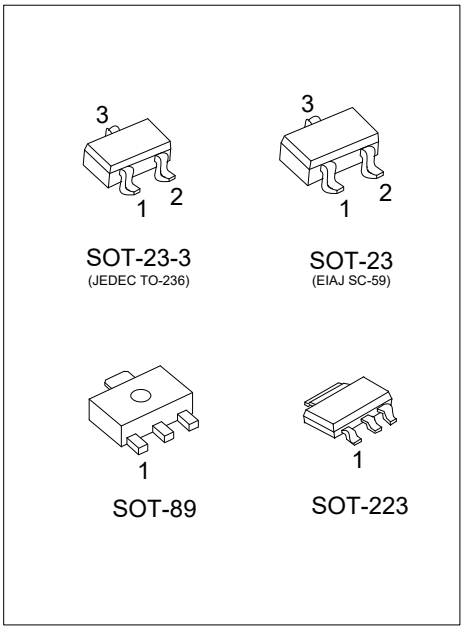
# UT3N06-L

**Power MOSFET**

## N-CHANNEL ENHANCEMENT MODE POWER MOSFET



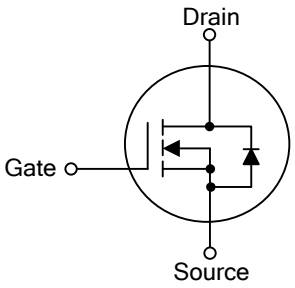

### ■ DESCRIPTION

The UTC **UT3N06-L** is an N-channel power MOSFET providing very low on-resistance. It has high efficiency and perfect cost-effectiveness. It can be generally applied in the commercial and industrial fields.

### ■ FEATURES

* Simple drive requirement

### ■ SYMBOL




### ■ ORDERING INFORMATION

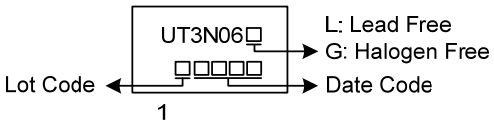
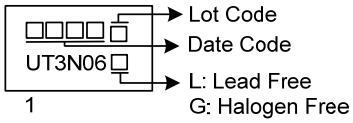
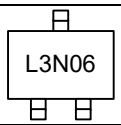
| Ordering Number | | Package | Pin Assignment | | | Packing |
|---|---|---|---|---|---|---|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| UT3N06L-AA3-R | UT3N06G-AA3-R | SOT-223 | G | D | S | Tape Reel |
| UT3N06L-AB3-R | UT3N06G-AB3-R | SOT-89 | G | D | S | Tape Reel |
| UT3N06L-AE2-R | UT3N06G-AE2-R | SOT-23-3 | G | S | D | Tape Reel |
| UT3N06L-AE3-R | UT3N06G-AE3-R | SOT-23 | G | S | D | Tape Reel |

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

UT3N06G-AA3-R
(1)Packing Type
(2)Package Type
(3)Green Package

(1) R: Tape Reel
(2) AA3: SOT-223, AB3: SOT-89, AE2: SOT-23-3, AE3: SOT-23
(3) G: Halogen Free and Lead Free, L: Lead Free

## ■ MARKING

| SOT-223 | SOT-89 |
|---|---|
|  |  |
| SOT-23-3 / SOT-23 | - |
|  | - |

## ■ 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 |
| Continuous Drain Current | Continuous | $I_D$ | 3 | A |
| Pulsed Drain Current | Pulsed (Note 2) | $I_{DM}$ | 6 | A |
| Power Dissipation | SOT-223 | $P_D$ | 1.25 | W |
| | SOT-23-3 | | 0.3 | W |
| | SOT-23/SOT-89 | | 0.5 | W |
| Junction Temperature | | $T_J$ | +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. Repetitive Rating: Pulse width limited by maximum junction temperature.

## ■ THERMAL DATA

| PARAMETER | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Junction to Ambient | SOT-223 | $\theta_{JA}$ | 100 | °C/W |
| | SOT-23-3 | | 416 | °C/W |
| | SOT-23 | | 250 | °C/W |
| | SOT-89 | | 125 | °C/W |

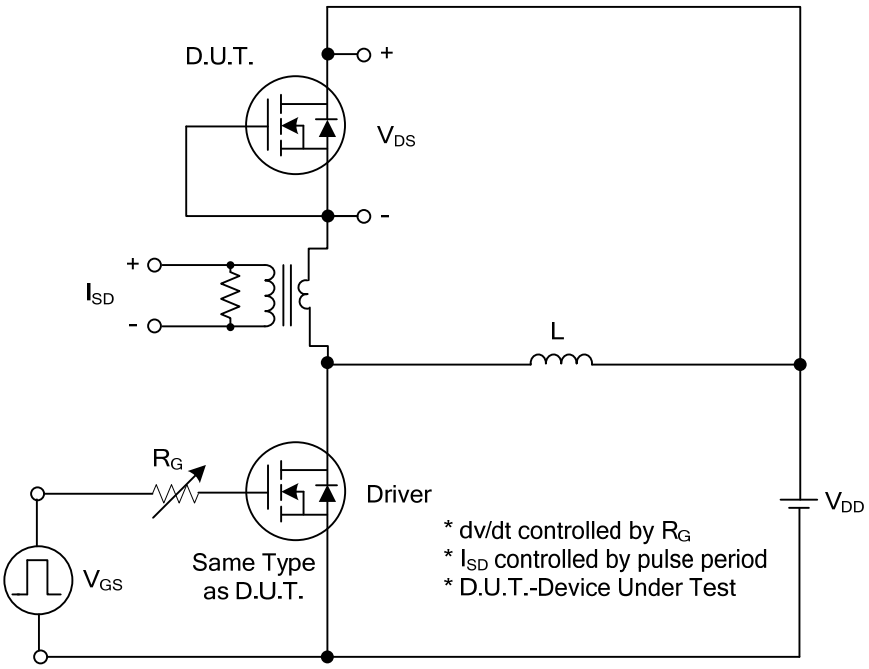
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

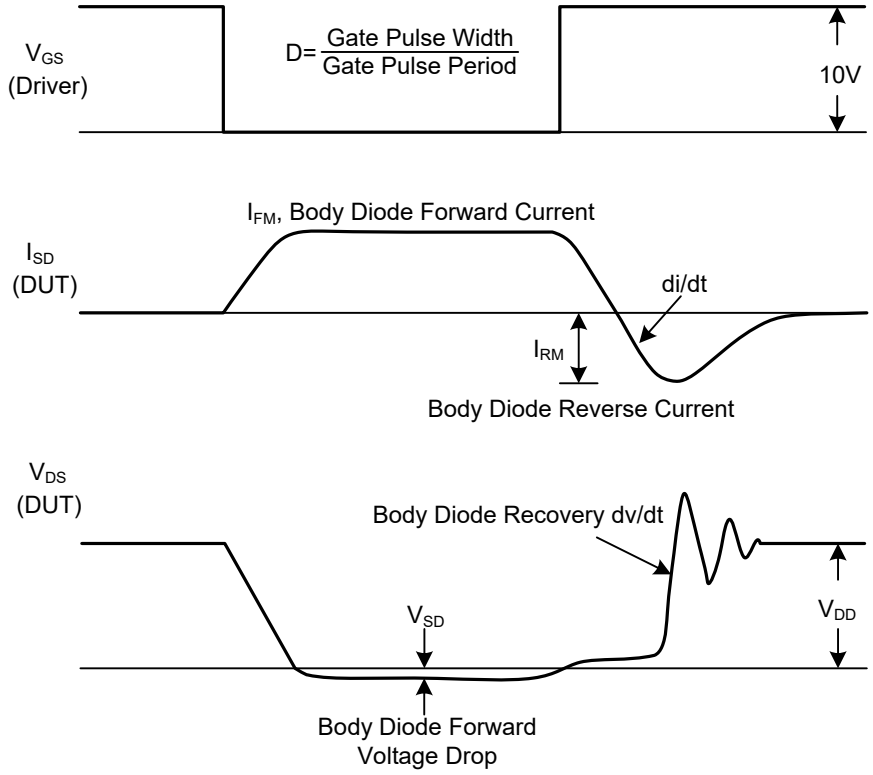
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ =0V, $I_D$ =250μA | 60 | | | V |
| Drain-Source Leakage Current | $I_{DSS}$ | $V_{DS}$ =60V, $V_{GS}$ =0V | | | 1 | μA |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{GS}$ =±20V | | | ±100 | nA |
| **ON CHARACTERISTICS** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =250μA | 0.5 | | 1.5 | V |
| Drain to Source On-state Resistance | $R_{DS(ON)}$ | $V_{GS}$ =10V, $I_D$ =3.0A | | | 110 | mΩ |
| | | $V_{GS}$ =4.5V, $I_D$ =2.0A | | | 150 | mΩ |
| | | $V_{GS}$ =3.3V, $I_D$ =1.0A | | | 250 | mΩ |
| **DYNAMIC PARAMETERS** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{DS}$=25V, $V_{GS}$=0V, f =1.0MHz | | 170 | | pF |
| Output Capacitance | $C_{OSS}$ | | | 30 | | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 20 | | pF |
| **SWITCHING PARAMETERS** | | | | | | |
| Total Gate Charge (Note) | $Q_G$ | $V_{DS}$=48V, $V_{GS}$=10V, $I_D$=3.0A $I_G$=1mA (Note 1, 2) | | 12 | | nC |
| Gate Source Charge | $Q_{GS}$ | | | 2 | | nC |
| Gate Drain Charge | $Q_{GD}$ | | | 1.8 | | nC |
| Turn-ON Delay Time (Note) | $t_{D(ON)}$ | $V_{DS}$=30V, $V_{GS}$=10V, $I_D$=0.3A, $R_G$=3Ω (Note 1, 2) | | 5 | | ns |
| Turn-ON Rise Time | $t_R$ | | | 14 | | ns |
| Turn-OFF Delay Time | $t_{D(OFF)}$ | | | 13 | | ns |
| Turn-OFF Fall-Time | $t_F$ | | | 8 | | ns |
| **SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS** | | | | | | |
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$ | | | | 3 | A |
| Maximum Pulsed Drain-Source Diode Forward Current | $I_{SM}$ | | | | 6 | A |
| Drain-Source Diode Forward Voltage (Note) | $V_{SD}$ | $I_S$ =3A, $V_{GS}$ =0V | | | 1.4 | V |

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

## ■ TEST CIRCUITS AND WAVEFORMS

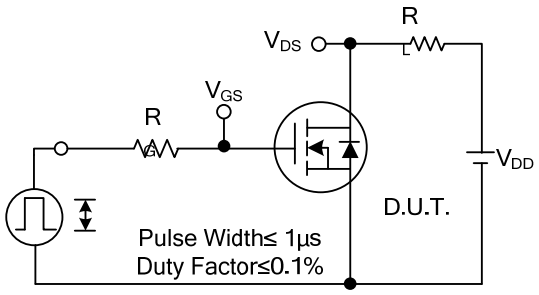



**Peak Diode Recovery dv/dt Test Circuit**

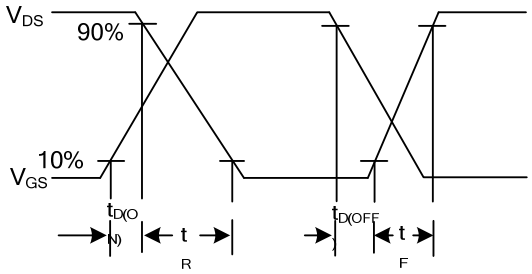



**Peak Diode Recovery dv/dt Waveforms**

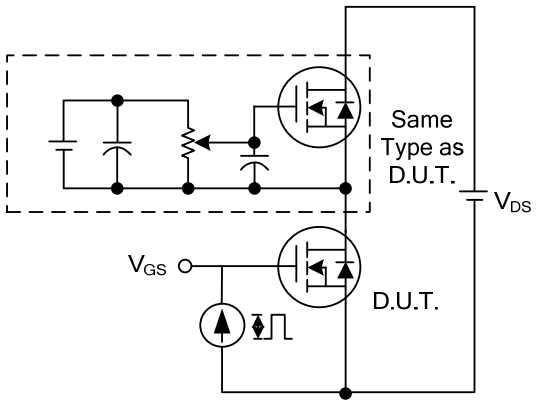
## ■ TEST CIRCUITS AND WAVEFORMS



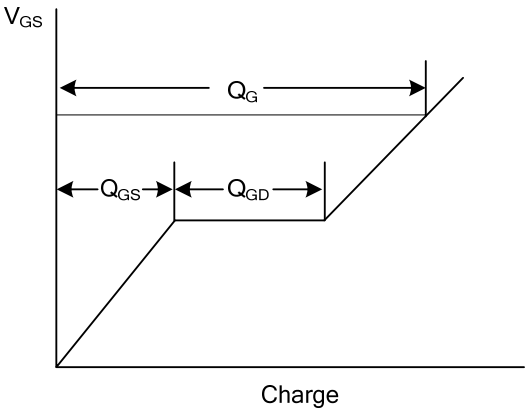

Switching Test Circuit



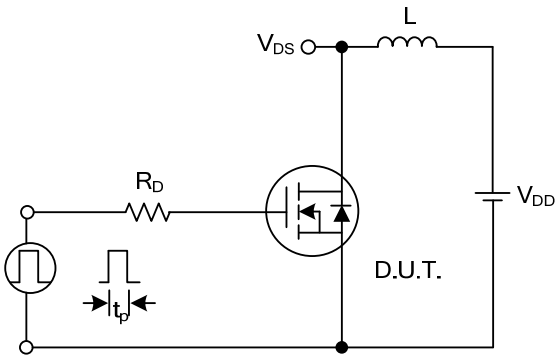

Switching Waveforms



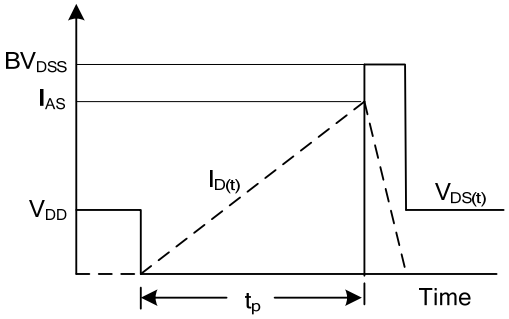

Gate Charge Test Circuit




Gate Charge Waveform



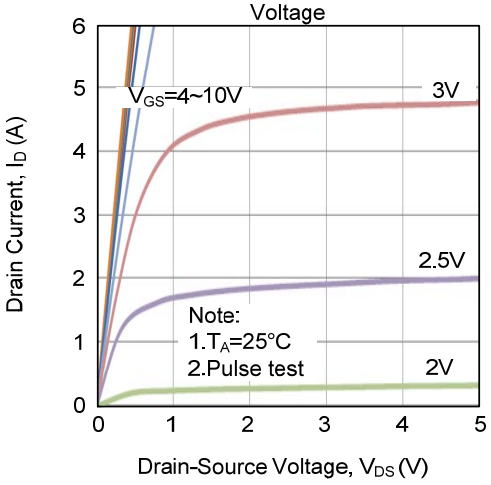

Unclamped Inductive Switching Test Circuit



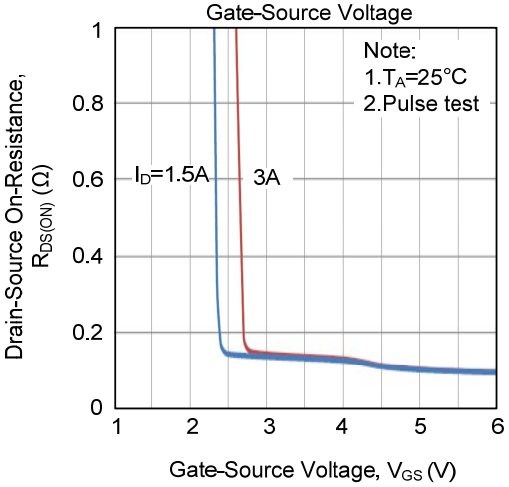

Unclamped Inductive Switching Waveforms

## ■ TYPICAL CHARACTERISTICS

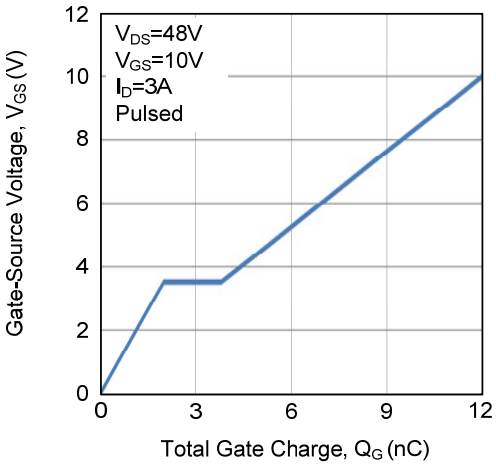
Drain Current vs. Drain-Source Voltage



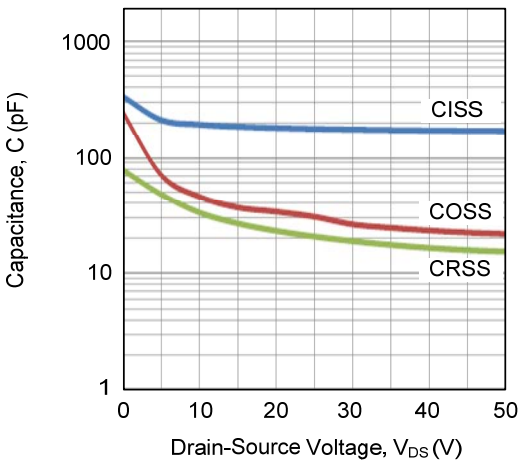

Drain-Source On-Resistance vs. Gate-Source Voltage



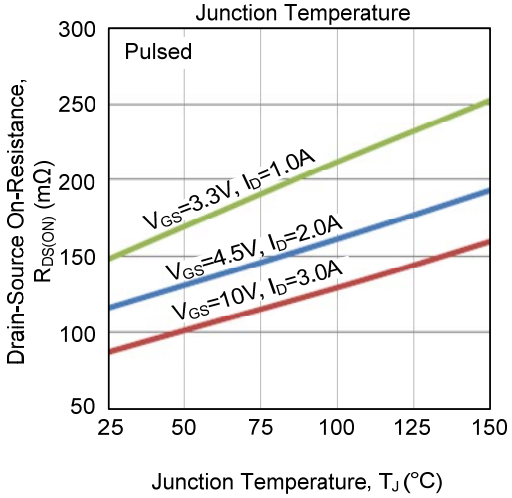

Gate Charge Characteristics



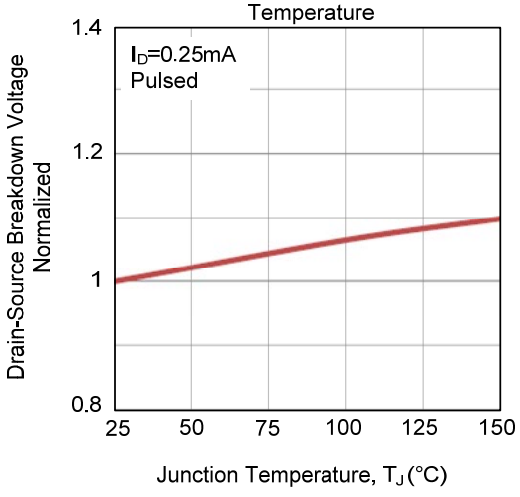

Capacitance Characteristics




Drain-Source On-Resistance vs. Junction Temperature

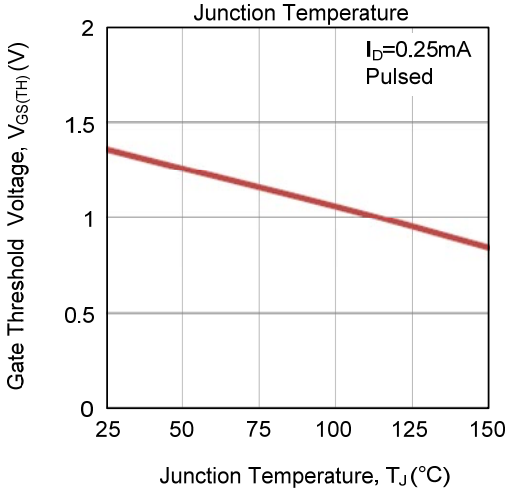



Breakdown Voltage vs. Junction Temperature

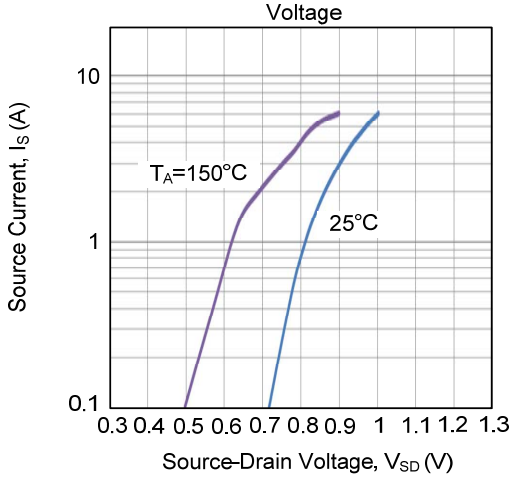


## ■ TYPICAL CHARACTERISTICS (Cont.)

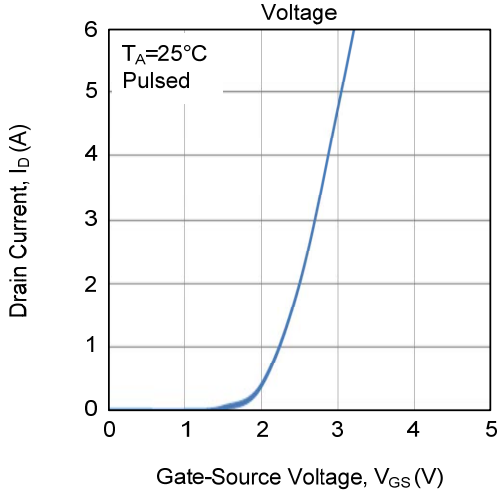
Gate Threshold Voltage vs. Junction Temperature



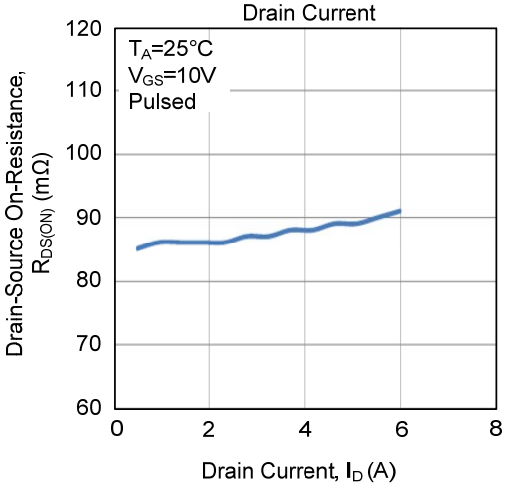

Source Current vs. Source-Drain Voltage



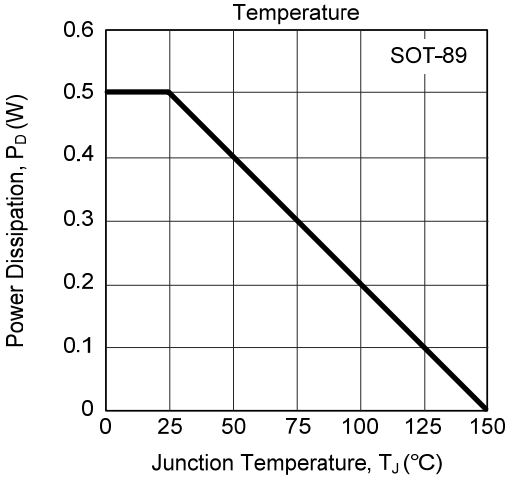

Drain Current vs. Gate-Source Voltage



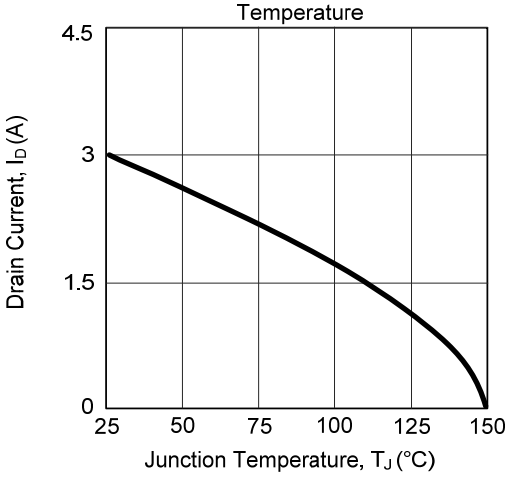

Drain-Source On-Resistance vs. Drain Current




Power Dissipation vs. Junction Temperature




Drain Current vs. Junction Temperature



## ■ TYPICAL CHARACTERISTICS (Cont.)