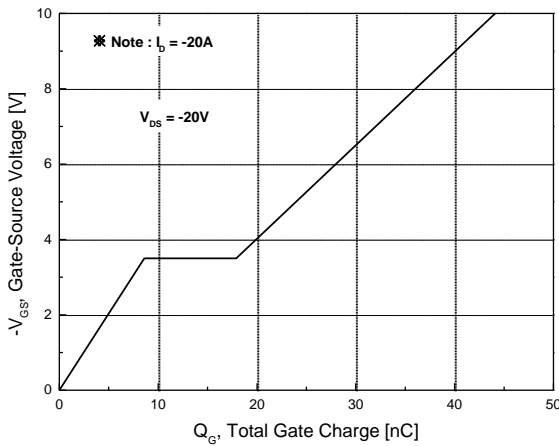


Fig.7 Gate Charge Characteristics

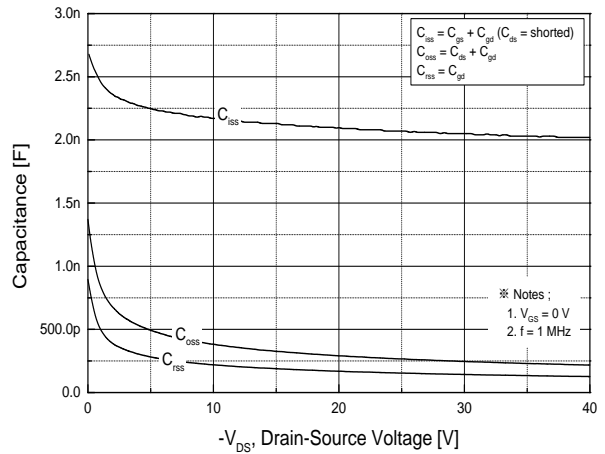


Fig.8 Capacitance Characteristics

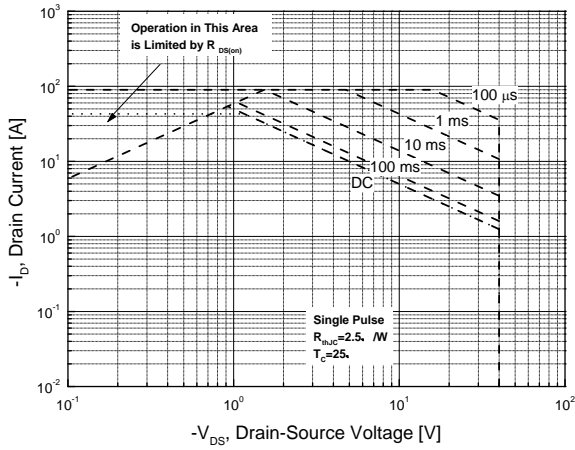


Fig.9 Maximum Safe Operating Area

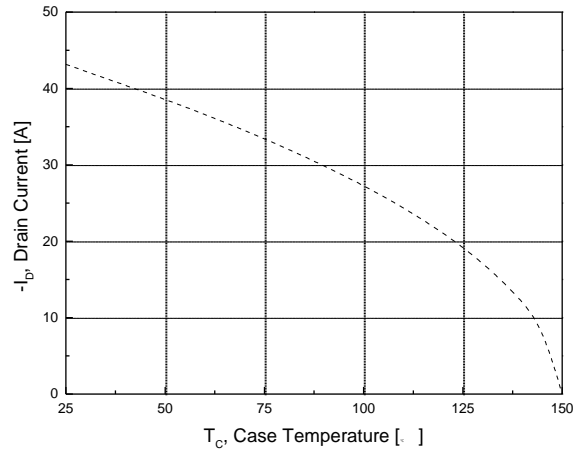


Fig.10 Maximum Drain Current vs. Case Temperature

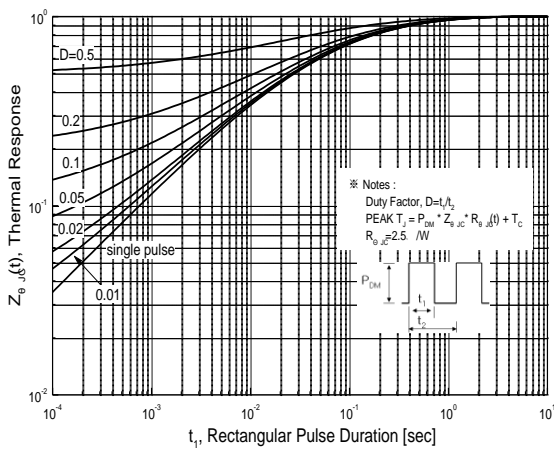
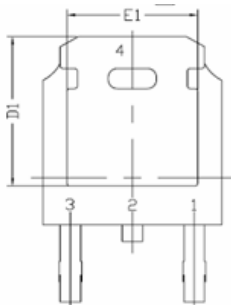
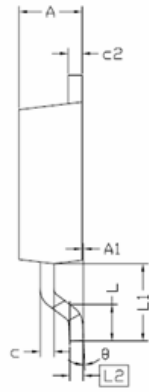
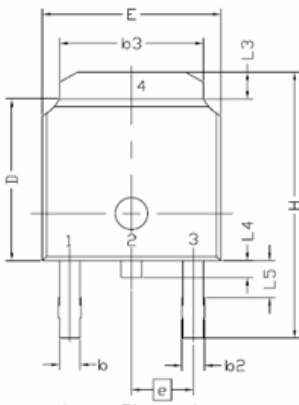


Fig.11 Transient Thermal Response Curve

Physical Dimensions

2 Leads, DPAK (TO252)

Dimensions are in millimeters unless otherwise specified



| Symbol | Min. | Nom. | Max. |
|--------|-----------|------|-------|
| E | 6.35 | - | 6.73 |
| L | 1.40 | 1.52 | 1.78 |
| L1 | 2.74 REF | | |
| L2 | 0.508 BCS | | |
| L3 | 0.89 | - | 1.27 |
| L4 | - | - | 1.02 |
| L5 | 1.14 | - | 1.52 |
| D | 5.97 | 6.10 | 6.22 |
| H | 9.40 | - | 10.41 |
| b | 0.64 | - | 0.89 |
| b2 | 0.76 | - | 1.14 |
| b3 | 4.95 | - | 5.46 |
| e | 2.286 BSC | | |
| A | 2.18 | - | 2.39 |
| A1 | - | - | 0.13 |
| c | 0.46 | - | 0.61 |
| c2 | 0.46 | - | 0.89 |
| D1 | 5.21 | - | - |
| E1 | 4.32 | - | - |
| ⌀ | 0.00 | - | 10.00 |

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](#) is a registered trademark of MagnaChip Semiconductor Ltd.