



UT2312H

Power MOSFET

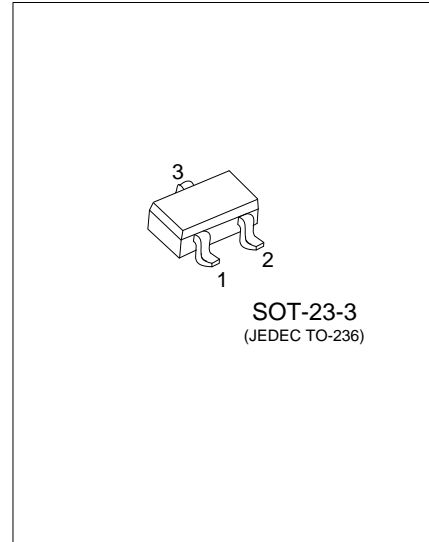
5A, 20V N-CHANNEL ENHANCEMENT MODE MOSFET

DESCRIPTION

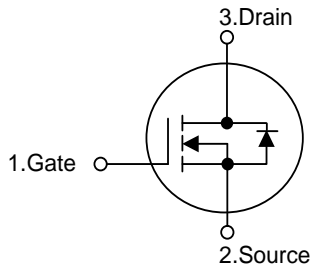
The **UT2312H** uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

FEATURES

- * $R_{DS(ON)} \leq 55 \text{ m}\Omega @ V_{GS} = 4.5\text{V}, I_D = 5.0 \text{ A}$
- * $R_{DS(ON)} \leq 85 \text{ m}\Omega @ V_{GS} = 2.5 \text{ V}, I_D = 4.0 \text{ A}$
- * Advanced trench process technology
- * Excellent thermal and electrical capabilities
- * High density cell design for ultra low on-resistance



SYMBOL



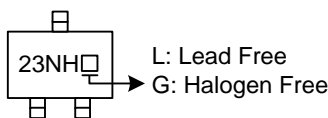
ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|-----------------|----------------|----------|----------------|---|---|-----------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| UT2312HL-AE2-R | UT2312HG-AE2-R | SOT-23-3 | G | S | D | Tape Reel |

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

| | | |
|--------------------|---|--|
| UT2312HG-AE2-R | (1) Packing Type (2) Package Type (3) Green Package | (1) R: Tape Reel (2) AE2: SOT-23-3 (3) G: Halogen Free and Lead Free, L: Lead Free |
|--------------------|---|--|

MARKING



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

| PARAMETER | SYMBOL | RATINGS | UNIT |
|----------------------|------------------|-----------------|------|
| Drain-Source Voltage | V _{DSS} | 20 | V |
| Gate-Source Voltage | V _{GSS} | ±8 | V |
| Drain Current | Continuous | I _D | 5 |
| | Pulsed (Note2) | I _{DM} | 15 |
| Power Dissipation | P _D | 0.5 | 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.

■ THERMAL DATA

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---------------------|-----------------|---------|------|
| Junction to Ambient | θ _{JA} | 250 | °C/W |

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

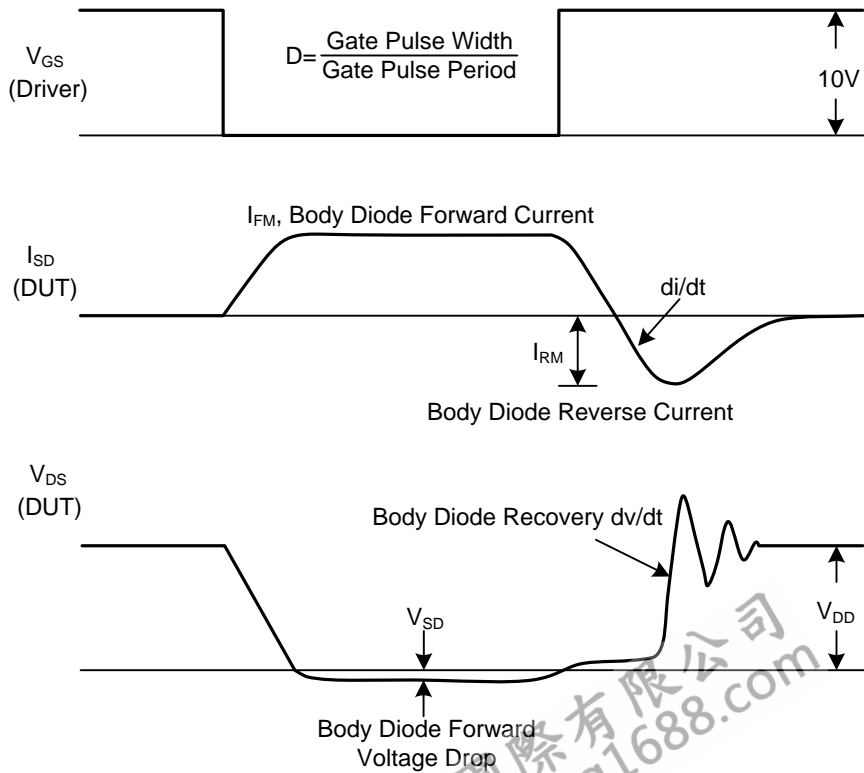
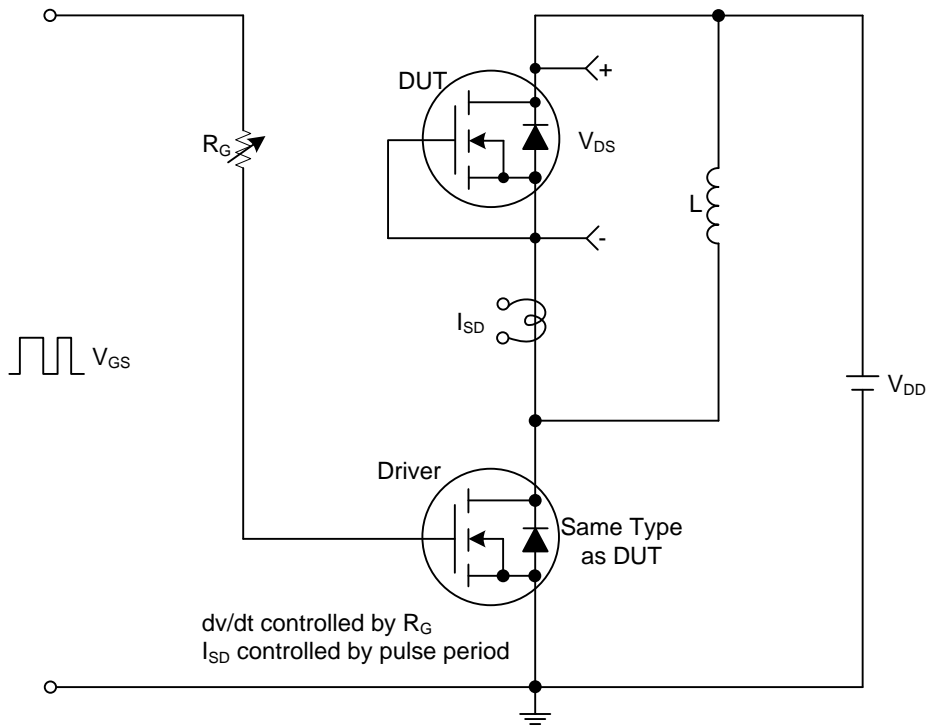
■ ELECTRICAL CHARACTERISTICS (T_A=25°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|---------------------|--|-----|------|------|------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} =0V, I _D =250μA | 20 | | | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =20V, V _{GS} =0V | | | 1 | μA |
| Gate-Body Leakage, Forward | I _{GSS} | V _{GS} =±8V, V _{DS} =0V | | | ±100 | nA |
| ON CHARACTERISTICS | | | | | | |
| Gate-Threshold Voltage | V _{GS(TH)} | V _{DS} =V _{GS} , I _D =250μA | 0.5 | | 1.2 | V |
| Static Drain-Source On-Resistance | R _{DS(ON)} | V _{GS} =4.5V, I _D =5.0A | | | 55 | mΩ |
| | | V _{GS} =2.5V, I _D =4.0A | | | 85 | mΩ |
| DYNAMIC PARAMETERS | | | | | | |
| Input Capacitance | C _{ISS} | V _{DS} =10V, V _{GS} =0V, f=1.0MHz | | 200 | | pF |
| Output Capacitance | C _{OSS} | | | 44 | | pF |
| Reverse Transfer Capacitance | C _{RSS} | | | 36 | | pF |
| SWITCHING PARAMETERS | | | | | | |
| Total Gate Charge | Q _G | V _{DS} =10V, V _{GS} =4.5V, I _D =5A I _G =1mA (Note 1, 2) | | 3.2 | | nC |
| Gate Source Charge | Q _{GS} | | | 0.5 | | nC |
| Gate Drain Charge | Q _{GD} | | | 0.3 | | nC |
| Turn-ON Delay Time | t _{D(ON)} | V _{DD} =10V, V _{GS} =10V, I _D =5A, R _G =3Ω (Note 1, 2) | | 2.4 | | ns |
| Turn-ON Rise Time | t _R | | | 13.8 | | ns |
| Turn-OFF Delay Time | t _{D(OFF)} | | | 14.2 | | ns |
| Turn-OFF Fall-Time | t _F | | | 7.9 | | ns |
| SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS | | | | | | |
| Maximum Continuous Drain-Source Diode Forward Current | I _S | | | | 5 | A |
| Maximum Pulsed Drain-Source Diode Forward Current | I _{SM} | | | | 15 | A |
| Drain-Source Diode Forward Voltage | V _{SD} | I _S =1A, V _{GS} =0V | | | 1.2 | V |

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

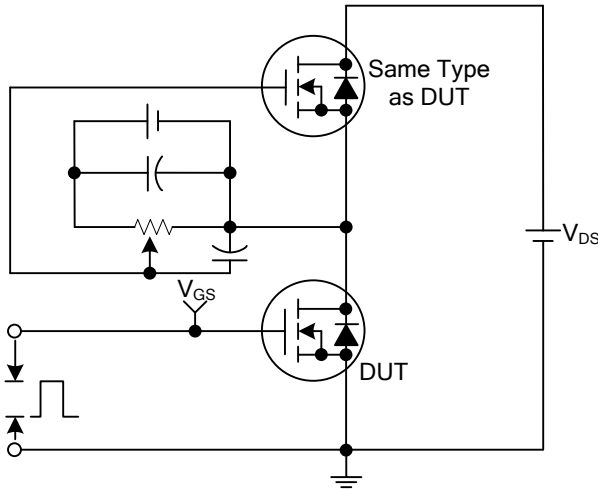
2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

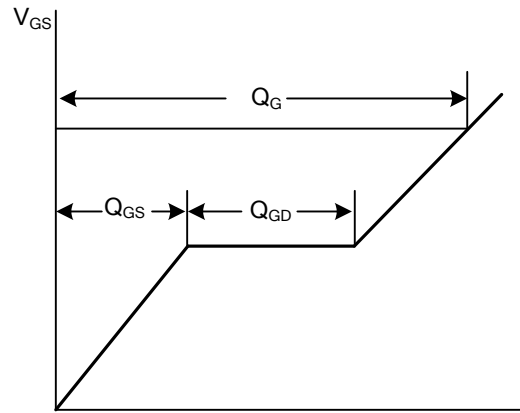


Peak Diode Recovery dv/dt Test Circuit and Waveforms

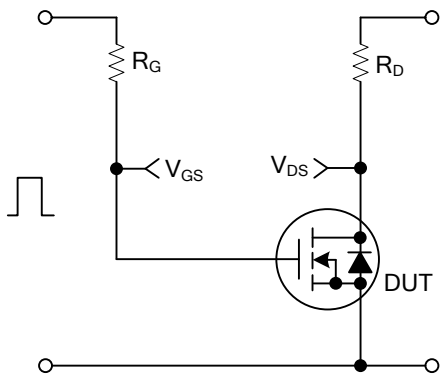
TEST CIRCUITS AND WAVEFORMS (Cont.)



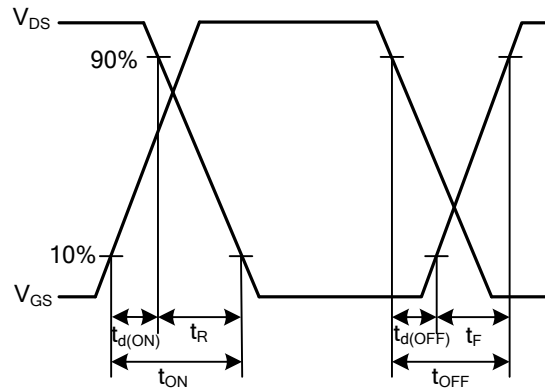
Gate Charge Test Circuit



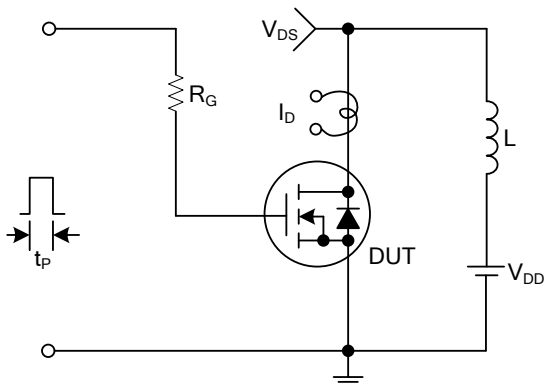
Gate Charge Waveforms



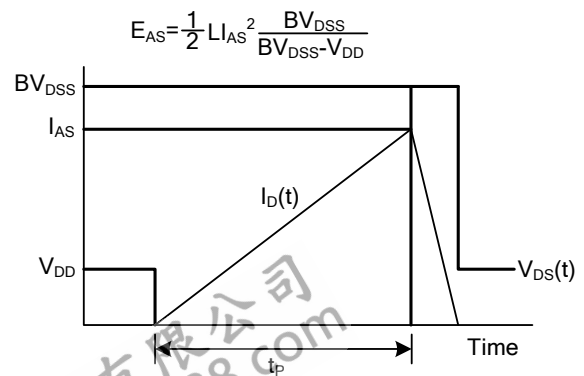
Resistive Switching Test Circuit



Resistive Switching Waveforms

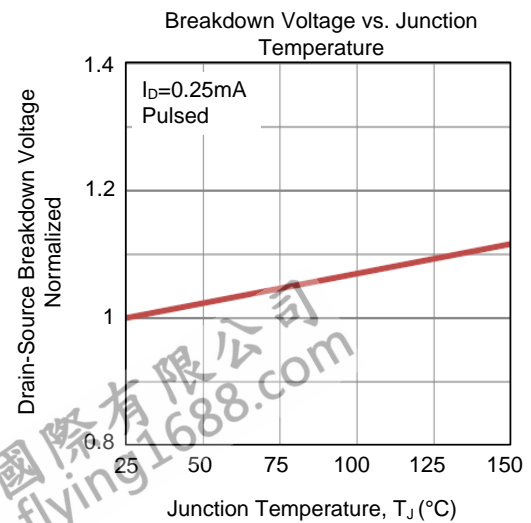
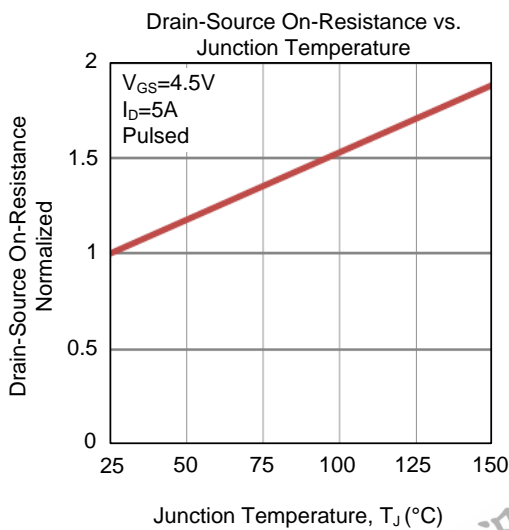
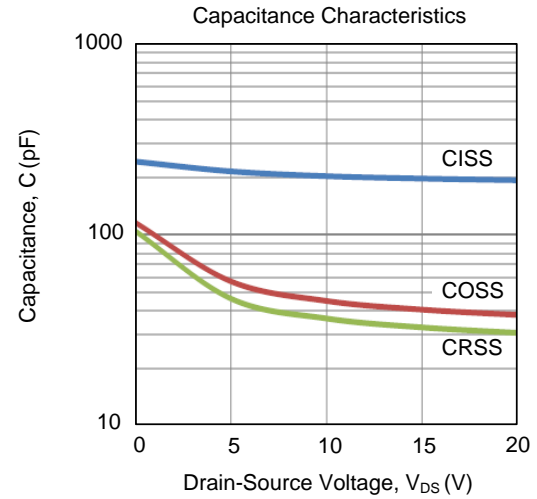
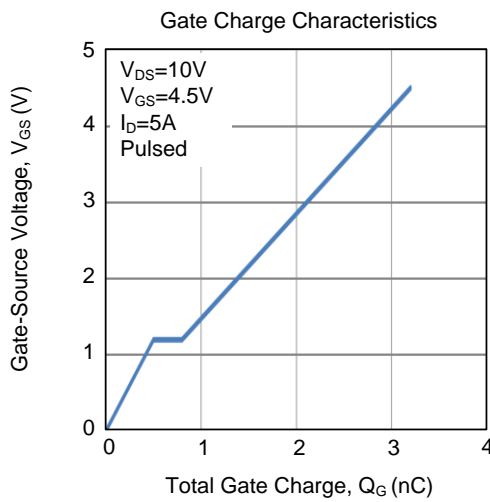
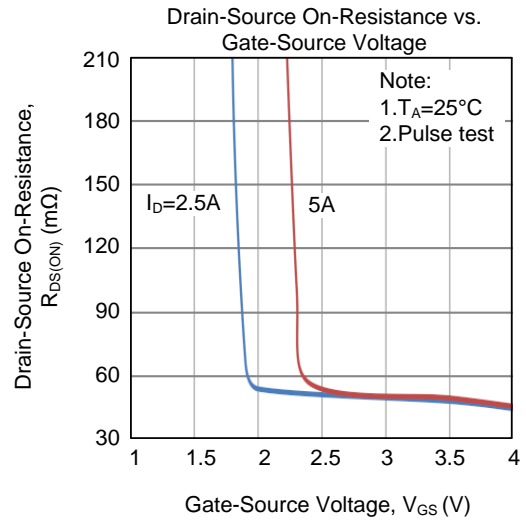
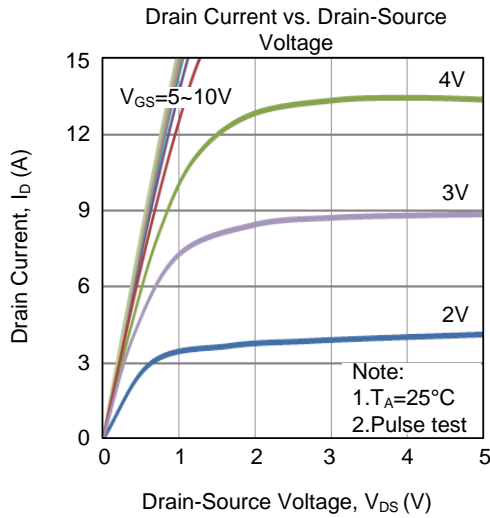


Unclamped Inductive Switching Test Circuit

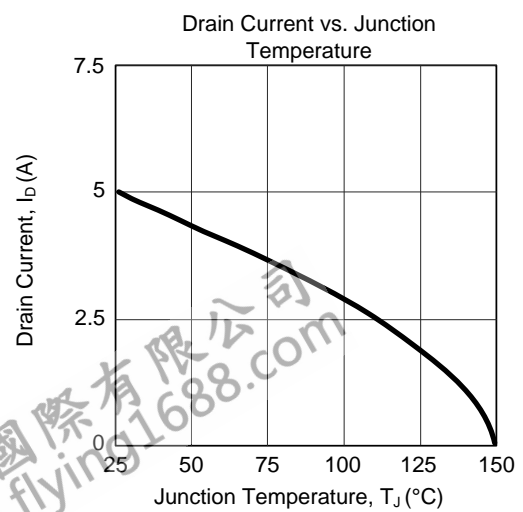
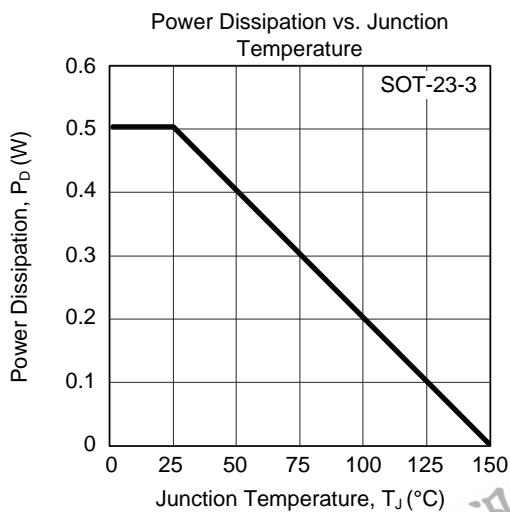
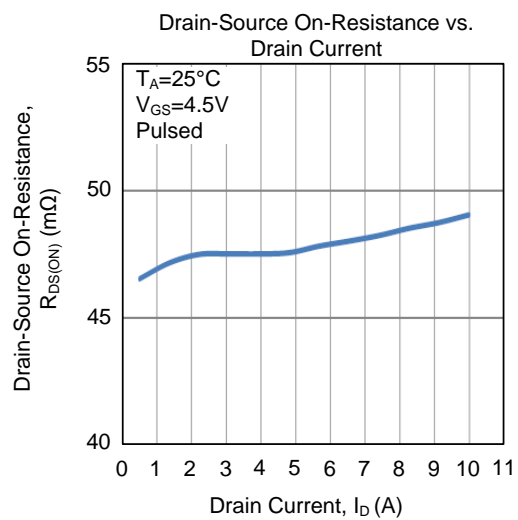
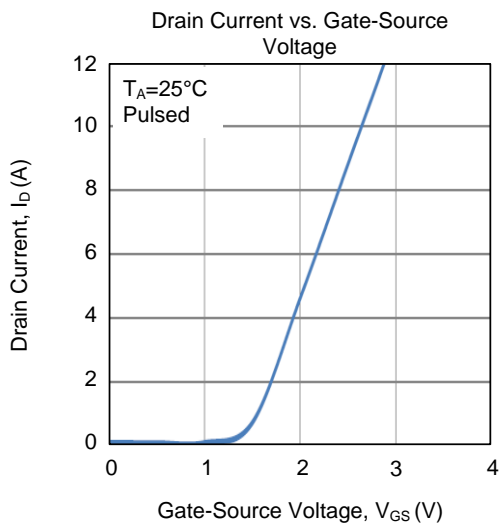
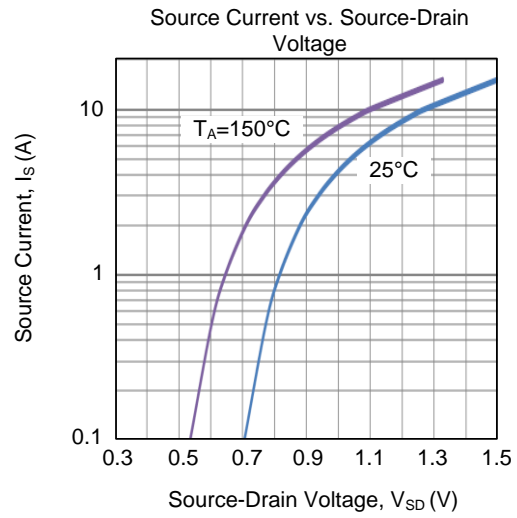
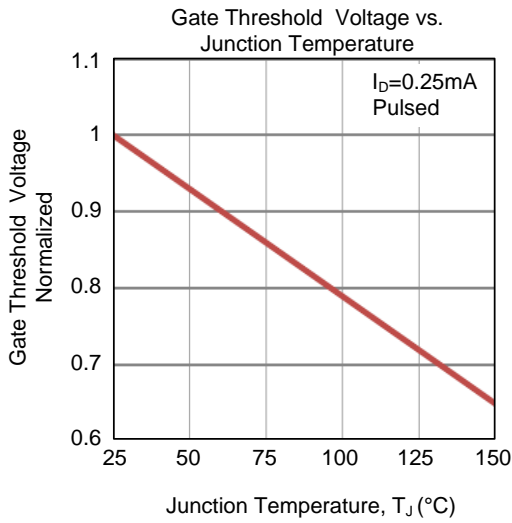


Unclamped Inductive Switching Waveforms

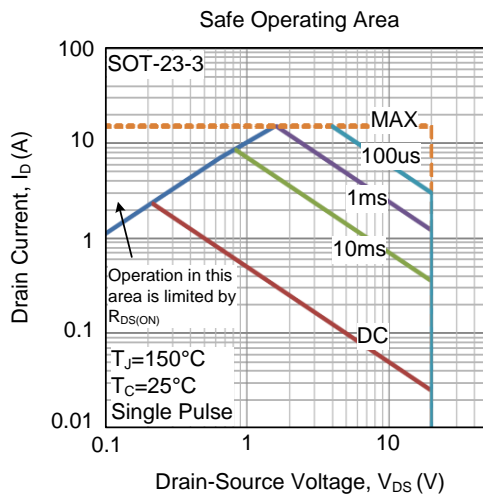
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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