

14N65-TC

Power MOSFET

14A, 650V N-CHANNEL POWER MOSFET

DESCRIPTION

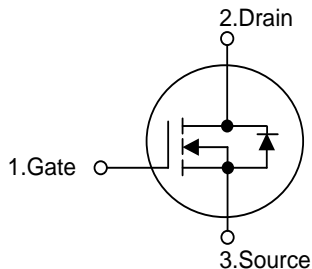
The UTC 14N65-TC are N-Channel enhancement mode power field effect transistors (MOSFET) which are produced using UTC's proprietary, planar stripe, DMOS technology.

These devices are suited for high efficiency switch mode power supply. To minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode the advanced technology has been especially tailored.

FEATURES

- * $R_{DS(ON)} \leq 0.7 \Omega @ V_{GS}=10V, I_D=7.0A$
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

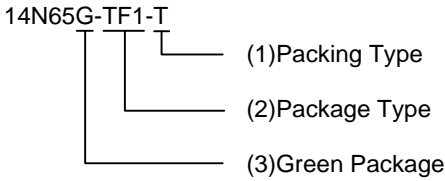
SYMBOL

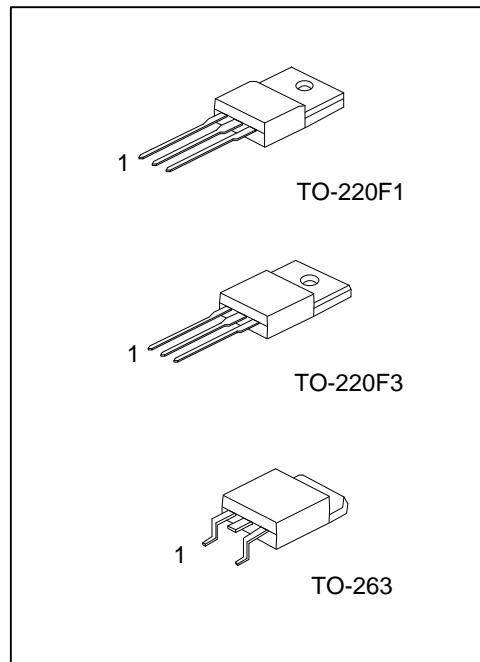


ORDERING INFORMATION

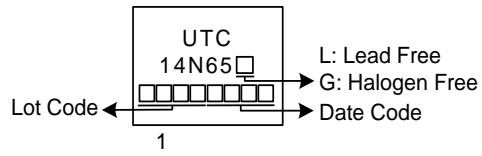
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
14N65L-TF1-T	14N65G-TF1-T	TO-220F1	G	D	S	Tube
14N65L-TF3T-T	14N65G-TF3T-T	TO-220F3	G	D	S	Tube
14N65L-TQ2-T	14N65G-TQ2-T	TO-263	G	D	S	Tube
14N65L-TQ2-R	14N65G-TQ2-R	TO-263	G	D	S	Tape Reel

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

<p>14N65G-TF1-T</p> 	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TF1: TO-220F1, TF3: TO-220F3, TQ2: TO-263</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}	650	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}	530	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.2	V/ns
Power Dissipation	TO-220F/TO-220F1	P_D	50	W
	TO-220F3			
	TO-263		235	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. $L = 60\text{mH}$, $I_{AS} = 4.2\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 14\text{A}$, $di/dt \leq 200\text{A/s}$, $V_{DD} \leq BV_{DSS}$ Starting $T_J = 25^\circ\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ_{JA}	62.5	$^\circ\text{C/W}$
Junction to Case	TO-220F/TO-220F1	θ_{JC}	2.5	$^\circ\text{C/W}$
	TO-220F3			
	TO-263		0.53	$^\circ\text{C/W}$

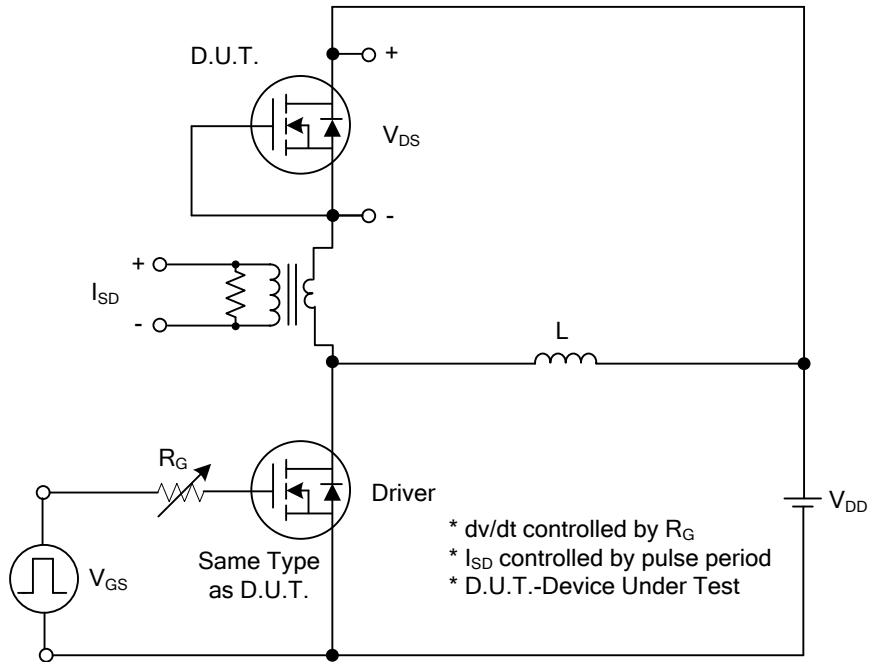
■ **ELECTRICAL CHARACTERISTICS** ($T_C=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$			10	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 30V, V_{DS}=0V$			± 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	$R_{DS(ON)}$	$V_{GS}=10V, I_D=7.0A$		0.52	0.7	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1\text{MHz}$		1960		pF
Output Capacitance	C_{OSS}			200		pF
Reverse Transfer Capacitance	C_{RSS}			11		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q_G	$V_{DS}=300V, V_{GS}=10V, I_D=10A$ $I_G=1\text{mA}$ (Note 1, 2)		41		nC
Gate-Source Charge	Q_{GS}			8		nC
Gate-Drain Charge	Q_{GD}			9.4		nC
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=300V, V_{GS}=10V, I_D=10A,$ $R_G=25\Omega$ (Note 1, 2)		26		ns
Turn-On Rise Time	t_R			20		ns
Turn-Off Delay Time	$t_{D(OFF)}$			130		ns
Turn-Off Fall Time	t_F			32		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	V_{SD}	$V_{GS}=0V, I_S=14A$			1.4	V
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_S=14A, di/dt=100A/\mu s$		364		ns
Reverse Recovery Charge	Q_{rr}			4.5		μC

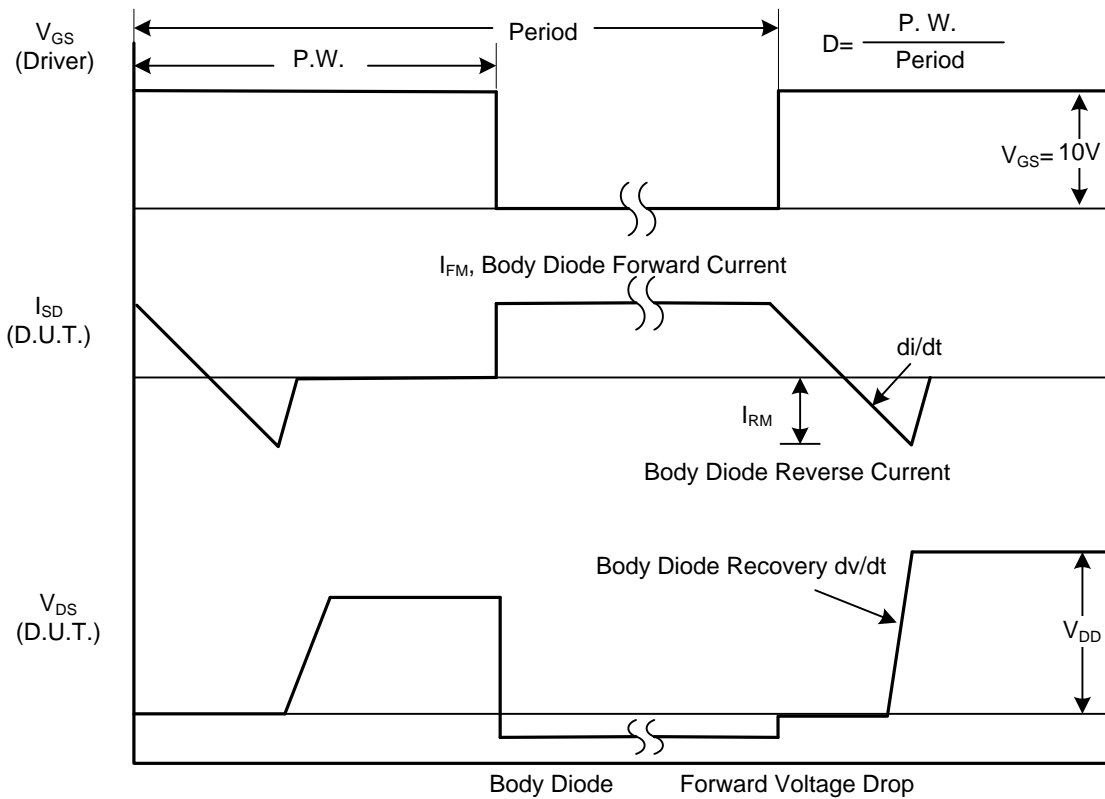
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

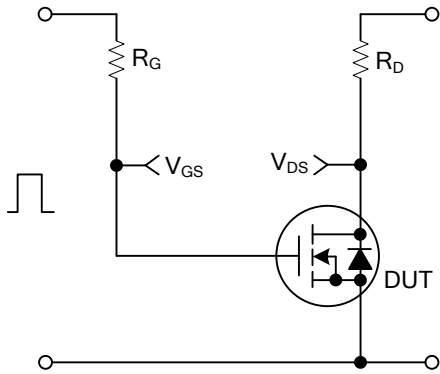


Peak Diode Recovery dv/dt Test Circuit

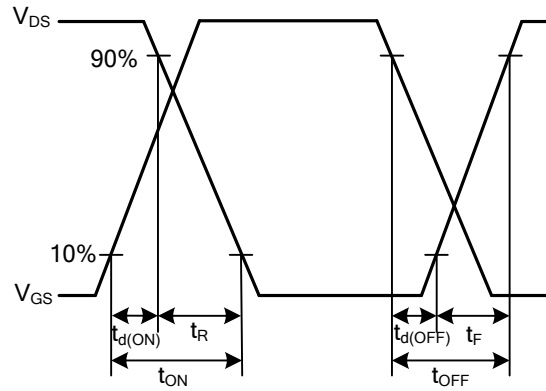


Peak Diode Recovery dv/dt Waveforms

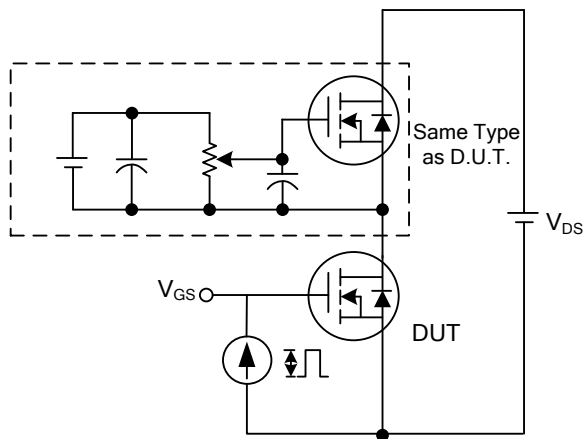
TEST CIRCUITS AND WAVEFORMS



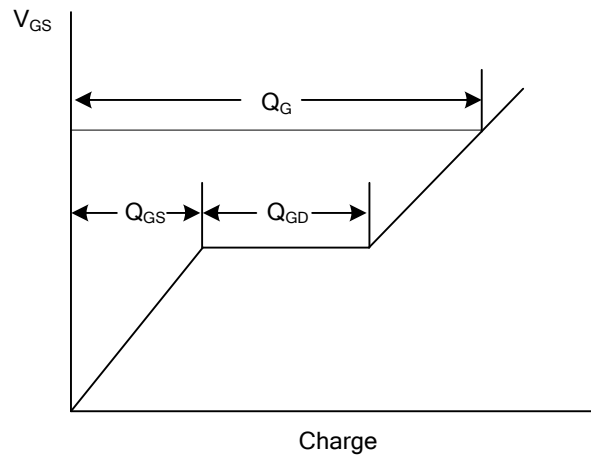
Switching Test Circuit



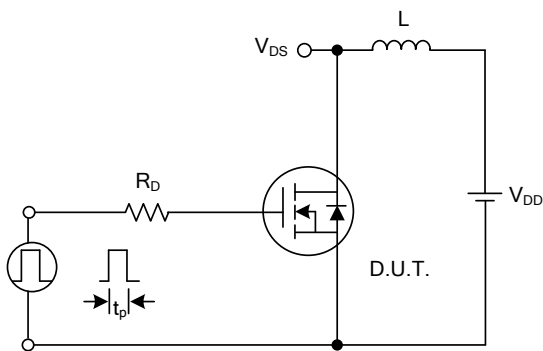
Switching Waveforms



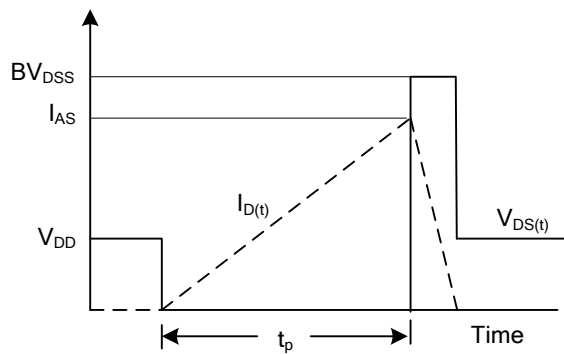
Gate Charge Test Circuit



Gate Charge Waveform

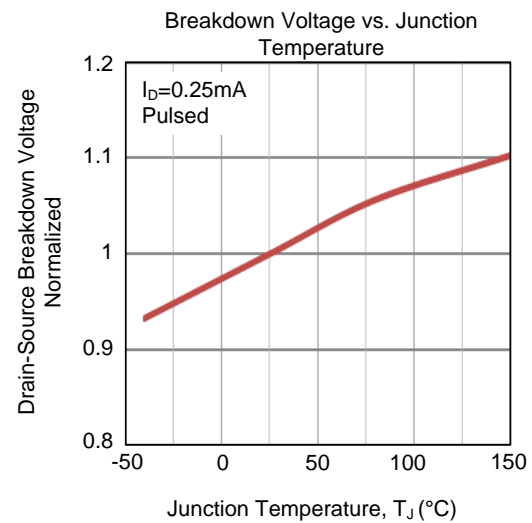
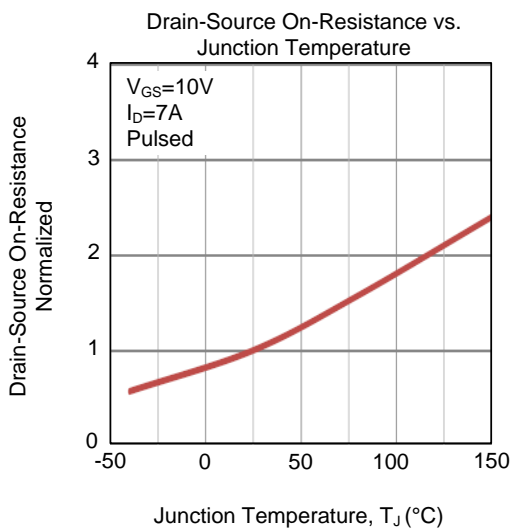
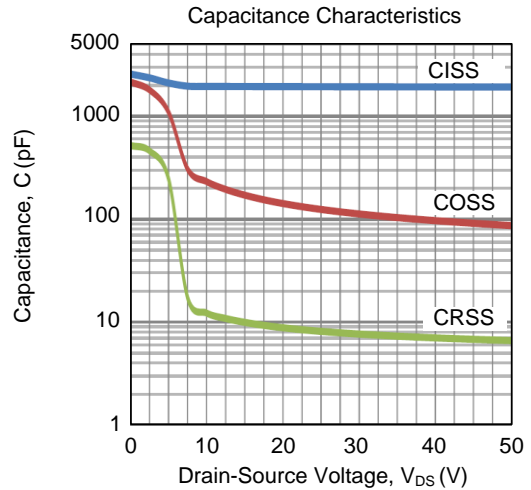
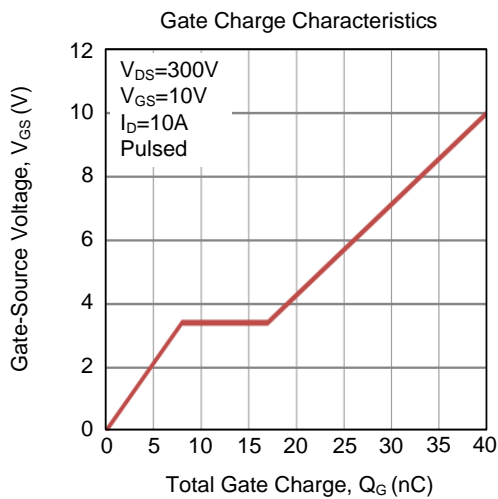
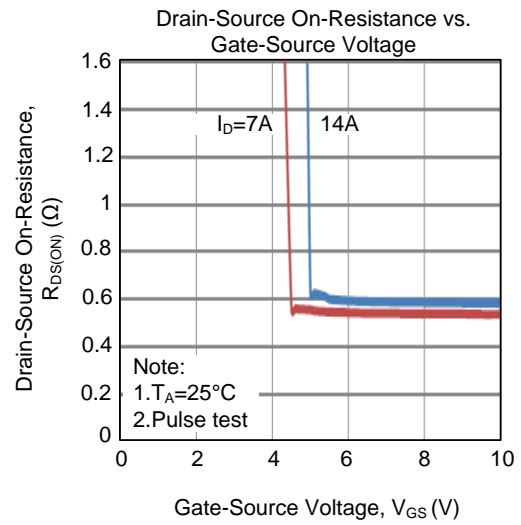
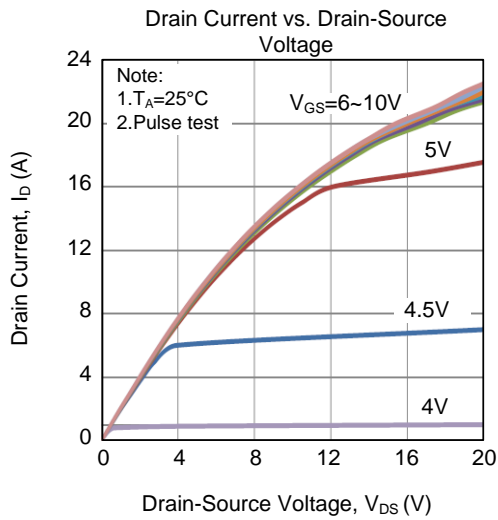


Unclamped Inductive Switching Test Circuit

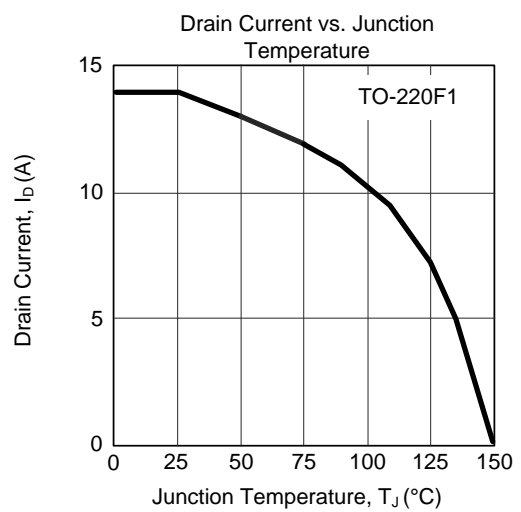
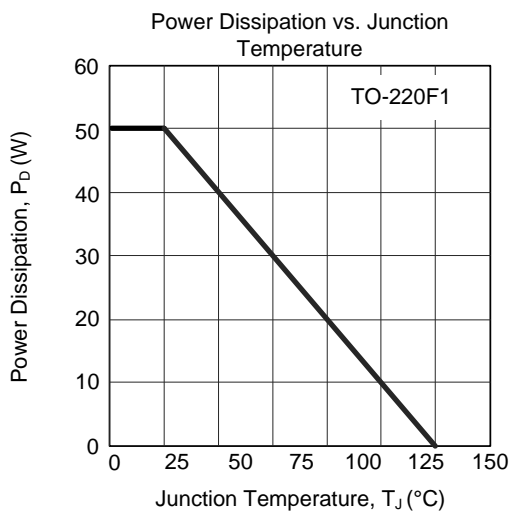
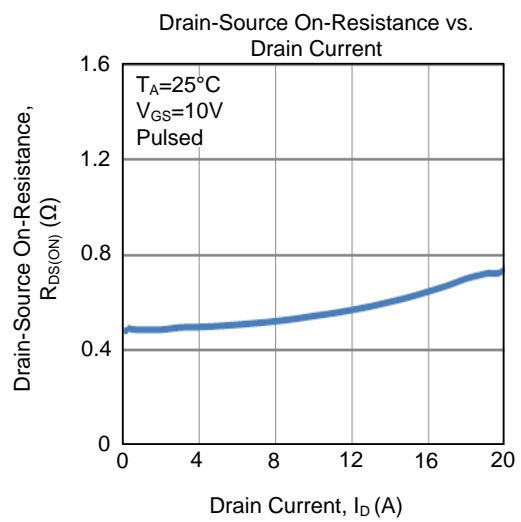
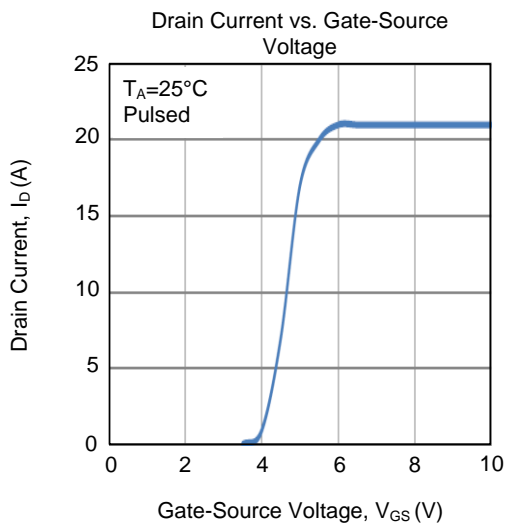
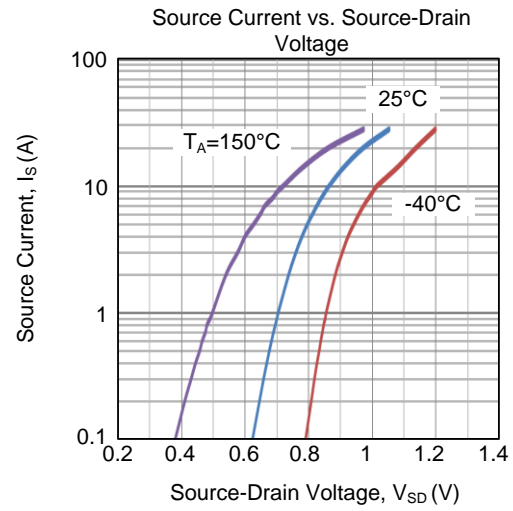
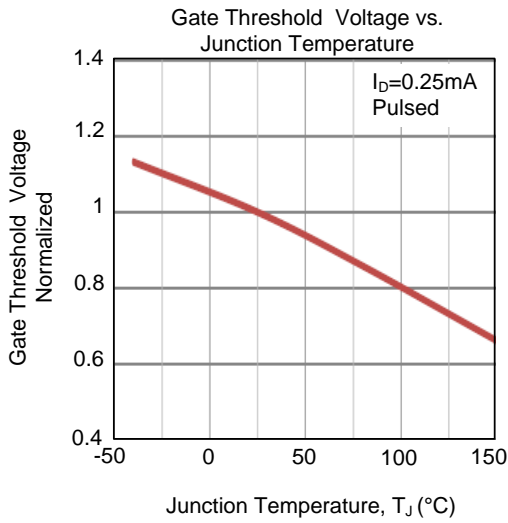


Unclamped Inductive Switching Waveforms

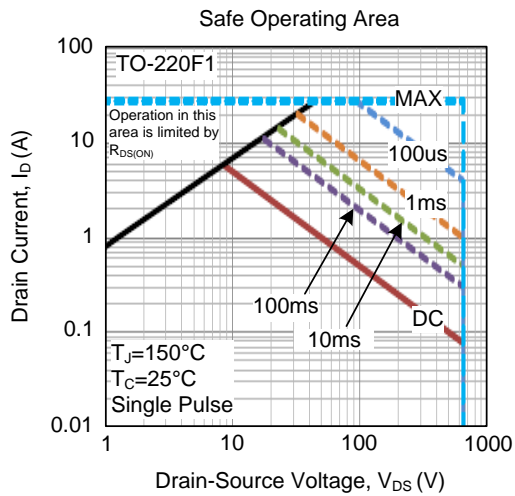
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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