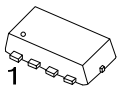
# UTT8P03-H

**Power MOSFET**

## -8A, -30V, P-CHANNEL MOSFET




DFN3020-8

### ■ DESCRIPTION

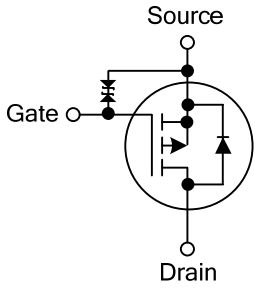
The UTC **UTT8P03-H** is a P-channel MOSFET. it uses UTC's advanced technology to provide the customers with a minimum on state resistance, high switching speed and low gate charge.

The UTC **UTT8P03-H** is suitable for load switching.

### ■ FEATURES

* $R_{DS(ON)}$ ≤ 26mΩ @ $V_{GS}$=-10V, $I_D$=-8A
  $R_{DS(ON)}$ ≤ 34mΩ @ $V_{GS}$=-4.5V, $I_D$=-7A
* High switching speed
* Low gate charge

### ■ SYMBOL



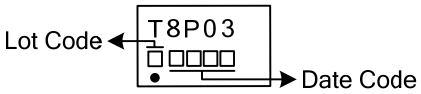

### ■ ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | | | | | | Packing |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| UTT8P03L-K08-3020-R | UTT8P03G-K08-3020-R | DFN3020-8 | D | D | D | G | S | D | D | D | Tape Reel |

Note: Pin Assignment: D: Drain G: Gate S: Source

| | |
|---|---|
| UTT8P03G-K08-3020-R<br>(1)Packing Type<br>(2)Package Type<br>(3)Green Package | (1) R: Tape Reel<br>(2) K08-3020: DFN3020-8<br>(3) G: Halogen Free and Lead Free, L: Lead Free |

### ■ MARKING



## ■ ABSOLUTE MAXIMUM RATINGS ($T_C$=25°C, unless otherwise noted)

| PARAMETER | | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | -30 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±20 | V |
| Drain Current | Continuous | $T_C$=25°C | $I_D$ | -8 | A |
| | | $T_C$=70°C | | -6 | A |
| | Pulsed (Note 3) | | $I_{DM}$ | -60 | A |
| Power Dissipation (Note2) | | | $P_D$ | 3 | W |
| Junction Temperature | | | $T_J$ | -55~+150 | °C |
| Storage Temperature Range | | | $T_{STG}$ | -55~+150 | °C |

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. The power dissipation $P_D$ is based on $T_{J(MAX)}$=150°C, using ≤10s junction-to-ambient thermal resistance.
3. 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

## ■ THERMAL CHARACTERISTICS

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Junction to Ambient | $\theta_{JA}$ | 90 | °C/W |
| Junction to Case | $\theta_{JC}$ | 40 | °C/W |

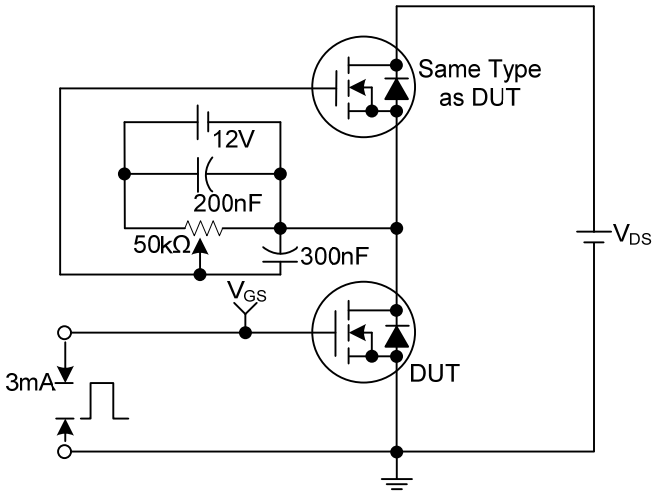
## ■ ELECTRICAL CHARACTERISTICS ($T_J$=25°C, unless otherwise noted)

| PARAMETER | | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | |
| Drain-Source Breakdown Voltage | | $BV_{DSS}$ | $I_D$=-250μA, $V_{GS}$=0V | -30 | | | V |
| Drain-Source Leakage Current | | $I_{DSS}$ | $V_{DS}$=-30V, $V_{GS}$=0V | | | -1 | μA |
| | | | $V_{DS}$=-30V, $V_{GS}$=0V, $T_J$=55°C | | | -5 | μA |
| Gate-Source Leakage Current | Forward | $I_{GSS}$ | $V_{GS}$=+20V, $V_{DS}$=0V | | | +10 | uA |
| | Reverse | | $V_{GS}$=-20V, $V_{DS}$=0V | | | -10 | uA |
| **ON CHARACTERISTICS** | | | | | | | |
| Gate Threshold Voltage | | $V_{GS(TH)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-250μA | -0.8 | -1.3 | -1.8 | V |
| Static Drain-Source On-State Resistance | | $R_{DS(ON)}$ | $V_{GS}$=-10V, $I_D$=-8A | | 21 | 26 | mΩ |
| | | | $V_{GS}$=-4.5V, $I_D$=-7A | | 27 | 34 | mΩ |
| On State Drain Current | | $I_{D(ON)}$ | $V_{GS}$=-10V, $V_{DS}$=-5V | -60 | | | A |
| **DYNAMIC PARAMETERS** | | | | | | | |
| Input Capacitance | | $C_{ISS}$ | $V_{GS}$=0V, $V_{DS}$=-15V, f=1.0MHz | | 930 | | pF |
| Output Capacitance | | $C_{OSS}$ | | | 170 | | pF |
| Reverse Transfer Capacitance | | $C_{RSS}$ | | | 120 | | pF |
| Gate Resistance | | $R_G$ | $V_{GS}$=0V, $V_{DS}$=0V, f=1MHz | | 8 | | Ω |
| **SWITCHING PARAMETERS (Note 2)** | | | | | | | |
| Total Gate Charge | | $Q_G$ | $V_{GS}$=-4.5V, $V_{DS}$=-15V, $I_D$=-5A | | 11 | 17 | nC |
| Gate to Source Charge | | $Q_{GS}$ | | | 3.4 | | nC |
| Gate to Drain Charge | | $Q_{GD}$ | | | 4.2 | | nC |
| Turn-ON Delay Time | | $t_{D(ON)}$ | $V_{DS}$=-1 5V, $V_{GS}$=-10V, $R_{GEN}$=6Ω, $I_D$=-1A | | 5.8 | 11 | ns |
| Rise Time | | $t_R$ | | | 18.8 | 36 | ns |
| Turn-OFF Delay Time | | $t_{D(OFF)}$ | | | 46.9 | 90 | ns |
| Fall-Time | | $t_F$ | | | 12.3 | 23 | ns |
| **SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS** | | | | | | | |
| Maximum Body-Diode Continuous Current | | $I_S$ | | | | -8.5 | A |
| Maximum Body-Diode Pulsed Current | | $I_{Sm}$ | | | | -17 | A |
| Drain-Source Diode Forward Voltage | | $V_{SD}$ | $I_S$=-1A, $V_{GS}$=0V | | -0.74 | -1 | V |

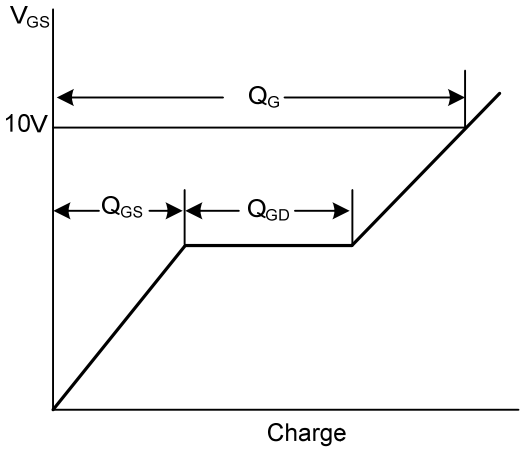
Notes: 1. The value of $\theta_{JA}$ is measured with the device mounted on 1in$^2$ FR-4 board with 2oz. Copper, in a still air environment with $T_A$=25°C. The value in any given application depends on the user's specific board design.

2. The power dissipation $P_D$ is based on $T_{J(MAX)}$=150°C, using ≤10s junction-to-ambient thermal resistance.
3. 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
4. The $\theta_{JA}$ is the sum of the thermal impedance from junction to lead $\theta_{JL}$ and lead to ambient
5. The static characteristics in Figures 1 to 6 are obtained using <300us pulses, duty cycle 0.5% max
6. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in$^2$ 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.

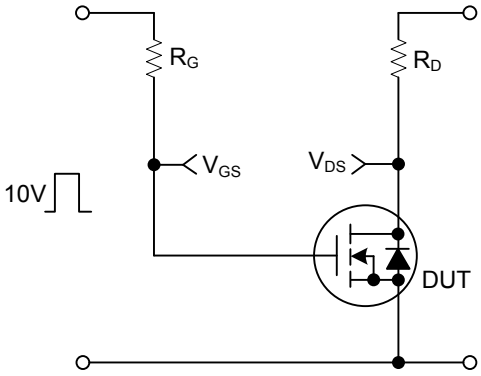
## ■ TEST CIRCUITS AND WAVEFORMS



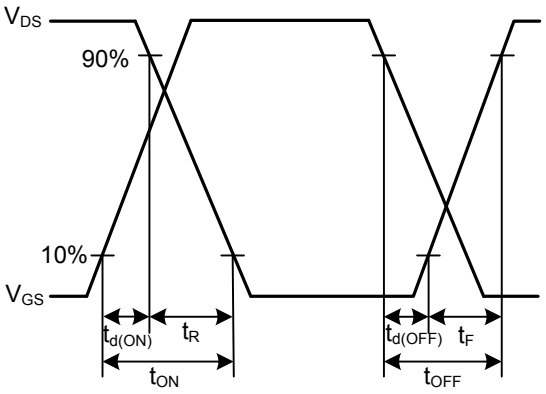

Gate Charge Test Circuit



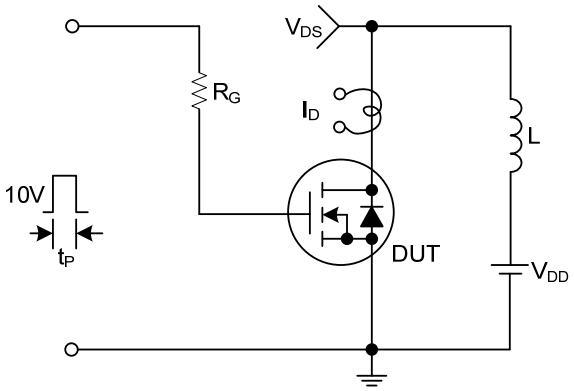

Gate Charge Waveforms



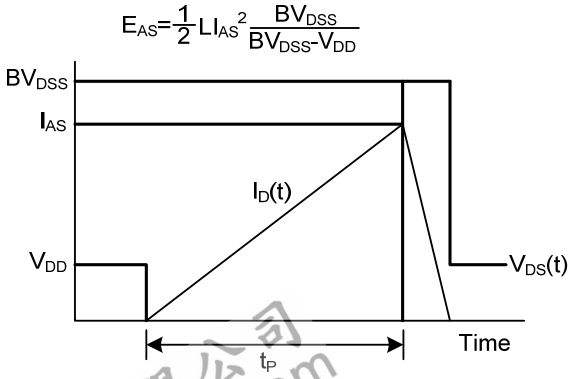

Resistive Switching Test Circuit




Resistive Switching Waveforms

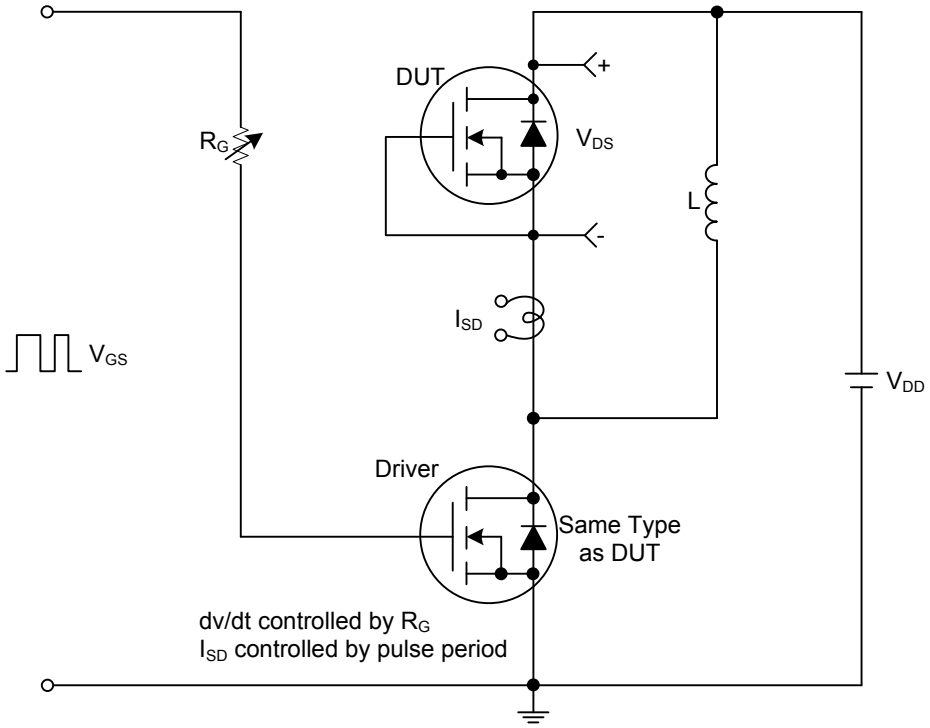


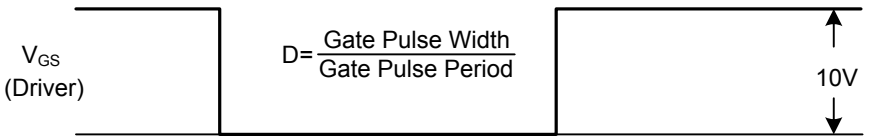

Unclamped Inductive Switching Test Circuit

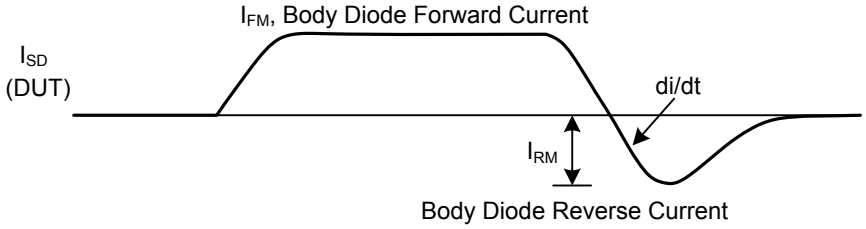


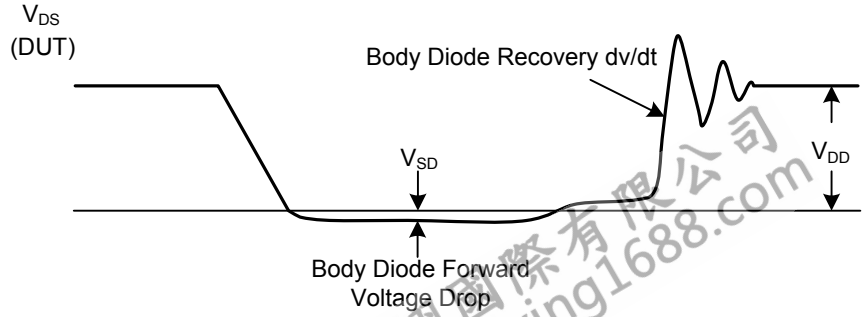

Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)




Peak Diode Recovery dv/dt Test Circuit and Waveforms

## ■ TYPICAL CHARACTERISTICS

Figure 1. On-Region Characteristics (Note 5)

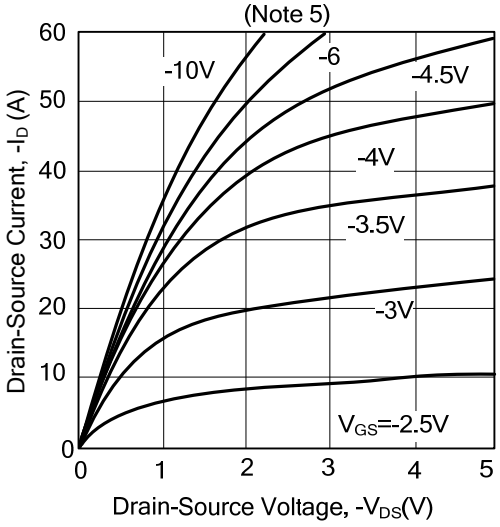



Figure 2. Transfer Characteristics (Note 5)

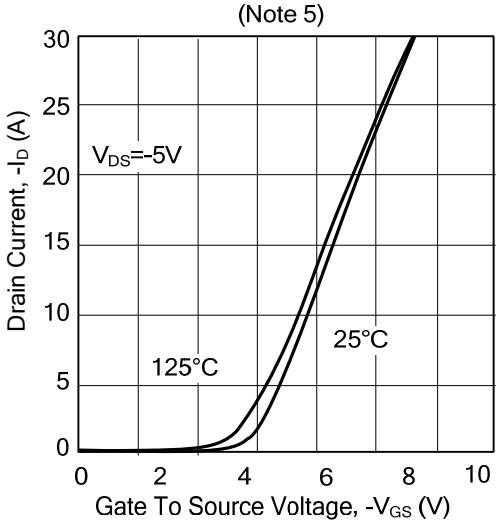



Figure 3. On-Resistance vs. Drain Current and Gate Voltage (Note 5)

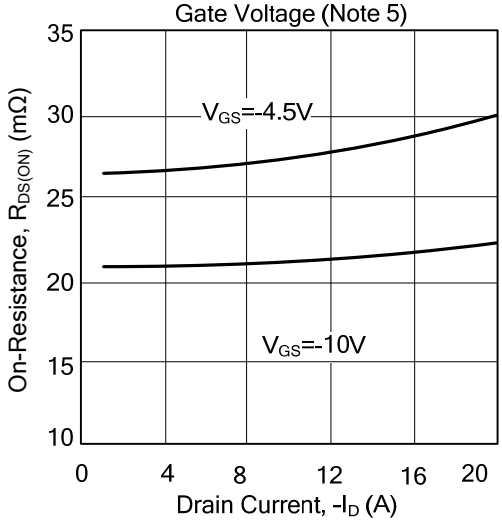



Figure 4. On-Resistance vs. Junction Temperature (Note 5)

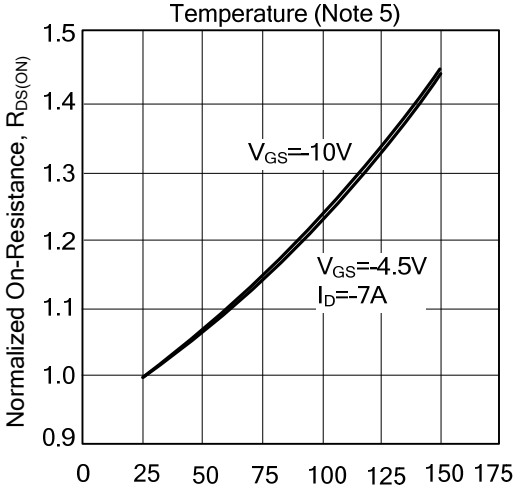



Figure 5. On-Resistance vs. Gate-Source Voltage (Note 5)

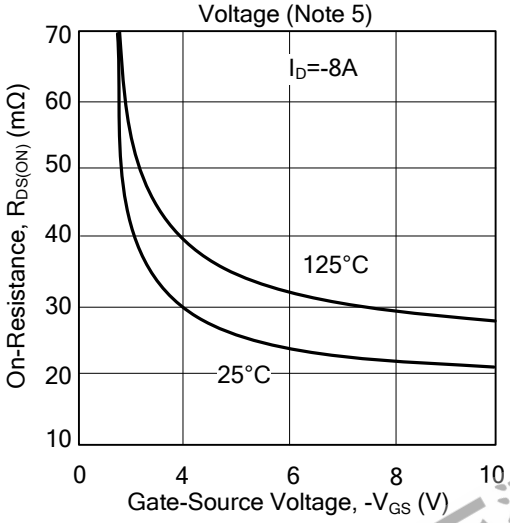
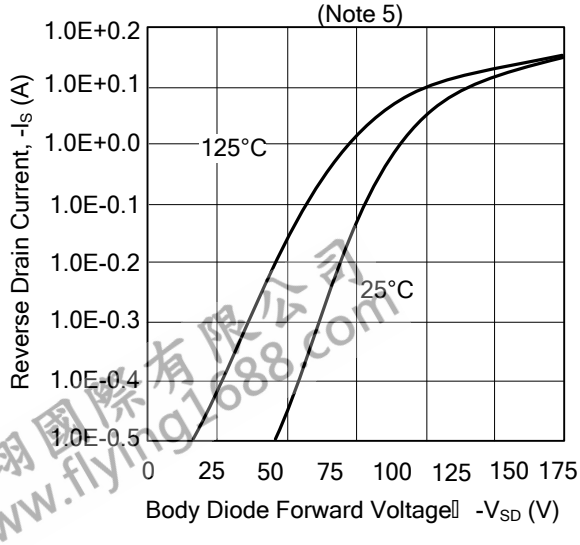



Figure 6. Body-Diode Characteristics (Note 5)



## ■ TYPICAL CHARACTERISTICS (Cont.)

Figure 7. Capacitance Characteristics (Note 5)

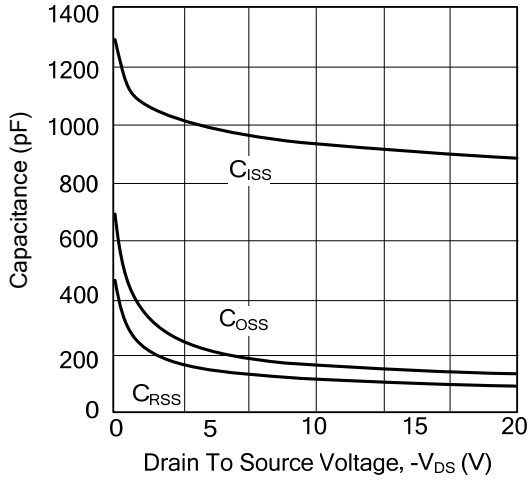



Figure 8. Maximum Forward Biased Safe Operation Area (Note 6)

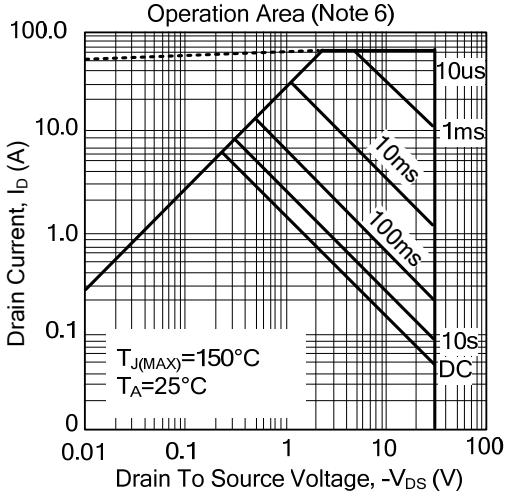



Figure 9. Single Pulse Power Rating Junction-to-Ambient (Note 6)

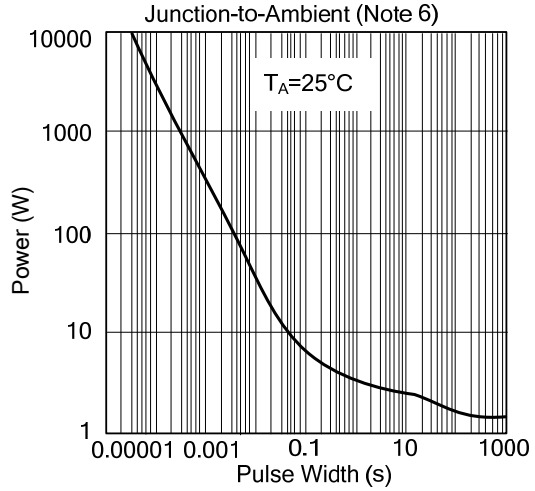



Figure 10: Normalized Maximum Transient Thermal Impedance (Note 6)

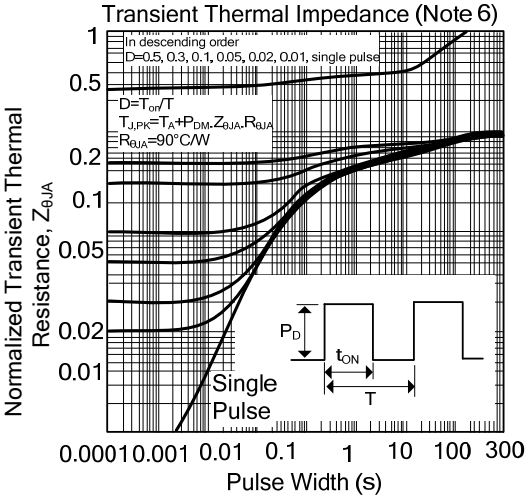



Figure 11: Normalized Maximum Transient Thermal Impedance (Note 6)