



14N50-TC

Power MOSFET

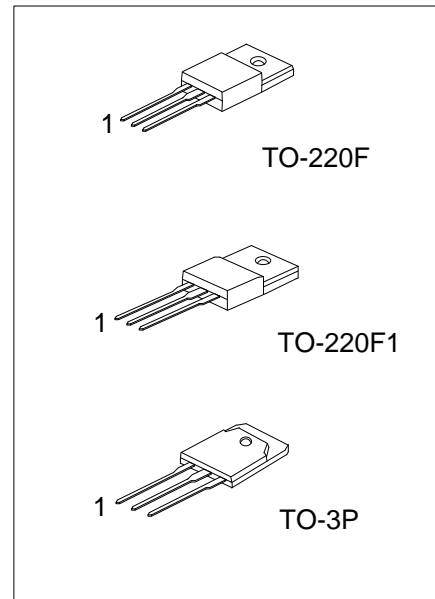
14A, 500V N-CHANNEL POWER MOSFET

DESCRIPTION

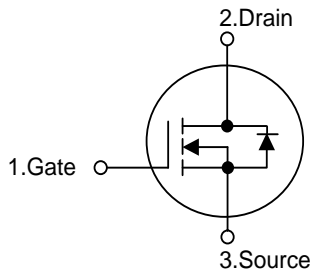
The UTC 14N50-TC is a high voltage and high current power MOSFET, designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power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



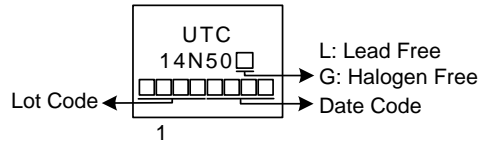
ORDERING INFORMATION

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)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</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** ($T_C = 25^\circ\text{C}$, 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	$^\circ\text{C}$
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. $L = 10\text{mH}$, $I_{AS} = 8.1\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$ Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 10\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220F/TO-220F1	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-3P		41.6	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220F/TO-220F1	θ_{JC}	3.37	$^\circ\text{C}/\text{W}$
	TO-3P		0.43	$^\circ\text{C}/\text{W}$

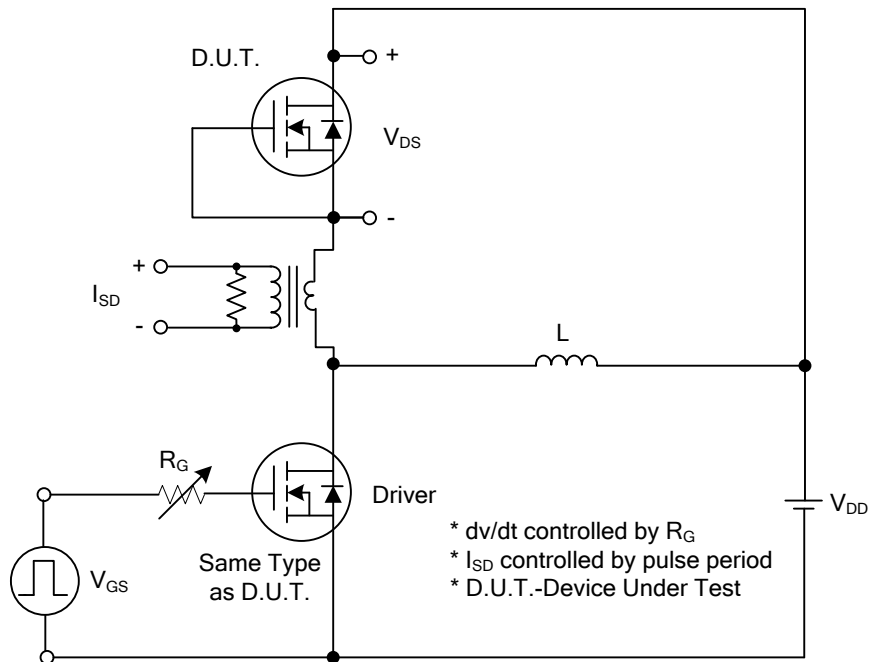
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

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	$V_{GS}=30V, V_{DS}=0V$			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

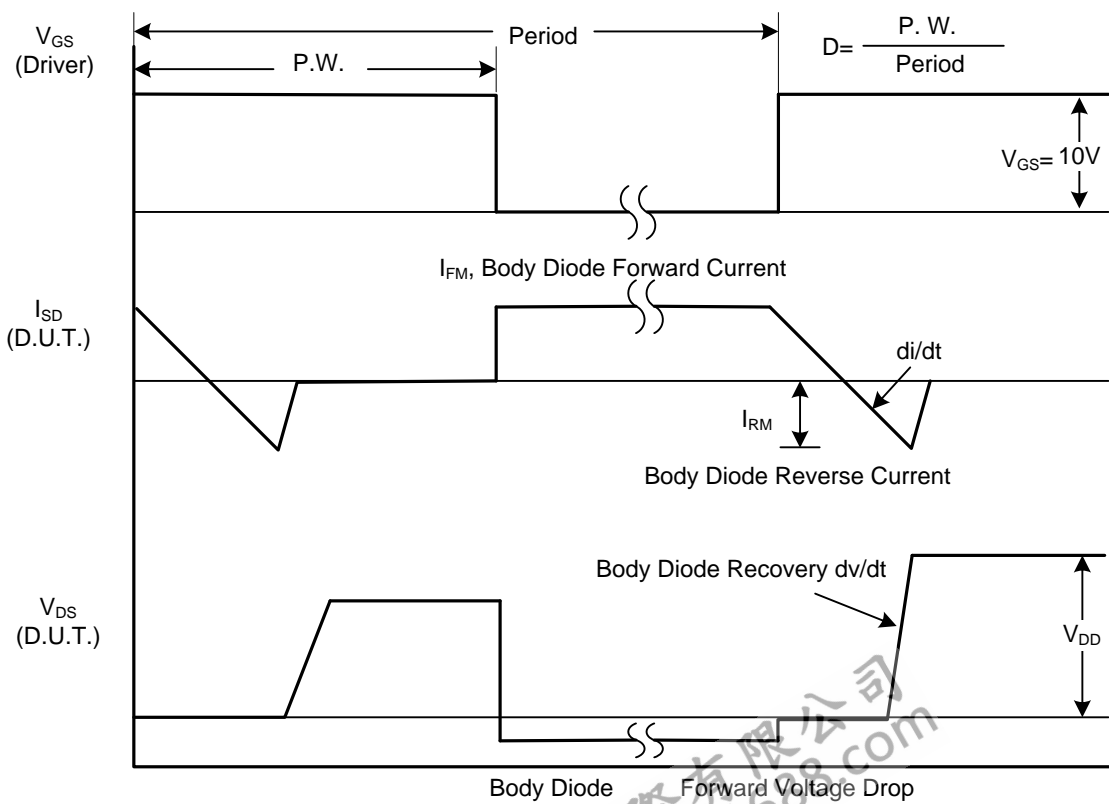
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

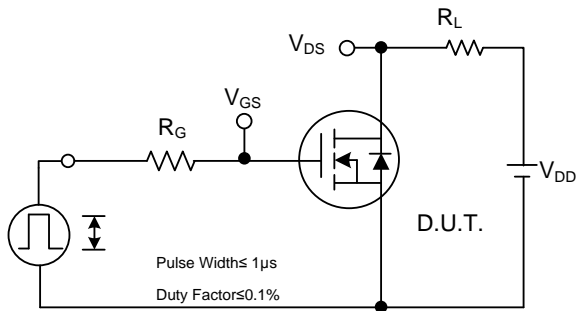


Peak Diode Recovery dv/dt Test Circuit

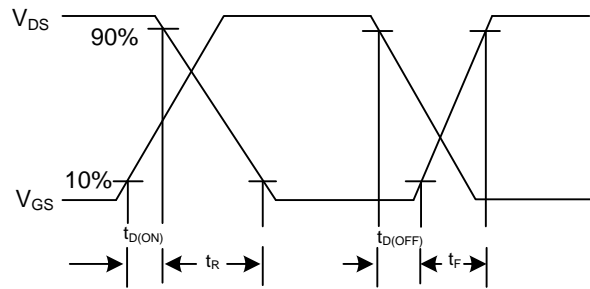


Peak Diode Recovery dv/dt Waveforms

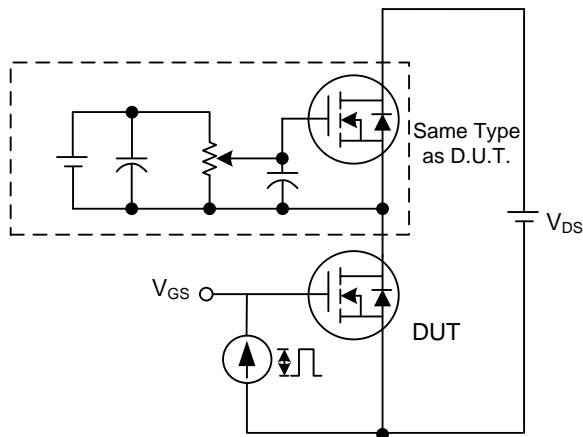
TEST CIRCUITS AND WAVEFORMS



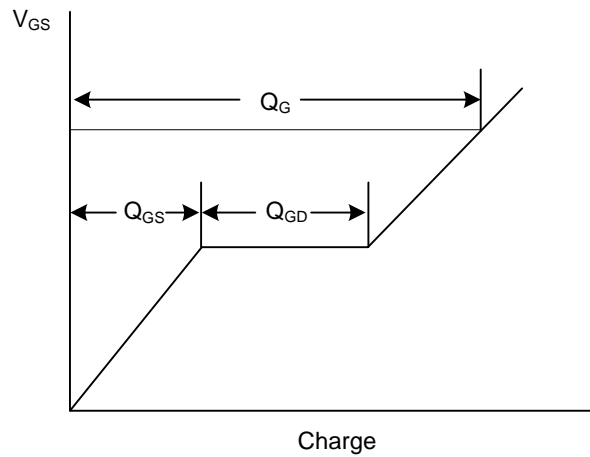
Switching Test Circuit



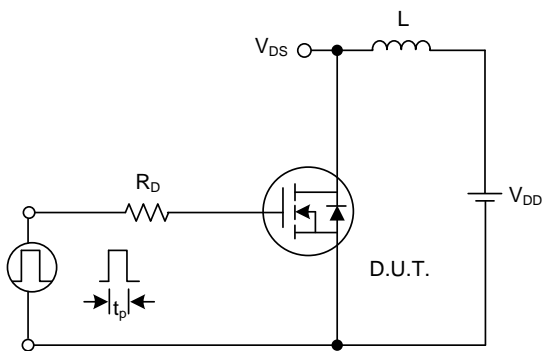
Switching Waveforms



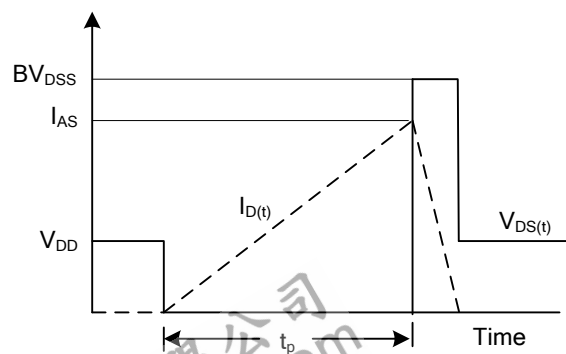
Gate Charge Test Circuit



Gate Charge Waveform

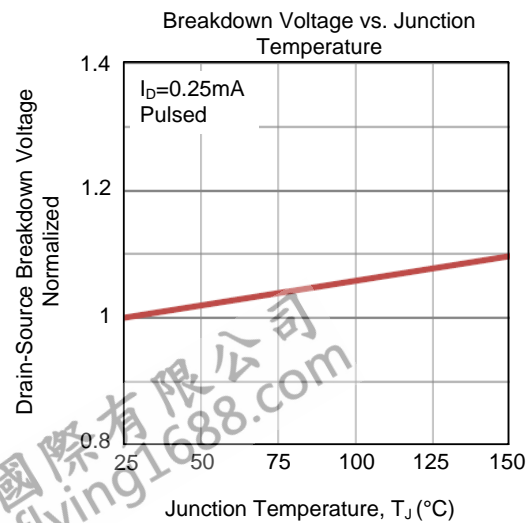
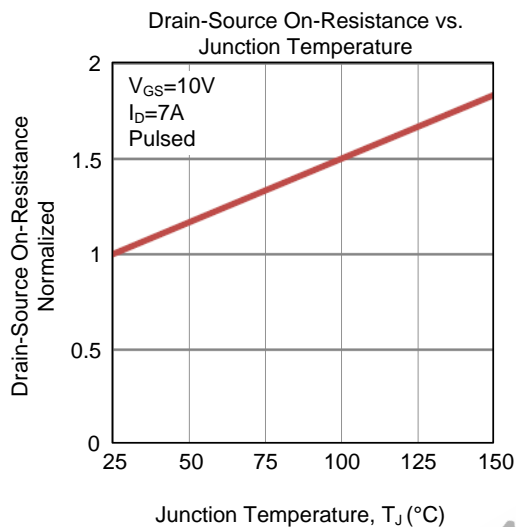
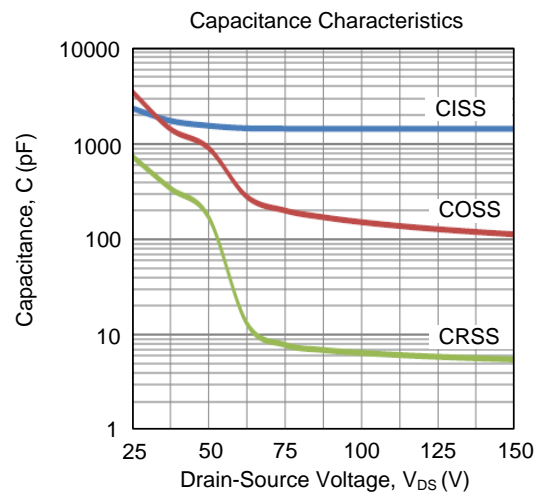
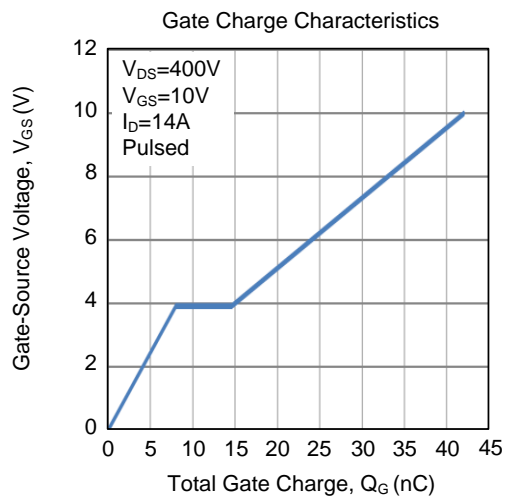
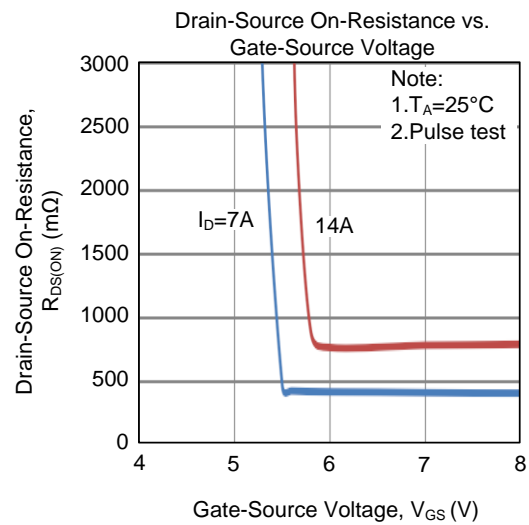
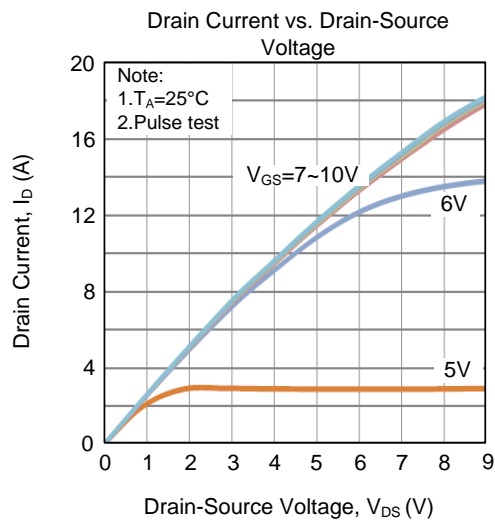


Unclamped Inductive Switching Test Circuit

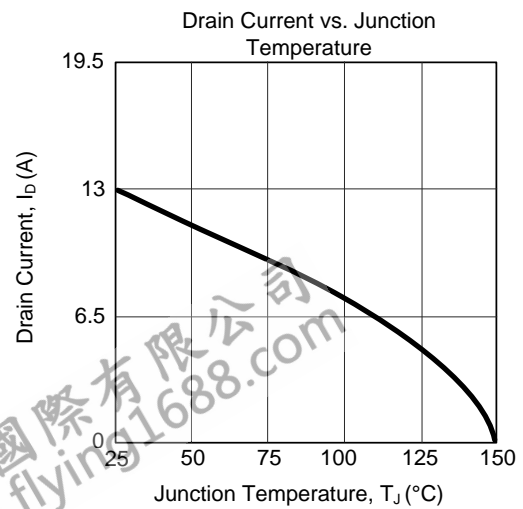
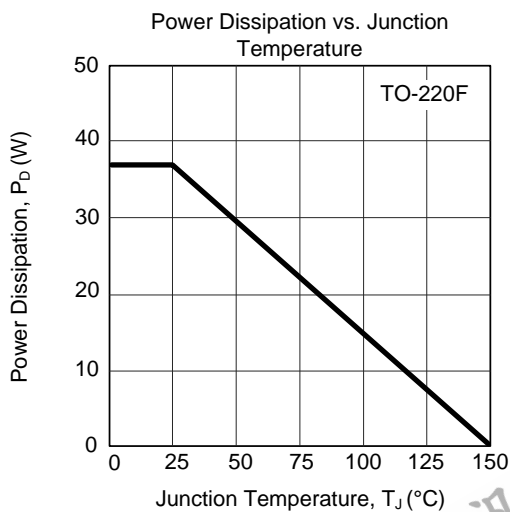
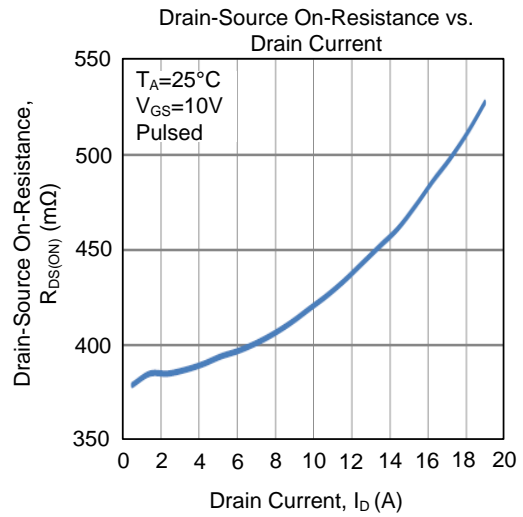
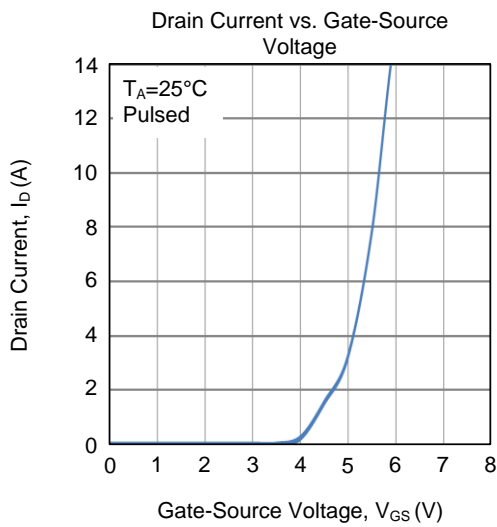
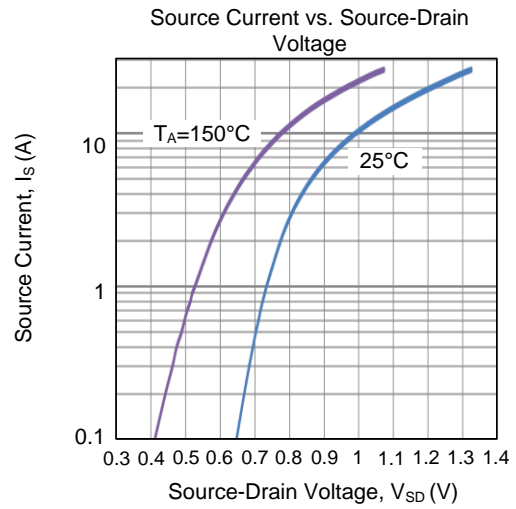
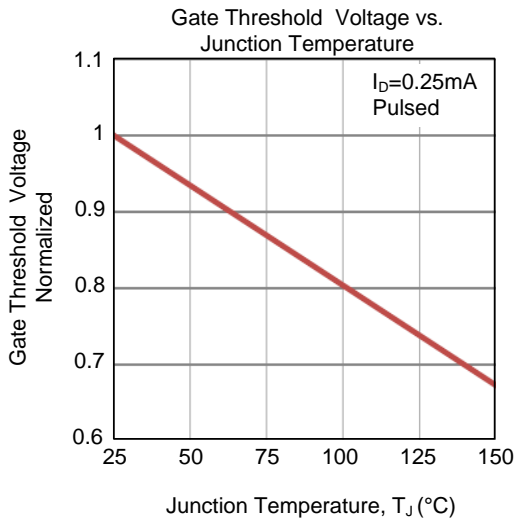


Unclamped Inductive Switching Waveforms

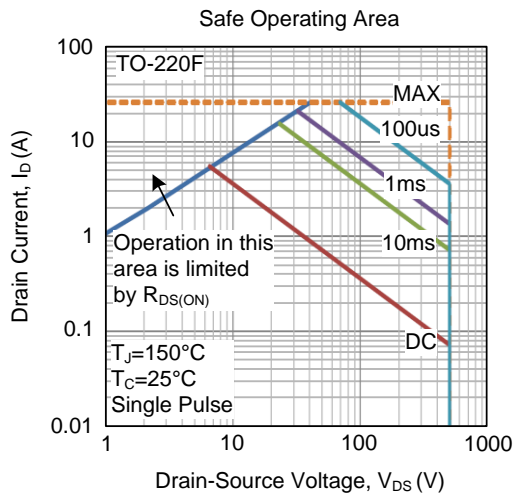
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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