

**MOSFETs Silicon 30V N-Channel MOS**
**■ Applications**

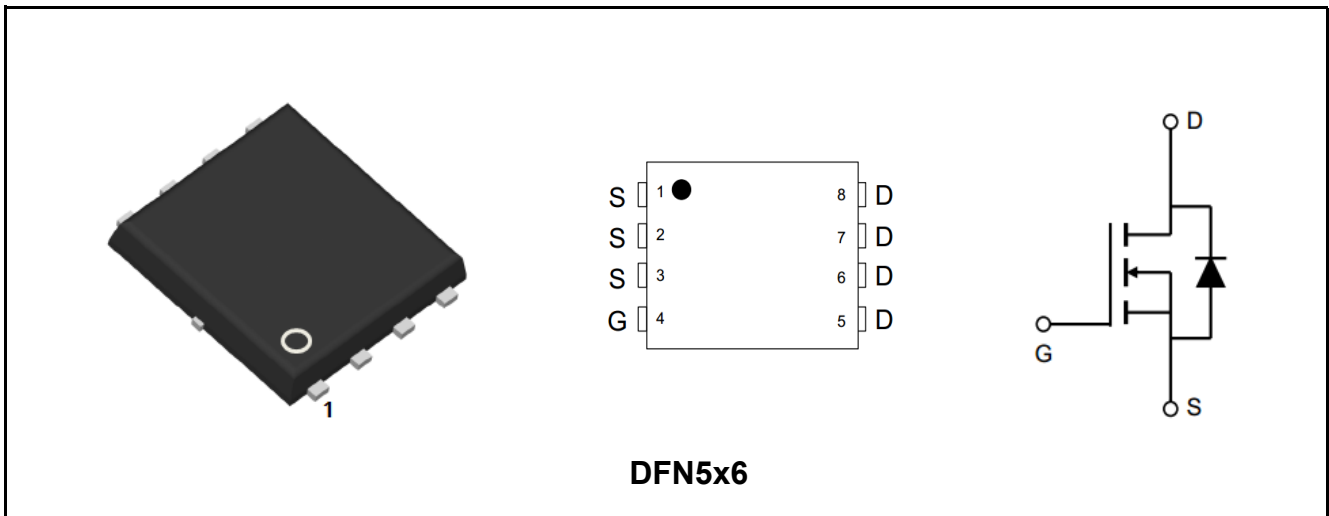
- Synchronous Rectification
- Industrial and Motor Drive
- DC/DC Converters
- Power Tools

**■ Features**

- High-Speed Switching
- Low  $R_{DS(ON)}$
- Enhanced Body diode dv/dt capability
- Enhanced Avalanche Ruggedness
- Lead and Halogen-Free Compliant
- 100% UIS and RG Tested

**■ Product Summary**

|                        |      |            |
|------------------------|------|------------|
| $V_{DS}$               | 30   | V          |
| $I_D$                  | 340  | A          |
| $R_{DS(ON), Typ@10V}$  | 0.55 | m $\Omega$ |
| $R_{DS(ON), Typ@4.5V}$ | 0.85 | m $\Omega$ |
| $Q_g$                  | 115  | nC         |



| Marking      | Package | Packaging   | Min. package quantity |
|--------------|---------|-------------|-----------------------|
| MDG0D7R030SL | DFN5X6  | Tape & Reel | 5000                  |



**■ Absolute Maximum Ratings (Tc=25°C unless otherwise noted)**

| Parameter                                  | Symbol    | Ratings | Unit |
|--|-----------|---------|------|
| Drain-Source Voltage                       | $V_{DS}$  | 30      | V    |
| Gate-Source Voltage                        | $V_{GS}$  | ±20     | V    |
| Continuous Drain Current Tc=25°C (Note 1)  | $I_D$     | 340     | A    |
| Continuous Drain Current Tc=100°C (Note 1) |           | 215     | A    |
| Drain Current-Pulsed (Note 1)              | $I_{DM}$  | 1000    | A    |
| Total Dissipation                          | $P_D$     | 120     | W    |
| Junction Temperature                       | $T_J$     | 150     | °C   |
| Storage Temperature                        | $T_{stg}$ | -55-150 | °C   |
| Single Pulse Avalanche Energy (Note 2)     | $E_{AS}$  | 180     | mJ   |

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

**■ Thermal Characteristics**

| Parameter                            | Symbol          | Max  | Unit |
|--------------------------------------|-----------------|------|------|
| Maximum Junction-to-Case             | $R_{\theta JC}$ | 1.05 | °C/W |
| Maximum Junction-to-Ambient (Note 3) | $R_{\theta JA}$ | 60   | °C/W |

Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2:  $V_{DD}=30V$ ,  $T_{ch}=25^\circ C$  (initial),  $L=0.1mH$ ,  $R_g=25\Omega$ .

Note 3: The value of  $R_{\theta JA}$  is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ C$ . The value in any given application depends on the user's specific board design.

Note: This transistor is sensitive to electrostatic discharge and should be handled with care.



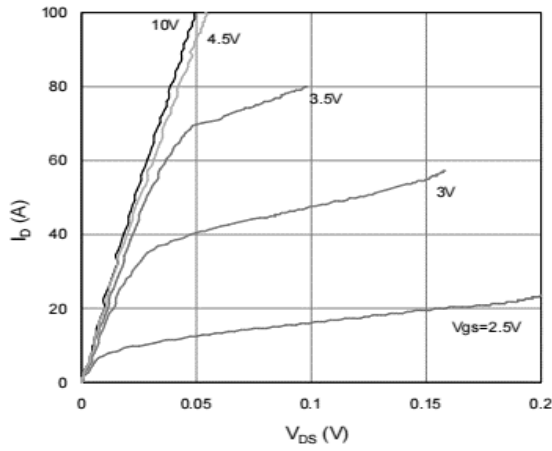
**■ Electrical Characteristics (Tc=25°C unless otherwise noted)**

| Parameter                           | Symbol       | Test Condition                                      | Min | Typ  | Max       | Unit       |
|-------------------------------------|--------------|---|-----|------|-----------|------------|
| <b>Static Parameters</b>            |              |   |     |      |           |            |
| Drain-Source Breakdown Voltage      | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                           | 30  | -    | -         | V          |
| Drain-Source Leakage Current        | $I_{DSS}$    | $V_{DS}=30V, V_{GS}=0V$                             | -   | -    | 1         | $\mu A$    |
| Gate-Body Leakage Current           | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                         | -   | -    | $\pm 100$ | nA         |
| Gate Threshold Voltage              | $V_{GS(TH)}$ | $V_{GS}=V_{DS}, I_D=250\mu A$                       | 1   | 1.6  | 2.4       | V          |
| Drain-Source On Resistance          | $R_{DS(ON)}$ | $V_{GS}=4.5V, I_D=15A$                              | -   | 0.85 | 1.1       | m $\Omega$ |
|                                     |              | $T_j=125^\circ C$                                   | -   | 1.2  | -         |            |
|                                     |              | $V_{GS}=10V, I_D=20A$                               | -   | 0.55 | 0.7       |            |
|                                     |              | $T_j=125^\circ C$                                   | -   | 0.8  | -         |            |
| <b>Dynamic Characteristics</b>      |              |   |     |      |           |            |
| Input Capacitance                   | $C_{iss}$    | $V_{DS}=15V, V_{GS}=0V,$<br>$f=1.0MHz$              | -   | 6260 | -         | pF         |
| Output Capacitance                  | $C_{oss}$    |   | -   | 3000 | -         | pF         |
| Reverse Transfer Capacitance        | $C_{rss}$    |   | -   | 450  | -         | pF         |
| Gate Resistance                     | $R_g$        | $V_{DS}=0V, V_{GS}=0V,$<br>$f=1.0MHz$               | -   | 0.95 | -         | $\Omega$   |
| <b>Switching Paramters</b>          |              |   |     |      |           |            |
| Turn-On Delay Time                  | $t_{d(on)}$  | $V_{DS}=15V, I_D=20A,$<br>$V_{GS}=10V, R_G=3\Omega$ | -   | 18   | -         | ns         |
| Turn-On Rise Time                   | $t_r$        |   | -   | 15   | -         | ns         |
| Turn-Off Delay Time                 | $t_{d(off)}$ |   | -   | 46   | -         | ns         |
| Turn-Off Rise Time                  | $t_f$        |   | -   | 11   | -         | ns         |
| Total Gate Charge                   | $Q_g$        | $V_{DS}=15V, I_D=20A,$<br>$V_{GS}=10V$              | -   | 115  | -         | nC         |
| Gate-Source Charge                  | $Q_{gs}$     |   | -   | 11   | -         | nC         |
| Gate-Drain Charge                   | $Q_{gd}$     |   | -   | 25   | -         | nC         |
| <b>Source-Drain Characteristics</b> |              |   |     |      |           |            |
| Diode Forward Voltage               | $V_{sd}$     | $V_{GS}=0V, I_S=20A$                                | -   | 0.8  | 1.2       | V          |
| Reverse Recovery Time               | $t_{rr}$     | $V_R=15V, I_F=20A,$<br>$di/dt=100A/\mu s$           | -   | 62   | -         | ns         |
| Reverse Recovery Charge             | $Q_{rr}$     |   | -   | 68   | -         | nC         |

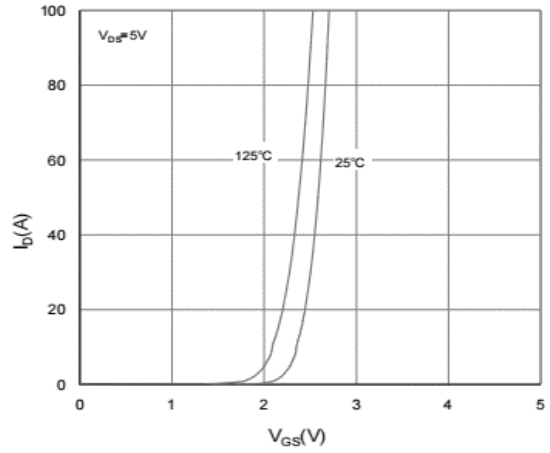




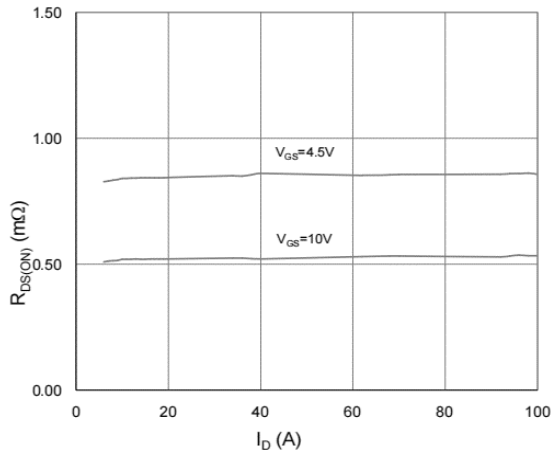
■ Characteristics Curves



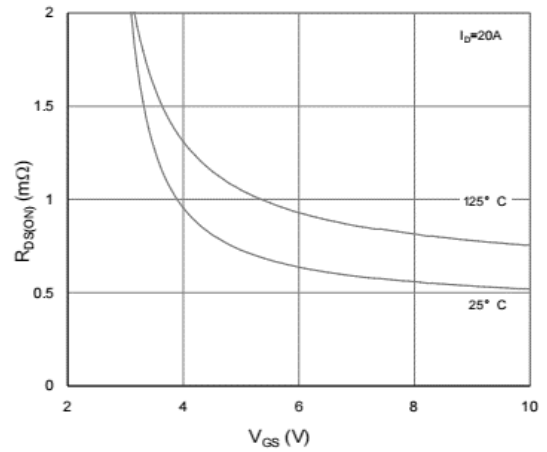
Output Characteristics



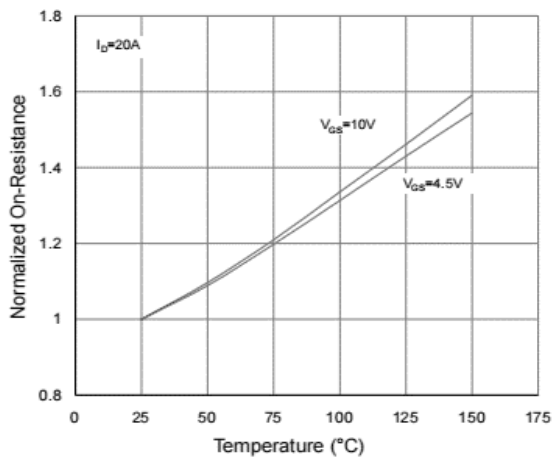
Transfer Characteristics



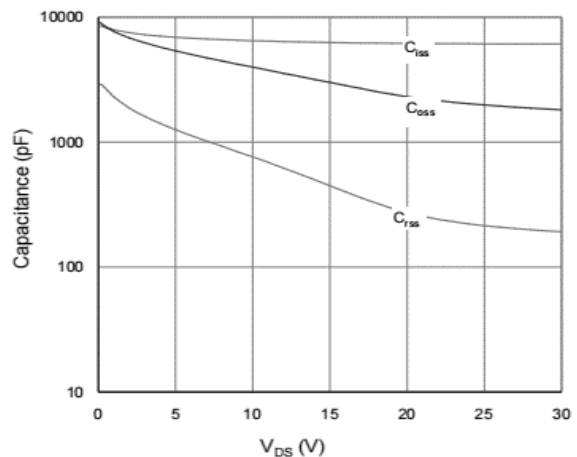
On Resistance Vs Drain Current



On Resistance Vs Gate Source Voltage

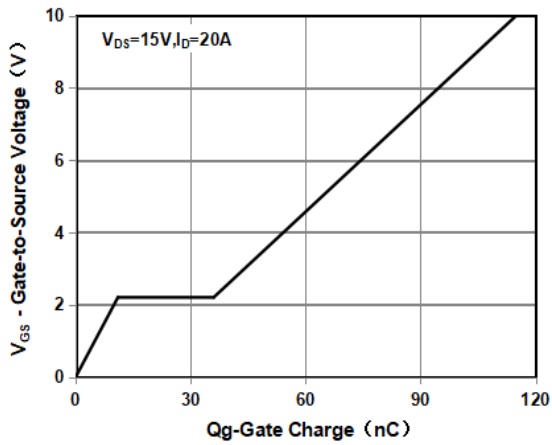


Rdson-Junction Temperature

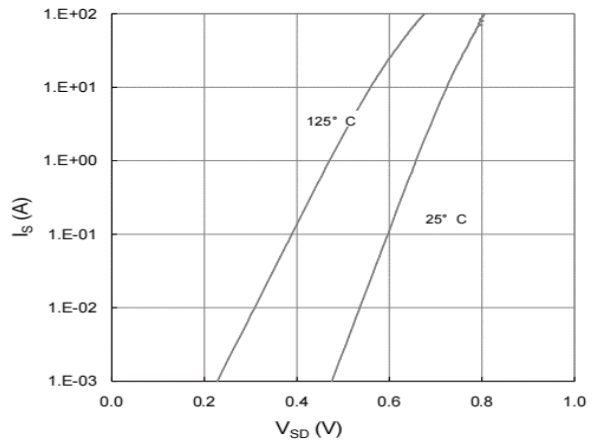


Capacitance

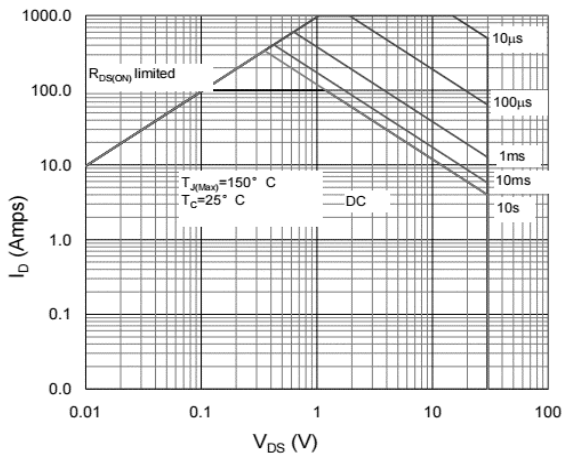




Gate Charge Waveform



Source-Drain Diode Forward Voltage



Maximum Safe Operating Area

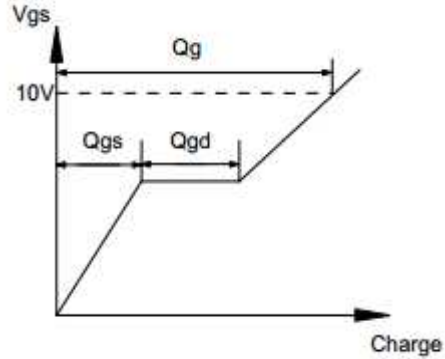
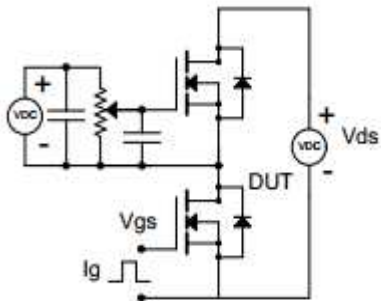
Note : The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



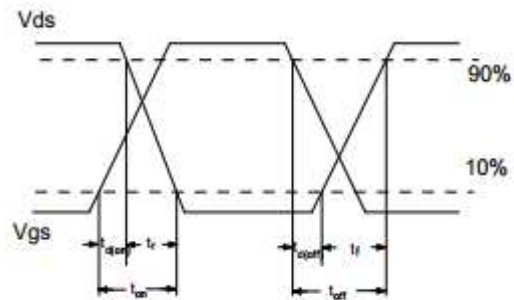
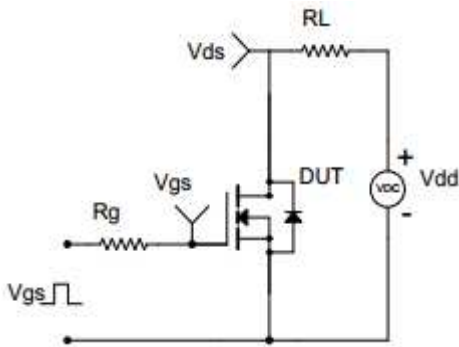


■ Test Circuit & Waveform

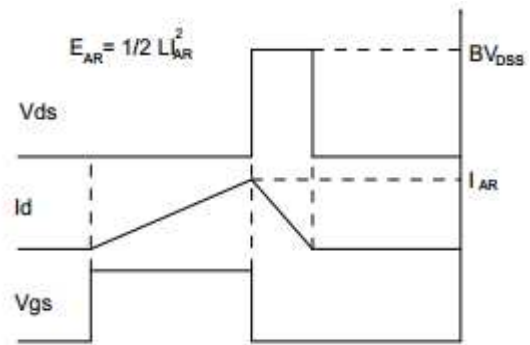
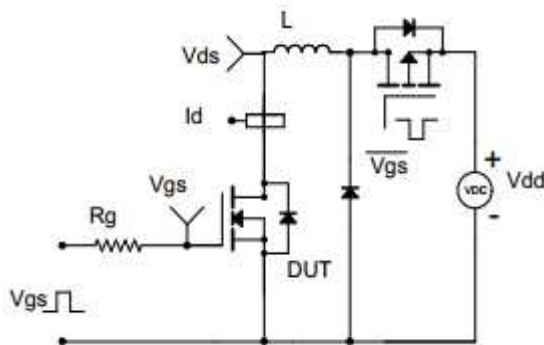
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform





DFN5x6 Package Dimensions

Unit: mm

| Symbol | Min  | Nom | Max  | Symbol   | Min  | Nom | Max  |
|--------|------|-----|------|----------|------|-----|------|
| A      | 0.90 |     | 1.10 | k        | 1.15 |     | 1.35 |
| A3     | 0.15 |     | 0.30 | b        | 0.20 |     | 0.40 |
| D      | 4.90 |     | 5.10 | e        | 1.15 |     | 1.35 |
| D1     | 3.90 |     | 4.10 | L        | 0.50 |     | 0.65 |
| D2     | 4.75 |     | 5.05 | L1       | 0.43 |     | 0.55 |
| E      | 5.85 |     | 6.15 | H        | 0.55 |     | 0.68 |
| E1     | 3.35 |     | 3.55 | $\theta$ | 8°   |     | 12°  |
| E2     | 5.55 |     | 5.85 |          |      |     |      |

