



### General Description

- $\alpha$ MOS E2 Tech
- Excellent  $R_{DS(ON)}$ \*A
- Optimized switching parameters for better EMI performance
- Enhanced body diode for robustness
- RoHS 2.0 and Halogen-Free Compliant

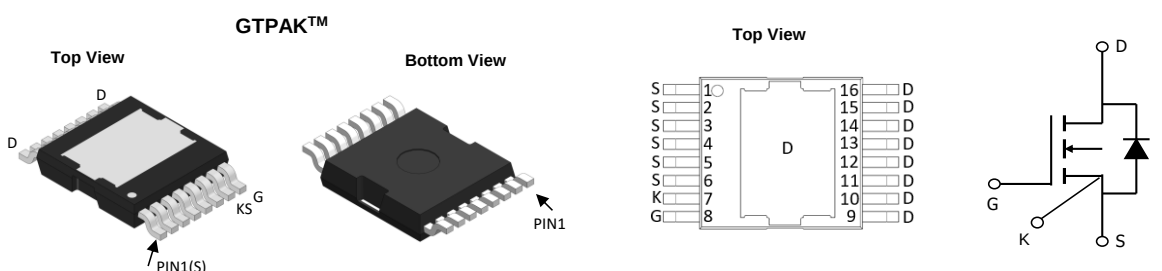
### Applications

- SMPS Active Bridge, Totem PFC, Hard-switching PFC, LLC, Phase-Shift, Half Bridge, Full Bridge topologies
- Server, Telecom, Solar, Workstation, Motor Driver, ATX and PC Power

### Product Summary

|                      |                  |
|----------------------|------------------|
| $V_{DS} @ T_{J,max}$ | 700V             |
| $I_{DM}$             | 328A             |
| $R_{DS(ON),max}$     | < 0.037 $\Omega$ |
| $Q_{g,typ}$          | 146nC            |
| $E_{oss} @ 400V$     | 14 $\mu$ J       |

100% UIS Tested  
100%  $R_g$  Tested



| Orderable Part Number | Package Type | Form        | Minimum Order Quantity |
|-----------------------|--------------|-------------|------------------------|
| AOGT037V60DE2         | GTPAK™       | Tape & Reel | 1800                   |

### Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

| Parameter                                                                    | Symbol         | Maximum    | Units |
|------------------------------------------------------------------------------|----------------|------------|-------|
| Drain-Source Voltage                                                         | $V_{DS}$       | 600        | V     |
| Gate-Source Voltage                                                          | $V_{GS}$       | $\pm 20$   | V     |
| Continuous Drain Current                                                     | $I_D$          | 82         | A     |
| $T_C=25^\circ\text{C}$                                                       |                | 52         |       |
| Pulsed Drain Current <sup>C</sup>                                            | $I_{DM}$       | 328        |       |
| Avalanche Current <sup>C</sup>                                               | $I_{AR}$       | 10         | A     |
| Repetitive avalanche energy <sup>C</sup>                                     | $E_{AR}$       | 50         | mJ    |
| Single pulsed avalanche energy <sup>G</sup>                                  | $E_{AS}$       | 750        | mJ    |
| MOSFET dv/dt ruggedness, $V_{DS}=0\sim 400V$                                 | dv/dt          | 120        | V/ns  |
| Diode reverse recovery                                                       |                | 70         | V/ns  |
| $V_{DS}=0$ to 400V, $I_F \leq 80A$ , $T_J=25^\circ\text{C}$                  | di/dt          | 1300       | A/us  |
| Power Dissipation <sup>B</sup>                                               | $P_D$          | 625        | W     |
| $T_C=25^\circ\text{C}$                                                       |                | 5          | W/°C  |
| Derate above 25°C                                                            |                |            |       |
| Junction and Storage Temperature Range                                       | $T_J, T_{STG}$ | -55 to 150 | °C    |
| Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds | $T_L$          | 300        | °C    |

### Thermal Characteristics

| Parameter                                  | Symbol          | Typical | Maximum | Units |
|--------------------------------------------|-----------------|---------|---------|-------|
| Maximum Junction-to-Ambient <sup>A</sup>   | $R_{\theta JA}$ | 10      | 15      | °C/W  |
| $t \leq 10s$                               |                 |         |         |       |
| Maximum Junction-to-Ambient <sup>A,D</sup> | $R_{\theta JC}$ | 32      | 40      | °C/W  |
| Steady-State                               |                 |         |         |       |
| Maximum Junction-to-Case                   | $R_{\theta JC}$ | 0.16    | 0.2     | °C/W  |

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

| Symbol                             | Parameter                                                 | Conditions                                                                           | Min | Typ   | Max   | Units |
|------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------|-----|-------|-------|-------|
| <b>STATIC PARAMETERS</b>           |                                                           |                                                                                      |     |       |       |       |
| BV <sub>DSS</sub>                  | Drain-Source Breakdown Voltage                            | I <sub>D</sub> =250μA, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                     | 600 |       |       | V     |
|                                    |                                                           | I <sub>D</sub> =10mA, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C                     |     | 700   |       |       |
| BV <sub>DSS</sub> /ΔT <sub>J</sub> | Breakdown Voltage Temperature Coefficient                 | I <sub>D</sub> =10mA, V <sub>GS</sub> =0V                                            |     | 0.52  |       | V/°C  |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> =600V, V <sub>GS</sub> =0V                                           |     |       | 10    | μA    |
|                                    |                                                           | V <sub>DS</sub> =480V, T <sub>J</sub> =125°C                                         |     | 90    |       |       |
| I <sub>GSS</sub>                   | Gate-Body leakage current                                 | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                           |     |       | ±100  | nA    |
| V <sub>GS(th)</sub>                | Gate Threshold Voltage                                    | V <sub>DS</sub> =5V, I <sub>D</sub> =250μA                                           | 2.8 | 3.5   | 4.2   | V     |
| R <sub>DS(on)</sub>                | Static Drain-Source On-Resistance                         | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                                            |     | 0.033 | 0.037 | Ω     |
| g <sub>FS</sub>                    | Forward Transconductance                                  | V <sub>DS</sub> =10V, I <sub>D</sub> =20A                                            |     | 38    |       | S     |
| V <sub>SD</sub>                    | Diode Forward Voltage                                     | I <sub>S</sub> =20A, V <sub>GS</sub> =0V                                             |     | 0.95  | 1.2   | V     |
| I <sub>S</sub>                     | Maximum Body-Diode Continuous Current                     |                                                                                      |     |       | 82    | A     |
| I <sub>SM</sub>                    | Maximum Body-Diode Pulsed Current <sup>C</sup>            |                                                                                      |     |       | 328   | A     |
| <b>DYNAMIC PARAMETERS</b>          |                                                           |                                                                                      |     |       |       |       |
| C <sub>iss</sub>                   | Input Capacitance                                         | V <sub>GS</sub> =0V, V <sub>DS</sub> =100V, f=1MHz                                   |     | 4250  |       | pF    |
| C <sub>oss</sub>                   | Output Capacitance                                        |                                                                                      |     | 135   |       | pF    |
| C <sub>o(er)</sub>                 | Effective output capacitance, energy related <sup>H</sup> | V <sub>GS</sub> =0V, V <sub>DS</sub> =0 to 480V, f=1MHz                              |     | 146   |       | pF    |
| C <sub>o(tr)</sub>                 | Effective output capacitance, time related <sup>I</sup>   |                                                                                      |     | 1192  |       | pF    |
| C <sub>rss</sub>                   | Reverse Transfer Capacitance                              | V <sub>GS</sub> =0V, V <sub>DS</sub> =100V, f=1MHz                                   |     | 3.5   |       | pF    |
| R <sub>g</sub>                     | Gate resistance                                           | f=1MHz                                                                               |     | 3.8   |       | Ω     |
| <b>SWITCHING PARAMETERS</b>        |                                                           |                                                                                      |     |       |       |       |
| Q <sub>g</sub>                     | Total Gate Charge                                         | V <sub>GS</sub> =10V, V <sub>DS</sub> =480V, I <sub>D</sub> =35A                     |     | 146   |       | nC    |
| Q <sub>gs</sub>                    | Gate Source Charge                                        |                                                                                      |     | 28    |       | nC    |
| Q <sub>gd</sub>                    | Gate Drain Charge                                         |                                                                                      |     | 80    |       | nC    |
| t <sub>D(on)</sub>                 | Turn-On DelayTime                                         | V <sub>GS</sub> =10V, V <sub>DS</sub> =400V, I <sub>D</sub> =35A, R <sub>G</sub> =5Ω |     | 52    |       | ns    |
| t <sub>r</sub>                     | Turn-On Rise Time                                         |                                                                                      |     | 102   |       | ns    |
| t <sub>D(off)</sub>                | Turn-Off DelayTime                                        |                                                                                      |     | 200   |       | ns    |
| t <sub>f</sub>                     | Turn-Off Fall Time                                        |                                                                                      |     | 56    |       | ns    |
| t <sub>rr</sub>                    | Body Diode Reverse Recovery Time                          | I <sub>F</sub> =35A, dI/dt=100A/μs, V <sub>DS</sub> =400V                            |     | 175   |       | ns    |
| I <sub>rm</sub>                    | Peak Reverse Recovery Current                             |                                                                                      |     | 12    |       | A     |
| Q <sub>rr</sub>                    | Body Diode Reverse Recovery Charge                        |                                                                                      |     | 1.2   |       | μC    |

A. The value of R<sub>θJA</sub> is measured with the device in a still air environment with T<sub>A</sub>=25° C.

B. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150° C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Single pulse width limited by junction temperature T<sub>J(MAX)</sub>=150° C.

D. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to case R<sub>θJC</sub> and case to ambient.

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

F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150° C. The SOA curve provides a single pulse rating.

G. L=60mH, I<sub>AS</sub>=5 A, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25° C.

H. C<sub>o(er)</sub> is a fixed capacitance that gives the same stored energy as C<sub>oss</sub> while V<sub>DS</sub> is rising from 0 to 80% V<sub>(BR)DSS</sub>.

I. C<sub>o(tr)</sub> is a fixed capacitance that gives the same charging time as C<sub>oss</sub> while V<sub>DS</sub> is rising from 0 to 80% V<sub>(BR)DSS</sub>.

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# TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

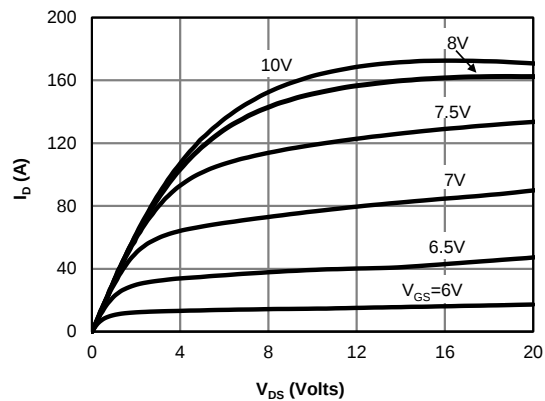


Figure 1: On-Region Characteristics

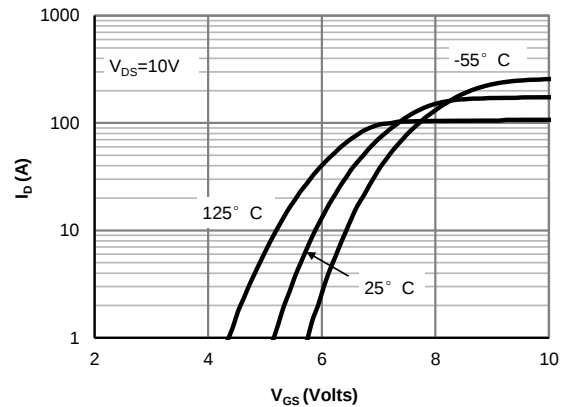


Figure 2: Transfer Characteristics

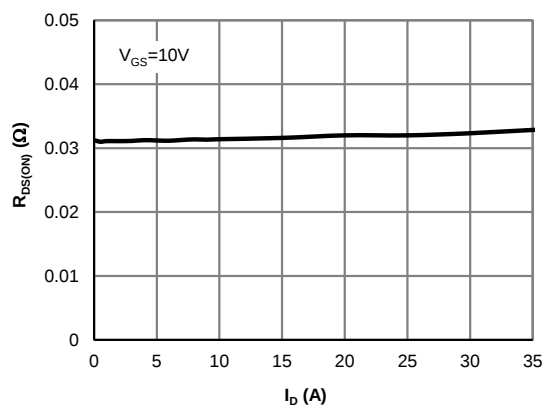


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

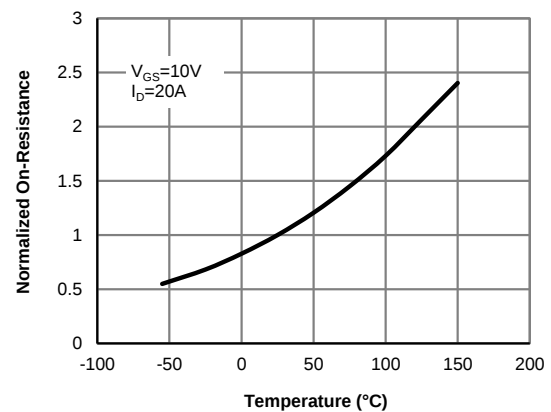


Figure 4: On-Resistance vs. Junction Temperature

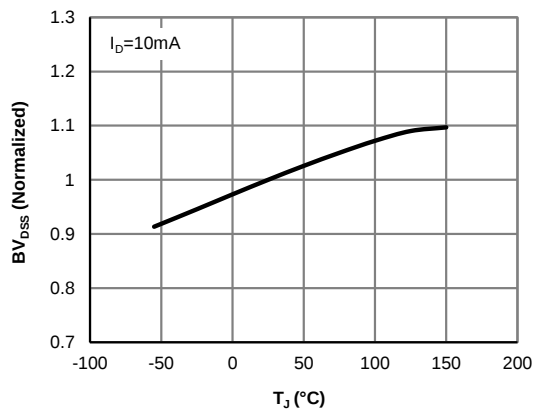


Figure 5: Break Down vs. Junction Temperature

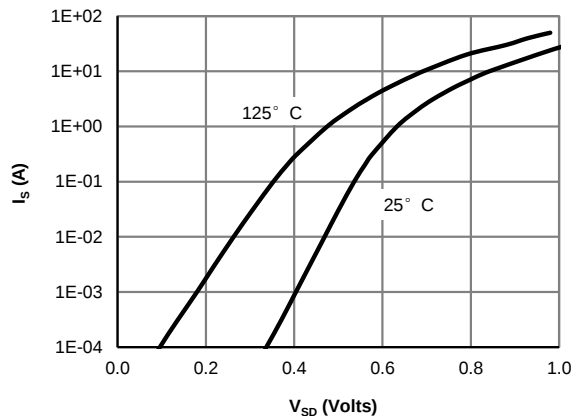
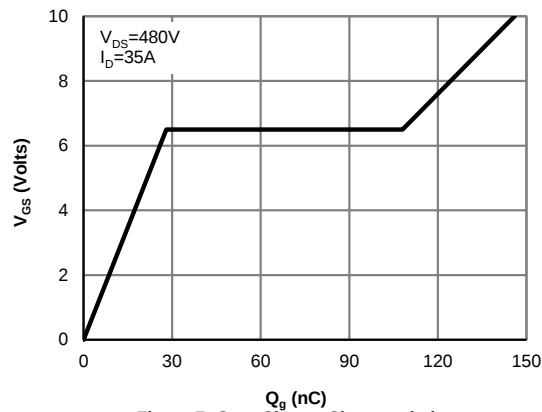
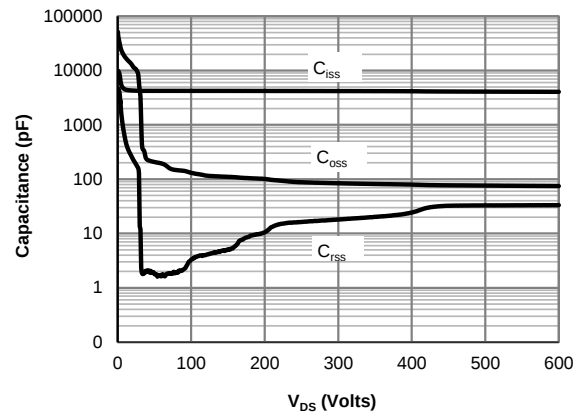


Figure 6: Body-Diode Characteristics

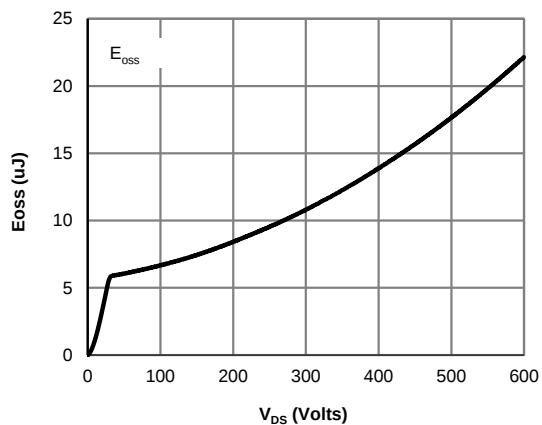
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



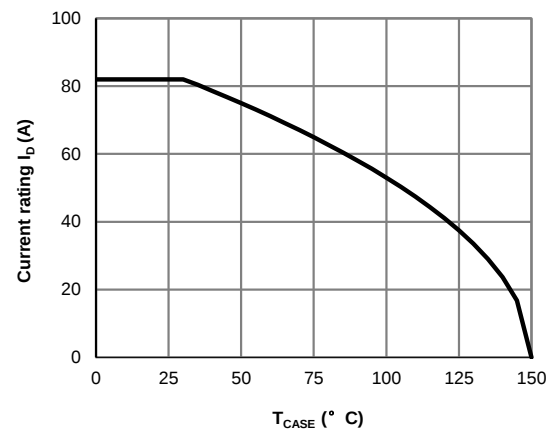
**Figure 7: Gate-Charge Characteristics**



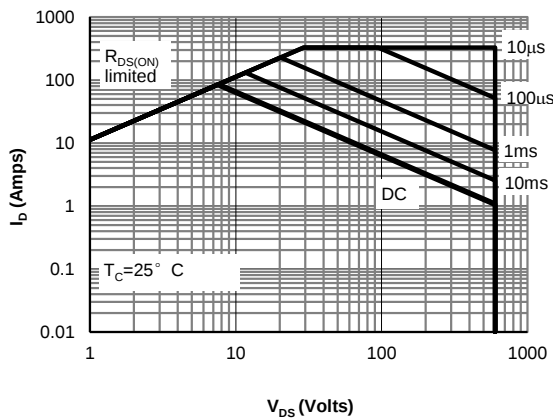
**Figure 8: Capacitance Characteristics**



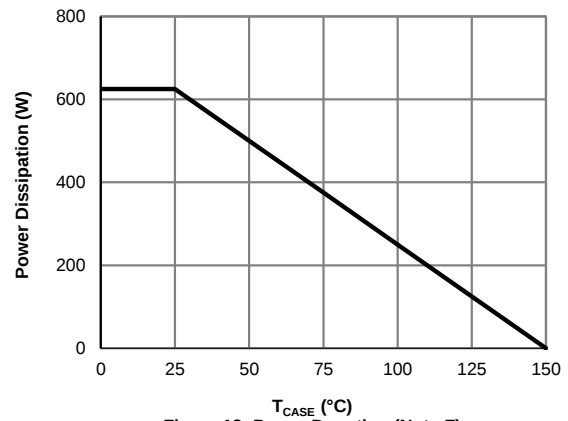
**Figure 9: Coss stored Energy**



**Figure 10: Current De-rating (Note F)**

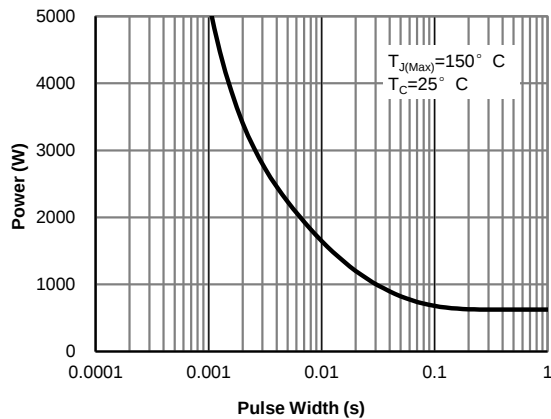


**Figure 11: Maximum Forward Biased Safe Operating Area (Note F)**

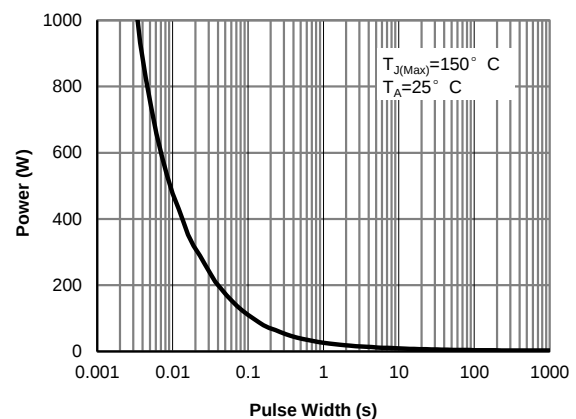


**Figure 12: Power De-rating (Note F)**

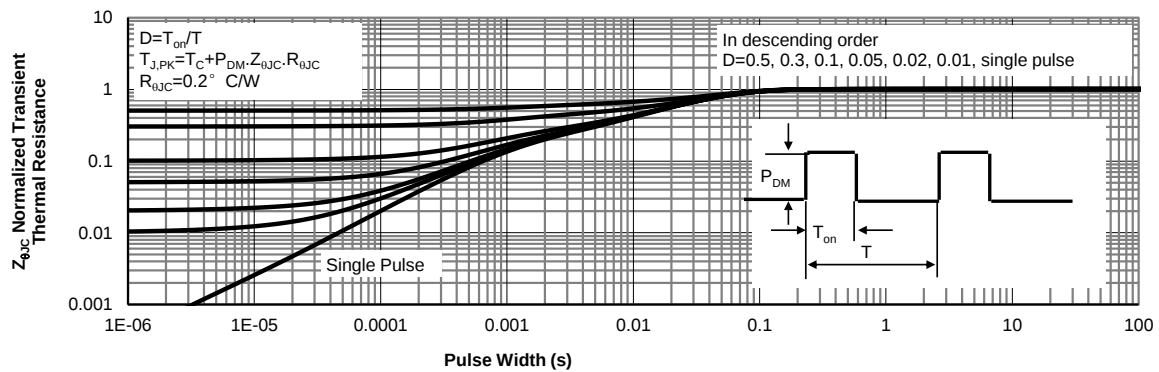
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



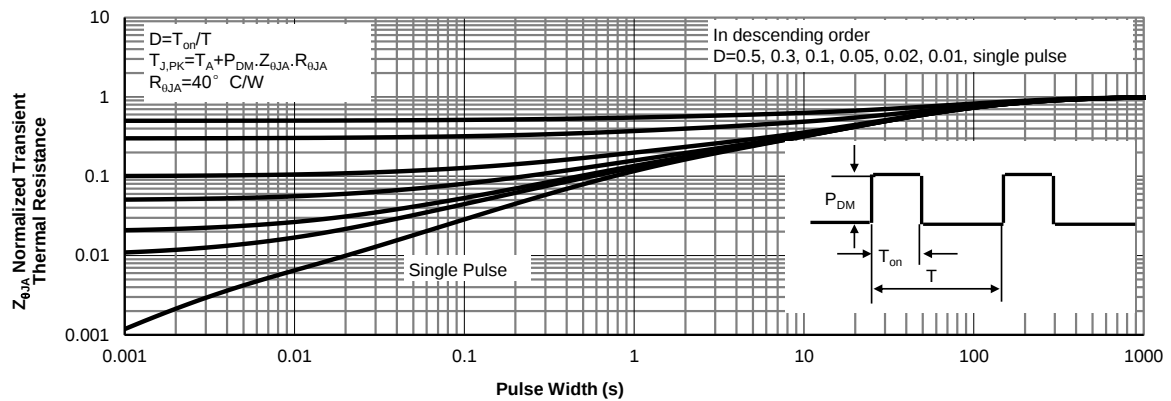
**Figure 13: Single Pulse Power Rating Junction-to-Case (Note F)**



**Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)**

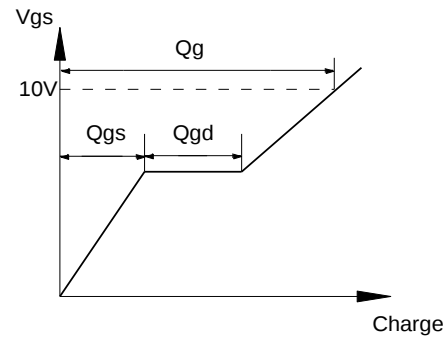
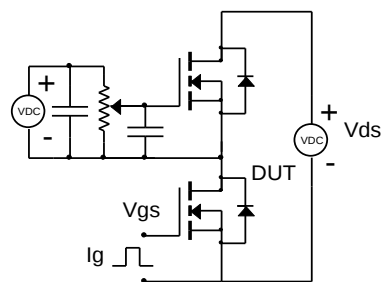


**Figure 15: Normalized Maximum Transient Thermal Impedance (Note F)**

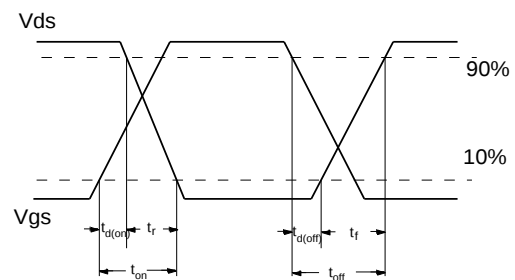
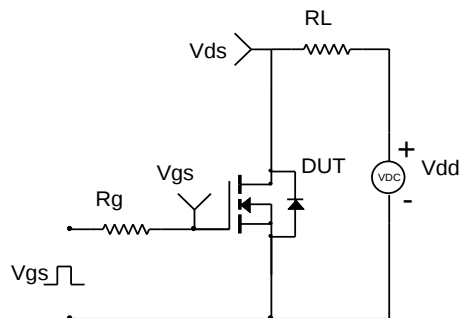


**Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)**

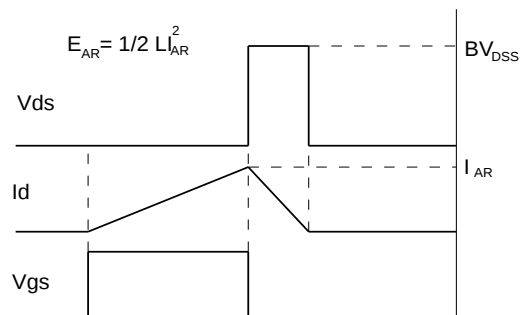
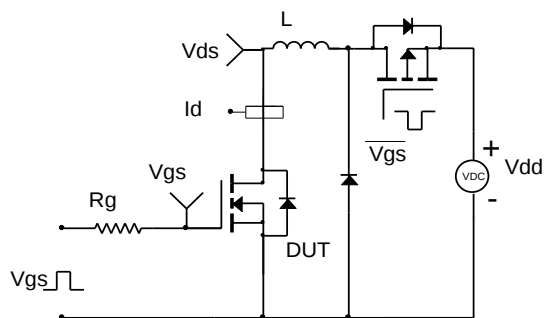
### Gate Charge Test Circuit & Waveform



## Resistive Switching Test Circuit & Waveforms



## Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



## Diode Recovery Test Circuit & Waveforms

