

# Silicon Power MOSFET

## Features

- SGT MOSFET
- LOW RDS(ON)
- FAST SWITCHING
- HIGH EAS
- REL TEST SPEC: JESD-22
- HTRB >1000 HRS
- ESD protect

## Applications

- POWER FACTOR CORRECTION
- SERVER POWER SUPPLIES
- TELECOM POWER SUPPLIES
- INVERTERS
- MOTOR CONTROL

## Descriptions

LSF10R150S is an advanced Silicon MOSFET offering excellent efficiency through low Rds-ON and low gate charge.

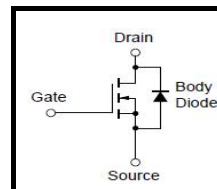
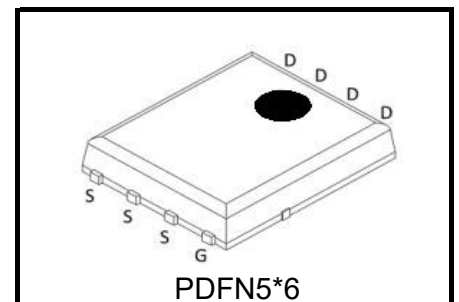
LSF10R150S is a rugged device with precision charge balance implementation designed for demanding uses such as enterprise power computing power supplies, motor control, lighting and other challenging power conversion applications.

## Benefits

- LOW CONDUCTION LOSSES
- HIGH EFFICIENCY
- EXCELLENT AVALANCHE
- PERFORMANCE

**Table1 Ordering Information**

| Part Number | Package | Marking | Packing |
|-------------|---------|---------|---------|
| LSF10R150S  | PDFN5*6 | TBC     | TBC     |
|             |         |         |         |
|             |         |         |         |



**Table 2 Key Parameters**

| Parameter                             | Value | Unit |
|---------------------------------------|-------|------|
| V <sub>DSS</sub> @ T <sub>j</sub> Min | 150   | V    |
| RDS(on) Typ                           | 10    | mΩ   |
| Q <sub>g</sub> Typ                    | 21    | nC   |
| I <sub>D</sub> @ 25 °C                | 71    | A    |

**Table 3 Maximum Ratings@ Tj = 25 °C,unless otherwise specified**

| Parameter                                        | Symbol           | Values |     |     | Unit | Condition                                                                                  |
|--------------------------------------------------|------------------|--------|-----|-----|------|--------------------------------------------------------------------------------------------|
|                                                  |                  | Min    | Typ | Max |      |                                                                                            |
| Continuous drain current(T <sub>C</sub> = 25°C)  | I <sub>D</sub>   | —      | —   | 71  | A    | Drain current is limited by maximum junction temperature.                                  |
| Continuous drain current(T <sub>C</sub> = 100°C) |                  | —      | —   | 50  | A    |                                                                                            |
| Pulsed drain current(T <sub>C</sub> = 25°C)      | I <sub>DM</sub>  | —      | —   | 284 | A    | Package PDFN5*6                                                                            |
| Avalanche energy, single pulse                   | E <sub>AS</sub>  | —      | —   | 215 | mJ   | V <sub>DS</sub> =100V, V <sub>DD</sub> =75V, V <sub>GS</sub> =10V<br>R <sub>G</sub> =1.2 Ω |
| Gate source voltage (DC)                         | V <sub>GS</sub>  | -20    | —   | 20  | V    |                                                                                            |
| Gate source voltage (AC)                         | V <sub>GS</sub>  | —      | —   | —   | V    |                                                                                            |
| Power dissipation                                | P <sub>D</sub>   | —      | —   | 104 | W    | PDFN5*6, T <sub>C</sub> = 25°C                                                             |
| Derating Factor above                            |                  | —      | —   | TBC | °C/W | PDFN5*6, T <sub>C</sub> = 25°C                                                             |
| Storage temperature                              | T <sub>stg</sub> | -55    | —   | 150 | °C   | PDFN5*6, T <sub>C</sub> = 25°C                                                             |
| Operating junction temperature                   | T <sub>j</sub>   | —      | —   | 150 | °C   | PDFN5*6, T <sub>C</sub> = 25°C                                                             |
| Mounting torque TO247                            |                  | —      | —   | —   | N.m  | M3 and M3.5 screws                                                                         |
| Continuous diode forward current                 | I <sub>S</sub>   | —      | —   | 71  | A    | T <sub>C</sub> = 25°C                                                                      |
| Maximum diode commutation speed                  | di/dt            | —      | —   | —   | A/μs | V <sub>DS</sub> =0...30V, I <sub>SD</sub> ≤I <sub>S</sub> , T <sub>j</sub> = 25°C          |

**Table 4 Thermal Characteristics**

| Parameter                                                  | Symbol            | Values  |     |     | Unit |
|------------------------------------------------------------|-------------------|---------|-----|-----|------|
|                                                            |                   | PDFN5*6 |     |     |      |
| Thermal resistance, junction-case*2                        | R <sub>thJC</sub> | —       | 1.1 | —   | °C/W |
| Thermal resistance, junction-ambient                       | R <sub>thJA</sub> | —       | 45  | —   | °C/W |
| Thermal resistance, junction-ambient for SMD version       | R <sub>thJT</sub> | —       | —   | —   | °C/W |
| Soldering temperature, wavesoldering only allowed at leads | T <sub>sold</sub> | —       | —   | 260 | °C   |

**Table 5 Electrical Characteristics @ Tj = 25°C, unless otherwise specified**

| Parameter                        | Symbol               | Values |     |      | Unit | Condition                                                         |
|----------------------------------|----------------------|--------|-----|------|------|-------------------------------------------------------------------|
|                                  |                      | Min    | Typ | Max  |      |                                                                   |
| Drain-source breakdown voltage   | V <sub>(BR)DSS</sub> | 150    | —   | —    | V    | I <sub>D</sub> = 1mA, V <sub>GS</sub> = 0V                        |
| Gate threshold voltage           | V <sub>(GS)th</sub>  | 2.0    | —   | 4.0  | V    | V <sub>DS</sub> = 10V, I <sub>D</sub> = 250μA                     |
| Zero gate voltage drain current  | I <sub>DSS</sub>     | —      | —   | 1    | μA   | V <sub>DS</sub> =150V, T <sub>j</sub> =25°C, V <sub>GS</sub> =0V  |
| Gate-source leakage current      | I <sub>GSS</sub>     | —      | —   | ±100 | nA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                      |
| Drain-source on-state resistance | R <sub>DS(on)</sub>  | —      | 10  | 12   | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 50A, T <sub>j</sub> =25°C |
|                                  | R <sub>DS(on)</sub>  | —      | TBD | —    | mΩ   | V <sub>GS</sub> = 6V, I <sub>D</sub> = 30A, T <sub>j</sub> =25°C  |
| Gate resistance                  | R <sub>G</sub>       | —      | 4.2 | —    | Ω    |                                                                   |

**Table 6 Dynamic Electrical Characteristics**

| Parameter                    | Symbol       | Values |      |     | Unit | Condition                                            |
|------------------------------|--------------|--------|------|-----|------|------------------------------------------------------|
|                              |              | Min    | Typ  | Max |      |                                                      |
| Input capacitance            | $C_{iss}$    | —      | 1320 | —   | pF   | $V_{DS} = 75V, f = 1MHz, V_{GS} = 0V,$<br>Level=0.5V |
| Output capacitance           | $C_{oss}$    | —      | 900  | —   | pF   |                                                      |
| Reverse transfer capacitance | $C_{rss}$    | —      | 20   | —   | pF   |                                                      |
| Turn-on delay time           | $t_{d(on)}$  | —      | 22   | —   | nS   | $V_{DS} = 75V, I_D = 70A,$<br>$V_{GS} = 10V$         |
| Rise time                    | $t_r$        | —      | 13   | —   | nS   |                                                      |
| Turn-off delay time          | $t_{d(off)}$ | —      | 18   | —   | nS   | $R_G = 1.5\Omega, L = 250\mu H$                      |
| Fall time                    | $t_f$        | —      | 12   | —   | nS   |                                                      |

**Table 7 Gate Charge Characteristics**

| Parameter                | Symbol        | Values |     |     | Unit | Condition                                                  |
|--------------------------|---------------|--------|-----|-----|------|------------------------------------------------------------|
|                          |               | Min    | Typ | Max |      |                                                            |
| Forward Transconductance | $g_{fs}$      | —      | 40  | —   | S    | $V_{DS} = 15V, I_D = 70A$                                  |
| Gate to source charge    | $Q_g$         | —      | 21  | —   | nC   | $V_{DS} = 75V, I_D = 70A,$<br>$V_{GS} = 10V, L = 250\mu H$ |
| Gate to drain charge     | $Q_{gs}$      | —      | 7   | —   | nC   |                                                            |
| Gate charge total        | $Q_{gd}$      | —      | 6   | —   | nC   |                                                            |
| Gate plateau voltage     | $V_{plateau}$ | —      | —   | —   | V    |                                                            |

**Table 8 Diode Characteristics**

| Parameter                  | Symbol   | Values |     |     | Unit    | Condition                                                                             |
|----------------------------|----------|--------|-----|-----|---------|---------------------------------------------------------------------------------------|
|                            |          | Min    | Typ | Max |         |                                                                                       |
| Diode forward voltage *3   | $V_{SD}$ | —      | 0.9 | —   | V       | $I_S = 50A, V_{GS} = 10V$<br>$di/dt = 100A/\mu s$<br>$L\sigma = 50nH, C\sigma = 10pF$ |
| Reverse recovery time *3   | $t_{rr}$ | —      | 160 | —   | nS      |                                                                                       |
| Reverse recovery charge *3 | $Q_{rr}$ | —      | 310 | —   | $\mu C$ |                                                                                       |

**Table 9 Typical Electrical Characteristics**

Fig1. Output characteristics

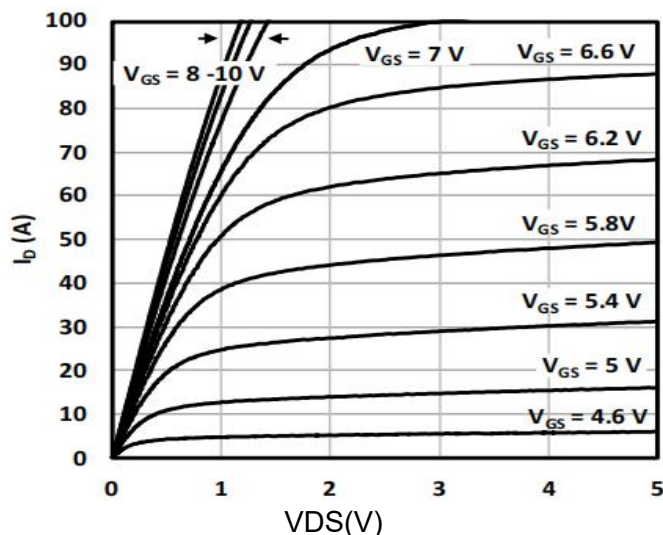


Fig.2 Transfer characteristics

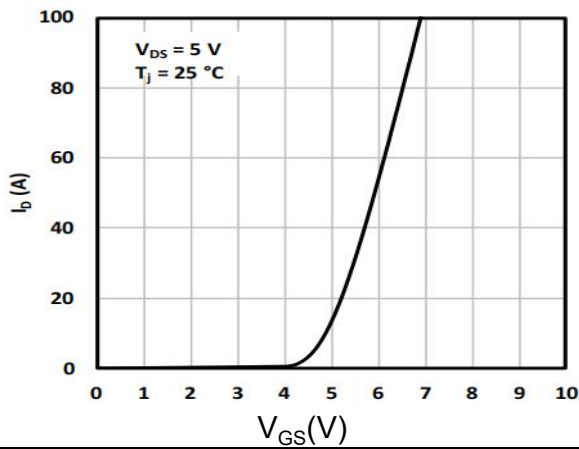


Fig.3 On-resistance vs. gate voltage

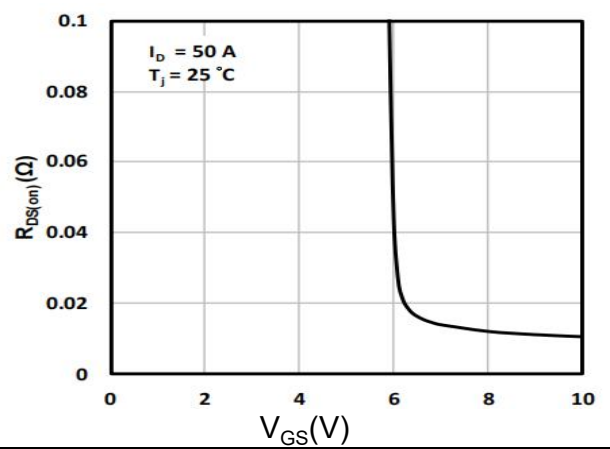


Fig.4 On-resistance vs. drain current

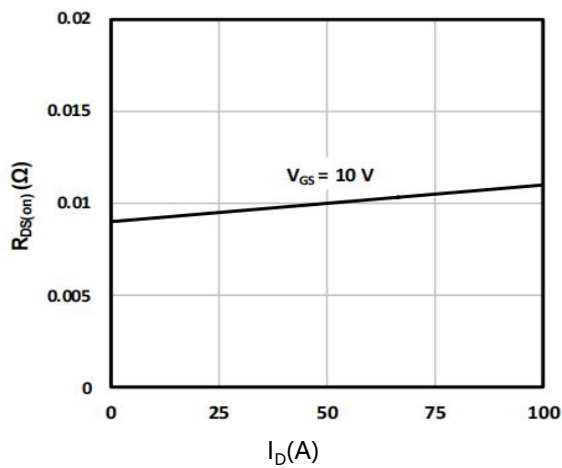


Fig.5 Source-to-drain diode forward characteristics

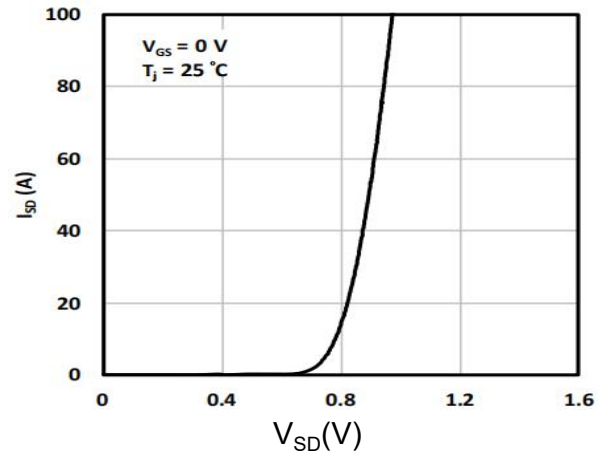


Fig.6 Capacitance vs. drain-to-source voltage

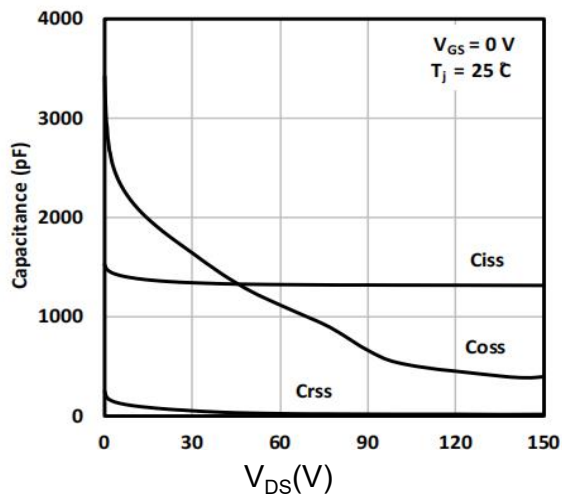


Fig. 7 Maximum drain current vs. case temperature

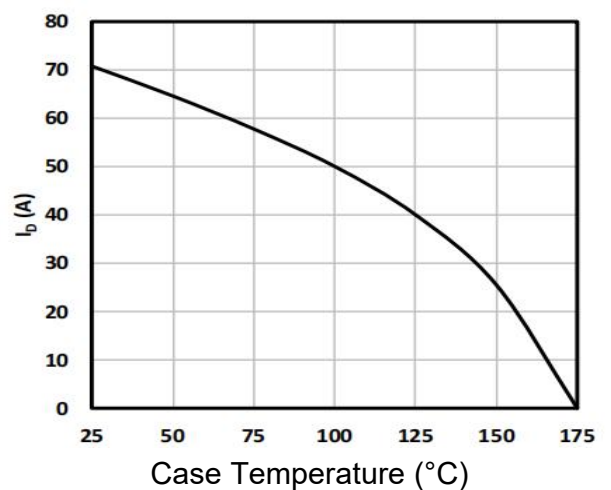
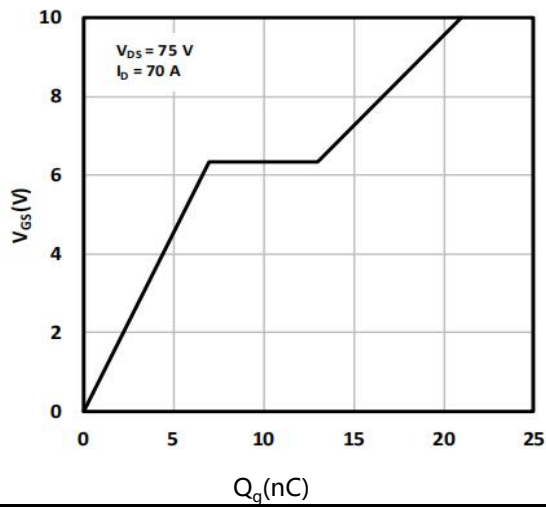
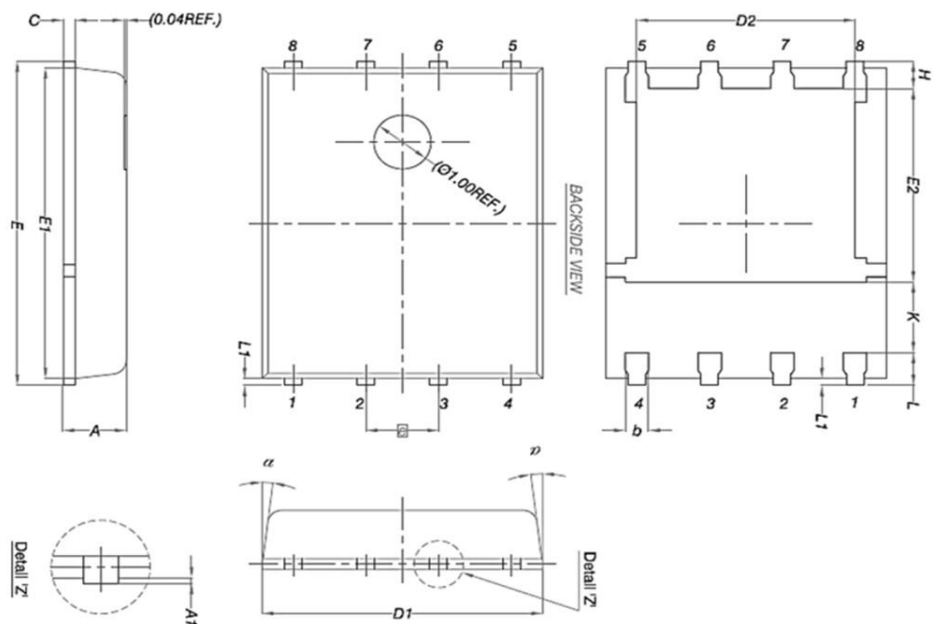


Fig.8 Gate-to-source voltage Vs. gate charge



**Table10** Package Drawing

| DIM.     | MILLIMETERS |      |      |
|----------|-------------|------|------|
|          | Min.        | Typ. | Max. |
| A        | 0.90        | 1.00 | 1.10 |
| A1       | 0.00        | —    | 0.05 |
| b        | 0.33        | 0.41 | 0.51 |
| C        | 0.20        | 0.25 | 0.30 |
| D1       | 4.80        | 4.90 | 5.00 |
| D2       | 3.61        | 3.81 | 3.96 |
| E        | 5.90        | 6.00 | 6.10 |
| E1       | 5.70        | 5.75 | 5.80 |
| E2       | 3.38        | 3.58 | 3.78 |
| e        | 1.27BSC     |      |      |
| H        | 0.41        | 0.51 | 0.61 |
| K        | 1.10        | —    | —    |
| L        | 0.51        | 0.61 | 0.71 |
| L1       | 0.06        | 0.13 | 0.20 |
| $\alpha$ | 0°          | —    | 12°  |



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