



10N70

Power MOSFET

10A, 700V N-CHANNEL POWER MOSFET

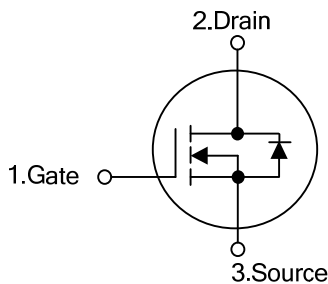
DESCRIPTION

The **UTC 10N70** 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 have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

FEATURES

- * $R_{DS(ON)} \leq 1.2\Omega$ @ $V_{GS}=10V, I_D=5.0A$
- * Fast switching
- * 100% avalanche tested
- * Improved dv/dt capability

SYMBOL

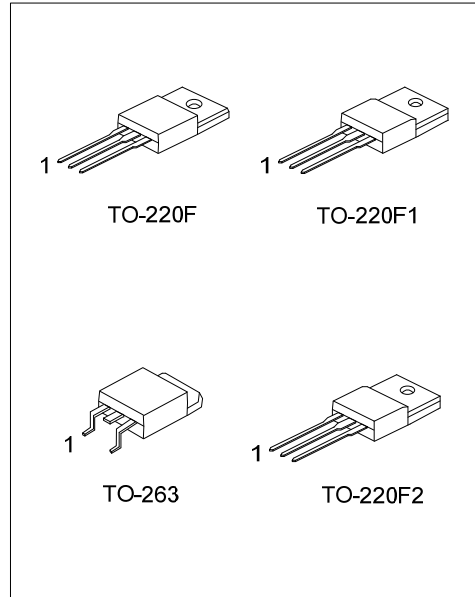


ORDERING INFORMATION

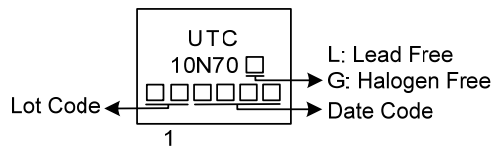
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
10N70L-TF1-T	10N70G-TF1-T	TO-220F1	G	D	S	Tube
10N70L-TF2-T	10N70G-TF2-T	TO-220F2	G	D	S	Tube
10N70L-TF3-T	10N70G-TF3-T	TO-220F	G	D	S	Tube
10N70L-TQ2-T	10N70G-TQ2-T	TO-263	G	D	S	Tube
10N70L-TQ2-R	10N70G-TQ2-R	TO-263	G	D	S	Tape Reel

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

<p>10N70G-TF1-T</p>	<p>(1) T: Tube, R: Tape Reel (2) TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F TQ2: TO-263 (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}	700	V
Gate-Source Voltage		V_{GSS}	± 30	V
Avalanche Current (Note 2)		I_{AR}	10	A
Drain Current	Continuous	I_D	10	A
	Pulsed (Note 2)	I_{DM}	40	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	600	mJ
	Repetitive (Note 2)	E_{AR}	15.6	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.5	V/ns
Power Dissipation	TO-220F/TO-220F1	P_D	50	W
	TO-220F2			
	TO-263		162	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. $L = 12\text{mH}$, $I_{AS} = 10\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$ 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 CHARACTERISTICS

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220F/TO-220F1	θ_{JC}	2.5	$^\circ\text{C}/\text{W}$
	TO-220F2			
	TO-263		0.77 (Note)	

Note: Device mounted on FR-4 substrate P_c board, 2oz copper, with 1inch square copper plate.

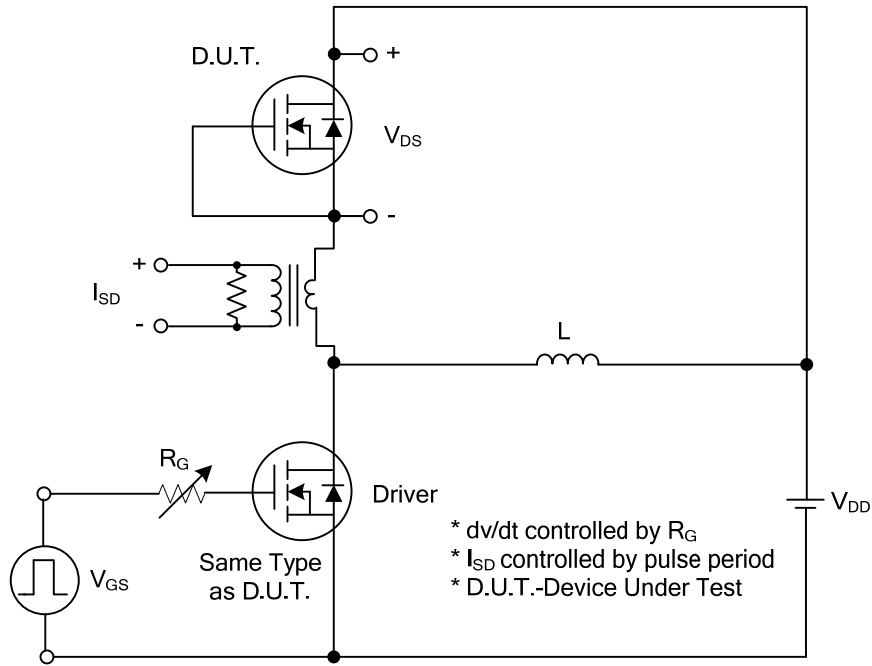
■ ELECTRICAL CHARACTERISTICS($T_C=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	700			V	
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=700V, V_{GS}=0V$			10	μA	
Gate-Source Leakage Current	Forward	I_{GSS}			100	nA	
	Reverse				-100	nA	
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu A$, Referenced to 25°C		0.7		$V/^\circ\text{C}$	
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	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5A$			1.2	Ω	
DYNAMIC CHARACTERISTICS							
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1.0\text{ MHz}$		1700		pF	
Output Capacitance	C_{OSS}				163		pF
Reverse Transfer Capacitance	C_{RSS}				30		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge	Q_G	$V_{DS}=100V, I_D=10A, V_{GS}=10V$ $I_G=1\text{ mA}$ (Note 1,2)		51		nC	
Gate-Source Charge	Q_{GS}				8		nC
Gate-Drain Charge	Q_{GD}				19		nC
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=100V, I_D=10A, R_G=25\Omega$ (Note 1,2)		22		ns	
Turn-On Rise Time	t_R				24		ns
Turn-Off Delay Time	$t_{D(OFF)}$				184		ns
Turn-Off Fall Time	t_F				63		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Maximum Continuous Drain-Source Diode Forward Current	I_S				10	A	
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				40	A	
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 10\text{ A}$			1.4	V	
Reverse Recovery Time	t_{rr}	$V_{GS} = 0\text{ V}, I_S = 10\text{ A},$		400		ns	
Reverse Recovery Charge	Q_{rr}	$di_F / dt = 100\text{ A}/\mu\text{s}$ (Note 1)		5.7		μC	

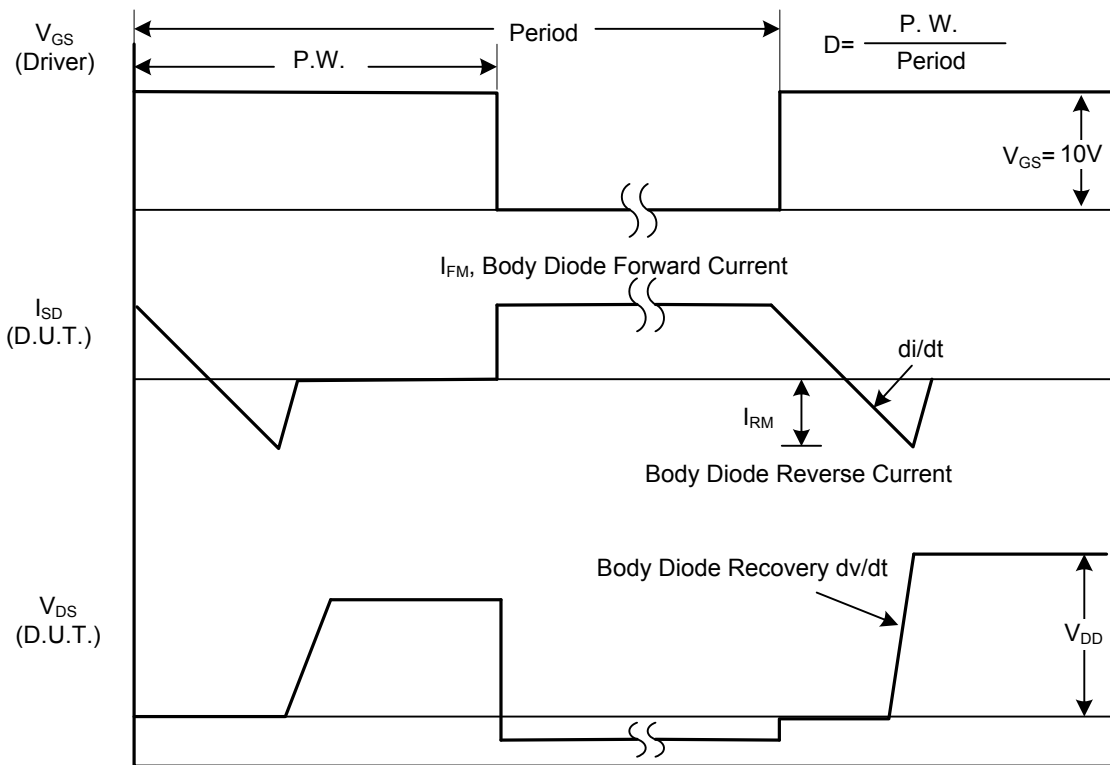
Notes: 1. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

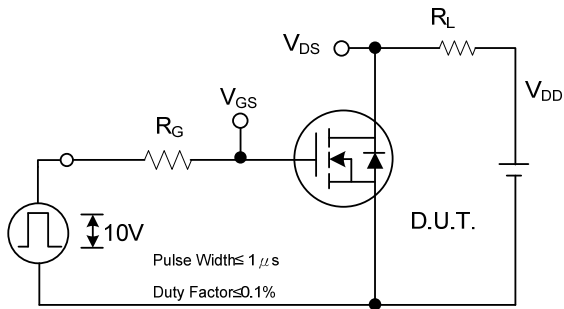


Peak Diode Recovery dv/dt Test Circuit

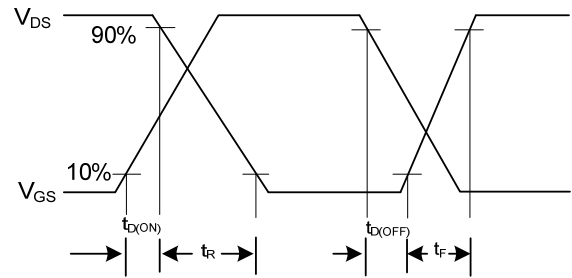


Peak Diode Recovery dv/dt Waveforms

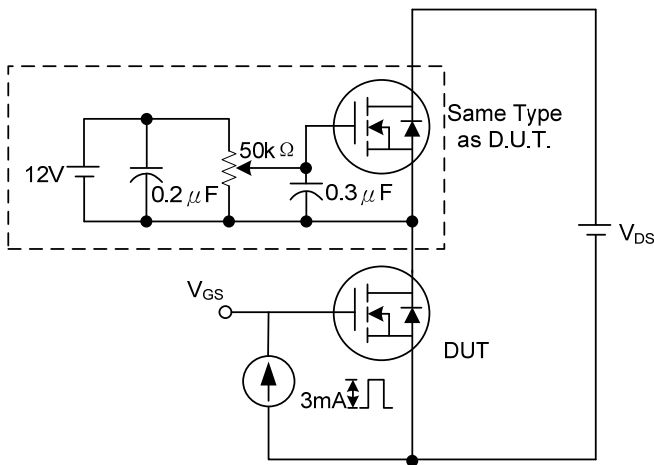
TEST CIRCUITS AND WAVEFORMS



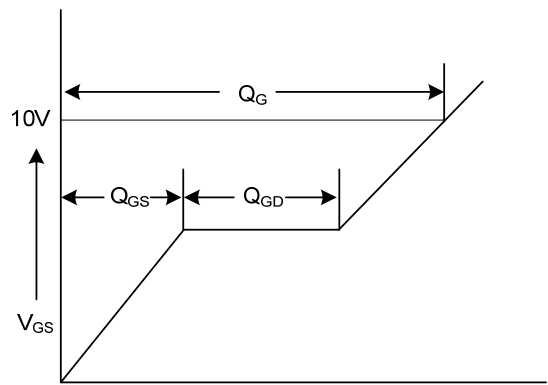
Switching Test Circuit



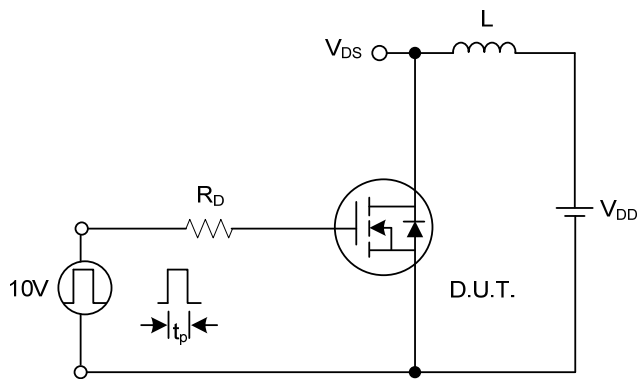
Switching Waveforms



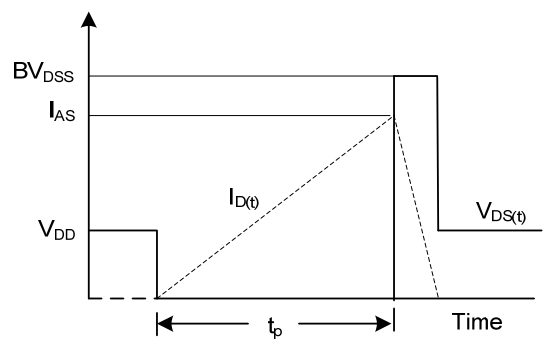
Gate Charge Test Circuit



Gate Charge Waveform

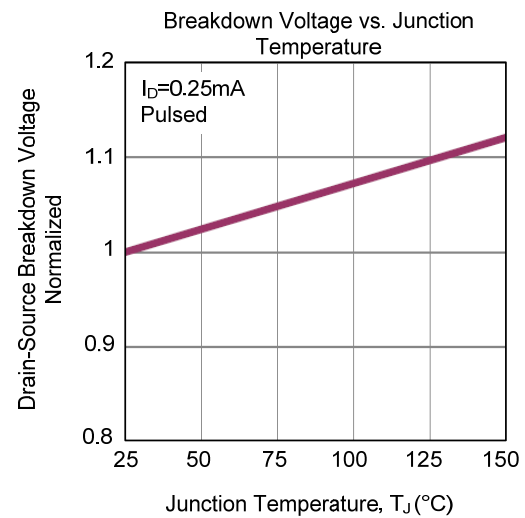
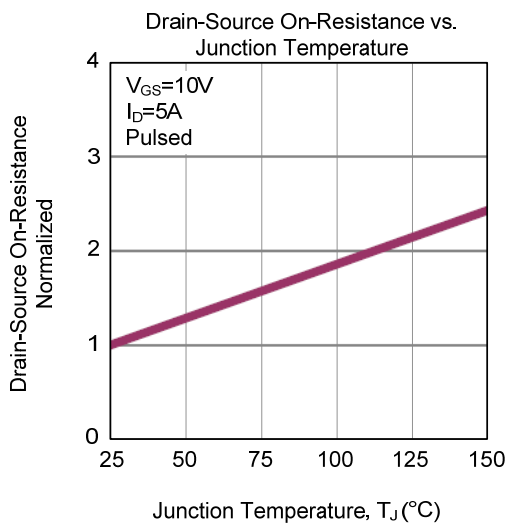
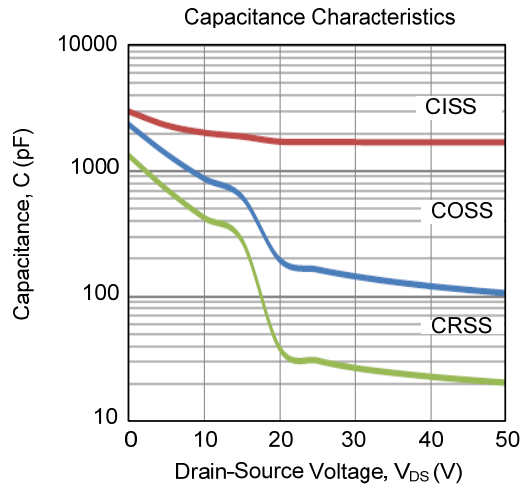
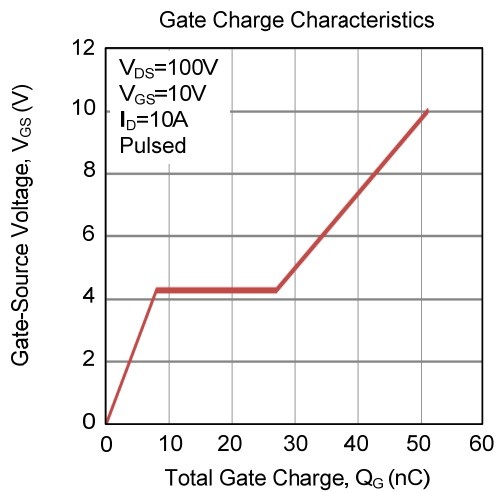
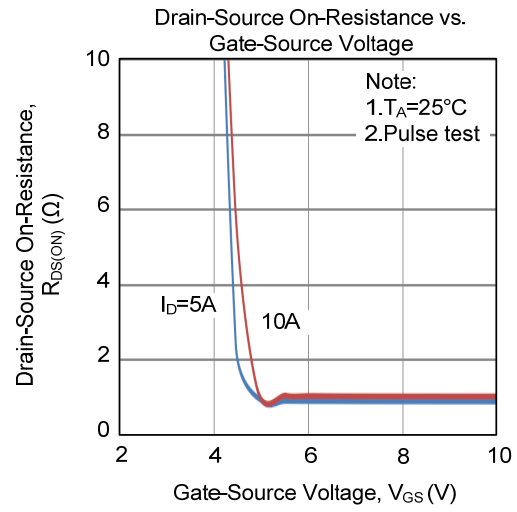
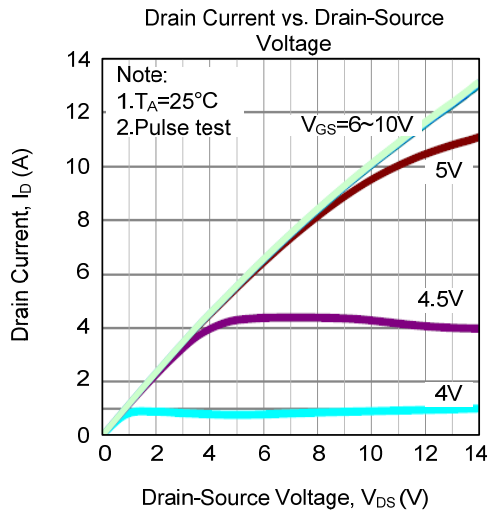


Unclamped Inductive Switching Test Circuit

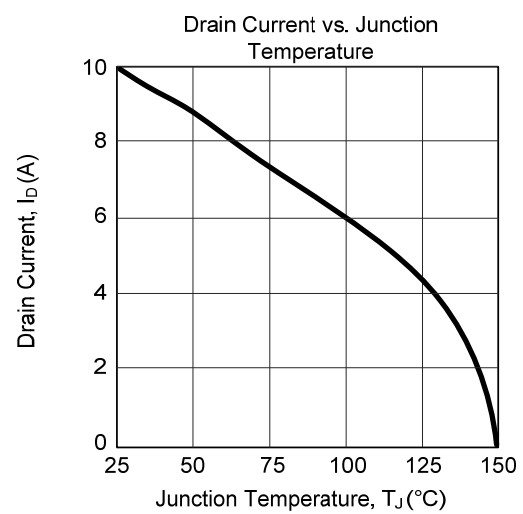
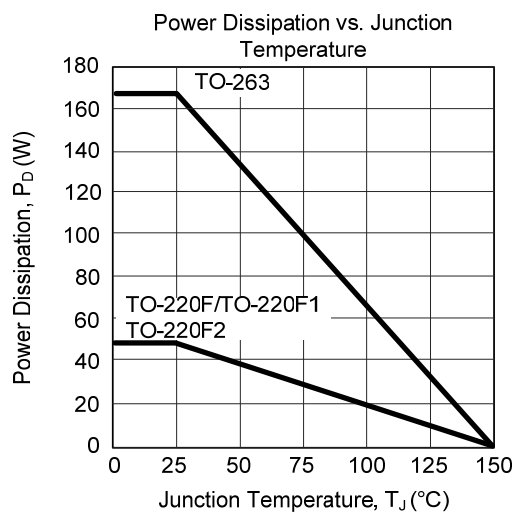
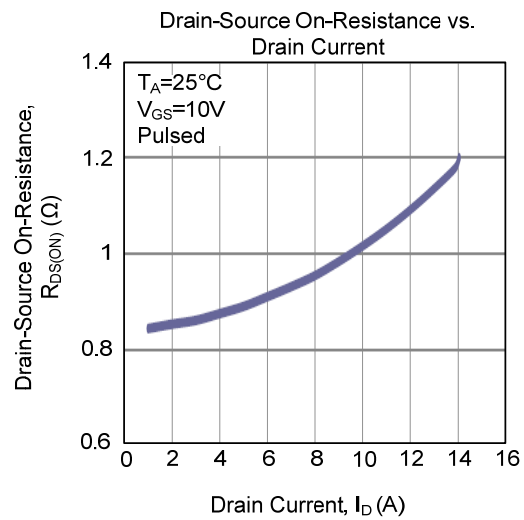
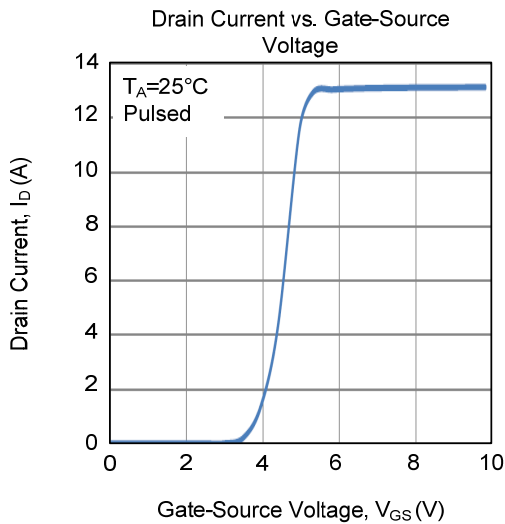
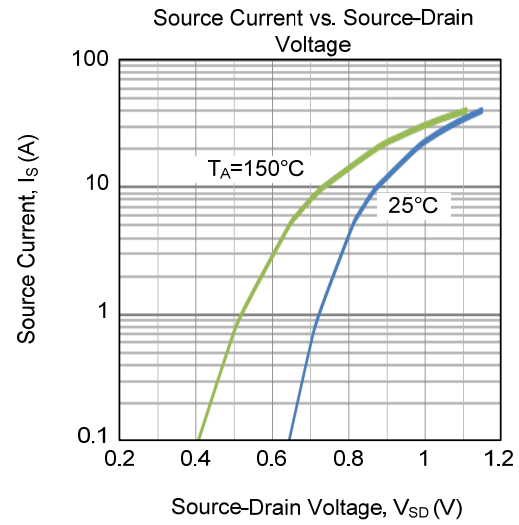
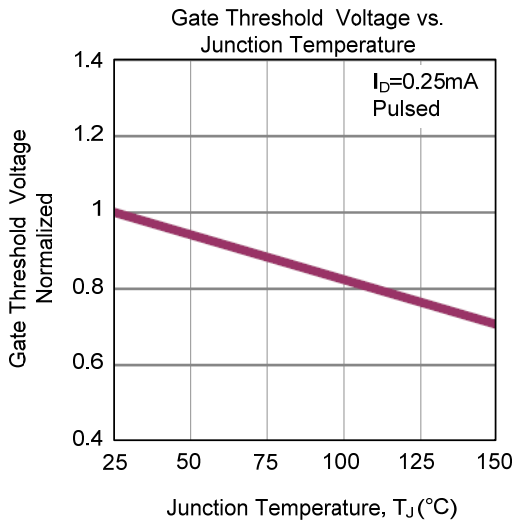


Unclamped Inductive Switching Waveforms

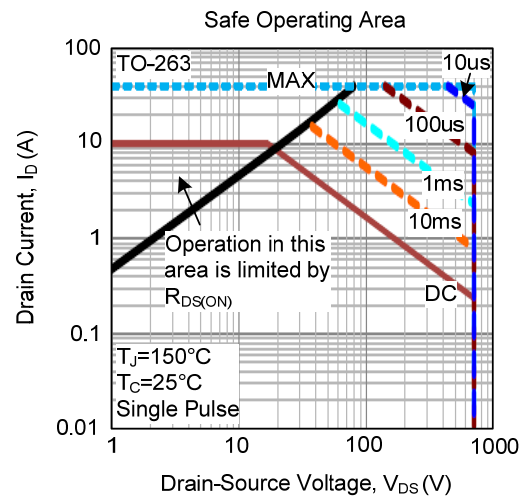
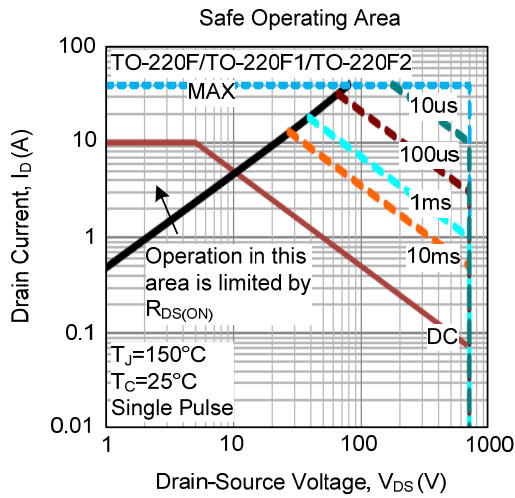
TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (Cont.)



TYPICAL CHARACTERISTICS (Cont.)



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