



UTT20N06

Power MOSFET

20A, 60V N-CHANNEL POWER MOSFET

DESCRIPTION

The UTC **UTT20N06** is an N-channel enhancement mode power MOSFET using UTC's advanced technology to provide customers with a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **UTT20N06** is universally applied in low voltage, such as automotive, high efficiency switching for DC/DC converters and DC motor control.

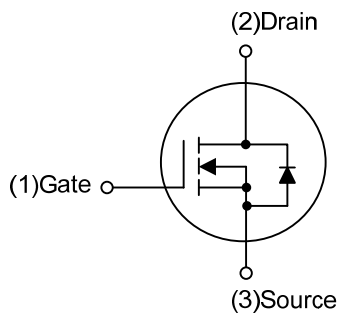
FEATURES

* $R_{DS(ON)} \leq 50 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=5.0\text{A}$

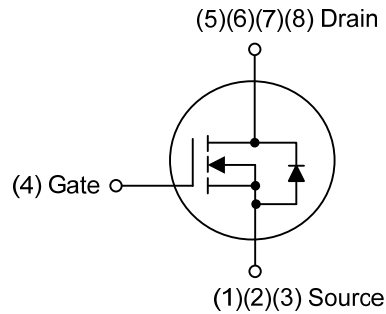
$R_{DS(ON)} \leq 65 \text{ m}\Omega$ @ $V_{GS}=4.5\text{V}$, $I_D=5.0\text{A}$

* High switching speed

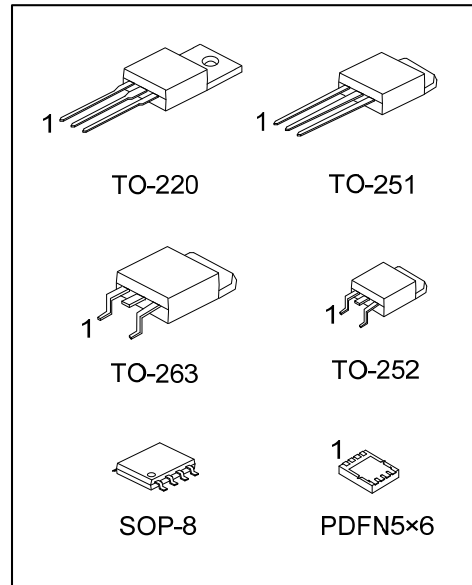
SYMBOL



TO-220/TO-251/TO-252/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 | |
| UTT20N06L-TA3-T | UTT20N06G-TA3-T | TO-220 | G | D | S | - | - | - | - | - | Tube |
| UTT20N06L-TM3-T | UTT20N06G-TM3-T | TO-251 | G | D | S | | | | | | Tube |
| UTT20N06L-TN3-R | UTT20N06G-TN3-R | TO-252 | G | D | S | - | - | - | - | - | Tape Reel |
| UTT20N06L-TQ2-T | UTT20N06G-TQ2-T | TO-263 | G | D | S | - | - | - | - | - | Tube |
| UTT20N06L-TQ2-R | UTT20N06G-TQ2-R | TO-263 | G | D | S | - | - | - | - | - | Tape Reel |
| UTT20N06L-S08-R | UTT20N06G-S08-R | SOP-8 | S | S | S | G | D | D | D | D | Tape Reel |
| UTT20N06L-P5060-R | UTT20N06G-P5060-R | PDFN5×6 | S | S | S | G | D | D | D | D | Tape Reel |

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

| | |
|---|--|
| <p>UTT20N06G-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 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-263 | <p>UTC UTT20N06 □□□□□ □□□□</p> <p>Lot Code ← → Date Code</p> <p>1</p> <p>L: Lead Free G: Halogen Free</p> |
| SOP-8 | <p>8 7 6 5 UTC □□□□ UTT20N06 □ □□□□ 1 2 3 4</p> <p>→ Date Code L: Lead Free G: Halogen Free → Lot Code</p> |
| PDFN5×6 | <p>UTC UTT 20N06 • □□□□□ □□□□</p> <p>Lot Code ← → Date Code</p> |

■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|----------------------|---------------|-----------|------------|--------------------|
| Drain-Source Voltage | | V_{DSS} | 60 | V |
| Gate-Source Voltage | | V_{GSS} | ± 20 | V |
| Drain Current | Continuous | I_D | 20 | A |
| | Pulsed | I_{DM} | 40 | A |
| Power Dissipation | TO-220/TO-263 | P_D | 89 | W |
| | TO-251/TO-252 | | 50 | W |
| | SOP-8 | | 5.2 | W |
| | PDFN5x6 | | 30 | W |
| Junction Temperature | | T_J | +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. Repetitive Rating: Pulse width limited by maximum junction temperature.

■ THERMAL DATA

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---------------------|---------------|---------------|-------------|----------------------|
| Junction to Ambient | TO-220/TO-263 | θ_{JA} | 62 | $^{\circ}\text{C/W}$ |
| | TO-251/TO-252 | | 110 | $^{\circ}\text{C/W}$ |
| | SOP-8 | | 100 (Note) | $^{\circ}\text{C/W}$ |
| | PDFN5x6 | | 35 (Note) | $^{\circ}\text{C/W}$ |
| Junction to Case | TO-220/TO-263 | θ_{JC} | 1.4 | $^{\circ}\text{C/W}$ |
| | TO-251/TO-252 | | 2.5 (Note) | $^{\circ}\text{C/W}$ |
| | SOP-8 | | 24 (Note) | $^{\circ}\text{C/W}$ |
| | PDFN5x6 | | 4.16 (Note) | $^{\circ}\text{C/W}$ |

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

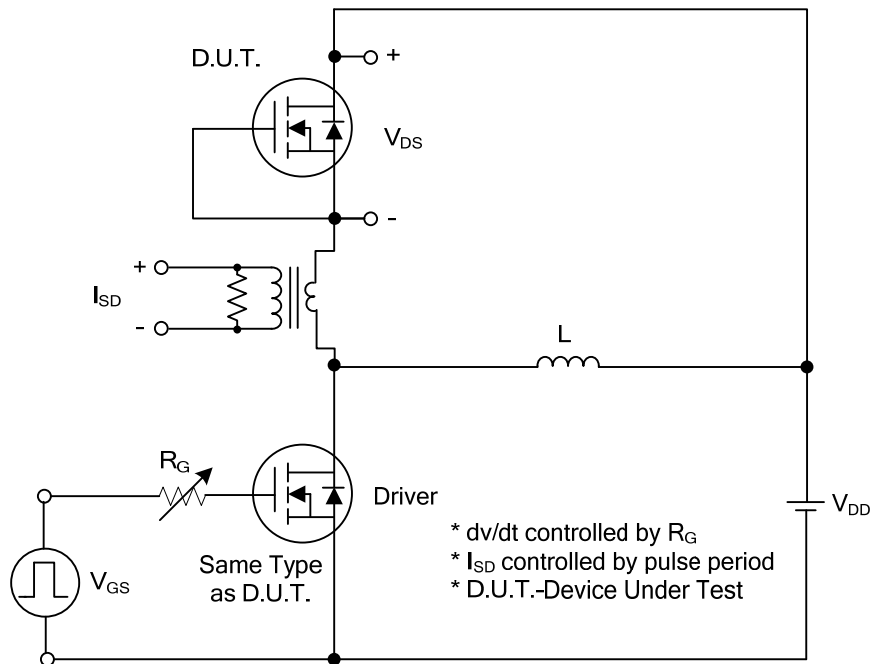
■ ELECTRICAL CHARACTERISTICS (T_c=25°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|---------------------|--|-----|-----|------|------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | I _D =250μA, V _{GS} =0V | 60 | | | V |
| Drain-Source Leakage Current | I _{DSS} | V _{DS} =60V, V _{GS} =0V | | | 1 | μA |
| | | V _{DS} =48V, V _{GS} =0V, T _c =125°C | | | 10 | μA |
| Gate-Source Leakage Current | Forward | I _{GSS} | | | | |
| | Reverse | | | | | |
| | | V _{GS} =+16V, V _{DS} =0V | | | +100 | nA |
| | | V _{GS} =-16V, V _{DS} =0V | | | -100 | nA |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | V _{DS} =V _{GS} , I _D =250μA | 1.0 | | 3.0 | V |
| Static Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} =10V, I _D =5.0A | | | 50 | mΩ |
| | | V _{GS} =4.5V, I _D =5.0A | | | 65 | mΩ |
| DYNAMIC PARAMETERS | | | | | | |
| Input Capacitance | C _{ISS} | V _{GS} =0V, V _{DS} =25V, f=1.0MHz | | 676 | | pF |
| Output Capacitance | C _{OSS} | | | 70 | | pF |
| Reverse Transfer Capacitance | C _{RSS} | | | 51 | | pF |
| SWITCHING PARAMETERS | | | | | | |
| Total Gate Charge | Q _G | V _{DS} =48V, V _{GS} =10V, I _D =20A (Note 1, 2) | | 22 | | nC |
| Gate to Source Charge | Q _{GS} | | | 5 | | nC |
| Gate to Drain Charge | Q _{GD} | | | 4.5 | | nC |
| Turn-ON Delay Time | t _{D(ON)} | V _{DS} =30V, V _{GS} =10V, I _D =20A, R _G =3.3Ω (Note 1, 2) | | 3.2 | | ns |
| Rise Time | t _R | | | 17 | | ns |
| Turn-OFF Delay Time | t _{D(OFF)} | | | 13 | | ns |
| Fall-Time | t _F | | | 19 | | ns |
| | | | | | | |
| SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS | | | | | | |
| Maximum Body-Diode Continuous Current | I _S | | | | 20 | A |
| Maximum Body-Diode Pulsed Current | I _{SM} | | | | 40 | A |
| Drain-Source Diode Forward Voltage | V _{SD} | I _S =20A, V _{GS} =0V | | | 1.2 | V |
| Reverse Recovery Time | t _{rr} | I _S =20A, V _{GS} =0V, dI/dt=100A/μs | | 30 | | nS |
| Reverse Recovery Charge | Q _{rr} | | | 12 | | nC |

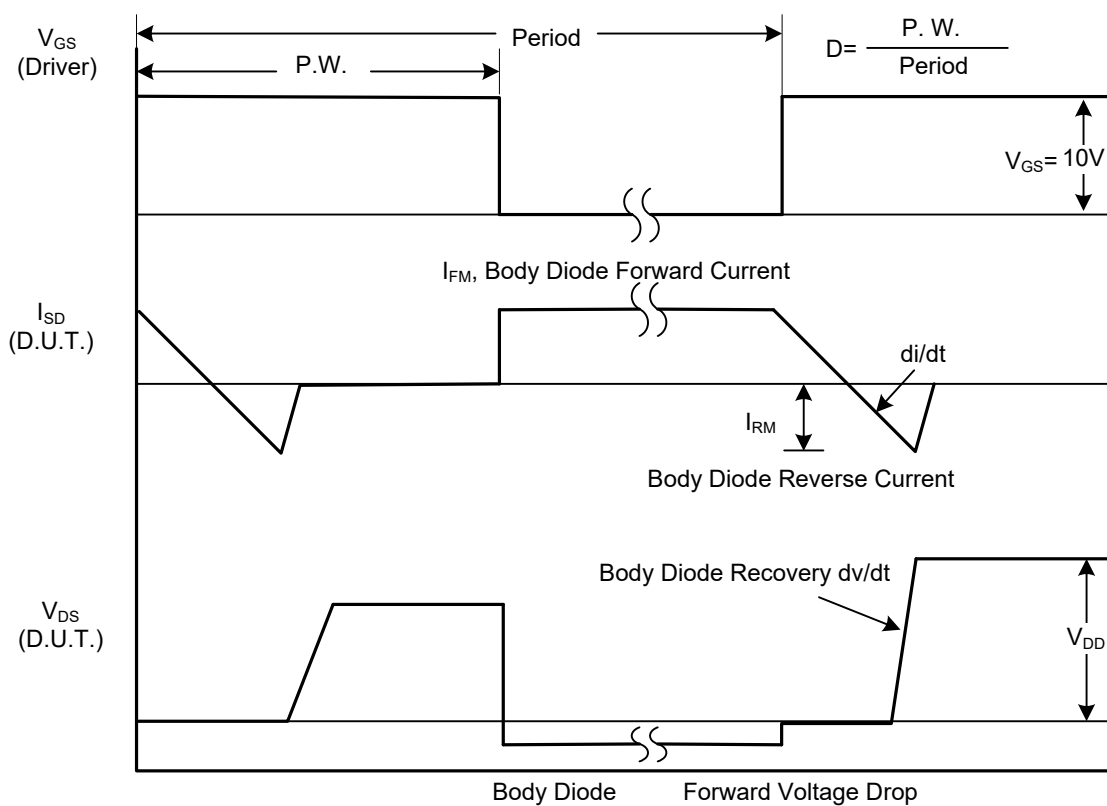
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

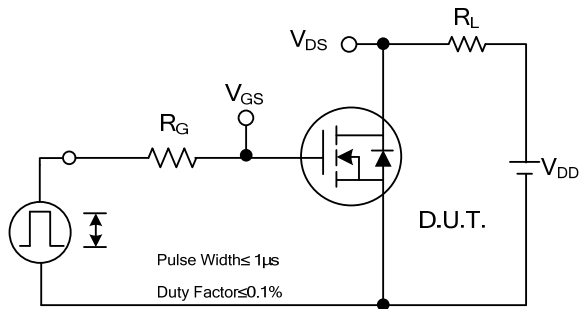


Peak Diode Recovery dv/dt Test Circuit

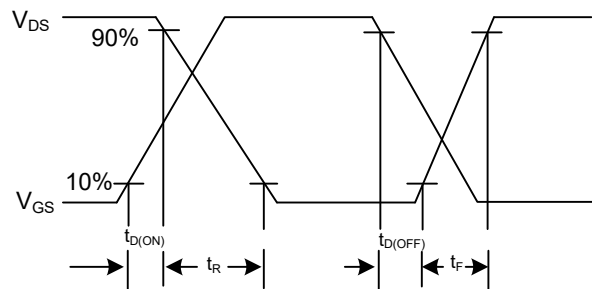


Peak Diode Recovery dv/dt Waveforms

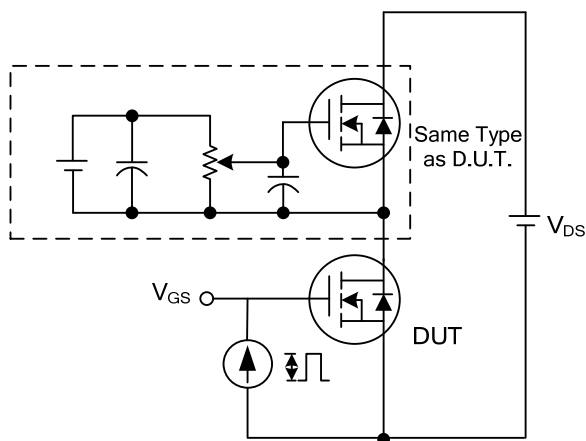
TEST CIRCUITS AND WAVEFORMS



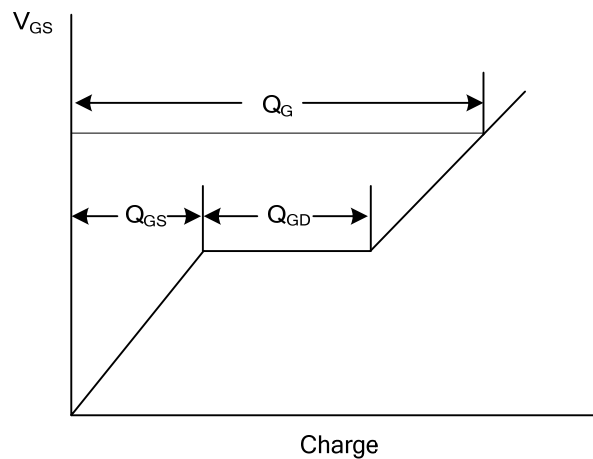
Switching Test Circuit



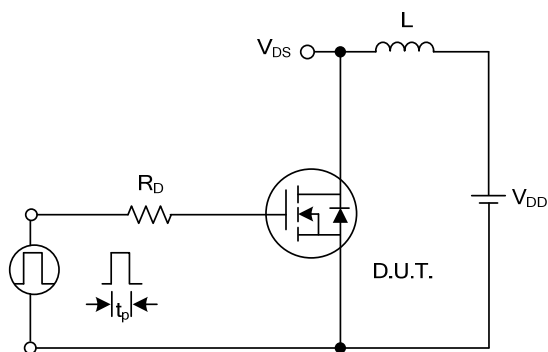
Switching Waveforms



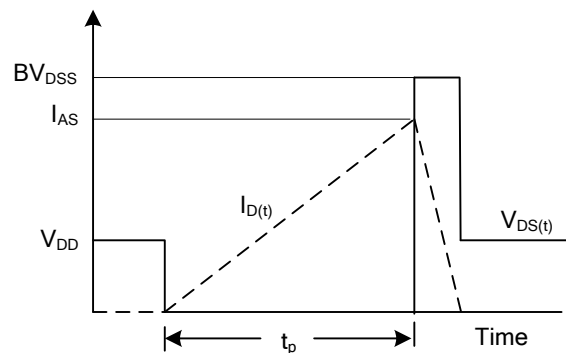
Gate Charge Test Circuit



Gate Charge Waveform

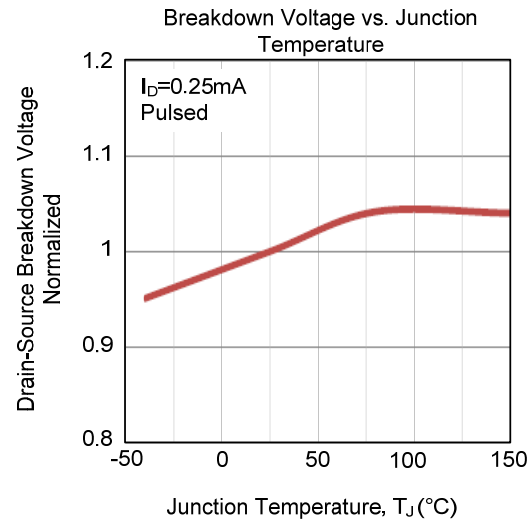
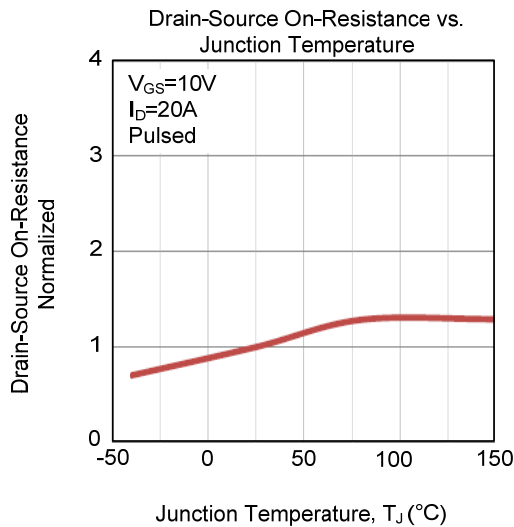
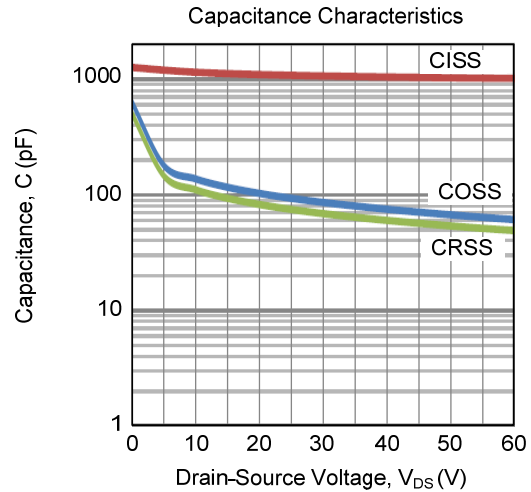
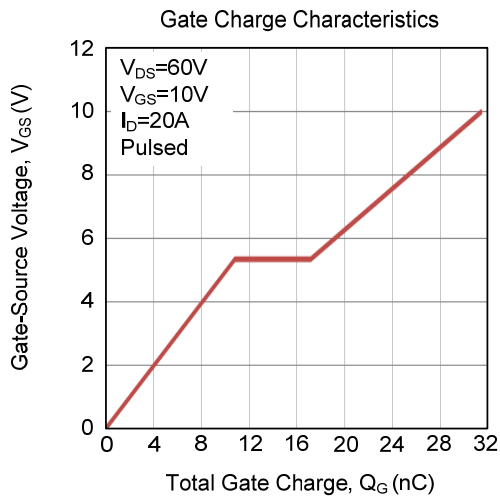
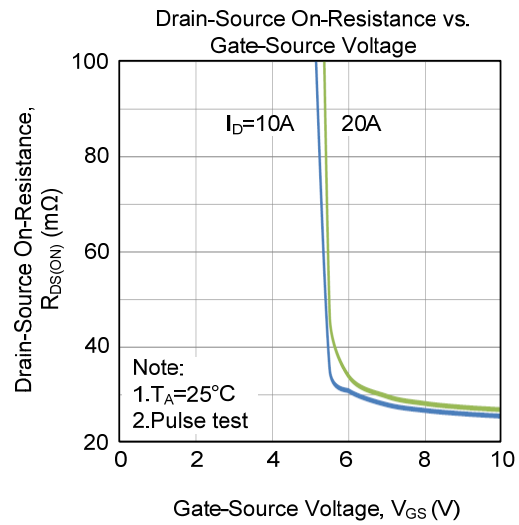
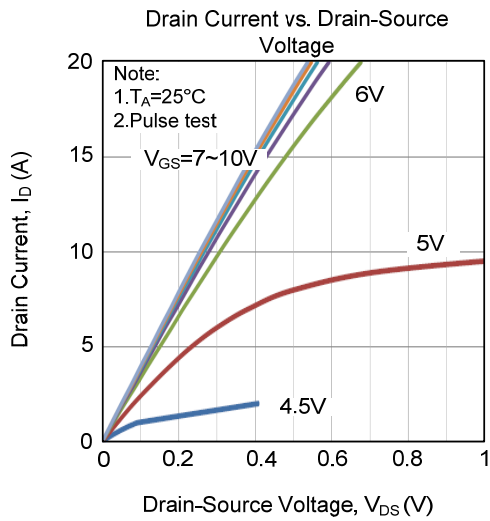


Unclamped Inductive Switching Test Circuit

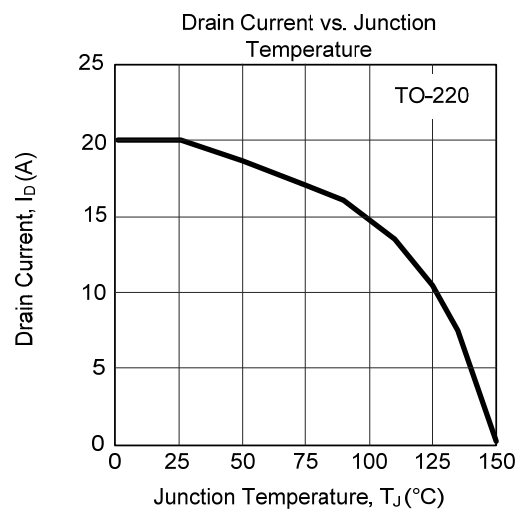
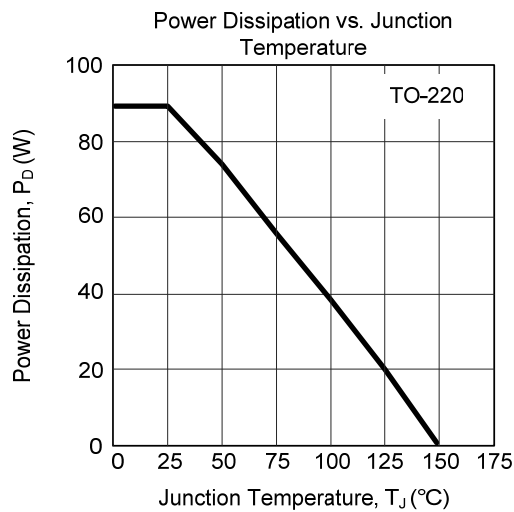
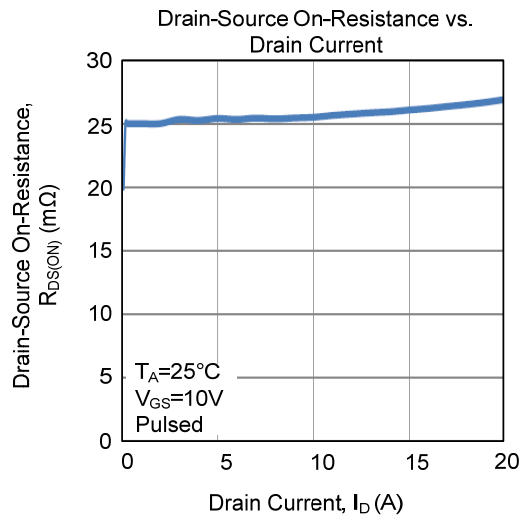
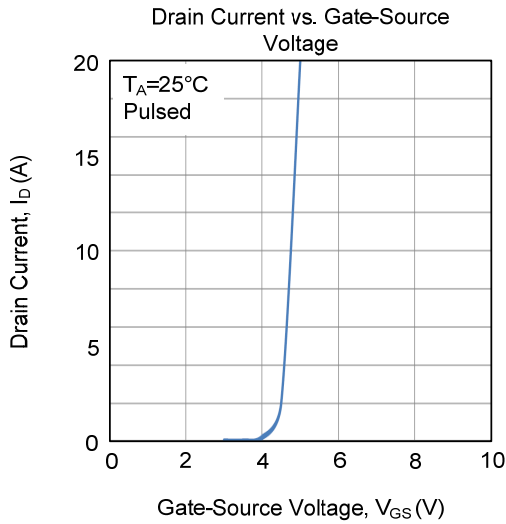
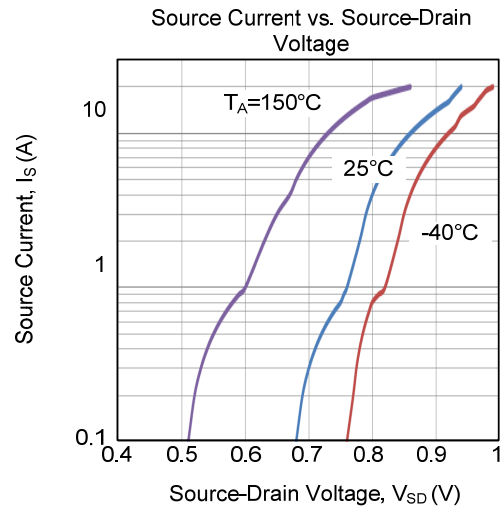
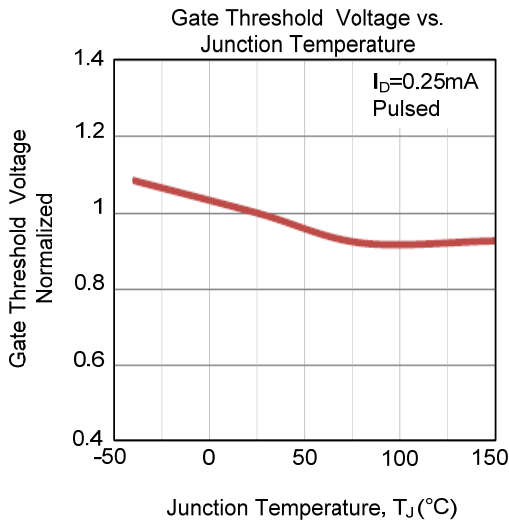


Unclamped Inductive Switching Waveforms

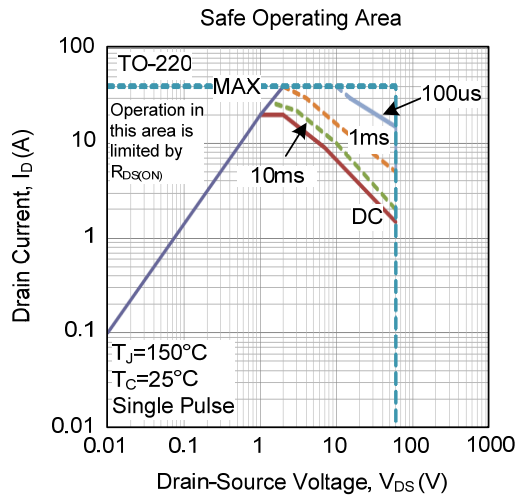
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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