



UTT30N06

Power MOSFET

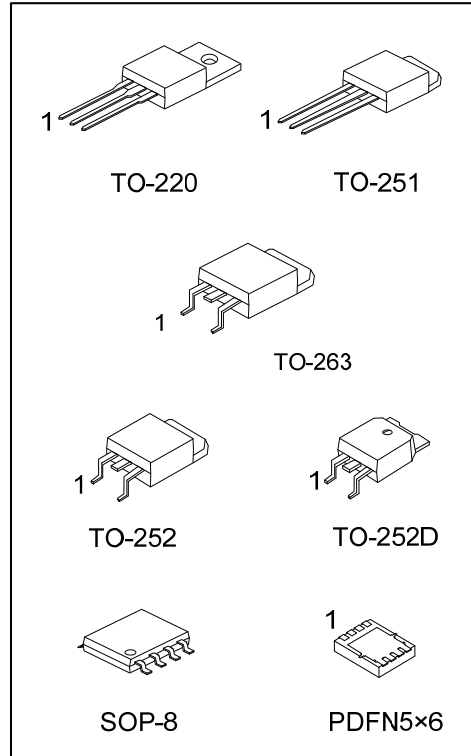
30A, 60V N-CHANNEL POWER MOSFET

DESCRIPTION

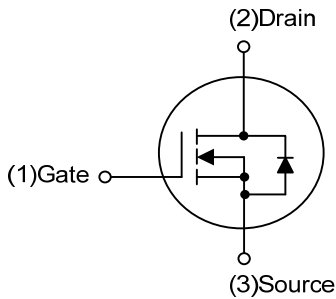
The UTC **UTT30N06** is a low voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and excellent avalanche characteristics. This power MOSFET is usually used in automotive applications of power supplies, high efficient DC to DC converters and battery operated products.

FEATURES

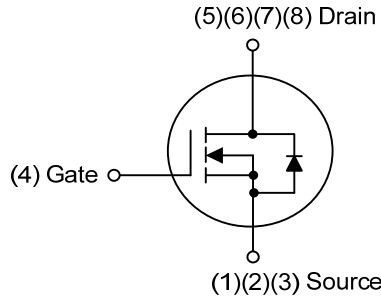
- * $R_{DS(ON)} \leq 22\text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=15\text{A}$
- * $R_{DS(ON)} \leq 30\text{ m}\Omega$ @ $V_{GS}=4.5\text{V}$, $I_D=15\text{A}$
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability



SYMBOL



TO-220/TO-251
TO-252/TO-252D/TO-263



SOP-8/PDFN5x6

ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | | | | | | Packing |
|-------------------|-------------------|---------|----------------|---|---|---|---|---|---|---|-----------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| UTT30N06L-TA3-T | UTT30N06G-TA3-T | TO-220 | G | D | S | - | - | - | - | - | Tube |
| UTT30N06L-TM3-T | UTT30N06G-TM3-T | TO-251 | G | D | S | - | - | - | - | - | Tube |
| UTT30N06L-TN3-R | UTT30N06G-TN3-R | TO-252 | G | D | S | - | - | - | - | - | Tape Reel |
| UTT30N06L-TND-R | UTT30N06G-TND-R | TO-252D | G | D | S | - | - | - | - | - | Tape Reel |
| UTT30N06L-TQ2-T | UTT30N06G-TQ2-T | TO-263 | G | D | S | - | - | - | - | - | Tube |
| UTT30N06L-TQ2-R | UTT30N06G-TQ2-R | TO-263 | G | D | S | - | - | - | - | - | Tape Reel |
| UTT30N06L-S08-R | UTT30N06G-S08-R | SOP-8 | S | S | S | G | D | D | D | D | Tape Reel |
| UTT30N06L-P5060-R | UTT30N06G-P5060-R | PDFN5×6 | S | S | S | G | D | D | D | D | Tape Reel |

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

| | |
|---|--|
| <p>UTT30N06G-TA3-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p> | <p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TM3: TO-251, TN3: TO-252 TND: TO-252D, TQ2: TO-263, S08: SOP-8, P5060: PDFN5×6 (3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|---|--|

MARKING

| PACKAGE | MARKING |
|---|---|
| TO-220 / TO-251 TO-252 / TO-252D TO-263 | <p>UTC UTT30N06 Lot Code ← → Date Code L: Lead Free G: Halogen Free</p> |
| SOP-8 | <p>UTC UTT30N06 Date Code L: Lead Free G: Halogen Free Lot Code</p> |
| PDFN5×6 | <p>UTC UTT 30N06 Lot Code ← → Date Code</p> |

■ ABSOLUTE MAXIMUM RATINGS ($T_C=25^{\circ}\text{C}$, 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 | 30 | A |
| | Pulsed (Note 2) | I_{DM} | 60 | A |
| Avalanche Energy | Single Pulsed (Note 3) | E_{AS} | 20.7 | mJ |
| Peak Diode Recovery dv/dt (Note 4) | | dv/dt | 9.2 | V/ns |
| Power Dissipation | TO-220/TO-263 | P_D | 100 | W |
| | TO-251/TO-252 | | 50 | W |
| | TO-252D | | 3.8 | W |
| | SOP-8 | | 20 | W |
| PDFN5x6 | | | | |
| Junction Temperature | | T_J | +150 | $^{\circ}\text{C}$ |
| Operation Temperature | | T_{OPR} | -55 ~ +150 | $^{\circ}\text{C}$ |
| Storage Temperature | | 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. Repeativity rating: pulse width limited by junction temperature

3. $L=0.1\text{mH}$, $I_{AS}=20.35\text{A}$, $V_{DD}=50\text{V}$, $R_G=20\Omega$, Starting $T_J=25^{\circ}\text{C}$

4. $I_{SD}\leq 30\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^{\circ}\text{C}$

■ THERMAL DATA

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---------------------|---------------|---------------|-------------|-----------------------------|
| Junction to Ambient | TO-220/TO-263 | θ_{JA} | 62.5 | $^{\circ}\text{C}/\text{W}$ |
| | TO-251/TO-252 | | 110 (Note) | $^{\circ}\text{C}/\text{W}$ |
| | TO-252D | | 125 (Note) | $^{\circ}\text{C}/\text{W}$ |
| | SOP-8 | | 65 (Note) | $^{\circ}\text{C}/\text{W}$ |
| | PDFN5x6 | | | |
| Junction to Case | TO-220/TO-263 | θ_{JC} | 1.25 | $^{\circ}\text{C}/\text{W}$ |
| | TO-251/TO-252 | | 2.5 (Note) | $^{\circ}\text{C}/\text{W}$ |
| | TO-252D | | 33 (Note) | $^{\circ}\text{C}/\text{W}$ |
| | SOP-8 | | 6.25 (Note) | $^{\circ}\text{C}/\text{W}$ |
| | PDFN5x6 | | | |

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

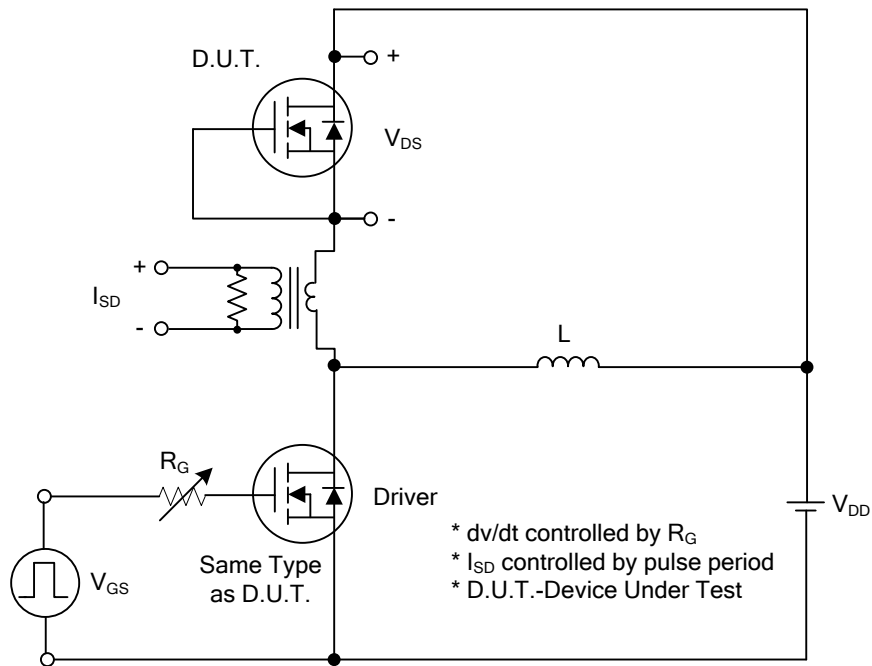
■ ELECTRICAL CHARACTERISTICS ($T_c=25^\circ\text{C}$, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|--------------|---|-----|------|------|------------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 60 | | | V |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS}=60V, V_{GS}=0V$ | | | 10 | μA |
| Gate-Source Leakage Current | Forward | $V_{GS}=20V, V_{DS}=0V$ $V_{GS}=-20V, V_{DS}=0V$ | | | 100 | nA |
| | Reverse | | | | -100 | nA |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1.0 | | 3.0 | V |
| Static Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=15A$ | | | 22 | m Ω |
| | | $V_{GS}=4.5V, I_D=15A$ | | | 30 | m Ω |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Input Capacitance | C_{ISS} | $V_{GS}=0V, V_{DS}=25V, f=1MHz$ | | 1230 | | pF |
| Output Capacitance | C_{OSS} | | | 125 | | pF |
| Reverse Transfer Capacitance | C_{RSS} | | | 92 | | pF |
| SWITCHING CHARACTERISTICS | | | | | | |
| Total Gate Charge | Q_G | $V_{DS}=48V, V_{GS}=10V, I_D=30A$ (Note1,2) | | 40 | | nC |
| Gate-Source Charge | Q_{GS} | | | 6 | | nC |
| Gate-Drain Charge | Q_{GD} | | | 11 | | nC |
| Turn-On Delay Time | $t_{D(ON)}$ | $V_{DD}=30V, V_{GS}=10V, I_D=30A$ (Note1,2) | | 6 | | ns |
| Turn-On Rise Time | t_R | | | 17 | | ns |
| Turn-Off Delay Time | $t_{D(OFF)}$ | | | 26 | | ns |
| Turn-Off Fall Time | t_F | | | 19 | | ns |
| SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS | | | | | | |
| Maximum Continuous Drain-Source Diode Forward Current | I_S | | | | 30 | A |
| Maximum Pulsed Drain-Source Diode Forward Current | I_{SM} | | | | 60 | A |
| Drain-Source Diode Forward Voltage | V_{SD} | $V_{GS}=0V, I_S=30A$ | | | 1.4 | V |
| Reverse Recovery Time | t_{rr} | $I_S=30A, V_{GS}=0V, di/dt = 100A/\mu s$ | | 30 | | ns |
| Reverse Recovery Charge | Q_{rr} | | | | 19 | |

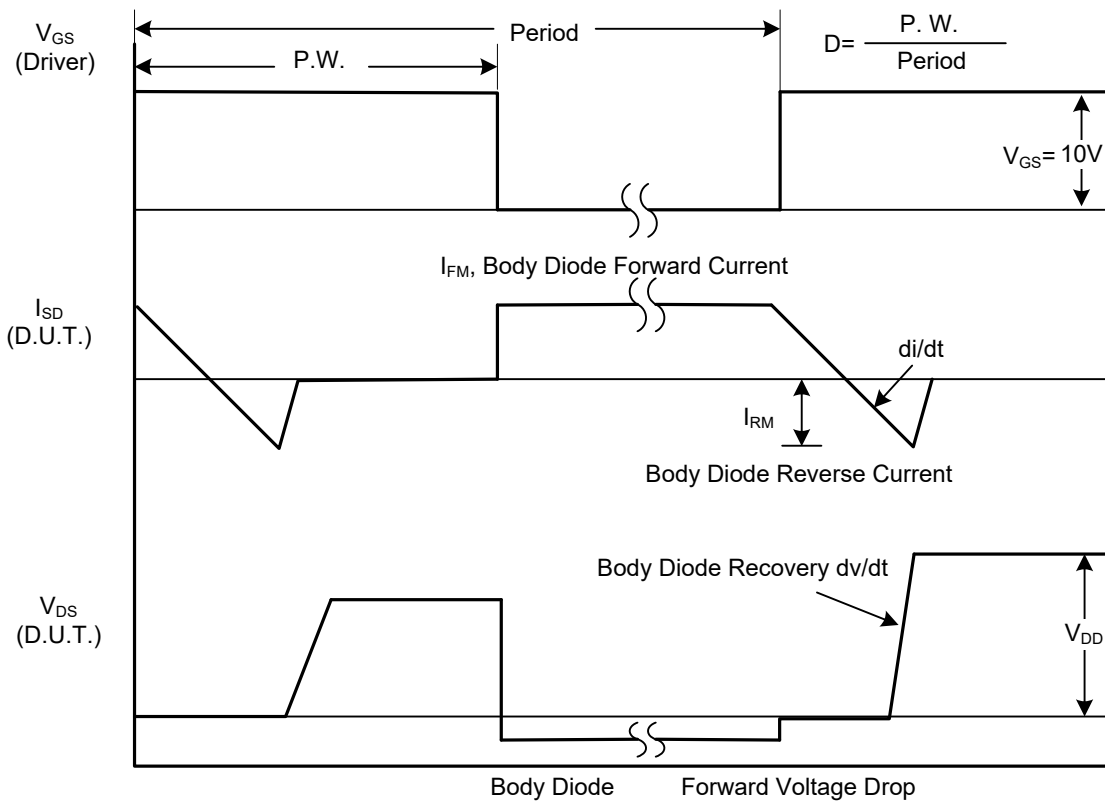
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

TEST CIRCUITS AND WAVEFORMS

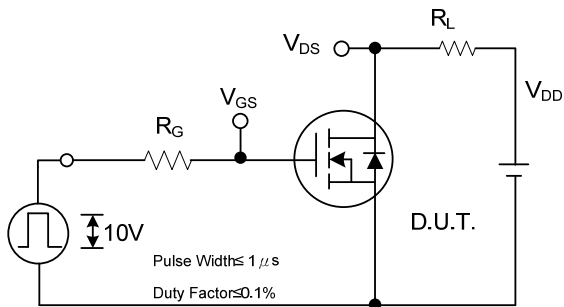


Peak Diode Recovery dv/dt Test Circuit

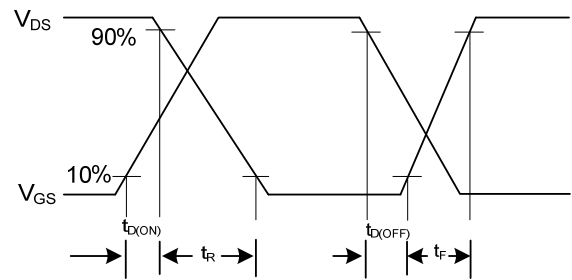


Peak Diode Recovery dv/dt Waveforms

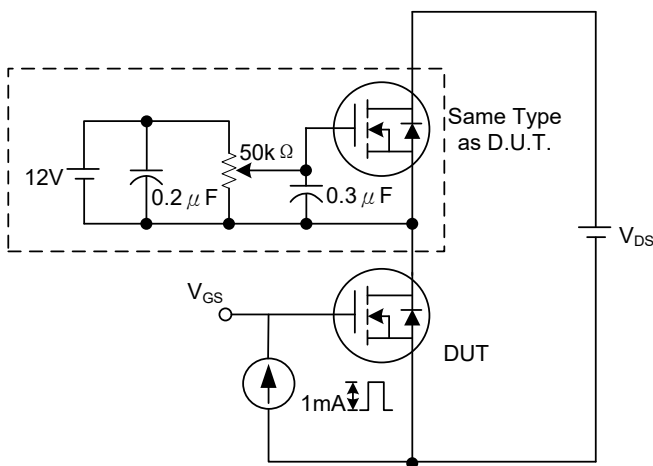
TEST CIRCUITS AND WAVEFORMS



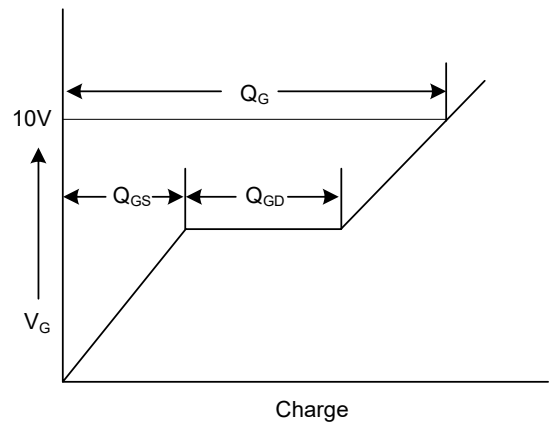
Switching Test Circuit



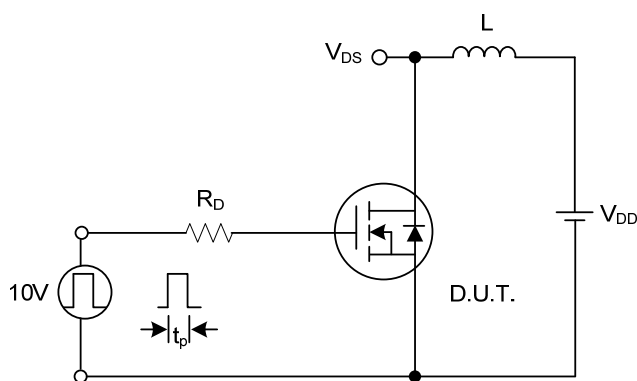
Switching Waveforms



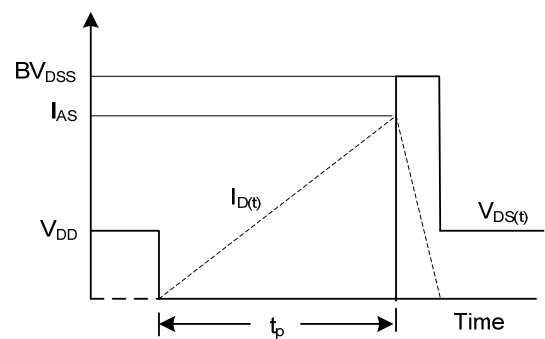
Gate Charge Test Circuit



Gate Charge Waveform

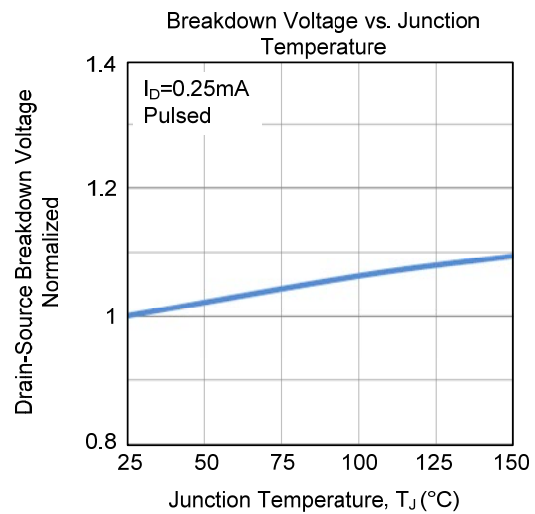
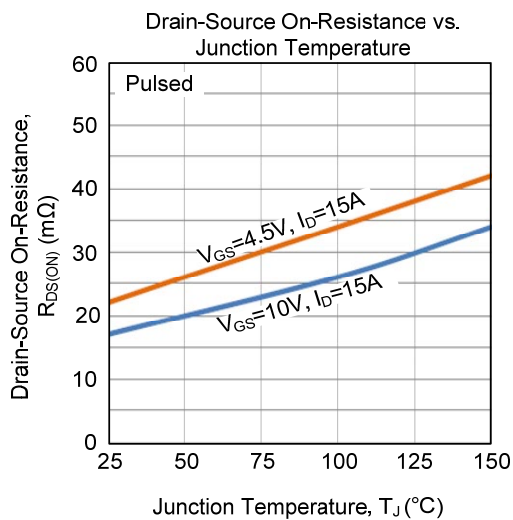
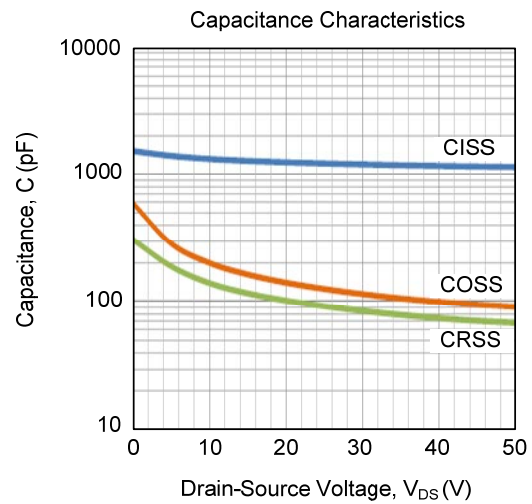
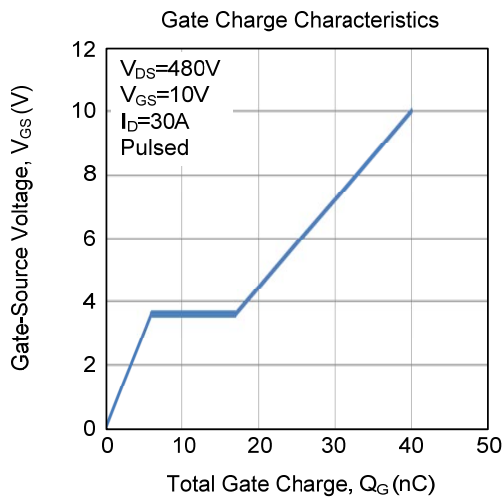
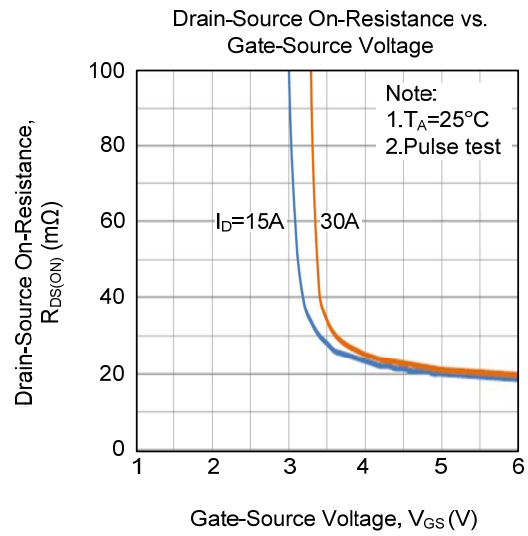
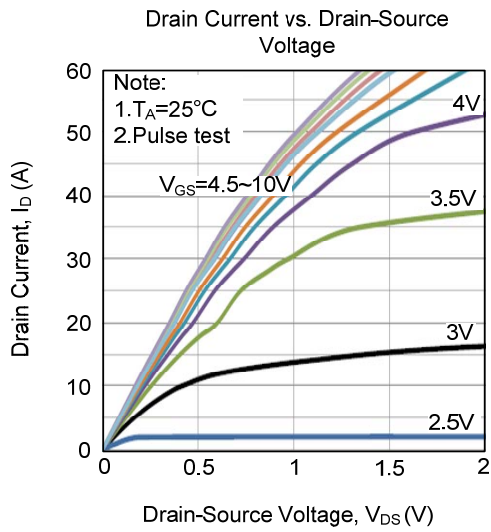


Unclamped Inductive Switching Test Circuit

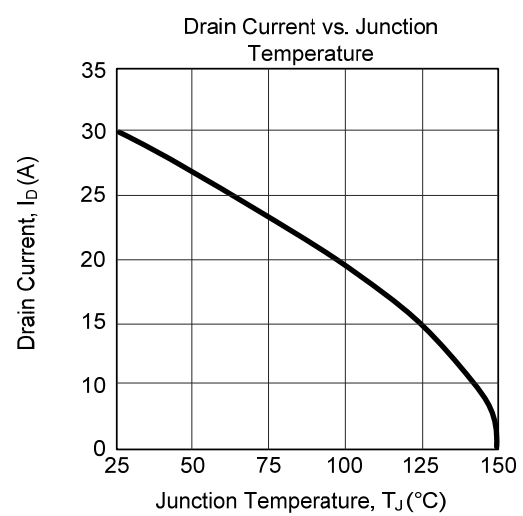
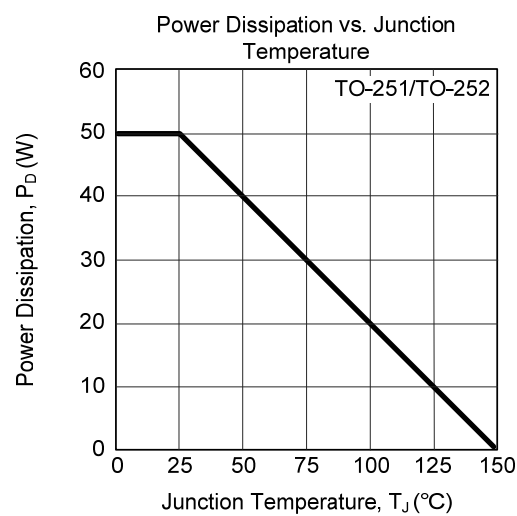
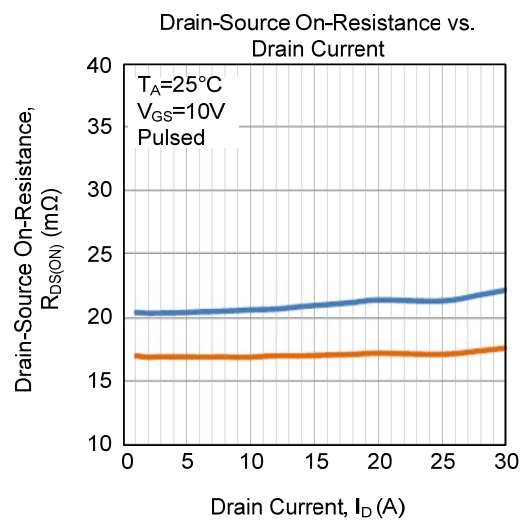
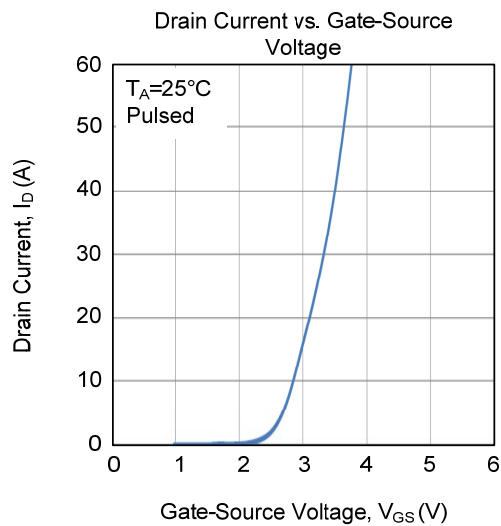
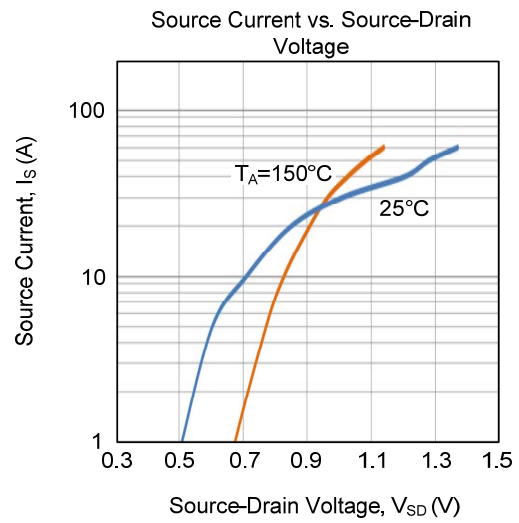
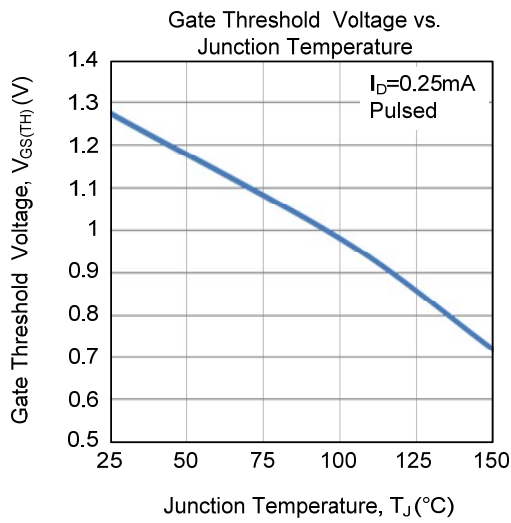


Unclamped Inductive Switching Waveforms

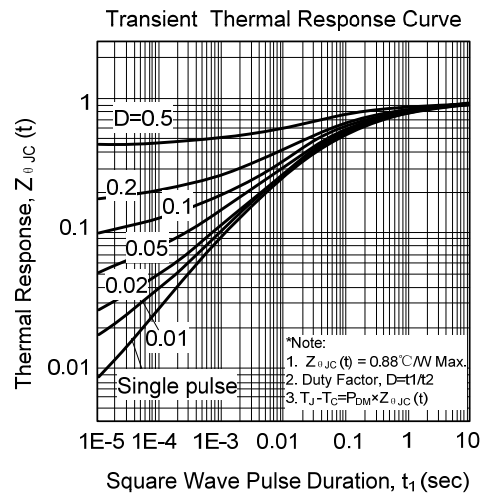
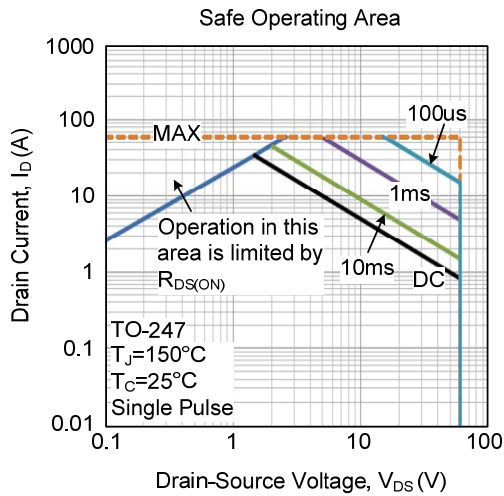
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



TYPICAL CHARACTERISTICS (Cont.)



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