

### General Description

The MDS1654 uses advanced MagnaChip's MOSFET Technology, which provides low on-state resistance, high switching performance and excellent reliability.

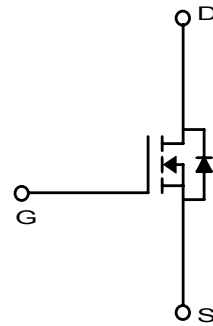
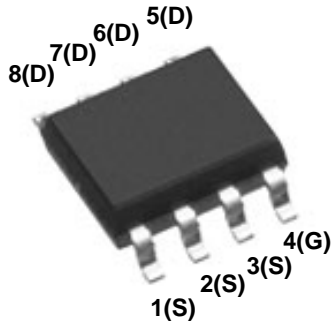
MDS1654 is suitable device for DC-DC Converters and general purpose applications.

### Features

- $V_{DS} = 30V$
- $I_D = 15A$  @  $V_{GS} = 10V$
- $R_{DS(ON)} < 9.5m\Omega$  @  $V_{GS} = 10V$   
 $< 13.0m\Omega$  @  $V_{GS} = 4.5V$

### Applications

- DC-DC Converters



### Absolute Maximum Ratings (Ta = 25°C)

| Characteristics                              |                   | Symbol         | Rating  | Unit |
|----------------------------------------------|-------------------|----------------|---------|------|
| Drain-Source Voltage                         |                   | $V_{DSS}$      | 30      | V    |
| Gate-Source Voltage                          |                   | $V_{GSS}$      | ±20     | V    |
| Continuous Drain Current                     | $T_a=25^\circ C$  | $I_D$          | 15      | A    |
|                                              | $T_a=100^\circ C$ |                | 10.5    | A    |
| Pulsed Drain Current                         |                   | $I_{DM}$       | 60      | A    |
| Power Dissipation <sup>(1)</sup>             | $T_a=25^\circ C$  | $P_D$          | 2.5     | W    |
|                                              | $T_a=100^\circ C$ |                | 1.25    |      |
| Single Pulse Avalanche Energy <sup>(2)</sup> |                   | $E_{AS}$       | 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 <sup>(1)</sup> | $R_{\theta JA}$ | 50     | °C/W |
| Thermal Resistance, Junction-to-Case                   | $R_{\theta JC}$ | 25     |      |

## Ordering Information

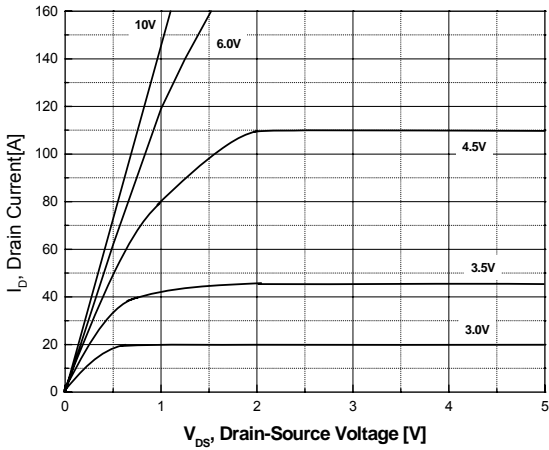
| Part Number | Temp. Range | Package | Packing     | ROHS Status  |
|-------------|-------------|---------|-------------|--------------|
| MDS1654URH  | -55~150°C   | SOIC-8  | Tape & Reel | Halogen Free |

## Electrical Characteristics (Ta =25°C)

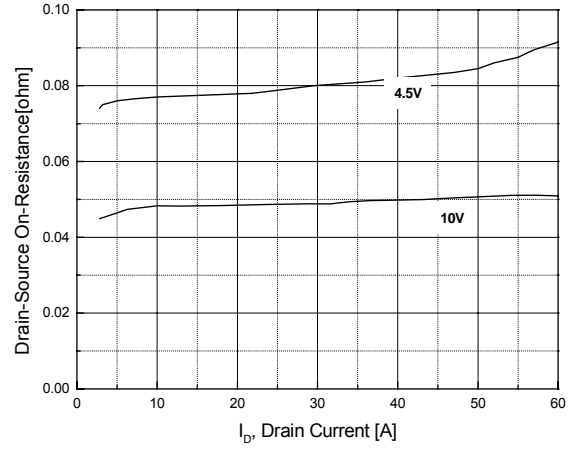
| Characteristics                                | Symbol        | Test Condition                                             | Min | Typ  | Max       | Unit      |
|------------------------------------------------|---------------|------------------------------------------------------------|-----|------|-----------|-----------|
| <b>Static Characteristics</b>                  |               |                                                            |     |      |           |           |
| Drain-Source Breakdown Voltage                 | $BV_{DSS}$    | $I_D = 250\mu A, V_{GS} = 0V$                              | 30  | -    | -         | V         |
| Gate Threshold Voltage                         | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu A$                          | 1.0 | 1.9  | 3.0       |           |
| Drain Cut-Off Current                          | $I_{DSS}$     | $V_{DS} = 30V, V_{GS} = 0V$                                | -   | -    | 1         | $\mu A$   |
| Gate Leakage Current                           | $I_{GSS}$     | $V_{GS} = \pm 20V, V_{DS} = 0V$                            | -   | -    | $\pm 0.1$ |           |
| Drain-Source ON Resistance                     | $R_{DS(ON)}$  | $V_{GS} = 10V, I_D = 15A$                                  | -   | 7.1  | 9.5       | $m\Omega$ |
|                                                |               | $V_{GS} = 4.5V, I_D = 12A$                                 | -   | 9.4  | 13.0      |           |
| Forward Transconductance                       | $g_{fs}$      | $V_{DS} = 5V, I_D = 15A$                                   | -   | 19   | -         | S         |
| <b>Dynamic Characteristics</b>                 |               |                                                            |     |      |           |           |
| Total Gate Charge                              | $Q_{g(10V)}$  | $V_{DS} = 15V, I_D = 15A, V_{GS} = 10V$                    | -   | 13.7 | -         | $nC$      |
| Total Gate Charge                              | $Q_{g(4.5V)}$ |                                                            | -   | 6.8  | -         |           |
| Gate-Source Charge                             | $Q_{gs}$      |                                                            | -   | 2.0  | -         |           |
| Gate-Drain Charge                              | $Q_{gd}$      |                                                            | -   | 3.5  | -         |           |
| Input Capacitance                              | $C_{iss}$     | $V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz$                    | -   | 1396 |           | $pF$      |
| Reverse Transfer Capacitance                   | $C_{rss}$     |                                                            | -   | 156  |           |           |
| Output Capacitance                             | $C_{oss}$     |                                                            | -   | 272  |           |           |
| Turn-On Delay Time                             | $t_{d(on)}$   | $V_{GS} = 10V, V_{DS} = 15V, R_L = 3\Omega, R_G = 3\Omega$ | -   | 8.4  | -         | $ns$      |
| Rise Time                                      | $t_r$         |                                                            | -   | 24.6 | -         |           |
| Turn-Off Delay Time                            | $t_{d(off)}$  |                                                            | -   | 33   | -         |           |
| Fall Time                                      | $t_f$         |                                                            | -   | 13.6 | -         |           |
| <b>Drain-Source Body Diode Characteristics</b> |               |                                                            |     |      |           |           |
| Source-Drain Diode Forward Voltage             | $V_{SD}$      | $I_S = 1A, V_{GS} = 0V$                                    | -   | 0.7  | 1.0       | V         |
| Body Diode Reverse Recovery Time               | $t_{rr}$      | $I_F = 15A, di/dt = 100A/\mu s$                            | -   | 19   | 21        | ns        |
| Body Diode Reverse Recovery Charge             | $Q_{rr}$      |                                                            | -   | 9    | 12        | nC        |

Note :

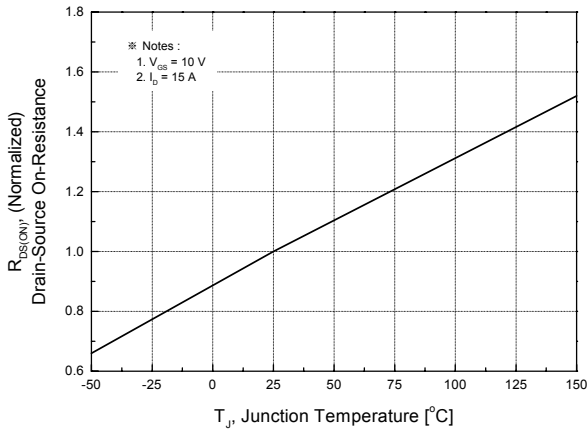
1. Surface mounted FR-4 board with 2oz. Copper.
2. Starting  $T_j = 25^\circ C, L = 1mH, I_{AS} = 14A, V_{DD} = 15V, V_{GS} = 10V.$



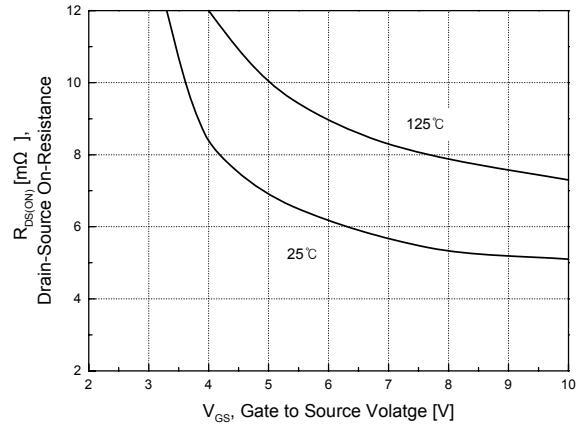
**Fig.1 On-Region Characteristics**



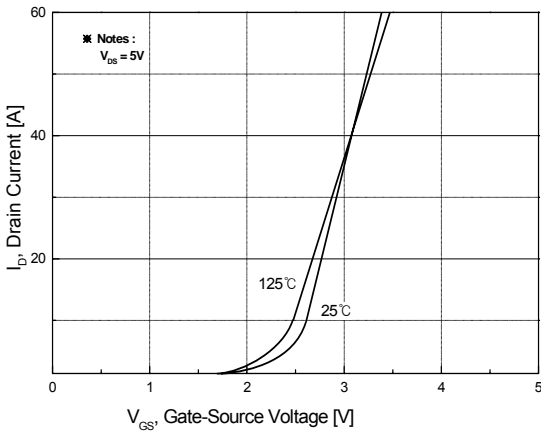
**Fig.2 On-Resistance Variation with Drain Current and Gate Voltage**



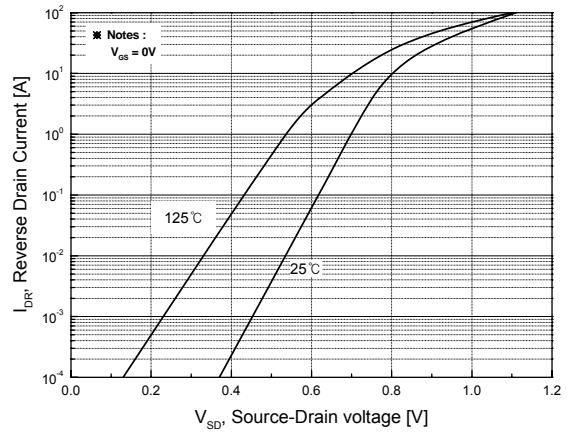
**Fig.3 On-Resistance Variation with Temperature**



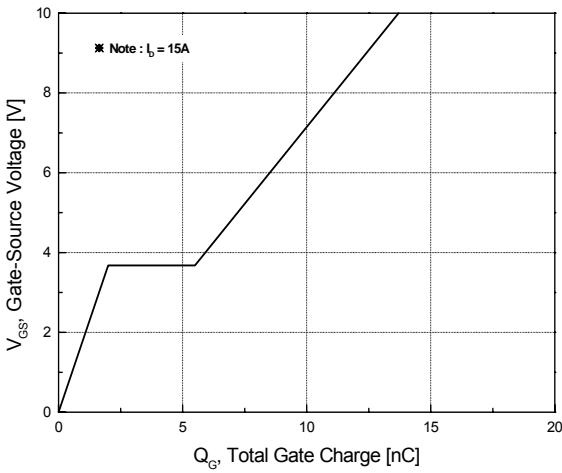
**Fig.4 On-Resistance Variation with Gate to Source Voltage**



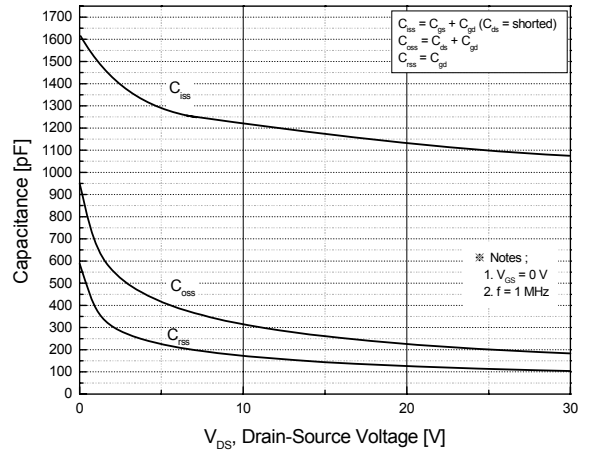
**Fig.5 Transfer Characteristics**



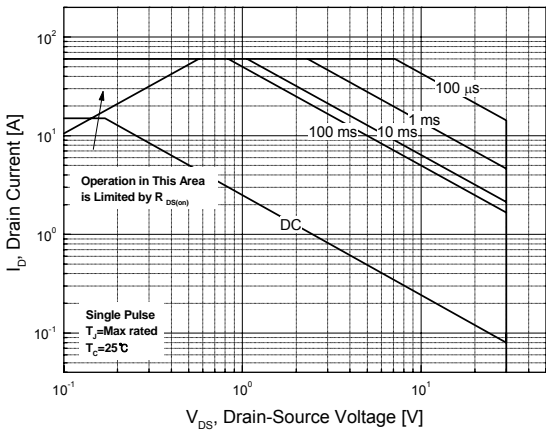
**Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature**



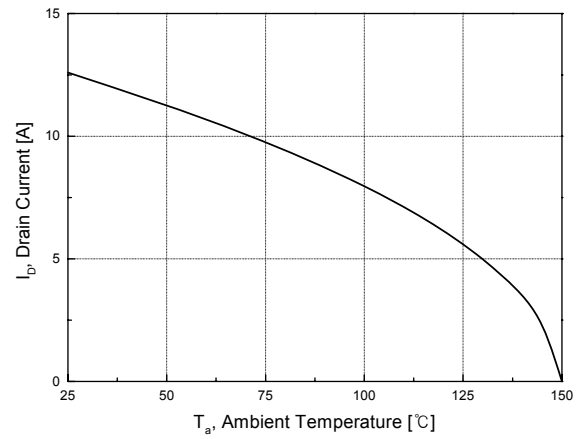
**Fig.7 Gate Charge Characteristics**



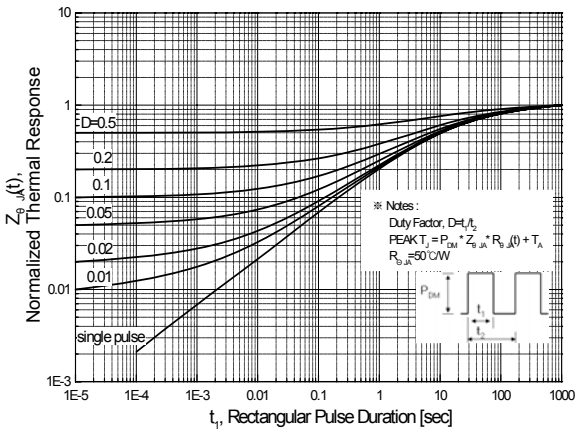
**Fig.8 Capacitance Characteristics**



**Fig.9 Maximum Safe Operating Area**



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

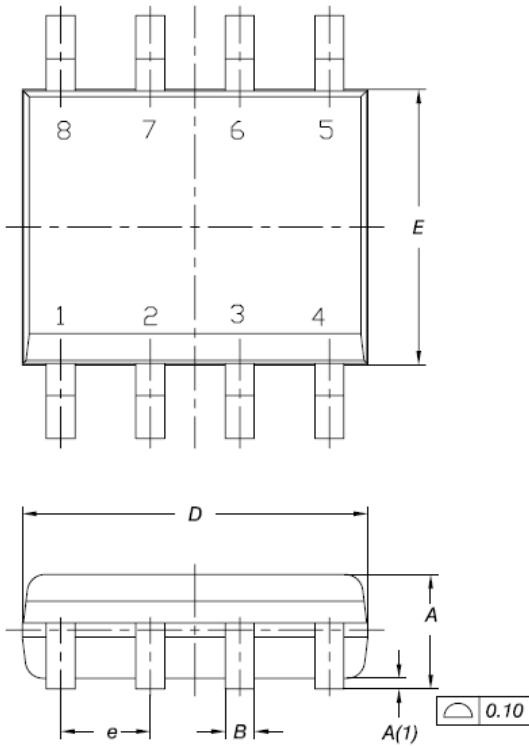


**Fig.11 Transient Thermal Response Curve**

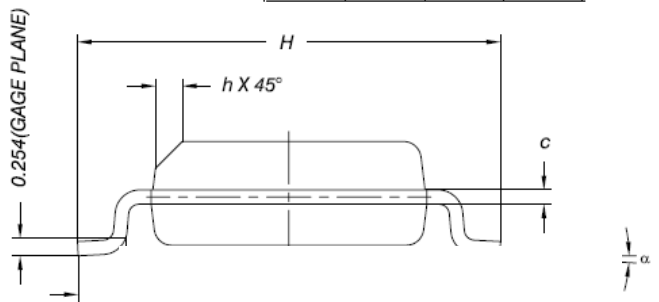
## Physical Dimensions

### 8 Leads, SOIC

Dimensions are in millimeters unless otherwise specified




| DIM.     | MILLIMETERS |       |      |
|----------|-------------|-------|------|
|          | MIN.        | NOM.  | MAX. |
| A        | 1.35        | 1.55  | 1.75 |
| A(1)     | 0.10        | 0.175 | 0.25 |
| B        | 0.38        | 0.445 | 0.51 |
| C        | 0.19        | 0.22  | 0.25 |
| D        | 4.80        | 4.90  | 5.00 |
| E        | 3.80        | 3.90  | 4.00 |
| e        | 1.27 BSC    |       |      |
| H        | 5.80        | 6.00  | 6.20 |
| L        | 0.50        | 0.715 | 0.93 |
| $\alpha$ | 0°          | 4°    | 8°   |
| h        | 0.25        | 0.375 | 0.50 |



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