



## 15N20

Power MOSFET

### 15A, 200V N-CHANNEL POWER MOSFET

#### DESCRIPTION

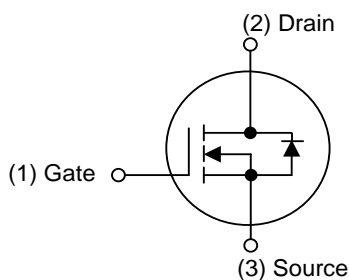
The UTC **15N20** is an N-channel enhancement MOSFET using UTC's advanced technology to provide the customers with perfect  $R_{DS(ON)}$ , high switching speed, high current capacity and low gate charge.

The UTC **15N20** is universally applied in low voltage such as automotive, high efficiency switching for AC/DC converters and DC motor control, etc.

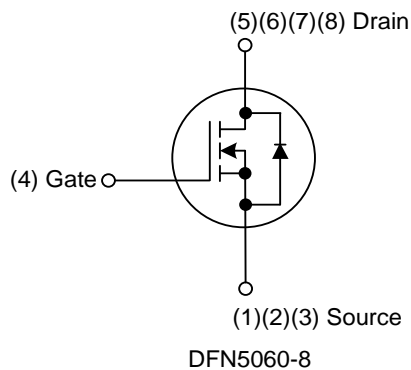
#### FEATURES

- \*  $R_{DS(ON)} \leq 250 \text{ m}\Omega$  @  $V_{GS}=10\text{V}$ ,  $I_D=7.5\text{A}$
- \* High Switching Speed

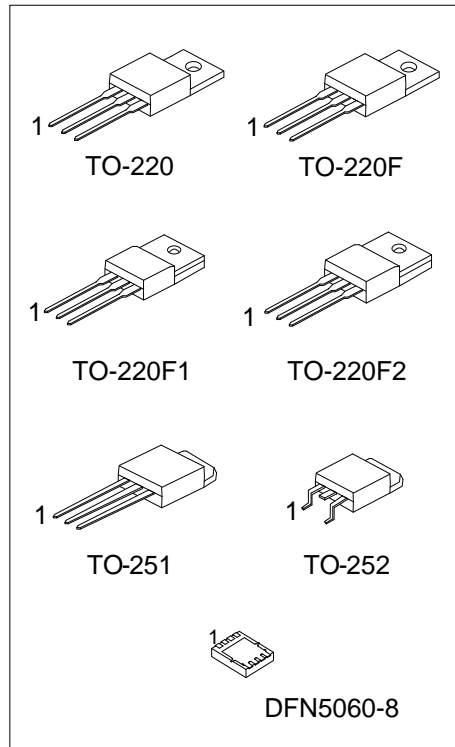
#### SYMBOL



TO-220/TO-220F/TO-220F1  
TO-220F2/TO-251/TO-252



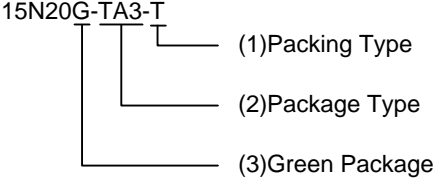
DFN5060-8



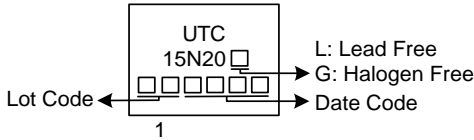
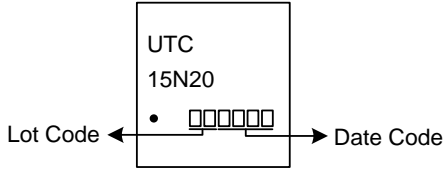
## ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
15N20L-TA3-T	15N20G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
15N20L-TF1-T	15N20G-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
15N20L-TF2-T	15N20G-TF2-T	TO-220F2	G	D	S	-	-	-	-	-	Tube
15N20L-TF3-T	15N20G-TF3-T	TO-220F	G	D	S	-	-	-	-	-	Tube
15N20L-TM3-T	15N20G-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
15N20L-TN3-R	15N20G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
15N20L-K08-5060-R	15N20G-K08-5060-R	DFN5060-8	S	S	S	G	D	D	D	D	Tape Reel

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

<p>15N20G-TA3-T</p>  <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TM3: TO-251, TN3: TO-252 K08-5060: DFN5060-8 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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## MARKING

TO-220 / TO-220F / TO-251 / TO-252	DFN5060-8
	

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	200	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Continuous Drain Current	Continuous	$I_D$	15	A
	Pulsed	$I_{DM}$	60	A
Single Pulsed Avalanche Current		$I_{AS}$	15	A
Single Pulsed Avalanche Energy		$E_{AS}$	170	mJ
Power Dissipation	TO-220	$P_D$	100	W
	TO-220F/TO-220F1 TO-220F2		40	
	TO-251/TO-252		55	
	DFN5060-8		14	
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.

**■ THERMAL DATA**

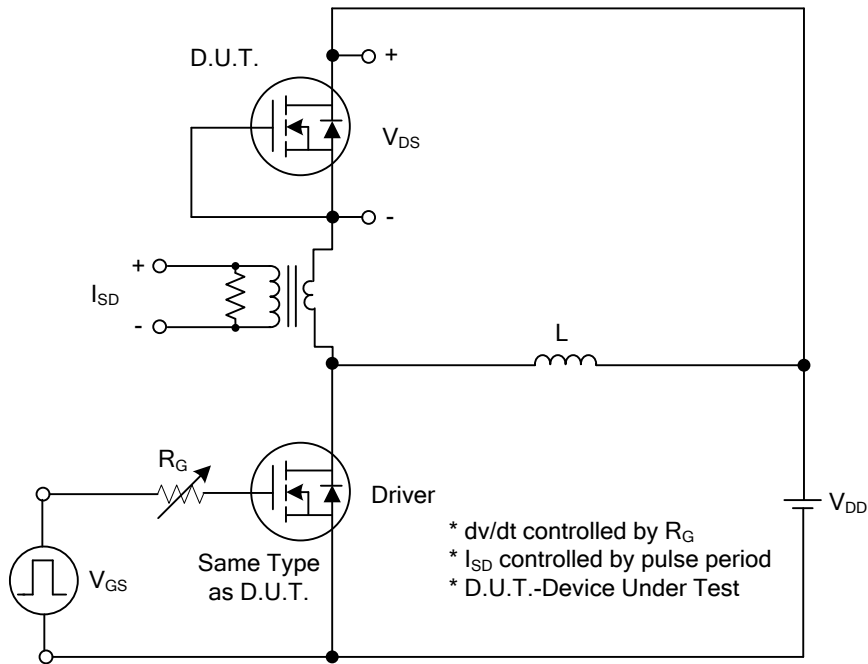
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2	$\theta_{JA}$	62.5	$^\circ\text{C/W}$
	TO-251/TO-252		110	
	DFN5060-8		65	
Junction to Case	TO-220	$\theta_{JC}$	1	$^\circ\text{C/W}$
	TO-220F/TO-220F1 TO-220F2		3.125 (Note)	
	TO-251/TO-252		2.27 (Note)	
	DFN5060-8		8.92 (Note)	

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

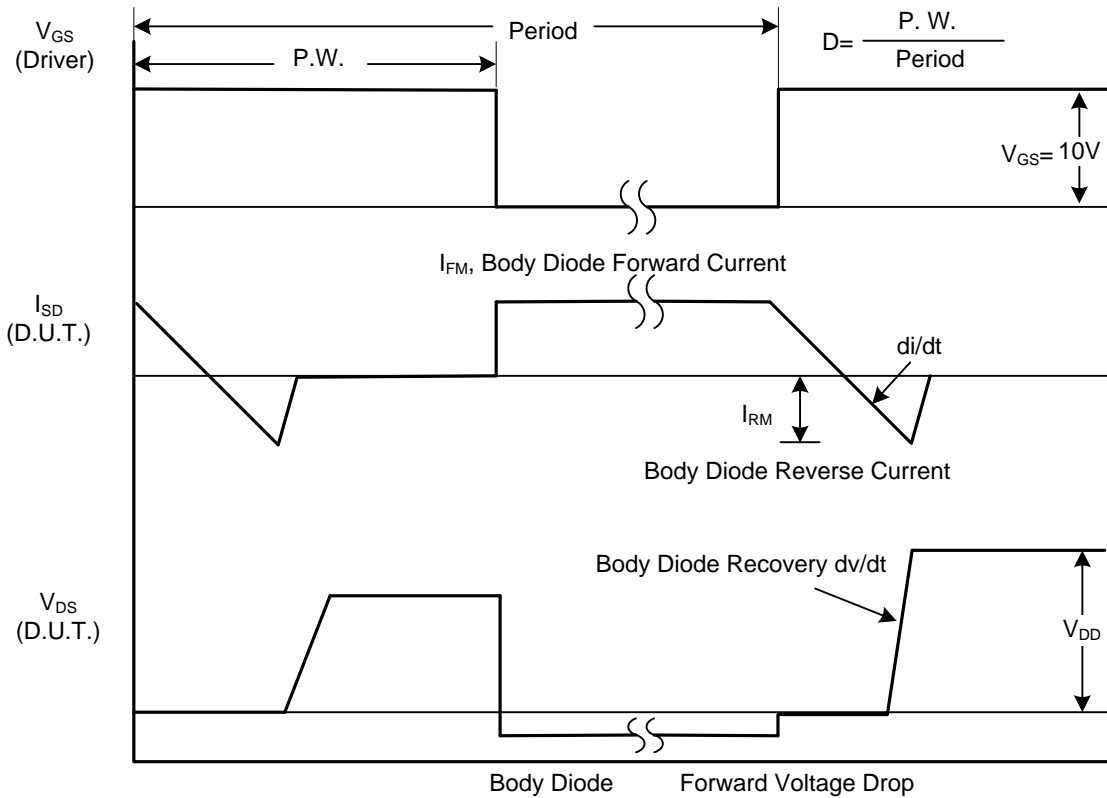
### ■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=250\mu A, V_{GS}=0V$	200			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=200V, V_{GS}=0V$			1	$\mu A$
Gate-Source Leakage Current	Forward	$V_{GS}=+30V, V_{DS}=0V$ $V_{GS}=-30V, V_{DS}=0V$			+100	nA
	Reverse				-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=7.5A$		200	250	m $\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0V, V_{DS}=25V, f=1.0MHz$		610	800	pF
Output Capacitance	$C_{OSS}$			145	200	pF
Reverse Transfer Capacitance	$C_{RSS}$			28	40	pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	$Q_G$	$V_{GS}=10V, V_{DD}=100V, I_D=15A$		21		nC
Gate to Source Charge	$Q_{GS}$			4.6		nC
Gate to Drain Charge	$Q_{GD}$			7		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=100V, I_D=15A, R_G=25\Omega,$ $V_{GS}=10V$		9.6		ns
Rise Time	$t_R$			20		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			53		ns
Fall-Time	$t_F$			23		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	$I_S$				15	A
Maximum Body-Diode Pulsed Current	$I_{SM}$				60	A
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_S=15A, V_{GS}=0V$			1.5	V
Reverse Recovery Time (Note 1)	$t_{rr}$	$I_S=15A, V_{GS}=0V, di/dt=100A/\mu s$		220		ns
Reverse Recovery Charge	$Q_{rr}$				2.5	

## TEST CIRCUITS AND WAVEFORMS

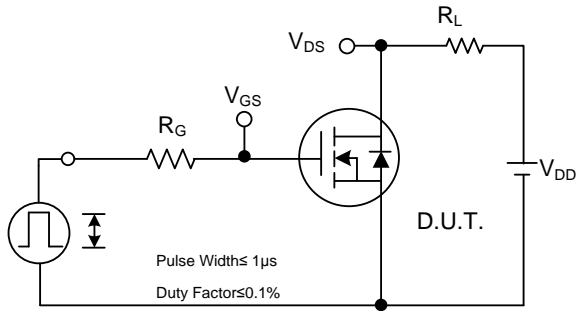


Peak Diode Recovery  $dv/dt$  Test Circuit

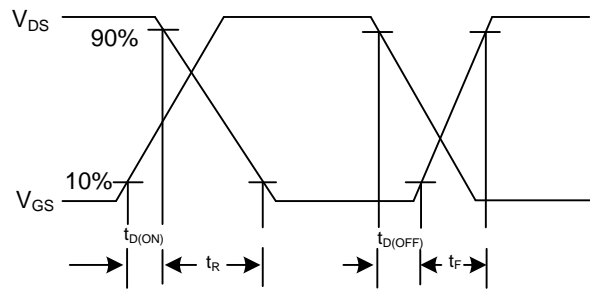


Peak Diode Recovery  $dv/dt$  Waveforms

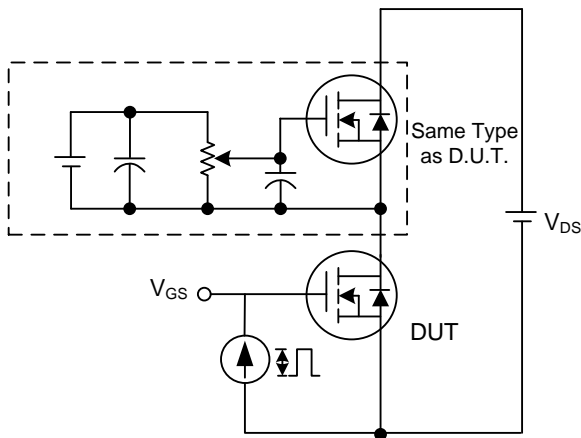
## TEST CIRCUITS AND WAVEFORMS



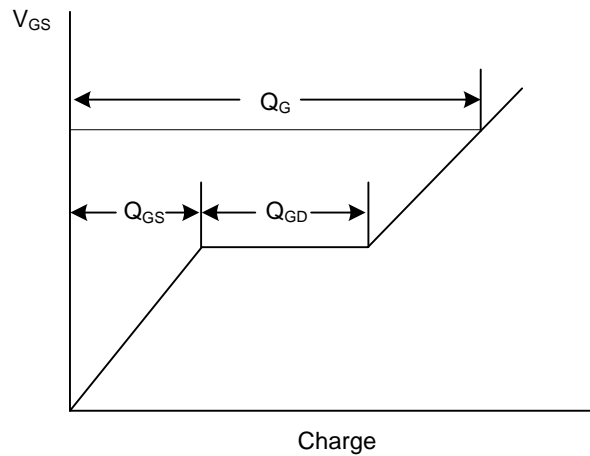
Switching Test Circuit



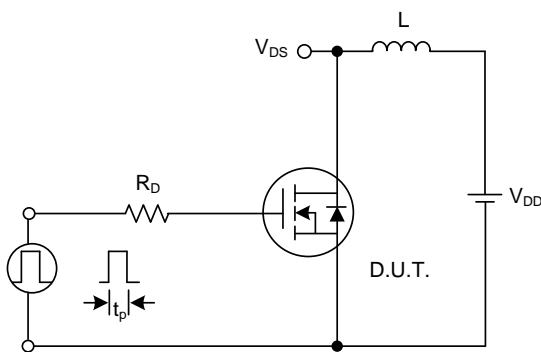
Switching Waveforms



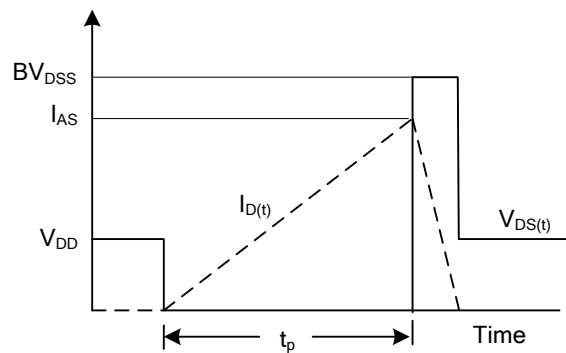
Gate Charge Test Circuit



Gate Charge Waveform

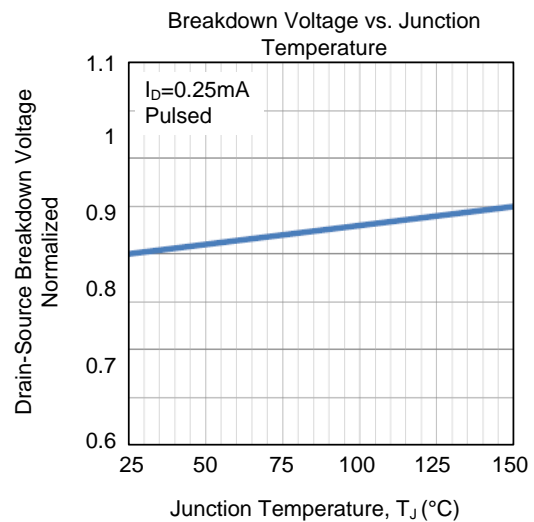
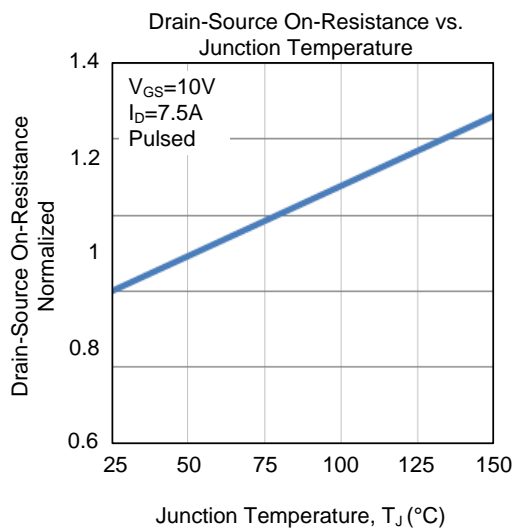
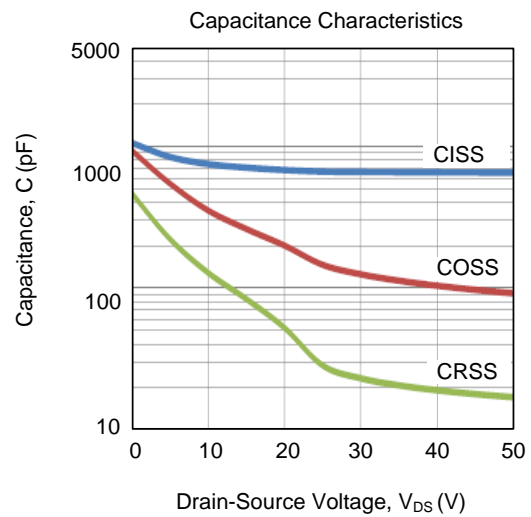
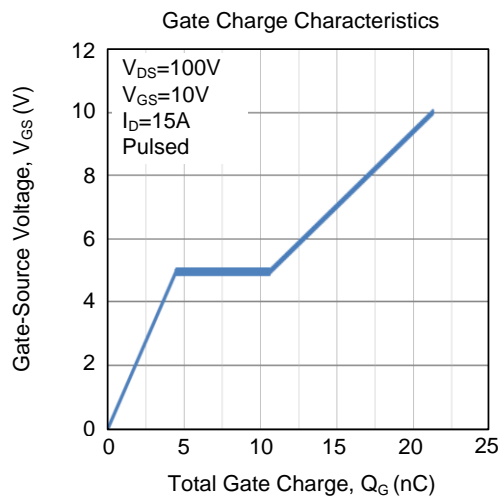
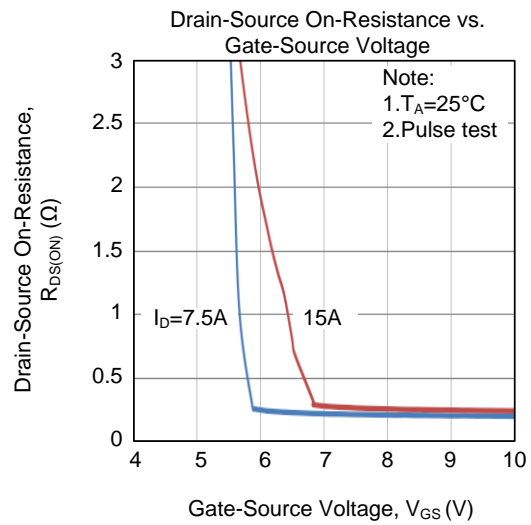
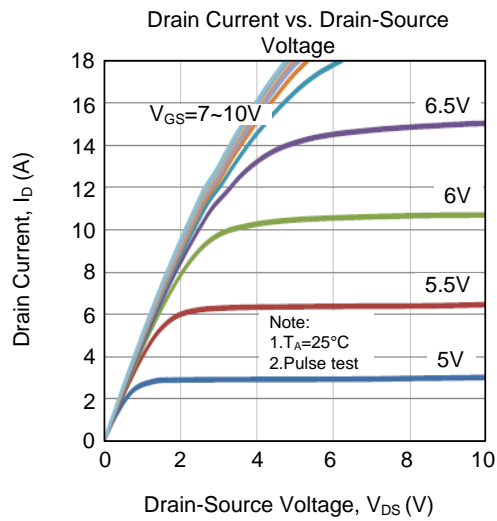


Unclamped Inductive Switching Test Circuit

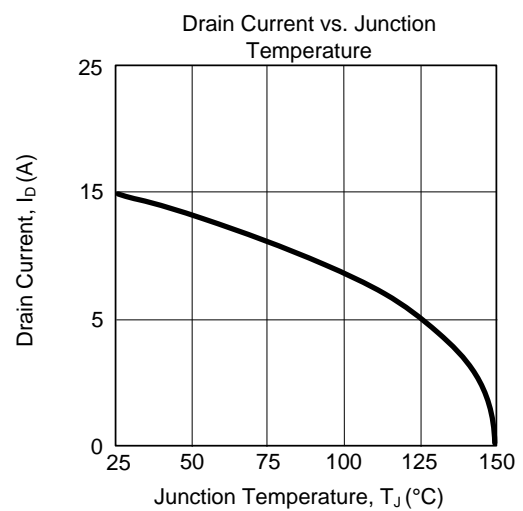
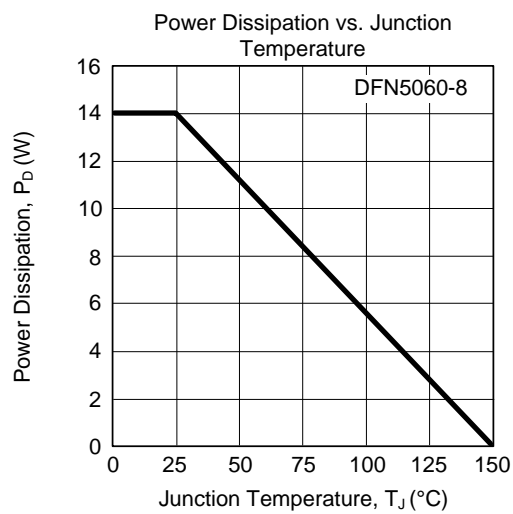
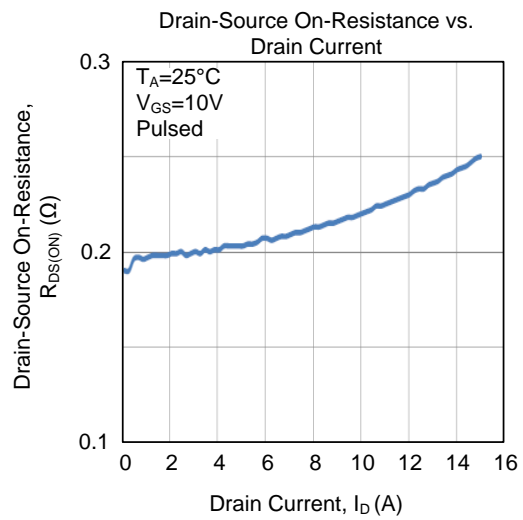
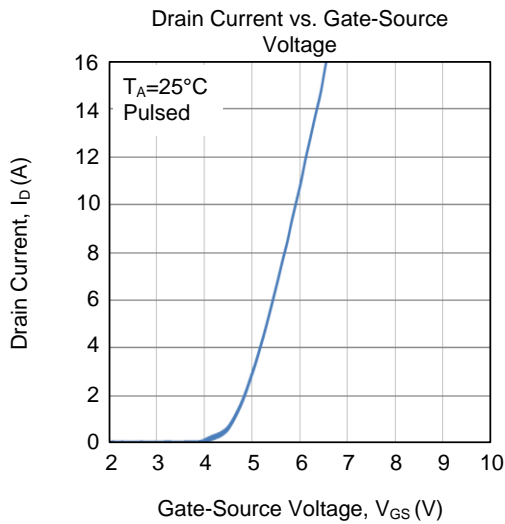
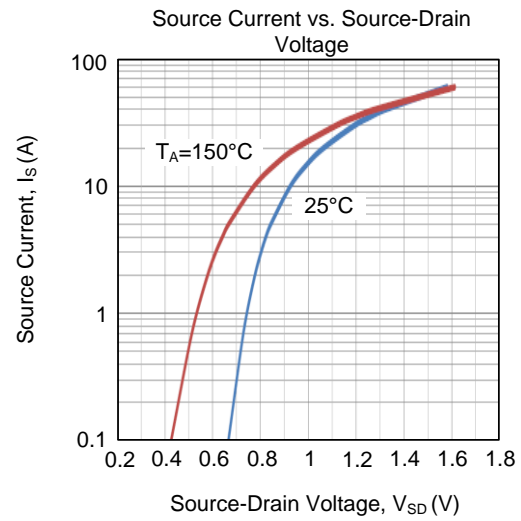
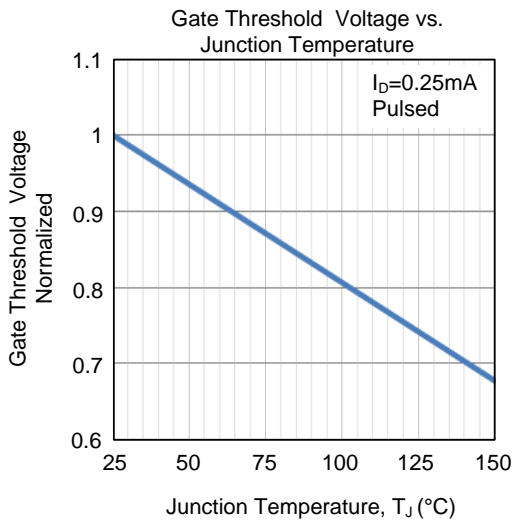


Unclamped Inductive Switching Waveforms

## TYPICAL CHARACTERISTICS

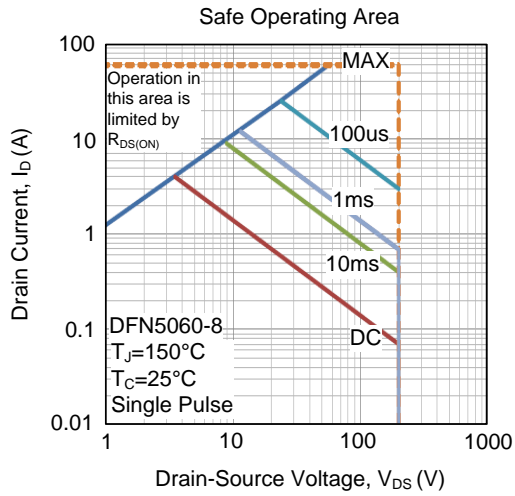


## ■ TYPICAL CHARACTERISTICS (Cont.)





■ TYPICAL CHARACTERISTICS (Cont.)



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