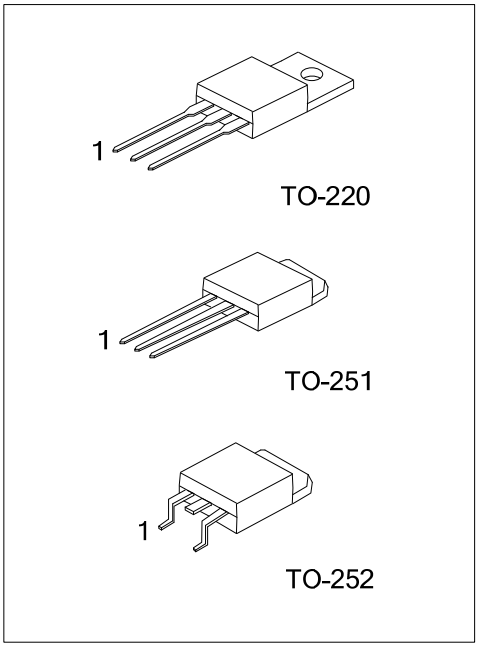
# UTT36N10H

**Power MOSFET**

## 36A, 100V N-CHANNEL POWER MOSFET




## ■ DESCRIPTION

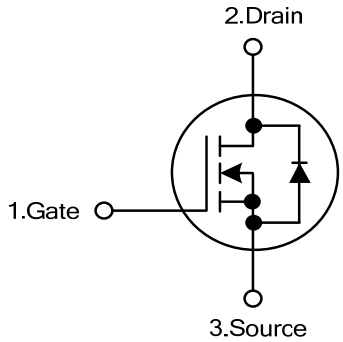
The UTC **UTT36N10H** is a N-channel mode power MOSFET using UTC's advanced technology to provide customers with a minimum on-state resistance, low gate charge and high switching speed.

The UTC **UTT36N10H** is suitable for high voltage synchronous rectifier and DC/DC converters, etc.

## ■ FEATURES

* $R_{DS(ON)} \leq 44\ m\Omega$ @ $V_{GS}$=10V, $I_D$=30A
* High Switching Speed

## ■ SYMBOL



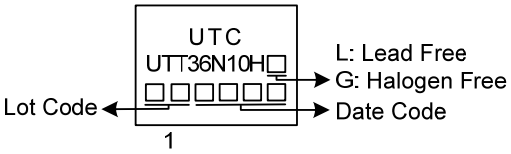

## ■ ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| UTT36N10HL-TA3-T | UTT36N10HG-TA3-T | TO-220 | G | D | S | Tube |
| UTT36N10HL-TM3-T | UTT36N10HG-TM3-T | TO-251 | G | D | S | Tube |
| UTT36N10HL-TN3-R | UTT36N10HG-TN3-R | TO-252 | G | D | S | Tape Reel |

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

| | |
|---|---|
| UTT36N10HG-TA3-T<br>(1)Packing Type<br>(2)Package Type<br>(3)Green Package | (1) T: Tube, R: Tape Reel<br>(2) TA3: TO-220, TM3: TO-251, TN3: TO-252<br>(3) G: Halogen Free and Lead Free, L: Lead Free |

■ MARKING



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

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 100 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±20 | V |
| Drain Current | Continuous ($V_{GS}$=10V) $T_C$=25°C | $I_D$ | 36 | A |
| | Pulsed | $I_{DM}$ | 72 | A |
| Avalanche Energy (Note 3) | Single Pulsed | $E_{AS}$ | 70 | mJ |
| Peak Diode Recovery dv/dt (Note 4) | | dv/dt | 3.7 | V/ns |
| Power Dissipation | TO-220 | $P_D$ | 90 | W |
| | TO-251/TO-252 | | 44 | 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, $I_{AS}$=37.4A, $V_{DD}$= 50V, $R_G$=25Ω, Starting $T_J$=25°C.
4. $I_{SD}$ ≤30A, di/dt ≤200A/μs, $V_{DD}$ ≤$BV_{DSS}$, Starting $T_J$=25°C.

## ■ THERMAL DATA

| PARAMETER | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Junction to Ambient | TO-220 | $\theta_{JA}$ | 62.5 | °C/W |
| | TO-251/TO-252 | | 110 | °C/W |
| Junction to Case | TO-220 | $\theta_{JC}$ | 1.38 | °C/W |
| | TO-251/TO-252 | | 2.85 | °C/W |

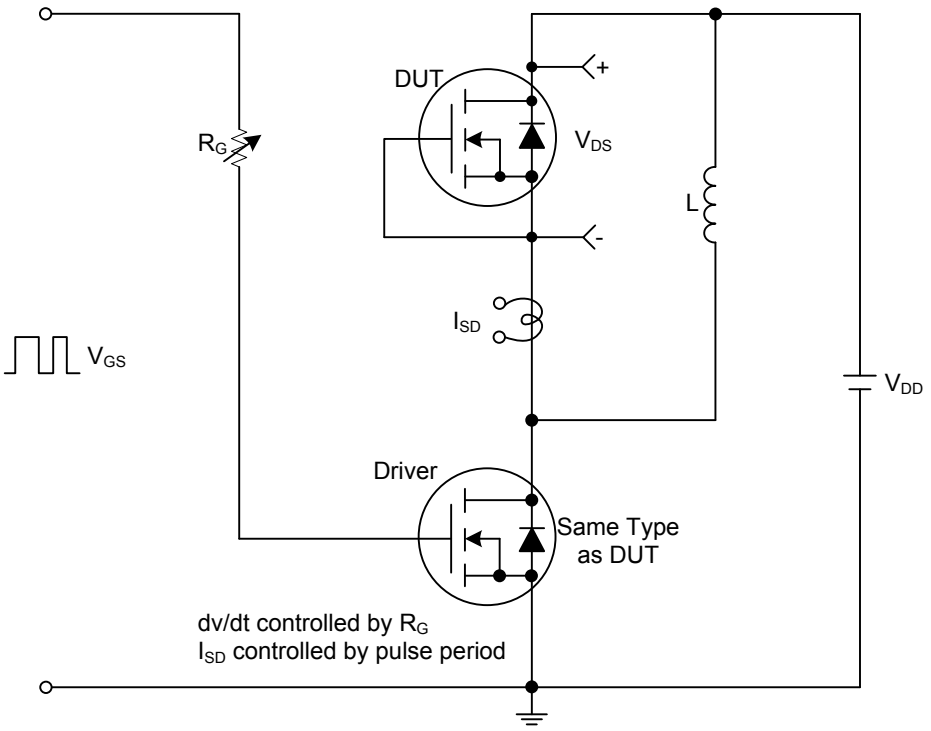
Note: The data tested by surface mounted on a 1 $inch^2$ FR-4 board with 2OZ copper.

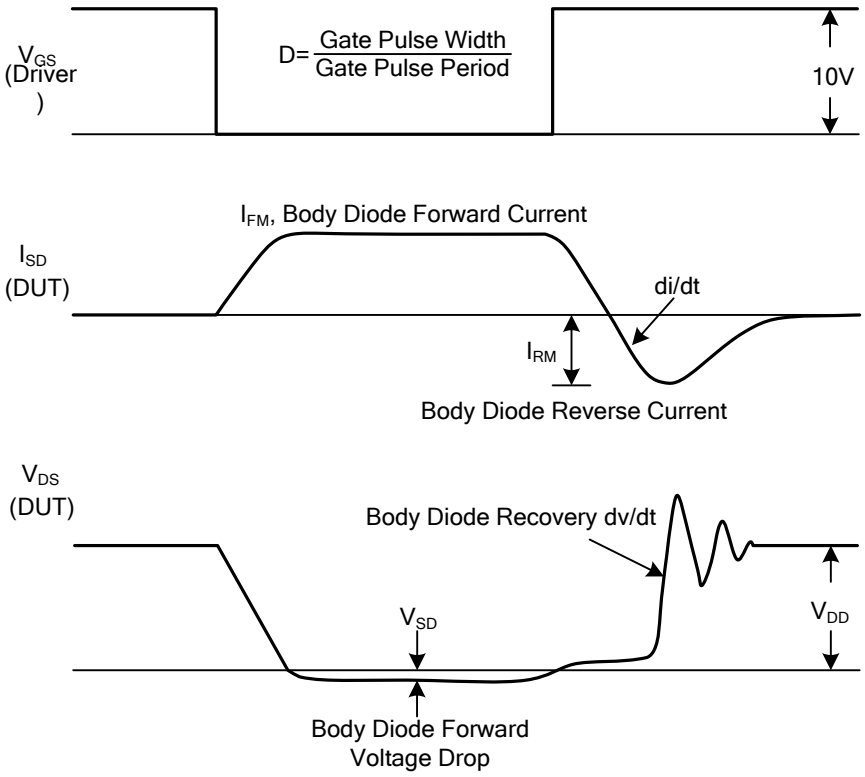
## ■ ELECTRICAL CHARACTERISTICS ($T_J$=25°C, unless otherwise specified)

| PARAMETER | | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | |
| Drain-Source Breakdown Voltage | | $BV_{DSS}$ | $I_D$=250μA, $V_{GS}$=0V | 100 | | | V |
| Drain-Source Leakage Current | | $I_{DSS}$ | $V_{DS}$=100V, $V_{GS}$=0V | | | 1 | μA |
| Gate- Source Leakage Current | Forward | $I_{GSS}$ | $V_{GS}$=+20V, $V_{DS}$=0V | | | +100 | nA |
| | Reverse | | $V_{GS}$=-20V, $V_{DS}$=0V | | | -100 | nA |
| **ON CHARACTERISTICS** | | | | | | | |
| Gate Threshold Voltage | | $V_{GS(TH)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 2.0 | | 4.0 | V |
| Static Drain-Source On-State Resistance | | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=30A | | | 44 | mΩ |
| **DYNAMIC PARAMETERS** | | | | | | | |
| Input Capacitance | | $C_{ISS}$ | $V_{GS}$=0V, $V_{DS}$=25V, f=1.0MHz | | 2860 | | pF |
| Output Capacitance | | $C_{OSS}$ | | | 144 | | pF |
| Reverse Transfer Capacitance | | $C_{RSS}$ | | | 125 | | pF |
| **SWITCHING PARAMETERS** | | | | | | | |
| Total Gate Charge at 10V | | $Q_G$ | $V_{DS}$=80V, $V_{GS}$=10V, $I_D$=36A, $I_G$=1mA (Note 1, 2) | | 64 | | nC |
| Gate to Source Charge | | $Q_{GS}$ | | | 10 | | nC |
| Gate to Drain Charge | | $Q_{GD}$ | | | 16.5 | | nC |
| Turn-ON Delay Time | | $t_{D(ON)}$ | $V_{DD}$ =50V, $V_{GS}$=10V, $I_D$=36A, $R_G$=3.3Ω (Note 1, 2) | | 11 | | ns |
| Rise Time | | $t_R$ | | | 18 | | ns |
| Turn-OFF Delay Time | | $t_{D(OFF)}$ | | | 42 | | ns |
| Fall-Time | | $t_F$ | | | 19 | | ns |
| **SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS** | | | | | | | |
| Maximum Body-Diode Continuous Current | | $I_S$ | | | | 36 | A |
| Continuous Drain-Source Current | | $I_{SD}$ | | | | 72 | A |
| Drain-Source Diode Forward Voltage | | $V_{SD}$ | $I_S$=36A, $V_{GS}$=0V | | | 1.4 | V |
| Reverse Recovery Time | | $t_{rr}$ | $I_F$=30A, di/dt = 100A/μs | | 66 | | ns |
| Reverse Recovery Charge | | $Q_{rr}$ | | | 0.36 | | μC |

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

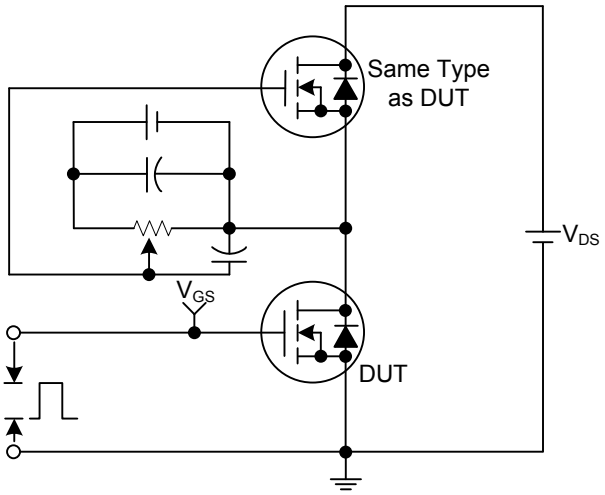
## ■ TEST CIRCUITS AND WAVEFORMS



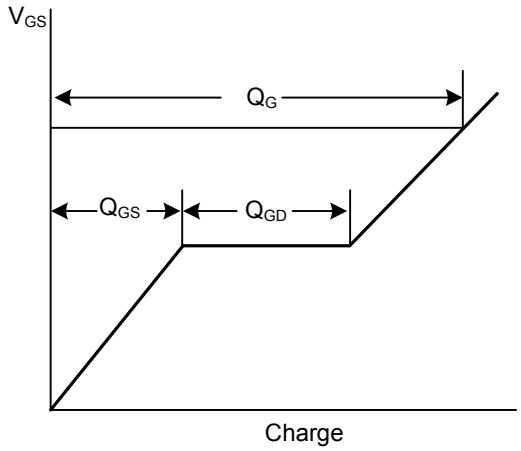




**Peak Diode Recovery dv/dt Test Circuit and Waveforms**

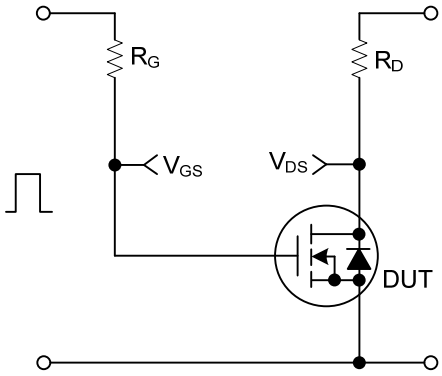
## ■ TEST CIRCUITS AND WAVEFORMS



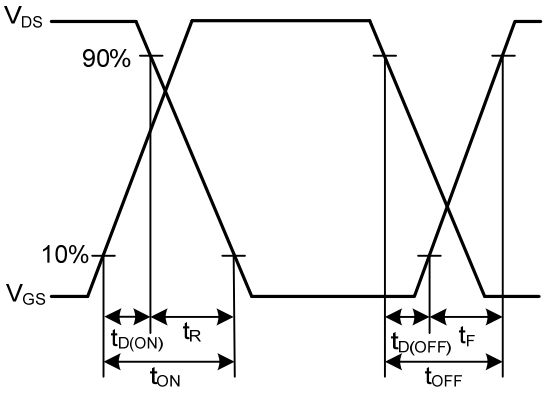

**Gate Charge Test Circuit**



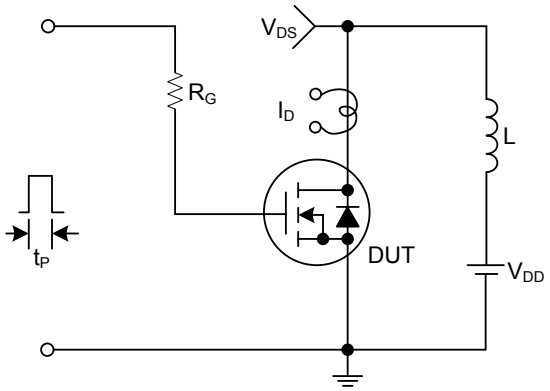

**Gate Charge Waveforms**



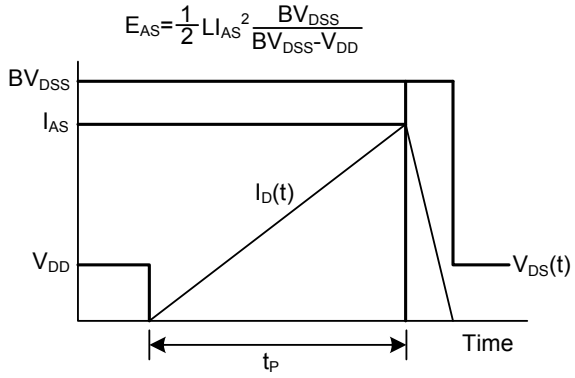

**Resistive Switching Test Circuit**




**Resistive Switching Waveforms**



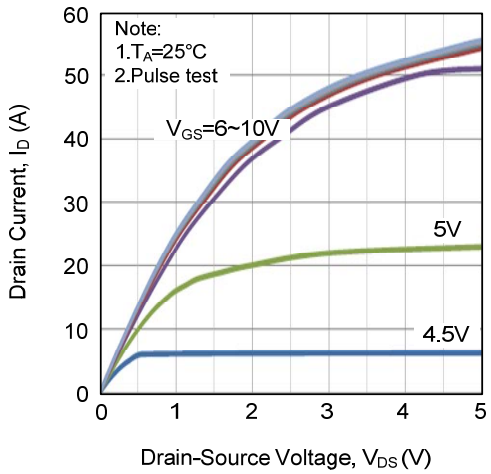

**Unclamped Inductive Switching Test Circuit**



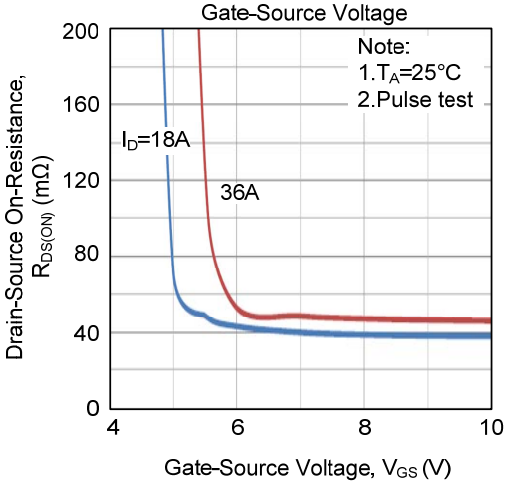

**Unclamped Inductive Switching Waveforms**

## ■ TYPICAL CHARACTERISTICS

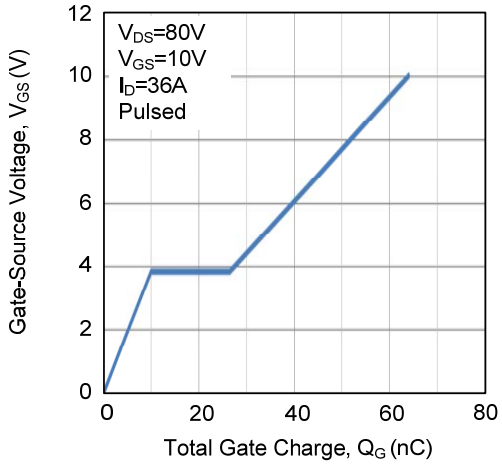
Drain Current vs. Drain-Source Voltage



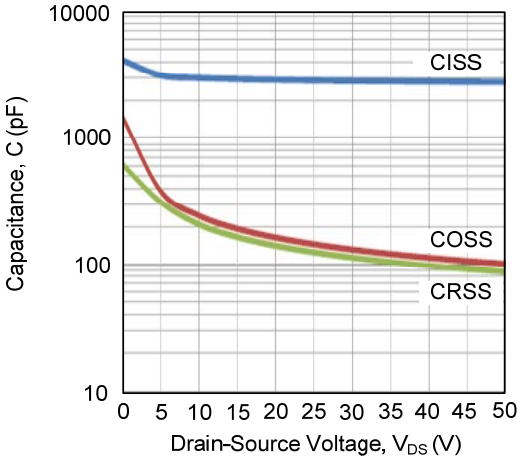

Drain-Source On-Resistance vs. Gate-Source Voltage



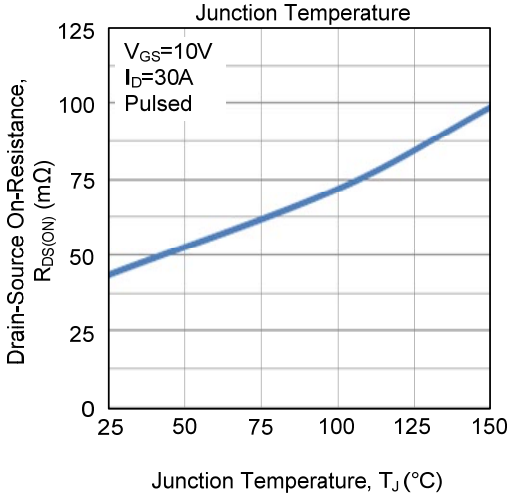

Gate Charge Characteristics



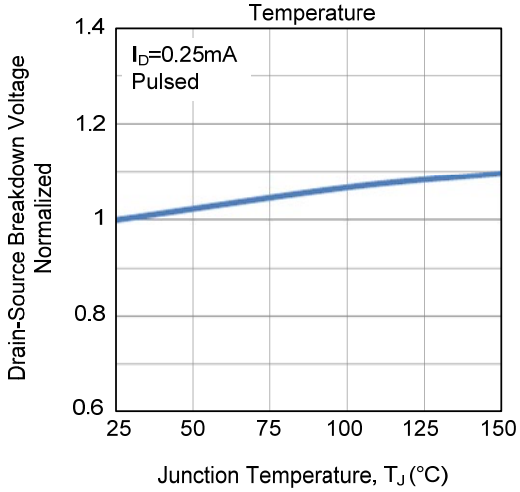

Capacitance Characteristics




Drain-Source On-Resistance vs. Junction Temperature

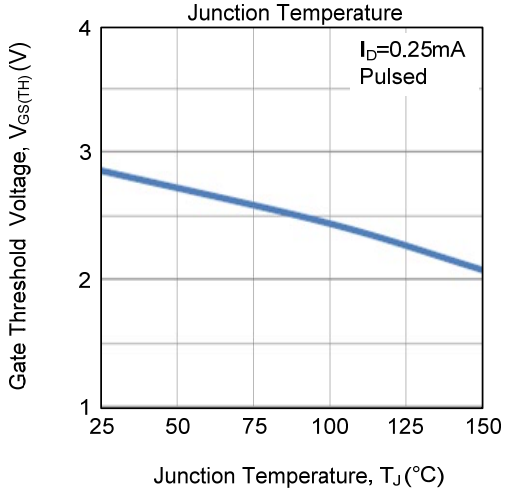



Breakdown Voltage vs. Junction Temperature

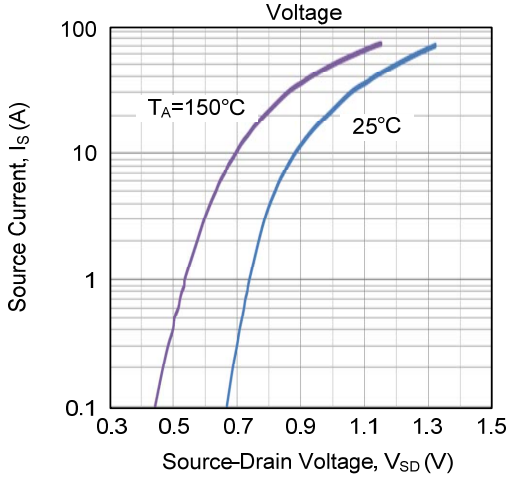


## ■ TYPICAL CHARACTERISTICS (Cont.)

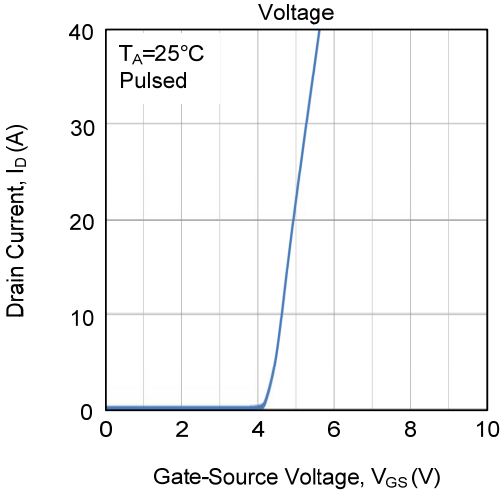
Gate Threshold Voltage vs. Junction Temperature



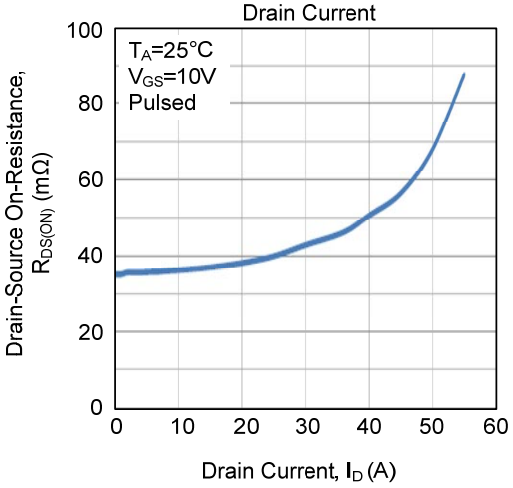

Source Current vs. Source-Drain Voltage



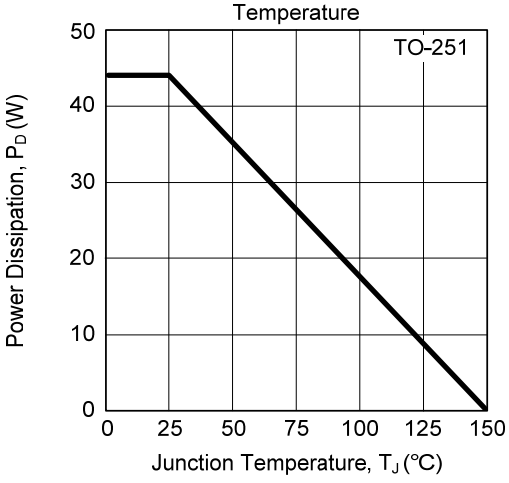

Drain Current vs. Gate-Source Voltage



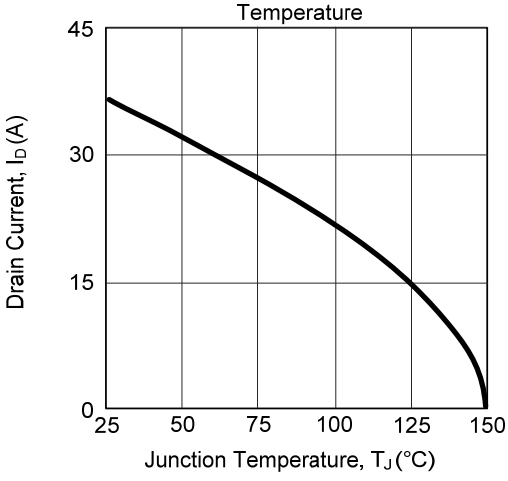

Drain-Source On-Resistance vs. Drain Current




Power Dissipation vs. Junction Temperature




Drain Current vs. Junction Temperature



## ■ TYPICAL CHARACTERISTICS (Cont.)