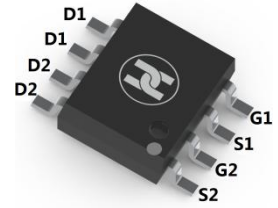
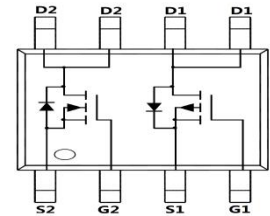


COMPLEMENTARY MOSFET
FEATURES

- $V_{DS}=30V, I_D=6A, R_{DS(ON)} \leq 30m\Omega @ V_{GS}=10V$
- $V_{DS}=-30V, I_D=-6.5A, R_{DS(ON)} \leq 28m\Omega @ V_{GS}=-10V$
- Low gate charge and Ultra low on-resistance
- For level shifted high side switch and for a host of other applicatio ns.
- Surface Mount device

MECHANICAL DATA

- Case: SOP-8
- Case Material: Molded Plastic. UL flammability
- Classification Rating: 94V-0
- Weight: 0.3 grams (approximate)
- Marking:4606


SOP-8

MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Max N-channel | Max P-channel | Unit | |
|---|------------------|--------------------------|---------------|--------------------|---|
| Drain-source voltage | V_{DS} | 30 | -30 | V | |
| Gate-source voltage | V_{GS} | ± 20 | ± 20 | V | |
| Continuous drain current | I_D | $T_A = 25^\circ\text{C}$ | 6 | -7 | A |
| | | $T_A = 70^\circ\text{C}$ | 5 | -6.5 | A |
| Pulsed drain current | I_{DM} | 26 | -28 | A | |
| Avalanche current | I_{AS}, I_{AR} | 10 | 23 | A | |
| Avalanche energy $L=0.1mH$ | E_{AS}, E_{AR} | 5 | 26 | mJ | |
| Power dissipation | P_D | $T_A = 25^\circ\text{C}$ | 2 | 2 | W |
| | | $T_A = 70^\circ\text{C}$ | 1.3 | 1.3 | W |
| Thermal resistance from Junction to ambient | $R_{\theta JA}$ | 74 | | $^\circ\text{C/W}$ | |
| Thermal resistance from Junction to Lead | $R_{\theta JL}$ | 32 | | $^\circ\text{C/W}$ | |
| Junction temperature | T_J | 150 | | $^\circ\text{C}$ | |
| Storage temperature | T_{STG} | -55 ~ +150 | | $^\circ\text{C}$ | |

N-CHANNEL ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise specified)

| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|------------------------------------|-----------------|-----|------|-----------|------------|--|
| Drain-Source breakdown voltage | $V_{(BR)DSS}^*$ | 30 | | | V | $V_{GS}=0V, I_D=250\mu A$ |
| Zero gate voltage drain current | I_{DSS}^* | | | 1 | μA | $V_{DS}=30V, V_{GS}=0V$ |
| Gate-body leakage current | I_{GSS}^* | | | ± 100 | μA | $V_{DS}=0V, V_{GS}=\pm 20V$ |
| Gate-threshold voltage | $V_{GS(th)}^*$ | 1.0 | 1.5 | 2.5 | V | $V_{DS}=V_{GS}, I_D=250\mu A$ |
| On-State Drain Current | $I_{D(ON)}$ | 30 | | | A | $V_{DS}=5V, V_{GS}=10V$ |
| Drain-source on-resistance | $R_{DS(ON)}^*$ | | 19 | 28 | m Ω | $V_{GS}=10V, I_D=5A$ |
| | | | 26 | 40 | m Ω | $V_{GS}=4.5V, I_D=3A$ |
| Forward transconductance | g_{FS} | | 15 | | S | $V_{DS}=5V, I_D=5A$ |
| Diode forward voltage | V_{SD} | | 0.76 | 1 | V | $I_S=1A, V_{GS}=0V$ |
| Diode forward current | I_S | | | 2.5 | A | |
| Input capacitance | C_{iss} | | 255 | 310 | pF | $V_{DS}=15V, V_{GS}=0V, f=1MHz$ |
| Output capacitance | C_{oss} | | 45 | 60 | pF | |
| Reverse transfer capacitance | C_{rss} | | 35 | 50 | pF | |
| Gate resistance | R_g | | 3.25 | 4.9 | Ω | $V_{DS}=0V, V_{GS}=0V, f=1MHz$ |
| Total gate charge | Q_g | | 2.55 | 3 | nC | $V_{GS}=4.5V, V_{DS}=15V, I_D=5A$ |
| Total gate charge | | | 5.2 | 6 | nC | |
| Gate-source charge | Q_{gs} | | 0.85 | | nC | $V_{GS}=10V, V_{DS}=15V, I_D=5A$ |
| Gate-drain charge | Q_{gd} | | 1.3 | | nC | |
| Turn-on delay time | $t_{d(on)}$ | | 4.5 | | nS | |
| Turn-on rise time | t_r | | 2.5 | | nS | $V_{GS}=10V, V_{DS}=15V, R_{GEN}=3\Omega, R_L=2.5\Omega$ |
| Turn-off delay time | $t_{d(off)}$ | | 14.5 | | nS | |
| Turn-off fall time | t_f | | 3.5 | | nS | |
| Body Diode Reverse Recovery Time | t_{rr} | | 8.5 | 12 | nS | $I_F=6A, di/dt=100A/\mu S$ |
| Body Diode Reverse Recovery Charge | Q_{rr} | | 2.2 | 3 | nC | $I_F=6A, di/dt=100A/\mu S$ |

*Pulse test ; Pulse width $\leq 300\mu s$, Duty cycle $\leq 0.5\%$.

COMPLEMENTARY MOSFET

N-Channel: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

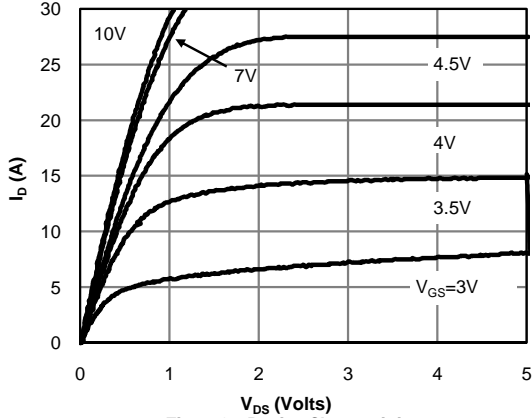


Fig 1: On-Region Characteristics

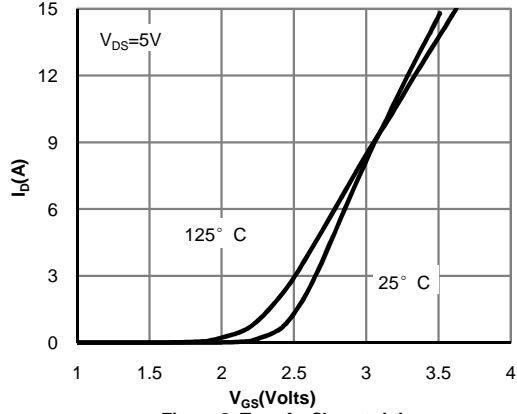


Figure 2: Transfer Characteristics

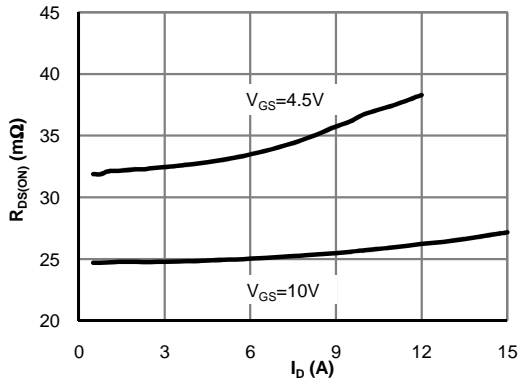


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

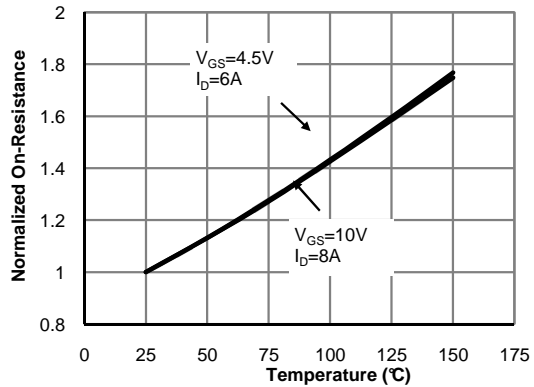


Figure 4: On-Resistance vs. Junction Temperature

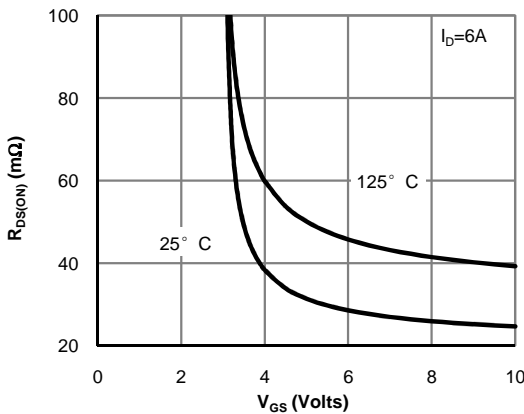


Figure 5: On-Resistance vs. Gate-Source Voltage

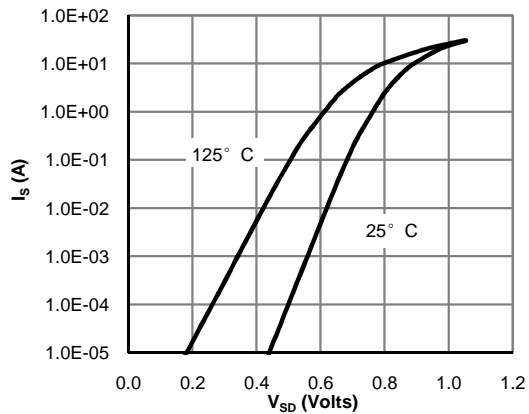


Figure 6: Body-Diode Characteristics

COMPLEMENTARY MOSFET

N-Channel: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

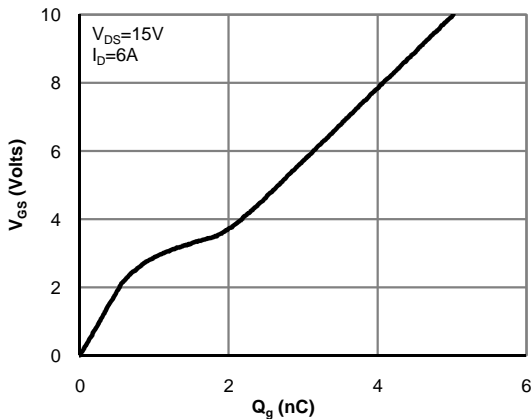


Figure 7: Gate-Charge Characteristics

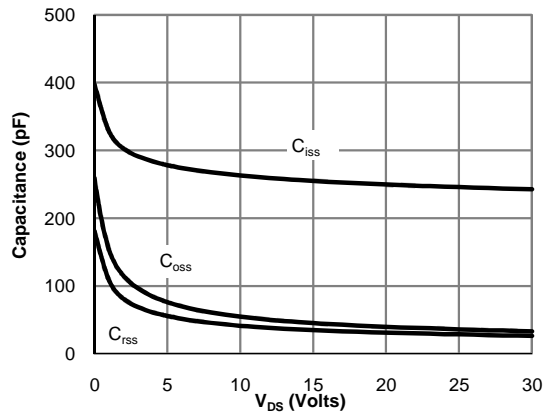


Figure 8: Capacitance Characteristics

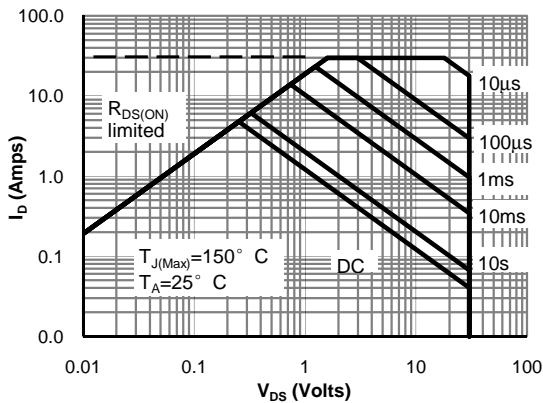


Figure 9: Maximum Forward Biased Safe Operating Area

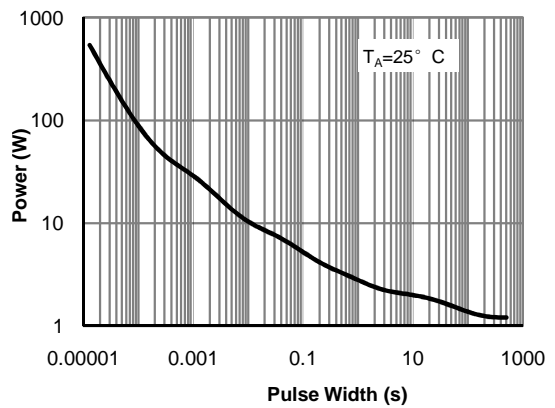


Figure 10: Single Pulse Power Rating Junction-to-Ambient

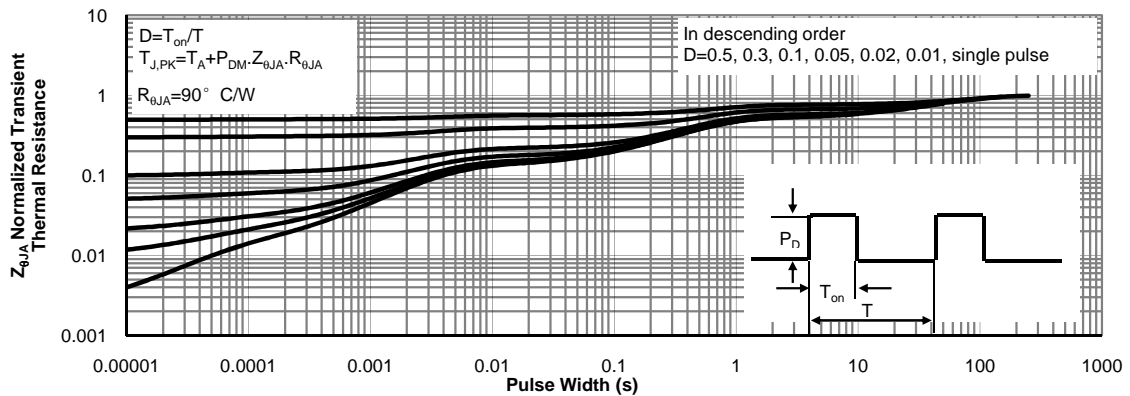
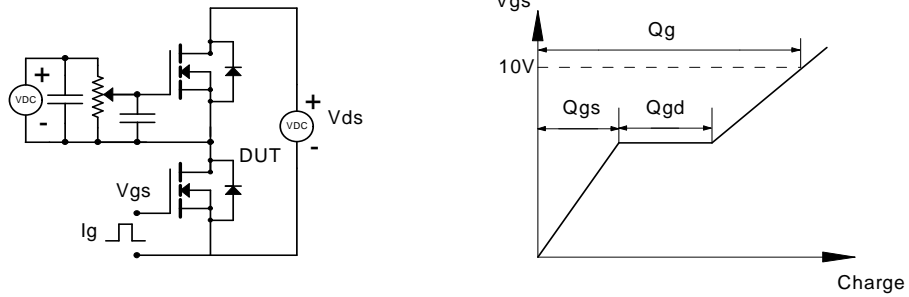


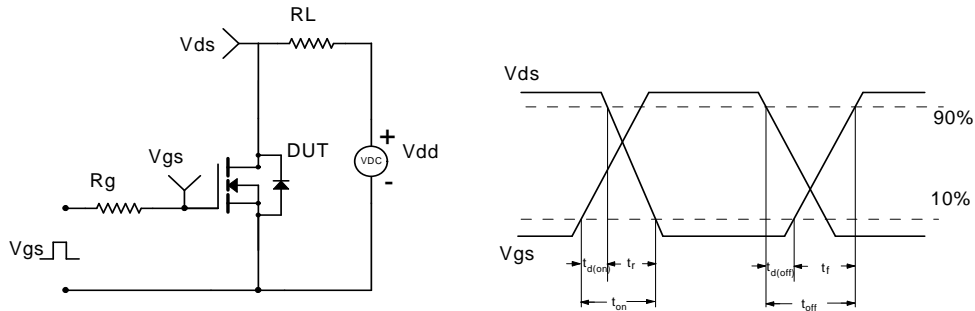
Figure 11: Normalized Maximum Transient Thermal Impedance

COMPLEMENTARY MOSFET

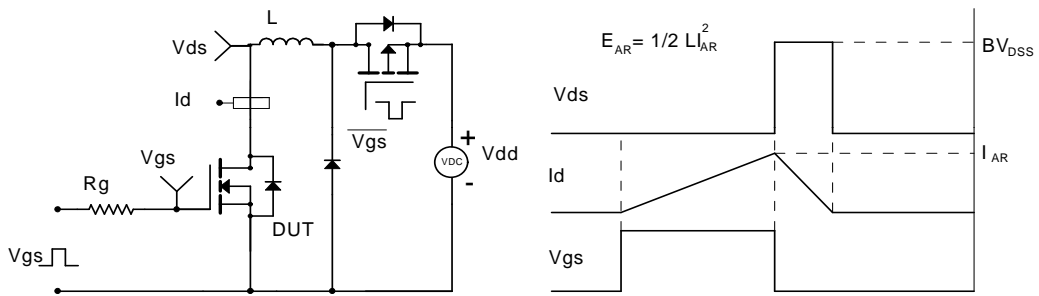
Gate Charge Test Circuit & Waveform



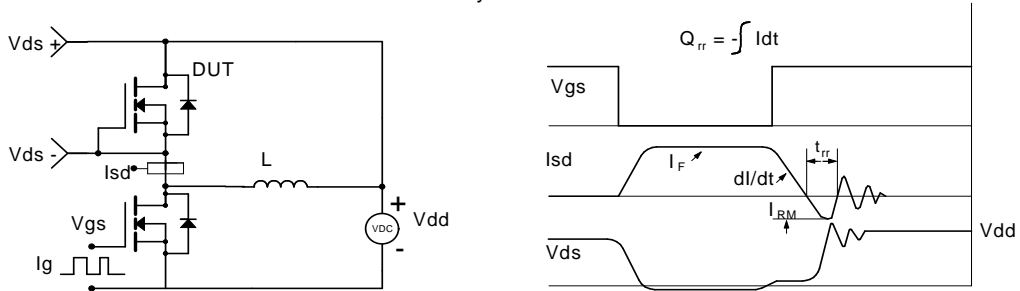
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



COMPLEMENTARY MOSFET
P-CHANNEL ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

| Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|------------------------------------|------------------------|------|-------|------|------|---|
| Drain-Source breakdown voltage | V _{(BR)DSS} * | -30 | | | V | V _{GS} =0V, I _D =-250μA |
| Zero gate voltage drain current | I _{DSS} * | | | -1 | μA | V _{DS} =-30V, V _{GS} =0V |
| Gate-body leakage current | I _{GSS} * | | | ±100 | nA | V _{DS} =0V, V _{GS} =±20V |
| Gate-threshold voltage | V _{GS(th)} * | -1.1 | -1.5 | -2.2 | V | V _{DS} =V _{GS} , I _D =-250μA |
| On-State Drain Current | I _{D(ON)} * | -30 | | | A | V _{DS} =-5V, V _{GS} =-10V |
| Drain-source on-resistance | R _{DS(ON)} * | | 22 | 28 | mΩ | V _{GS} =-10V, I _D =-1A |
| | | | 33 | 40 | mΩ | V _{GS} =-4.5V, I _D =-1A |
| Forward transconductance | g _{FS} | | 18 | | S | V _{DS} =-5V, I _D =-6.5A |
| Diode forward voltage | V _{SD} | | -0.80 | -1 | V | I _S =-1A, V _{GS} =0V |
| Diode forward current | I _S | | | -2.5 | A | |
| Input capacitance | C _{iss} | | 760 | | pF | V _{DS} =-15V, V _{GS} =0V, f=1MHz |
| Output capacitance | C _{oss} | | 140 | | pF | |
| Reverse transfer capacitance | C _{rss} | | 95 | | pF | |
| Gate resistance | R _g | 1.5 | 3.2 | 5 | Ω | V _{DS} =0V, V _{GS} =0V, f=1MHz |
| Total gate charge | Q _g | | 6.7 | 8 | nC | V _{GS} =-4.5V, V _{DS} =-15V, I _D =-6.5A |
| Total gate charge | | | 13.6 | 16 | nC | V _{GS} =-10V, V _{DS} =-15V, I _D =-6.5A |
| Gate-source charge | Q _{gs} | | 2.5 | | nC | |
| Gate-drain charge | Q _{gd} | | 3.2 | | nC | |
| Turn-on delay time | t _{d(on)} | | 8 | | nS | V _{GS} =-10V, V _{DS} =-15V, R _{GEN} =3Ω, R _L =2.3Ω |
| Turn-on rise time | t _r | | 6 | | nS | |
| Turn-off delay time | t _{d(off)} | | 17 | | nS | |
| Turn-off fall time | t _f | | 5 | | nS | |
| Body Diode Reverse Recovery Time | t _{rr} | | 15 | | nS | I _F =-6.5A, dI/dt=100A/μs |
| Body Diode Reverse Recovery Charge | Q _{rr} | | 9.7 | | nC | I _F =-6.5A, dI/dt=100A/μs |

*Pulse test ; Pulse width ≤300μs, Duty cycle ≤ 0.5% .

COMPLEMENTARY MOSFET

P-Channel: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

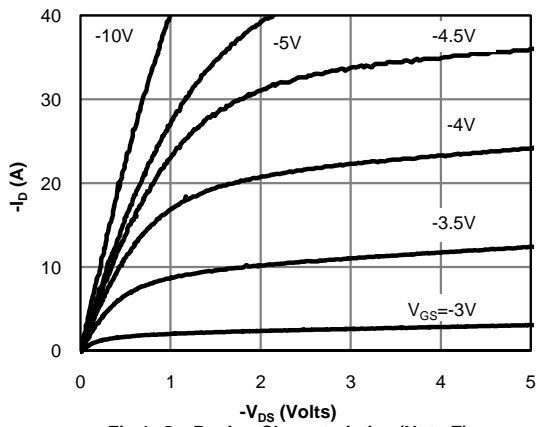


Fig 1: On-Region Characteristics (Note E)

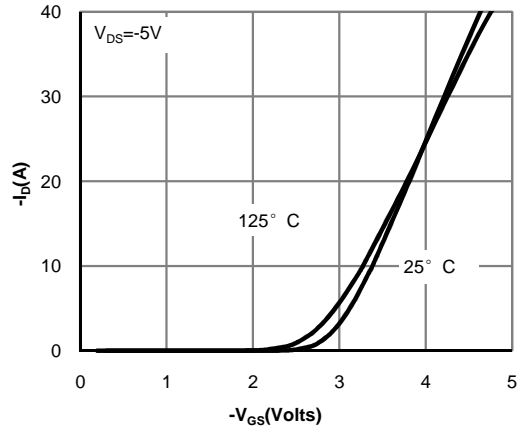


Figure 2: Transfer Characteristics (Note E)

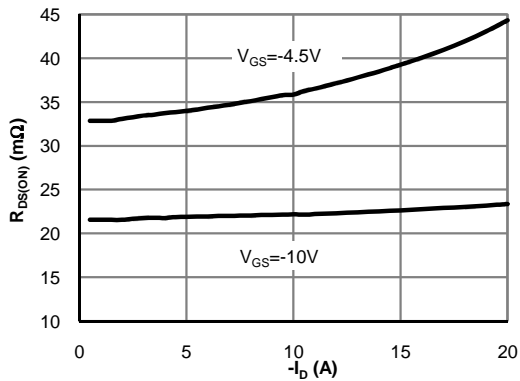


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

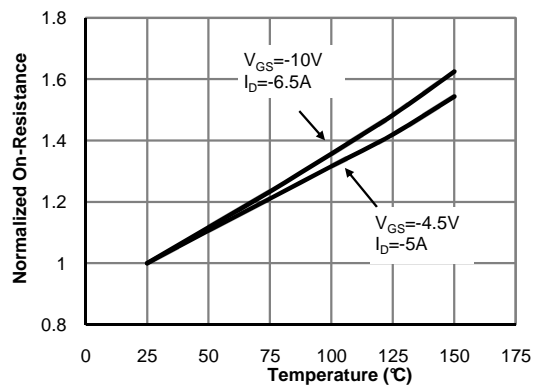


Figure 4: On-Resistance vs. Junction Temperature

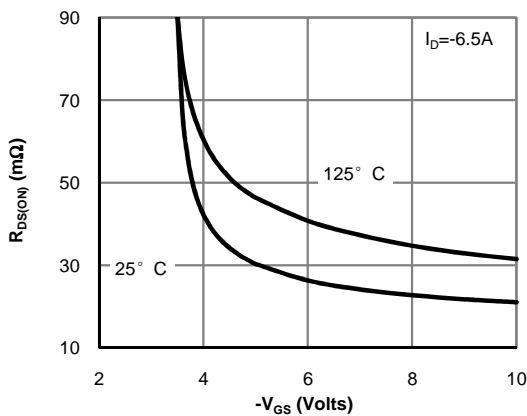


Figure 5: On-Resistance vs. Gate-Source Voltage

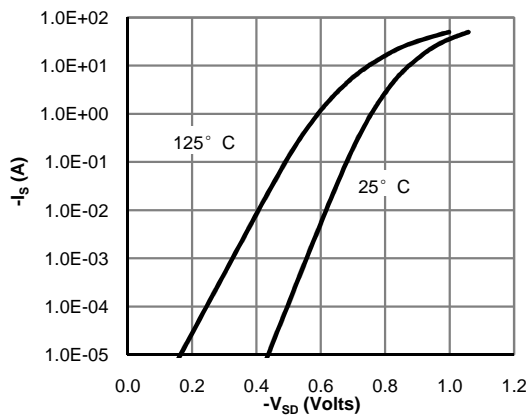


Figure 6: Body-Diode Characteristics

COMPLEMENTARY MOSFET

P-Channel: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

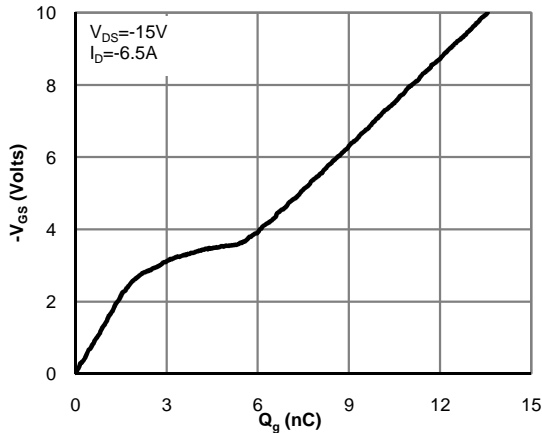


Figure 7: Gate-Charge Characteristics

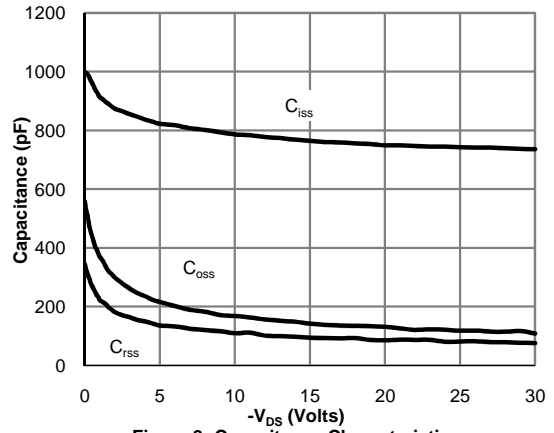


Figure 8: Capacitance Characteristics

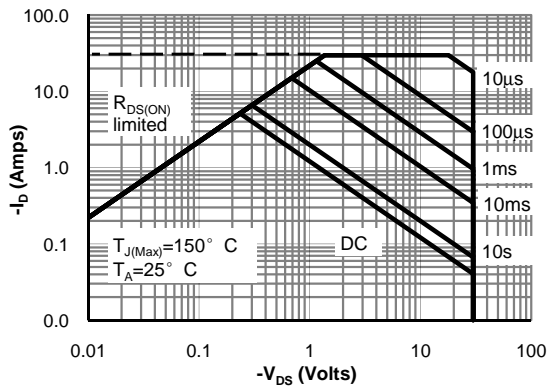


Figure 9: Maximum Forward Biased Safe Operating Area

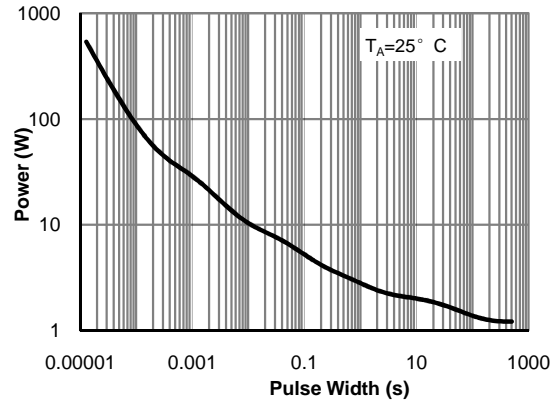


Figure 10: Single Pulse Power Rating Junction-to-Ambient

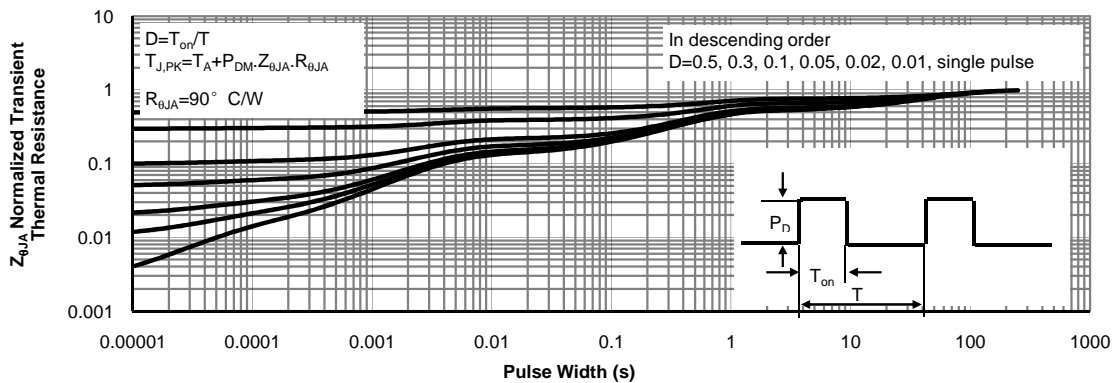
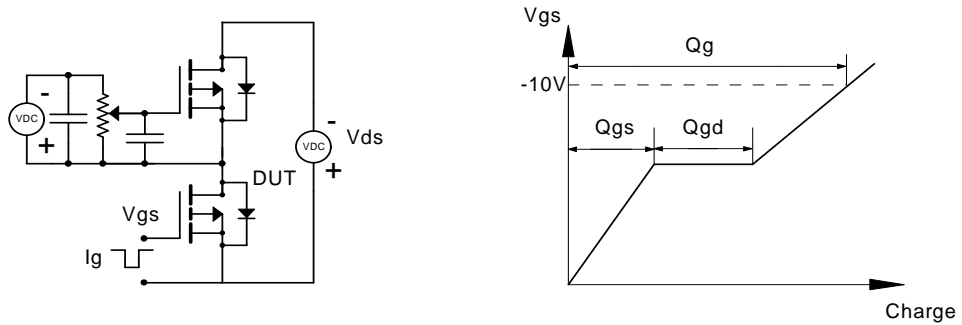


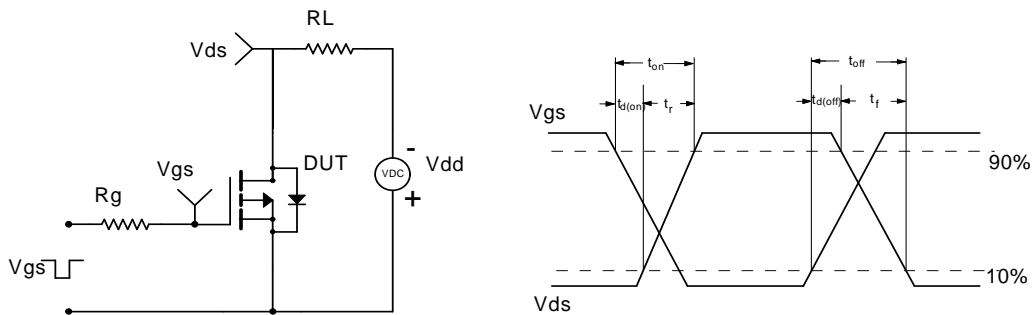
Figure 11: Normalized Maximum Transient Thermal Impedance

COMPLEMENTARY MOSFET

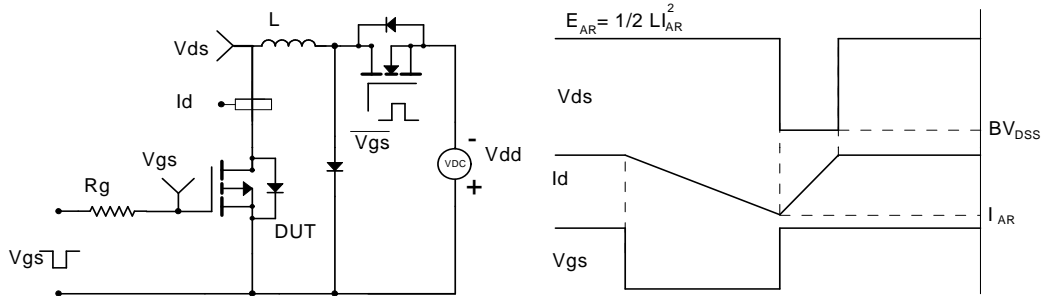
Gate Charge Test Circuit & Waveform



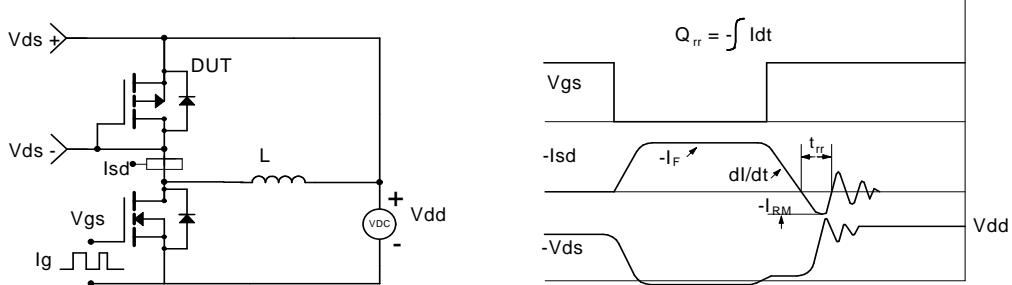
Resistive Switching Test Circuit & Waveforms

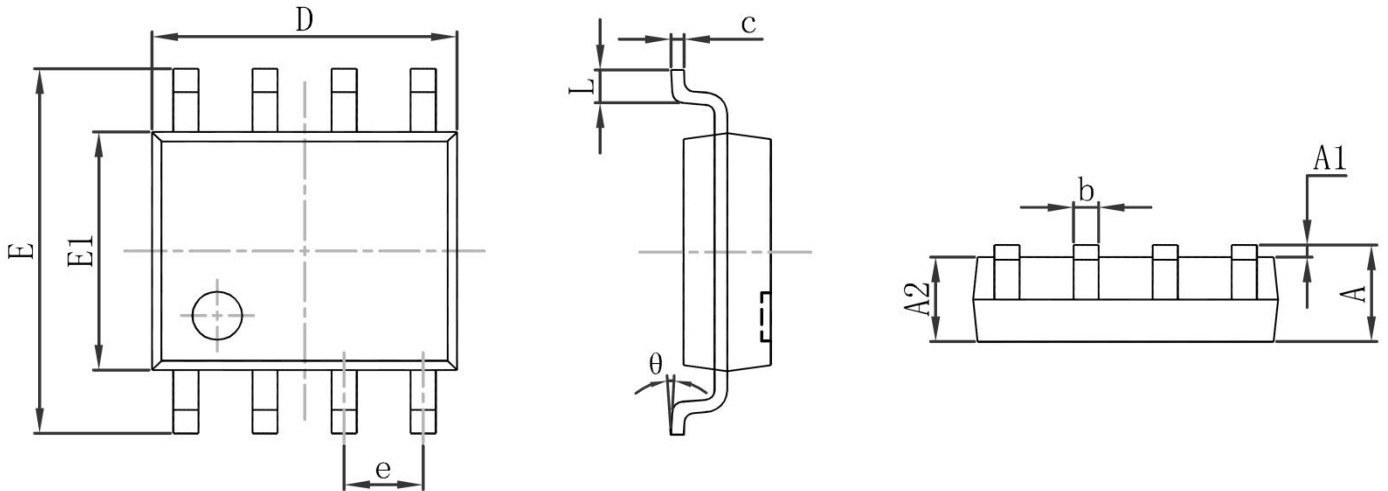


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

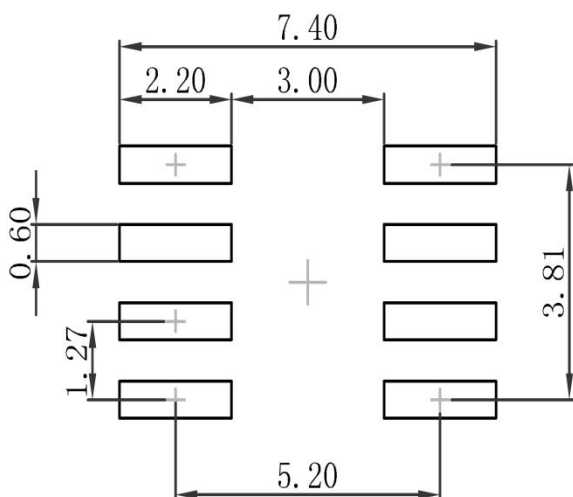


Diode Recovery Test Circuit & Waveforms



COMPLEMENTARY MOSFET
SOP-8 Package Outline Dimensions


| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|---------------------------|-------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.007 | 0.010 |
| D | 4.800 | 5.000 | 0.189 | 0.197 |
| e | 1.270(BSC) | | 0.050 (BSC) | |
| E | 5.800 | 6.200 | 0.228 | 0.244 |
| E1 | 3.800 | 4.000 | 0.150 | 0.157 |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |

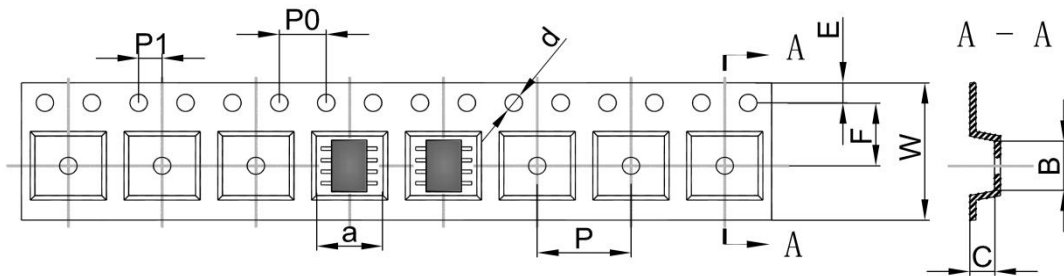
SOP-8 Suggested Pad Layout

Note:

1. Controlling dimension: in millimeters
2. General tolerance: $\pm 0.05\text{mm}$
3. The pad layout is for reference purposes only

COMPLEMENTARY MOSFET

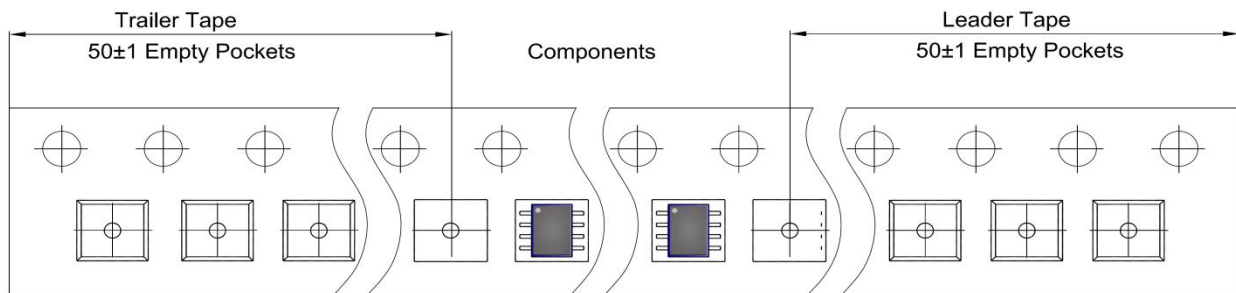
SOP-8 Tape and Reel

SOP-8 Embossed Carrier Tape

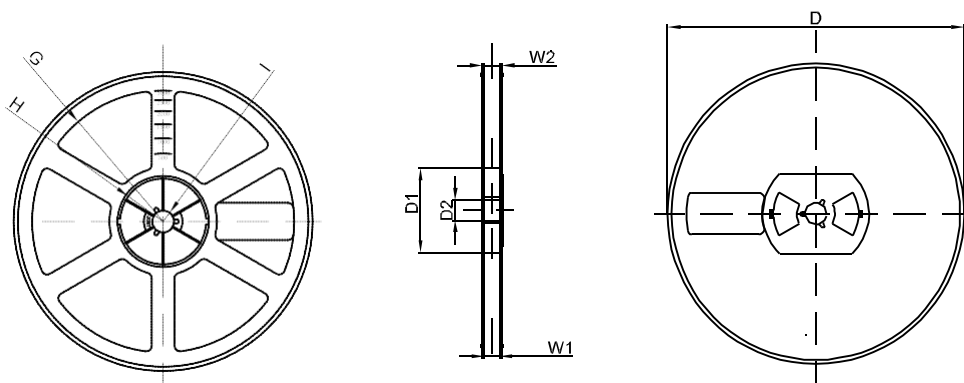


| DIMENSIONS ARE IN MILLIMETER | | | | | | | | | | |
|------------------------------|------|------|------|-------|------|------|------|------|------|-------|
| TYPE | A | B | C | d | E | F | P0 | P | P1 | W |
| SOP-8 | 6.40 | 5.40 | 2.10 | Ø1.50 | 1.75 | 5.50 | 4.00 | 8.00 | 2.00 | 12.00 |
| TOLERANCE | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 |

SOP-8 Tape Leader and Trailer



SOP-8 Reel



| DIMENSIONS ARE IN MILLIMETER | | | | | | | | |
|------------------------------|---------|--------|-------|---------|--------|-------|-------|-------|
| REEL OPTION | D | D1 | D2 | G | H | I | W1 | W2 |
| 13" DIA | Ø330.00 | 100.00 | 13.00 | R151.00 | R56.00 | R6.50 | 12.40 | 17.60 |
| TOLERANCE | ±2 | ±1 | ±1 | ±1 | ±1 | ±1 | ±1 | ±1 |