



13N50K-MT

Power MOSFET

13A, 500V N-CHANNEL POWER MOSFET

DESCRIPTION

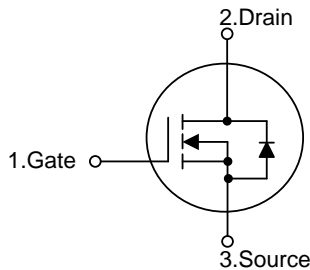
The UTC 13N50K-MT is a N-Channel enhancement mode power MOSFET. The device adopts planar stripe and uses DMOS technology to minimize and provide lower on-state resistance and faster switching speed. It can also withstand high energy pulse under the avalanche and commutation mode conditions.

The UTC 13N50K-MT is ideally suitable for high efficiency switch mode power supply, power factor correction, electronic lamp ballast based on half bridge topology.

FEATURES

- * $R_{DS(ON)} \leq 0.41\Omega @ V_{GS}=10V, I_D=6.5A$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness

SYMBOL

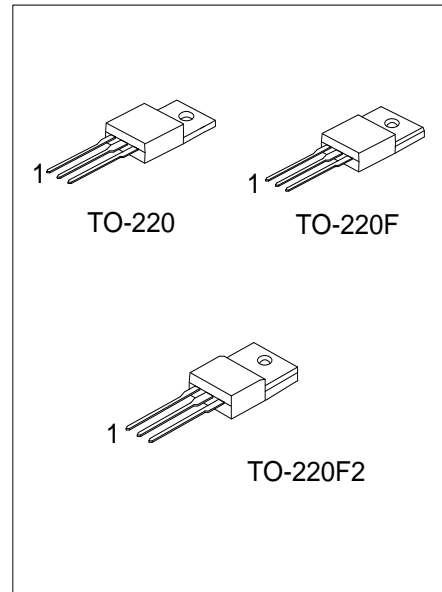


ORDERING INFORMATION

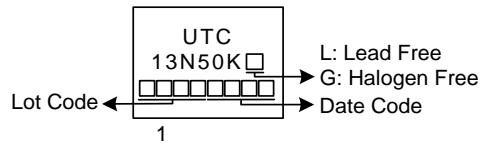
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
13N50KL-TA3-T	13N50KG-TA3-T	TO-220	G	D	S	Tube
13N50KL-TF2-T	13N50KG-TF2-T	TO-220F2	G	D	S	Tube
13N50KL-TF3-T	13N50KG-TF3-T	TO-220F	G	D	S	Tube

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

<p>13N50KG-TA3-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube (2) TA3: TO-220, TF2: TO-220F2, TF3: TO-220F (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
Continuous Drain Current	I_D	13	A
Pulsed Drain Current (Note 2)	I_{DM}	26	A
Single Pulsed Avalanche Energy (Note 3)	E_{AS}	625	mJ
Peak Diode Recovery dv/dt (Note 4)	dv/dt	4.5	V/ns
Power Dissipation	TO-220	P_D	160
	TO-220F/TO-220F2		35
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. $L = 7.39\text{mH}$, $I_{AS} = 13\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 13\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ **THERMAL DATA**

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	1.28
	TO-220F/TO-220F2		3.57

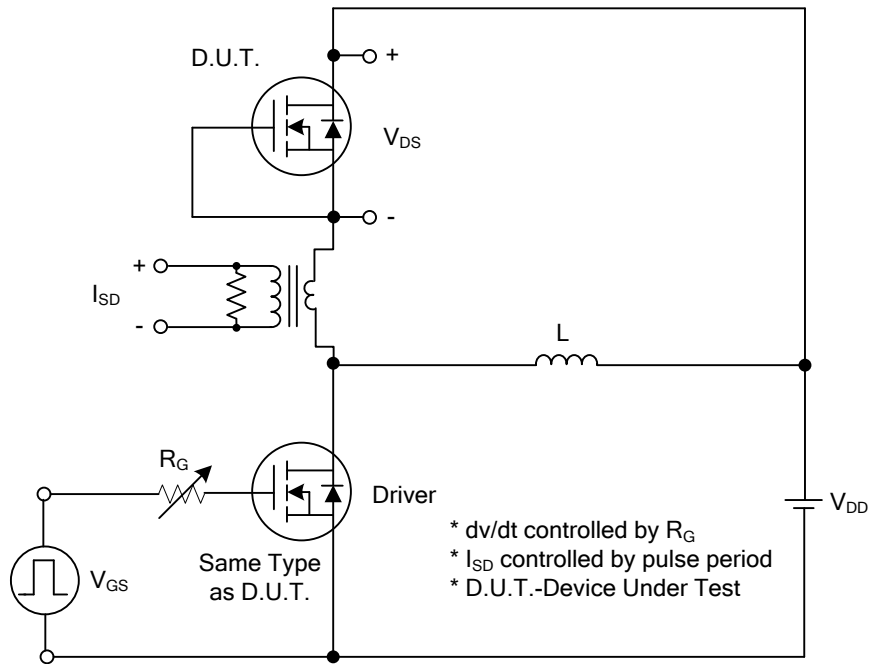
■ **ELECTRICAL CHARACTERISTICS** ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	500			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 500V, V_{GS} = 0V$			10	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = 30V, V_{DS} = 0V$			100	nA
		$V_{GS} = -30V, V_{DS} = 0V$			-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	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 6.5A$		0.35	0.41	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1.0MHz$		1960		pF
Output Capacitance	C_{OSS}			204		pF
Reverse Transfer Capacitance	C_{RSS}			13		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q_G	$V_{DS}=400V, V_{GS}=10V, I_D=13A$ (Note 1, 2)		39		nC
Gate-Source Charge	Q_{GS}			8		nC
Gate-Drain Charge	Q_{GD}			9		nC
Turn-On Delay Time	$t_{D(ON)}$	$V_{DS}=100V, I_D=13A, R_G=25\Omega$ (Note 1, 2)		24		nS
Turn-On Rise Time	t_R			22		nS
Turn-Off Delay Time	$t_{D(OFF)}$			138		nS
Turn-Off Fall Time	t_F			35		nS
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				13	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				26	A
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=13A$			1.4	V
Reverse Recovery Time (Note 1)	t_{rr}	$I_S=13A, V_{GS}=0V$ $di/dt=100A/\mu s$		340		ns
Reverse Recovery Charge	Q_{rr}			3.9		μC

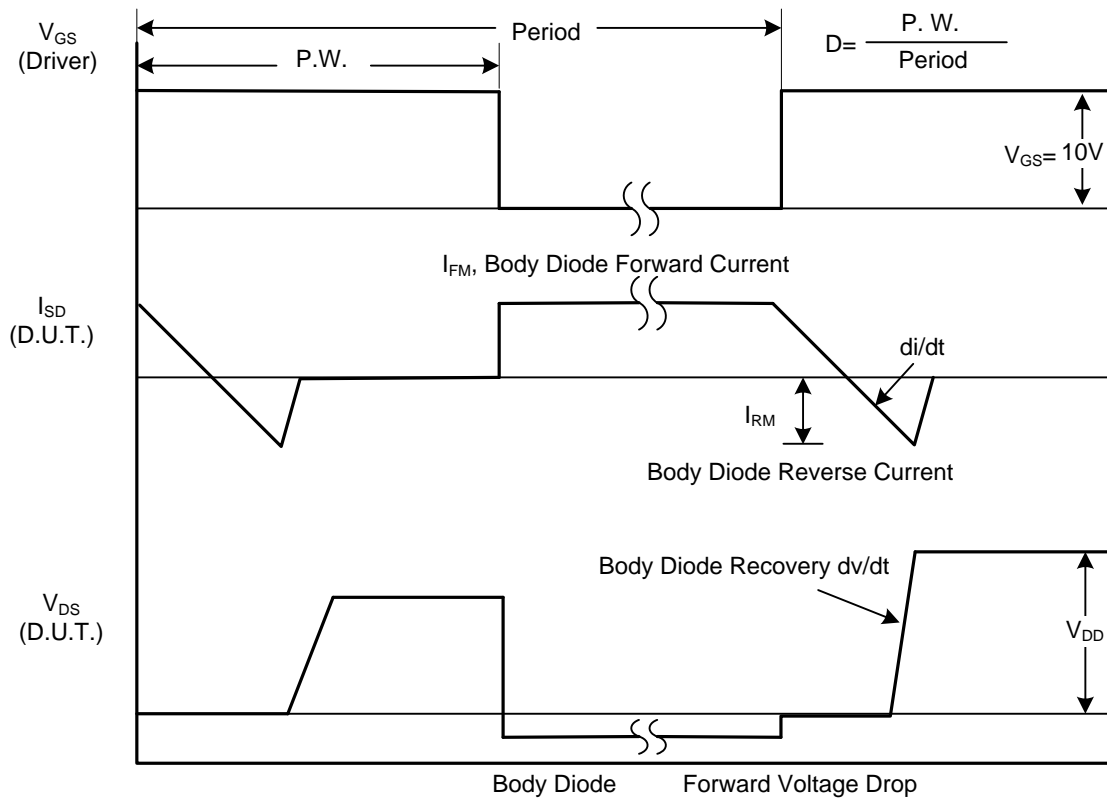
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

2. Essentially independent of operating ambient temperature

TEST CIRCUITS AND WAVEFORMS

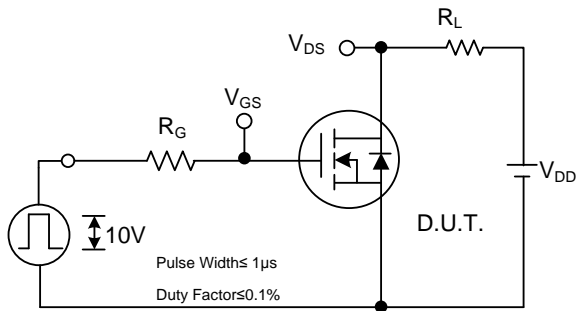


Peak Diode Recovery dv/dt Test Circuit

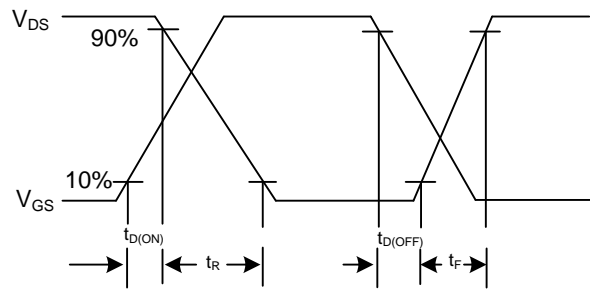


Peak Diode Recovery dv/dt Waveforms

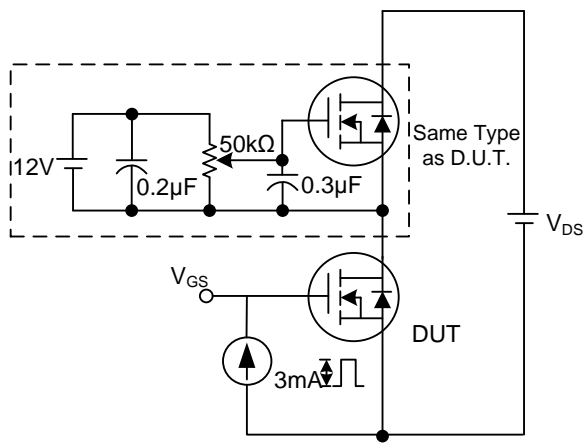
TEST CIRCUITS AND WAVEFORMS



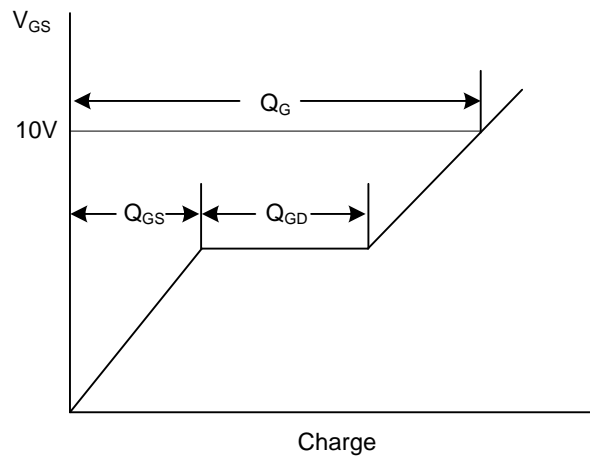
Switching Test Circuit



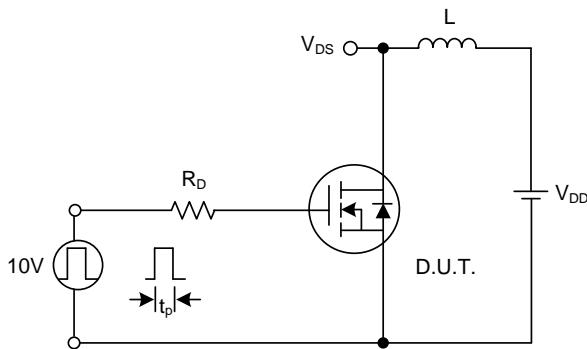
Switching Waveforms



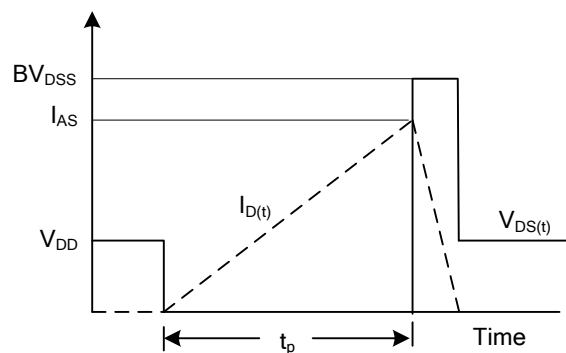
Gate Charge Test Circuit



Gate Charge Waveform

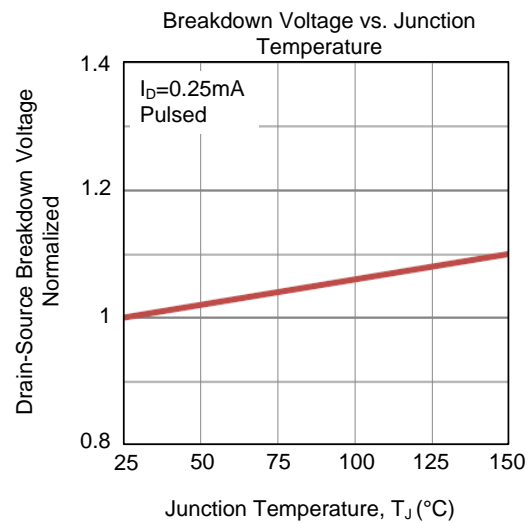
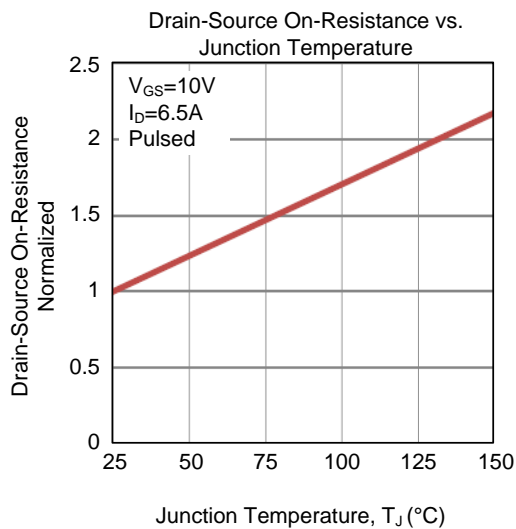
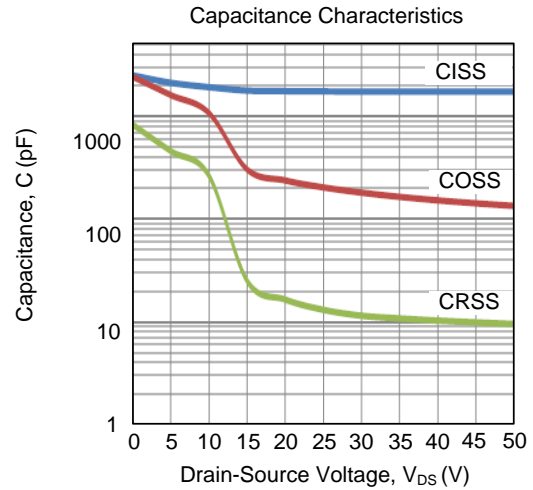
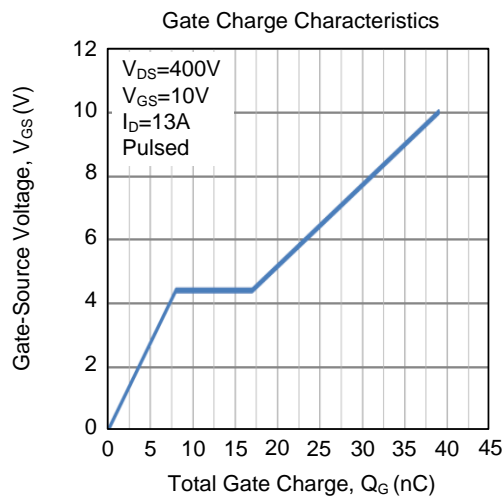
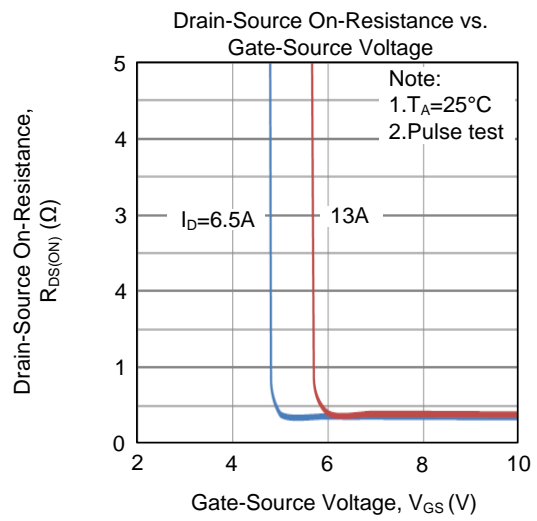
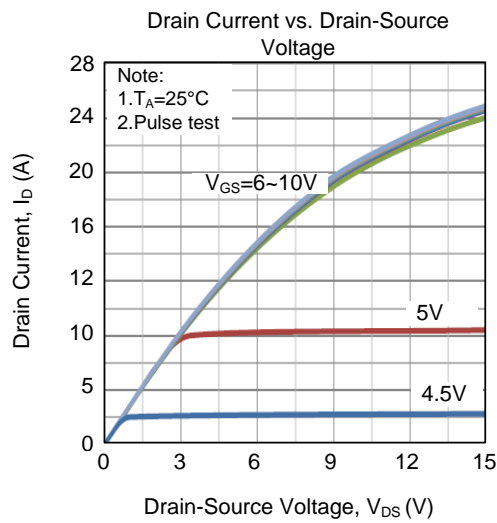


Unclamped Inductive Switching Test Circuit

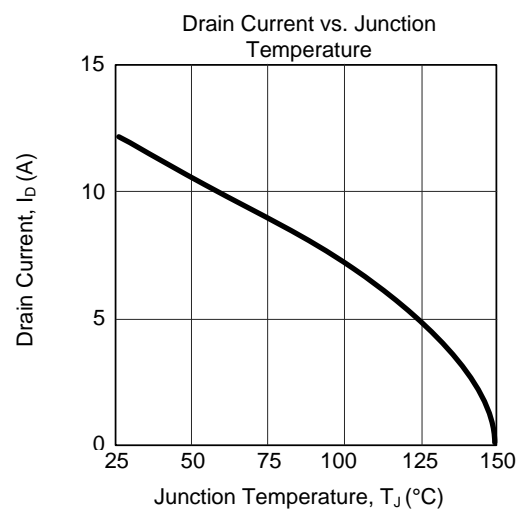
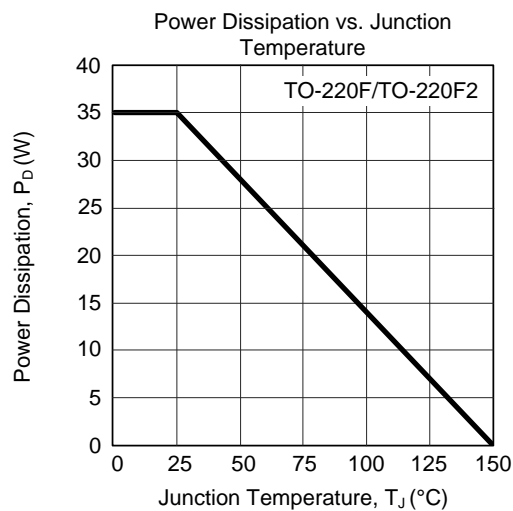
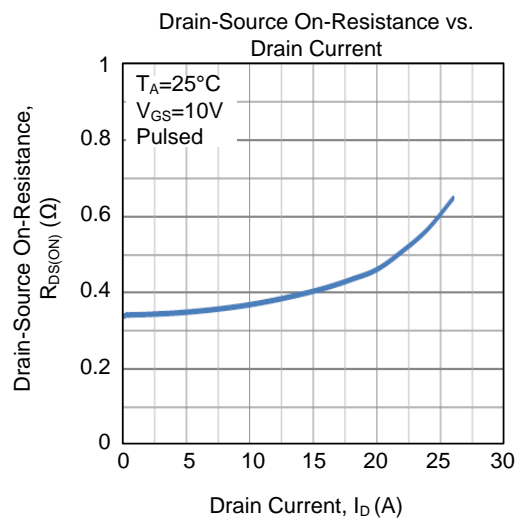
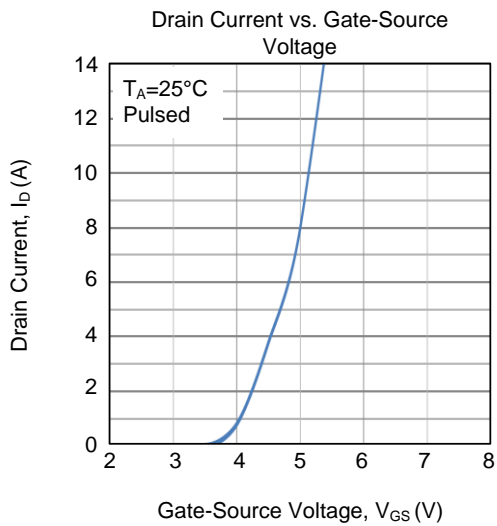
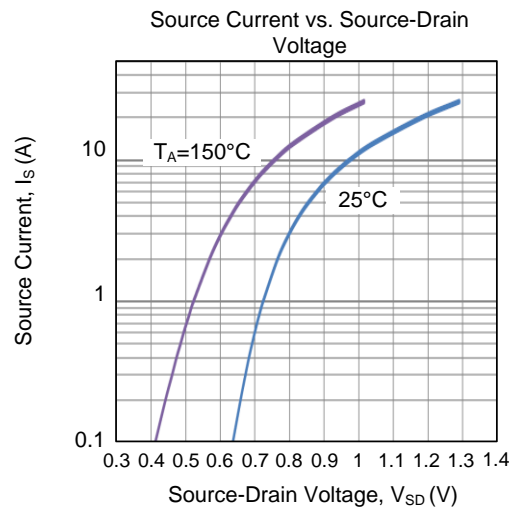
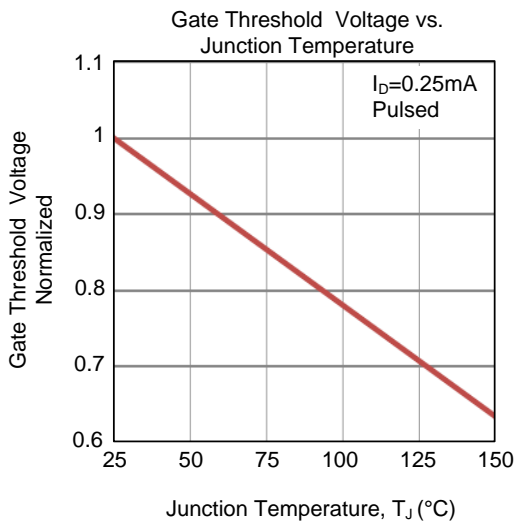


Unclamped Inductive Switching Waveforms

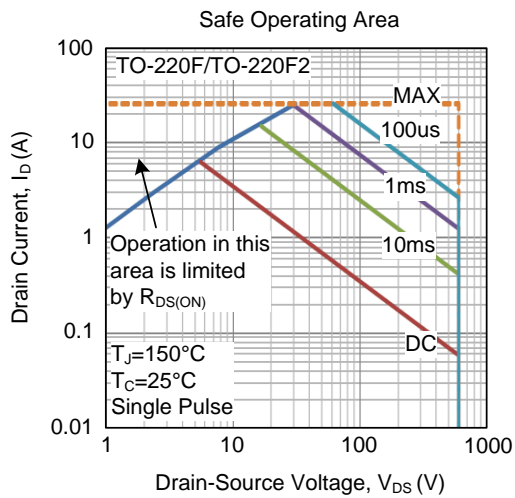
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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