RoHS Compliant
HALOGEN-FREE

MagnaChip

# MDS3753E

## P-Channel Trench MOSFET, -40V, -7.1A, 30mΩ



### General Description

The MDS3753E uses advanced MagnaChip's MOSFET Technology to provide low on-state resistance, high switching performance and excellent reliability

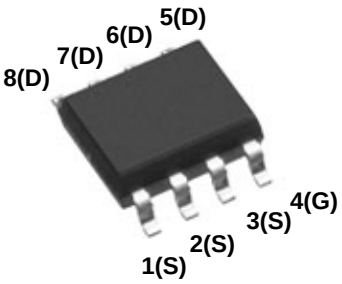
Low $R_{DS(ON)}$ and low gate charge operation offer superior benefit in the application.

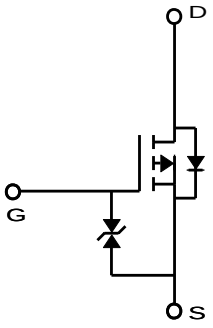
### Features

- $V_{DS}$ = -40V
- $I_D$ = -7.1A @ $V_{GS}$ = 10V
- $R_{DS(ON)}$
  <30mΩ @ $V_{GS}$ = -10V
  <37mΩ @ $V_{GS}$ = -4.5V

### Applications

- Inverters
- General purpose applications




### Absolute Maximum Ratings ($T_A$ =25°C unless otherwise noted)

| Characteristics | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | -40 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current | (Note 1) | $I_D$ | -7.1 | A |
| Pulsed Drain Current | | $I_{DM}$ | -50 | A |
| Power Dissipation | | $P_D$ | 2.5 | W |
| Single Pulse Avalanche Energy | (Note 2) | $E_{AS}$ | 98 | mJ |
| Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | -55~150 | °C |

### Thermal Characteristics

| Characteristics | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Thermal Resistance, Junction-to-Ambient | (Note 1) | $R_{\theta JA}$ | 50 | °C/W |
| Thermal Resistance, Junction-to-Case | | $R_{\theta JC}$ | 25 | |

## Ordering Information

| Part Number | Temp. Range | Package | Packing | RoHS Status |
|---|---|---|---|---|
| MDS3753EURH | -55~150°C | SO-8 | 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 | -1.8 | -3.0 | |
| Drain Cut-Off Current | $I_{DSS}$ | $V_{DS}$ = -40V, $V_{GS}$ = 0V | - | - | -10 | μA |
| Gate Leakage Current | $I_{GSS}$ | $V_{GS}$ = ±16V, $V_{DS}$ = 0V | - | - | ±10 | |
| Drain-Source ON Resistance | $R_{DS(ON)}$ | $V_{GS}$ = -10V, $I_D$ = -3.3A | - | 20 | 30 | mΩ |
| | | $V_{GS}$ = -4.5V, $I_D$ = -3.3A | - | 27 | 37 | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = -10V, $I_D$ = -3.3A | | 14 | - | S |
| **Dynamic Characteristics** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DD}$ = -32V, $I_D$ = -4.7A,$V_{GS}$ = -10V | - | 32.7 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 4.1 | - | |
| Gate-Drain Charge | $Q_{gd}$ | | - | 7.4 | - | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = -15V, $V_{GS}$ = 0V, f = 1.0MHz | - | 1423 | - | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 129 | - | |
| Output Capacitance | $C_{oss}$ | | - | 221 | - | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{GS}$ = -10V ,$V_{DD}$ = -20V, $I_D$ = -3.3A $R_{GEN}$ = 4.7Ω | - | 14.7 | - | ns |
| Turn-On Rise Time | $t_r$ | | - | 7.1 | - | |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 44.2 | - | |
| Turn-Off Fall Time | $t_f$ | | - | 9.0 | - | |
| **Drain-Source Body Diode Characteristics** | | | | | | |
| Source-Drain Diode Forward Voltage | $V_{SD}$ | $I_S$ = -4.7A, $V_{GS}$ = 0V | - | 0.81 | 1.2 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_S$ = -4.7A, di/dt=100A/us | - | 34 | - | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | - | 36.5 | - | nC |

Note :

1. Surface mounted FR4 board with 2oz. Copper.
2. Starting $T_J$=25°C, L=1mH, $I_{AS}$=-14A $V_{DD}$=-20V, $V_{GS}$=-10V

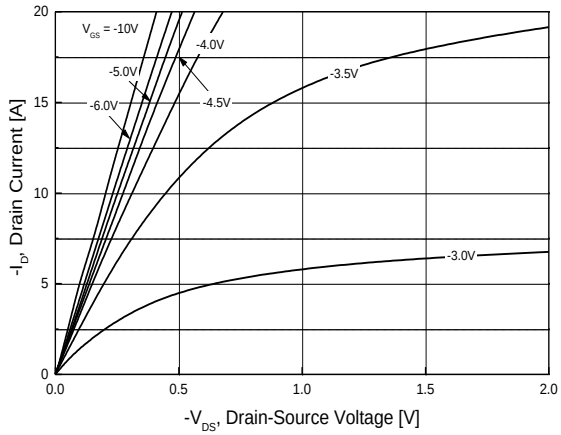



**Fig.1 On-Region Characteristics**

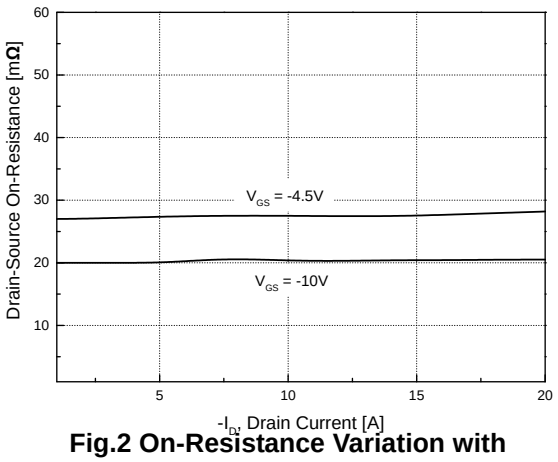



**Fig.2 On-Resistance Variation with Drain Current and Gate Voltage**

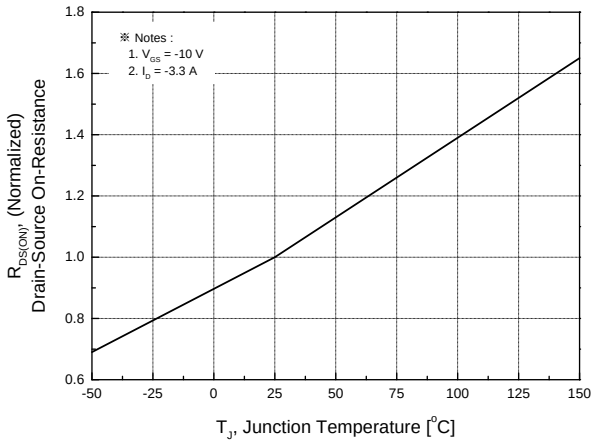



**Fig.3 On-Resistance Variation with**

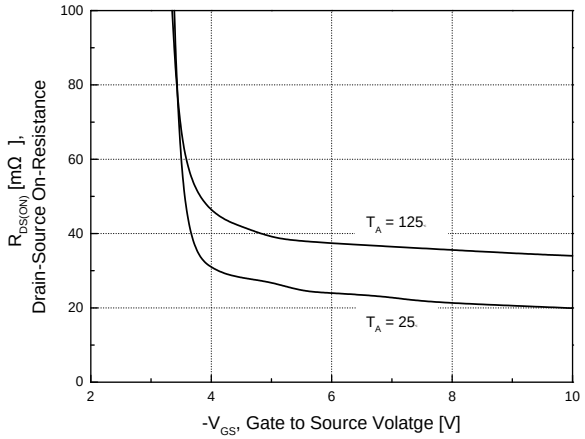



**Fig.4 On-Resistance Variation with Gate to Source Voltage**

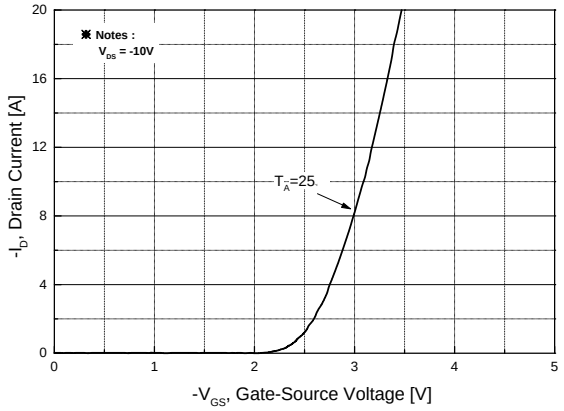



**Fig.5 Transfer Characteristics**

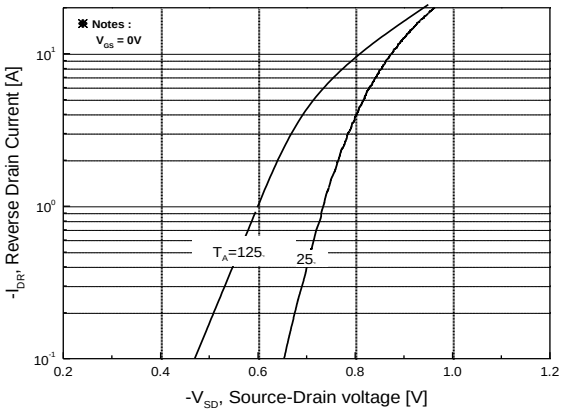



**Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature**

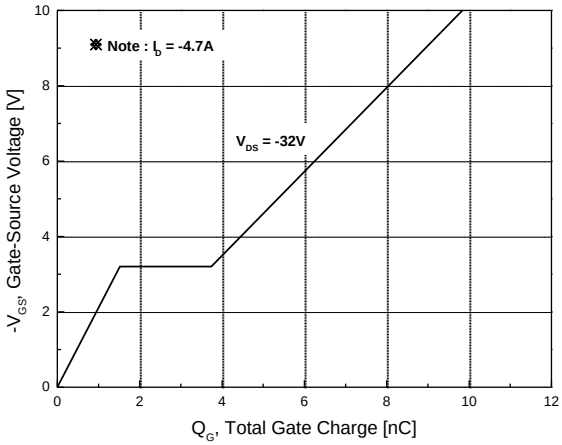



**Fig.7 Gate Charge Characteristics**

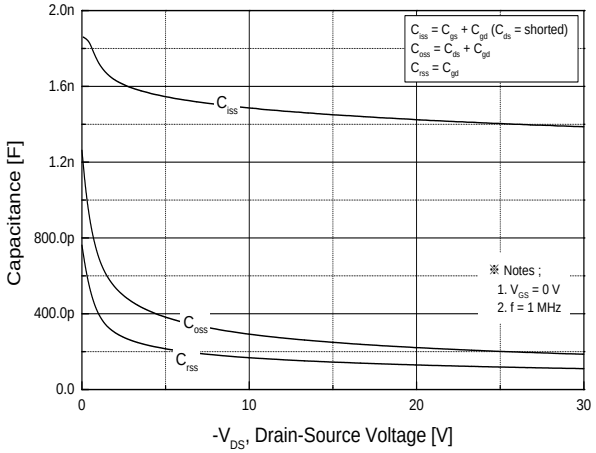



**Fig.8 Capacitance Characteristics**

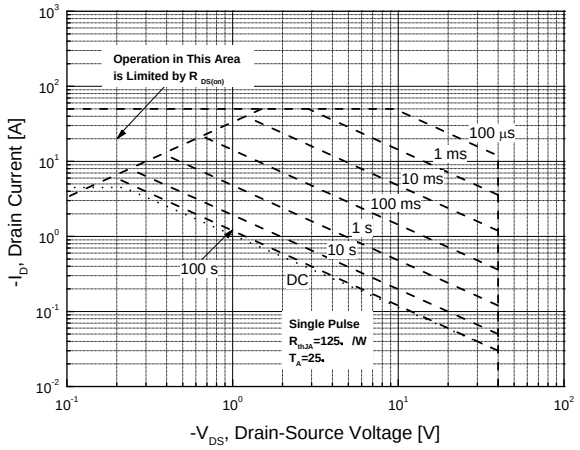



**Fig.9 Maximum Safe Operating Area**

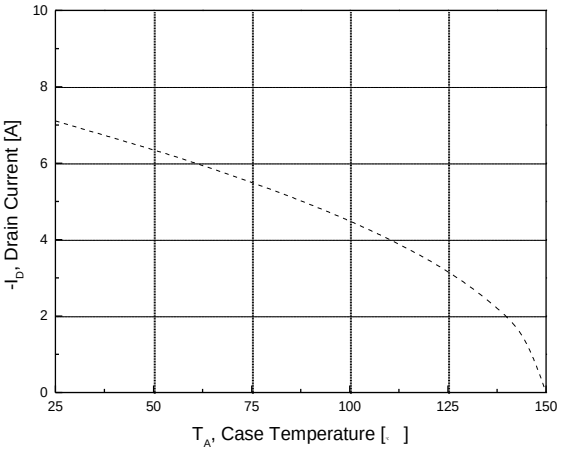



**Fig.10 Maximum Drain Current vs. Case Temperature**

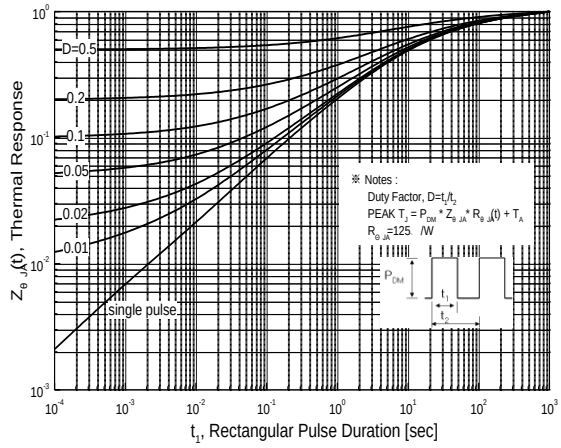
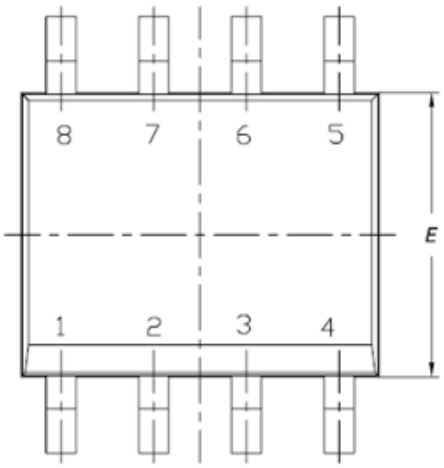



**Fig.11 Transient Thermal Response Curve**

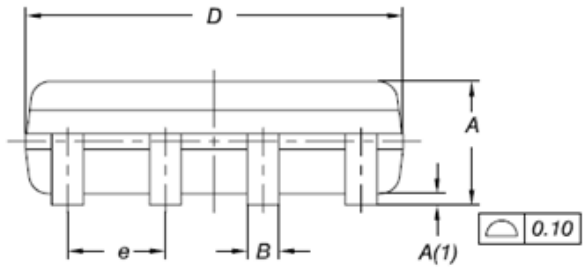
## Physical Dimensions

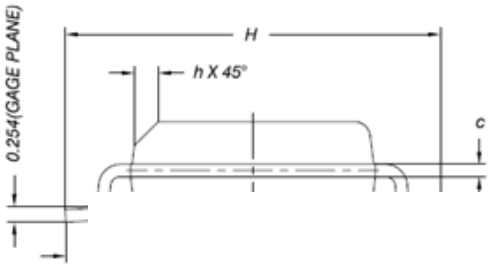
### 8 Leads, SOIC

**Dimensions are in millimeters unless otherwise specified**




| Symbol | Min | Nom | Max |
|---|---|---|---|
| A | - | - | 1.75 |
| A(1) | 0.10 | - | 0.25 |
| B | 0.31 | - | 0.51 |
| C | 0.10 | - | 0.25 |
| D | | 4.9 BSC | |
| E | | 3.9 BSC | |
| e | | 1.27 BSC | |
| H | | 6.0 BSC | |
| L | 0.40 | - | 1.27 |
| a | 0 | - | 8 |
| h | 0.250 | - | 0.500 |
| L2(Gage plane) | | 0.25 BSC | |



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