



## UT3414

Power MOSFET

### N-CHANNEL ENHANCEMENT MODE

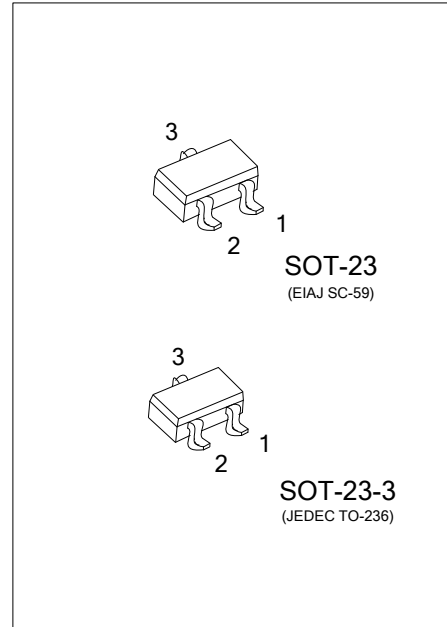
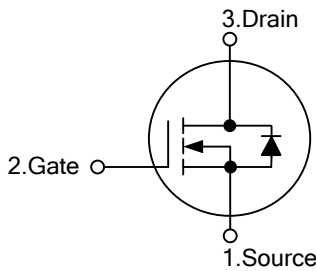
#### DESCRIPTION

The **UT3414** uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications.

#### FEATURES

- \*  $R_{DS(ON)} \leq 50m\Omega$  @  $V_{GS}=4.5V, I_D=4.2A$
- \*  $R_{DS(ON)} \leq 63m\Omega$  @  $V_{GS}=2.5V, I_D=3.7A$
- \*  $R_{DS(ON)} \leq 87m\Omega$  @  $V_{GS}=1.8V, I_D=3.2A$
- \* Low capacitance
- \* Low gate charge
- \* Fast switching capability
- \* Avalanche energy specified

#### SYMBOL



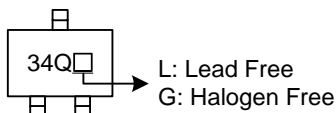
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UT3414L-AE2-R	UT3414G-AE2-R	SOT-23-3	S	G	D	Tape Reel
UT3414L-AE3-R	UT3414G-AE3-R	SOT-23	S	G	D	Tape Reel

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

<p>UT3414G-AE2-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) AE2: SOT-23-3, AE3: SOT-23 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



### ■ ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	V <sub>DSS</sub>	20	V
Gate-Source Voltage	V <sub>GSS</sub>	±8	V
Continuous Drain Current	I <sub>D</sub>	4.2	A
Pulsed Drain Current	I <sub>DM</sub>	15	A
Power Dissipation	P <sub>D</sub>	1.4	W
Junction Temperature	T <sub>J</sub>	+150	°C
Storage Temperature	T <sub>STG</sub>	-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

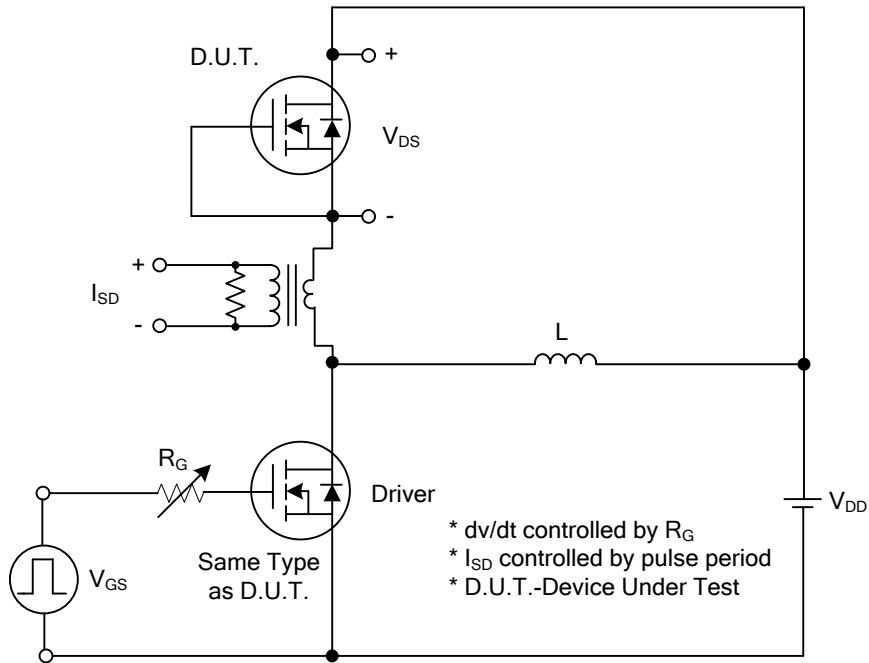
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Junction to Ambient	θ <sub>JA</sub>		100	125	°C/W

Note: Device mounted on FR-4 substrate P<sub>C</sub> board, 2oz copper, with 1inch square copper plate.

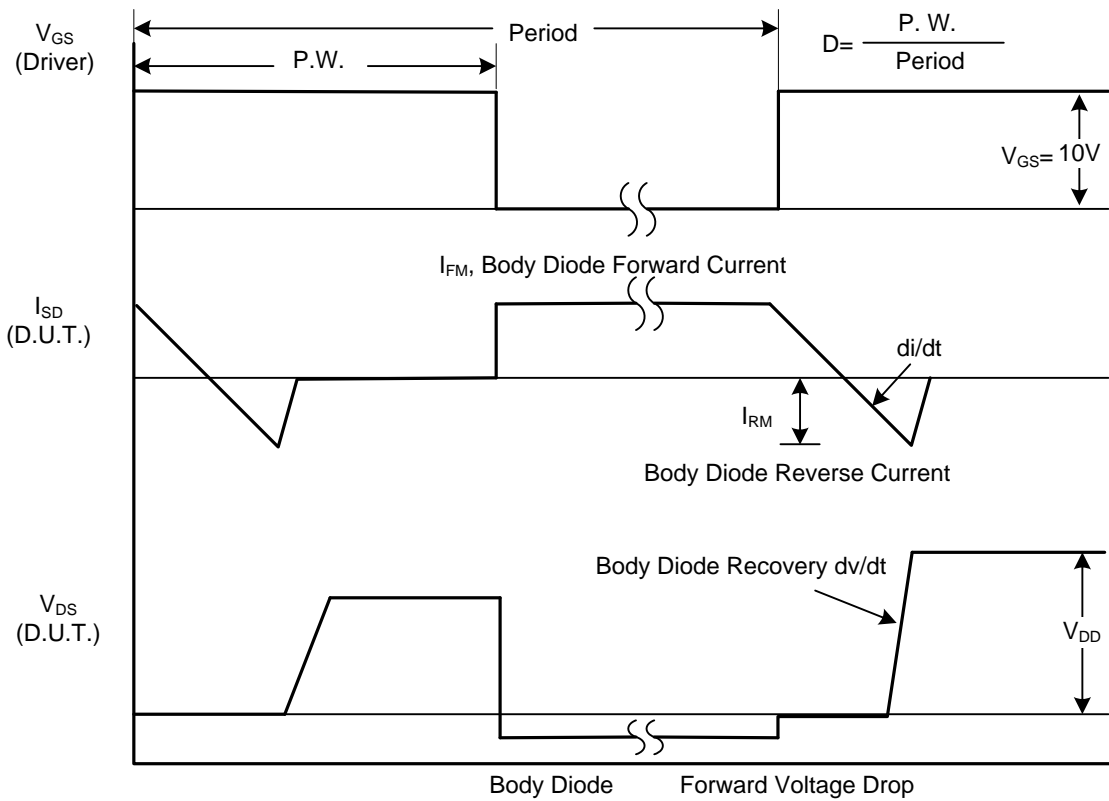
### ■ Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	20			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =16V, V <sub>GS</sub> =0V			1	μA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±8V			100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.4	0.6	1.0	V
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =4.2A			50	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =3.7A			63	
		V <sub>GS</sub> =1.8V, I <sub>D</sub> =3.2A			87	
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, f=1.0MHz		211		pF
Output Capacitance	C <sub>OSS</sub>			76		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			62		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =4.2A, V <sub>GS</sub> =4.5V		4.4		nC
Gate Source Charge	Q <sub>GS</sub>			0.8		nC
Gate Drain Charge	Q <sub>GD</sub>			0.7		nC
Turn ON Delay Time	t <sub>D(ON)</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =5V, R <sub>L</sub> =2.7Ω R <sub>G</sub> =6Ω		1.6		ns
Turn ON Rise Time	t <sub>r</sub>			14.8		ns
Turn OFF Delay Time	t <sub>D(OFF)</sub>			11		ns
Turn OFF Fall-Time	t <sub>f</sub>			19		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>				2	A
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =1.0A		0.76	1	V

■ TEST CIRCUITS AND WAVEFORMS

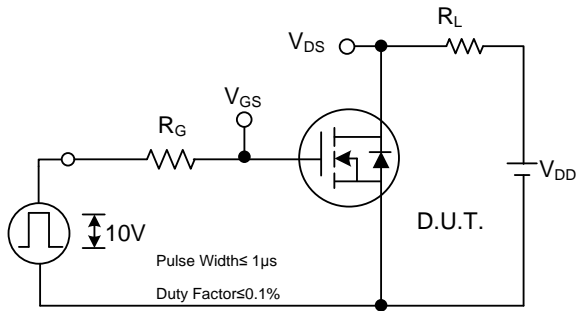


Peak Diode Recovery  $dv/dt$  Test Circuit

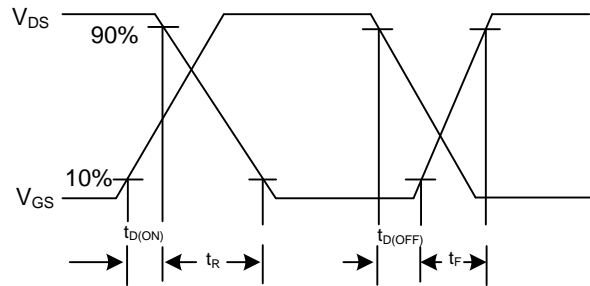


Peak Diode Recovery  $dv/dt$  Waveforms

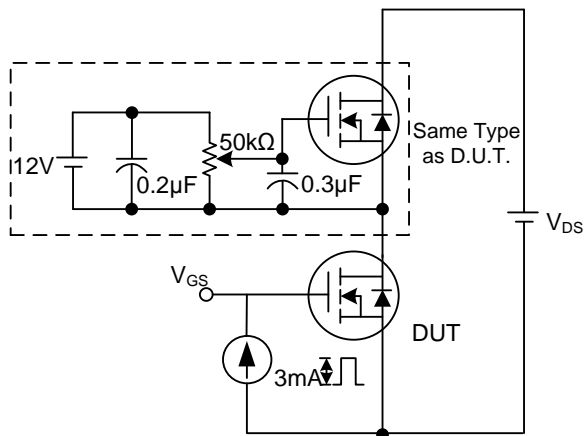
## TEST CIRCUITS AND WAVEFORMS



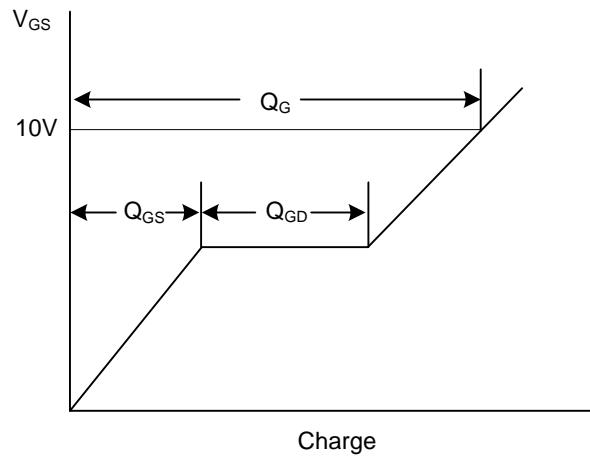
Switching Test Circuit



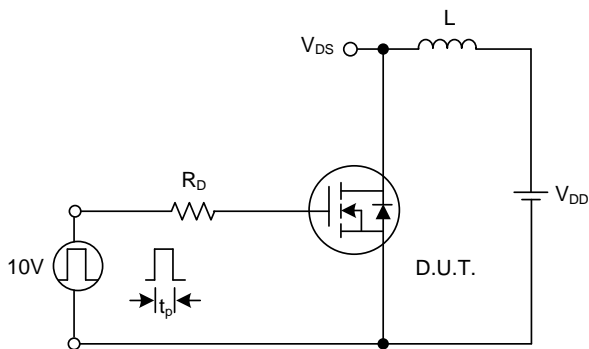
Switching Waveforms



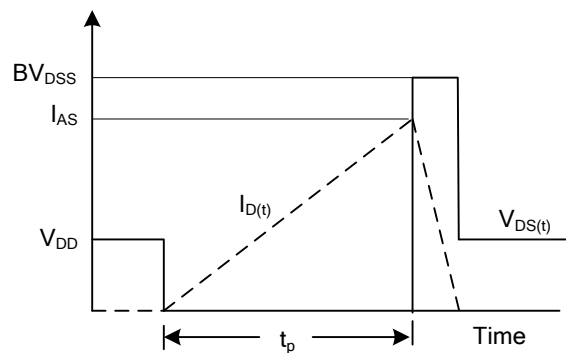
Gate Charge Test Circuit



Gate Charge Waveform

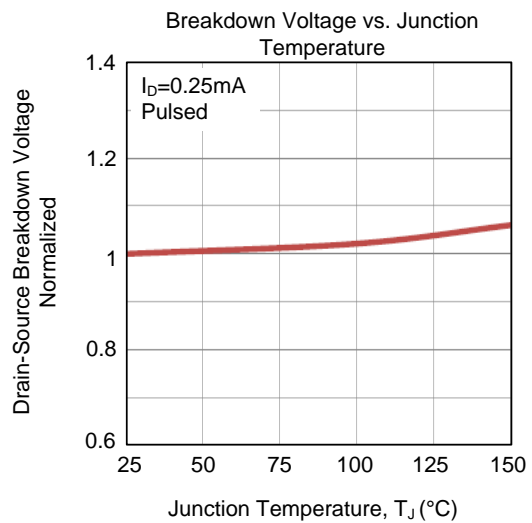
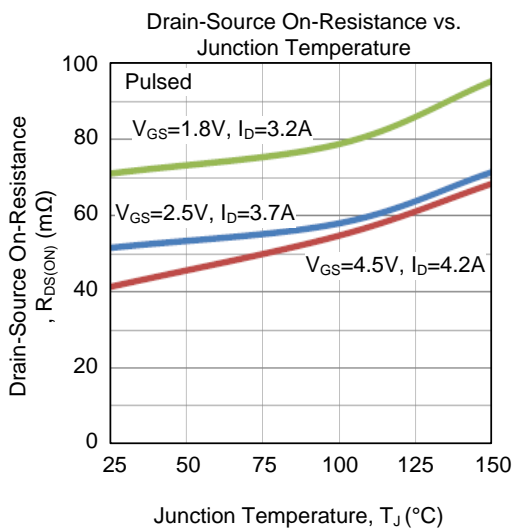
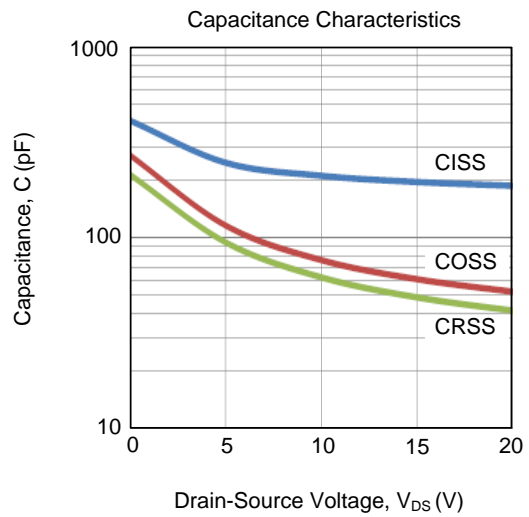
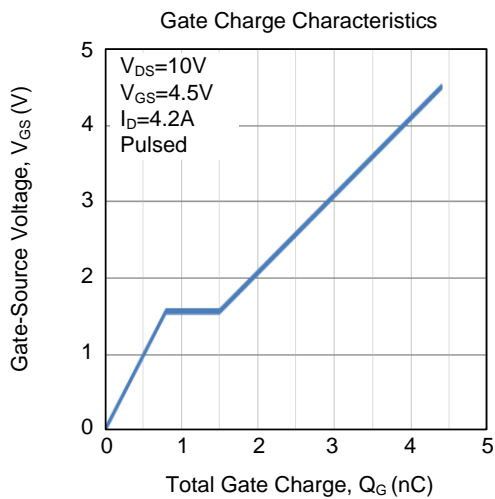
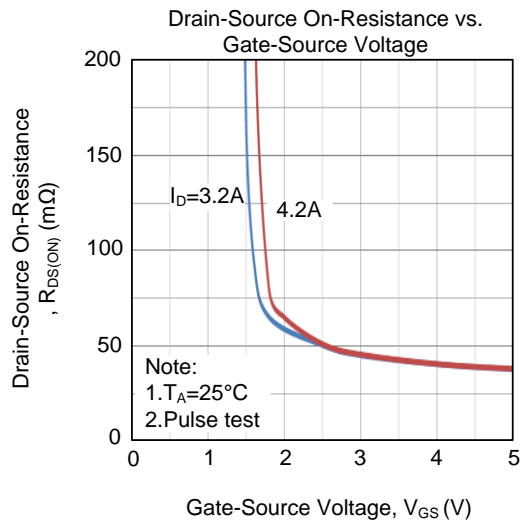
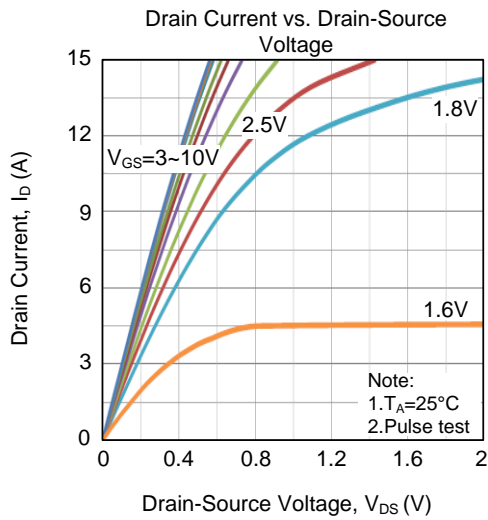


Unclamped Inductive Switching Test Circuit

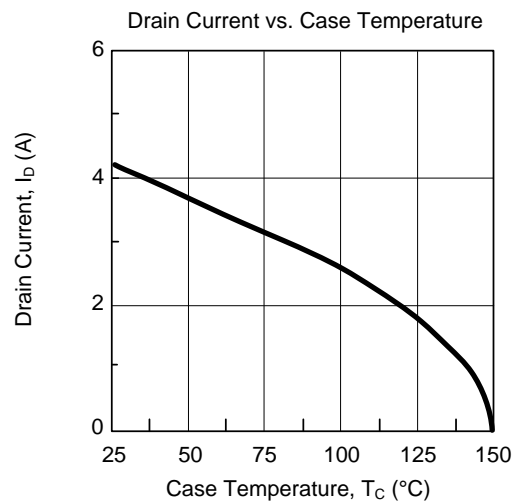
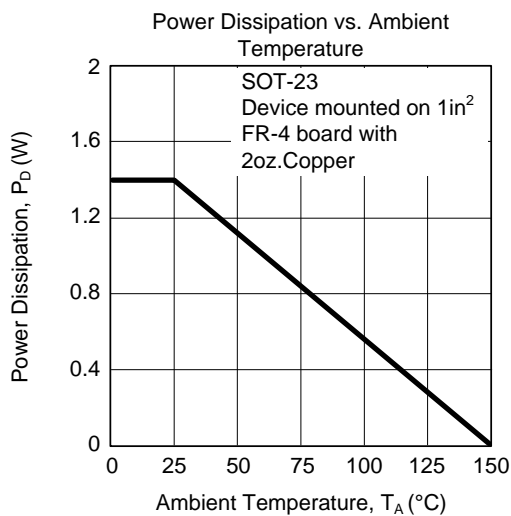
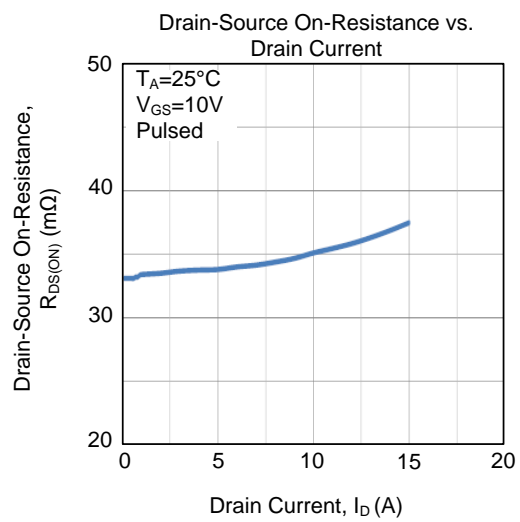
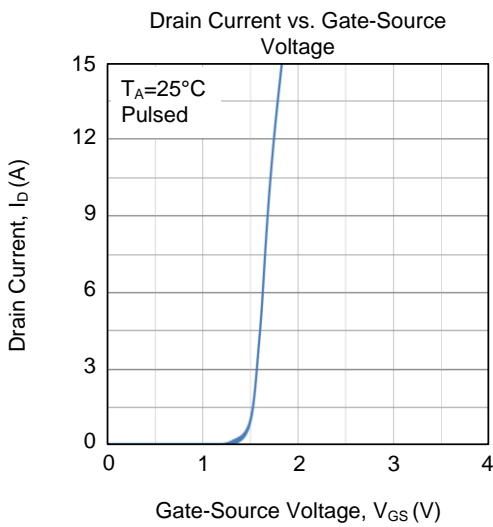
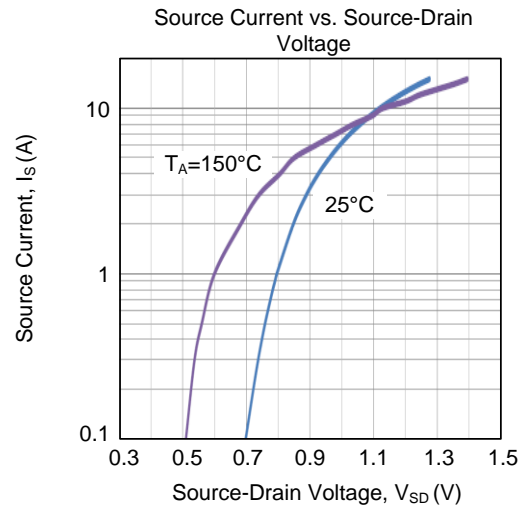
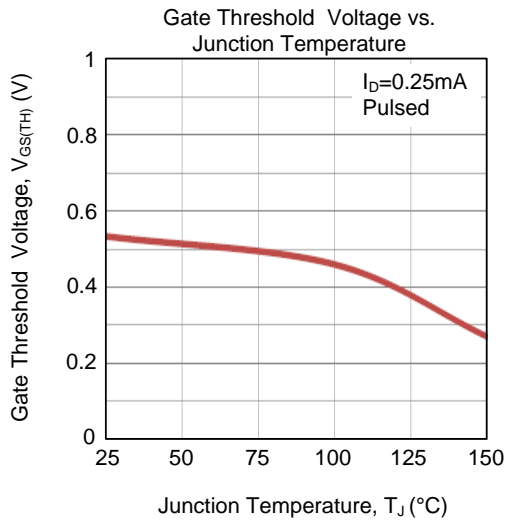


Unclamped Inductive Switching Waveforms

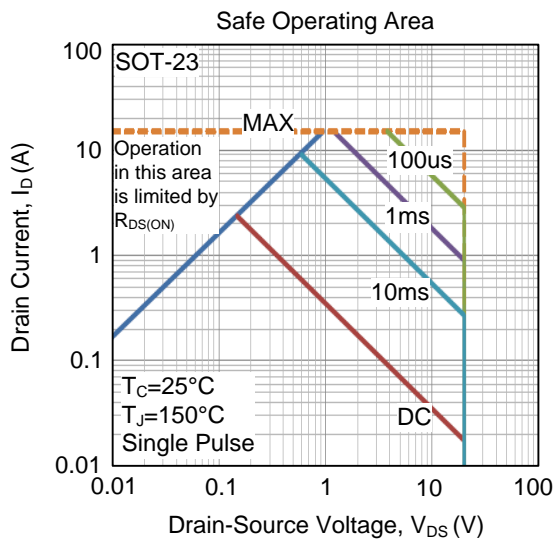
## ■ TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS (Cont.)



## ■ TYPICAL CHARACTERISTICS (Cont.)



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