



4N150

Power MOSFET

4.0A, 1500V N-CHANNEL POWER MOSFET

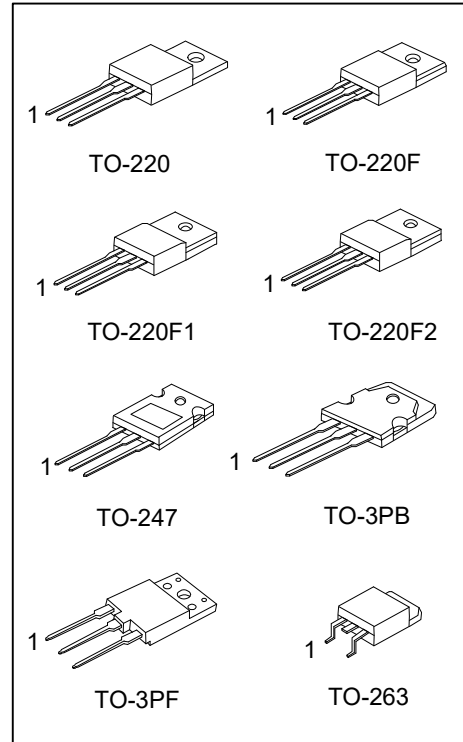
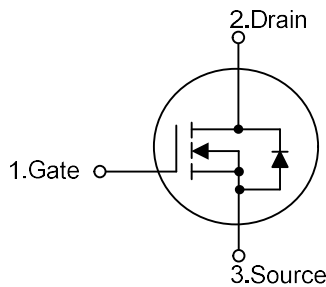
DESCRIPTION

The UTC 4N150 is a high voltage power MOSFET and is 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 AC to DC converters and bridge circuits.

FEATURES

- * $R_{DS(ON)} \leq 6.5 \Omega @ V_{GS}=10V, I_D=2.0A$
- * High Switching Speed
- * 100% Avalanche Tested

SYMBOL



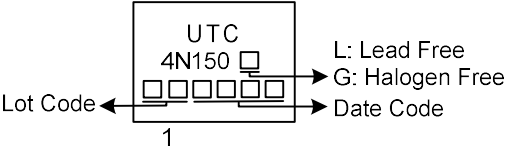
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
4N150L-TA3-T	4N150G-TA3-T	TO-220	G	D	S	Tube
4N150L-TF1-T	4N150G-TF1-T	TO-220F1	G	D	S	Tube
4N150L-TF2-T	4N150G-TF2-T	TO-220F2	G	D	S	Tube
4N150L-TF3-T	4N150G-TF3-T	TO-220F	G	D	S	Tube
4N150L-T47-T	4N150G-T47-T	TO-247	G	D	S	Tube
4N150L-TQ2-T	4N150G-TQ2-T	TO-263	G	D	S	Tube
4N150L-TQ2-R	4N150G-TQ2-R	TO-263	G	D	S	Tape Reel
4N150L-T3B-T	4N150G-T3B-T	TO-3PB	G	D	S	Tube
4N150L-T3F-T	4N150G-T3F-T	TO-3PF	G	D	S	Tube

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

<p>4N150G-TA3-T</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, T47: TO-247, TQ2: TO-263, T3B: TO-3PB, T3F: TO-3PF</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}	1500	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	4	A
	Pulsed (Note 2)	I_{DM}	8	A
Avalanche Energy		E_{AS}	721	mJ
Peak Diode Recovery dv/dt		dv/dt	2	V/ns
Power Dissipation	TO-220/TO-263	P_D	110	W
	TO-220F/TO-220F1		45	W
	TO-220F2			
	TO-247			
	TO-3PB			
TO-3PF	60	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. $L = 150\text{mH}$, $I_{AS} = 3.1\text{A}$, $V_{DD} = 90\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

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

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-220F1/TO-220F2			
	TO-263			
	TO-247			
TO-3PB/TO-3PF	50	$^\circ\text{C}/\text{W}$		
Junction to Case	TO-220/TO-263	θ_{JC}	1.14	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		2.77	$^\circ\text{C}/\text{W}$
	TO-220F2			
	TO-247			
	TO-3PB			
TO-3PF	0.83	$^\circ\text{C}/\text{W}$		
	2.08	$^\circ\text{C}/\text{W}$		

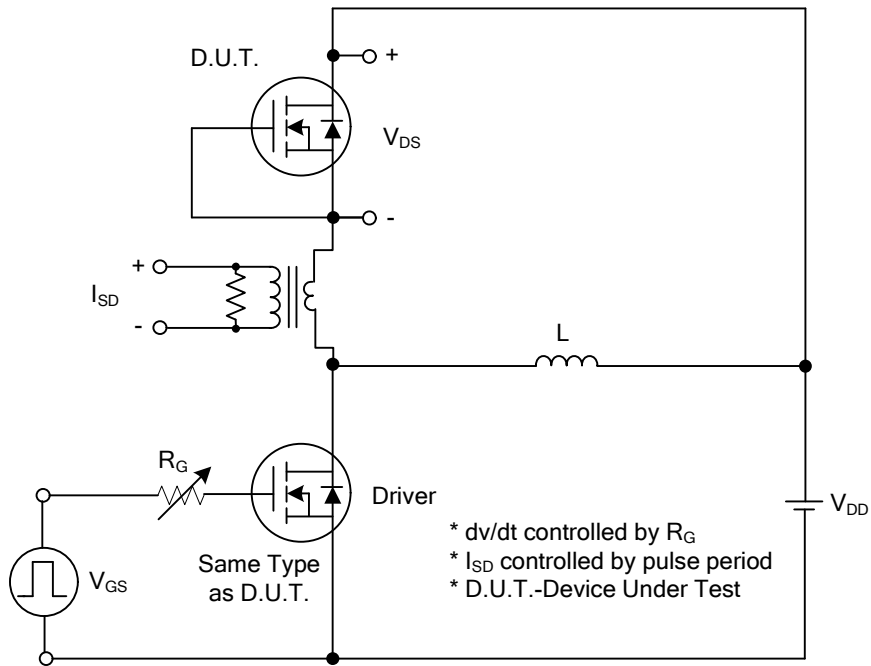
ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	1500			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=1500\text{V}$, $V_{GS}=0\text{V}$			10	μA
Gate- Source Leakage Current	Forward	$V_{GS}=+30\text{V}$, $V_{DS}=0\text{V}$			+100	nA
	Reverse	$V_{GS}=-30\text{V}$, $V_{DS}=0\text{V}$			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	3.0		5.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=2.0\text{A}$			6.5	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS}=0\text{V}$, $V_{DS}=25\text{V}$, $f=1.0\text{MHz}$		1310		pF
Output Capacitance	C_{OSS}			95		pF
Reverse Transfer Capacitance	C_{RSS}			17		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{DS}=1200\text{V}$, $V_{GS}=10\text{V}$, $I_D=4\text{A}$ $I_G=1\text{mA}$ (Note 1, 2)		40		nC
Gate to Source Charge	Q_{GS}			11		nC
Gate to Drain Charge	Q_{GD}			16		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DS}=100\text{V}$, $V_{GS}=10\text{V}$, $I_D=4\text{A}$, $R_G=25\Omega$ (Note 1, 2)		32		ns
Rise Time	t_R			39		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			125		ns
Fall-Time	t_F			47		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				4	A
Maximum Body-Diode Pulsed Current	I_{SM}				8	A
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=4\text{A}$, $V_{GS}=0\text{V}$			1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$I_S=4\text{A}$, $V_{GS}=0\text{V}$,		1.2		μs
Body Diode Reverse Recovery Charge	Q_{rr}	$di_F/dt=100\text{A}/\mu\text{s}$ (Note 1)		13.1		μC

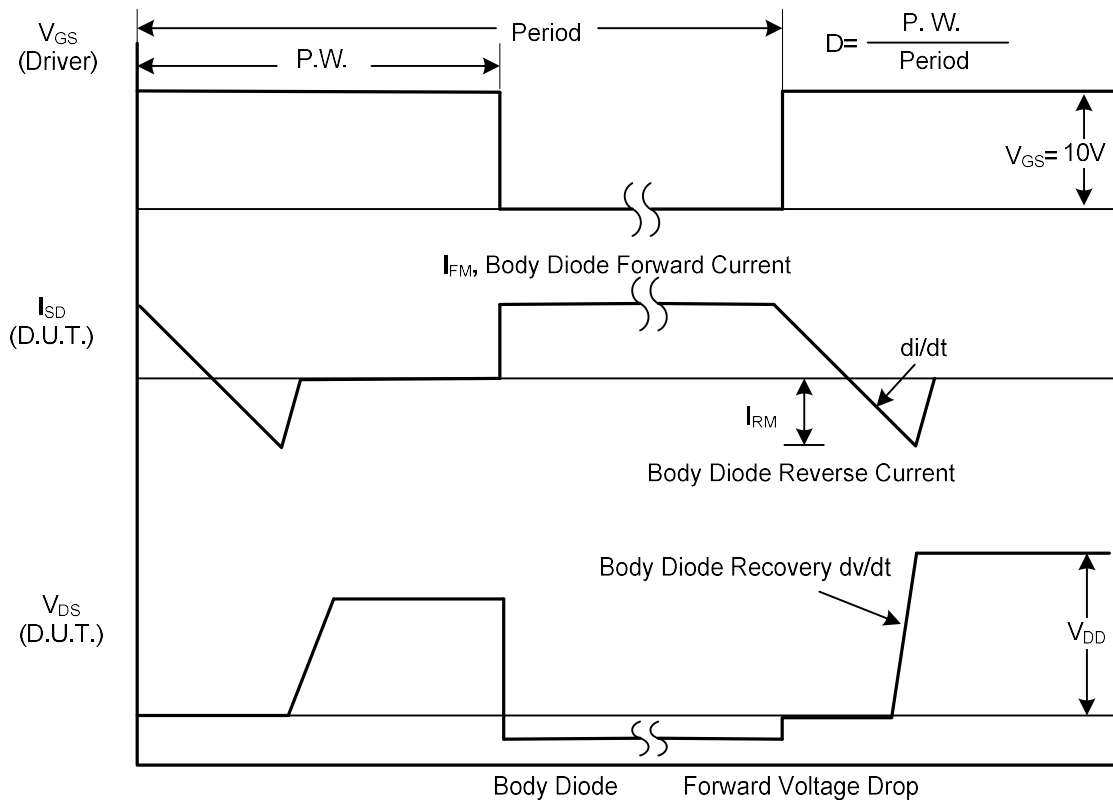
Notes: 1. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS



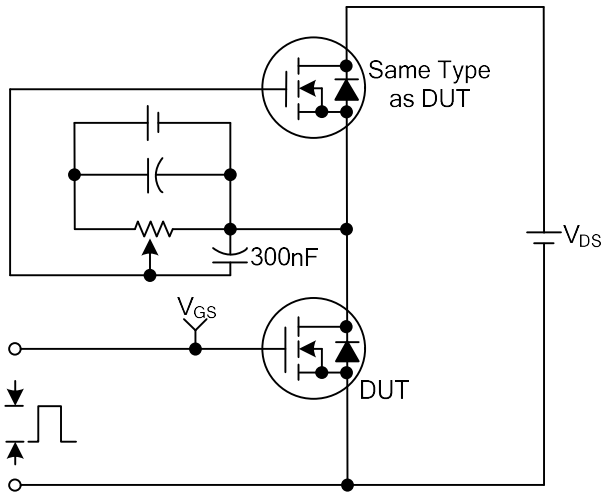
Peak Diode Recovery dv/dt Test Circuit



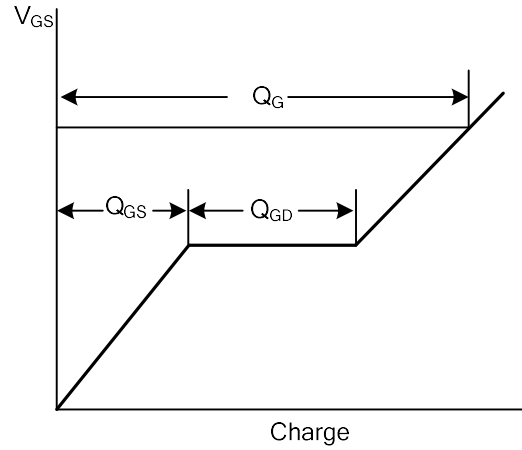
Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS

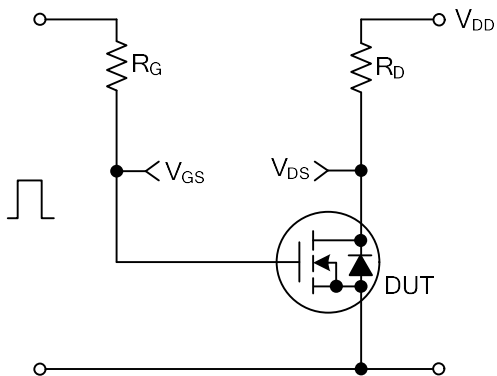
Gate Charge Test Circuit



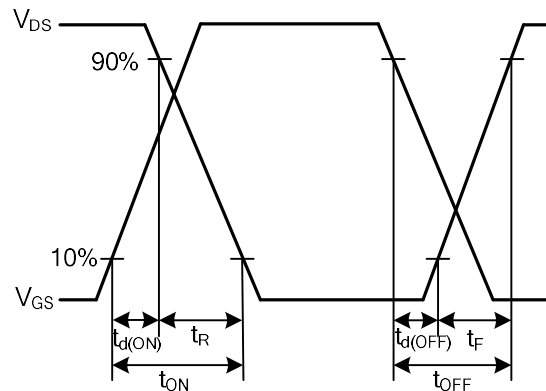
Gate Charge Waveforms



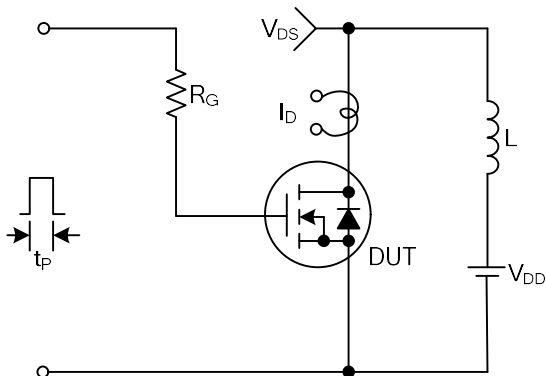
Resistive Switching Test Circuit



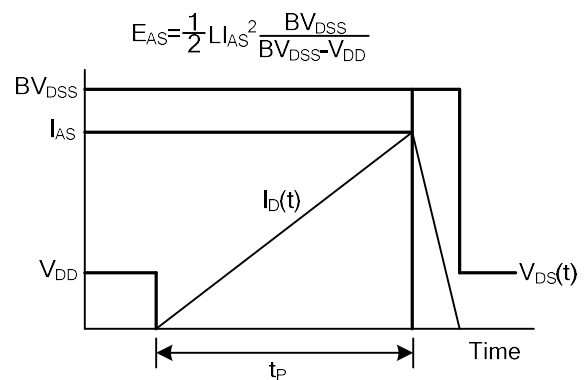
Resistive Switching Waveforms



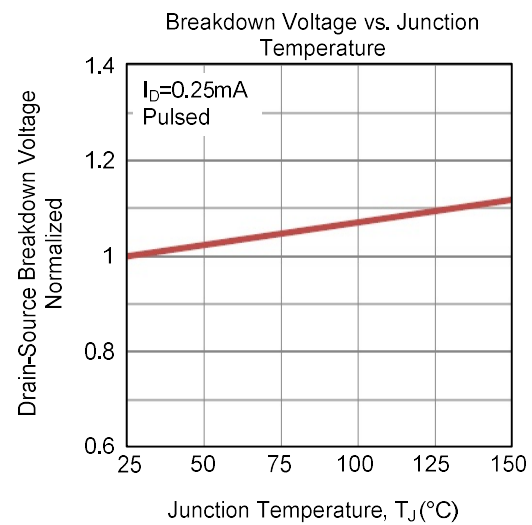
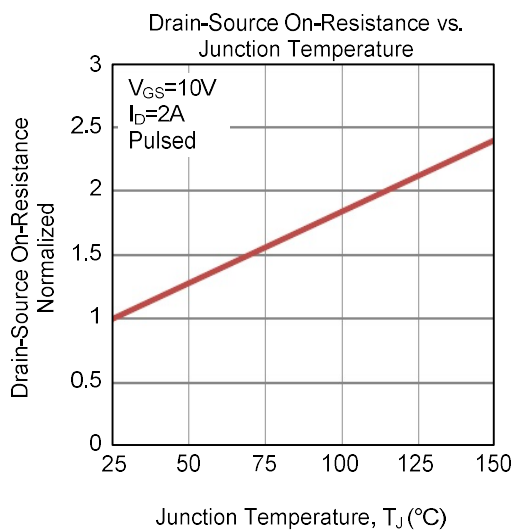
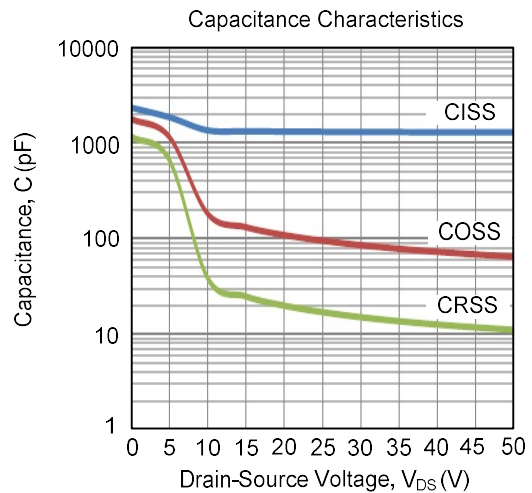
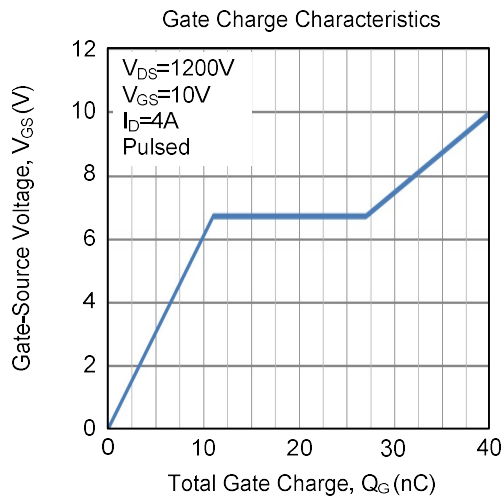
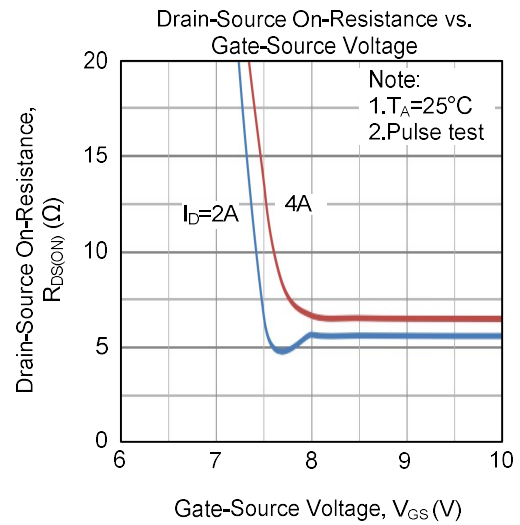
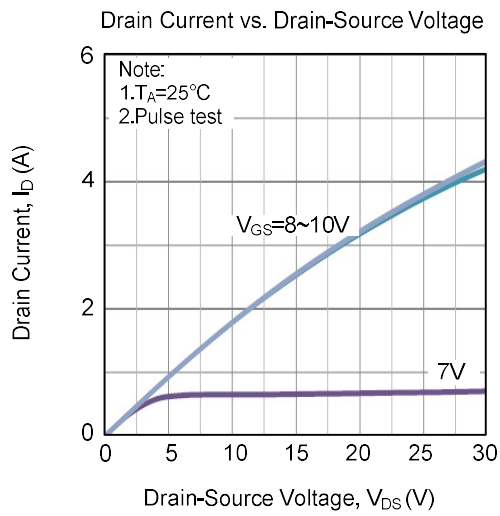
Unclamped Inductive Switching Test Circuit



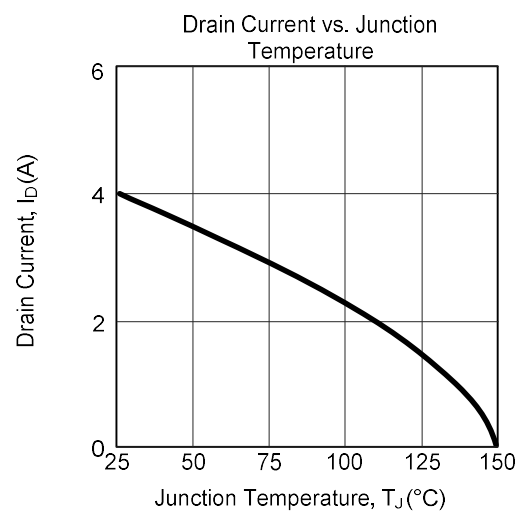
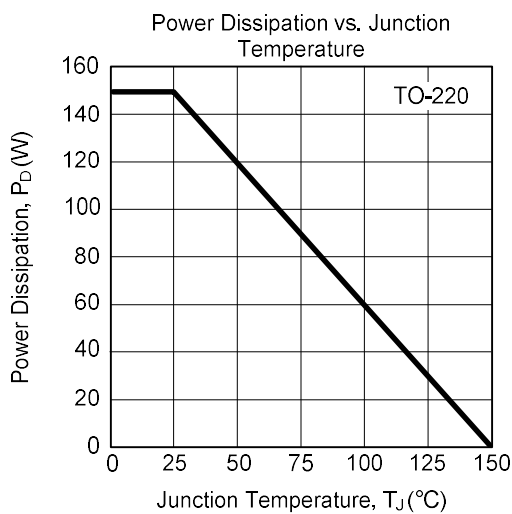
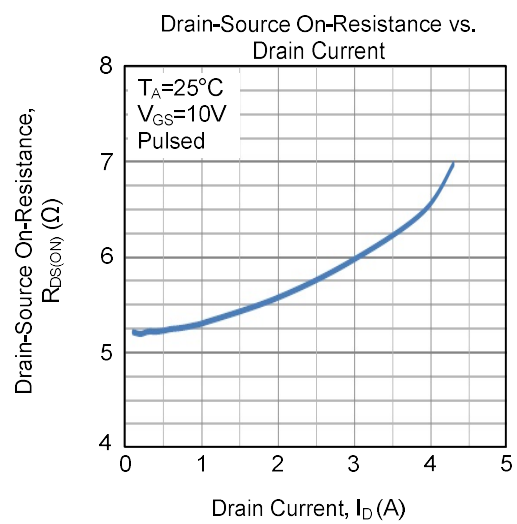
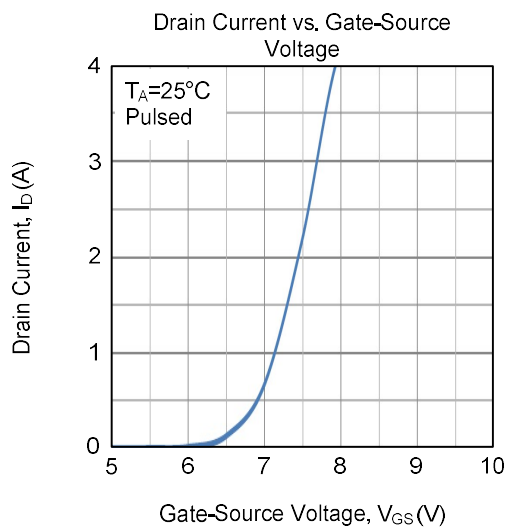
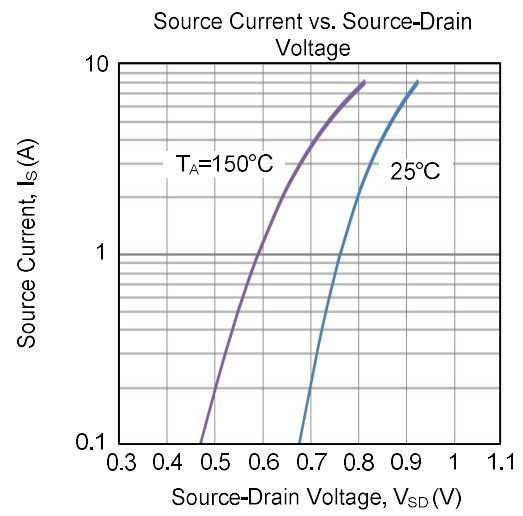
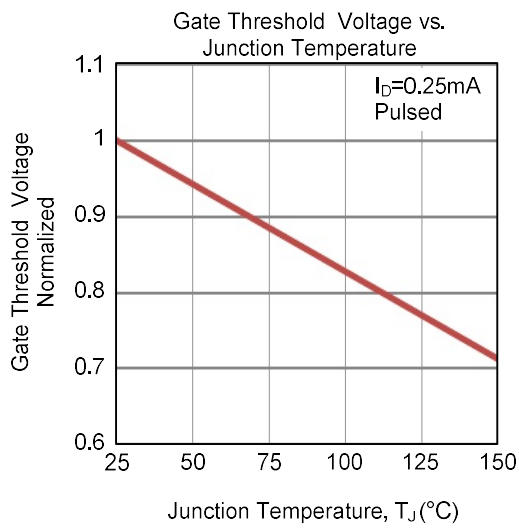
Unclamped Inductive Switching Waveforms



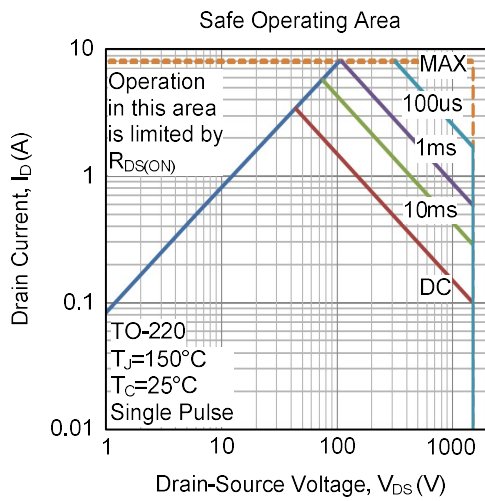
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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