



7N60A

Power MOSFET

7A, 600V N-CHANNEL POWER MOSFET

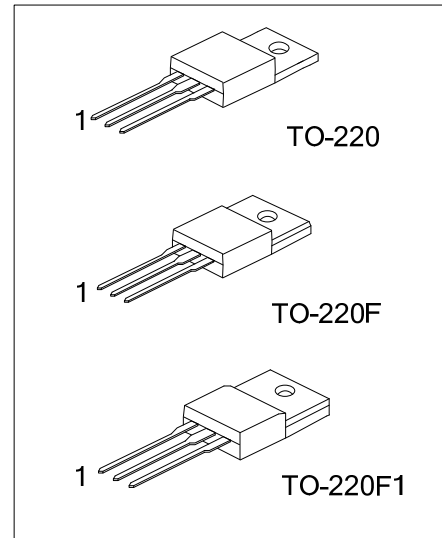
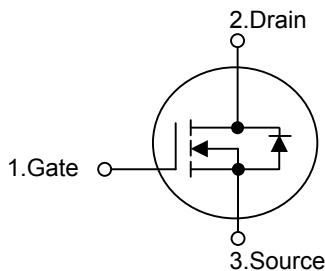
DESCRIPTION

The UTC **7N60A** is a high voltage N-Channel enhancement mode power field effect transistors and is designed to have minimize on-state resistance , provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. This power MOSFET is well suited for high efficiency switch mode power supply.

FEATURES

- * $R_{DS(ON)} = 1.2\Omega @ V_{GS} = 10V$
- * Ultra low gate charge (typical 28 nC)
- * Low reverse transfer Capacitance (C_{RSS} = typical 12 pF)
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness

SYMBOL



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7N60AL-TA3-T	7N60AG-TA3-T	TO-220	G	D	S	Tube
7N60AL-TF1-T	7N60AG-TF1-T	TO-220F1	G	D	S	Tube
7N60AL-TF3-T	7N60AG-TF3-T	TO-220F	G	D	S	Tube

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

<p>7N60AL-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Lead Free</p>	<p>(1) T: Tube</p> <p>(2) TA3: TO-220, TF1: TO220-F1, TF3: TO-220F</p> <p>(3) G: Halogen Free, L: Lead Free</p>
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■ ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	± 30	V
Avalanche Current (Note 2)		I_{AR}	7	A
Continuous Drain Current		I_D	7	A
Pulsed Drain Current (Note 2)		I_{DM}	28	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	330	mJ
	Repetitive (Note 2)	E_{AR}	7.5	mJ
Power Dissipation	TO-220	P_D	65	W
	TO-220F/TO-220F1		30	
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 $T_{J(MAX)}$

3. $L = 12.05\text{mH}$, $I_{AS} = 7.4\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 27\ \Omega$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	θ_{JA}	83.3	$^\circ\text{C/W}$
	TO-220F/TO-220F1		62.5	
Junction to Case	TO-220	θ_{JC}	1.92	$^\circ\text{C/W}$
	TO-220F/TO-220F1		4.16	

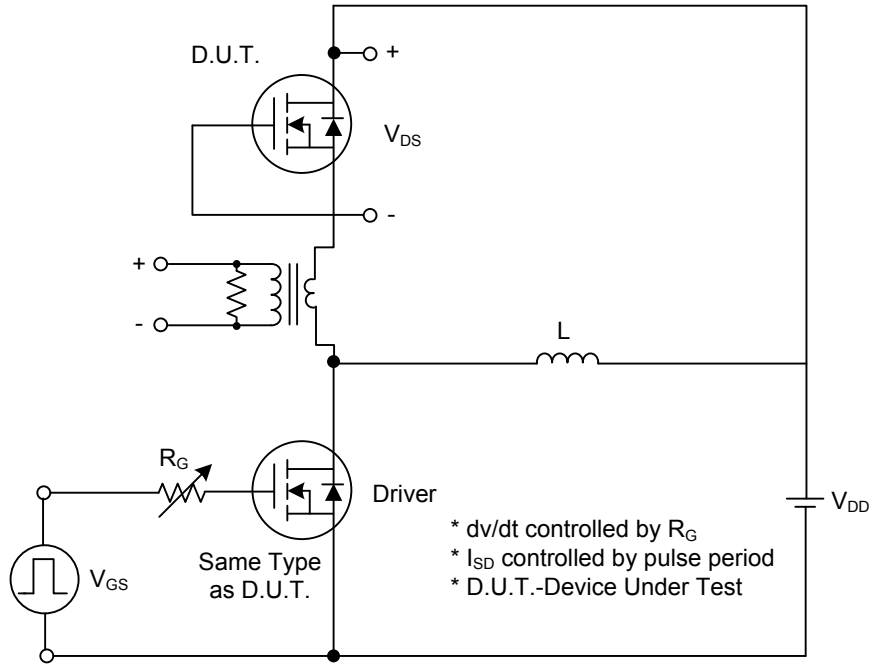
■ ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	600			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 600V, V_{GS} = 0V$			10	μA
Gate-Source Leakage Current	Forward	$V_{GS} = 30V, V_{DS} = 0V$			100	nA
	Reverse		$V_{GS} = -30V, V_{DS} = 0V$			-100
ON CHARACTERISTICS						
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	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 3.5A$ (Note 4)		0.93	1.2	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0\text{ MHz}$		950	1430	pF
Output Capacitance	C_{OSS}			85	130	pF
Reverse Transfer Capacitance	C_{RSS}			12	18	pF
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = 300V, I_D = 7A, R_G = 25\Omega$ (Note 1, 2)		16		ns
Turn-On Rise Time	t_R			60		ns
Turn-Off Delay Time	$t_{D(OFF)}$			80		ns
Turn-Off Fall Time	t_F			65		ns
Total Gate Charge	Q_G	$V_{DS} = 300V, I_D = 7A, V_{GS} = 10V$ (Note 1, 2)		28	42	nC
Gate-Source Charge	Q_{GS}			5.5	8.3	nC
Gate-Drain Charge	Q_{GD}			11	17	nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0V, I_S = 7A$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	I_S				7	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				28	A
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_S = 7A,$		365		ns
Reverse Recovery Charge	Q_{RR}	$dI_F / dt = 100A/\mu s$ (Note 1)		4.23		μC

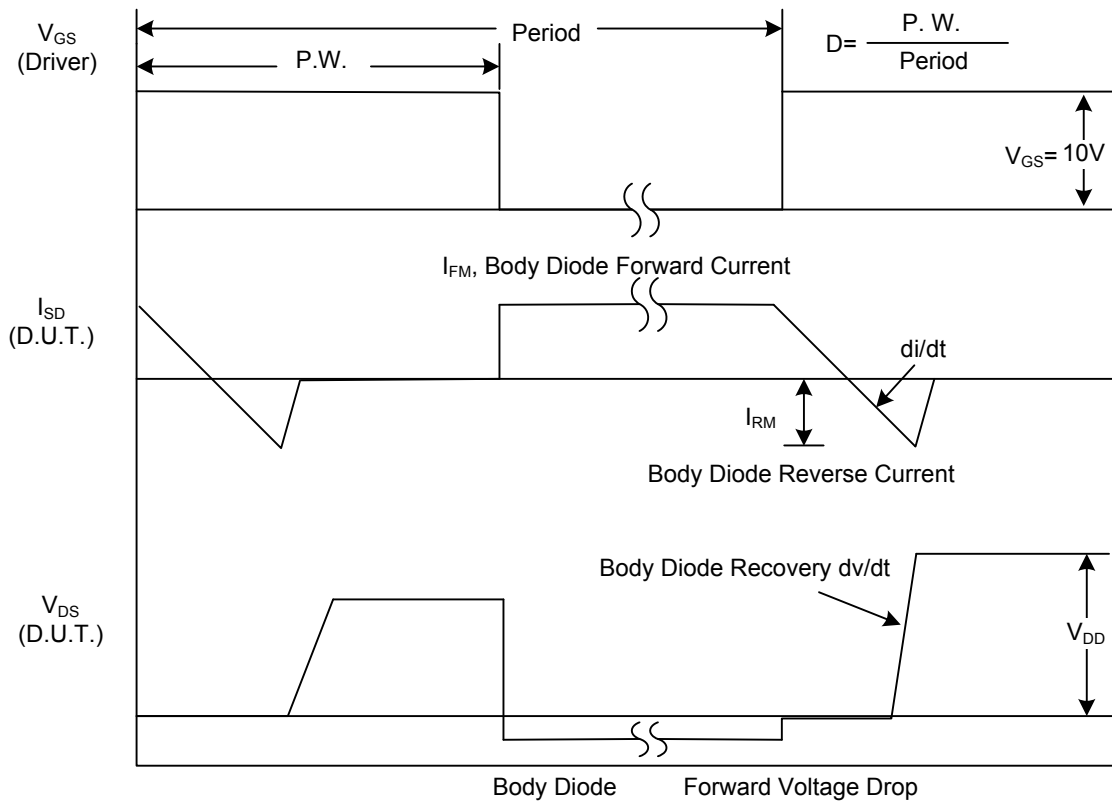
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

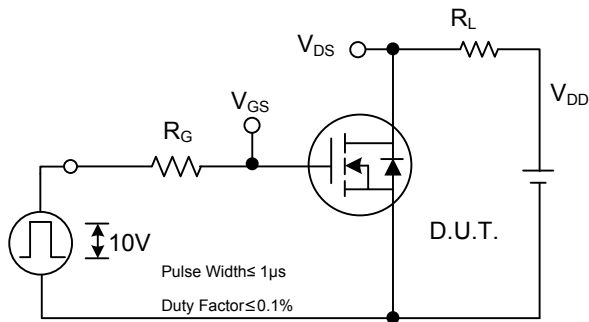


Peak Diode Recovery dv/dt Test Circuit

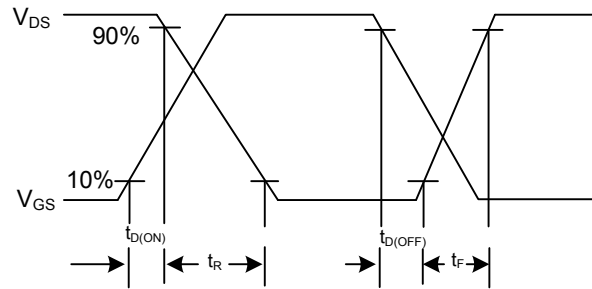


Peak Diode Recovery dv/dt Waveforms

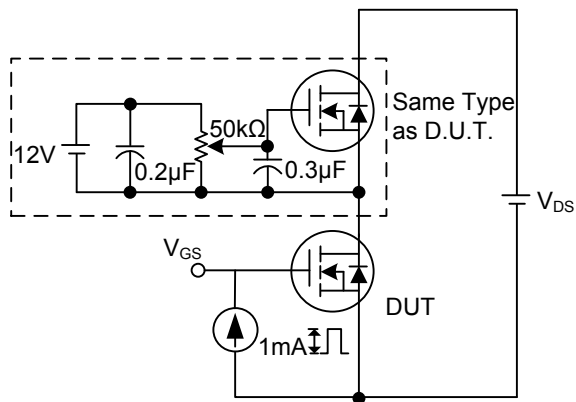
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



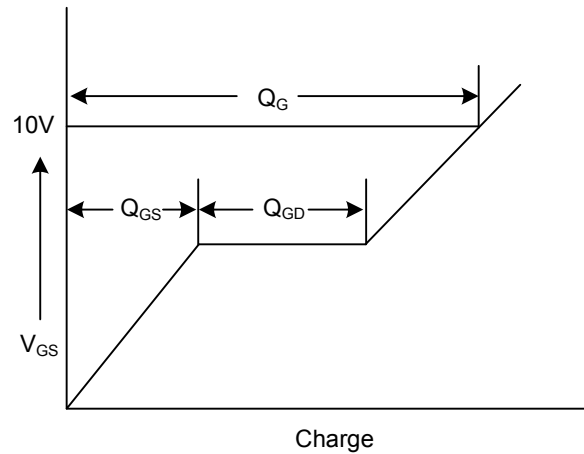
Switching Test Circuit



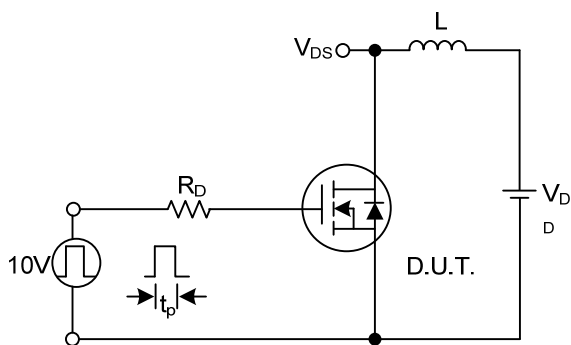
Switching Waveforms



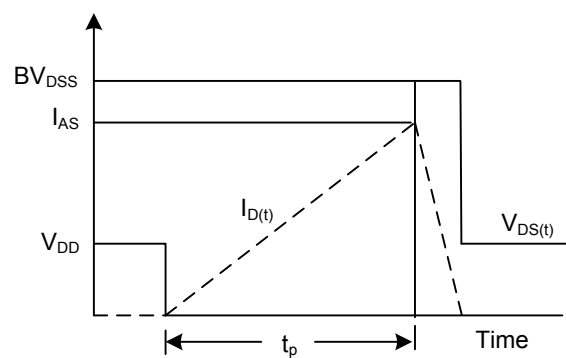
Gate Charge Test Circuit



Gate Charge Waveform

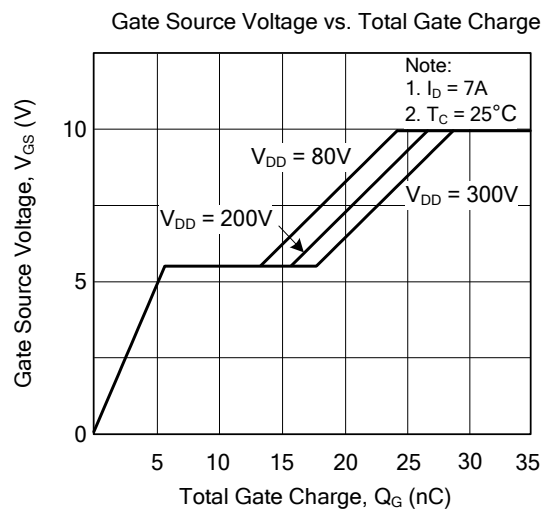
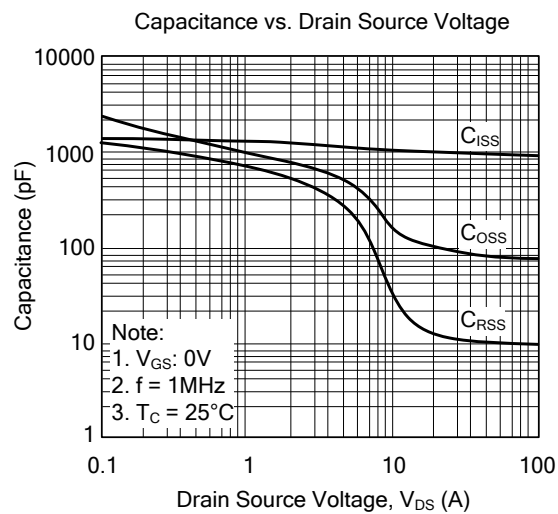
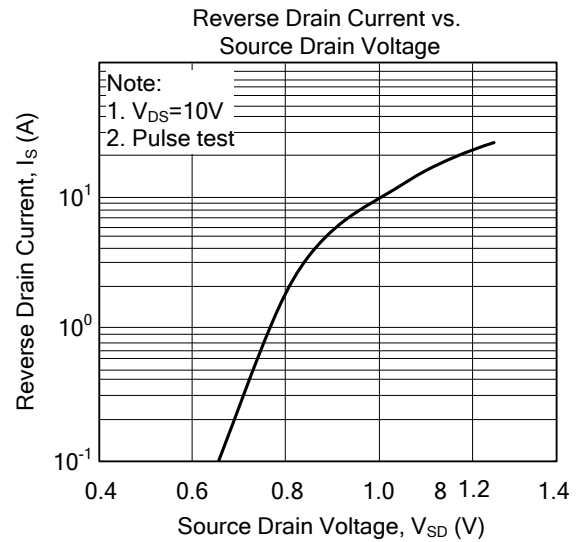
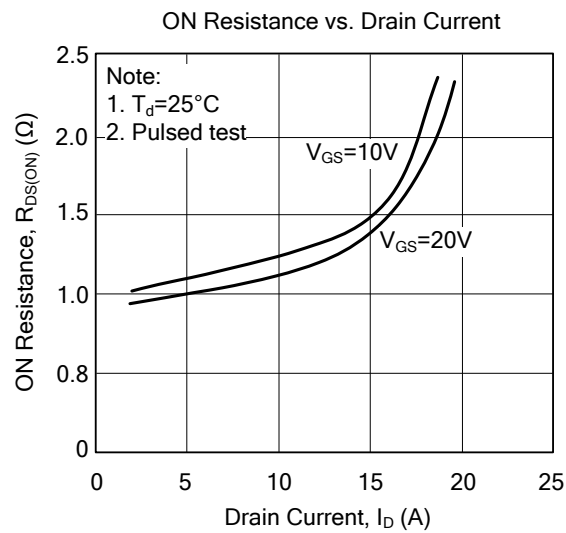
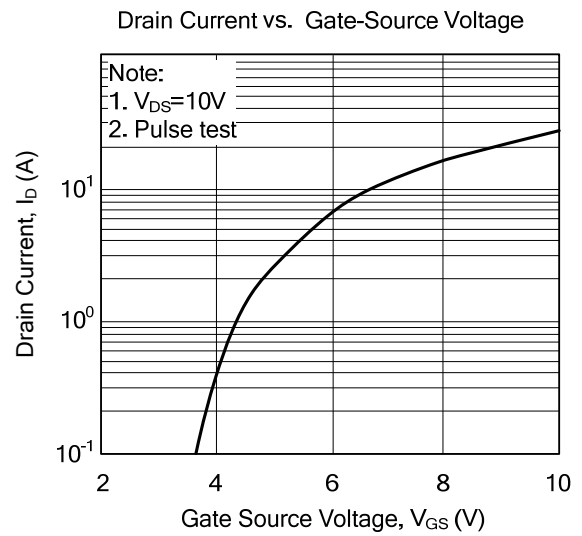
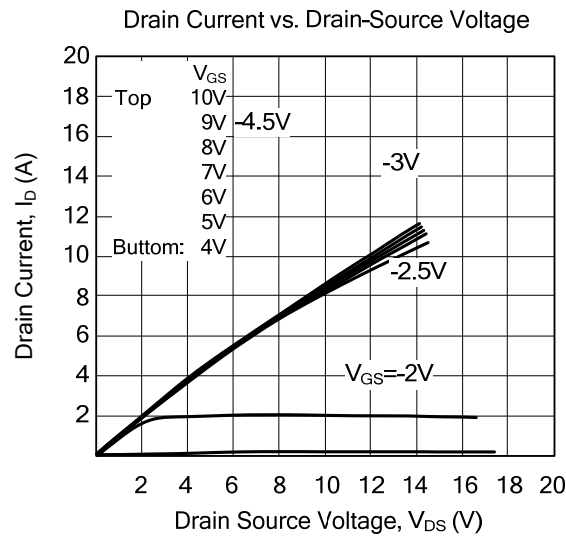


Unclamped Inductive Switching Test Circuit

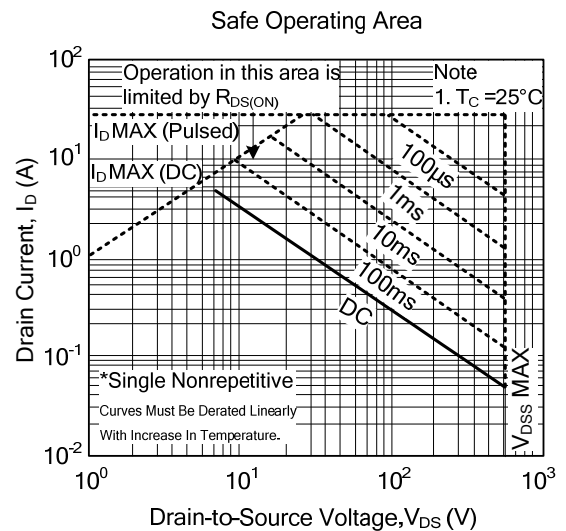
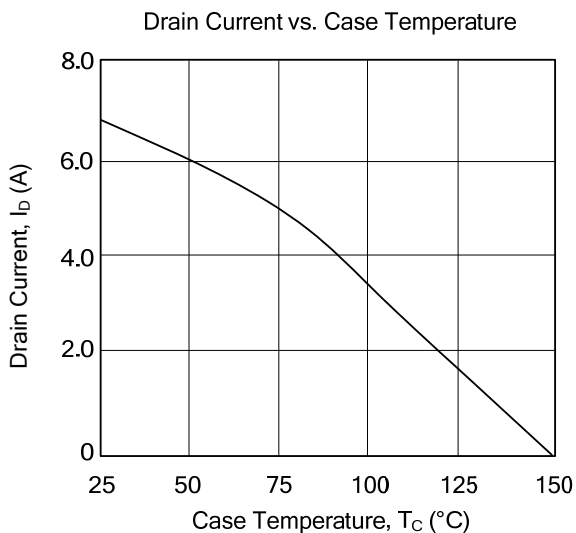
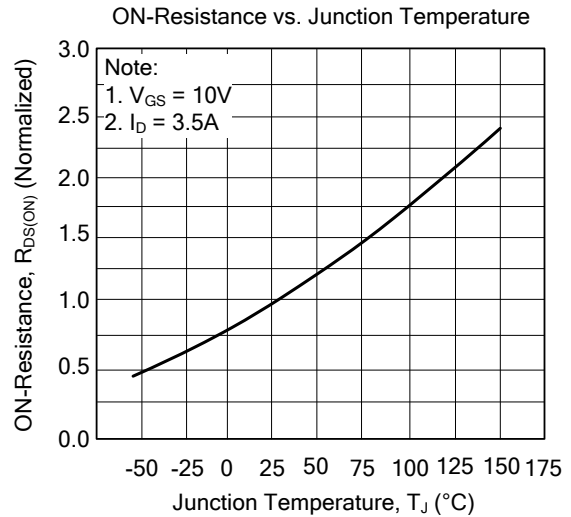
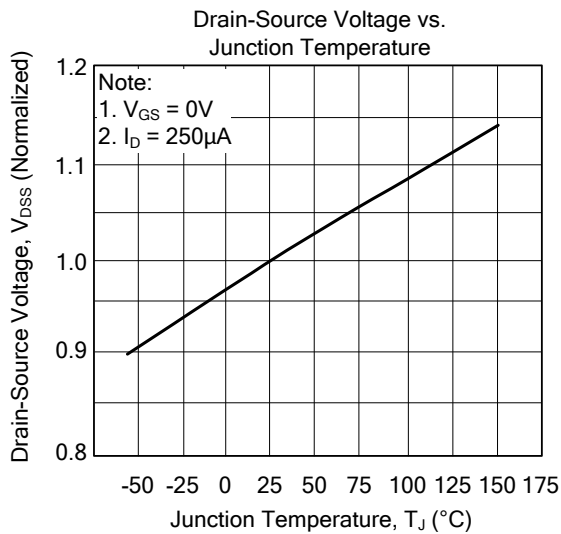


Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



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