



18NM65

Power MOSFET

18A, 650V N-CHANNEL SUPER-JUNCTION MOSFET

DESCRIPTION

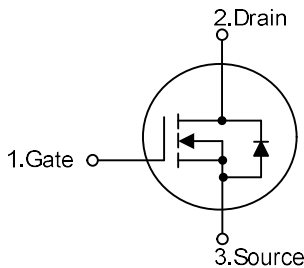
The UTC 18NM65 is a high voltage super junction MOSFET and is designed to have better characteristics.

The UTC 18NM65 Utilizing an advanced charge-balance technology, enhance system efficiency, improve EMI and reliability. such as low gate charge, low on-state resistance and have a high power density and high rugged avalanche characteristics. This super junction MOSFET usually used at AC/DC power conversion, and industrial power applications.

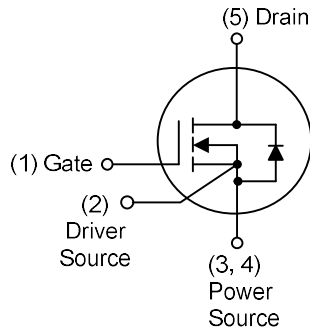
FEATURES

- * $R_{DS(ON)} \leq 0.33 \Omega @ V_{GS}=10V, I_D=9.0A$
- * Fast Switching Capability
- * Avalanche Energy Specified
- * Improved dv/dt Capability, High Ruggedness

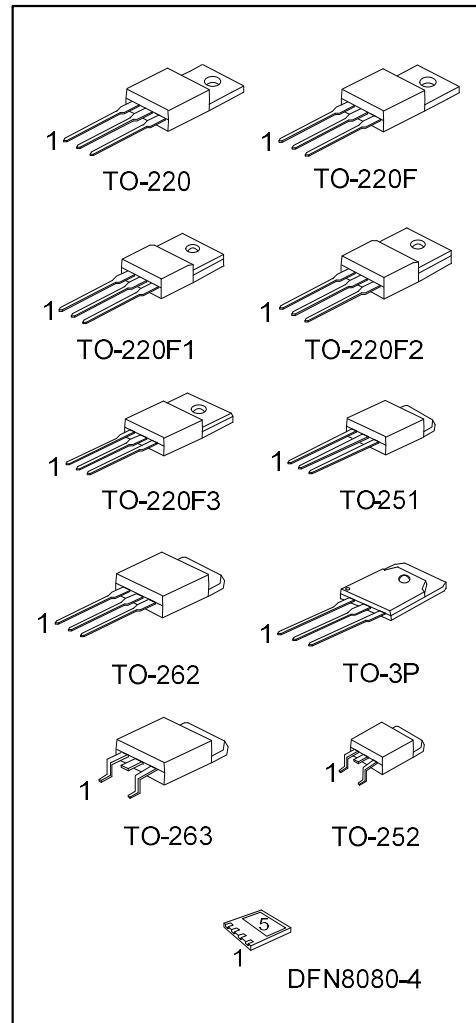
SYMBOL



TO-220/TO-220F/TO-220F1
 TO-220F2/TO-220F3/TO-251
 TO-252/TO-262/TO-263/TO-3P



DFN8080-4



ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | | | Packing |
|--------------------|--------------------|-----------|----------------|---|---|---|---|-----------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | 4 | 5 | |
| 18NM65L-TA3-T | 18NM65G-TA3-T | TO-220 | G | D | S | - | - | Tube |
| 18NM65L-TF1-T | 18NM65G-TF1-T | TO-220F1 | G | D | S | - | - | Tube |
| 18NM65L-TF2-T | 18NM65G-TF2-T | TO-220F2 | G | D | S | - | - | Tube |
| 18NM65L-TF3-T | 18NM65G-TF3-T | TO-220F | G | D | S | - | - | Tube |
| 18NM65L-TF3T-T | 18NM65G-TF3T-T | TO-220F3 | G | D | S | - | - | Tube |
| 18NM65L-TM3-T | 18NM65G-TM3-T | TO-251 | G | D | S | - | - | Tube |
| 18NM65L-TN3-R | 18NM65G-TN3-R | TO-252 | G | D | S | - | - | Tape Reel |
| 18NM65L-T2Q-T | 18NM65G-T2Q-T | TO-262 | G | D | S | - | - | Tube |
| 18NM65L-TQ2-T | 18NM65G-TQ2-T | TO-263 | G | D | S | - | - | Tube |
| 18NM65L-TQ2-R | 18NM65G-TQ2-R | TO-263 | G | D | S | - | - | Tape Reel |
| 18NM65L-T3P-T | 18NM65G-T3P-T | TO-3P | G | D | S | - | - | Tube |
| 18NM65L-K04-8080-R | 18NM65G-K04-8080-R | DFN8080-4 | G | S | S | S | D | Tape Reel |

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

| | |
|---|---|
| <p>18NM65G-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, TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F, TF3T: TO-220F3, TM3: TO-251, TN3: TO-252, T2Q: TO-262, TQ2: TO-263, T3P: TO-3P, K04-8080: DFN8080-4 (3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|---|---|

MARKING

| | |
|--|---|
| <p>TO-220 / TO-220F / TO-220F1 TO-220F2 / TO-220F3 / TO-251 TO-252 / TO-262/TO-263 / TO-3P</p> | <p>DFN8080-4</p> |
| <p>UTC 18NM65</p> <p>Lot Code ← [] [L] [G] [] [] → Date Code</p> <p>1</p> <p>L: Lead Free G: Halogen Free</p> | <p>UTC 18NM65</p> <p>Lot Code ← [•] [] [] [] [] → Date Code</p> |

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

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|------------------------------------|------------------------|------------------|------------|------|
| Drain-Source Voltage | | V _{DSS} | 650 | V |
| Gate-Source Voltage | | V _{GSS} | ±30 | V |
| Drain Current | Continuous | I _D | 18 | A |
| | Pulsed (Note 2) | I _{DM} | 36 | A |
| Avalanche Current (Note 2) | | I _{AR} | 2.9 | A |
| Avalanche Energy | Single Pulsed (Note 3) | E _{AS} | 151 | mJ |
| | Repetitive | E _{AR} | 0.44 | mJ |
| Drain Source Voltage Slope | | dv/dt | 12.9 | V/ns |
| Peak Diode Recovery dv/dt (Note 4) | | | 6.0 | V/ns |
| Power Dissipation | TO-220/TO-262/TO-263 | P _D | 104 | W |
| | TO-220F/TO-220F1 | | 33 | W |
| | TO-220F2/TO-220F3 | | | |
| | TO-251/TO-252 | | 83 | W |
| | TO-3P | | 200 | W |
| | DFN8080-4 | | 62 | 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 = 10mH, I_{AS} = 5.5A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
4. I_{SD} ≤ 18A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

| PARAMETER | | SYMBOL | RATINGS | UNIT | | |
|---------------------------------------|--|-----------------|---------|------------|----------------------|-----------------|
| Junction to Ambient | TO-220/TO-220F TO-220F1/TO-220F2 TO-220F3/TO-262 TO-263 | θ _{JA} | 62.5 | °C/W | | |
| | TO-251/TO-252 | | | | 110 | °C/W |
| | TO-3P | | | | 40 | °C/W |
| | DFN8080-4 | | | | 35 | °C/W |
| | Junction to Case | | | | TO-220/TO-262/TO-263 | θ _{JC} |
| TO-220F/TO-220F1 TO-220F2/TO-220F3 | | 3.78 | °C/W | | | |
| TO-251/TO-252 | | | | 1.5 (Note) | °C/W | |
| TO-3P | | 0.625 | °C/W | | | |
| DFN8080-4 | | 2 | °C/W | | | |

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

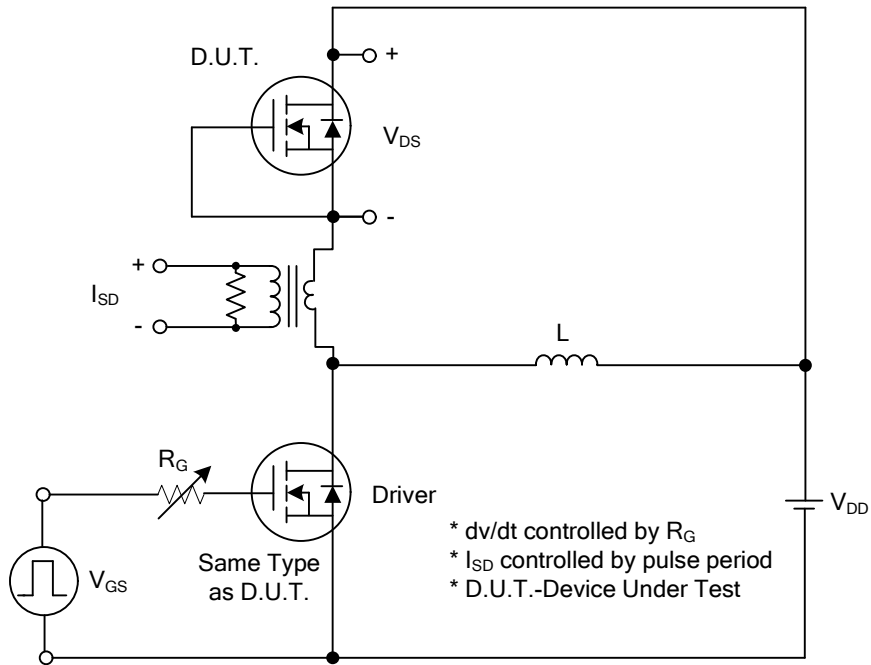
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|--------------|--|-----|------|-----------|----------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 650 | | | V |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS}=650V, V_{GS}=0V$ | | | 10 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{DS}=0V, V_{GS}=\pm 30V$ | | | ± 100 | nA |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 2.5 | | 4.5 | V |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=9.0A$ | | 0.28 | 0.33 | Ω |
| DYNAMIC PARAMETERS | | | | | | |
| Input Capacitance | C_{ISS} | $V_{GS}=0V, V_{DS}=50V, f=1.0MHz$ | | 1115 | | pF |
| Output Capacitance | C_{OSS} | | | 134 | | pF |
| Reverse Transfer Capacitance | C_{RSS} | | | 4.9 | | pF |
| Gate Resistance | R_G | $f=1MHz, \text{Open Drain}$ | | | 5 | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Total Gate Charge (Note 1) | Q_G | $V_{DS}=520V, V_{GS}=10V, I_D=18A, I_G=1mA$ (Note 1, 2) | | 44 | | nC |
| Gate Source Charge | Q_{GS} | | | 13 | | nC |
| Gate Drain Charge | Q_{GD} | | | 17 | | nC |
| Turn-ON Delay Time (Note 1) | $t_{D(ON)}$ | $V_{DS}=100V, V_{GS}=10V, I_D=18A, R_G=25\Omega$ (Note 1, 2) | | 18 | | ns |
| Turn-ON Rise Time | t_R | | | 25 | | ns |
| Turn-OFF Delay Time | $t_{D(OFF)}$ | | | 50 | | ns |
| Turn-OFF Fall-Time | t_F | | | 76 | | ns |
| SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS | | | | | | |
| Maximum Continuous Drain-Source Diode Forward Current | I_S | | | | 18 | A |
| Maximum Pulsed Drain-Source Diode Forward Current | I_{SM} | | | | 36 | A |
| Drain-Source Diode Forward Voltage (Note 1) | V_{SD} | $I_F=I_S, V_{GS}=0V$ | | | 1.5 | V |
| Reverse Recovery Time (Note 1) | t_{rr} | $I_S=18A, V_{GS}=0V, dI_F/dt=100A/\mu s$ | | 420 | | ns |
| Reverse Recovery Charge | Q_{rr} | | | | 7.0 | |

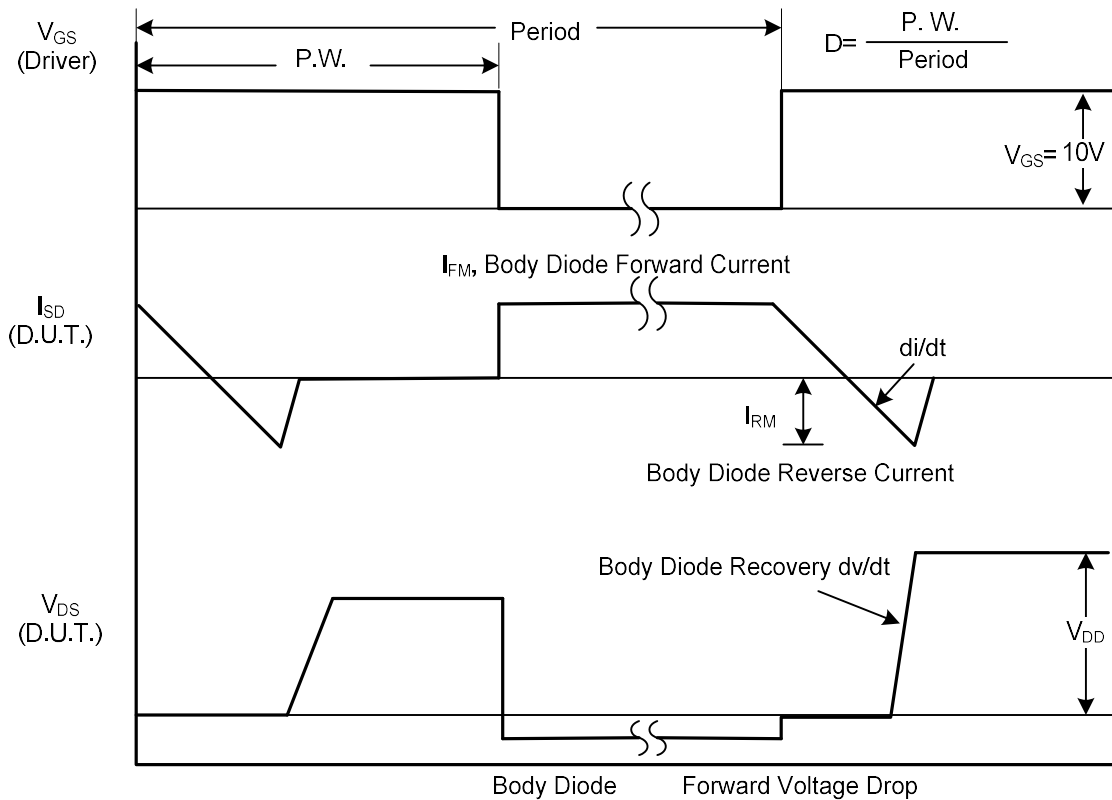
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

TEST CIRCUITS AND WAVEFORMS

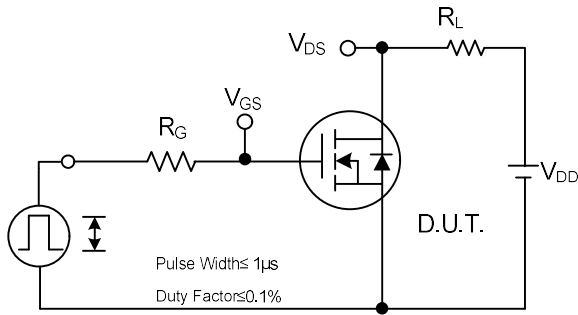


Peak Diode Recovery dv/dt Test Circuit

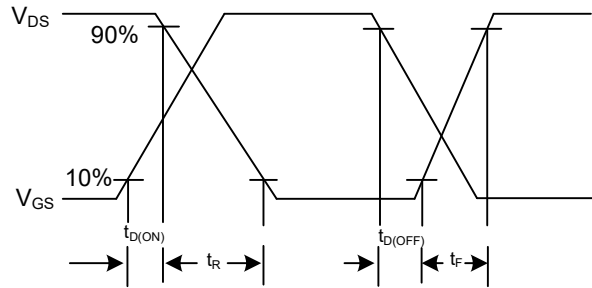


Peak Diode Recovery dv/dt Waveforms

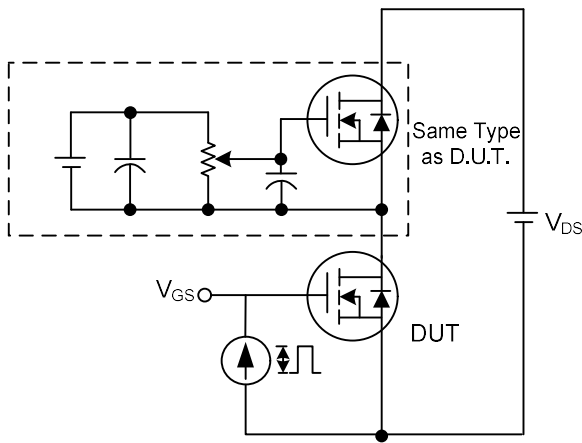
TEST CIRCUITS AND WAVEFORMS



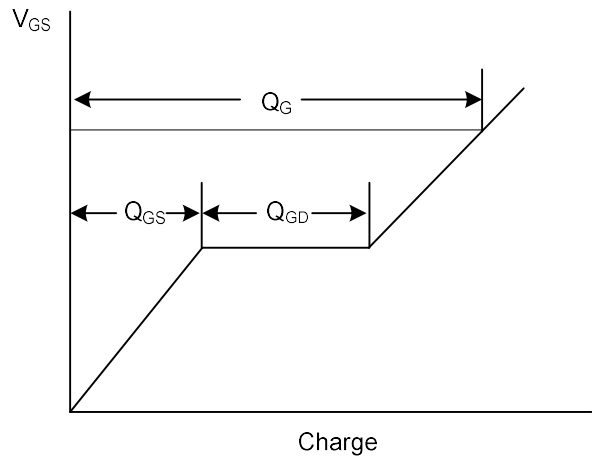
Switching Test Circuit



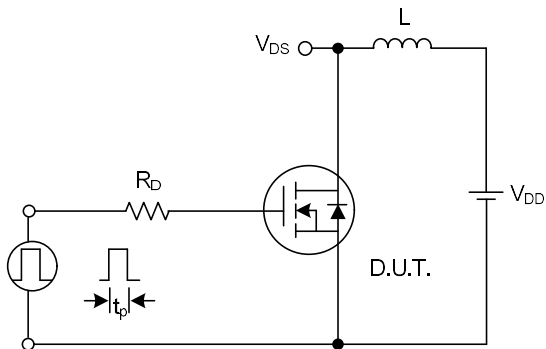
Switching Waveforms



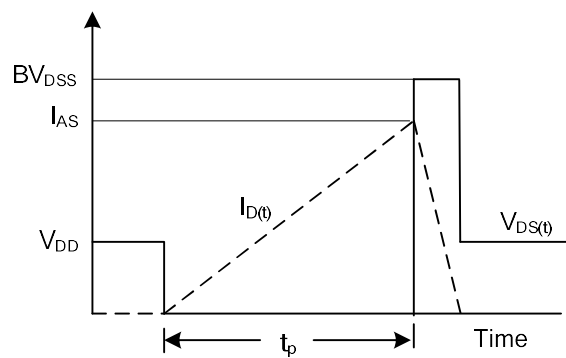
Gate Charge Test Circuit



Gate Charge Waveform

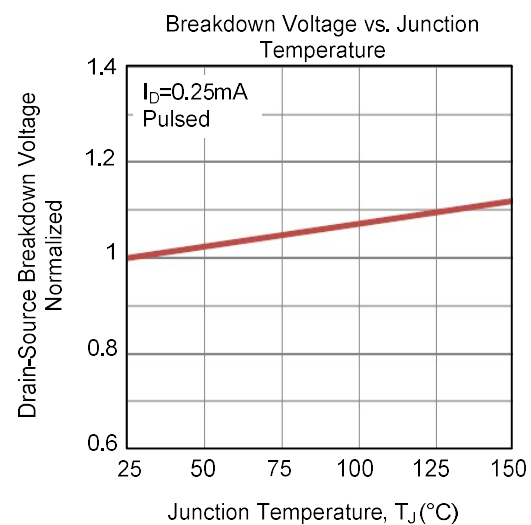
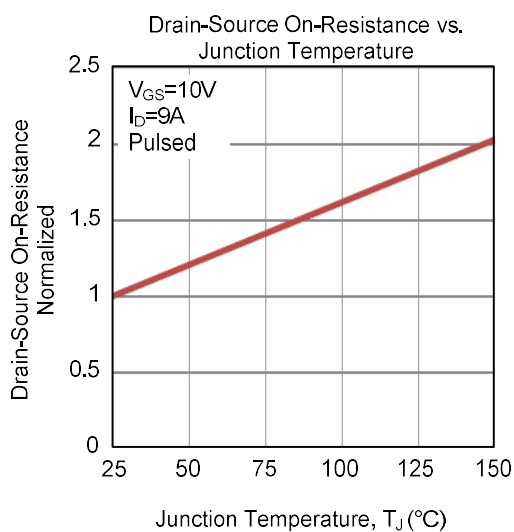
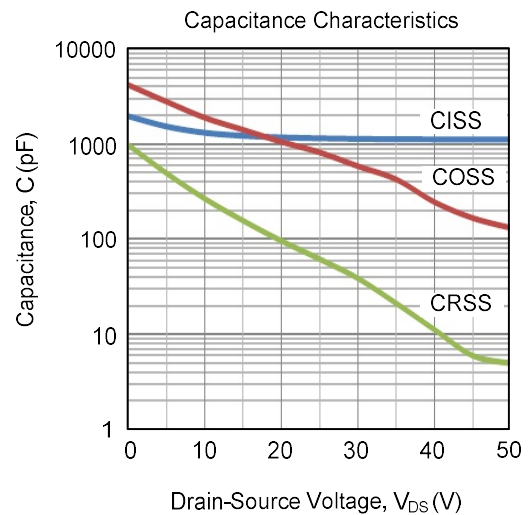
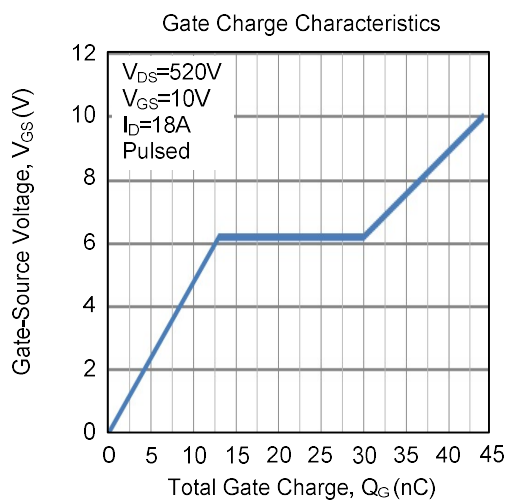
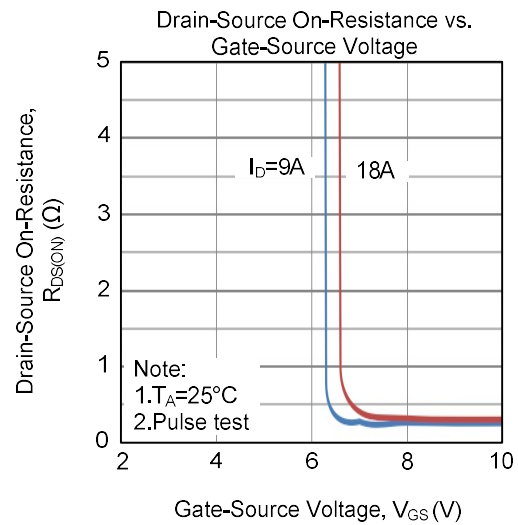
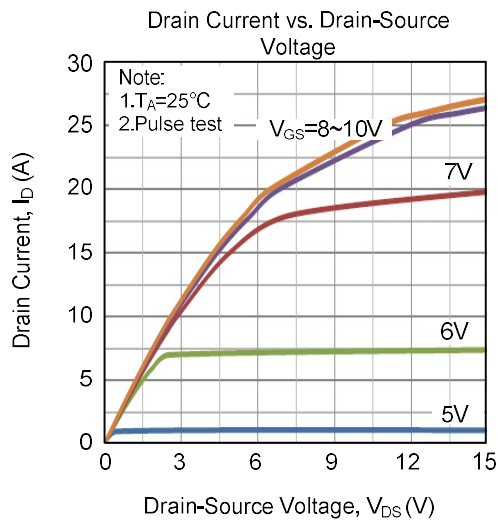


Unclamped Inductive Switching Test Circuit

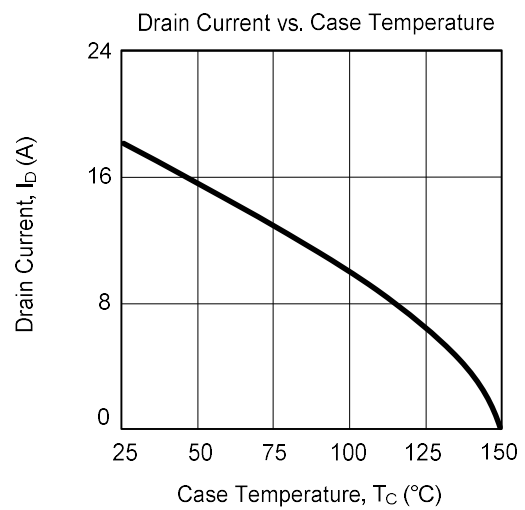
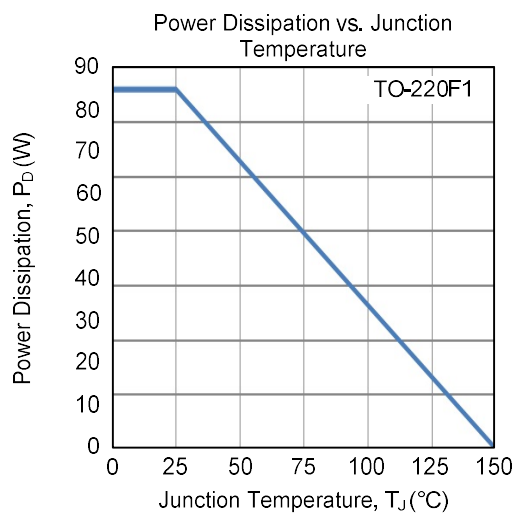
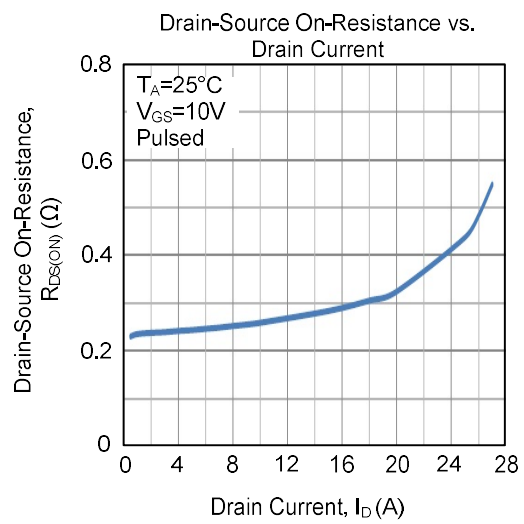
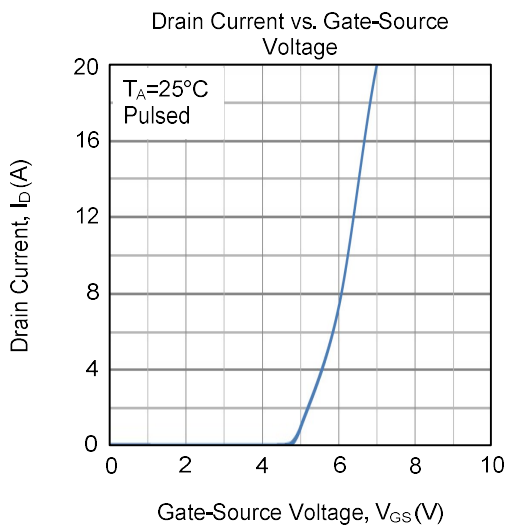
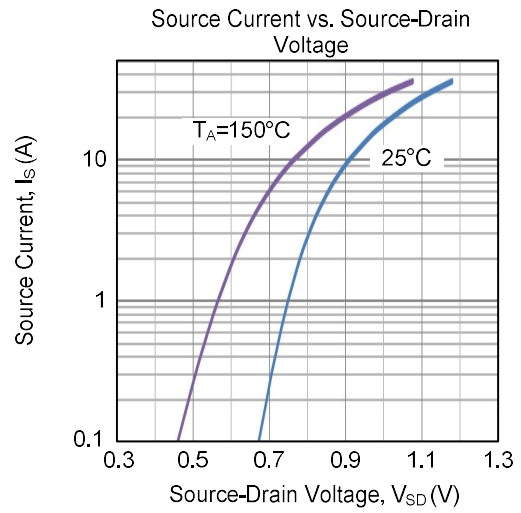
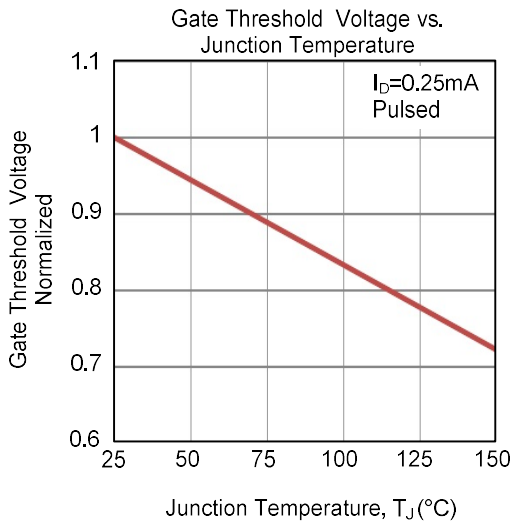


Unclamped Inductive Switching Waveforms

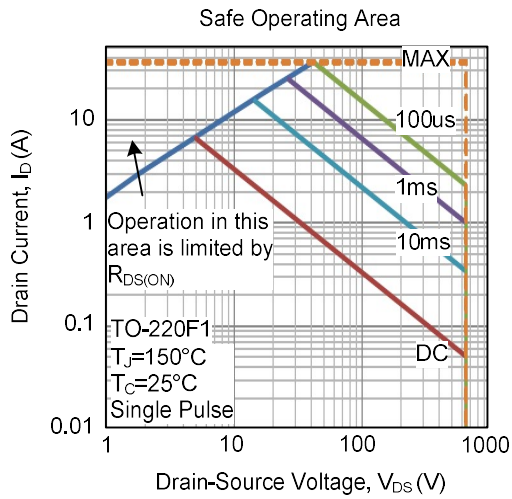
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ **TYPICAL CHARACTERISTICS (Cont.)**



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.