



## 18N50

Power MOSFET

### 18A, 500V N-CHANNEL POWER MOSFET

#### DESCRIPTION

The UTC **18N50** is a N-channel enhancement mode power MOSFET using UTC's advanced planar stripe and DMOS technology to provide perfect performance.

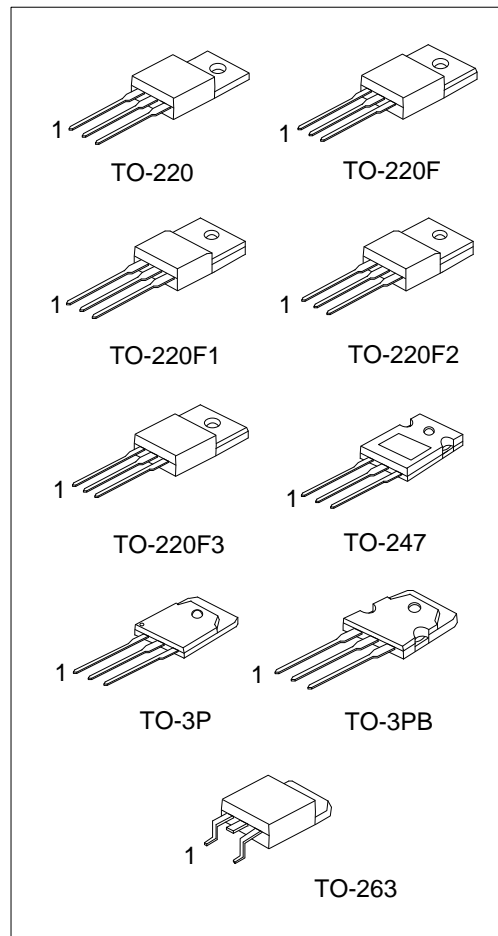
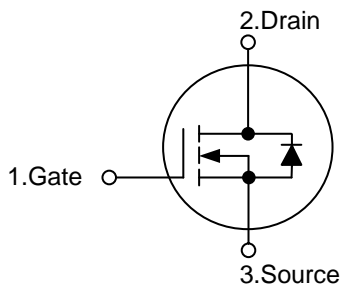
This technology can withstand high energy pulse in the avalanche and commutation mode. It can provide minimum on-state resistance and high switching speed.

This device is generally applied in active power factor correction and high efficient switched mode power supplies.

#### FEATURES

- \*  $R_{DS(ON)} \leq 0.32 \Omega @ V_{GS}=10V, I_D=9.0A$
- \* High switching speed
- \* 100% avalanche tested

#### SYMBOL



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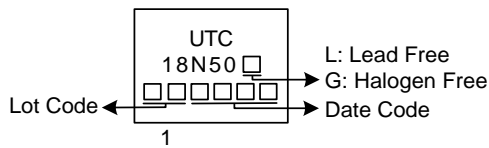
### ■ ORDERING INFORMATION

| Ordering Number |               | Package  | Pin Assignment |   |   | Packing   |
|-----------------|---------------|----------|----------------|---|---|-----------|
| Lead Free       | Halogen Free  |          | 1              | 2 | 3 |           |
| 18N50L-TA3-T    | 18N50G-TA3-T  | TO-220   | G              | D | S | Tube      |
| 18N50L-TF1-T    | 18N50G-TF1-T  | TO-220F1 | G              | D | S | Tube      |
| 18N50L-TF2-T    | 18N50G-TF2-T  | TO-220F2 | G              | D | S | Tube      |
| 18N50L-TF3T-T   | 18N50G-TF3T-T | TO-220F3 | G              | D | S | Tube      |
| 18N50L-TF3-T    | 18N50G-TF3-T  | TO-220F  | G              | D | S | Tube      |
| 18N50L-T3B-T    | 18N50G-T3B-T  | TO-3PB   | G              | D | S | Tube      |
| 18N50L-T3P-T    | 18N50G-T3P-T  | TO-3P    | G              | D | S | Tube      |
| 18N50L-T47-T    | 18N50G-T47-T  | TO-247   | G              | D | S | Tube      |
| 18N50L-TQ2-T    | 18N50G-TQ2-T  | TO-263   | G              | D | S | Tube      |
| 18N50L-TQ2-R    | 18N50G-TQ2-R  | TO-263   | G              | D | S | Tape Reel |

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

|  |   |
|--|---|
| <p>18N50G-TA3-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p> | <p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2, TF3T: TO-220F3, TF3: TO-220F, TQ2: TO-263, T3B: TO-3PB, T3P: TO-3P, T47: TO-247</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|--|---|

### ■ MARKING



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■ **ABSOLUTE MAXIMUM RATINGS** ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

| PARAMETER                          |                        | SYMBOL    | RATINGS    | UNIT             |
|------------------------------------|------------------------|-----------|------------|------------------|
| Drain-Source Voltage               |                        | $V_{DSS}$ | 500        | V                |
| Gate-Source Voltage                |                        | $V_{GSS}$ | $\pm 30$   | V                |
| Drain Current                      | Continuous             | $I_D$     | 18         | A                |
|                                    | Pulsed (Note 2)        | $I_{DM}$  | 72         | A                |
| Avalanche Current (Note 2)         |                        | $I_{AR}$  | 13         | A                |
| Avalanche Energy                   | Single Pulsed (Note 3) | $E_{AS}$  | 845        | mJ               |
| Peak Diode Recovery dv/dt (Note 4) |                        | dv/dt     | 3.2        | V/ns             |
| Power Dissipation                  | TO-220/TO-263          | $P_D$     | 235        | W                |
|                                    | TO-220F/TO-220F1       |           | 40         | W                |
|                                    | TO-220F2/TO-220F3      |           |            |                  |
|                                    | TO-3P/TO-3PB           |           |            |                  |
|                                    | TO-247                 |           |            |                  |
| 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.

3.  $L=10\text{mH}$ ,  $I_{AS}=13\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\ \Omega$ , Starting  $T_J = 25^\circ\text{C}$

4.  $I_{SD} \leq 18\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

■ **THERMAL CHARACTERISTICS**

| PARAMETER           |                   | SYMBOL        | RATINGS | UNIT               |
|---------------------|-------------------|---------------|---------|--------------------|
| Junction to Ambient | TO-220/TO-220F    | $\theta_{JA}$ | 62.5    | $^\circ\text{C/W}$ |
|                     | TO-220F1/TO-220F2 |               |         |                    |
|                     | TO-220F3/TO-263   |               |         |                    |
|                     | TO-3P/TO-3PB      |               | 30      | $^\circ\text{C/W}$ |
|                     | TO-247            |               | 40      | $^\circ\text{C/W}$ |
| Junction to Case    | TO-220/TO-263     | $\theta_{JC}$ | 0.53    | $^\circ\text{C/W}$ |
|                     | TO-220F/TO-220F1  |               | 3.13    | $^\circ\text{C/W}$ |
|                     | TO-220F2/TO-220F3 |               |         |                    |
|                     | TO-3P/TO-3PB      |               | 0.33    | $^\circ\text{C/W}$ |
|                     | TO-247            |               | 0.35    | $^\circ\text{C/W}$ |

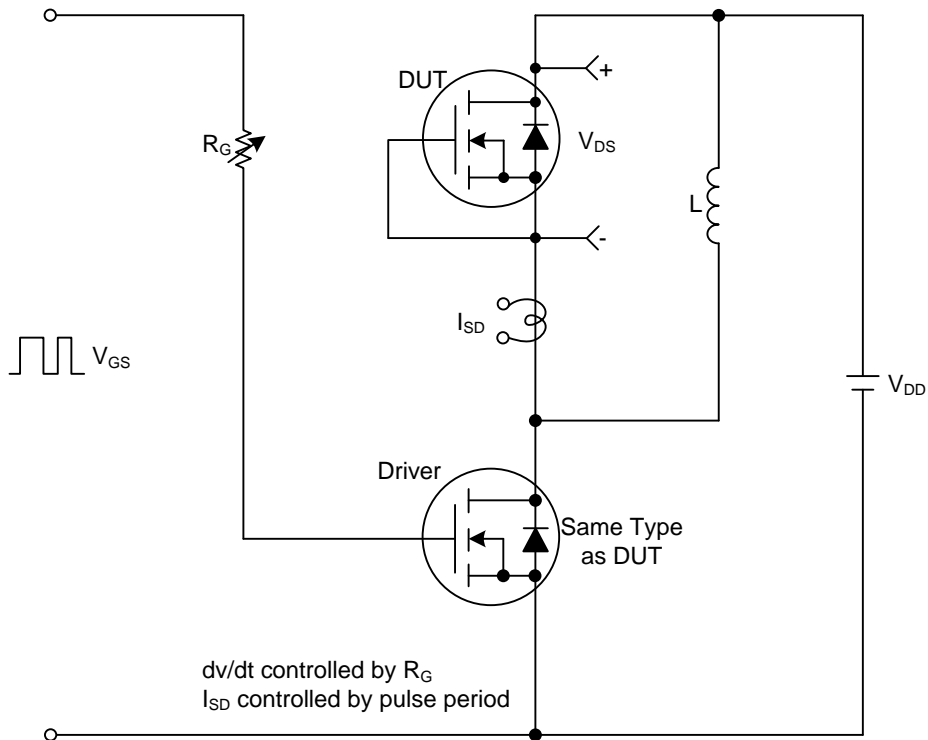
■ **ELECTRICAL CHARACTERISTICS** ( $T_J=25^\circ\text{C}$ , unless otherwise specified)

| PARAMETER  | SYMBOL       | TEST CONDITIONS   | MIN | TYP  | MAX  | UNIT     |
|--|--------------|---|-----|------|------|----------|
| <b>OFF CHARACTERISTICS</b>                             |              |   |     |      |      |          |
| Drain-Source Breakdown Voltage                         | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$   | 500 |      |      | V        |
| Drain-Source Leakage Current                           | $I_{DSS}$    | $V_{DS}=500V, V_{GS}=0V$  |     |      | 10   | $\mu A$  |
| Gate-Source Leakage Current                            | Forward      | $V_{GS} = 30V, V_{DS} = 0V$<br>$V_{GS} = -30V, V_{DS} = 0V$       |     |      | 100  | nA       |
|  | Reverse      |   |     |      | -100 |          |
| <b>ON CHARACTERISTICS</b>                              |              |   |     |      |      |          |
| Gate Threshold Voltage                                 | $V_{GS(TH)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                                     | 2.0 |      | 4.0  | V        |
| Drain-Source On-State Resistance                       | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=9.0A$  |     |      | 0.32 | $\Omega$ |
| <b>DYNAMIC PARAMETERS</b>                              |              |   |     |      |      |          |
| Input Capacitance                                      | $C_{ISS}$    | $V_{DS}=25V, V_{GS}=0V, f=1.0MHz$                                 |     | 2550 |      | pF       |
| Output Capacitance                                     | $C_{OSS}$    |   |     | 330  |      | pF       |
| Reverse Transfer Capacitance                           | $C_{RSS}$    |   |     | 47   |      | pF       |
| <b>SWITCHING PARAMETERS</b>                            |              |   |     |      |      |          |
| Total Gate Charge (Note 1)                             | $Q_G$        | $V_{DS}=100V, V_{GS}=10V, I_D=18A,$<br>$I_D=1mA$ (Note 1, 2)      |     | 70   |      | nC       |
| Gate to Source Charge                                  | $Q_{GS}$     |   |     | 13   |      | nC       |
| Gate to Drain Charge                                   | $Q_{GD}$     |   |     | 25   |      | nC       |
| Turn-ON Delay Time (Note 1)                            | $t_{D(ON)}$  | $V_{DS}=100V, V_{GS}=10V, I_D=18A,$<br>$R_G=25\Omega$ (Note 1, 2) |     | 40   |      | ns       |
| Rise Time  | $t_R$        |   |     | 38   |      | ns       |
| Turn-OFF Delay Time                                    | $t_{D(OFF)}$ |   |     | 200  |      | ns       |
| Fall-Time  | $t_F$        |   |     | 50   |      | ns       |
| <b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b> |              |   |     |      |      |          |
| Maximum Continuous Drain-Source Diode Forward Current  | $I_S$        |   |     |      | 18   | A        |
| Maximum Pulsed Drain-Source Diode Forward Current      | $I_{SM}$     |   |     |      | 72   | A        |
| Drain-Source Diode Forward Voltage (Note 1)            | $V_{SD}$     | $I_S=18A, V_{GS}=0V$  |     |      | 1.4  | V        |
| Body Diode Reverse Recovery Time (Note 1)              | $t_{rr}$     | $I_S=18A, V_{GS}=0V,$<br>$dI_F/dt=100A/\mu s$                     |     | 380  |      | nS       |
| Body Diode Reverse Recovery Charge                     | $Q_{rr}$     |   |     | 5.4  |      | $\mu C$  |

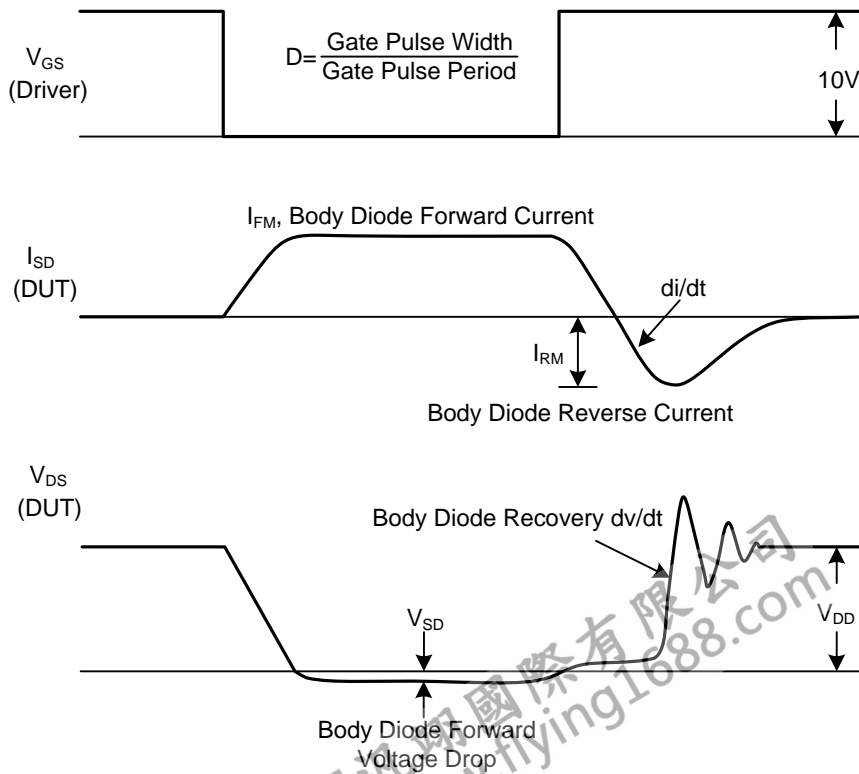
Notes: 1. Pulse Test : Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating temperature.

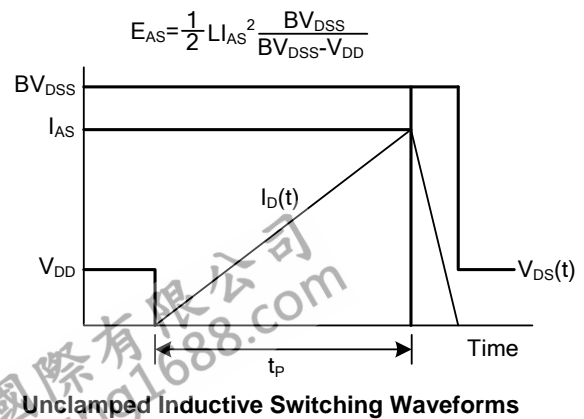
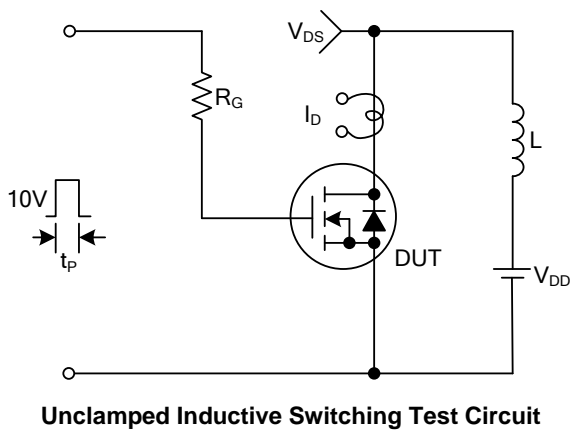
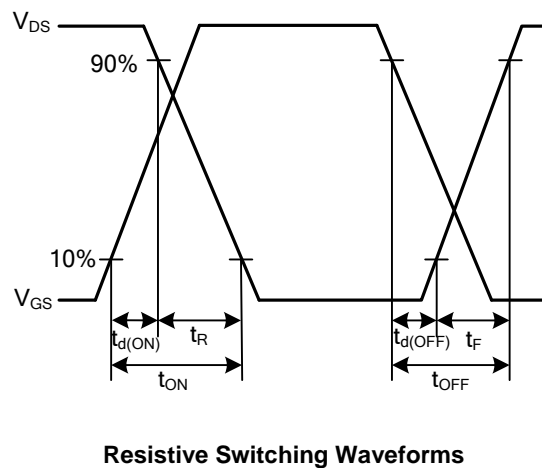
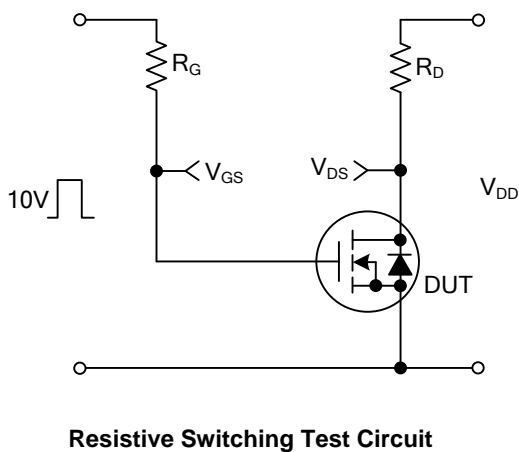
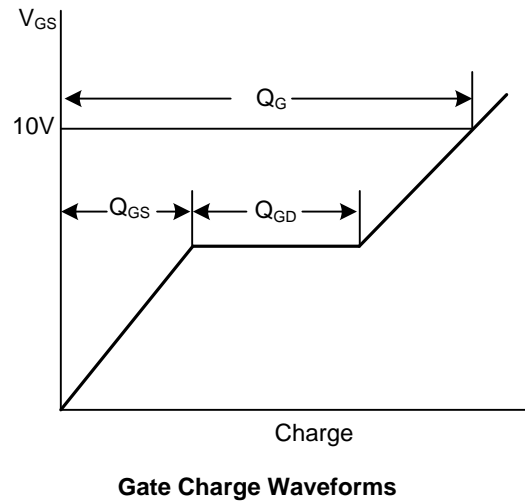
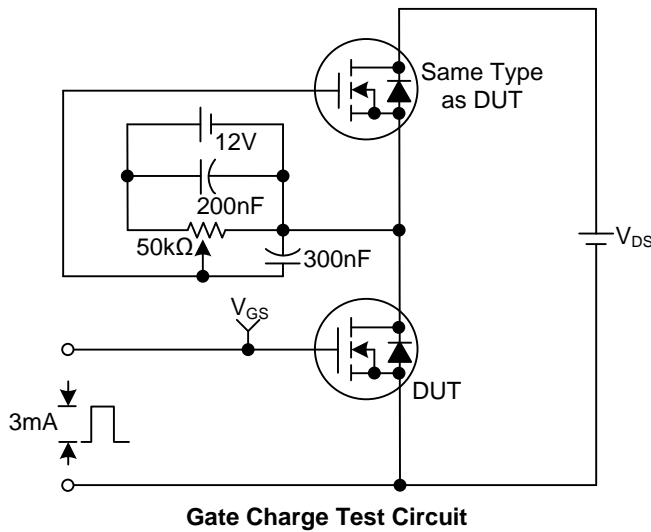
■ TEST CIRCUITS AND WAVEFORMS



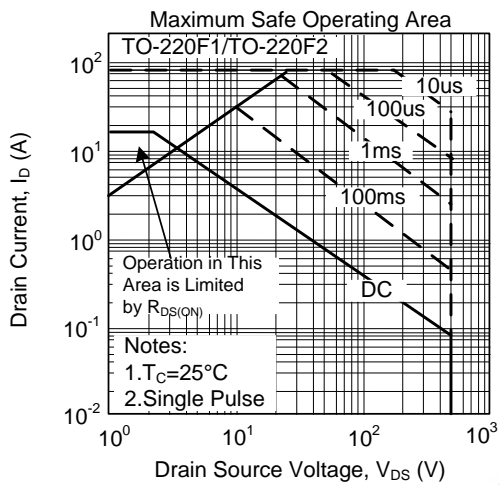
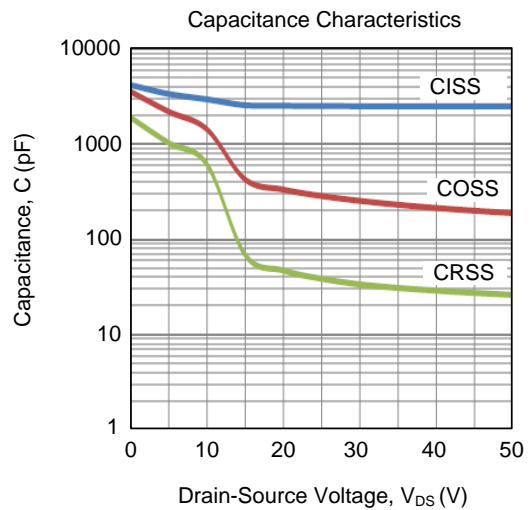
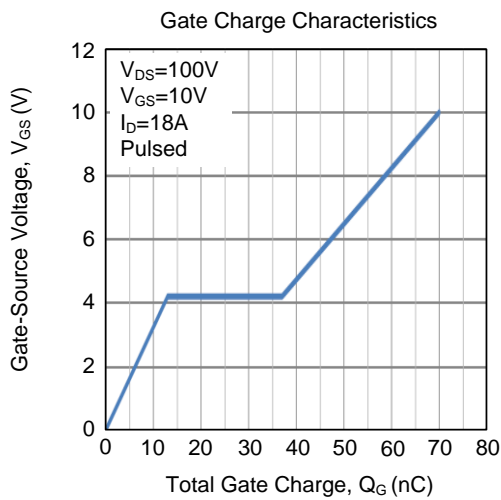
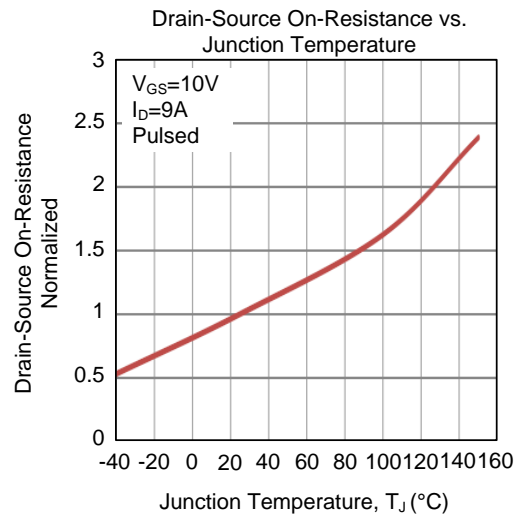
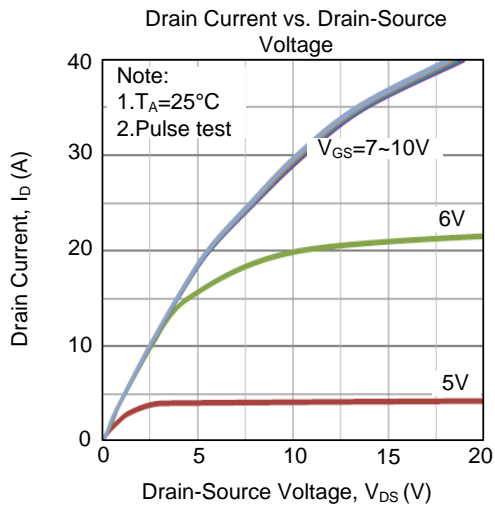
Peak Diode Recovery dv/dt Test Circuit & Waveforms



## TEST CIRCUITS AND WAVEFORMS



## TYPICAL CHARACTERISTICS



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