



## UK4N20

Power MOSFET

### 4A, 200V N-CHANNEL POWER MOSFET

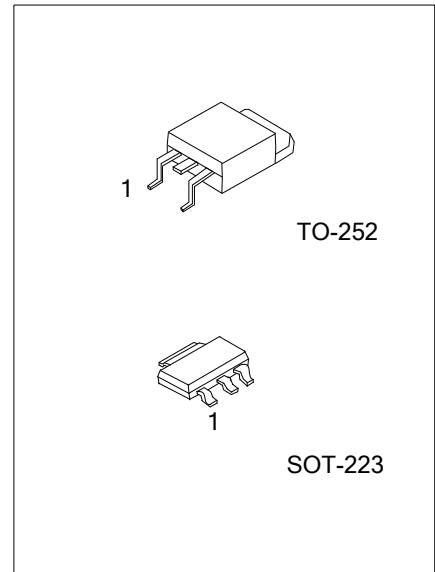
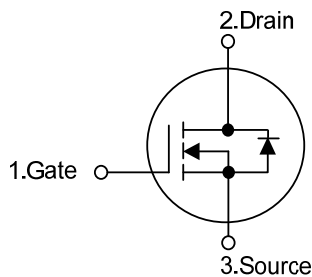
#### DESCRIPTION

The UTC **UK4N20** is a N-channel mode power MOSFET using UTC's advanced technology to provide customers with a minimum on-state resistance, low gate charge and superior switching performance.

#### FEATURES

- \*  $R_{DS(ON)} \leq 1.05\Omega @ V_{GS}=10V, I_D=1.8A$
- \* High switching speed
- \* Typically 3.2nC low gate charge
- \* 100% avalanche tested

#### SYMBOL



#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UK4N20L-AA3-R	UK4N20G-AA3-R	SOT-223	G	D	S	Tape Reel
UK4N20L-TN3-R	UK4N20G-TN3-R	TO-252	G	D	S	Tape Reel

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

	<p>(1) R: Tape Reel</p> <p>(2) AA3: SOT-223, TN3: TO-252</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING

SOT-223	TO-252

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	200	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Continuous Drain Current	Continuous	$I_D$	4	A
	Pulsed	$I_{DM}$	8	A
Avalanche Energy		$E_{AS}$	90	mJ
Power Dissipation	SOT-223	$P_D$	0.8	W
	TO-252		60	W
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.  $L=10\text{mH}$ ,  $I_{AS}=4.24\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\ \Omega$ , Starting  $T_J = 25^{\circ}\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	110	$^{\circ}\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	2.08	$^{\circ}\text{C}/\text{W}$

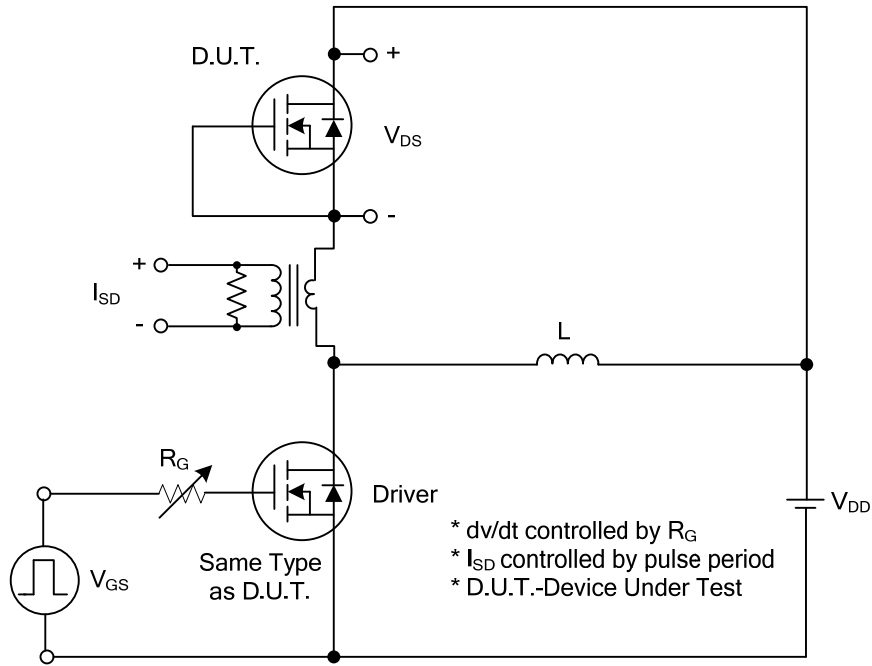
■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=250\ \mu\text{A}$ , $V_{GS}=0\text{V}$	200			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=200\text{V}$			10	$\mu\text{A}$
Gate-Source Leakage Current	$I_{GSS}$	Forward			100	nA
		Reverse	$V_{GS}=+20\text{V}$ , $V_{DS}=0\text{V}$			-100
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$I_D=250\ \mu\text{A}$	1.0		3.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$ , $I_D=1.8\text{A}$			1.05	$\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0\text{V}$ , $V_{DS}=25\text{V}$ , $f=1\text{MHz}$		206		pF
Output Capacitance	$C_{OSS}$			40		pF
Reverse Transfer Capacitance	$C_{RSS}$			6.6		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge (Note 1)	$Q_G$	$V_{DS}=100\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=2\text{A}$ , $I_G=1\text{mA}$		7.6		nC
Gate to Source Charge	$Q_{GS}$			2.4		nC
Gate to Drain Charge	$Q_{GD}$			0.6		nC
Turn-ON Delay Time (Note 1)	$t_{D(ON)}$	$V_{DD}=100\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=4\text{A}$ , $R_G=25\ \Omega$		2		ns
Rise Time	$t_R$			17		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			27		ns
Fall-Time	$t_F$			21		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				4	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				8	A
Drain-Source Diode Forward Voltage (Note 1)	$V_{SD}$	$I_S=4.0\text{A}$			1.4	V
Body Diode Reverse Recovery Time (Note 1)	$t_{rr}$	$I_S=4.0\text{A}$ , $V_{GS}=0\text{V}$ ,		128		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$	$di/dt = 100\text{A}/\mu\text{s}$		423		nC

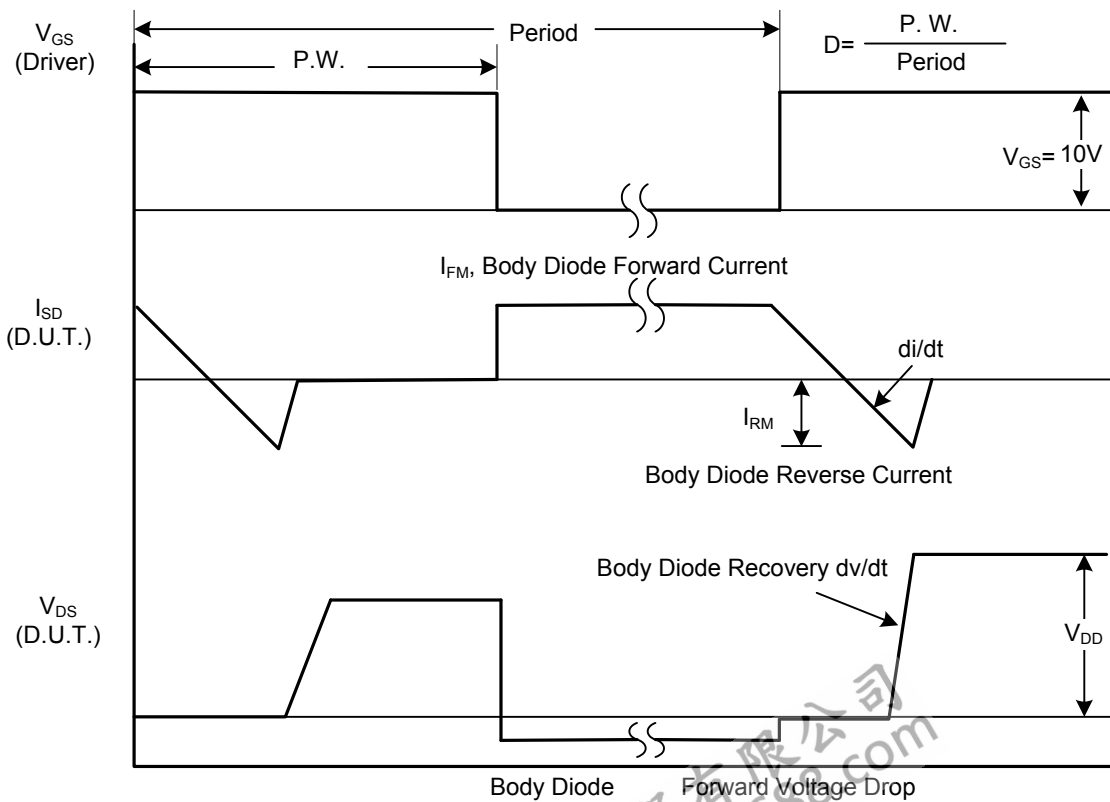
Notes: 1. Pulse Test: Pulse width  $\leq 300\ \mu\text{s}$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating temperature.

## TEST CIRCUITS AND WAVEFORMS

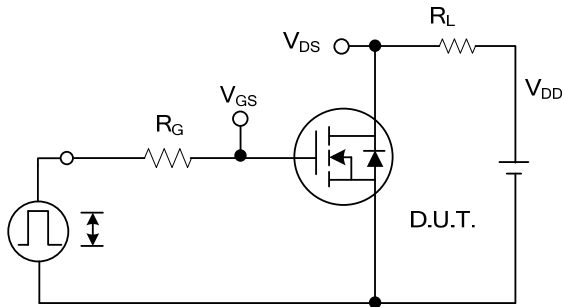


**Peak Diode Recovery  $dv/dt$  Test Circuit**

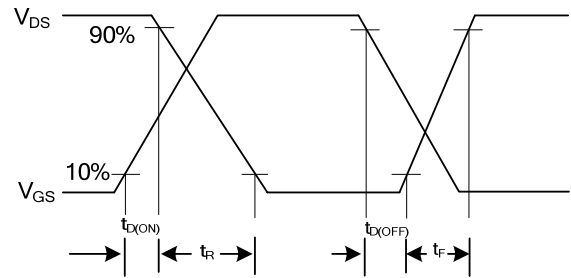


**Peak Diode Recovery  $dv/dt$  Waveforms**

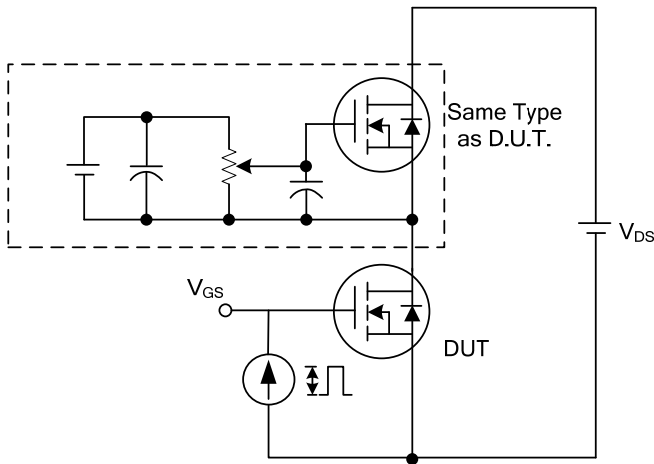
## TEST CIRCUITS AND WAVEFORMS (Cont.)



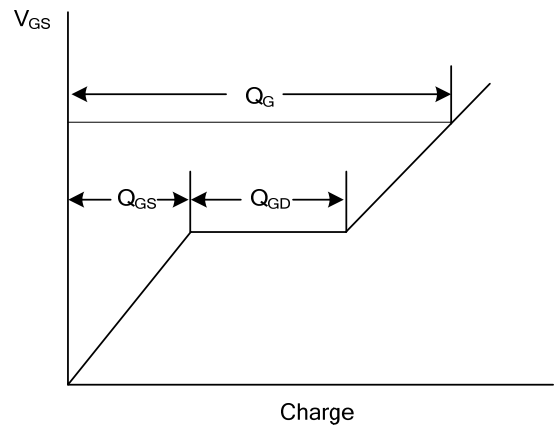
**Switching Test Circuit**



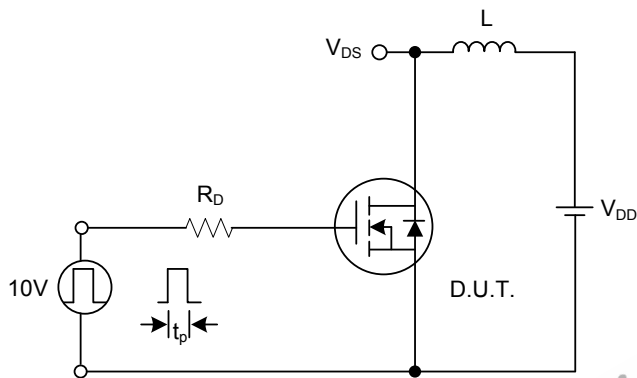
**Switching Waveforms**



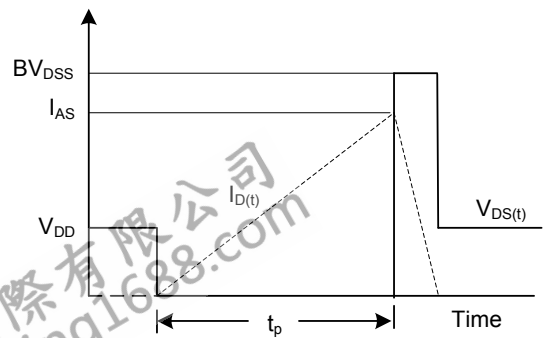
**Gate Charge Test Circuit**



**Gate Charge Waveform**

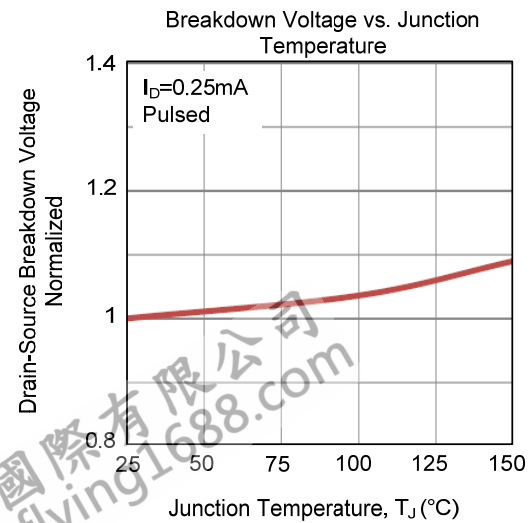
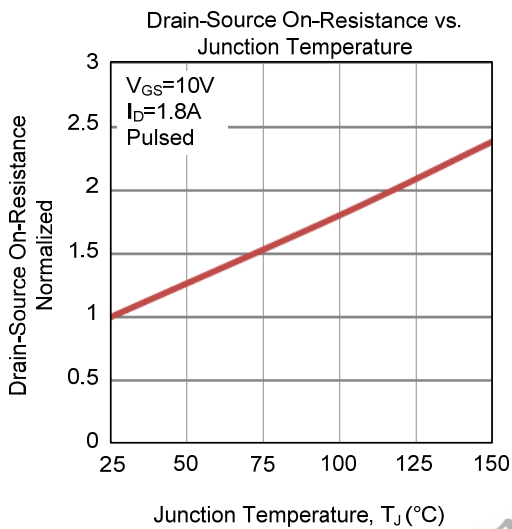
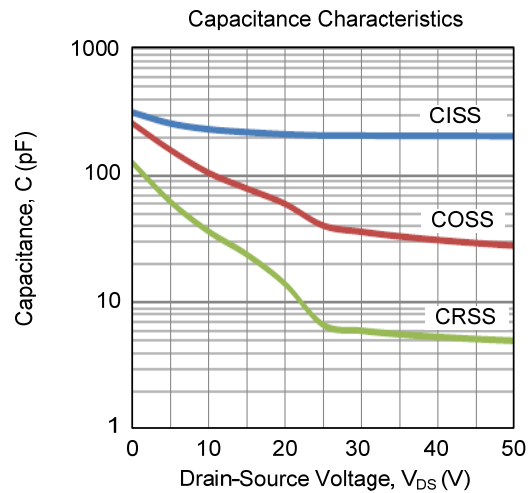
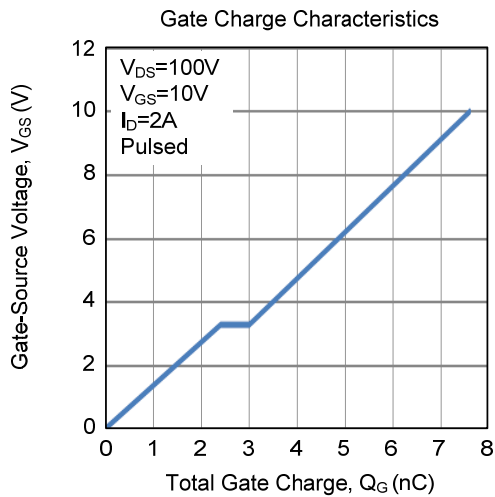
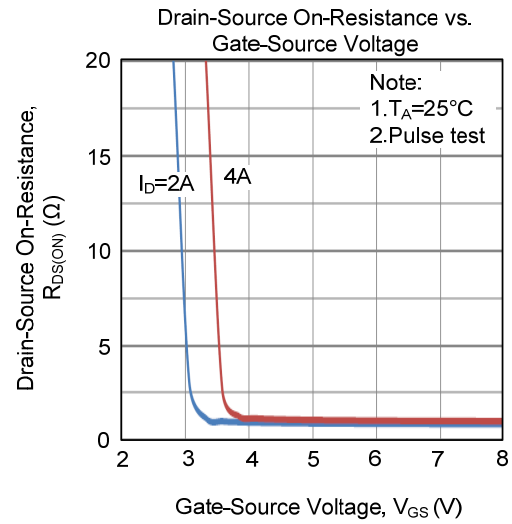
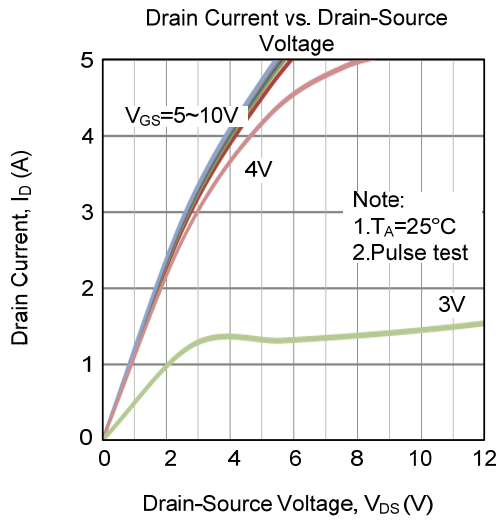


**Unclamped Inductive Switching Test Circuit**

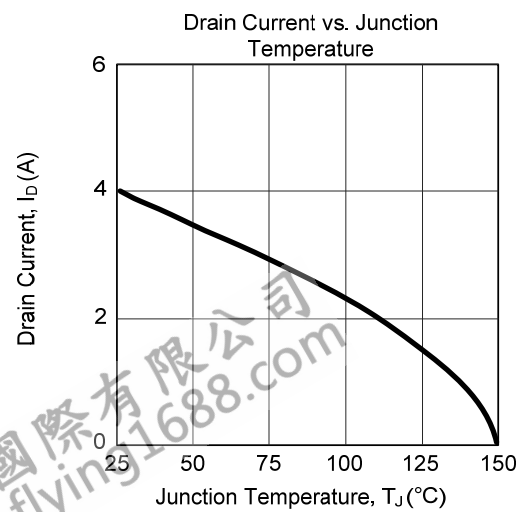
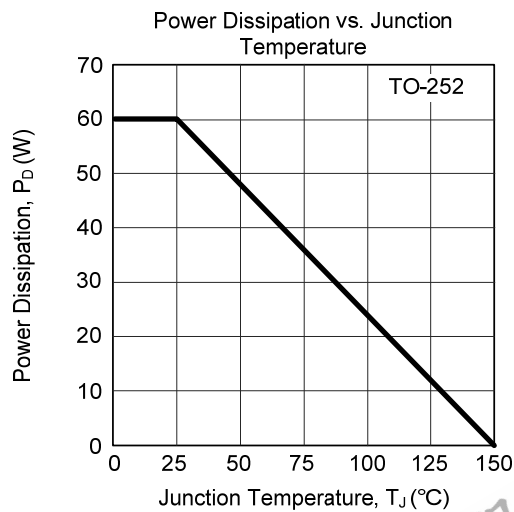
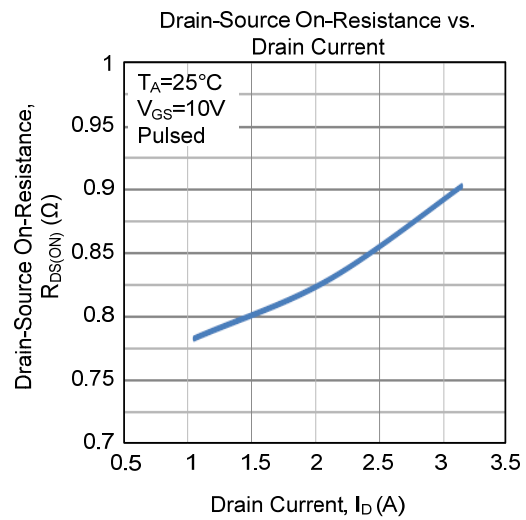
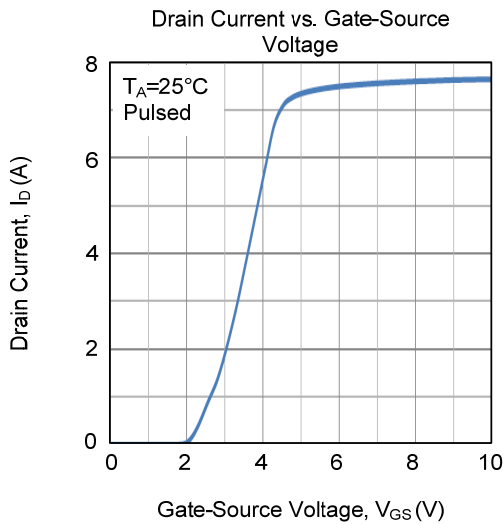
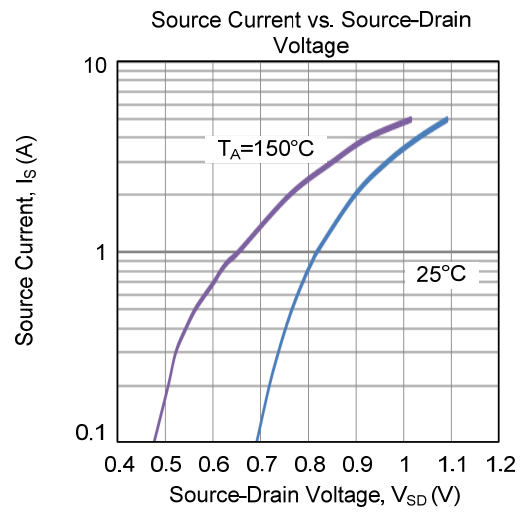
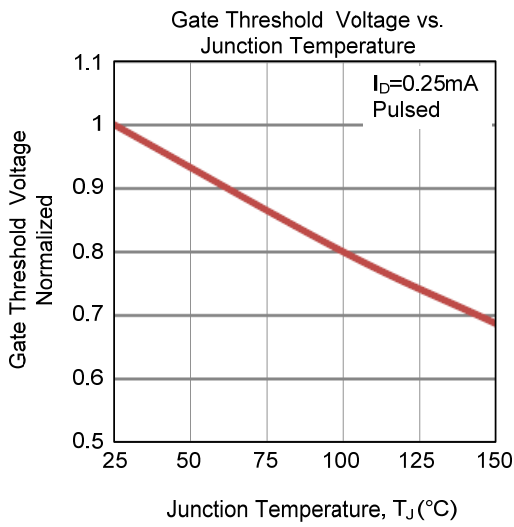


**Unclamped Inductive Switching Waveforms**

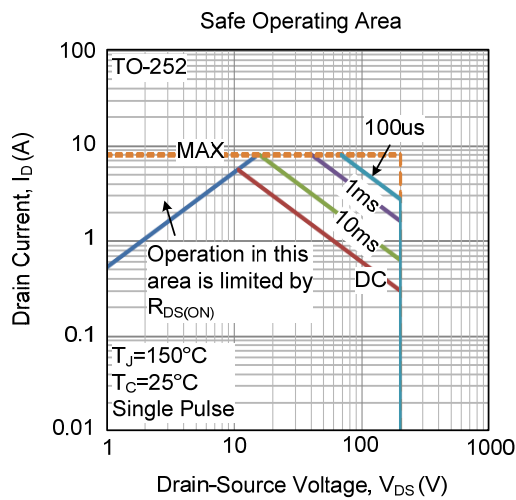
## TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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