



# UK4N20

*Power MOSFET*

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

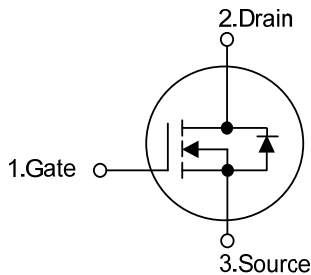
■ DESCRIPTION

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

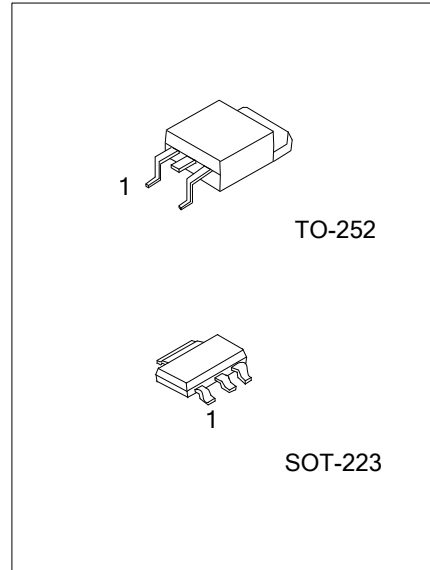
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UK4N20L-AA3-R	UK4N20G-AA3-R	SOT-223	G	D	S	Tape Reel
UK4N20L-TN3-R	UK4N20G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>UK4N20G-AA3-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) AA3: SOT-223, TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ MARKING

SOT-223	TO-252
<p>UK4N20 □ □□□□ → Date Code</p> <p>L: Lead Free G: Halogen Free</p>	<p>UTC UK4N20 □ □□□□ → Date Code</p> <p>Lot Code ←</p> <p>L: Lead Free G: Halogen Free</p>



■ 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		Single Pulsed (Note 3)	$E_{AS}$	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	$^{\circ}\text{C}/\text{W}$

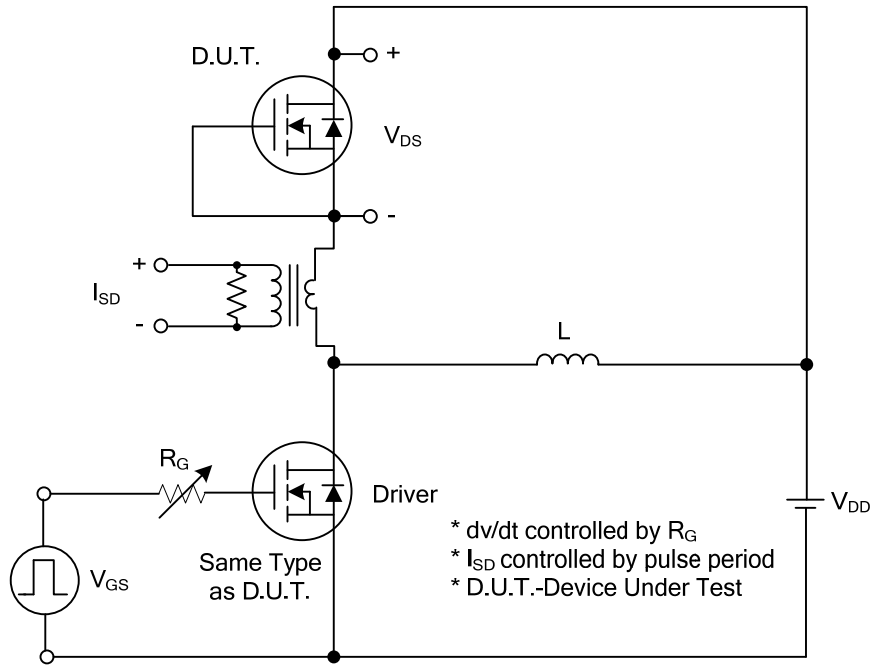
■ ELECTRICAL CHARACTERISTICS

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	Forward	$I_{GSS}$	$V_{GS}=+20\text{V}$ , $V_{DS}=0\text{V}$		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)	$t_{rr}$	$I_S=4.0\text{A}$ , $V_{GS}=0\text{V}$ , $di_F/dt = 100\text{A}/\mu\text{s}$		128		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			423		nC

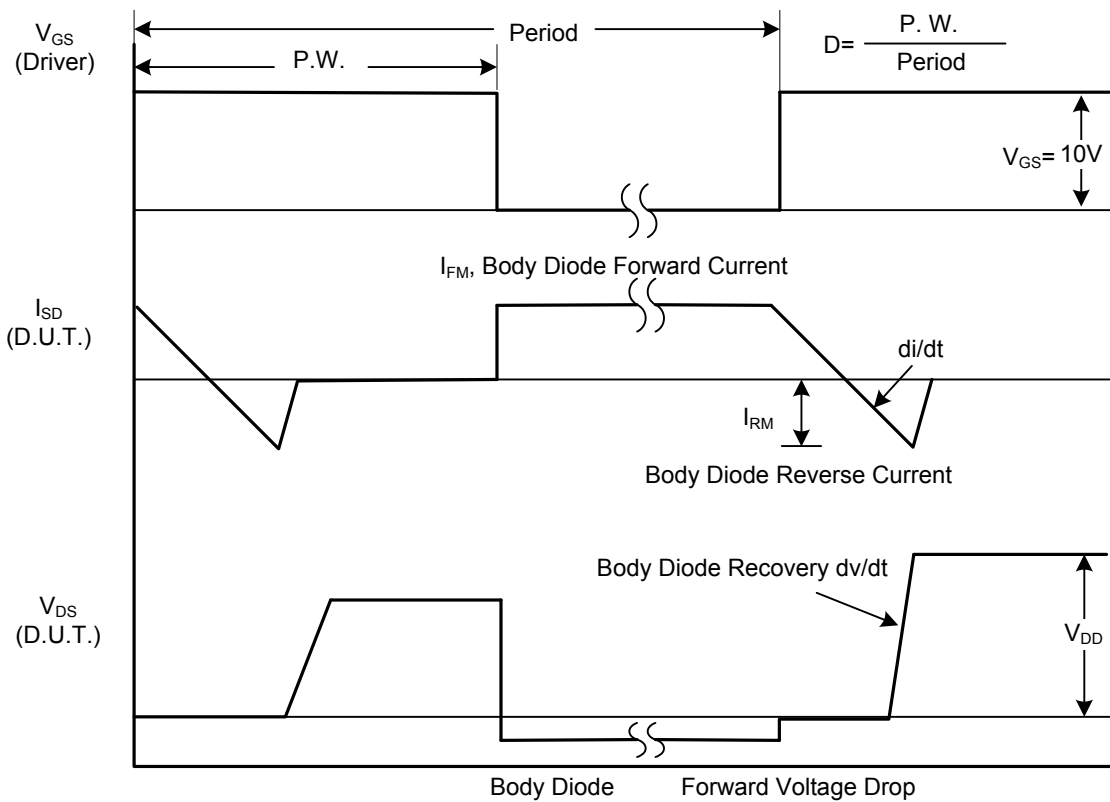
Notes: 1. Pulse Test: Pulse width  $\leq 300\ \mu\text{s}$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

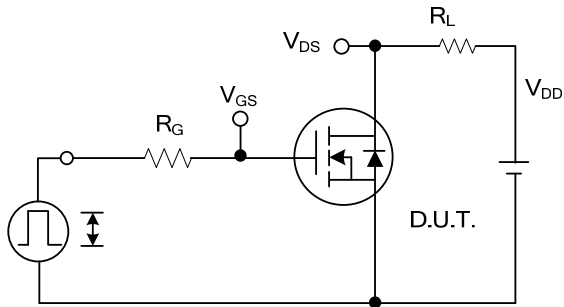


Peak Diode Recovery dv/dt Test Circuit

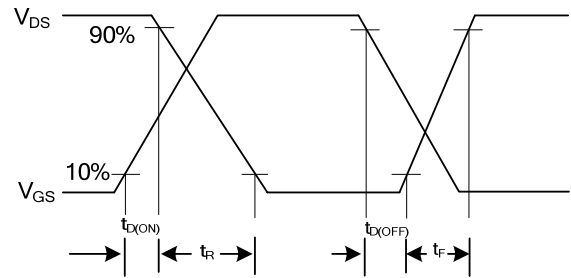


Peak Diode Recovery dv/dt Waveforms

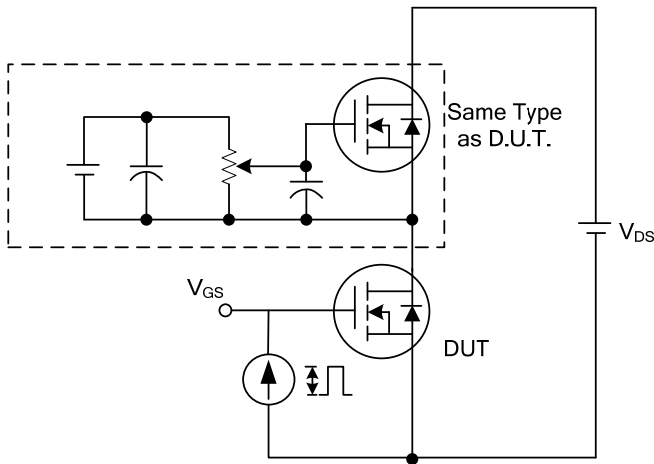
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



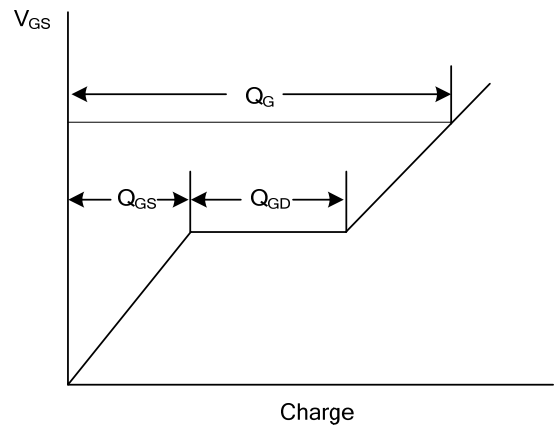
Switching Test Circuit



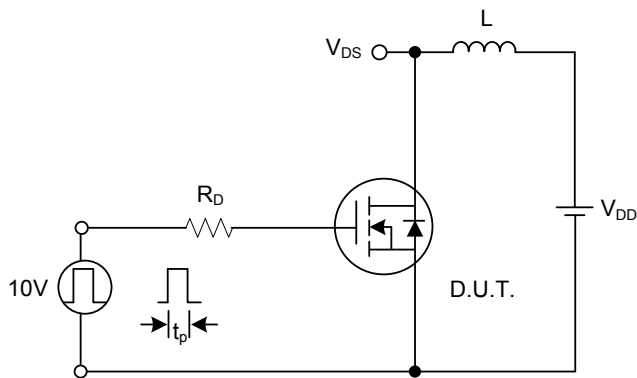
Switching Waveforms



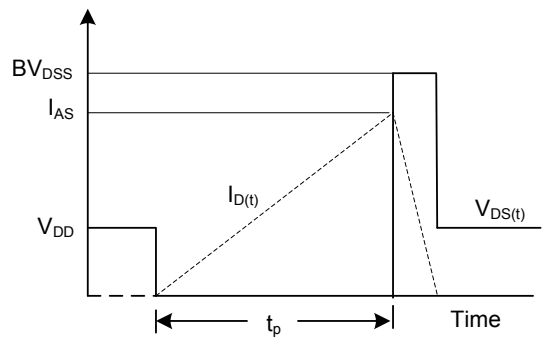
Gate Charge Test Circuit



Gate Charge Waveform

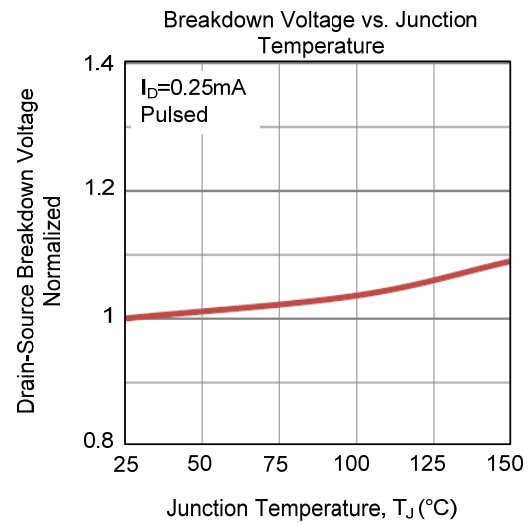
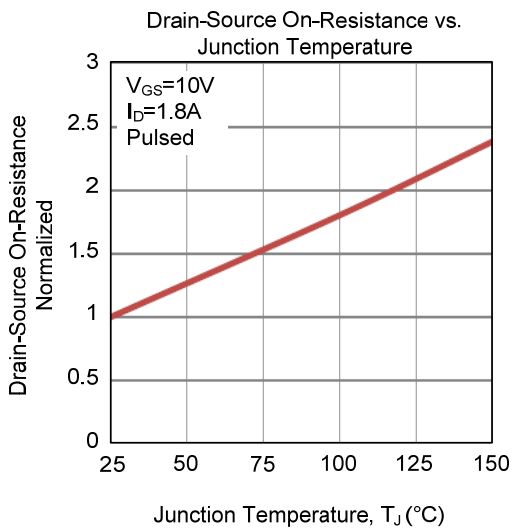
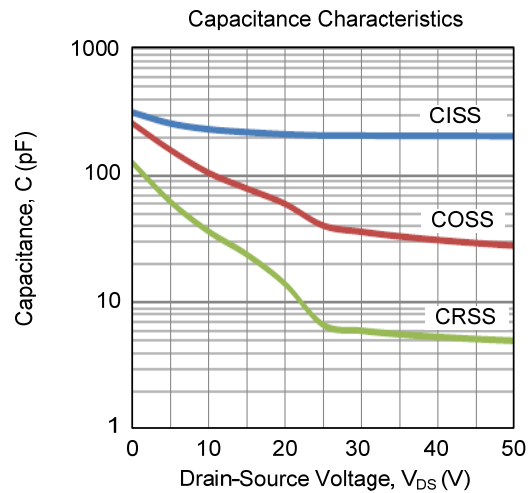
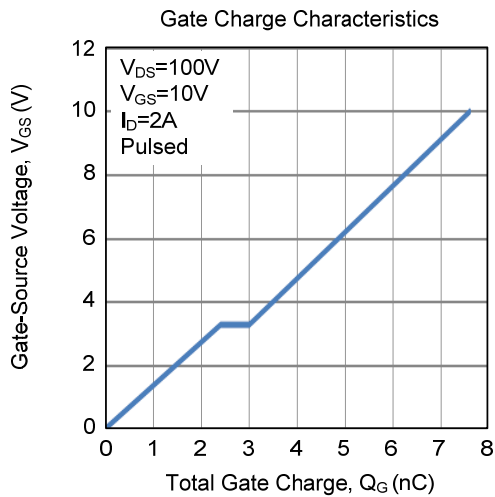
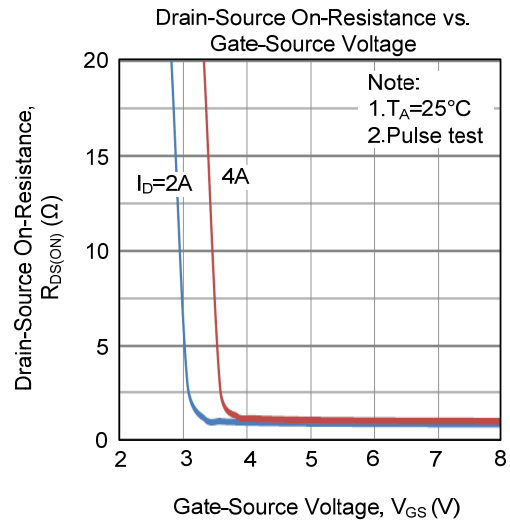
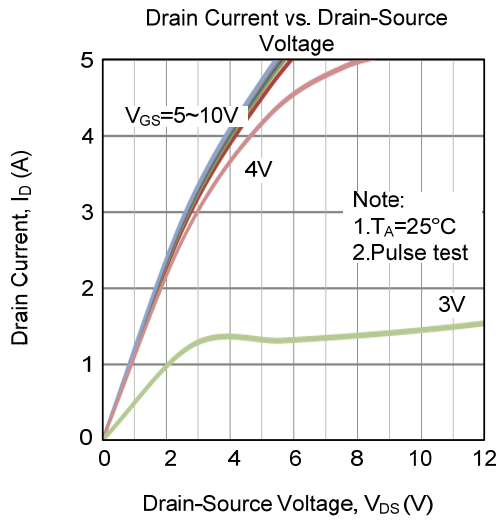


Unclamped Inductive Switching Test Circuit

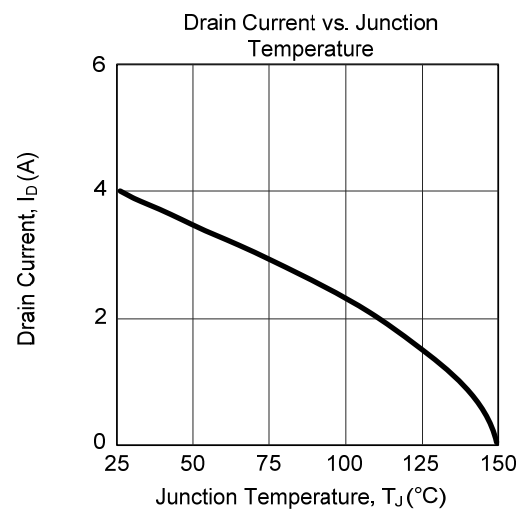
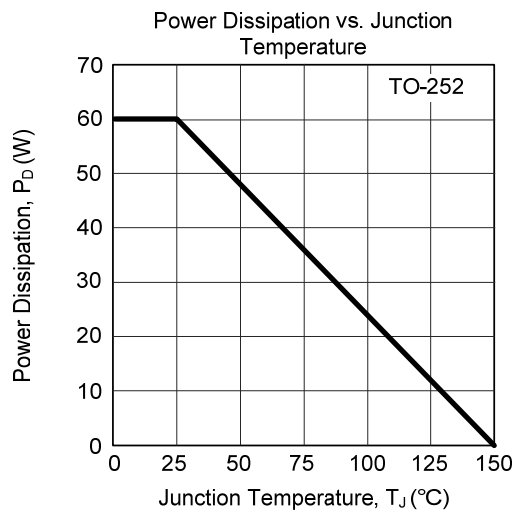
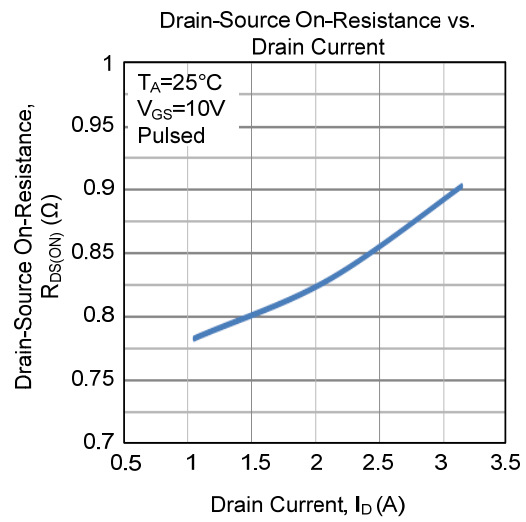
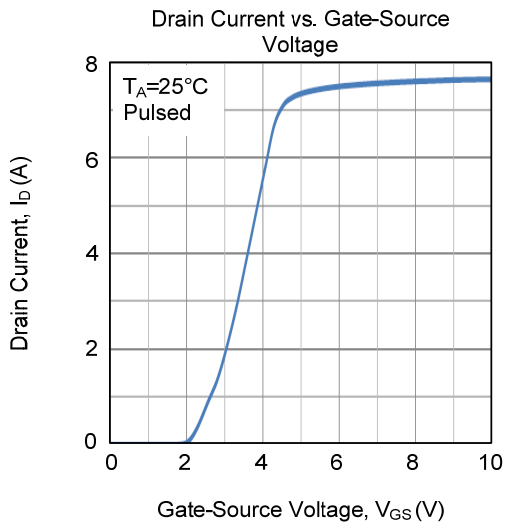
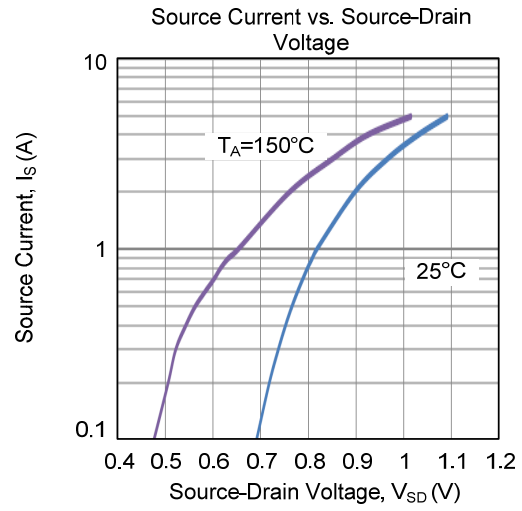
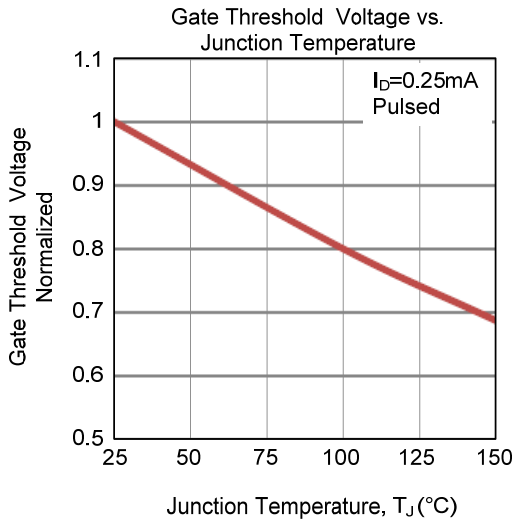


Unclamped Inductive Switching Waveforms

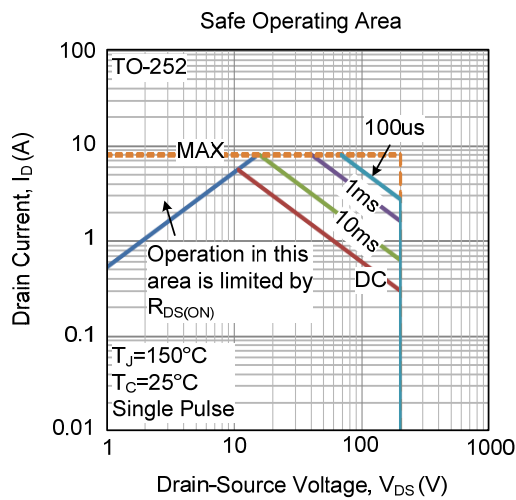
## TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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