



14N50-TC

Power MOSFET

14A, 500V N-CHANNEL POWER MOSFET

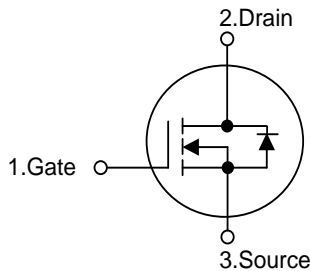
DESCRIPTION

The UTC 14N50-TC is a high voltage and high current power MOSFET, designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient AC to DC converters and bridge circuits.

FEATURES

- * $R_{DS(ON)} \leq 0.55 \Omega @ V_{GS}=10V, I_D=7.0A$
- * Fast switching
- * Improved dv/dt capability

SYMBOL

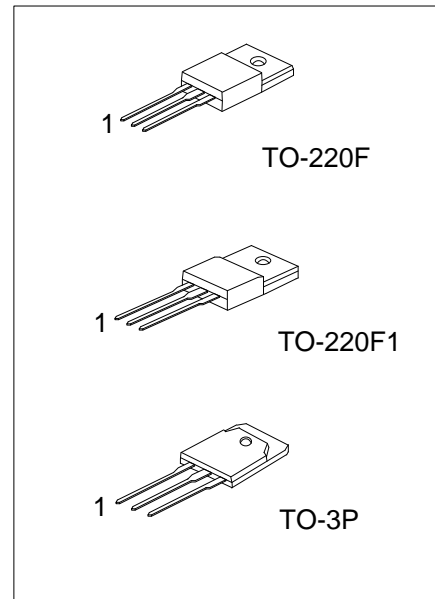


ORDERING INFORMATION

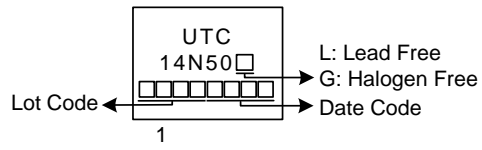
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen-Free		1	2	3	
14N50L-TF1-T	14N50G-TF1-T	TO-220F1	G	D	S	Tube
14N50L-TF3-T	14N50G-TF3-T	TO-220F	G	D	S	Tube
14N50L-T3P-T	14N50G-T3P-T	TO-3P	G	D	S	Tube

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

<p>14N50G-TF1-T</p>	<p>(1) T: Tube</p> <p>(2) TF1: TO-220F1, TF3: TO-220F, T3P: TO-3P</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V _{DSS}	500	V
Gate-Source Voltage		V _{GSS}	±30	V
Drain Current	Continuous	I _D	14	A
	Pulsed (Note 2)	I _{DM}	28	A
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	328	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.1	V/ns
Power Dissipation	TO-220F/TO-220F1	P _D	37	W
	TO-3P		290	W
Junction Temperature		T _J	+150	°C
Storage Temperature		T _{STG}	-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.

3. L = 10mH, I_{AS} = 8.1A, V_{DD} = 50V, R_G = 25 Ω Starting T_J = 25°C

4. I_{SD} ≤ 10A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220F/TO-220F1	θ _{JA}	62.5	°C/W
	TO-3P		41.6	°C/W
Junction to Case	TO-220F/TO-220F1	θ _{JC}	3.37	°C/W
	TO-3P		0.43	°C/W

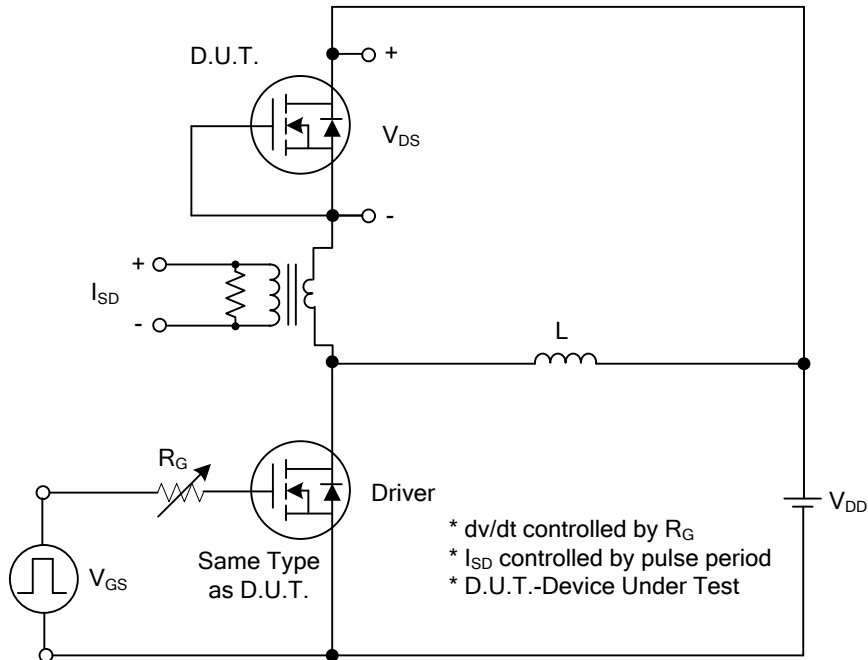
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS								
Drain-Source Breakdown Voltage		BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	500			V	
Drain-Source Leakage Current		I_{DSS}	$V_{DS}=500V, V_{GS}=0V$			10	μA	
Gate-Source Leakage Current	Forward	I_{GSS}	$V_{GS}=30V, V_{DS}=0V$			100	nA	
	Reverse		$V_{GS}=-30V, V_{DS}=0V$			-100	nA	
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		$R_{DS(ON)}$	$V_{GS}=10V, I_D=7.0A$			0.55	Ω	
DYNAMIC CHARACTERISTICS								
Input Capacitance		C_{ISS}	$V_{GS}=0V, V_{DS}=25V, f=1.0\text{ MHz}$		1440		pF	
Output Capacitance		C_{OSS}				170		pF
Reverse Transfer Capacitance		C_{RSS}				7		pF
SWITCHING CHARACTERISTICS								
Total Gate Charge (Note 1)		Q_G	$V_{DS}=400V, V_{GS}=10V, I_D=14A$ $I_G=1\text{ mA}$ (Note 1, 2)		42		nC	
Gate-Drain Charge		Q_{GD}				8		nC
Gate-source Charge		Q_{GS}				6.6		nC
Turn-on Delay Time (Note 1)		$t_{D(ON)}$	$V_{DS}=100V, V_{GS}=10V, I_D=14A,$ $R_G=25\Omega$ (Note 1, 2)		20		ns	
Rise Time		t_R				21		ns
Turn-off Delay Time		$t_{D(OFF)}$				97.5		ns
Fall-Time		t_F				33.5		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS								
Maximum Body-Diode Continuous Current		I_S				14	A	
Maximum Body-Diode Pulsed Current		I_{SM}				28	A	
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	$V_{GS}=0V, I_S=14A$			1.4	V	
Reverse Recovery Time (Note 1)		t_{rr}	$V_{GS}=0V, I_S=14A,$ $di_F/dt=100A/\mu s$ (Note1)		312		ns	
Reverse Recovery Charge		Q_{rr}				3.5		μC

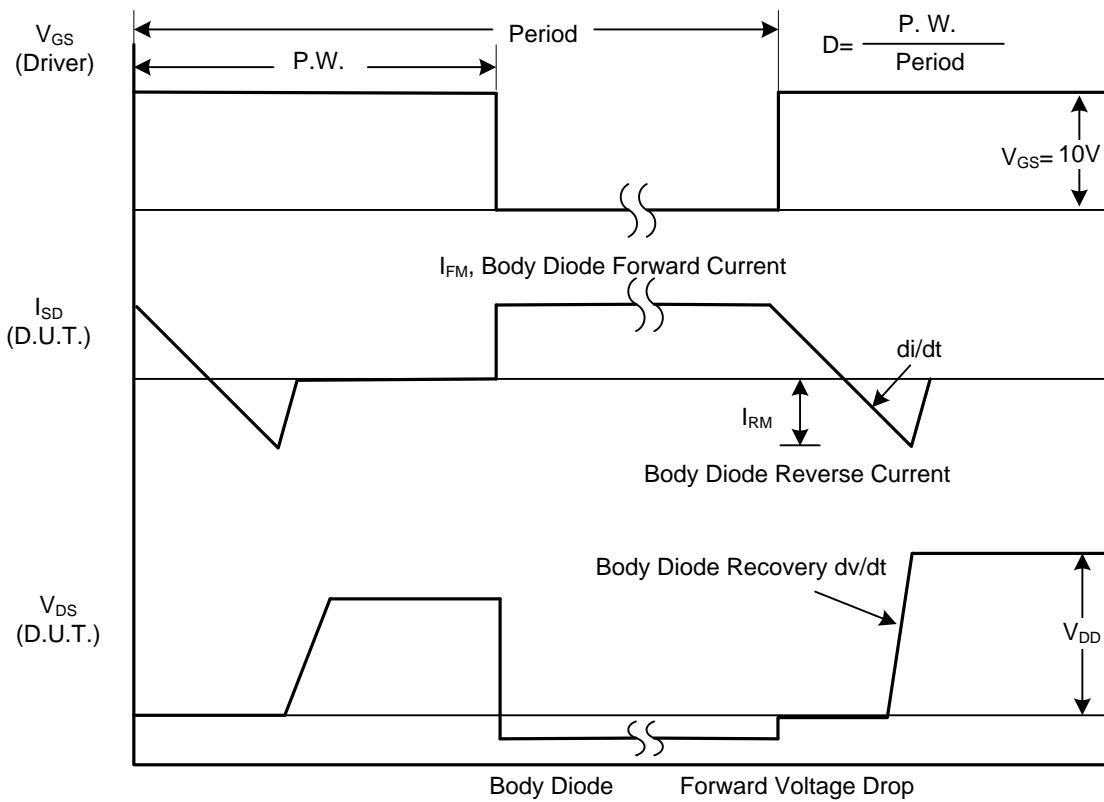
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

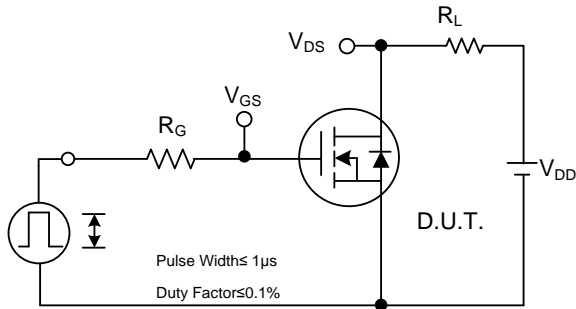


Peak Diode Recovery dv/dt Test Circuit

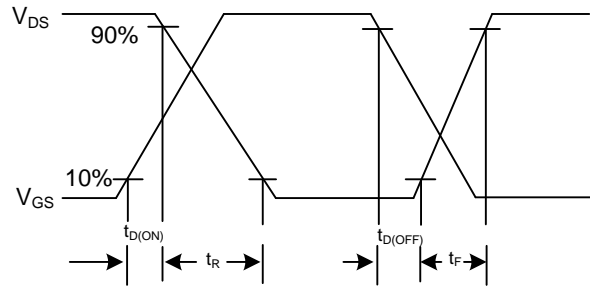


Peak Diode Recovery dv/dt Waveforms

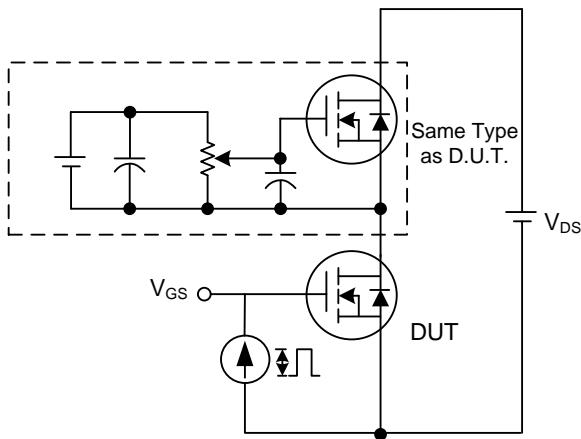
TEST CIRCUITS AND WAVEFORMS



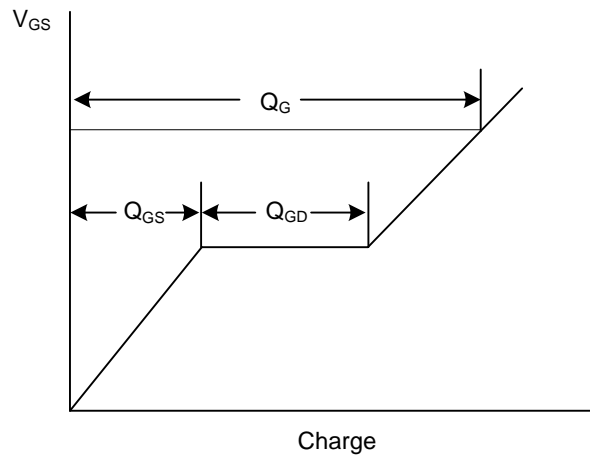
Switching Test Circuit



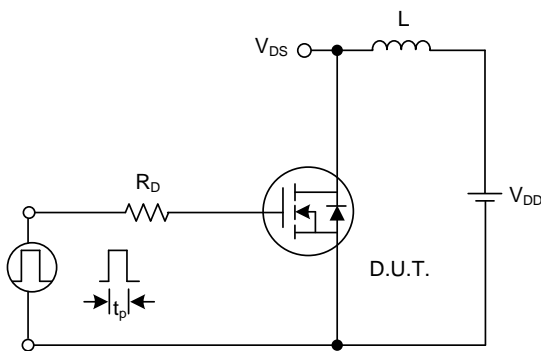
Switching Waveforms



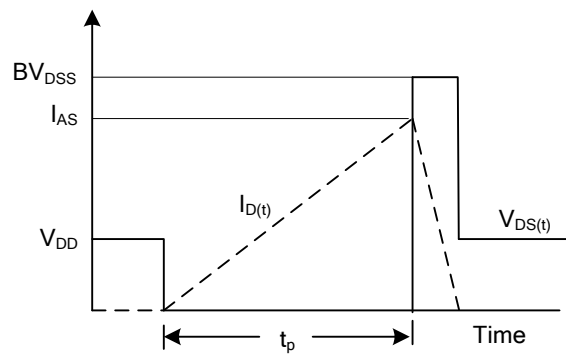
Gate Charge Test Circuit



Gate Charge Waveform

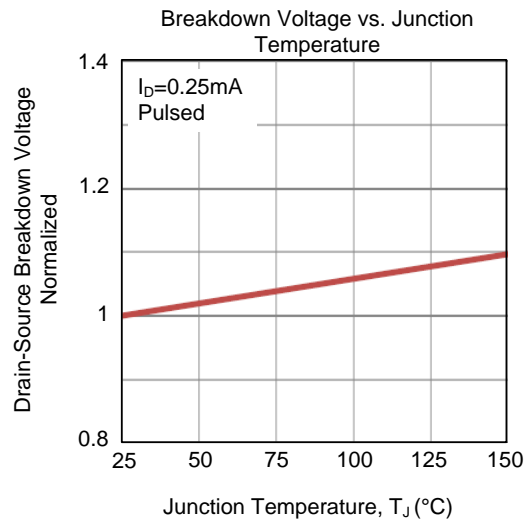
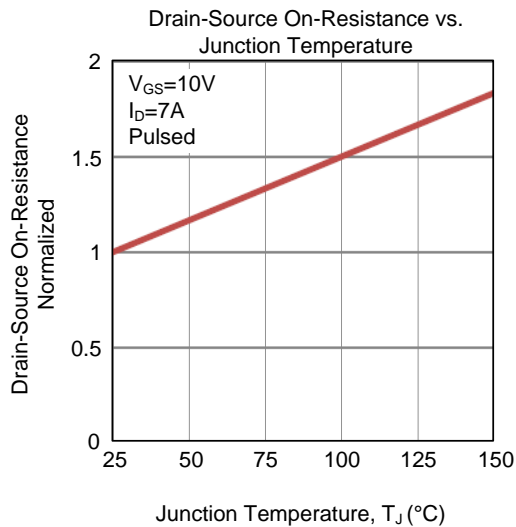
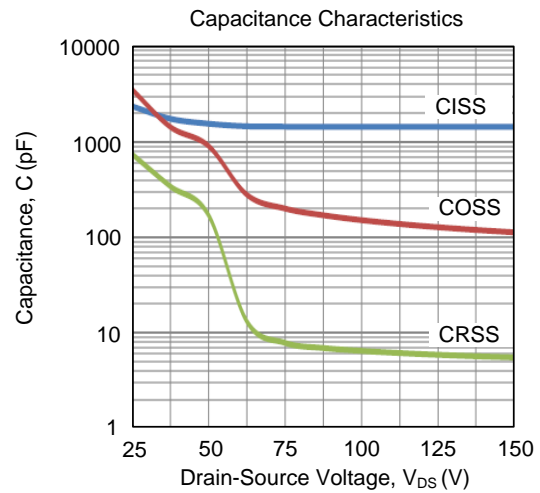
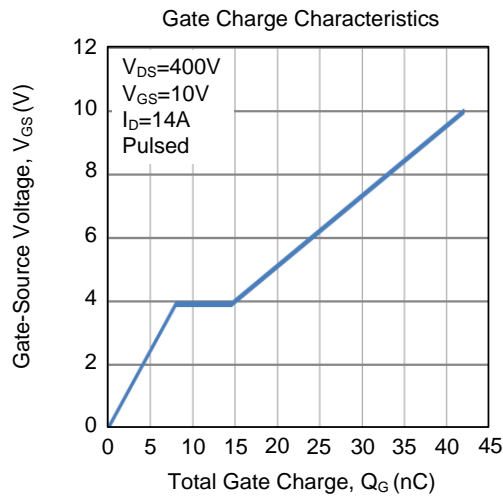
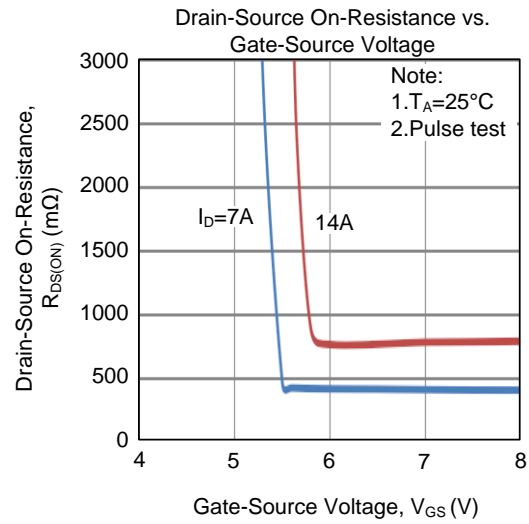
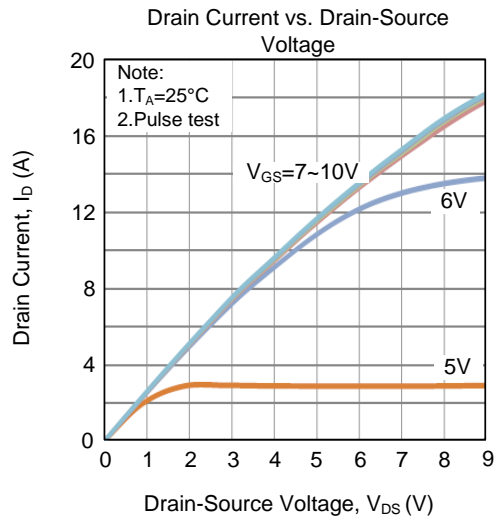


Unclamped Inductive Switching Test Circuit

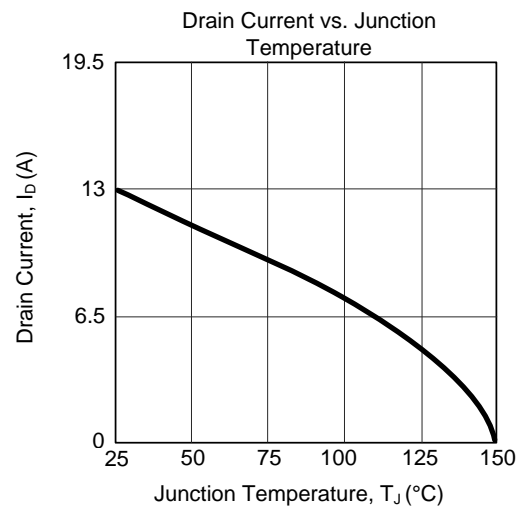
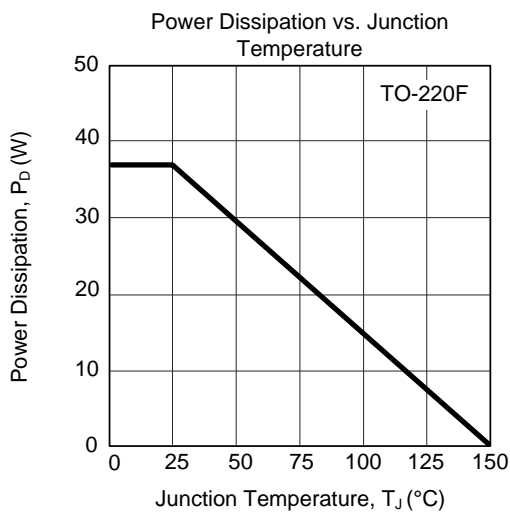
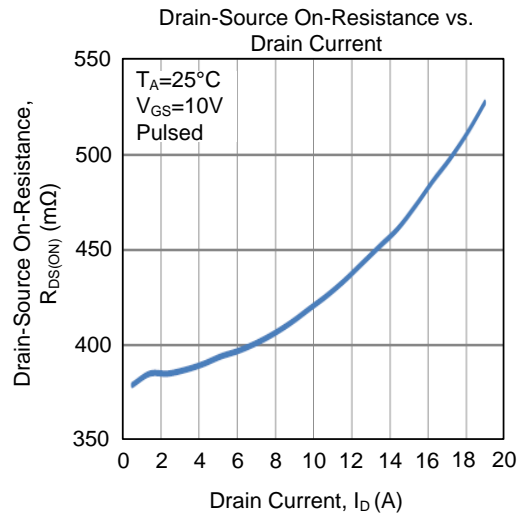
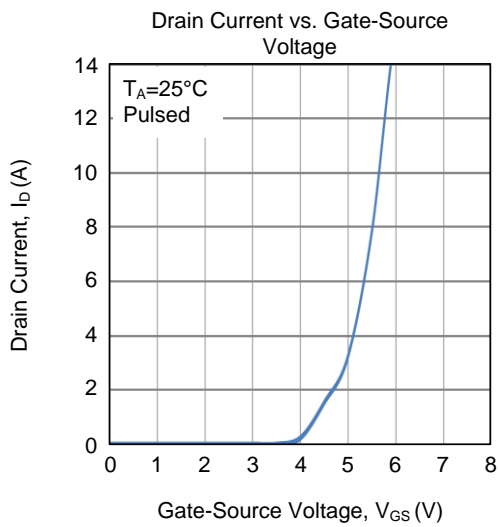
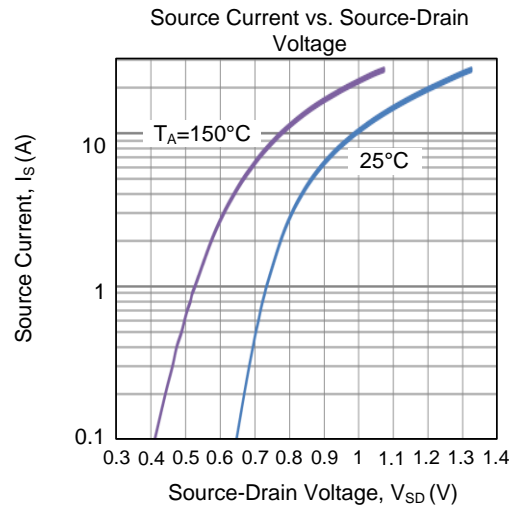
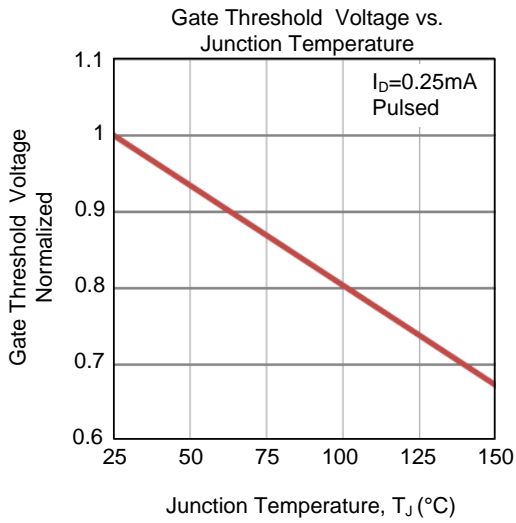


Unclamped Inductive Switching Waveforms

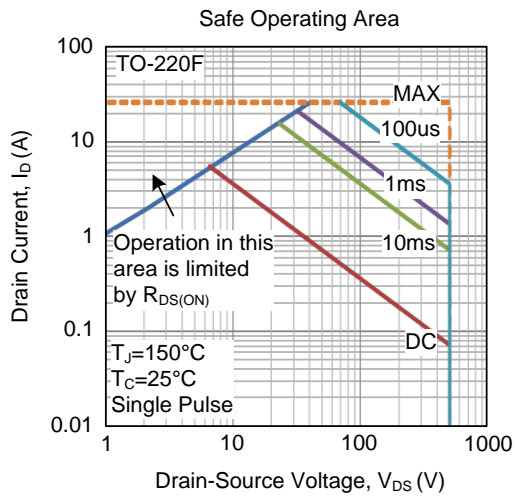
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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