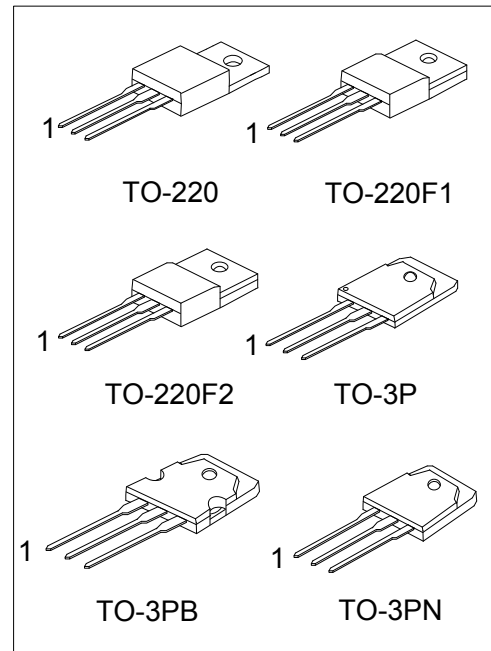
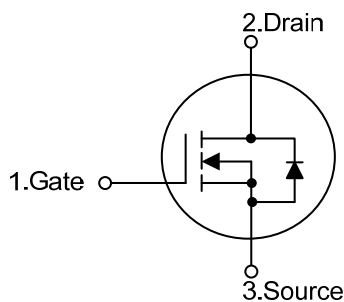


**12N90-FC****Power MOSFET****12A, 900V N-CHANNEL
POWER MOSFET****DESCRIPTION**

The UTC **12N90-FC** provide excellent $R_{DS(ON)}$, low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

FEATURES

- * $R_{DS(ON)} \leq 0.95 \Omega$ @ $V_{GS}=10V$, $I_D=6.0A$
- * Fast Switching Capability
- * Avalanche Energy Specified

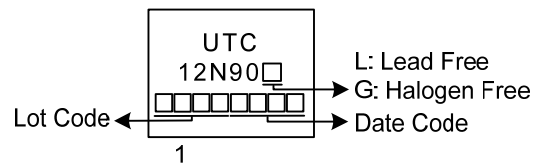
SYMBOL**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
12N90L-TA3-T	12N90G-TA3-T	TO-220	G	D	S	Tube
12N90L-TF1-T	12N90G-TF1-T	TO-220F1	G	D	S	Tube
12N90L-TF3-T	12N90G-TF3-T	TO-220F	G	D	S	Tube
12N90L-T3B-T	12N90G-T3B-T	TO-3PB	G	D	S	Tube
12N90L-T3P-T	12N90G-T3P-T	TO-3P	G	D	S	Tube
12N90L-T3N-T	12N90G-T3N-T	TO-3PN	G	D	S	Tube

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

12N90G-TA3-T (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2 T3B: TO-3PB, T3P: TO-3P, T3N: TO-3PN (3) G: Halogen Free and Lead Free, L: Lead Free
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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}	900	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	12	A
	Pulsed (Note 2)	I_{DM}	24	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	106	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.97	V/ns
Power Dissipation	TO-220	P_D	140	W
	TO-220F1/TO-220F2		42	W
	TO-3P/TO-3PB		250	W
	TO-3PN			
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. $L=10\text{mH}$, $I_{AS}=4.6\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 12\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F1	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-220F2			
	TO-3P/TO-3PB		40	$^\circ\text{C}/\text{W}$
	TO-3PN			
Junction to Case	TO-220	θ_{JC}	0.89	$^\circ\text{C}/\text{W}$
	TO-220F1/TO-220F2		2.97	$^\circ\text{C}/\text{W}$
	TO-3P/TO-3PB		0.5	$^\circ\text{C}/\text{W}$
	TO-3PN			

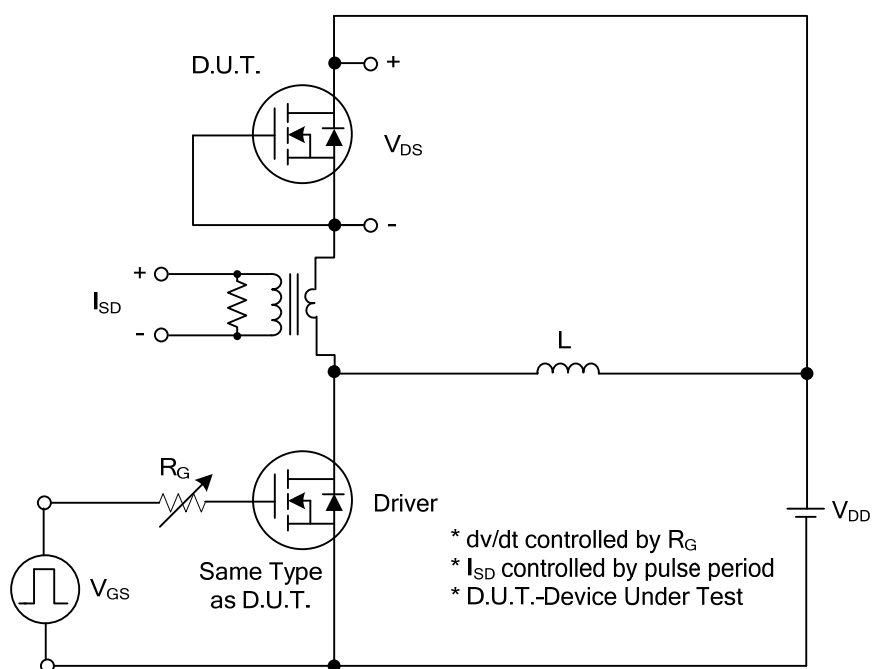
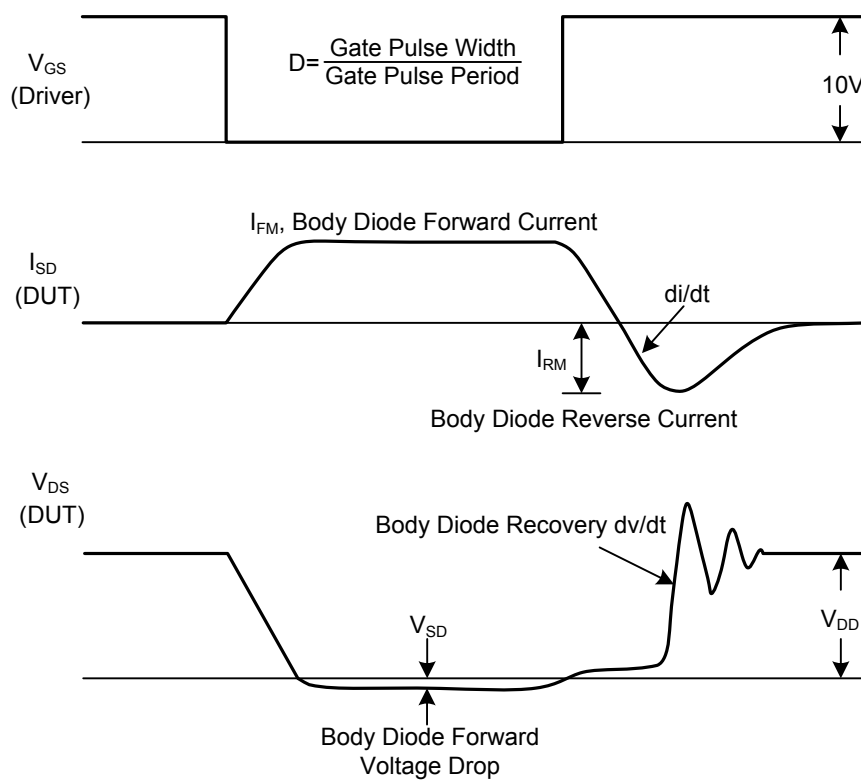
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	900			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=900V, V_{GS}=0V$			10	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 30V, V_{DS}=0V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	3.0		5.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=6.0A$			0.95	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{GS}=0V, V_{DS}=25V, f=1MHz$		2300		pF
Output Capacitance	C_{OSS}			200		pF
Reverse Transfer Capacitance	C_{RSS}			0.8		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q_G	$V_{DS}=100V, V_{GS}=10V, I_D=12A$ $I_G=1mA$ (Note 1, 2)		35		nC
Gate-Source Charge	Q_{GS}			12		nC
Gate-Drain Charge	Q_{DD}			3		nC
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=100V, V_{GS}=10V, I_D=12A,$ $R_G=25\Omega$ (Note 1, 2)		34		ns
Turn-On Rise Time	t_R			17		ns
Turn-Off Delay Time	$t_{D(OFF)}$			82		ns
Turn-Off Fall Time	t_F			30		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				12	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				24	A
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=12A, V_{GS}=0V$			1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$I_S=12A, V_{GS}=0V,$		610		nS
Body Diode Reverse Recovery Charge	Q_{rr}	$dl_F/dt=100A/\mu s$		10		μC

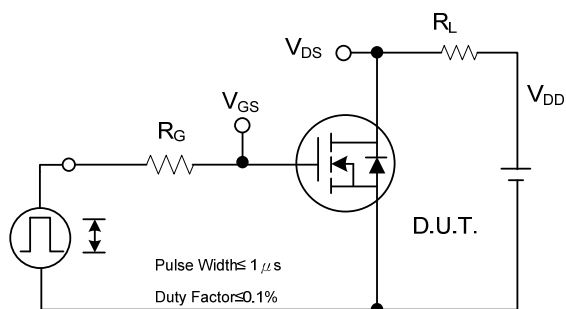
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

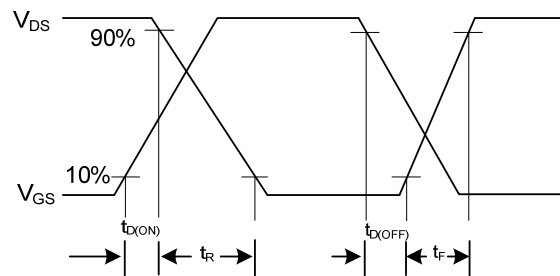
TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test CircuitPeak Diode Recovery dv/dt Waveforms

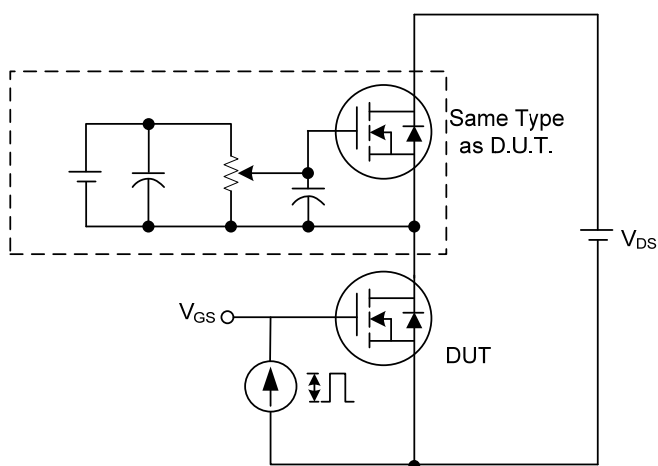
■ TEST CIRCUITS AND WAVEFORMS



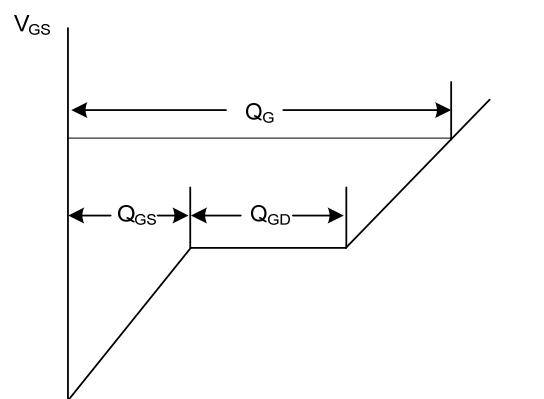
Switching Test Circuit



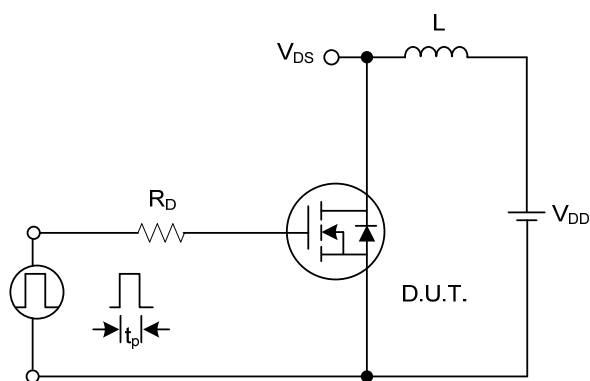
Switching Waveforms



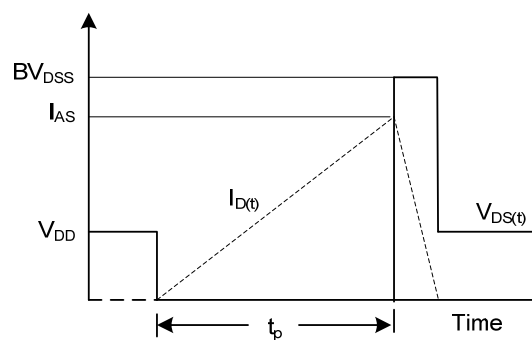
Gate Charge Test Circuit



Charge
Gate Charge Waveform

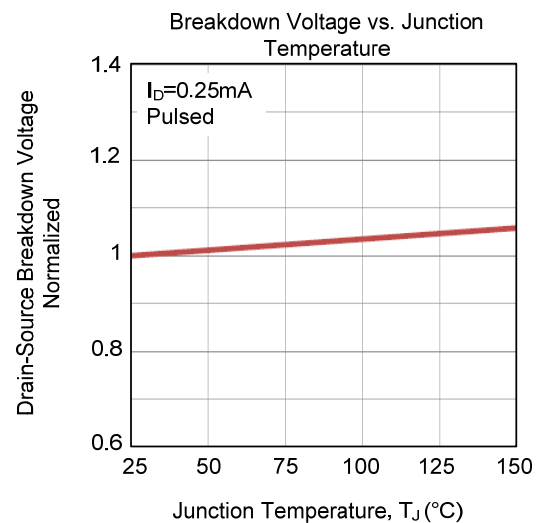
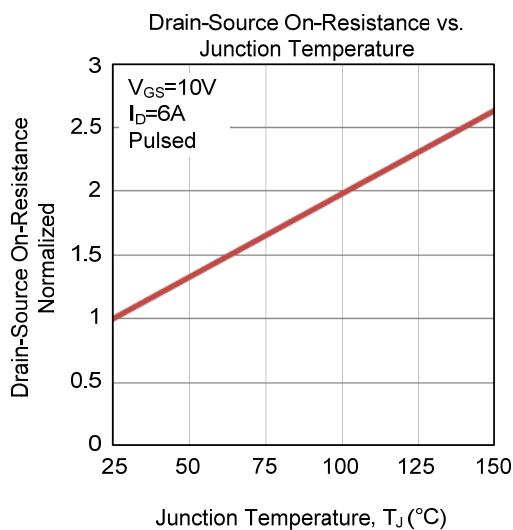
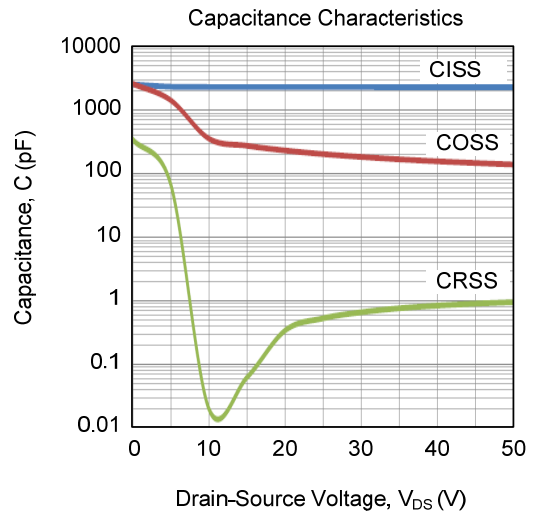
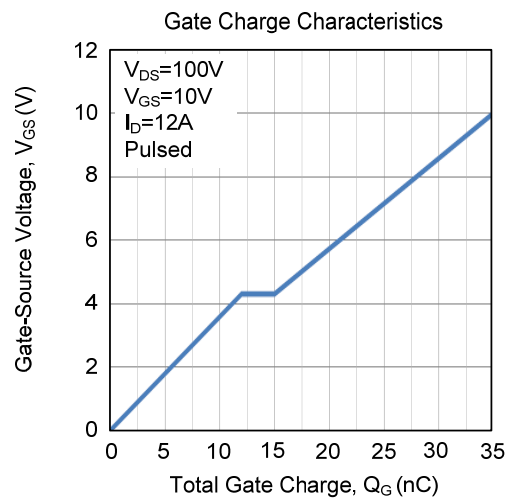
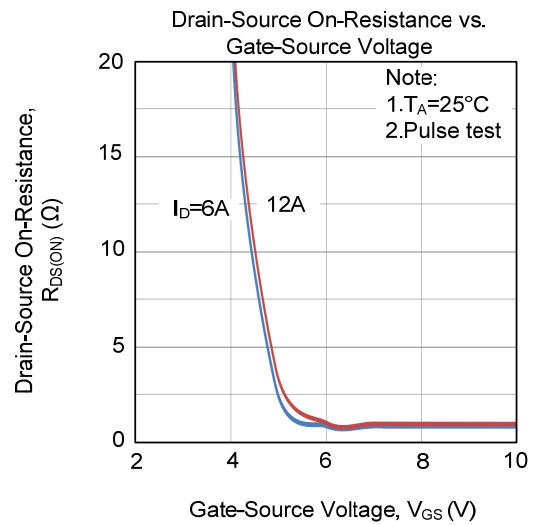
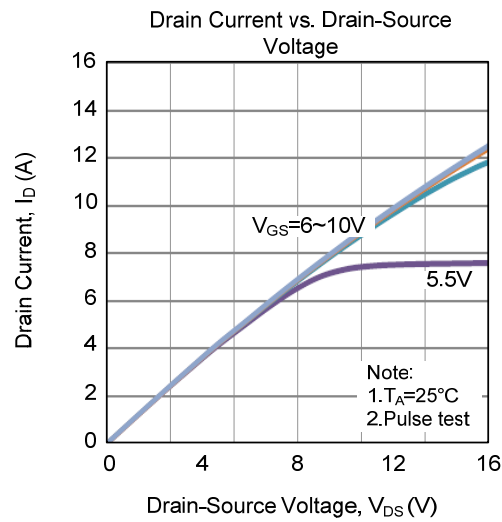


Unclamped Inductive Switching Test Circuit

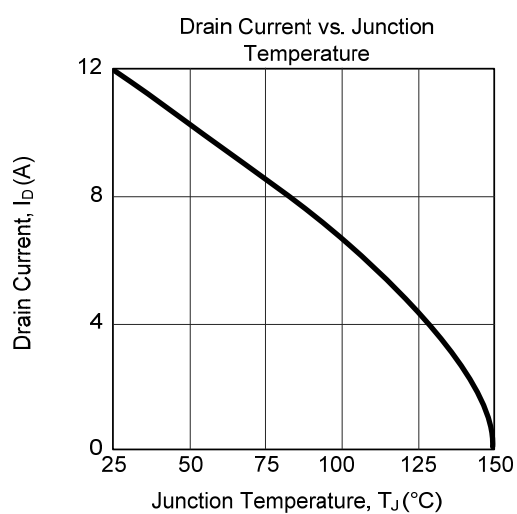
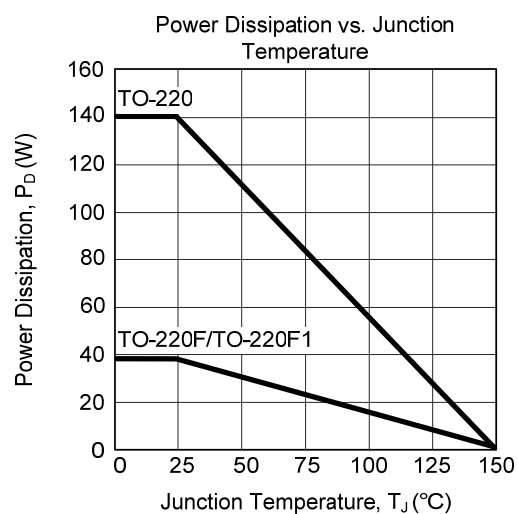
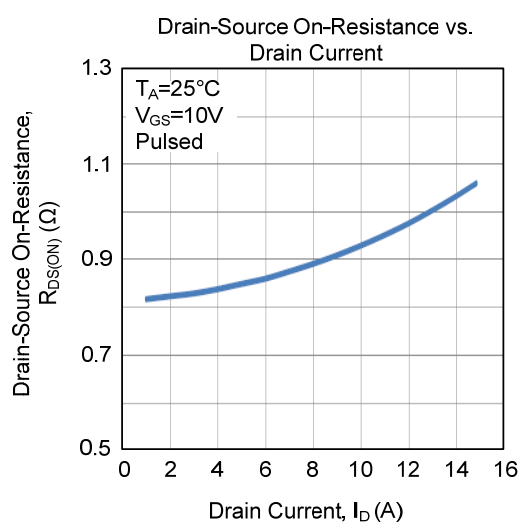
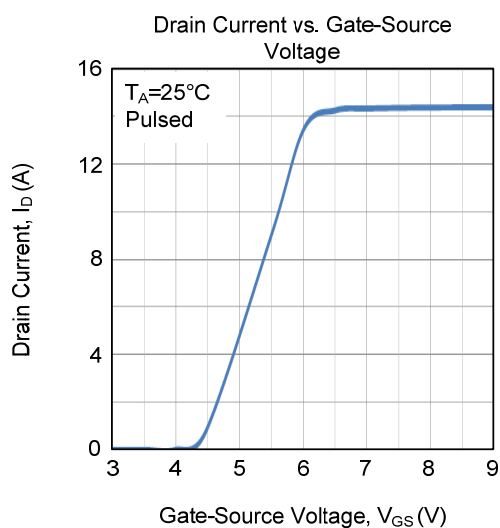
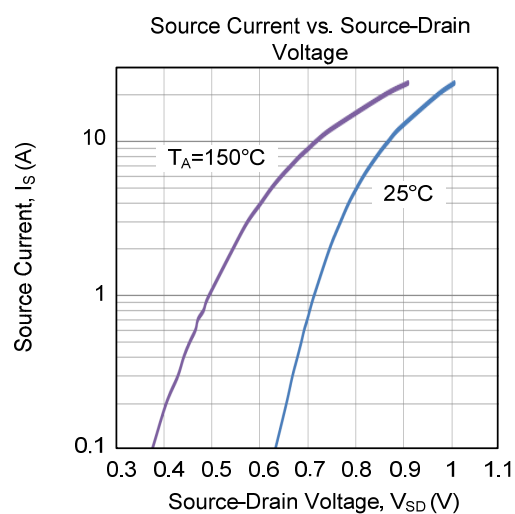
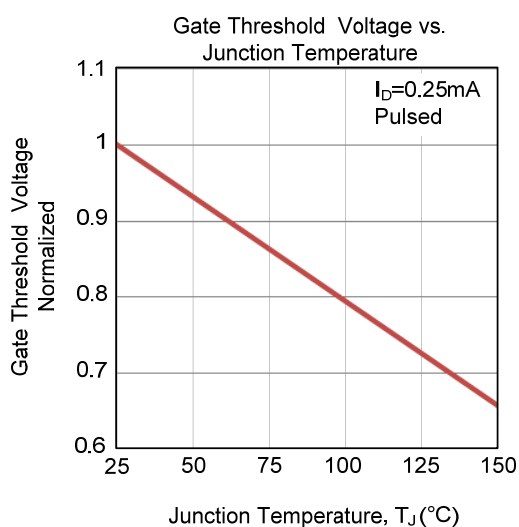


Unclamped Inductive Switching Waveforms

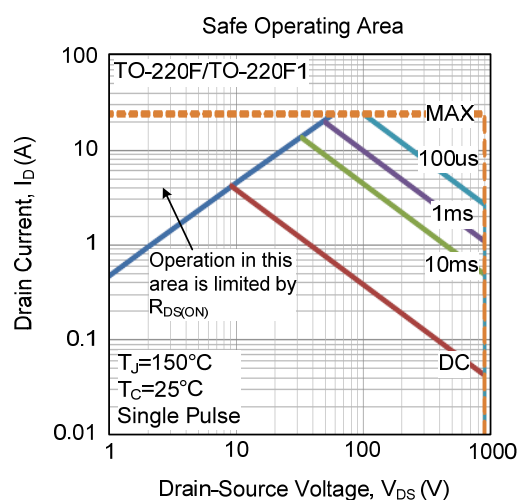
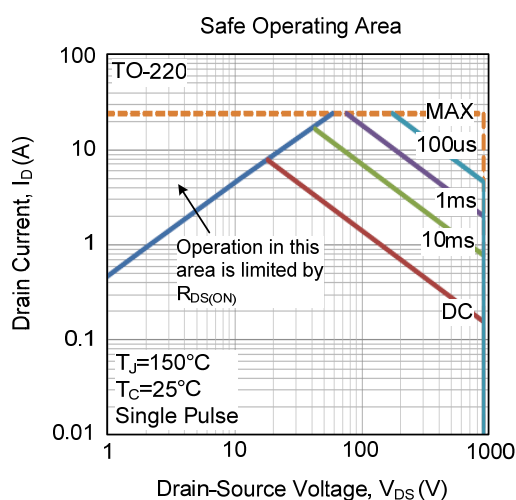
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



TYPICAL CHARACTERISTICS (Cont.)



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