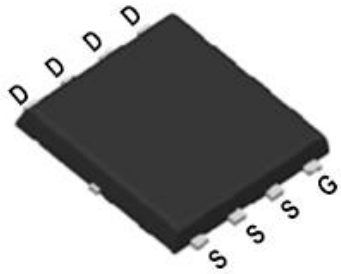
N-channel 100V, 7.5mΩ max.,
SGT MOSFET M1 in PDFN5*6

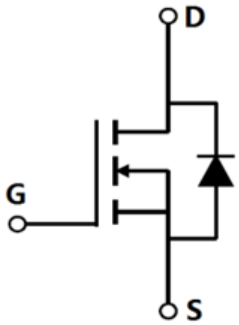
**Datasheet - Preliminary data**

# 1. Descriptions

**PDFN5*6**




**Schematic Diagram**




## Key Performance Parameters

| Parameters | Value | Unit |
|---|---|---|
| $BV_{DSS}$ | 100 | V |
| $R_{DS(on),max}$ | 7.5 | mΩ |
| $Q_{g,typ}$ | 34 | nC |
| $I_{D,pulse}$ | 320 | A |
| $E_{AS}$ | 100 | mJ |

## Features

• Extremely low losses due to very low FOM Rdson*Qg.
• High-speed switching.
• Qualified for industrial grade applications according to JEDEC.
• 100% UIS Tested.

## Applications

High-Efficiency DC-DC Converters, High-Frequency Switching and Synchronous Rectification, Motor Drivers.

| Type/Ordering Code | Package | Marking | Related Links |
|---|---|---|---|
| CSLS075N10M1L | PDFN5*6 | 075N10M1L | see Appendix A |

# Contents

# 2. Maximum Ratings

**at $T_j$ = 25°C, unless otherwise specified**

**Table 1. Absolute Maximum Ratings**

| Symbol | Parameter | Values | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| $V_{DS}$ | Drain-source voltage[1)] | - | - | 100 | V | $V_{GS}$=0V, $I_D$=250μA |
| $I_D$ | Continuous drain current (Silicon Limited) | - | - | 98 | A | $T_C$=25°C |
| $I_{D,pulse}$ | Pulsed drain current | - | - | 320 | A | $T_C$=25°C |
| $E_{AS}$ | Avalanche energy, single pulse[2)] | - | - | 100 | mJ | $I_D$=45A; $V_{DD}$ =50V |
| $I_{AS}$ | Avalanche current | - | - | 45 | A | - |
| $V_{GS}$ | Gate source voltage | -20 | - | 20 | V | static; AC (f>1 Hz) |
| $P_{tot}$ | Power dissipation | - | - | 104 | W | $T_C$=25°C |
| $T_j$, $T_{stg}$ | Operating and storage temperature | -55 | - | 150 | °C | - |
| $I_S$ | Continuous diode forward current | - | - | 98 | A | $T_C$=25°C |
| $I_{S,pulse}$ | Diode pulse current | - | - | 320 | A | $T_C$=25°C |

1) Limited by $T_j$ max. Maximum duty cycle D=0.75.
2) $V_{DD}$=50V, L=0.1mH, $R_G$=25Ω, Starting $T_j$=25°C.

# 3. Thermal Characteristics

**Table 2. Thermal Characteristics**

| Symbol | Parameter | Values | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| $R_{thJC}$ | Thermal resistance, junction - case | - | - | 1.2 | °C/W | $T_C$ = 25°C |
| $R_{thJA}$ | Thermal resistance, junction - ambient | - | - | 65 | °C/W | $T_C$ = 25°C |
| $T_{sold}$ | Soldering temperature, wavesoldering only allowed at leads | - | - | 260 | °C | Lead Temperature (Soldering, 10 sec) |

# 4. Electrical Characteristics

**at Tj = 25°C, unless otherwise specified**

## Table 3. Static Characteristics

| Symbol | Parameter | Values | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| $V_{(BR)DSS}$ | Drain-source breakdown voltage | 100 | - | - | V | $V_{GS}$=0V, $I_D$=250μA |
| $V_{(GS)th}$ | Gate threshold voltage | 1.0 | 1.9 | 2.5 | V | $V_{DS}$=$V_{GS}$, $I_D$=250μA |
| $I_{DSS}$ | Zero gate voltage drain current | - | - | 1 | μA | $V_{DS}$=100V, $V_{GS}$=0V, $T_j$=25°C |
| $I_{GSS}$ | Gate-source leakage current | - | - | ±100 | nA | $V_{GS}$=±20V, $V_{DS}$=0V |
| $R_{DS(on)}$ | Drain-source on-state resistance | - | 6 | 7.5 | mΩ | $V_{GS}$=10V, $I_D$=20A, $T_j$=25°C |
| | | | 8 | 10 | mΩ | $V_{GS}$=4.5V, $I_D$=15A, $T_j$=25°C |
| $R_G$ | Gate resistance | - | 1.9 | - | Ω | $V_{DD}$=0V,$V_{GS}$=0V,$F$=1MHz |
| $g_{fs}$ | Transconductance | | 82 | | S | $V_{DS}$=5V, $I_D$=20A |

## Table 4. Dynamic Characteristics

| Symbol | Parameter | Values | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| $C_{iss}$ | Input capacitance | - | 2150 | - | pF | $V_{GS}$=0V, $V_{DS}$=50V, $f$=1MHz |
| $C_{oss}$ | Output capacitance | - | 440 | - | pF | $V_{GS}$=0V, $V_{DS}$=50V, $f$=1MHz |
| $C_{rss}$ | Reverse transfer capacitance | - | 8 | - | pF | $V_{GS}$=0V, $V_{DS}$=50V, $f$=1MHz |
| $t_{d(on)}$ | Turn-on delay time | - | 13 | - | ns | $V_{DD}$=50V, $V_{GS}$=10V, $I_D$=13A, $R_G$ =6Ω |
| $t_r$ | Rise time | - | 14 | - | ns | $V_{DD}$=50V, $V_{GS}$=10V, $I_D$=13A, $R_G$ =6Ω |
| $t_{d(off)}$ | Turn-off delay time | - | 30 | - | ns | $V_{DD}$=50V, $V_{GS}$=10V, $I_D$=13A, $R_G$ =6Ω |
| $t_f$ | Fall time | - | 18 | - | ns | $V_{DD}$=50V, $V_{GS}$=10V, $I_D$=13A, $R_G$ =6Ω |

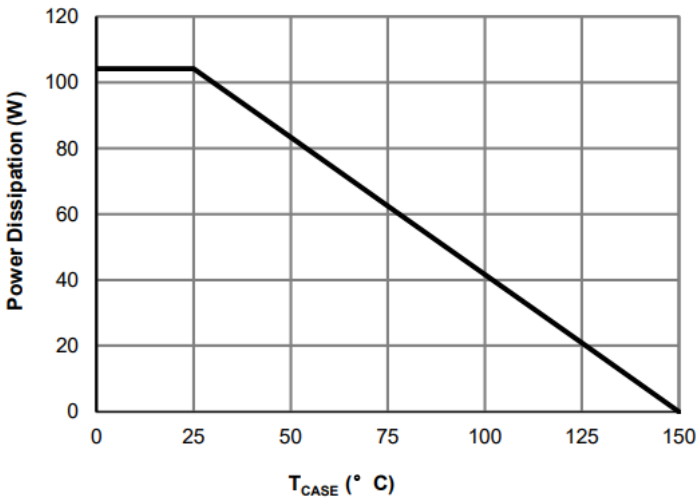
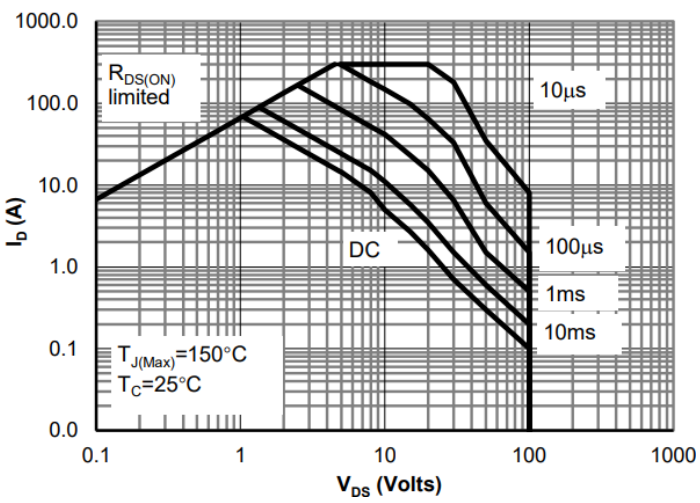
## Table 5. Gate Charge Characteristics

| Symbol | Parameter | Values | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| $Q_{gs}$ | Gate to source charge | - | 5.5 | - | nC | $V_{DD}$=50V, $I_D$=13A, $V_{GS}$=0 to 10V |
| $Q_{gd}$ | Gate to drain charge | - | 5.7 | - | nC | $V_{DD}$=50V, $I_D$=13A, $V_{GS}$=0 to 10V |
| $Q_g$ | Gate charge total | - | 34 | - | nC | $V_{DD}$=50V, $I_D$=13A, $V_{GS}$=0 to 10V |
| $V_{plateau}$ | Gate plateau voltage | - | 2.3 | - | V | $V_{DD}$=50V, $I_D$=13A, $V_{GS}$=0 to 10V |

## Table 6. Reverse Diode Characteristics

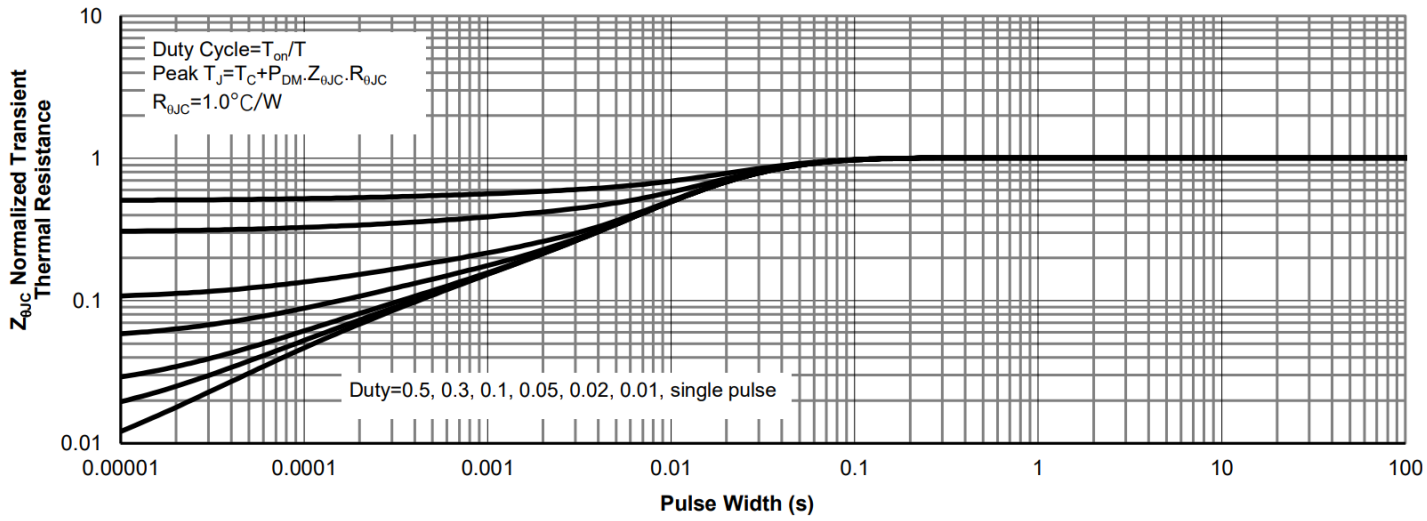
| Symbol | Parameter | Values | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| $V_{SD}$ | Diode forward voltage | - | 0.7 | 1.2 | V | $V_{GS}$=0V, $I_F$=13A, $T_f$=25°C |
| $t_{rr}$ | Reverse recovery time | - | 51 | - | ns | $V_R$=50V, $I_F$=13A, d$i_F$/d$t$=100A/μs |
| $Q_{rr}$ | Reverse recovery charge | - | 90 | - | nC | $V_R$=50V, $I_F$=13A, d$i_F$/d$t$=100A/μs |
| | | | | | | |

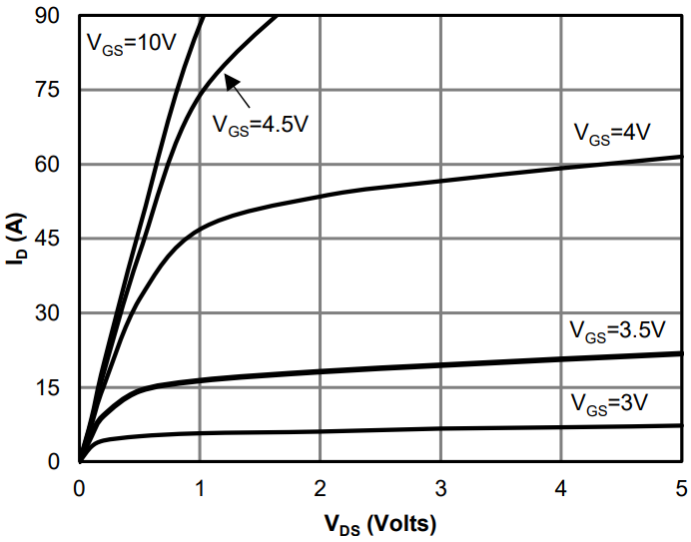
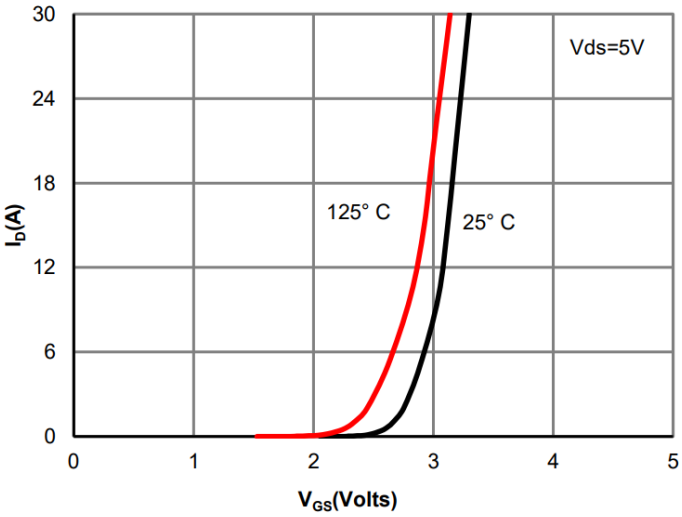
# 5. Electrical Characteristics Diagrams

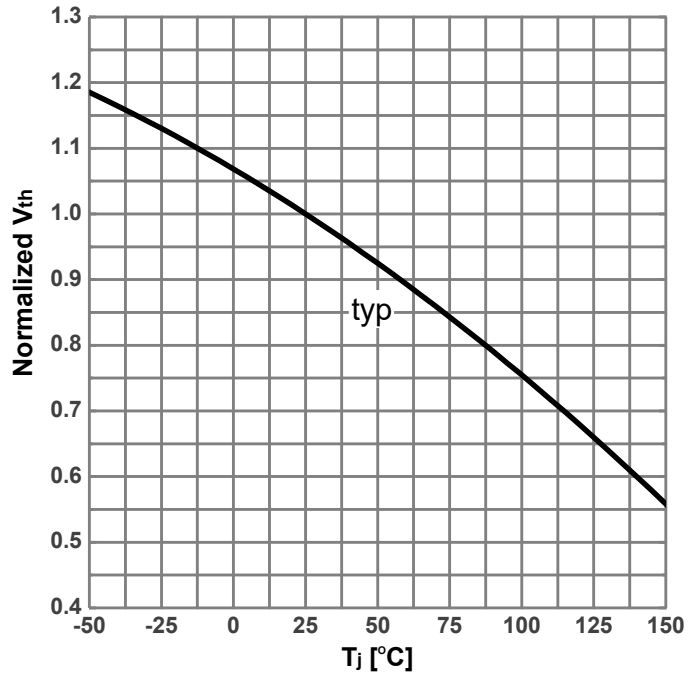
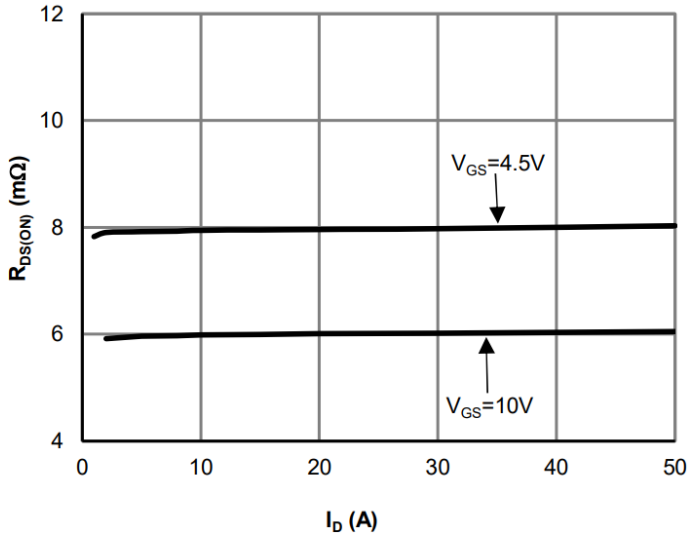
| Diagram 1: Power dissipation | Diagram 2: Max. Safe Operating Area |
|---|---|
|  |  |
| $P_{tot}=f(T_C)$ | $I_D=f(V_{DS})$ |

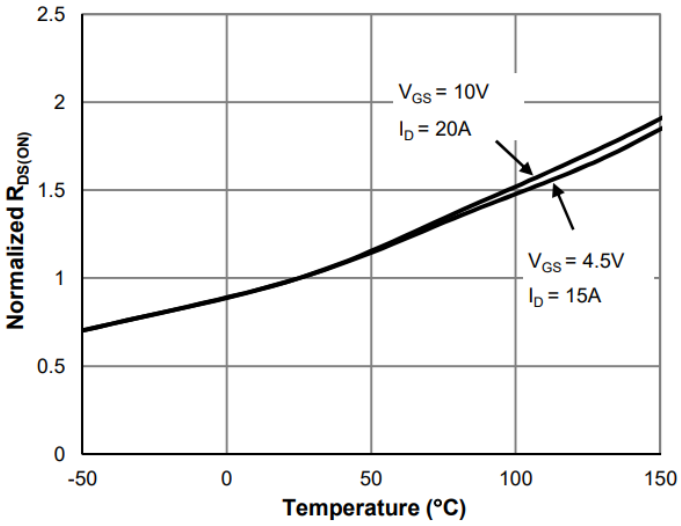
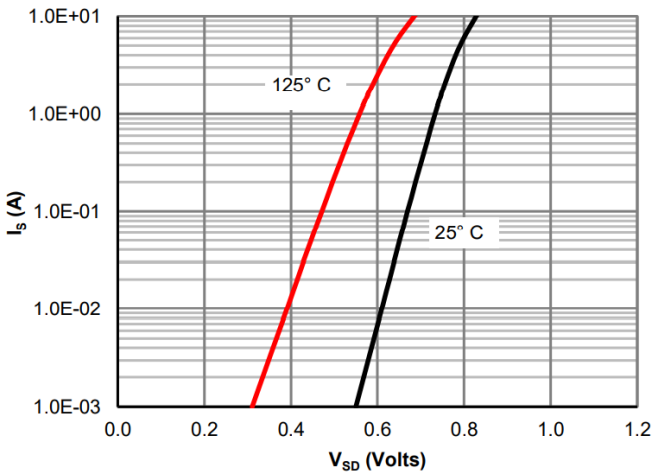


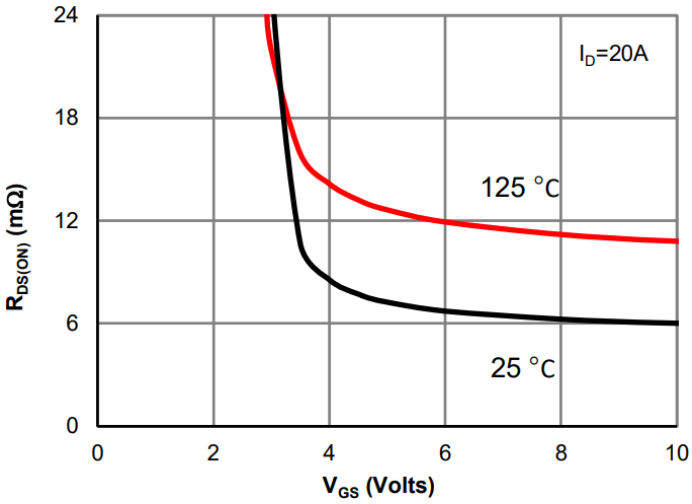
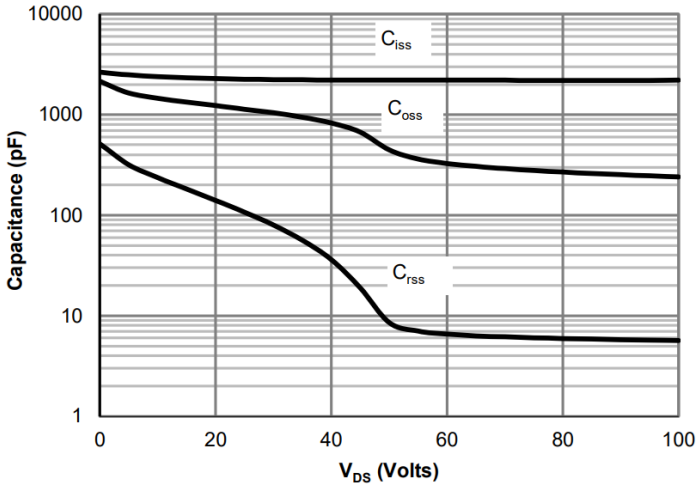


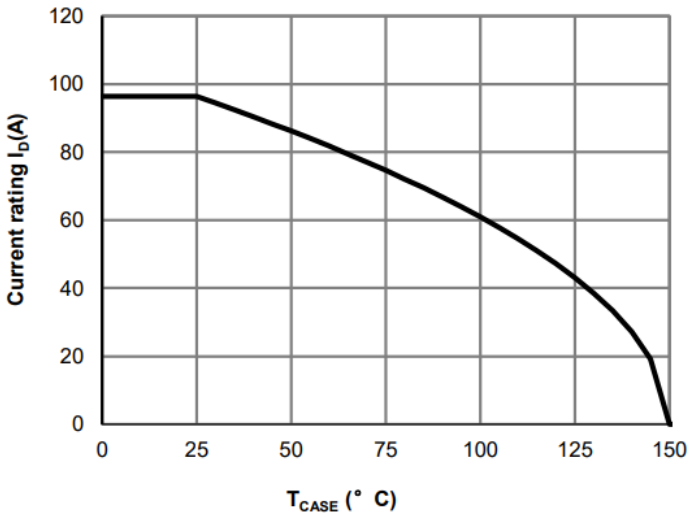
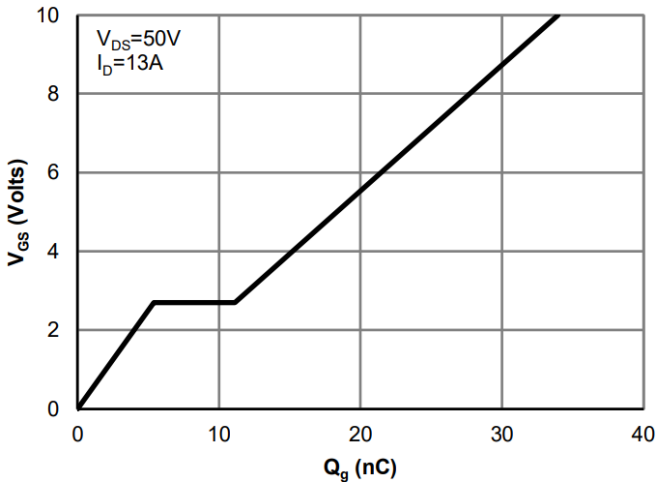
| Diagram 3: Normalized Maximum Transient Thermal Impedance |
|---|
|  |
| $Z_{thJC}=f(t_p)$ |

| Diagram 4: Typ. output characteristics | Diagram 5: Typ. transfer characteristics |
|---|---|
|  |  |
| $I_D$=f($V_{DS}$); $T$j=25°C; parameter: $V_{GS}$ | $I_D$=f($V_{GS}$); $V_{DS}$=5V; parameter: $T_j$ |

| Diagram 6: Gate threshold voltage vs. Junction temperature | Diagram 7: On-state resistance vs. Drain current |
|---|---|
|  |  |
| $V_{th}$=f($T_j$); $I_D$=250μA | $R_{DS}$(on)=f($I_D$); $T$j=25°C; parameter: $V_{GS}$ |

| Diagram 8: On-state resistance vs. Junction temperature | Diagram 9: Forward characteristics of reverse diode |
|---|---|
|  |  |
| $R_{DS}$(on)=f($T_j$) | $I_S$=f($V_{SD}$); parameter: $T_j$ |

| Diagram 10: On-state resistance vs. Vgs characteristics | Diagram 11: Typ. capacitances |
|---|---|
|  |  |
| $R_{DS}$(on)=f($V_{gs}$);$I_D$=20A | $C$=f($V_{DS}$); $V_{GS}$=0V; f=1MHz |

| Diagram 12: Maximum Drain Current | Diagram 13 Typ. gate charge |
|---|---|
|  |  |
| $I_D$= f($T_c$); $V_{GS}$=10V | $V_{GS}$=f($Q_{gate}$); $I_D$=13A pulsed; $V_{DS}$=50V |

# 6. Test Circuits

**Table 7. Diode Characteristics**

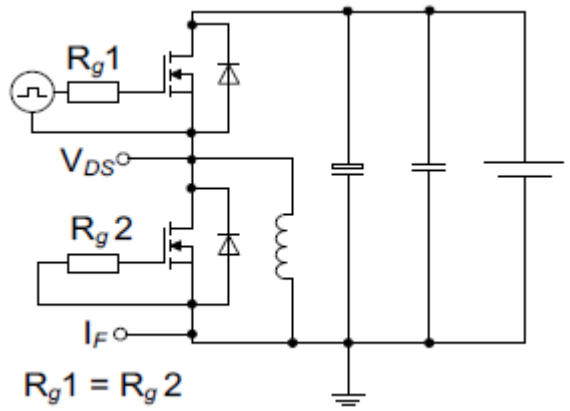
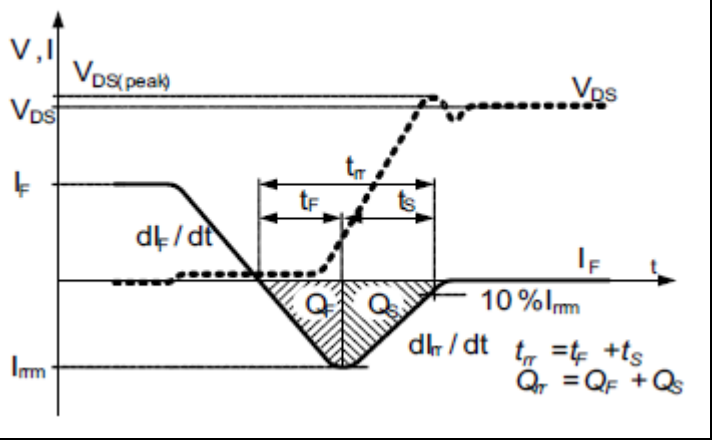
| Test circuit for diode characteristics | Diode recovery waveform |
|---|---|
|  |  |



**Table 8. Switching Times**

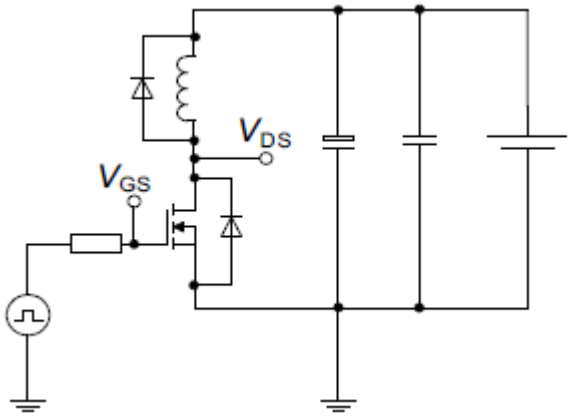
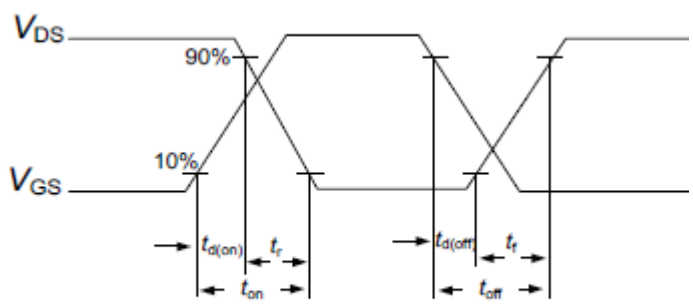
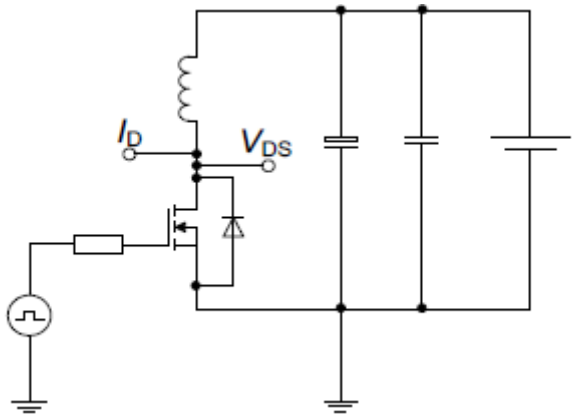
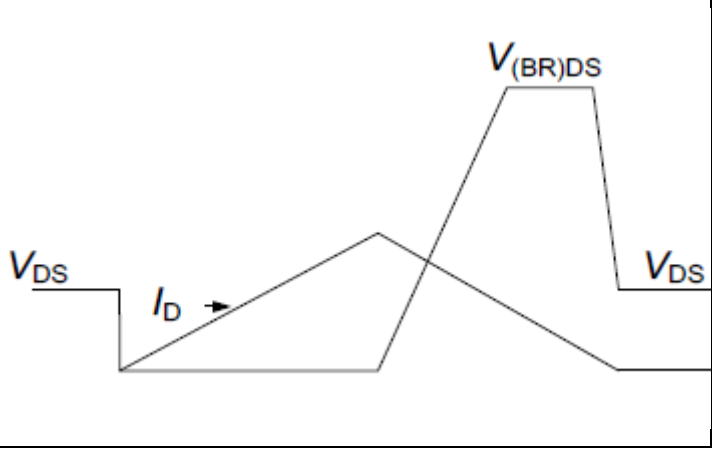
| Switching times test circuit for inductive load | Switching times waveform |
|---|---|
|  |  |

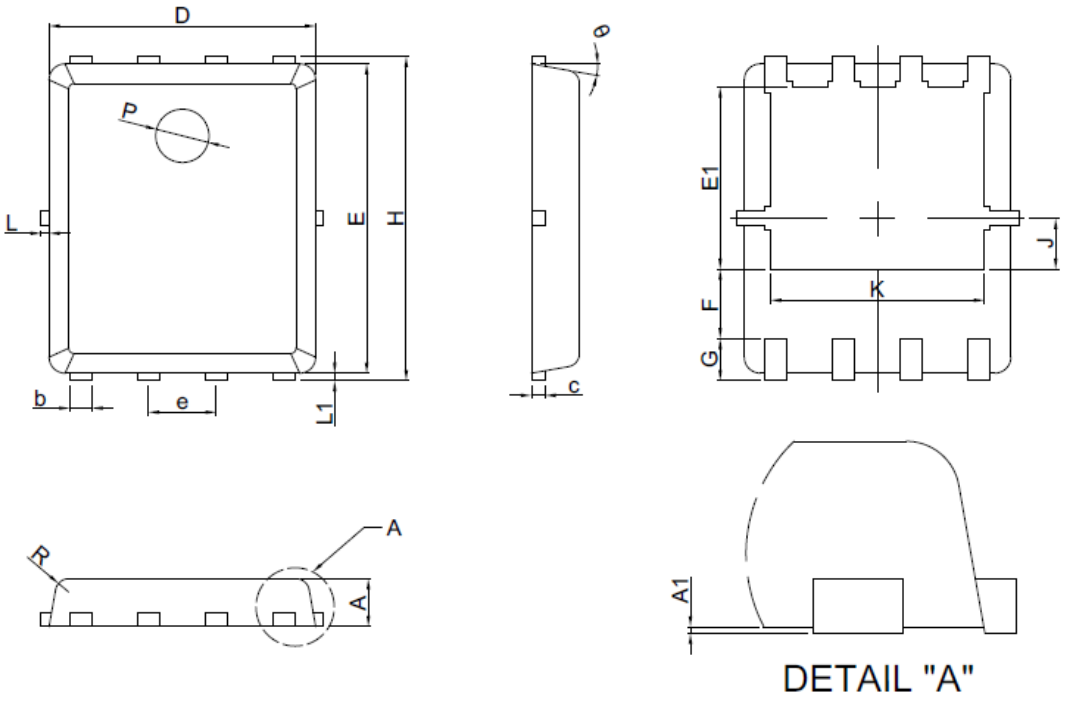


**Table 9. Unclamped Inductive Load**

| Unclamped inductive load test circuit | Unclamped inductive waveform |
|---|---|
|  |  |

# 7. Package Outlines

**Figure 1 Outline PDFN5*6 Dimensions in mm**




| SYMBOL | MIN | NOM | MAX |
|---|---|---|---|
| A | 0.80 | 0.90 | 1.00 |
| $A_1$ | 0.00 | 0.03 | 0.05 |
| b | 0.35 | 0.42 | 0.49 |
| c | | 0.254REF | |
| D | 4.90 | 5.00 | 5.10 |
| F | | 1.40REF | |
| E | 5.70 | 5.80 | 5.90 |
| e | | 1.27BSC | |
| H | 5.95 | 6.08 | 6.20 |
| L1 | 0.10 | 0.14 | 0.18 |
| G | | 0.60REF | |
| K | | 4.00REF | |
| L | —— | —— | 0.15 |
| J | | 0.95BSC | |
| P | | 1.00REF | |
| E1 | 3.35 | 3.40 | 3.65 |
| θ | 6° | 10° | 14° |
| R | | 0.25REF | |

# 8. Appendix

CoolSemi Webpage: www.coolsemi.com.