

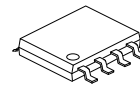
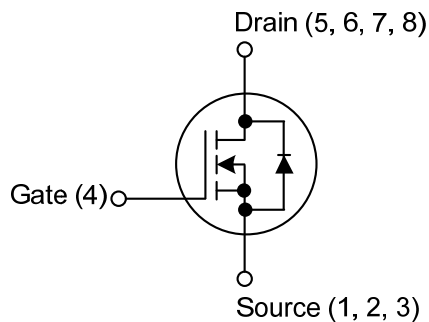
**UTM6006***Power MOSFET***6.3A, 60V N-CHANNEL FAST SWITCHING MOSFET****DESCRIPTION**

The UTC **UTM6006** is an N-Channel MOSFET, it uses UTC's advanced technology to provide customers with a minimum on-state resistance, high switching speed and low gate charge.

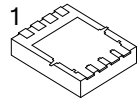
The UTC **UTM6006** is suitable for application in networking DC-DC power system and LCD/LED back light, etc.

**FEATURES**

- \*  $R_{DS(ON)} < 18\text{ m}\Omega$  @  $V_{GS}=10\text{V}$ ,  $I_D=6\text{A}$
- \*  $R_{DS(ON)} < 20\text{ m}\Omega$  @  $V_{GS}=4.5\text{V}$ ,  $I_D=4\text{A}$
- \* Low gate charge
- \* Excellent  $CdV/dt$  effect decline
- \* High switching speed

**SYMBOL**

SOP-8



DFN-8(5x6)

**ORDERING INFORMATION**

| Ordering Number     |                     | Package    | Pin Assignment |   |   |   |   |   |   |   | Packing   |
|---------------------|---------------------|------------|----------------|---|---|---|---|---|---|---|-----------|
| Lead Free           | Halogen Free        |            | 1              | 2 | 3 | 4 | 5 | 6 | 7 | 8 |           |
| UTM6006L-S08-R      | UTM6006G-S08-R      | SOP-8      | S              | S | S | G | D | D | D | D | Tape Reel |
| UTM6006L-K08-5060-R | UTM6006G-K08-5060-R | DFN-8(5x6) | S              | S | S | G | D | D | D | D | Tape Reel |

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

|                                                                                                |  |                                                                                                                            |
|------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------|
| <p>UTM6006G-S08-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) S08: SOP-8, K08-5060: DFN-8(5x6)</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p> |
|------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------|

**MARKING**

| SOP-8                                               | DFN-8(5x6)                                          |
|-----------------------------------------------------|-----------------------------------------------------|
| <p>UTC UTM6006</p> <p>Lot Code</p> <p>Date Code</p> | <p>UTC UTM6006</p> <p>Lot Code</p> <p>Date Code</p> |

## ■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                         |                                |                      | SYMBOL           | RATINGS  | UNIT |
|---------------------------------------------------|--------------------------------|----------------------|------------------|----------|------|
| Drain-Source Voltage                              |                                |                      | V <sub>DSS</sub> | 60       | V    |
| Gate-Source Voltage                               |                                |                      | V <sub>GSS</sub> | ±20      | V    |
| Drain Current                                     | Continuous                     | T <sub>A</sub> =25°C | I <sub>D</sub>   | 6.3      | A    |
|                                                   | V <sub>GS</sub> @ 10V (Note 1) | T <sub>A</sub> =70°C |                  | 5.0      | A    |
|                                                   | Pulsed (Note 2)                |                      | I <sub>DM</sub>  | 32       | A    |
| Avalanche Current                                 |                                |                      | I <sub>AS</sub>  | 28       | A    |
| Single Pulse Avalanche Energy (Note 3)            |                                |                      | E <sub>AS</sub>  | 67       | mJ   |
| Power Dissipation (T <sub>A</sub> =25°C) (Note 4) |                                | SOP-8                | P <sub>D</sub>   | 1.5      | W    |
|                                                   |                                | DFN-8(5×6)           |                  | 1.92     |      |
| Junction Temperature                              |                                |                      | T <sub>J</sub>   | -55~+150 | °C   |
| Storage Temperature Range                         |                                |                      | T <sub>STG</sub> | -55~+150 | °C   |

Note: 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.

## ■ THERMAL CHARACTERISTICS (Note 1)

| PARAMETER           |            | SYMBOL        | RATINGS | UNIT                 |
|---------------------|------------|---------------|---------|----------------------|
| Junction to Ambient | SOP-8      | $\theta_{JA}$ | 85      | $^{\circ}\text{C/W}$ |
|                     | DFN-8(5×6) |               | 65      |                      |
| Junction to Case    | SOP-8      | $\theta_{JC}$ | 24      | $^{\circ}\text{C/W}$ |
|                     | DFN-8(5×6) |               | 12      |                      |

Notes: 1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.

2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%.

3. The EAS data shows Max. rating. The test condition is  $V_{DD}=25\text{V}$ ,  $V_{GS}=10\text{V}$ ,  $L=0.1\text{mH}$ ,  $I_{AS}=30\text{A}$ .

4. The power dissipation is limited by 150 $^{\circ}\text{C}$  junction temperature.

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

| PARAMETER                                        |         | SYMBOL                              | TEST CONDITIONS                                                                      | MIN | TYP   | MAX  | UNIT  |
|--------------------------------------------------|---------|-------------------------------------|--------------------------------------------------------------------------------------|-----|-------|------|-------|
| OFF CHARACTERISTICS                              |         |                                     |                                                                                      |     |       |      |       |
| Drain-Source Breakdown Voltage                   |         | BV <sub>DSS</sub>                   | I <sub>D</sub> =250μA, V <sub>GS</sub> =0V                                           | 60  |       |      | V     |
| BV <sub>DSS</sub> Temperature Coefficient        |         | ΔBV <sub>DSS</sub> /ΔT <sub>J</sub> | Reference to 25°C , I <sub>D</sub> =1mA                                              |     | 0.057 |      | V/°C  |
| Drain-Source Leakage Current                     |         | I <sub>DSS</sub>                    | V <sub>DS</sub> =48V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                      |     |       | 1    | μA    |
|                                                  |         |                                     | V <sub>DS</sub> =48V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C                      |     |       | 5    | μA    |
| Gate-Source Leakage Current                      | Forward | I <sub>GSS</sub>                    | V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V                                           |     |       | +100 | nA    |
|                                                  | Reverse |                                     | V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V                                           |     |       | -100 | nA    |
| ON CHARACTERISTICS                               |         |                                     |                                                                                      |     |       |      |       |
| Gate Threshold Voltage                           |         | V <sub>GS(TH)</sub>                 | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                             | 1.2 |       | 2.5  | V     |
| V <sub>GS(TH)</sub> Temperature Coefficient      |         | ΔV <sub>GS(TH)</sub>                |                                                                                      |     | -5.68 |      | mV/°C |
| Static Drain-Source On-State Resistance (Note 2) |         | R <sub>DS(ON)</sub>                 | V <sub>GS</sub> =10V, I <sub>D</sub> =6A                                             |     | 14    | 18   | mΩ    |
|                                                  |         |                                     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A                                            |     | 16    | 20   | mΩ    |
| Forward Transconductance                         |         | g <sub>FS</sub>                     | V <sub>DS</sub> =5V, I <sub>D</sub> =6A                                              |     | 40    |      | S     |
| DYNAMIC PARAMETERS                               |         |                                     |                                                                                      |     |       |      |       |
| Input Capacitance                                |         | C <sub>ISS</sub>                    | V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz                                  |     | 1070  | 1200 | pF    |
| Output Capacitance                               |         | C <sub>OSS</sub>                    |                                                                                      |     | 200   | 220  | pF    |
| Reverse Transfer Capacitance                     |         | C <sub>RSS</sub>                    |                                                                                      |     | 190   | 210  | pF    |
| SWITCHING PARAMETERS (Note 2)                    |         |                                     |                                                                                      |     |       |      |       |
| Total Gate Charge (4.5V)                         |         | Q <sub>G</sub>                      | V <sub>GS</sub> =10V, V <sub>DS</sub> =48V, I <sub>D</sub> =1A                       |     | 290   | 310  | nC    |
| Gate to Source Charge                            |         | Q <sub>GS</sub>                     |                                                                                      |     | 10.7  | 15   | nC    |
| Gate to Drain Charge                             |         | Q <sub>GD</sub>                     |                                                                                      |     | 30    | 45   | nC    |
| Turn-ON Delay Time                               |         | t <sub>D(ON)</sub>                  | V <sub>GS</sub> =10V, V <sub>DD</sub> =30V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =2A |     | 55    | 70   | ns    |
| Rise Time                                        |         | t <sub>R</sub>                      |                                                                                      |     | 100   | 120  | ns    |
| Turn-OFF Delay Time                              |         | t <sub>D(OFF)</sub>                 |                                                                                      |     | 580   | 620  | ns    |
| Fall-Time                                        |         | t <sub>F</sub>                      |                                                                                      |     | 190   | 210  | ns    |
| GUARANTEED AVALANCHE CHARACTERISTICS             |         |                                     |                                                                                      |     |       |      |       |
| Single Pulse Avalanche Energy (Note 5)           |         | E <sub>AS</sub>                     | V <sub>DD</sub> =25V, L=0.1mH, I <sub>AS</sub> =15A                                  | 19  |       |      | mJ    |
| DIODE CHARACTERISTICS                            |         |                                     |                                                                                      |     |       |      |       |
| Continuous Source Current (Note 1, 6)            |         | I <sub>S</sub>                      | V <sub>G</sub> =V <sub>D</sub> =0V , Force Current                                   |     |       | 6.3  | A     |
| Pulsed Source Current (Note 2, 6)                |         | I <sub>SM</sub>                     |                                                                                      |     |       | 32   | A     |
| Diode Forward Voltage (Note 2)                   |         | V <sub>SD</sub>                     | V <sub>GS</sub> =0V , I <sub>S</sub> =6.3A , T <sub>J</sub> =25°C                    |     |       | 1    | V     |
| Reverse Recovery Time                            |         | t <sub>rr</sub>                     | I <sub>F</sub> =6A, dI/dt=100A/μs, T <sub>J</sub> =25°C                              |     | 15    |      | nS    |
| Reverse Recovery Charge                          |         | Q <sub>rr</sub>                     |                                                                                      |     | 10.4  |      | nC    |

Notes: 1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.

2. The data tested by pulsed, pulse width≤300μs, duty cycle≤2%.

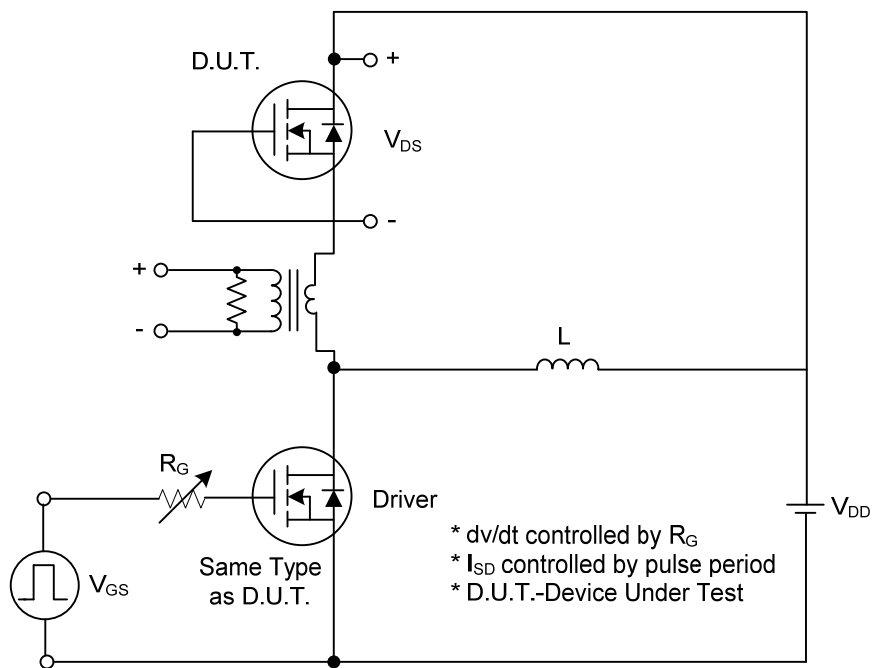
3. The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=30A.

4. The power dissipation is limited by 150°C junction temperature.

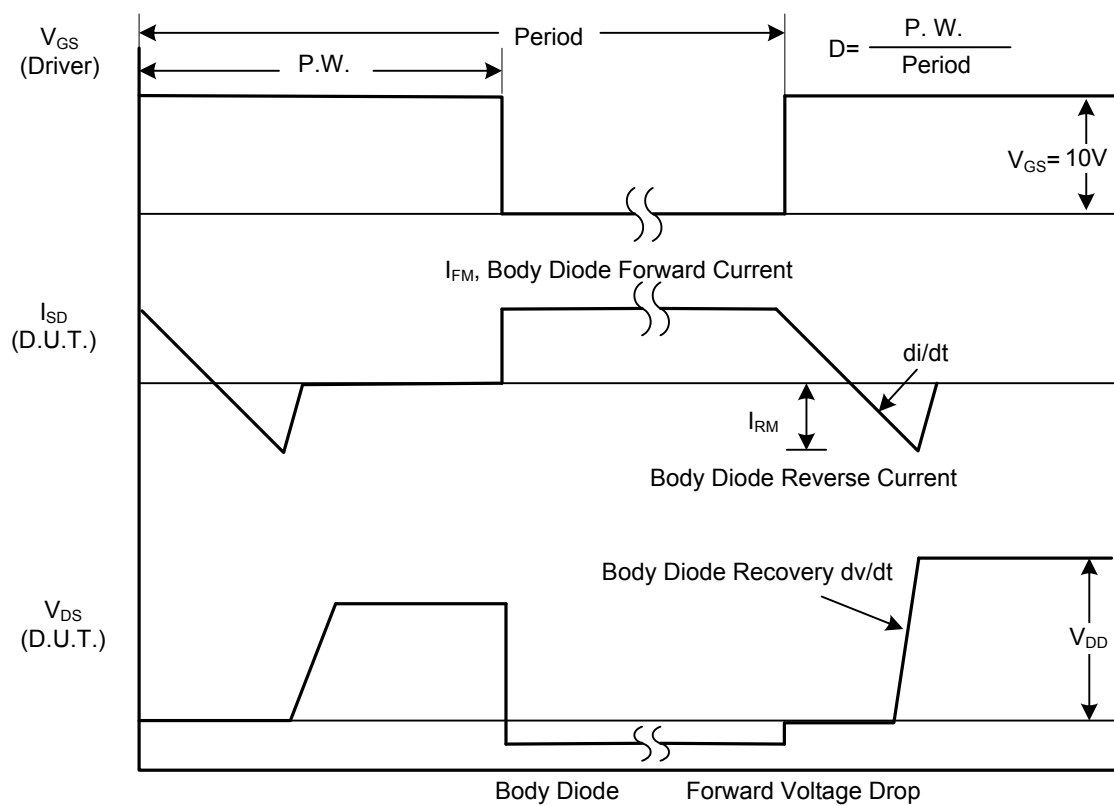
5. The Min. value is 100% EAS tested guarantee.

6. The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

## ■ TEST CIRCUITS AND WAVEFORMS

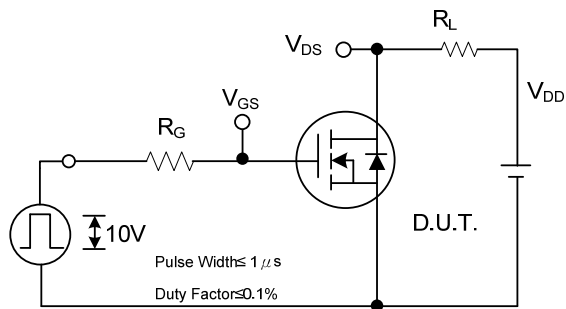


Peak Diode Recovery  $dv/dt$  Test Circuit

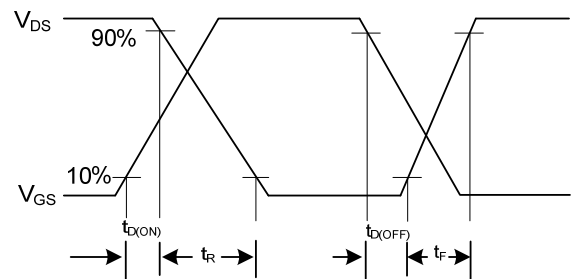


Peak Diode Recovery  $dv/dt$  Waveforms

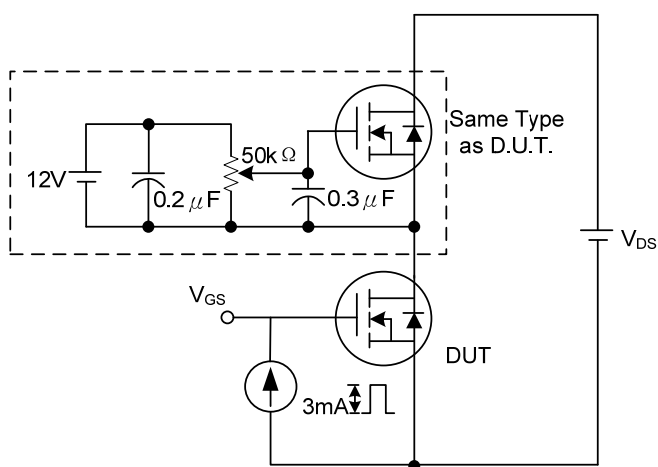
## ■ TEST CIRCUITS AND WAVEFORMS (Cont.)



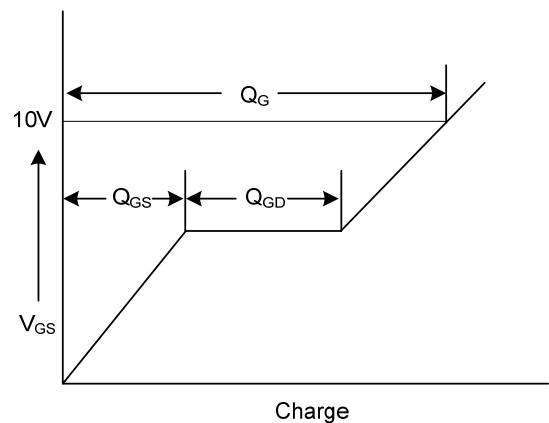
Switching Test Circuit



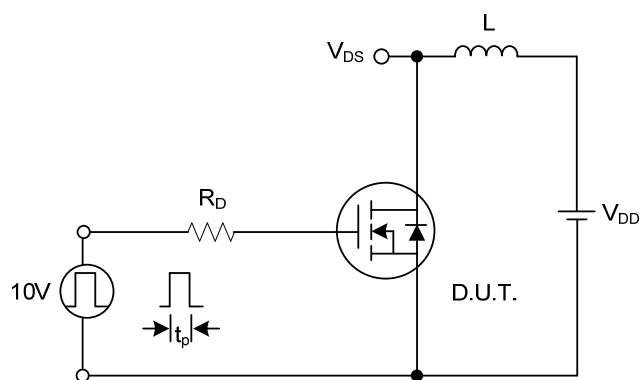
Switching Waveforms



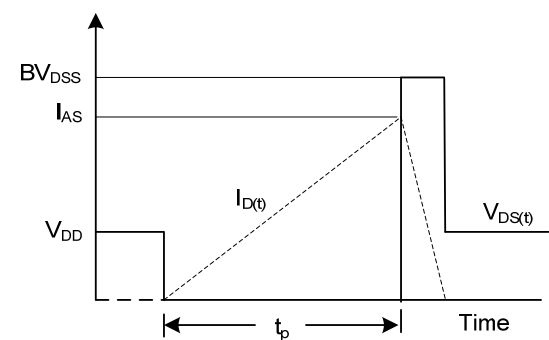
Gate Charge Test Circuit



Gate Charge Waveform

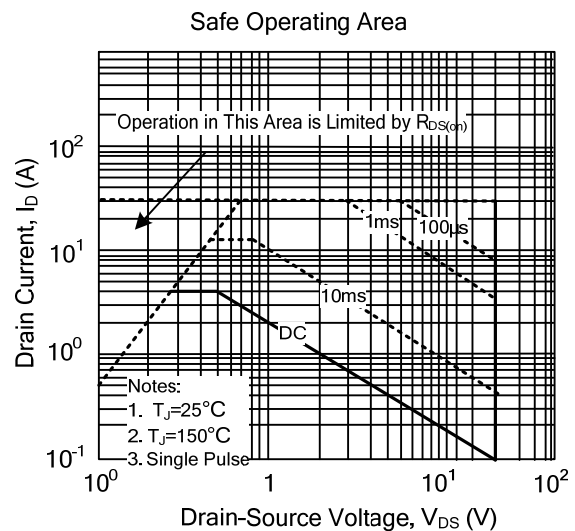
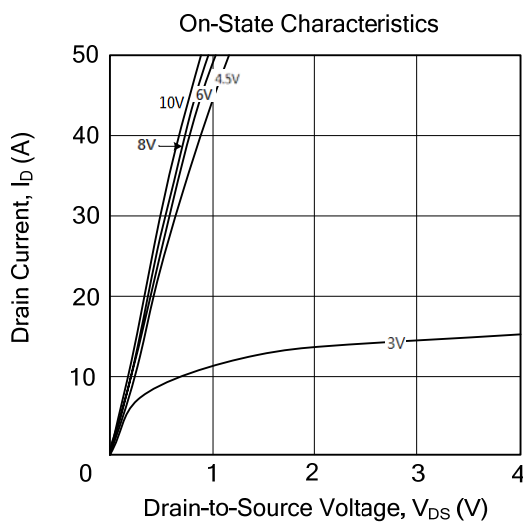
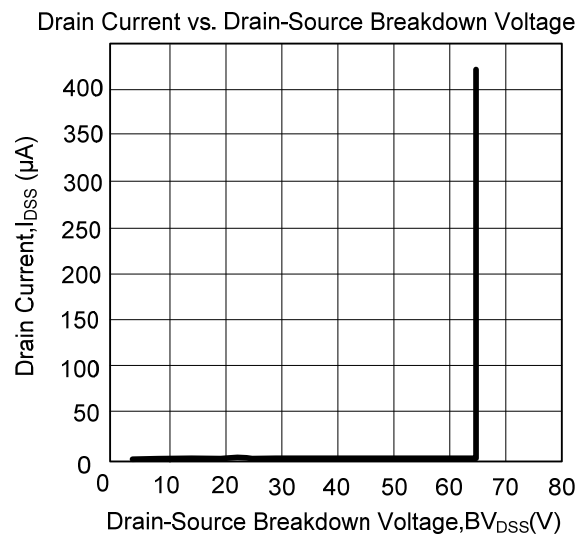
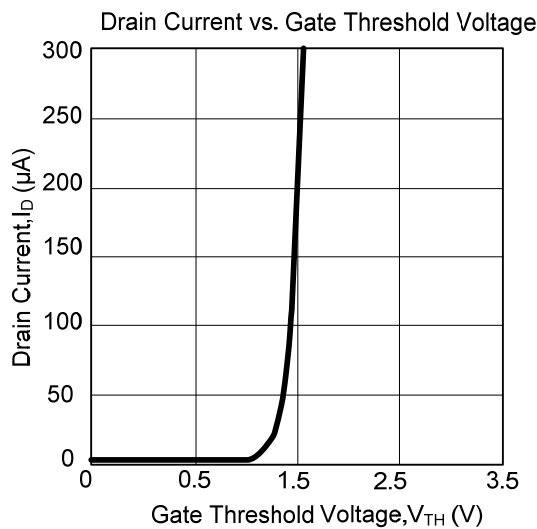
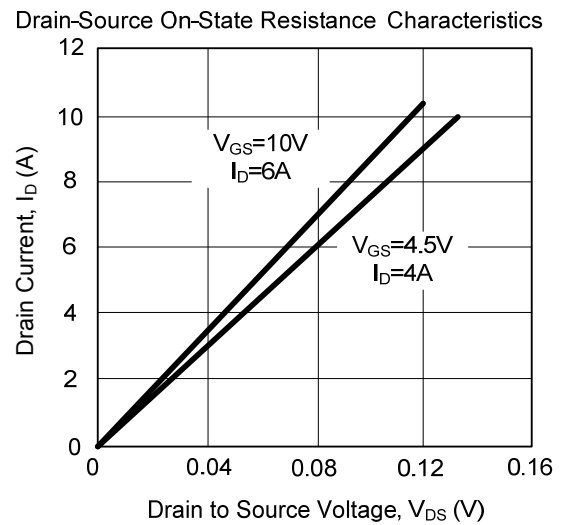
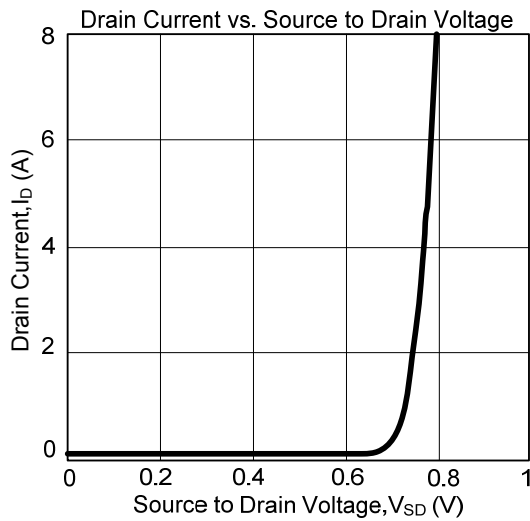


Unclamped Inductive Switching Test Circuit

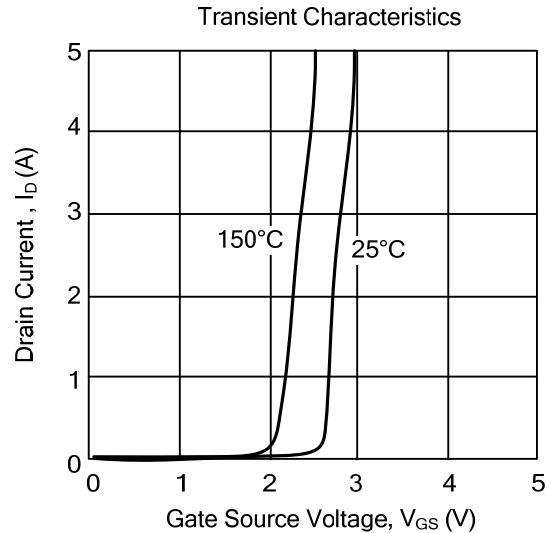
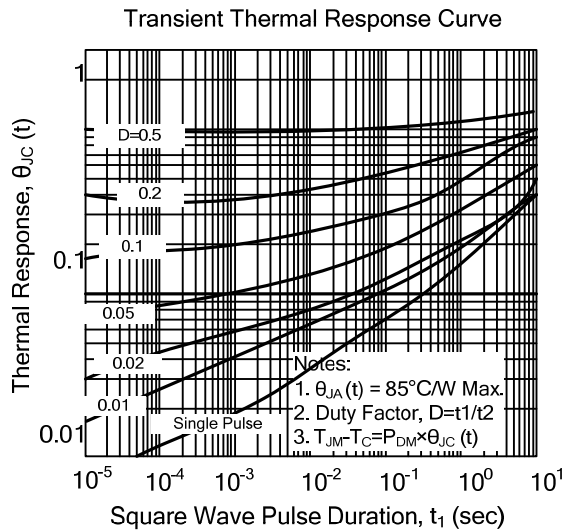


Unclamped Inductive Switching Waveforms

## TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS (Cont.)



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