

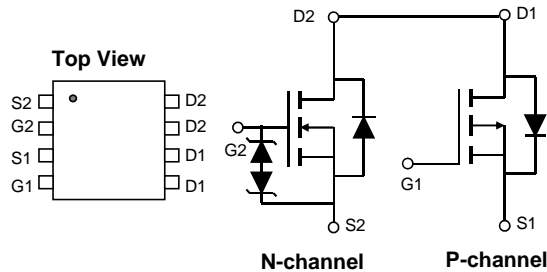
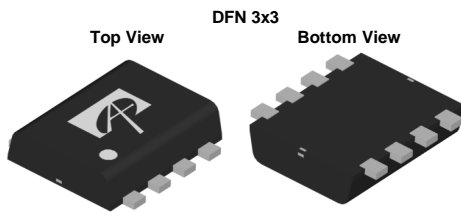
General Description

The AON3613 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used in inverter and other applications.

Product Summary

| | | |
|--------------------------|---------------------------|-----------------------|
| N-channel | P-channel | |
| $V_{DS} (V) = 30V$ | $V_{DS} (V) = -30V$ | |
| $I_D = 4.5A$ | $I_D = -4.5A$ | $(V_{GS} = \pm 10V)$ |
| $R_{DS(ON)} < 52m\Omega$ | $R_{DS(ON)} < 68m\Omega$ | $(V_{GS} = \pm 10V)$ |
| $R_{DS(ON)} < 60m\Omega$ | $R_{DS(ON)} < 100m\Omega$ | $(V_{GS} = \pm 4.5V)$ |

ESD protection
HBM Class 3A



Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

| Parameter | Symbol | Max N-channel | Max P-channel | Units |
|--|----------------|------------------|---------------|------------|
| Drain-Source Voltage | V_{DS} | 30 | -30 | V |
| Gate-Source Voltage | V_{GS} | ± 12 | ± 20 | V |
| Continuous Drain Current | I_D | $T_A=25^\circ C$ | 4.5 | -4.5 |
| | | $T_A=70^\circ C$ | 3.5 | -3.5 |
| Pulsed Drain Current ^C | I_{DM} | 20 | -20 | A |
| Power Dissipation ^B | P_D | $T_A=25^\circ C$ | 2.1 | 2.1 |
| | | $T_A=70^\circ C$ | 1.3 | 1.3 |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 150 | -55 to 150 | $^\circ C$ |

Thermal Characteristics: N-channel

| Parameter | Symbol | Typ | Max | Units |
|--|-----------------|-----|-----|--------------|
| Maximum Junction-to-Ambient ^A | $R_{\theta JA}$ | 50 | 60 | $^\circ C/W$ |
| Maximum Junction-to-Ambient ^{A D} | | 80 | 100 | $^\circ C/W$ |
| Maximum Junction-to-Lead | $R_{\theta JL}$ | 30 | 40 | $^\circ C/W$ |

Thermal Characteristics: P-channel

| Parameter | Symbol | Typ | Max | Units |
|--|-----------------|-----|-----|--------------|
| Maximum Junction-to-Ambient ^A | $R_{\theta JA}$ | 50 | 60 | $^\circ C/W$ |
| Maximum Junction-to-Ambient ^{A D} | | 80 | 100 | $^\circ C/W$ |
| Maximum Junction-to-Lead | $R_{\theta JL}$ | 30 | 40 | $^\circ C/W$ |

N-channel Electrical Characteristics (T_J=25°C unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------------------------|---------------------------------------|---|-----|----------|----------|-------|
| STATIC PARAMETERS | | | | | | |
| BV _{DSS} | Drain-Source Breakdown Voltage | I _D =250μA, V _{GS} =0V | 30 | | | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} =30V, V _{GS} =0V T _J =55°C | | | 1 5 | μA |
| I _{GSS} | Gate-Body leakage current | V _{DS} =0V, V _{GS} =±10V | | | ±10 | μA |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D =250μA | 0.7 | 1.05 | 1.5 | V |
| I _{D(ON)} | On state drain current | V _{GS} =10V, V _{DS} =5V | 20 | | | A |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =10V, I _D =4.5A T _J =125°C | | 42 66 | 52 82 | mΩ |
| | | V _{GS} =4.5V, I _D =3A | | 47 | 60 | |
| g _{FS} | Forward Transconductance | V _{DS} =5V, I _D =4.5A | | 15 | | S |
| V _{SD} | Diode Forward Voltage | I _S =1A, V _{GS} =0V | | 0.75 | 1 | V |
| I _S | Maximum Body-Diode Continuous Current | | | | 2.5 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =15V, f=1MHz | | 245 | | pF |
| C _{oss} | Output Capacitance | | | 35 | | pF |
| C _{riss} | Reverse Transfer Capacitance | | | 20 | | pF |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, f=1MHz | | 5.3 | | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _{g(10V)} | Total Gate Charge | V _{GS} =10V, V _{DS} =15V, I _D =4.5A | | 5.7 | 10 | nC |
| Q _{g(4.5V)} | Total Gate Charge | | | 2.6 | 5 | nC |
| Q _{gs} | Gate Source Charge | | | 0.5 | | nC |
| Q _{gd} | Gate Drain Charge | | | 1 | | nC |
| t _{D(on)} | Turn-On DelayTime | V _{GS} =10V, V _{DS} =15V, R _L =3.3Ω, R _{GEN} =3Ω | | 2 | | ns |
| t _r | Turn-On Rise Time | | | 3.5 | | ns |
| t _{D(off)} | Turn-Off DelayTime | | | 22 | | ns |
| t _f | Turn-Off Fall Time | | | 3.5 | | ns |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =4.5A, di/dt=500A/μs | | 6.5 | | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =4.5A, di/dt=500A/μs | | 7.5 | | nC |

- A. The value of R_{qJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C. The value in any given application depends on the user's specific board design.
- B. The power dissipation P_D is based on T_{J(MAX)}=150° C, using ≤ 10s junction-to-ambient thermal resistance.
- C. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150° C. Ratings are based on low frequency and duty cycles to keep initial T_J=25° C.
- D. The R_{qJA} is the sum of the thermal impedance from junction to lead R_{qJL} and lead to ambient.
- E. The static characteristics in Figures 1 to 6 are obtained using <300ms pulses, duty cycle 0.5% max.
- F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T_{J(MAX)}=150° C. The SOA curve provides a single pulse rating.
- G. The maximum current rating is package limited.

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N-channel TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

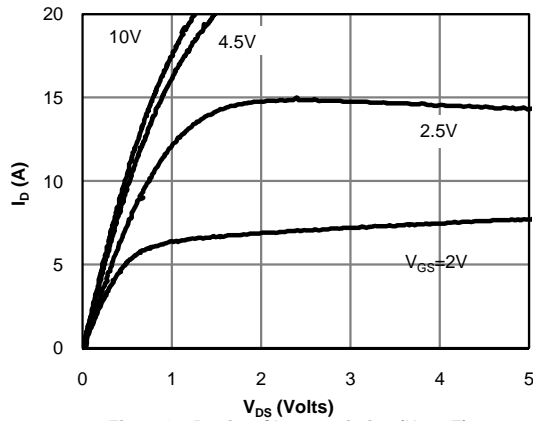


Figure 1: On-Region Characteristics (Note E)

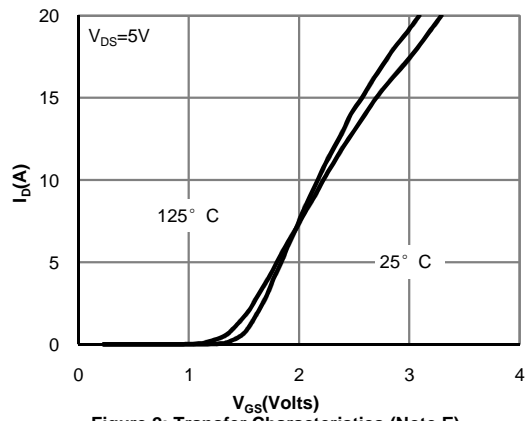


Figure 2: Transfer Characteristics (Note E)

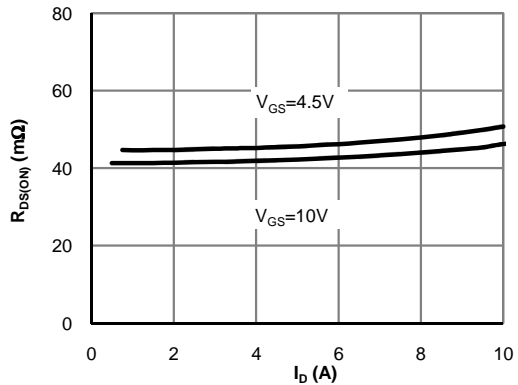


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

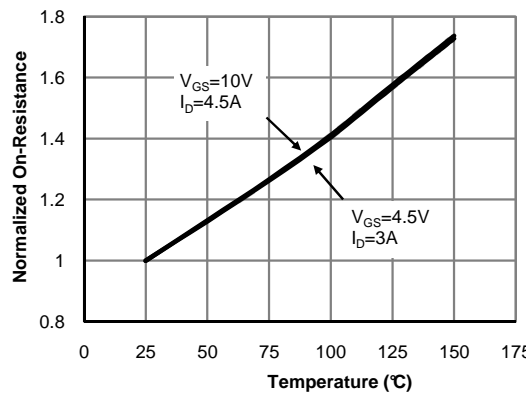


Figure 4: On-Resistance vs. Junction Temperature (Note E)

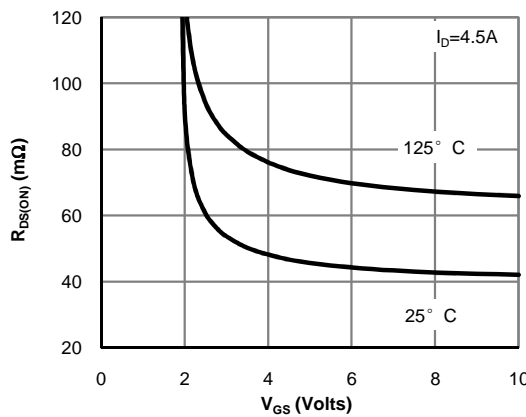


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

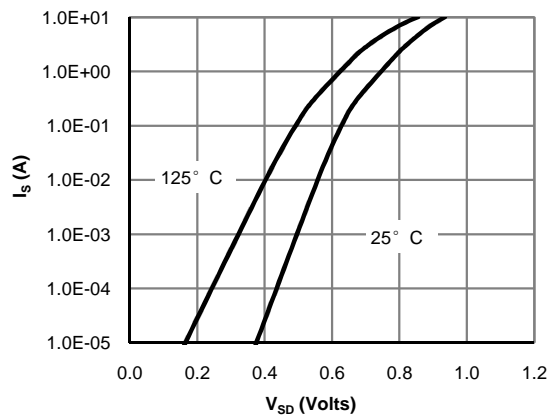


Figure 6: Body-Diode Characteristics (Note E)

N-channel TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

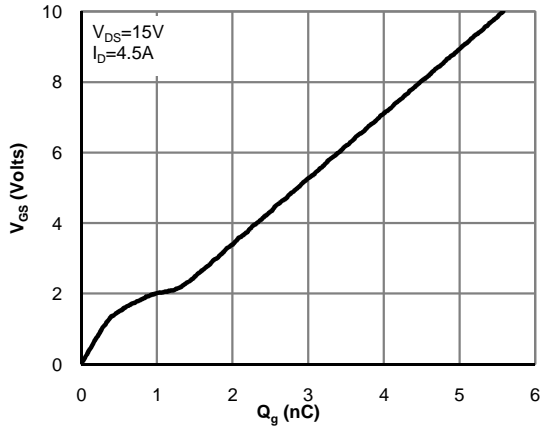


Figure 7: Gate-Charge Characteristics

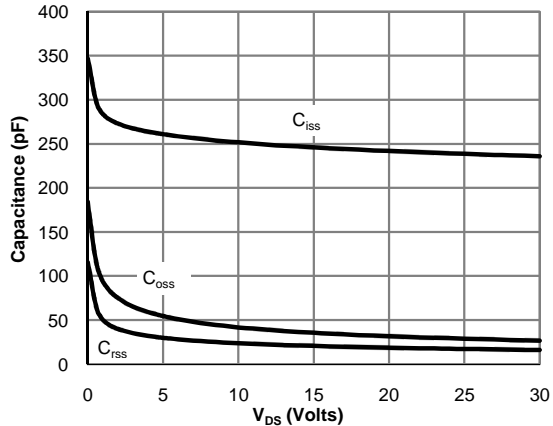


Figure 8: Capacitance Characteristics

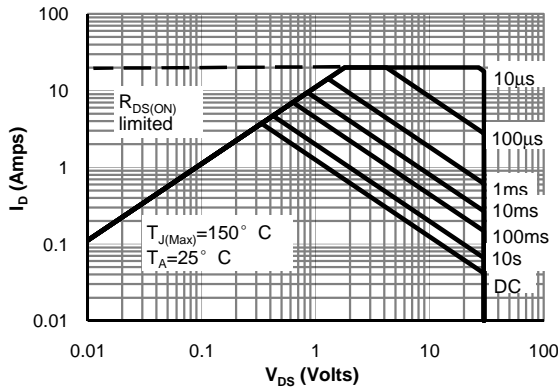


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

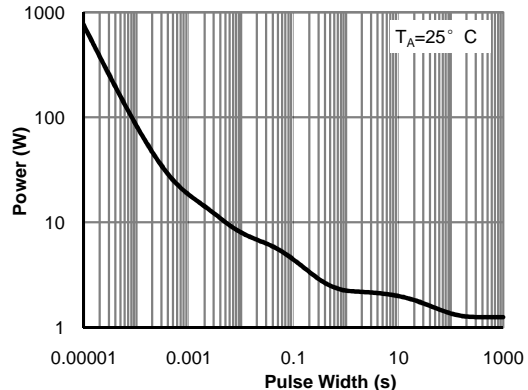


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

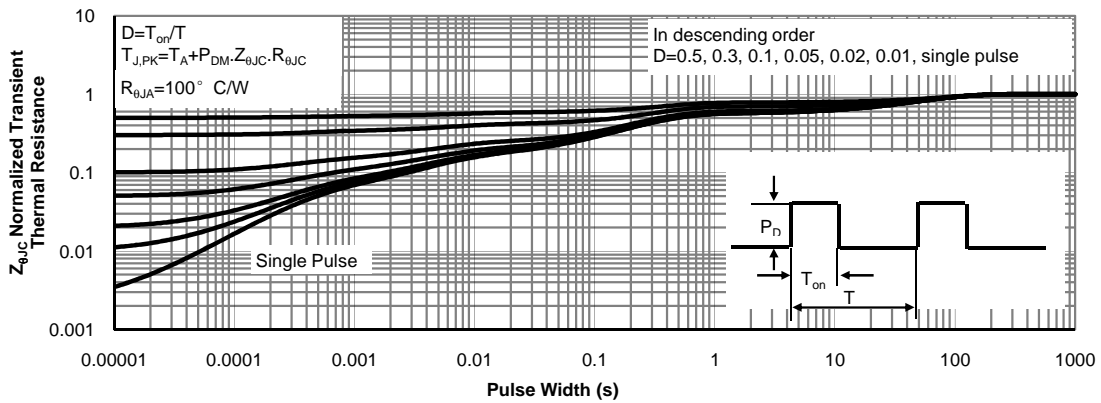
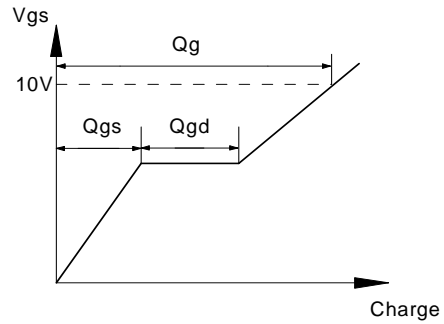
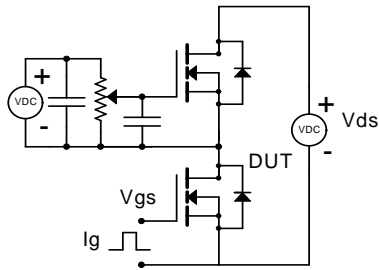
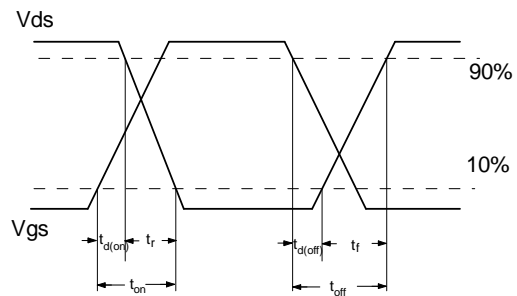
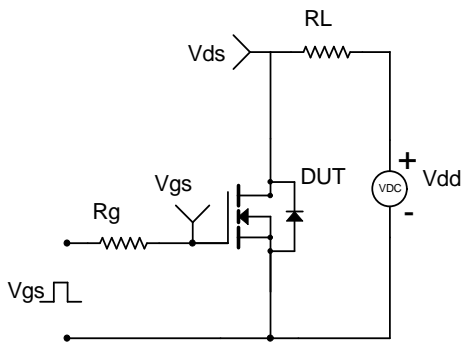


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

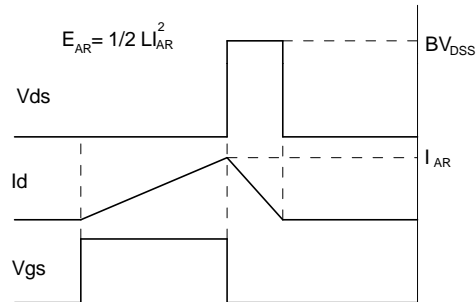
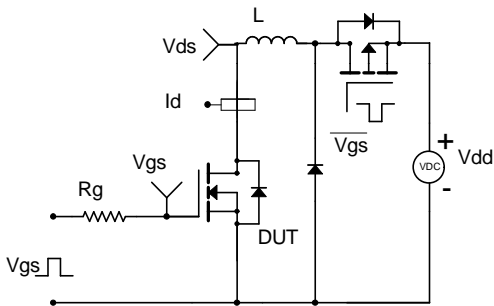
Gate Charge Test Circuit & Waveform



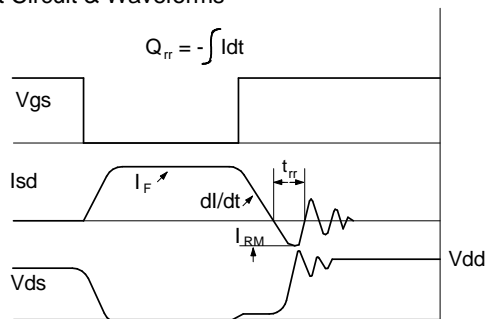
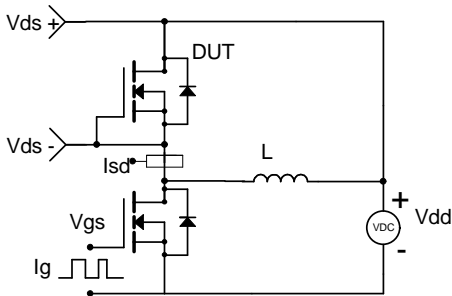
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



P-channel Electrical Characteristics (T_J=25°C unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------------------------|---------------------------------------|---|------|----------|----------|-------|
| STATIC PARAMETERS | | | | | | |
| BV _{DSS} | Drain-Source Breakdown Voltage | I _D =-250μA, V _{GS} =0V | -30 | | | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} =-30V, V _{GS} =0V T _J =55°C | | | -1 -5 | μA |
| I _{GSS} | Gate-Body leakage current | V _{DS} =0V, V _{GS} =±20V | | | ±100 | nA |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D =-250μA | -1.3 | -1.8 | -2.3 | V |
| I _{D(ON)} | On state drain current | V _{GS} =-10V, V _{DS} =-5V | -20 | | | A |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =-10V, I _D =-4.5A T _J =125°C | | 56 79 | 68 96 | mΩ |
| | | V _{GS} =-4.5V, I _D =-3A | | 80 | 100 | |
| g _{FS} | Forward Transconductance | V _{DS} =-5V, I _D =-4.5A | | 8 | | S |
| V _{SD} | Diode Forward Voltage | I _S =-1A, V _{GS} =0V | | -0.78 | -1 | V |
| I _S | Maximum Body-Diode Continuous Current | | | | -2.5 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =-15V, f=1MHz | | 290 | | pF |
| C _{oss} | Output Capacitance | | | 60 | | pF |
| C _{riss} | Reverse Transfer Capacitance | | | 40 | | pF |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, f=1MHz | | 16 | | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _{g(10V)} | Total Gate Charge | V _{GS} =-10V, V _{DS} =-15V, I _D =-4.5A | | 5.8 | 10 | nC |
| Q _{g(4.5V)} | Total Gate Charge | | | 2.8 | 6 | nC |
| Q _{gs} | Gate Source Charge | | | 1.1 | | nC |
| Q _{gd} | Gate Drain Charge | | | 1.3 | | nC |
| t _{D(on)} | Turn-On DelayTime | V _{GS} =-10V, V _{DS} =-15V, R _L =3.3Ω, R _{GEN} =3Ω | | 6 | | ns |
| t _r | Turn-On Rise Time | | | 5 | | ns |
| t _{D(off)} | Turn-Off DelayTime | | | 21 | | ns |
| t _f | Turn-Off Fall Time | | | 9 | | ns |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =-4.5A, di/dt=500A/μs | | 10 | | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =-4.5A, di/dt=500A/μs | | 20 | | nC |

A. The value of R_{qJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on T_{J(MAX)}=150° C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150° C. Ratings are based on low frequency and duty cycles to keep initial T_J=25° C.

D. The R_{qJA} is the sum of the thermal impedance from junction to lead R_{qJL} and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300ms pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T_{J(MAX)}=150° C. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

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P-channel TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

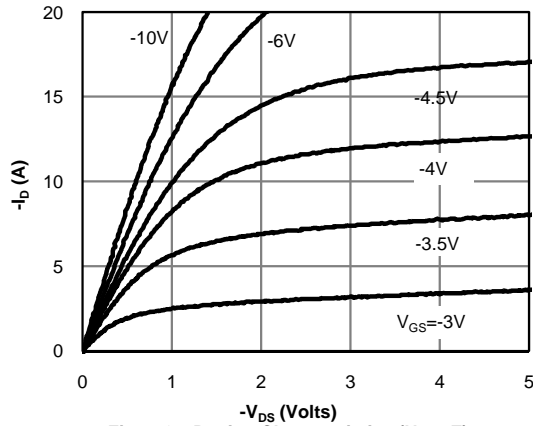


Figure 1: On-Region Characteristics (Note E)

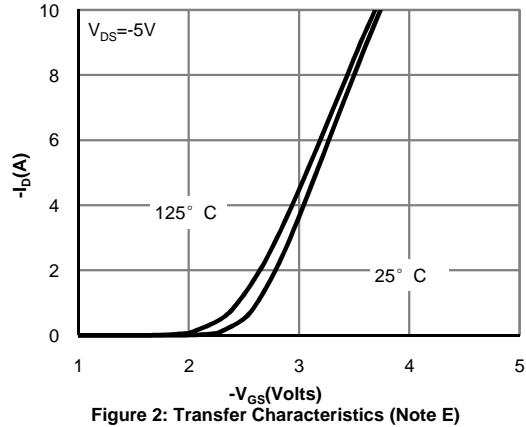


Figure 2: Transfer Characteristics (Note E)

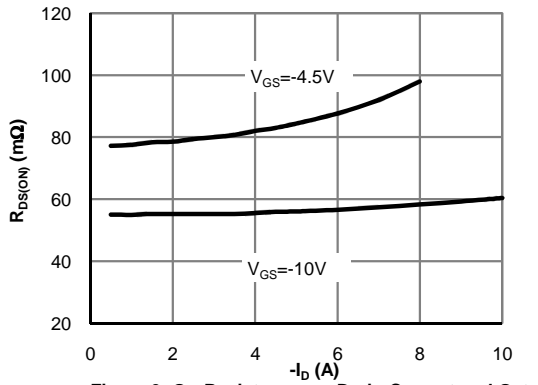


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

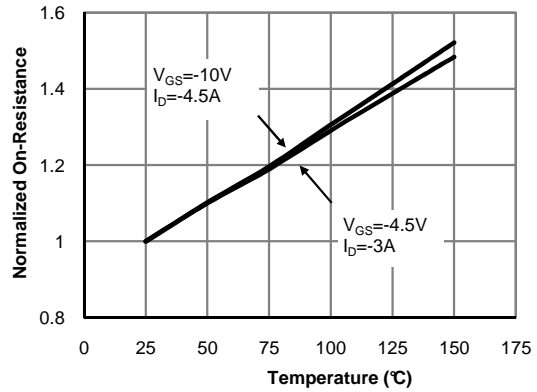


Figure 4: On-Resistance vs. Junction Temperature (Note E)

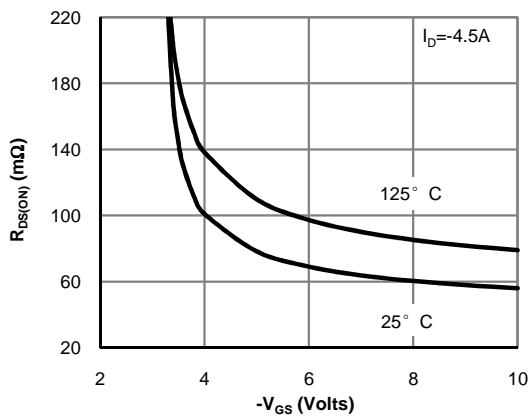


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

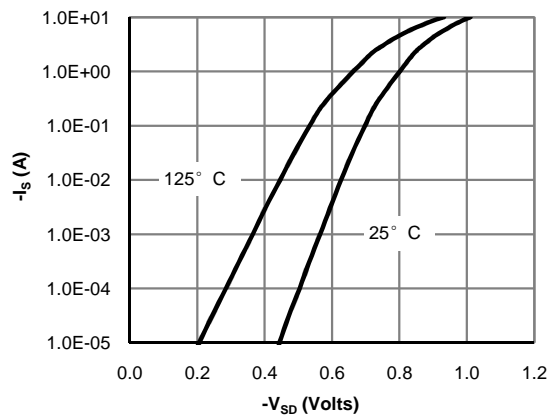


Figure 6: Body-Diode Characteristics (Note E)

P-channel TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

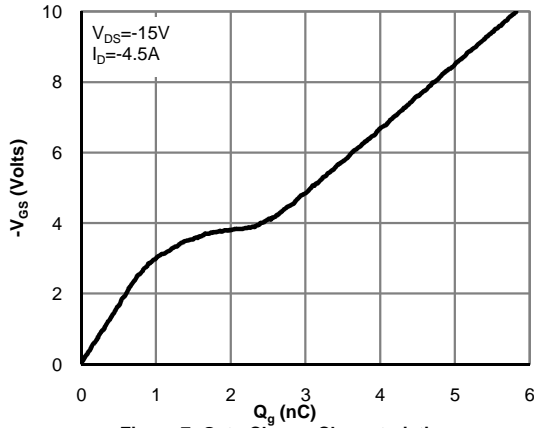


Figure 7: Gate-Charge Characteristics

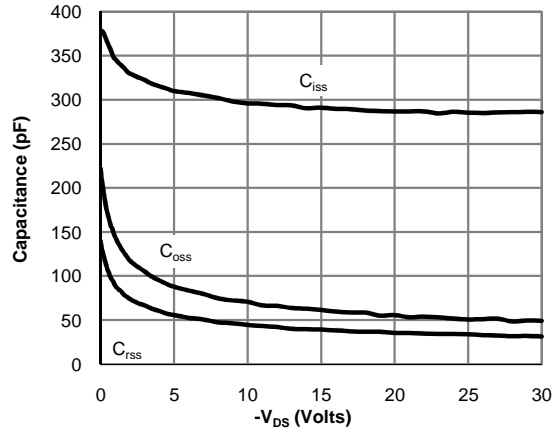


Figure 8: Capacitance Characteristics

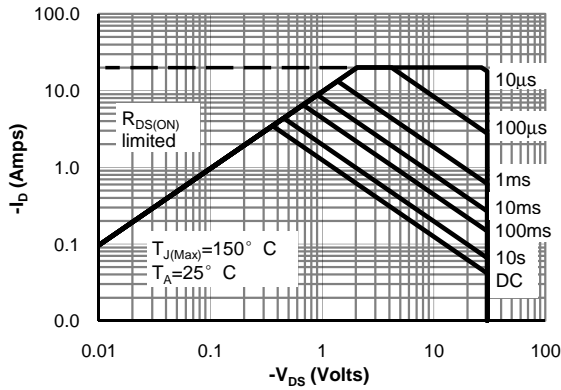


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

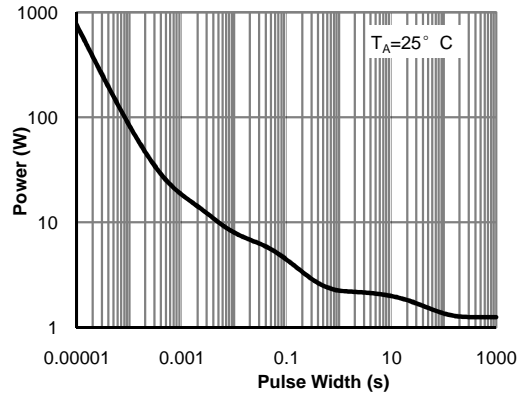


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

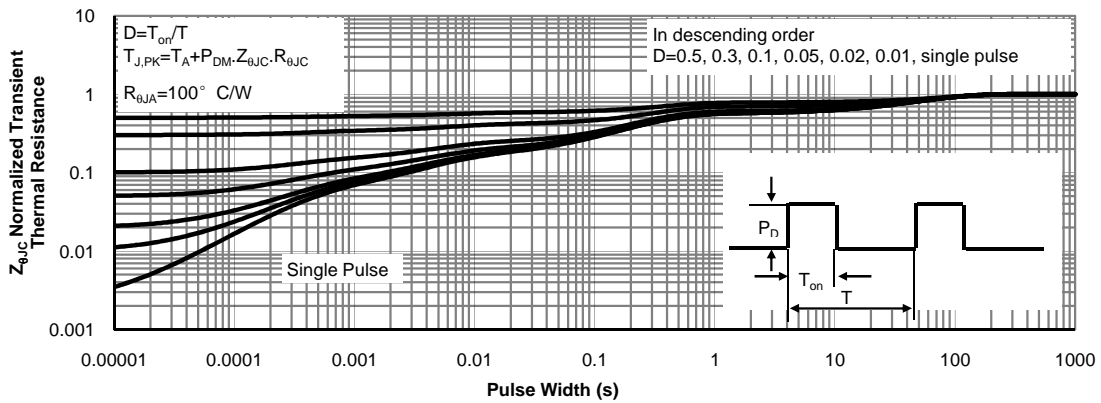
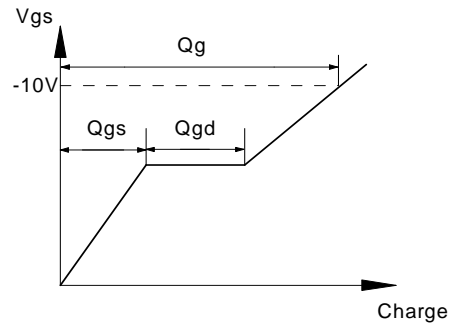
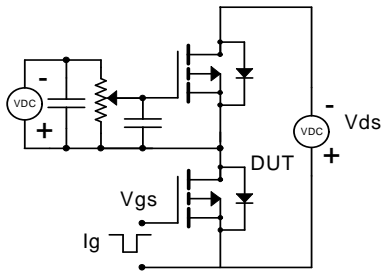
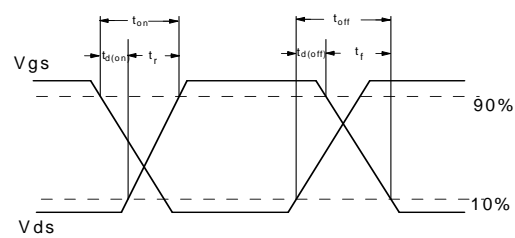
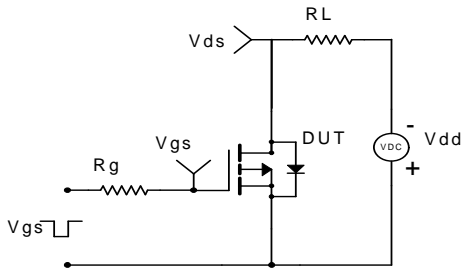


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

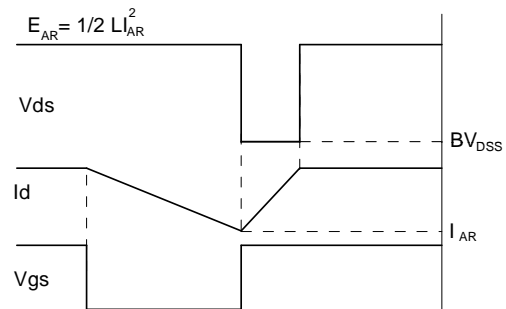
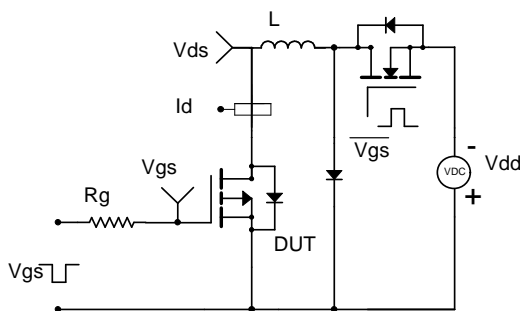
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

