



# UTT2N10-H

## POWER MOSFET

### 2.0A, 100V HEXFET POWER MOSFET

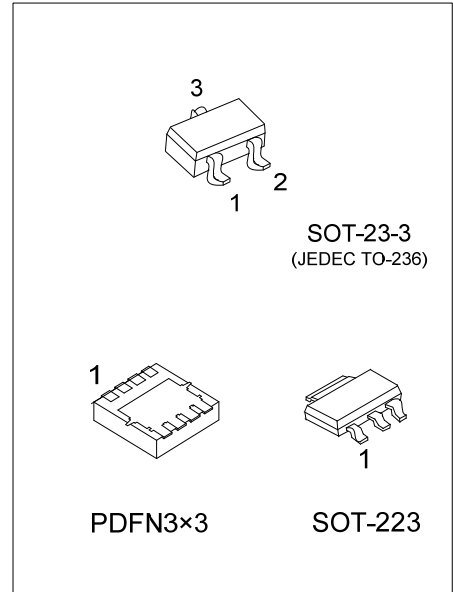
#### DESCRIPTION

The UTC **UTT2N10-H** is an N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with high switching speed and low gate charge.

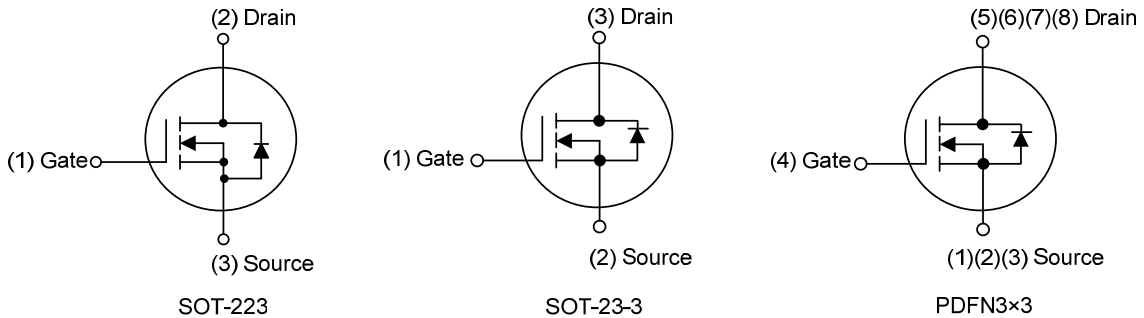
The UTC **UTT2N10-H** is suitable for Load/system switch.

#### FEATURES

- \*  $R_{DS(ON)} \leq 220 \text{ m}\Omega$  @  $V_{GS}=10\text{V}$ ,  $I_D=1.6\text{A}$
- $R_{DS(ON)} \leq 235 \text{ m}\Omega$  @  $V_{GS}=4.5\text{V}$ ,  $I_D=1.3\text{A}$
- \* 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 |           |
| UTT2N10L-AA3-R   | UTT2N10G-AA3-R   | SOT-223  | G              | D | S | - | - | - | - | - | Tape Reel |
| UTT2N10L-AE2-R   | UTT2N10G-AE2-R   | SOT-23-3 | G              | S | D | - | - | - | - | - | Tape Reel |
| UTT2N10L-P3030-R | UTT2N10G-P3030-R | PDFN3x3  | S              | S | S | G | D | D | D | D | Tape Reel |

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

|  |  |
|--|--|
| <p>UTT2N10G-AA3-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p> | <p>(1) R: Tape Reel</p> <p>(2) AA3: SOT-223, AE2: SOT-23-3<br/>P3030: PDFN3x3</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|--|--|

■ MARKING

| SOT-223  | SOT-23-3    | PDFN3x3  |
|--|-------------|--|
| <p>UTT2N10□<br/>           Lot Code ← □□□□ → Date Code<br/>           L: Lead Free<br/>           G: Halogen Free<br/>           1</p> | <p>2NAH</p> | <p>UTT<br/>           2N10<br/>           • □□□□ → Lot Code<br/>           → Date Code</p> |

■ ABSOLUTE MAXIMUM RATING ( $T_c=25^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER                          |                        | SYMBOL    | RATINGS    | UNIT               |
|------------------------------------|------------------------|-----------|------------|--------------------|
| Drain-Source Voltage               |                        | $V_{DSS}$ | 100        | V                  |
| Gate-Source Voltage                |                        | $V_{GSS}$ | $\pm 16$   | V                  |
| Drain Current                      | Continuous             | $I_D$     | 2          | A                  |
|                                    | Pulsed (Note 2)        | $I_{DM}$  | 4          | A                  |
| Avalanche Energy (Note 3)          | Single Pulsed (Note 3) | $E_{AS}$  | 0.1        | mJ                 |
| Peak Diode Recovery dv/dt (Note 4) |                        | dv/dt     | 2.1        | V/ns               |
| Power Dissipation                  | SOT-223                | $P_D$     | 1.2        | W                  |
|                                    | SOT-23-3               |           | 0.89       | W                  |
|                                    | PDFN3x3                |           | 8          | W                  |
| Junction Temperature               |                        | $T_J$     | +150       | $^{\circ}\text{C}$ |
| Storage Temperature Range          |                        | $T_{STG}$ | -55 ~ +150 | $^{\circ}\text{C}$ |

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.  $L = 0.1\text{mH}$ ,  $I_{AS} = 1.3\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^{\circ}\text{C}$ .

4.  $I_{SD} \leq 2.0\text{A}$ ,  $di/dt \leq 100\text{ A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J = 25^{\circ}\text{C}$ .

■ THERMAL DATA

| PARAMETER           |          | SYMBOL        | RATINGS     | UNIT                        |
|---------------------|----------|---------------|-------------|-----------------------------|
| Junction to Ambient | SOT-223  | $\theta_{JA}$ | 140         | $^{\circ}\text{C}/\text{W}$ |
|                     | SOT-23-3 |               | 177 (Note)  | $^{\circ}\text{C}/\text{W}$ |
|                     | PDFN3x3  |               | 130 (Note)  | $^{\circ}\text{C}/\text{W}$ |
| Case to Ambient     | SOT-223  | $\theta_{JC}$ | 104 (Note)  | $^{\circ}\text{C}/\text{W}$ |
|                     | SOT-23-3 |               | 140 (Note)  | $^{\circ}\text{C}/\text{W}$ |
|                     | PDFN3x3  |               | 15.6 (Note) | $^{\circ}\text{C}/\text{W}$ |

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

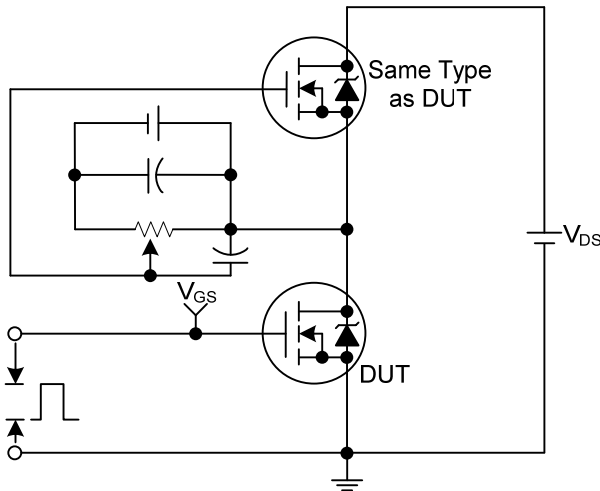
■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub> =25°C, unless otherwise specified)

| PARAMETER  | SYMBOL                | TEST CONDITIONS  | MIN  | TYP | MAX  | UNIT |    |
|--|-----------------------|--|--|-----|------|------|----|
| <b>OFF CHARACTERISTICS</b>                             |                       |  |  |     |      |      |    |
| Drain-Source Breakdown Voltage                         | BV <sub>DSS</sub>     | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                     | 100  |     |      | V    |    |
| Drain-Source Leakage Current                           | I <sub>DSS</sub>      | V <sub>DS</sub> =100V, V <sub>GS</sub> =0V                                     |  |     | 1    | μA   |    |
| Gate-Source Leakage Current                            | I <sub>GSS</sub>      | V <sub>GS</sub> =±16V  |  |     | ±100 | nA   |    |
| <b>ON CHARACTERISTICS</b>                              |                       |  |  |     |      |      |    |
| Gate Threshold Voltage                                 | V <sub>GS(TH)</sub>   | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                       | 1.0  |     | 2.5  | V    |    |
| Drain to Source On-state Resistance                    | R <sub>DS(ON)</sub>   | V <sub>GS</sub> =10V, I <sub>D</sub> =1.6A                                     |  |     | 220  | mΩ   |    |
|  |                       | V <sub>GS</sub> =4.5V, I <sub>D</sub> =1.3A                                    |  |     | 235  | mΩ   |    |
| <b>DYNAMIC PARAMETERS</b>                              |                       |  |  |     |      |      |    |
| Input Capacitance                                      | C <sub>ISS</sub>      | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f =1.0MHz                           |  | 310 |      | pF   |    |
| Output Capacitance                                     | C <sub>OSS</sub>      |  |  | 25  |      | pF   |    |
| Reverse Transfer Capacitance                           | C <sub>RSS</sub>      |  |  | 20  |      | pF   |    |
| <b>SWITCHING PARAMETERS</b>                            |                       |  |  |     |      |      |    |
| Total Gate Charge (Note 1)                             | V <sub>GS</sub> =4.5V | V <sub>DS</sub> =80V, I <sub>D</sub> =2.0A, I <sub>G</sub> =1mA<br>(Note 1, 2) |  | 5   |      | nC   |    |
|  | V <sub>GS</sub> =10V  |  |  | 10  |      | nC   |    |
| Gate Source Charge                                     | Q <sub>GS</sub>       |  |  | 2   |      | nC   |    |
| Gate Drain Charge                                      | Q <sub>GD</sub>       |  |  | 1   |      | nC   |    |
| Turn-ON Delay Time (Note 1)                            | t <sub>D(ON)</sub>    |  |  | 4   |      | ns   |    |
| Turn-ON Rise Time                                      | t <sub>R</sub>        |  | V <sub>DD</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =2.0A,<br>R <sub>G</sub> =25Ω (Note 1, 2) |     | 17   |      | ns |
| Turn-OFF Delay Time                                    | t <sub>D(OFF)</sub>   |  |  |     | 32   |      | ns |
| Turn-OFF Fall-Time                                     | t <sub>F</sub>        |  |  |     | 25   |      | ns |
| <b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b> |                       |  |  |     |      |      |    |
| Maximum Continuous Drain-Source Diode Forward Current  | I <sub>S</sub>        |  |  |     | 2    | A    |    |
| Maximum Pulsed Drain-Source Diode Forward Current      | I <sub>SM</sub>       |  |  |     | 4    | A    |    |
| Drain-Source Diode Forward Voltage (Note 1)            | V <sub>SD</sub>       | I <sub>S</sub> =2.0A, V <sub>GS</sub> =0V                                      |  |     | 1.4  | V    |    |
| Reverse Recovery Time (Note 1)                         | t <sub>rr</sub>       | I <sub>S</sub> =2.0A, V <sub>GS</sub> =0V,                                     |  | 46  |      | ns   |    |
| Reverse Recovery Charge                                | Q <sub>rr</sub>       | dI/dt =100A/μs   |  | 48  |      | nC   |    |

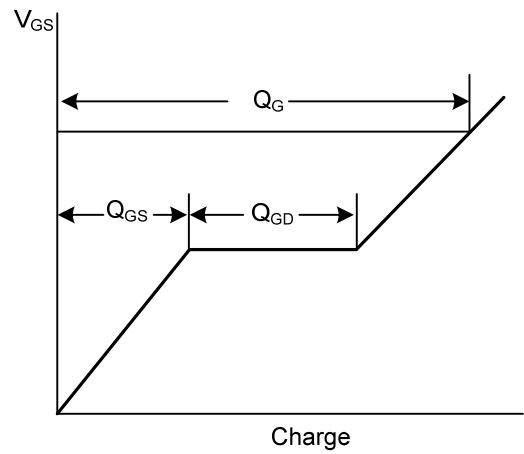
Notes: 1. Pulse Test : Pulse width ≤ 1000μs, Duty cycle ≤ 2%.

2. Essentially independent of operating ambient temperature.

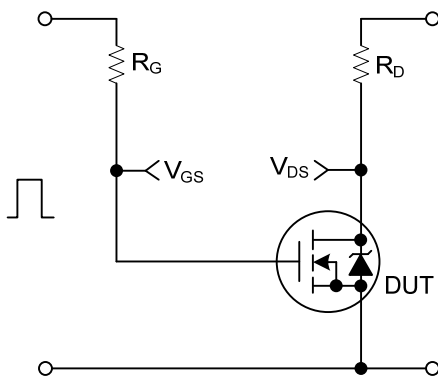
## ■ TEST CIRCUITS AND WAVEFORMS



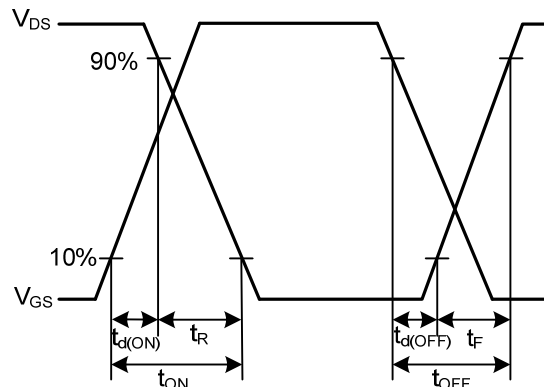
Gate Charge Test Circuit



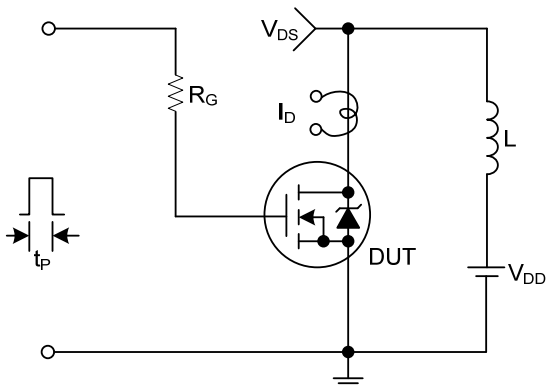
Gate Charge Waveforms



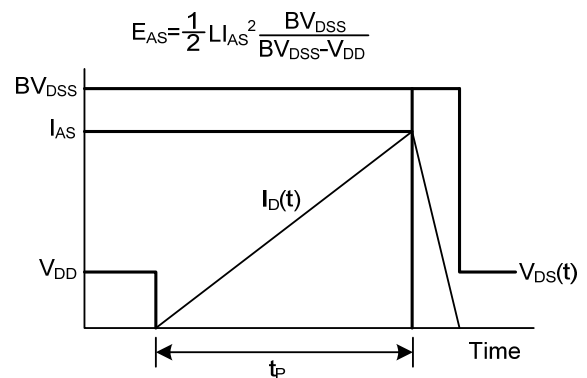
Resistive Switching Test Circuit



Resistive Switching Waveforms

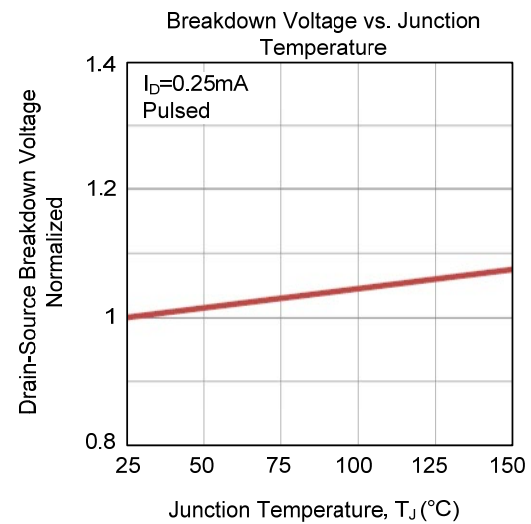
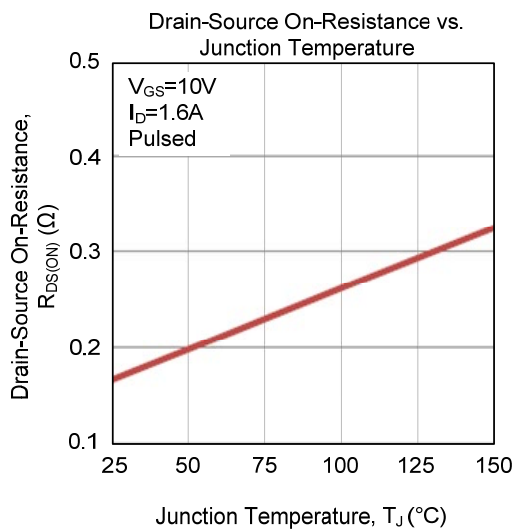
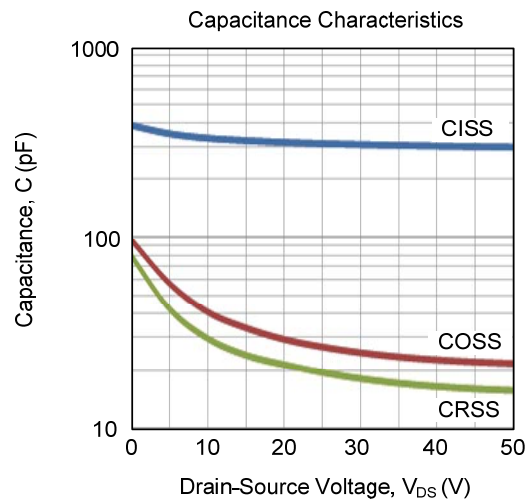
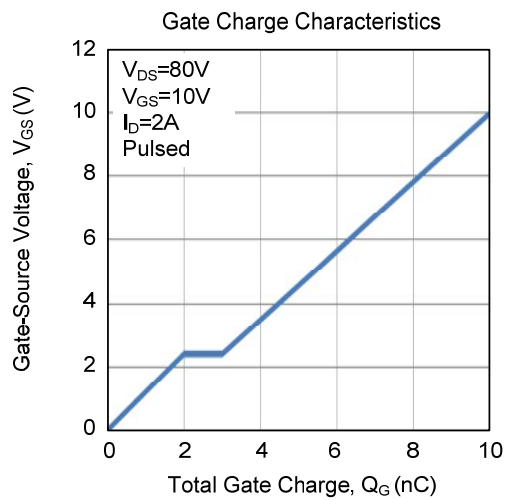
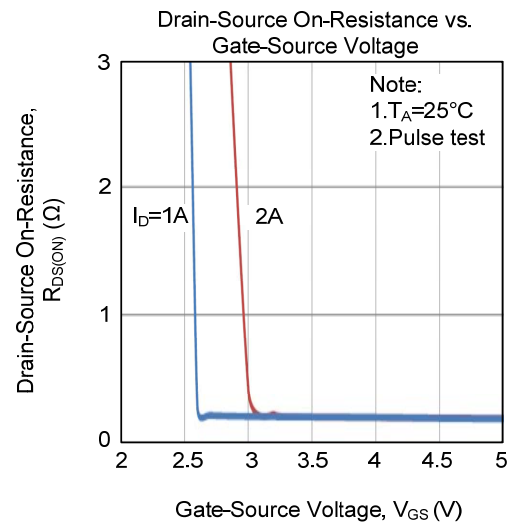
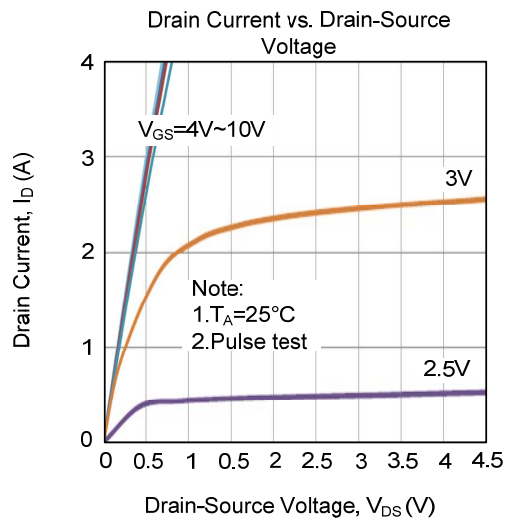


Unclamped Inductive Switching Test Circuit

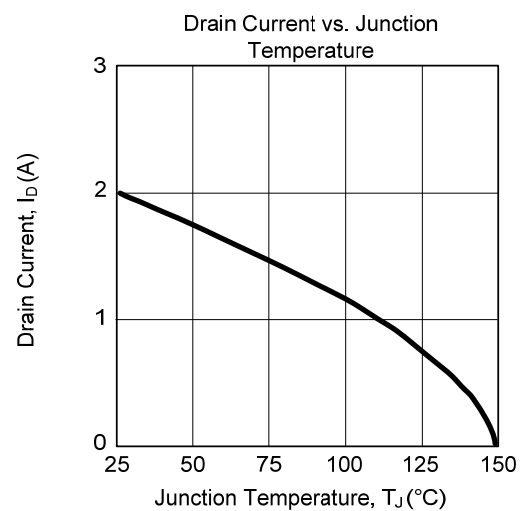
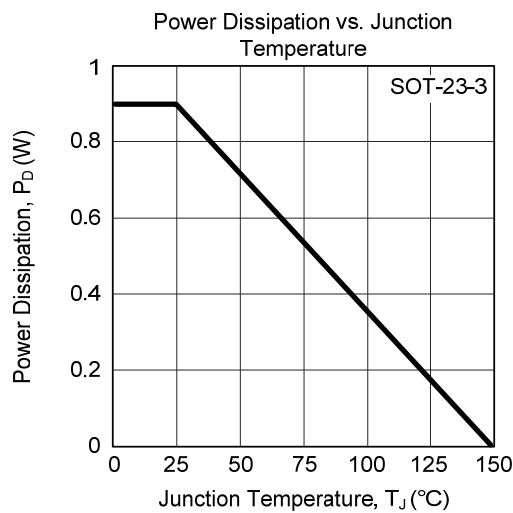
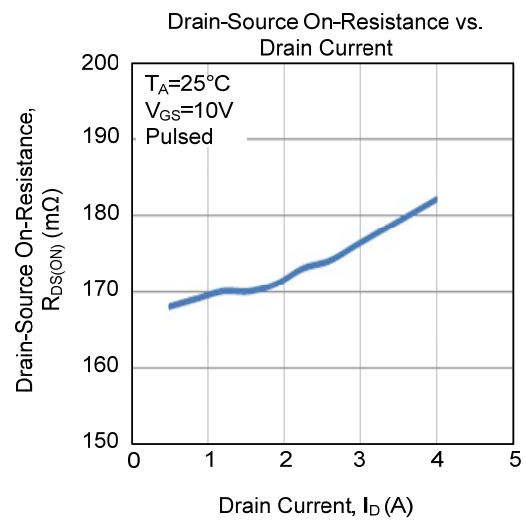
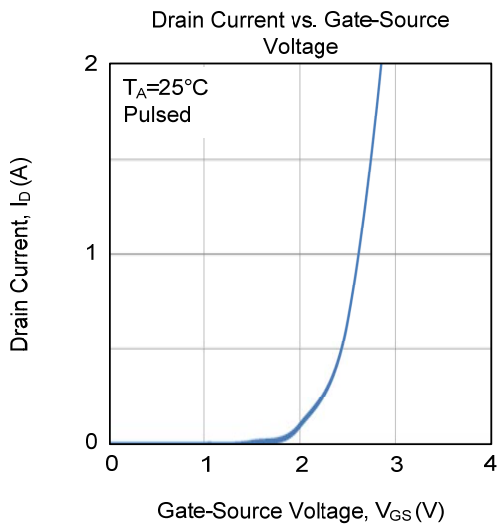
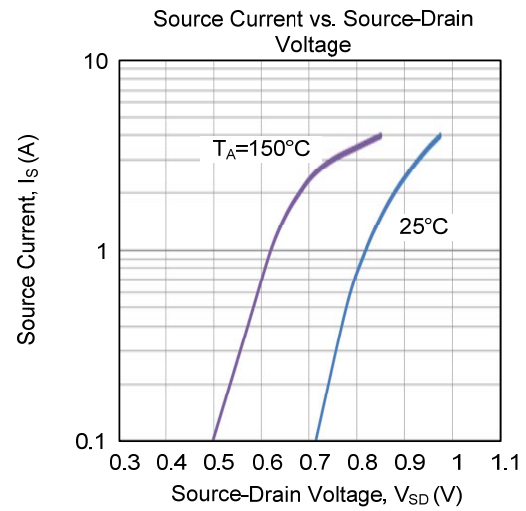
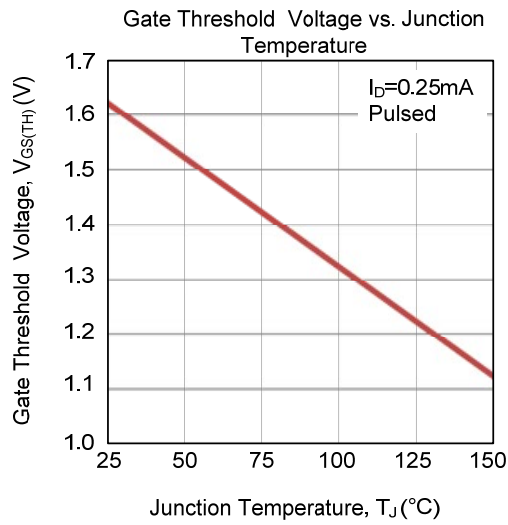


Unclamped Inductive Switching Waveforms

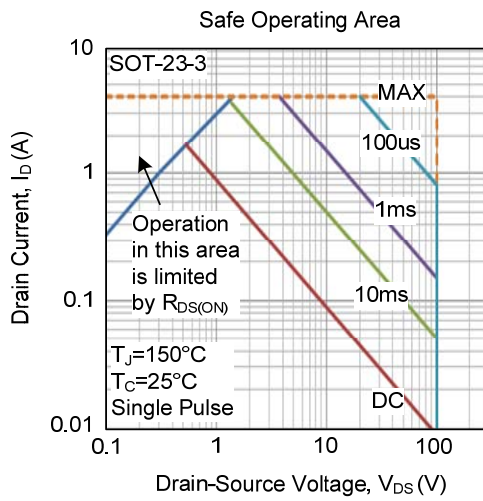
## TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



## ■ TYPICAL CHARACTERISTICS (Cont.)



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