

MDU5692S

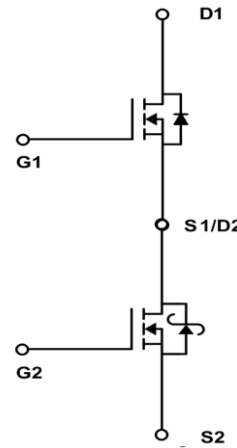
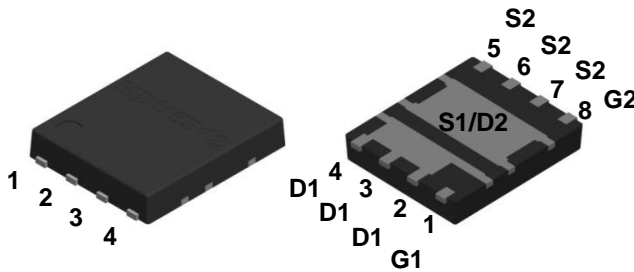
Dual Asymmetric N-channel Trench MOSFET 30V

General Description

The MDU5692S uses advanced MagnaChip's MOSFET Technology, which provides high performance in on-state resistance, fast switching performance and excellent quality. MDU5692S is suitable for DC/DC converter and general purpose applications.

Features

- | | |
|---|--|
| FET1 <ul style="list-style-type: none"> ▫ $V_{DS} = 30V$ ▫ $I_D = 52A$ ▫ $R_{DS(ON)} < 5.4m\Omega$ ▫ $< 8.5m\Omega$ ▫ 100% UIL Tested ▫ 100% Rg Tested | FET2 <ul style="list-style-type: none"> $V_{DS} = 30V$ $I_D = 100A @ V_{GS} = 10V$ $< 2.0m\Omega @ V_{GS} = 10V$ $< 2.5m\Omega @ V_{GS} = 4.5V$ |
|---|--|



Absolute Maximum Ratings (Ta = 25°C)

| Characteristics | | Symbol | FET1 | FET2 | Unit |
|--|------------------------------------|----------------|---------|------|------|
| Drain-Source Voltage | | V_{DSS} | 30 | | V |
| Gate-Source Voltage | | V_{GSS} | ±20 | ±12 | V |
| Continuous Drain Current ⁽¹⁾ | $T_C=25^\circ C$ (Silicon Limited) | I_D | 70 | 160 | A |
| | $T_C=25^\circ C$ (Package Limited) | | 52 | 100 | |
| | $T_C=70^\circ C$ | | 57 | 129 | |
| | $T_A=25^\circ C$ | | 15.3 | 27.9 | |
| | $T_A=70^\circ C$ | | 12.4 | 22.4 | |
| Pulsed Drain Current | | I_{DM} | 208 | 400 | A |
| Power Dissipation | $T_C=25^\circ C$ | P_D | 46.3 | 83.3 | W |
| | $T_A=25^\circ C$ | | 2.2 | 2.5 | |
| Single Pulse Avalanche Energy ⁽²⁾ | | E_{AS} | 43 | 100 | mJ |
| Junction and Storage Temperature Range | | T_J, T_{stg} | -55~150 | | °C |

Thermal Characteristics

| Characteristics | Symbol | FET1 | | FET2 | | Unit |
|--|-----------------|------|-----|------|-----|------|
| | | Typ. | Max | Typ. | Max | |
| Thermal Resistance, Junction-to-Ambient ⁽¹⁾ | $R_{\theta JA}$ | 47.5 | 57 | 41.7 | 50 | °C/W |
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 2.2 | 2.7 | 1.1 | 1.5 | |

Ordering Information

| Part Number | Temp. Range | Package | Packing | RoHS Status |
|-------------|-------------|-------------|-------------|--------------|
| MDU5692SVRH | -55~150°C | Dual PDFN56 | Tape & Reel | Halogen Free |

FET1 Electrical Characteristics (Ta =25°C)

| Characteristics | Symbol | Test Condition | Min | Typ | Max | Unit |
|--|---------------|--|------|------|-----------|------------|
| Static Characteristics | | | | | | |
| 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 | 1.8 | 3.0 | |
| Drain Cut-Off Current | I_{DSS} | $V_{DS} = 30V, V_{GS} = 0V$ | - | - | 1 | μA |
| Gate Leakage Current | I_{GSS} | $V_{GS} = \pm 20V, V_{DS} = 0V$ | - | - | ± 0.1 | |
| Drain-Source ON Resistance | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 20A$ | - | 4.4 | 5.4 | m Ω |
| | | $T_J = 125^\circ C$ | - | 6.8 | 8.3 | |
| | | $V_{GS} = 4.5V, I_D = 20A$ | - | 6.7 | 8.5 | |
| Forward Transconductance | g_{fs} | $V_{DS} = 5V, I_D = 20A$ | - | 91 | - | S |
| Dynamic Characteristics | | | | | | |
| Total Gate Charge | $Q_{g(10V)}$ | $V_{DS} = 15.0V, I_D = 20A, V_{GS} = 10V$ | 14 | 20 | 27 | nC |
| Total Gate Charge | $Q_{g(4.5V)}$ | | 6.2 | 9 | 12 | |
| Gate-Source Charge | Q_{gs} | | - | 6 | - | |
| Gate-Drain Charge | Q_{gd} | | - | 1.9 | - | |
| Input Capacitance | C_{iss} | $V_{DS} = 15.0V, V_{GS} = 0V, f = 1.0MHz$ | 1040 | 1500 | 1950 | pF |
| Output Capacitance | C_{oss} | | 418 | 610 | 790 | |
| Reverse Transfer Capacitance | C_{rss} | | 28 | 42 | 55 | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{GS} = 10V, V_{DS} = 15V, I_D = 20A, R_g = 3.0\Omega$ | - | 10.5 | - | ns |
| Rise Time | t_r | | - | 11.3 | - | |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 28.5 | - | |
| Fall Time | t_f | | - | 5.1 | - | |
| Gate Resistance | R_g | $f = 1 MHz$ | 0.5 | 1.0 | 2.0 | Ω |
| Drain-Source Body Diode Characteristics | | | | | | |
| 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} | $I_F = 20A, dI/dt = 200A/\mu s$ | - | 30.5 | - | ns |
| Body Diode Reverse Recovery Charge | Q_{rr} | | - | 42.9 | - | nC |

Note :

- Surface mounted FR-4 board by JEDEC (jesd51-7). Continuous current at $T_C = 25^\circ C$ is silicon limited.
- E_{AS} is tested at starting $T_J = 25^\circ C, L = 0.1mH, I_{AS} = 20 A, V_{DD} = 27V, V_{GS} = 10V$.

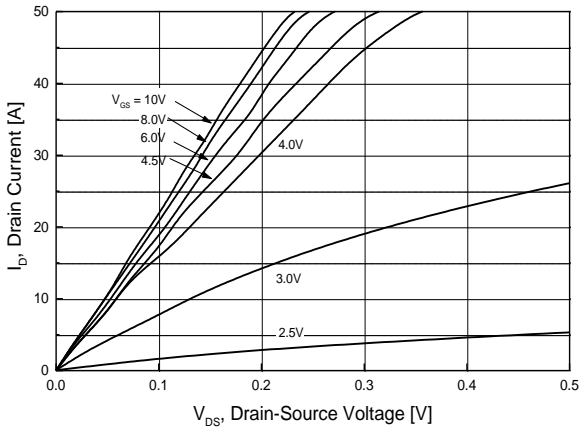


Fig.1 On-Region Characteristics

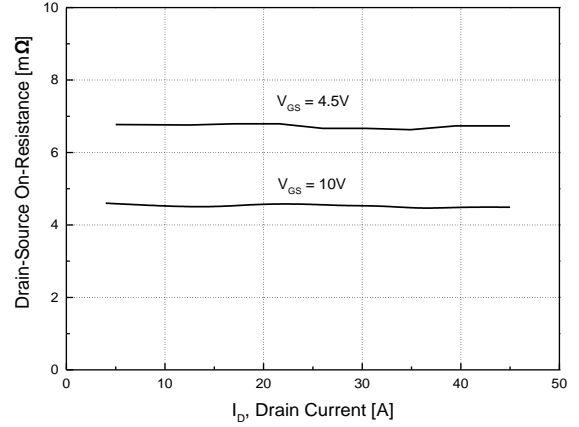


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

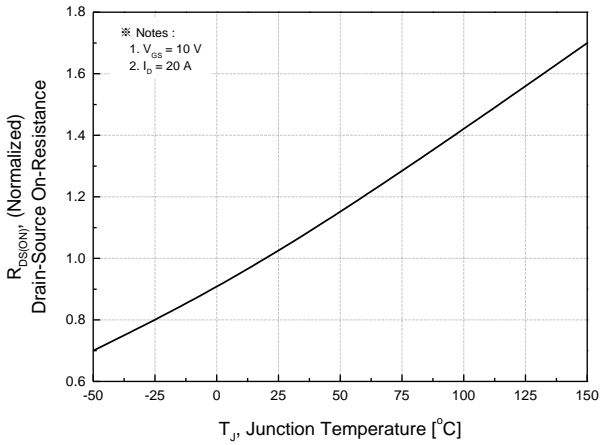


Fig.3 On-Resistance Variation with Temperature

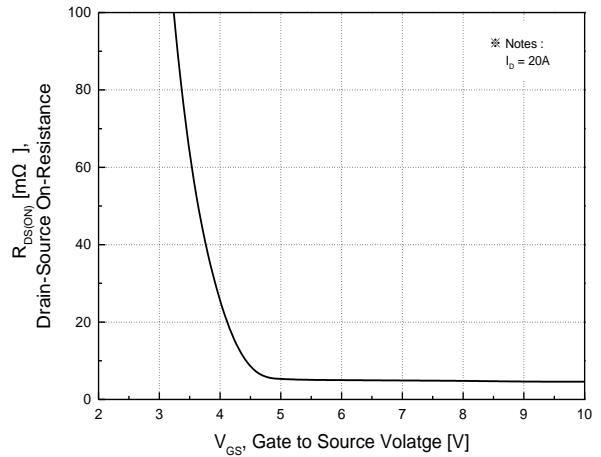


Fig.4 On-Resistance Variation with Gate to Source Voltage

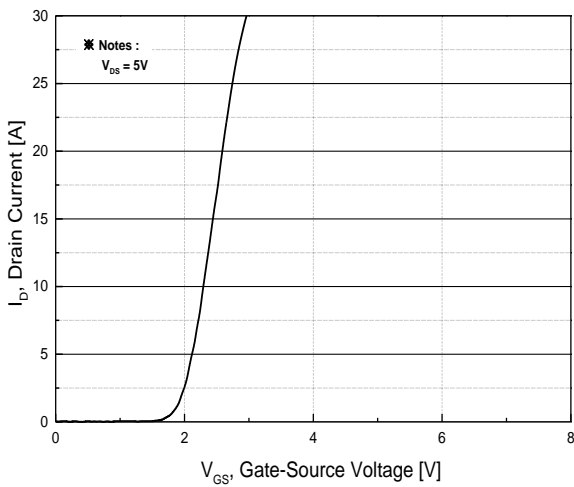


Fig.5 Transfer Characteristics

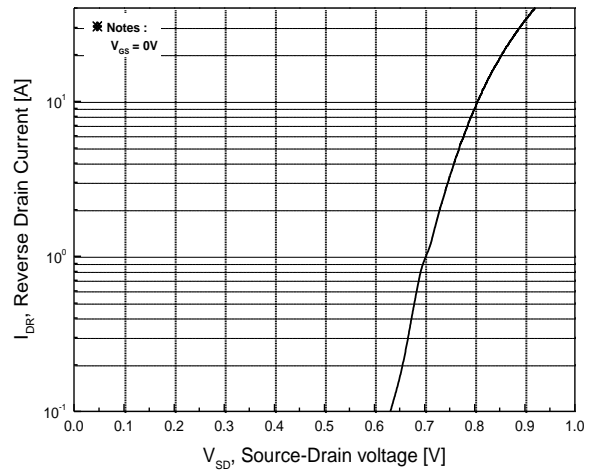


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

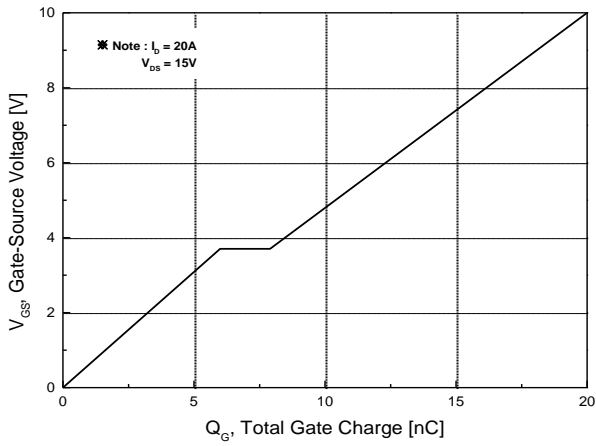


Fig.7 Gate Charge Characteristics

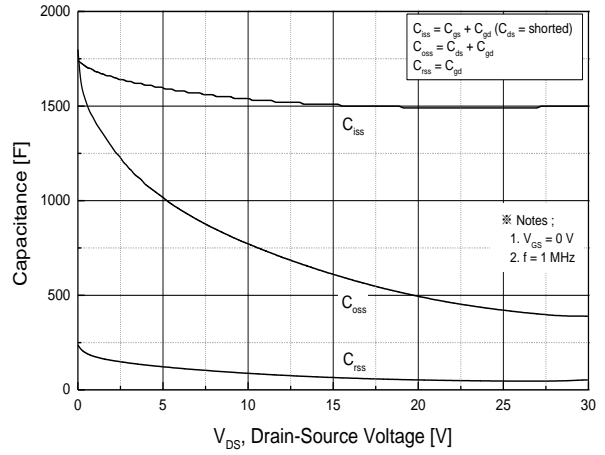


Fig.8 Capacitance Characteristics

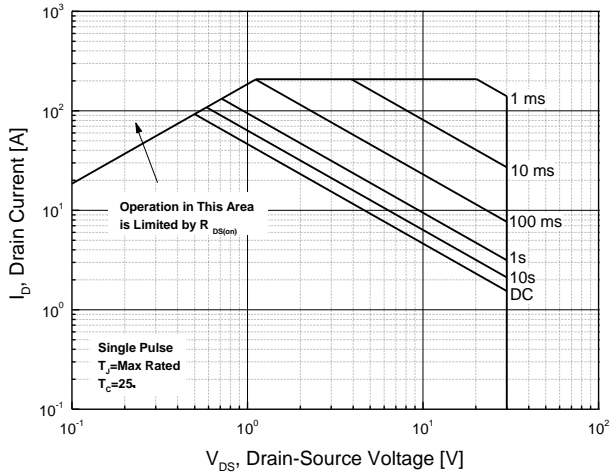


Fig.9 Maximum Safe Operating Area

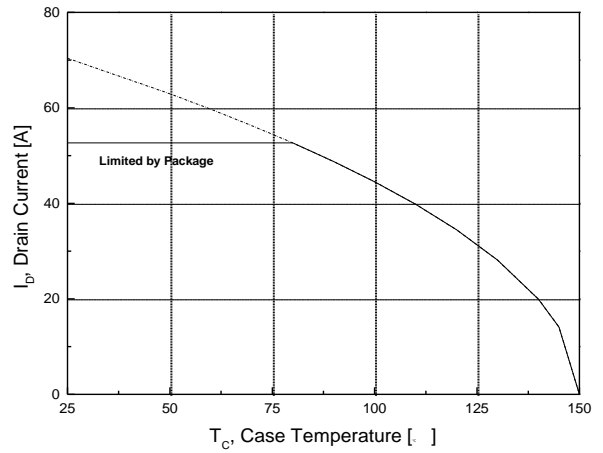


Fig.10 Maximum Drain Current vs. Case Temperature

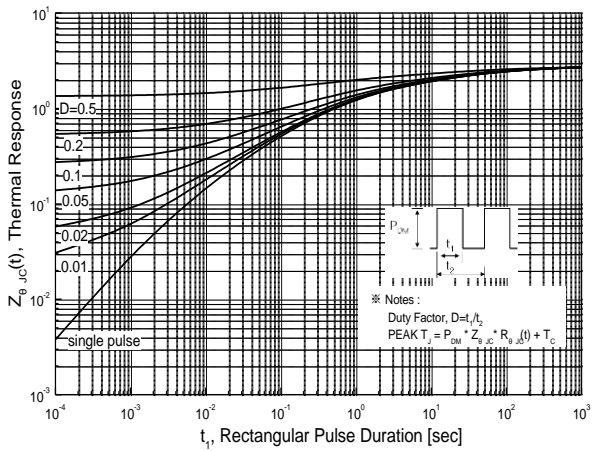


Fig.11 Transient Thermal Response Curve

FET2 Electrical Characteristics (Ta =25°C)

| Characteristics | Symbol | Test Condition | Min | Typ | Max | Unit |
|--|---------------|--|------|------|-----------|------------|
| Static Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $I_D = 10mA, V_{GS} = 0V$ | 30 | - | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 1.1 | 1.4 | 2.2 | |
| Drain Cut-Off Current | I_{DSS} | $V_{DS} = 30V, V_{GS} = 0V$ | - | - | 500 | μA |
| Gate Leakage Current | I_{GSS} | $V_{GS} = \pm 12V, V_{DS} = 0V$ | - | - | ± 0.1 | |
| Drain-Source ON Resistance | $R_{DS(on)}$ | $V_{GS} = 10V, I_D = 20A$ | - | 1.5 | 2.0 | m Ω |
| | | $T_J = 125^\circ C$ | - | 1.9 | 2.7 | |
| | | $V_{GS} = 4.5V, I_D = 20A$ | - | 1.9 | 2.5 | |
| Forward Transconductance | g_{fs} | $V_{DS} = 5V, I_D = 20A$ | - | 100 | - | S |
| Dynamic Characteristics | | | | | | |
| Total Gate Charge | $Q_{g(10V)}$ | $V_{DS} = 15.0V, I_D = 20A, V_{GS} = 10V$ | 49 | 70 | 92 | nC |
| Total Gate Charge | $Q_{g(4.5V)}$ | | 20 | 29 | 39 | |
| Gate-Source Charge | Q_{gs} | | - | 10.8 | - | |
| Gate-Drain Charge | Q_{gd} | | - | 6.6 | - | |
| Input Capacitance | C_{iss} | $V_{DS} = 15.0V, V_{GS} = 0V, f = 1.0MHz$ | 3573 | 5140 | 6679 | pF |
| Output Capacitance | C_{oss} | | 820 | 1200 | 1560 | |
| Reverse Transfer Capacitance | C_{rss} | | 64 | 94 | 122 | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{GS} = 10V, V_{DD} = 15V, I_D = 20A, R_g = 3\Omega$ | - | 15.7 | - | ns |
| Rise Time | t_r | | - | 12.7 | - | |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 77 | - | |
| Fall Time | t_f | | - | 9.6 | - | |
| Gate Resistance | R_g | $f = 1 MHz$ | 0.5 | 1.0 | 2.0 | Ω |
| Drain-Source Body Diode Characteristics | | | | | | |
| Source-Drain Diode Forward Voltage | V_{SD} | $I_S = 1.0A, V_{GS} = 0V$ | - | 0.4 | 1.0 | V |
| Body Diode Reverse Recovery Time | t_{rr} | $I_F = 20A, di/dt = 200A/\mu s$ | - | 42 | - | ns |
| Body Diode Reverse Recovery Charge | Q_{rr} | | - | 70 | - | nC |

Note :

- Surface mounted FR-4 board by JEDEC (jesd51-7). Continuous current at $T_C = 25^\circ C$ is silicon limited.
- E_{AS} is tested at starting $T_J = 25^\circ C, L = 0.1mH, I_{AS} = 25 A, V_{DD} = 27V, V_{GS} = 10V$.

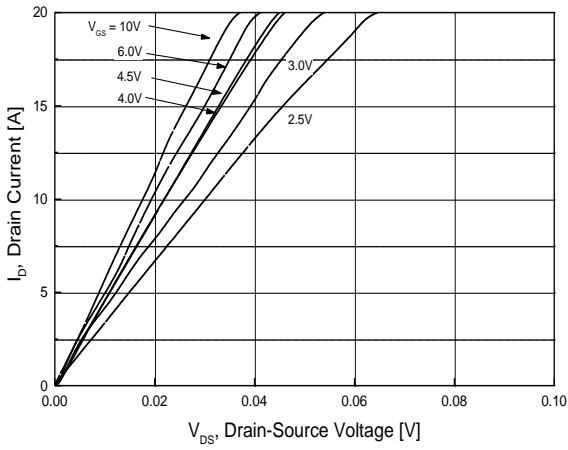


Fig.1 On-Region Characteristics

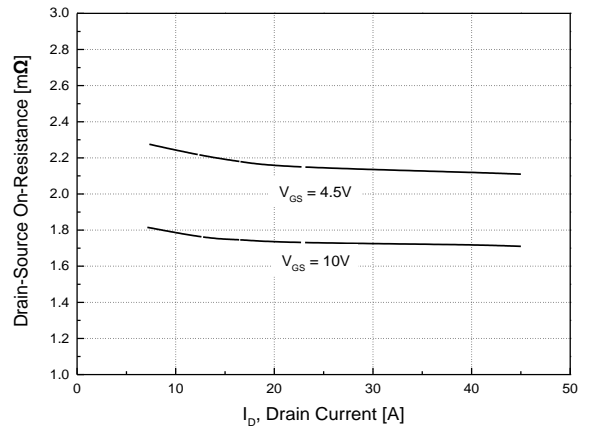


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

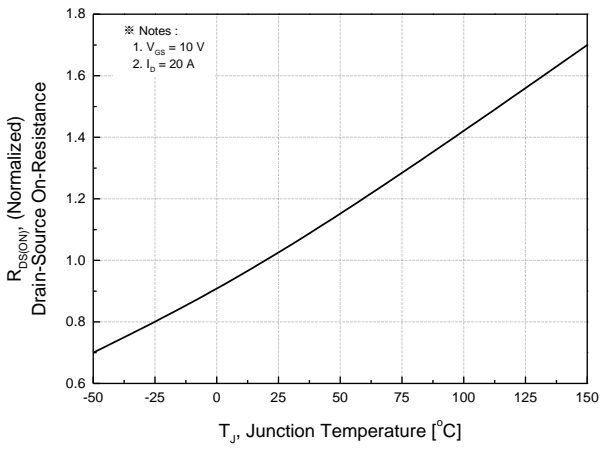


Fig.3 On-Resistance Variation with Temperature

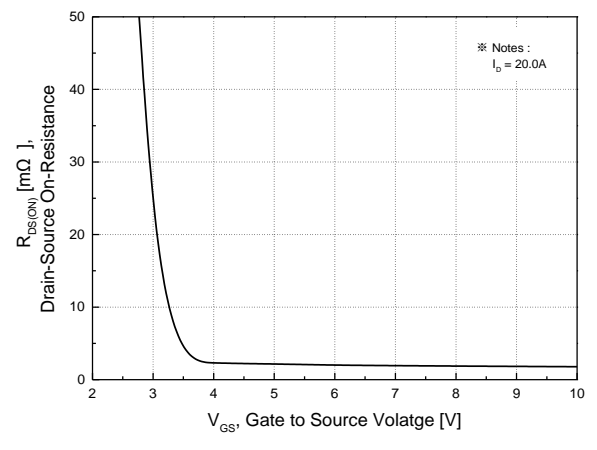


Fig.4 On-Resistance Variation with Gate to Source Voltage

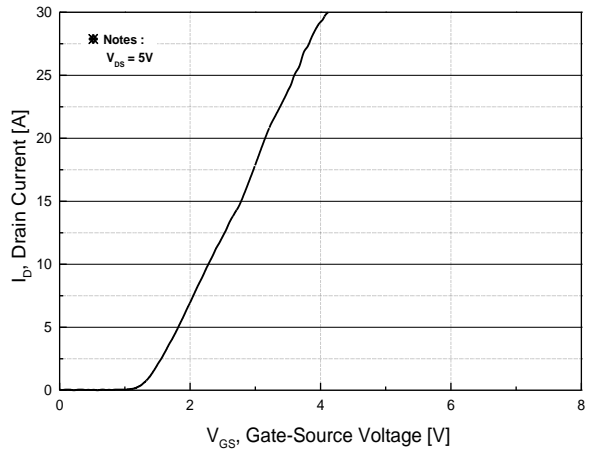


Fig.5 Transfer Characteristics

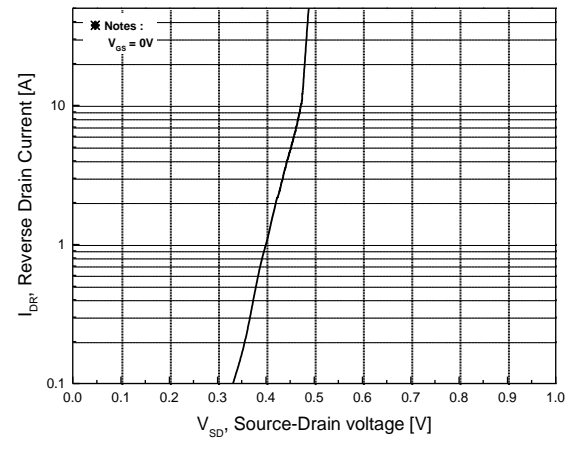


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

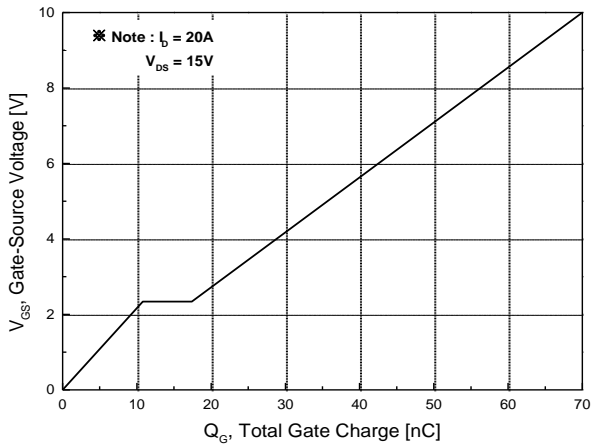


Fig.7 Gate Charge Characteristics

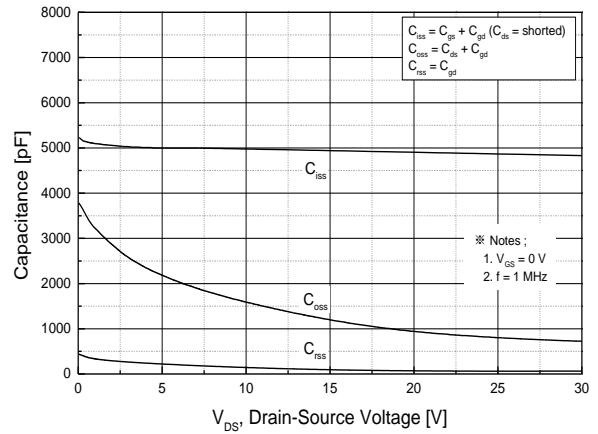


Fig.8 Capacitance Characteristics

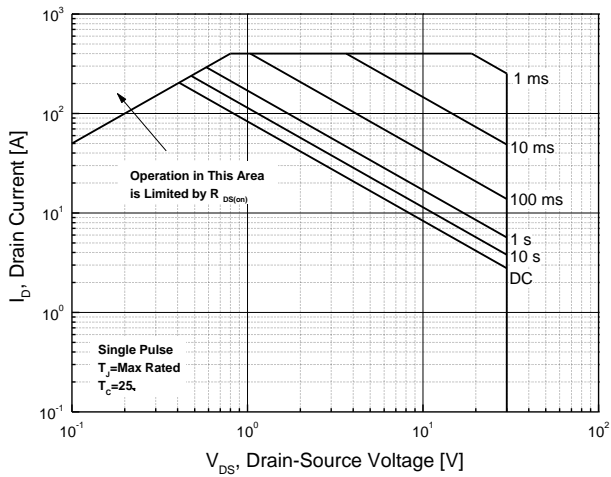


Fig.9 Maximum Safe Operating Area

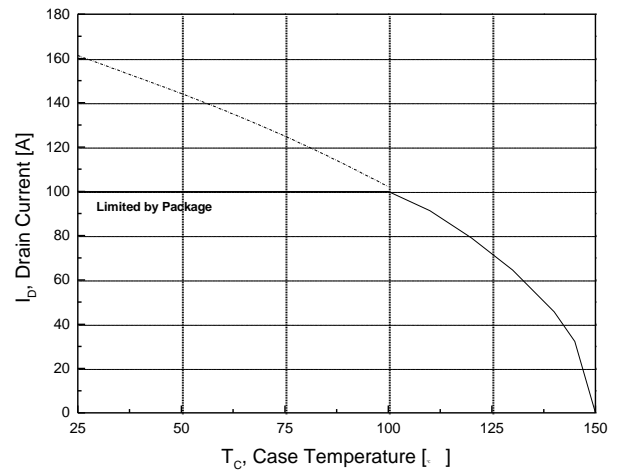


Fig.10 Maximum Drain Current vs. Case Temperature

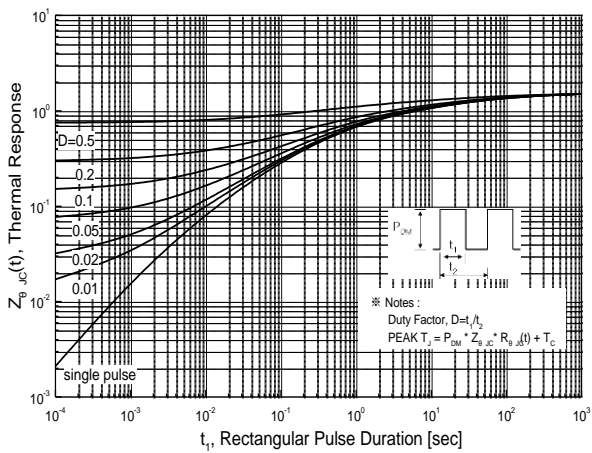
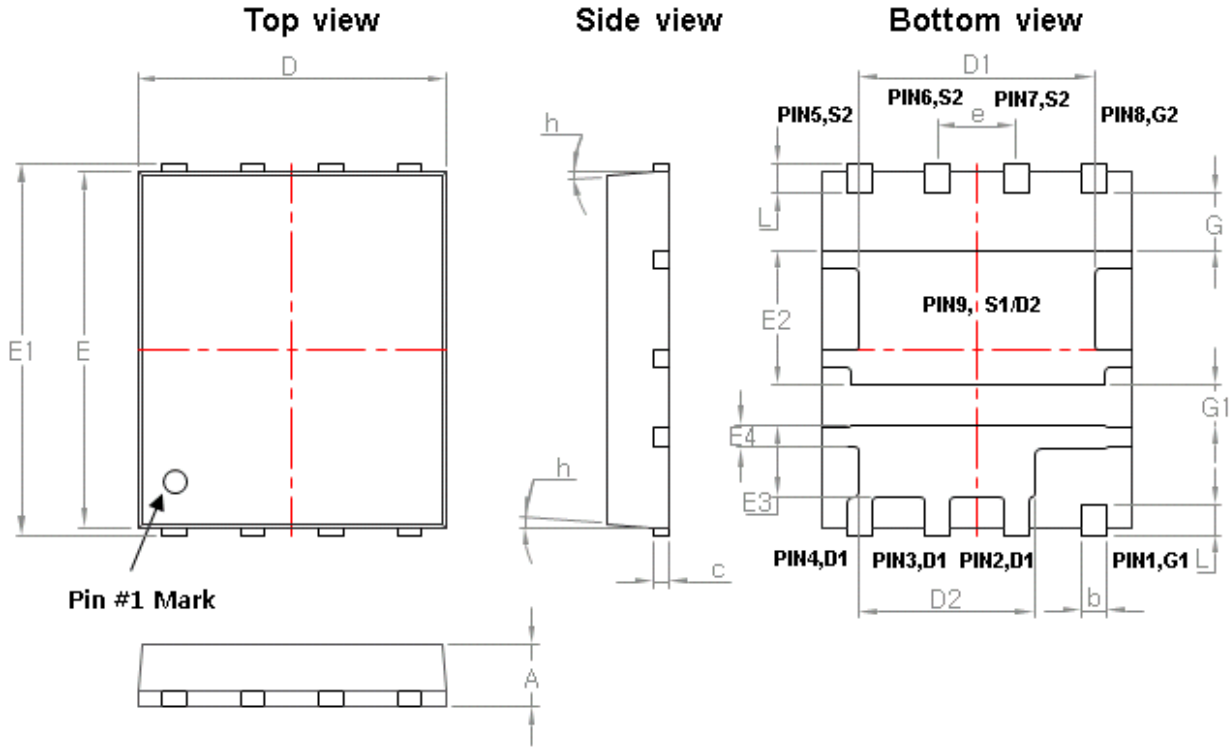


Fig.11 Transient Thermal Response Curve

Package Dimension

Dual PDFN56 (5x6mm)


Dimensions are in millimeters, unless otherwise specified



| Symbol | Dimension [mm] | | |
|--------|----------------|------|------|
| | Min | Nom | Max |
| A | 0.90 | 1.00 | 1.10 |
| b | 0.33 | 0.41 | 0.51 |
| c | 0.20 | 0.25 | 0.30 |
| D | 4.80 | 5.00 | 5.20 |
| D1 | 3.60 | 3.80 | 4.00 |
| D2 | 2.64 | 2.84 | 3.04 |
| E | 5.70 | 5.75 | 5.80 |
| E1 | 5.90 | 6.00 | 6.10 |
| E2 | 2.00 | 2.25 | 2.50 |
| E3 | 1.10 | 1.20 | 1.30 |
| E4 | 0.32 | 0.42 | 0.52 |
| e | 1.27 BSC | | |
| G | 0.50 | 0.90 | 1.30 |
| G1 | 0.40 | 0.60 | 0.80 |
| h | 0° | - | 12° |
| L | 0.38 | 0.55 | 0.71 |

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