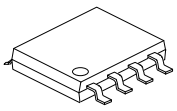
# UTT15NN06

**Power MOSFET**

## 15A, 60V DUAL N-CHANNEL ENHANCEMENT MODE POWER MOSFET



SOP-8

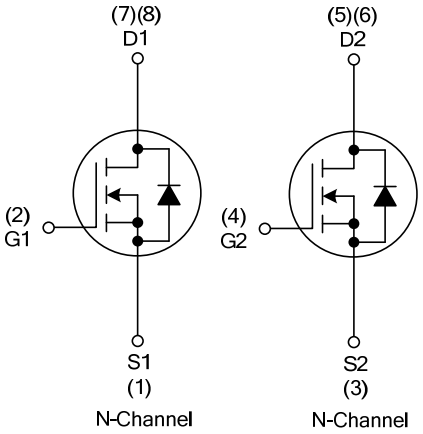
### ■ DESCRIPTION

The UTC **UTT15NN06** is a N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with low Rdson characteristic by high cell density trench technology.

### ■ FEATURES

* $R_{DS(ON)}$ ≤ 35 mΩ @ $V_{GS}$=10V, $I_D$=7.5A
  $R_{DS(ON)}$ ≤ 53 mΩ @ $V_{GS}$=4.5V, $I_D$=7.5A
* Fast Switching Speed
* Simple Drive Requirement

### ■ SYMBOL



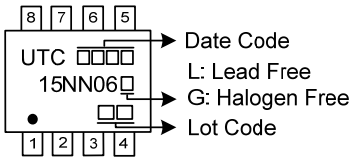

### ■ ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | | | | | | Packing |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| UTT15NN06L-S015-R | UTT15NN06G-S015-R | SOP-15 | S1 | G1 | S2 | G2 | D2 | D2 | D1 | D1 | Tape Reel |

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

UTT15NN06G-S08-R
- (1)Packing Type — (1) R: Tape Reel
- (2)Package Type — (2) S08: SOP-8
- (3)Green Package — (3) G: Halogen Free and Lead Free, L: Lead Free

## ■ MARKING


8 7 6 5
UTC □□□□
15NN06□
□□
1 2 3 4
Date Code
L: Lead Free
G: Halogen Free
Lot Code

## ■ ABSOLUTE MAXIMUM RATINGS ($T_A$=25°C, unless otherwise specified)

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 60 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±20 | V |
| Drain Current | Continuous | $I_D$ | 15 | A |
| | Pulsed (Note 2) | $I_{DM}$ | 30 | A |
| Avalanche Energy | Single Pulsed (Note 3) | $E_{AS}$ | 14.1 | mJ |
| Peak Diode Recovery dv/dt (Note 4) | | dv/dt | 1.7 | V/nS |
| Power Dissipation | | $P_D$ | 2 | W |
| Junction Temperature | | $T_J$ | +150 | °C |
| Storage Temperature | | $T_{STG}$ | -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. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. L =0.1mH, $I_{AS}$ =16.8A, $V_{DD}$ = 25V, $R_G$ = 25Ω, Starting $T_J$ = 25°C.
4. $I_{SD}$ ≤15A, di/dt ≤ 200A/μs, $V_{DD}$ ≤ $V_{(BR)DSS}$, $T_J$ = 25°C.

## ■ THERMAL DATA (NOTE)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Junction to Ambient | $\theta_{JA}$ | 125 | °C/W |
| Junction to Case | $\theta_{JC}$ | 62.5 | °C/W |

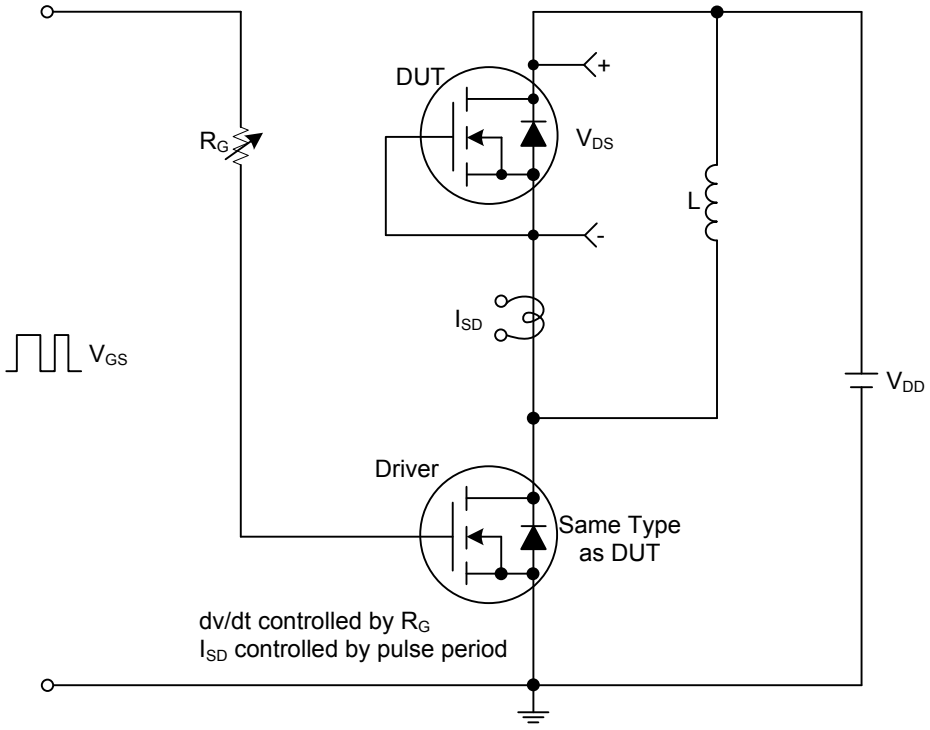
Note: Device mounted on FR-4 substrate $P_C$ board, 2oz copper, with 1inch square copper plate.

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

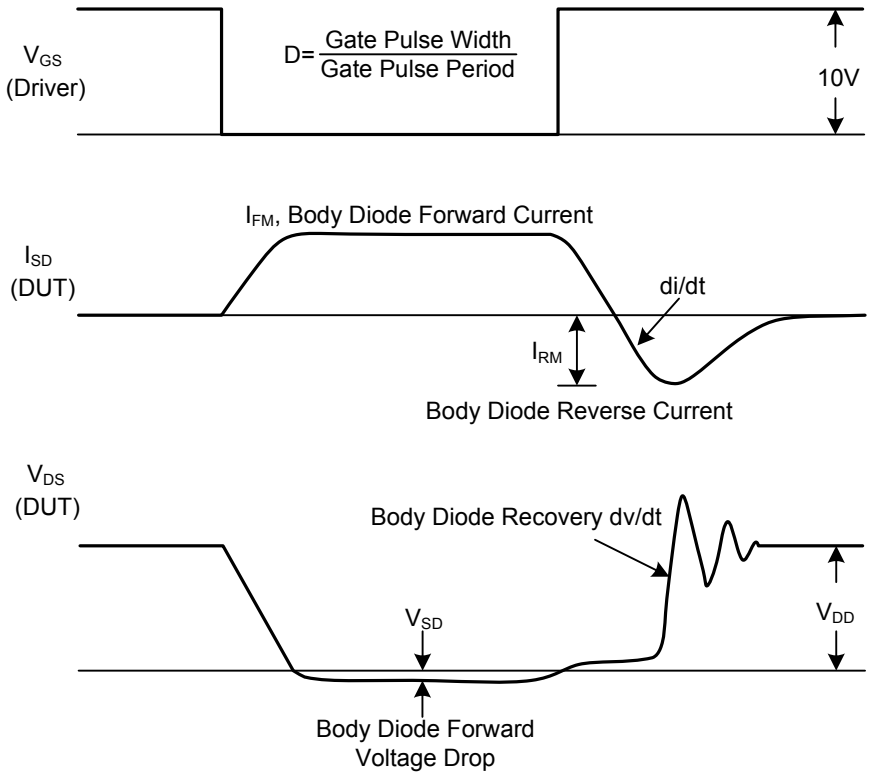
| PARAMETER | | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | |
| Drain-Source Breakdown Voltage | | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=250μA | 60 | | | V |
| Drain-Source Leakage Current | | $I_{DSS}$ | $V_{DS}$=60V, $V_{GS}$=0V | | | 1 | μA |
| Gate-Source Leakage Current | Forward | $I_{GSS}$ | $V_{DS}$=0V ,$V_{GS}$=20V | | | 60 | nA |
| | Reverse | | $V_{DS}$=0V ,$V_{GS}$=-20V | | | -60 | nA |
| **ON CHARACTERISTICS** | | | | | | | |
| Gate Threshold Voltage | | $V_{GS(TH)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 1.0 | | 3.0 | V |
| Drain-Source On-State Resistance | | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=7.5A | | | 35 | mΩ |
| | | | $V_{GS}$=4.5V, $I_D$=7.5A | | | 53 | mΩ |
| **DYNAMIC PARAMETERS** | | | | | | | |
| Input Capacitance | | $C_{ISS}$ | $V_{DS}$=25V, $V_{GS}$=0V, f=1.0MHz | | 817.1 | | pF |
| Output Capacitance | | $C_{OSS}$ | | | 85.7 | | pF |
| Reverse Transfer Capacitance | | $C_{RSS}$ | | | 74.7 | | pF |
| **SWITCHING PARAMETERS** | | | | | | | |
| Total Gate Charge (Note 1) | | $Q_G$ | $V_{DS}$=48V, $V_{GS}$=10V, $I_D$=15A, $I_G$=1mA (Note 1, 2) | | 28.8 | | nC |
| Gate-Source Charge | | $Q_{GS}$ | | | 5.8 | | nC |
| Gate-Drain Charge | | $Q_{GD}$ | | | 8 | | nC |
| Turn-ON Delay Time (Note 1) | | $t_{D(ON)}$ | $V_{DD}$=30V, $V_{GS}$=10V, $I_D$=15A, $R_G$=3Ω (Note 1, 2) | | 8 | | ns |
| Turn-ON Rise Time | | $t_R$ | | | 15.5 | | ns |
| Turn-OFF Delay Time | | $t_{D(OFF)}$ | | | 18.4 | | ns |
| Turn-OFF Fall Time | | $t_F$ | | | 18.6 | | ns |
| **SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS** | | | | | | | |
| Maximum Body-Diode Continuous Current | | $I_S$ | | | | 15 | A |
| Maximum Body-Diode Pulsed Current | | $I_{SM}$ | | | | 30 | A |
| Drain-Source Diode Forward Voltage (Note 1) | | $V_{SD}$ | $I_S$ =15A, $V_{GS}$=0V | | | 1.4 | V |
| Body Diode Reverse Recovery Time (Note 1) | | $t_{rr}$ | $I_S$ =15A, $V_{GS}$=0V, $dI_F/dt$=100A/μs | | 22 | | ns |
| Body Diode Reverse Recovery Charge | | $Q_{rr}$ | | | 31 | | nC |

Notes: 1. Pulse Test: Pulse width ≤ 600μs, Duty cycle≤2%.
2. Essentially independent of operating temperature.

## ■ TEST CIRCUITS AND WAVEFORMS



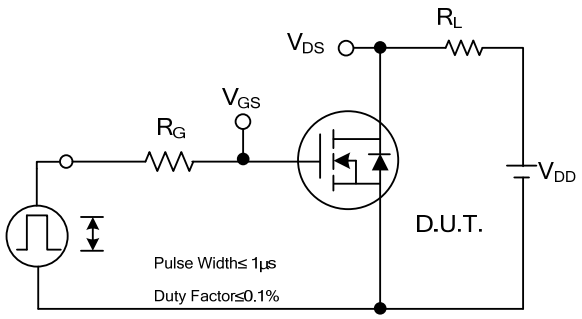

**Peak Diode Recovery dv/dt Test Circuit**



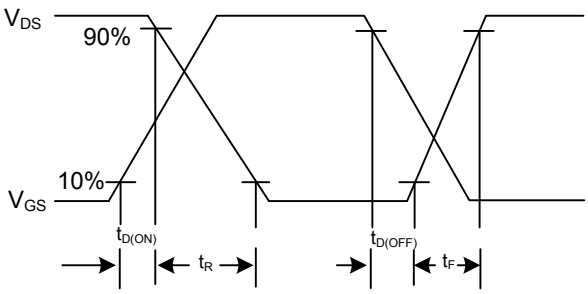

Peak Diode Recovery dv/dt Test Circuit and Waveforms

**Peak Diode Recovery dv/dt Waveforms**

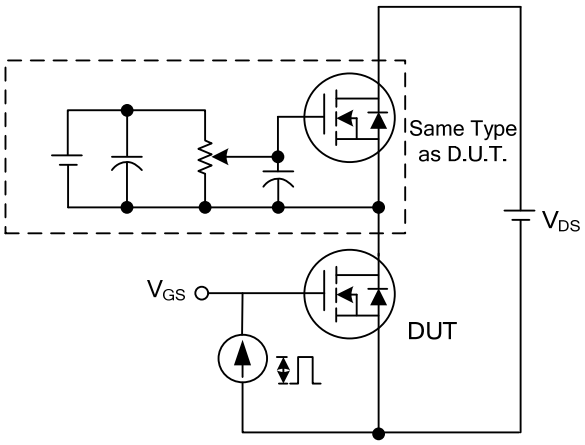
## ■ TEST CIRCUITS AND WAVEFORMS



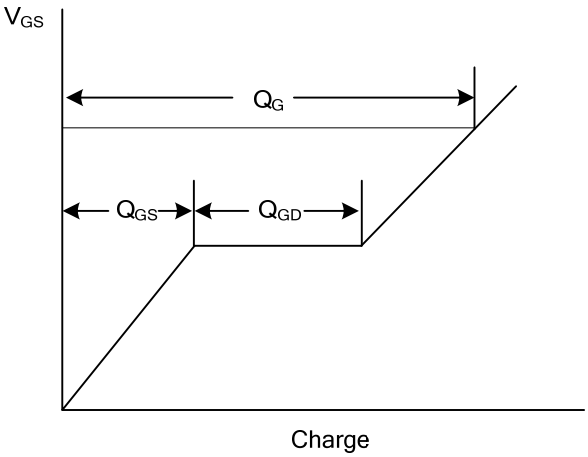

**Switching Test Circuit**



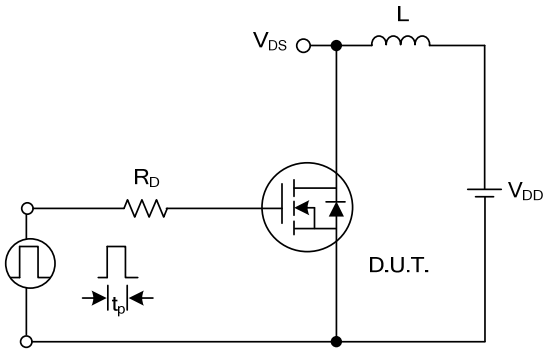

**Switching Waveforms**



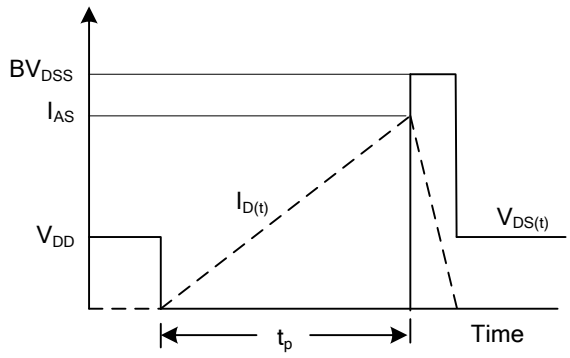

**Gate Charge Test Circuit**




**Gate Charge Waveform**

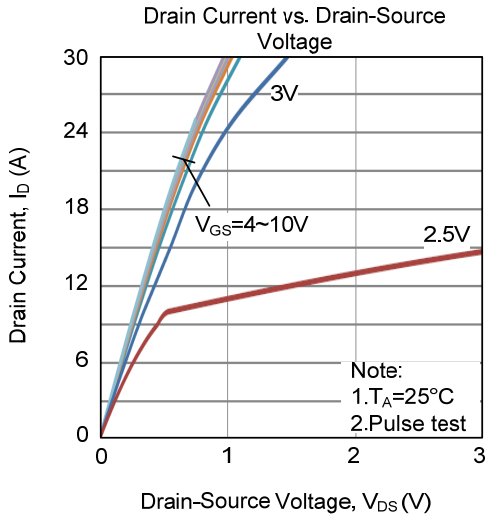


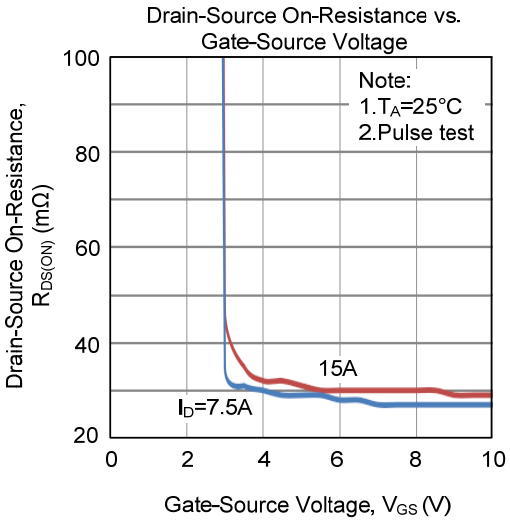

**Unclamped Inductive Switching Test Circuit**

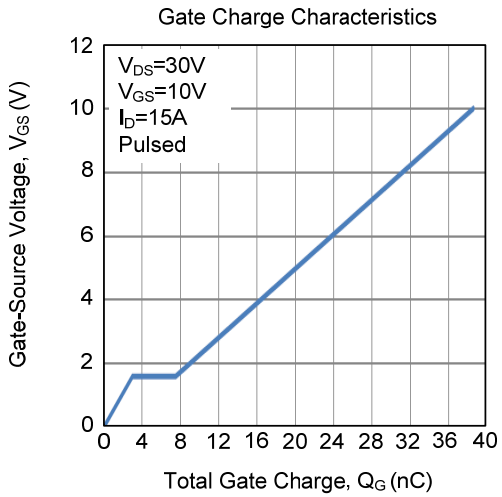


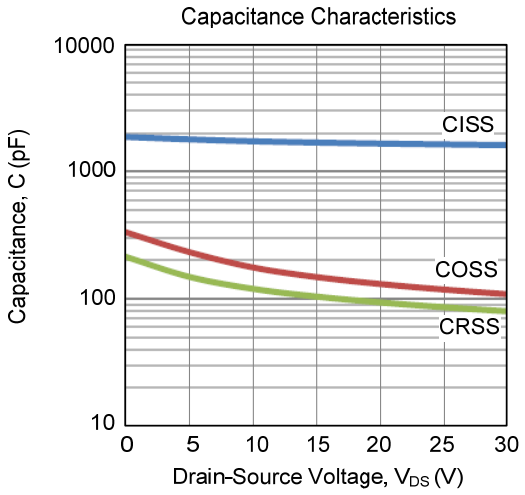

**Unclamped Inductive Switching Waveforms**

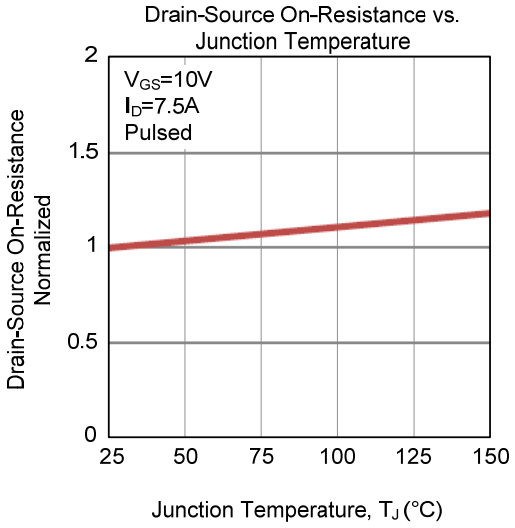
## ■ TYPICAL CHARACTERISTICS

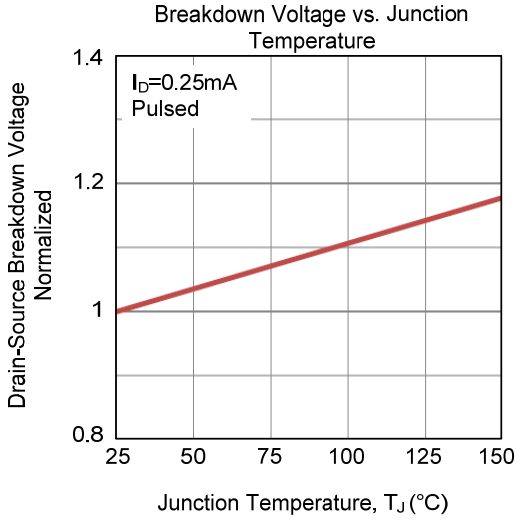


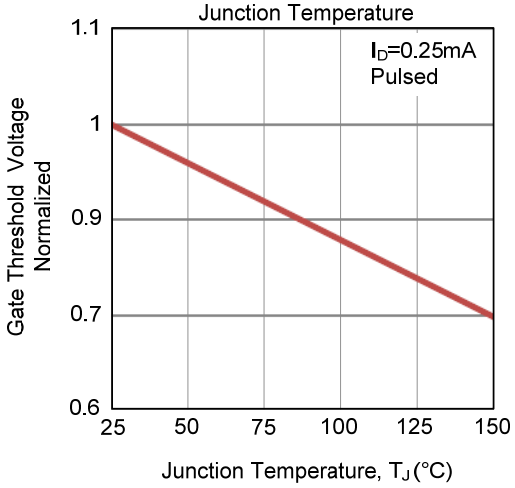



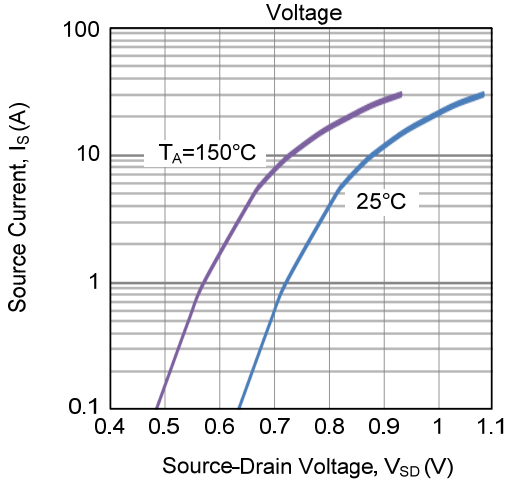



## ■ TYPICAL CHARACTERISTICS (Cont.)

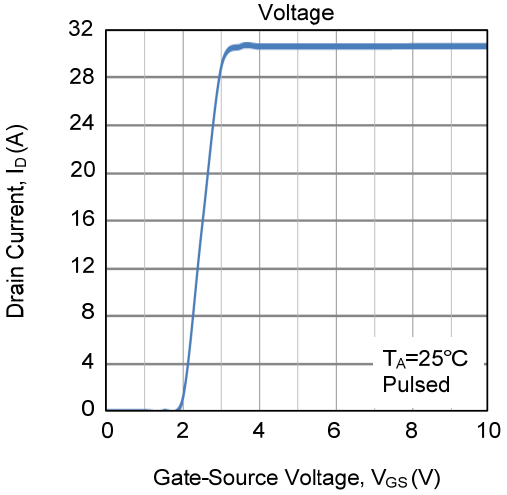
Gate Threshold Voltage vs. Junction Temperature



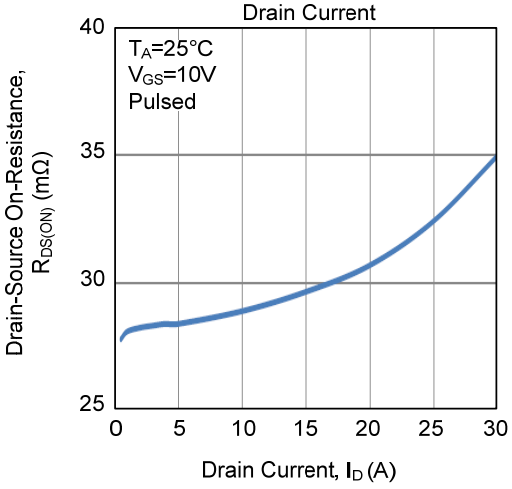

Source Current vs. Source-Drain Voltage



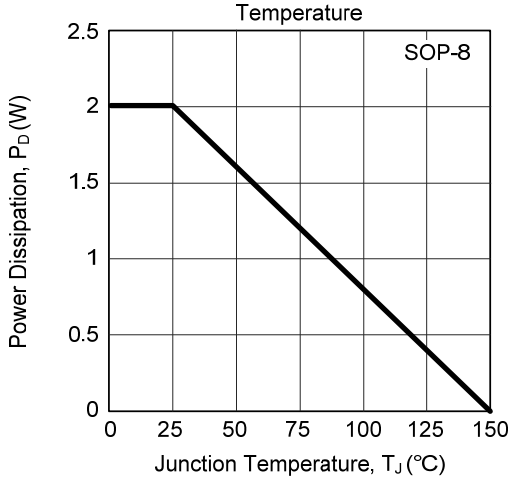

Drain Current vs. Gate-Source Voltage



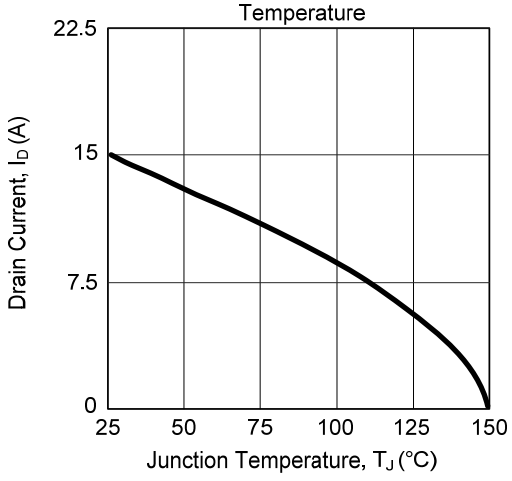

Drain-Source On-Resistance vs. Drain Current




Power Dissipation vs. Junction Temperature




Drain Current vs. Junction Temperature



## ■ TYPICAL CHARACTERISTICS (Cont.)