

# MDS5951

## Dual N-Channel Trench MOSFET 60V, 4.5A, 50mΩ

### General Description

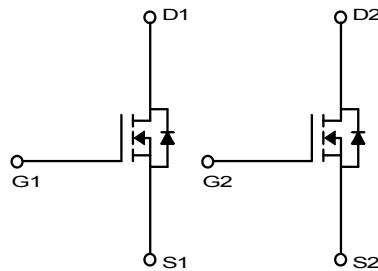
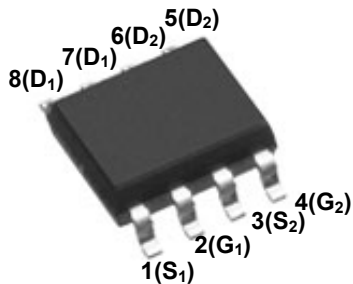
The MDS5951 uses advanced Magnachip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent reliability.

### Features

- $V_{DS} = 60V$
- $I_D = 4.5A$  @  $V_{GS} = 10V$
- $R_{DS(ON)} < 50m\Omega$  @  $V_{GS} = 10V$   
 $< 60m\Omega$  @  $V_{GS} = 4.5V$

### Applications

- Inverters
- General purpose applications



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

| Characteristics                                 |                    | Symbol         | Rating   | Unit       |
|-------------------------------------------------|--------------------|----------------|----------|------------|
| Drain-Source Voltage                            |                    | $V_{DSS}$      | 60       | V          |
| Gate-Source Voltage                             |                    | $V_{GSS}$      | $\pm 20$ | V          |
| Continuous Drain Current (Note 4)               | $T_A = 25^\circ C$ | $I_D$          | 4.5      | A          |
|                                                 | $T_A = 70^\circ C$ |                | 3.6      | A          |
| Pulsed Drain Current (Note 3)                   |                    | $I_{DM}$       | 20       | A          |
| Power Dissipation for Single Operation (Note 2) | $T_A = 25^\circ C$ | $P_D$          | 2.0      | W          |
|                                                 | $T_A = 70^\circ C$ |                | 1.28     |            |
| Junction and Storage Temperature Range          |                    | $T_J, T_{stg}$ | -55~150  | $^\circ C$ |

### Thermal Characteristics

| Characteristics                                                 |  | Symbol          | Rating | Unit         |
|-----------------------------------------------------------------|--|-----------------|--------|--------------|
| Thermal Resistance, Junction-to-Ambient (Steady-State) (Note 1) |  | $R_{\theta JA}$ | 62.5   | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Case                            |  | $R_{\theta JC}$ | 34.0   |              |

## Ordering Information

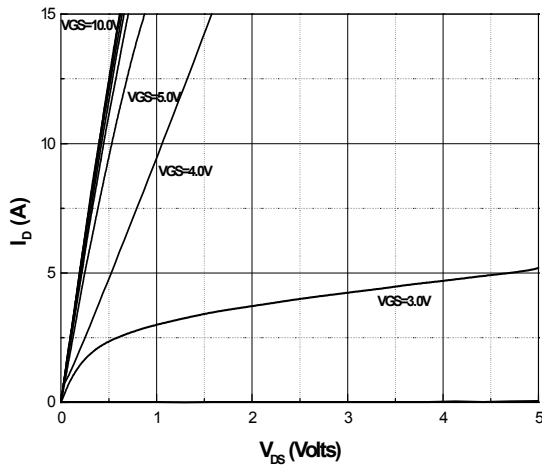
| Part Number | Temp. Range | Package | Packing     | RoHS Status  |
|-------------|-------------|---------|-------------|--------------|
| MDS5951URH  | -55~150°C   | SOIC-8  | Tape & Reel | Halogen Free |

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

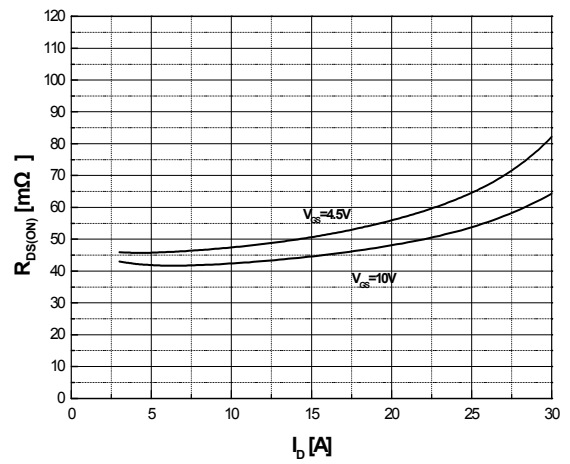
| Characteristics                            | Symbol              | Test Condition                                                                                | Min             | Typ | Max  | Unit |   |
|--------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------|-----------------|-----|------|------|---|
| Static Characteristics                     |                     |                                                                                               |                 |     |      |      |   |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V                                                  | 60              | -   | -    | V    |   |
| Gate Threshold Voltage                     | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                    | 1.0             | 2.0 | 3.0  |      |   |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>    | V <sub>DS</sub> = 60V, 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> = 4.5A                                                  | -               | 38  | 50   | mΩ   |   |
|                                            |                     | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3.0A                                                 | -               | 46  | 60   |      |   |
| Forward Transconductance                   | g <sub>FS</sub>     | V <sub>DS</sub> = 10V, I <sub>D</sub> =3.3A                                                   | -               | 11  | -    | S    |   |
| Dynamic Characteristics                    |                     |                                                                                               |                 |     |      |      |   |
| Total Gate Charge ( V <sub>gs</sub> =10V)  | Q <sub>g</sub>      | V <sub>DS</sub> = 30V, I <sub>D</sub> = 4.5A, V <sub>GS</sub> = 10V                           | -               | 9.0 | 10.5 | nC   |   |
| Total Gate Charge ( V <sub>gs</sub> =4.5V) |                     |                                                                                               |                 | 4.4 |      |      |   |
| Gate-Source Charge                         |                     |                                                                                               | Q <sub>gs</sub> | -   | 1.5  |      | - |
| Gate-Drain Charge                          |                     |                                                                                               | Q <sub>gd</sub> | -   | 2.0  |      | - |
| Input Capacitance                          | C <sub>iss</sub>    | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V, f = 1.0MHz                                       | -               | 420 | -    | pF   |   |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    |                                                                                               | -               | 25  | -    |      |   |
| Output Capacitance                         | C <sub>oss</sub>    |                                                                                               | -               | 50  | -    |      |   |
| Turn-On Delay Time                         | t <sub>d(on)</sub>  | V <sub>GS</sub> = 10V ,V <sub>DS</sub> = 30V,<br>R <sub>L</sub> = 6.7Ω, R <sub>GEN</sub> = 5Ω | -               | 4.5 | -    | ns   |   |
| Turn-On Rise Time                          | t <sub>r</sub>      |                                                                                               | -               | 20  | -    |      |   |
| Turn-Off Delay Time                        | t <sub>d(off)</sub> |                                                                                               | -               | 15  | -    |      |   |
| Turn-Off Fall Time                         | t <sub>f</sub>      |                                                                                               | -               | 9.5 | -    |      |   |
| Drain-Source Body Diode Characteristics    |                     |                                                                                               |                 |     |      |      |   |
| Source-Drain Diode Forward Voltage         | V <sub>SD</sub>     | I <sub>S</sub> = 1.0A, V <sub>GS</sub> = 0V                                                   | -               | 0.7 | 1.1  | V    |   |
| Body Diode Reverse Recovery Time           | t <sub>rr</sub>     | I <sub>F</sub> = 4.5A, di/dt = 100A/μs                                                        | -               | 21  | 30   | ns   |   |
| Body Diode Reverse Recovery Charge         | Q <sub>rr</sub>     |                                                                                               | -               | 25  | -    | nC   |   |

Note :

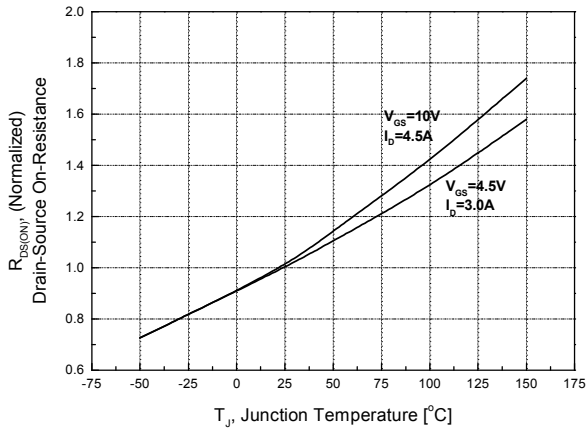
1. Surface mounted RF4 board with 2oz. Copper. PDSM is based on R<sub>θJA</sub> and the maximum allowed junction temperature of 150°C.
2. PD is based on T<sub>J(MAX)</sub> =150°C, using R<sub>θJA</sub>.
3. Pulse test: pulse width ≤300us, duty cycle≤2%, pulse width limited by junction temperature T<sub>J(MAX)</sub> =150°C.
4. Static characteristics are obtained using <300 μs pulses, duty cycle 0.5% max.



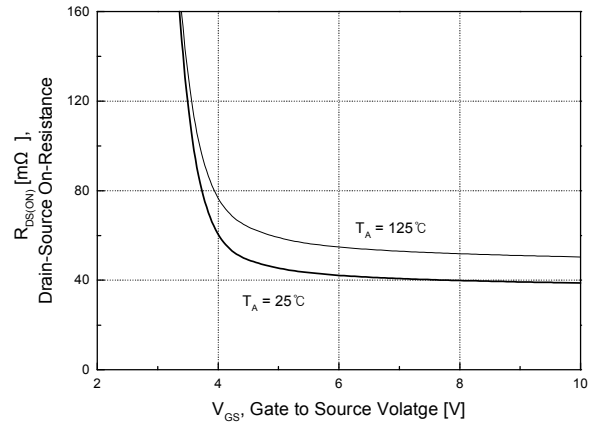
**Fig.1 On-Region Characteristics**



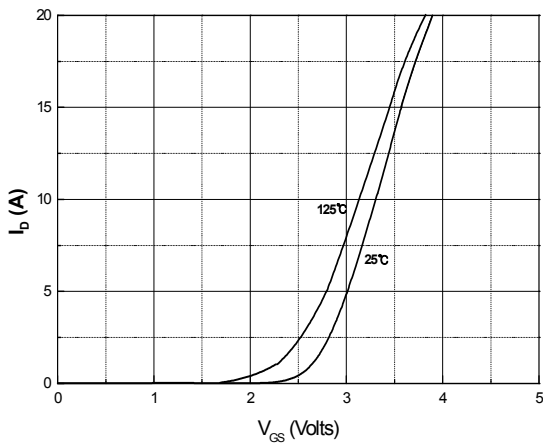
**Fig.2 On-Resistance Variation with Drain Current and Gate Voltage**



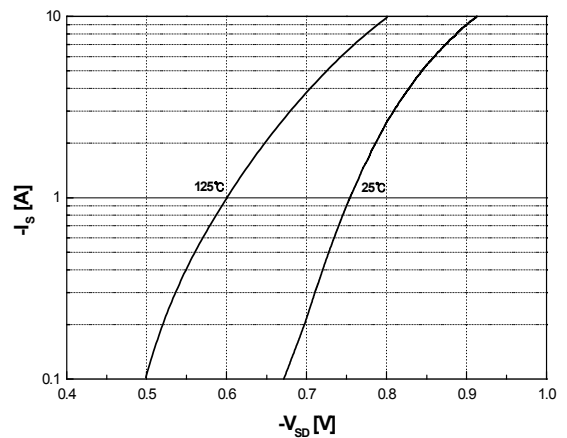
**Fig.3 On-Resistance Variation with Temperature**



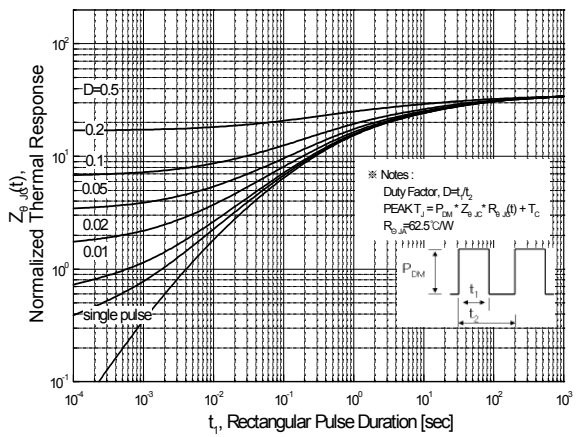
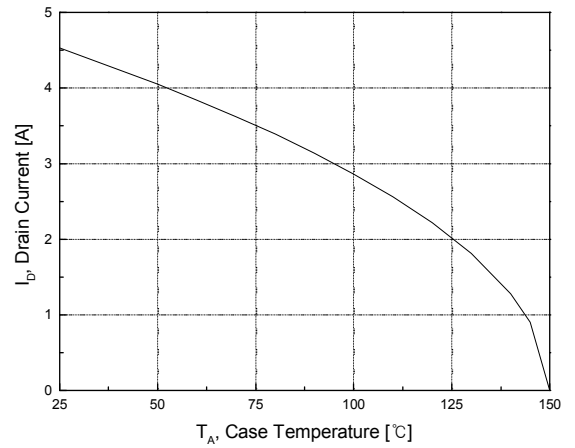
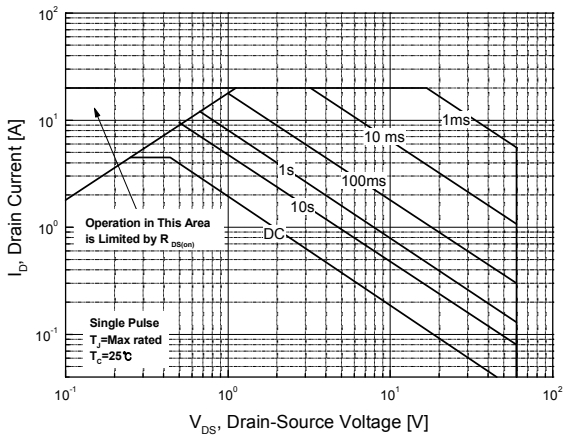
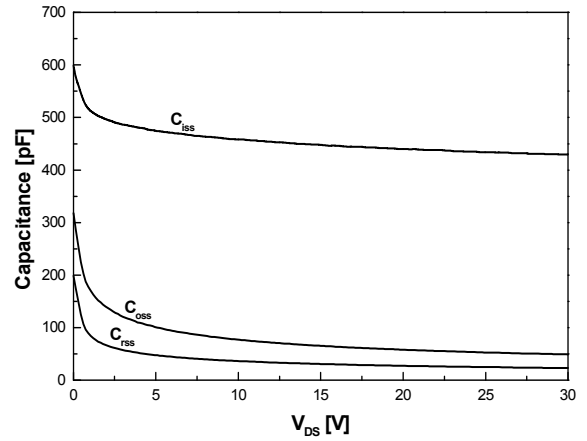
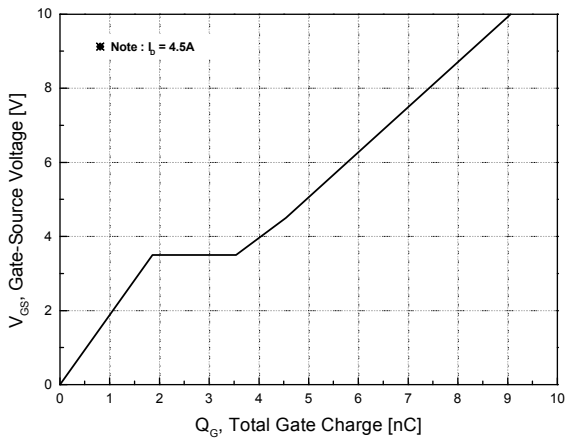
**Fig.4 On-Resistance Variation with Gate to Source Voltage**



**Fig.5 Transfer Characteristics**



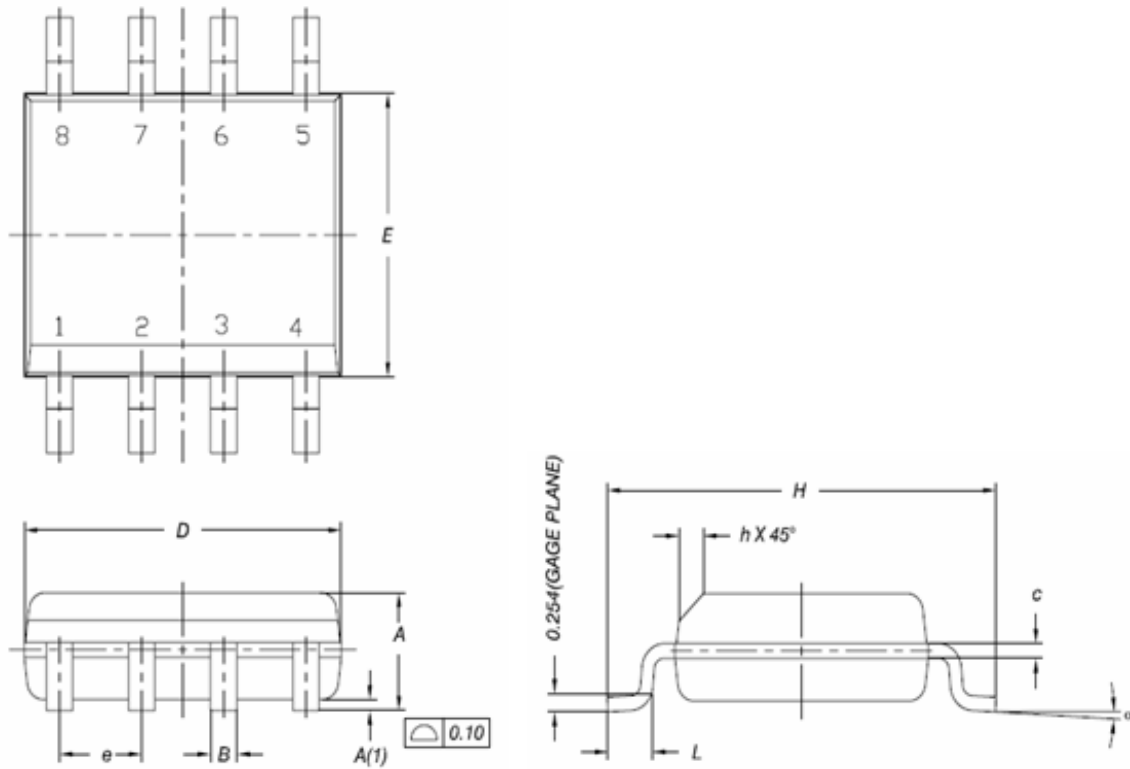
**Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature**



# Physical 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              | 1.27BSC  |         |       |
| H              | –        | 6.0 BSC | –     |
| L              | 0.40     | –       | 1.27  |
| a              | 0        | –       | 8     |
| h              | 0.250    | –       | 0.500 |
| L2(Gage Plane) | 0.25 BSC |         |       |

## 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** is a registered trademark of MagnaChip Semiconductor Ltd.