



4N120

Power MOSFET

4.0A, 1200V N-CHANNEL POWER MOSFET

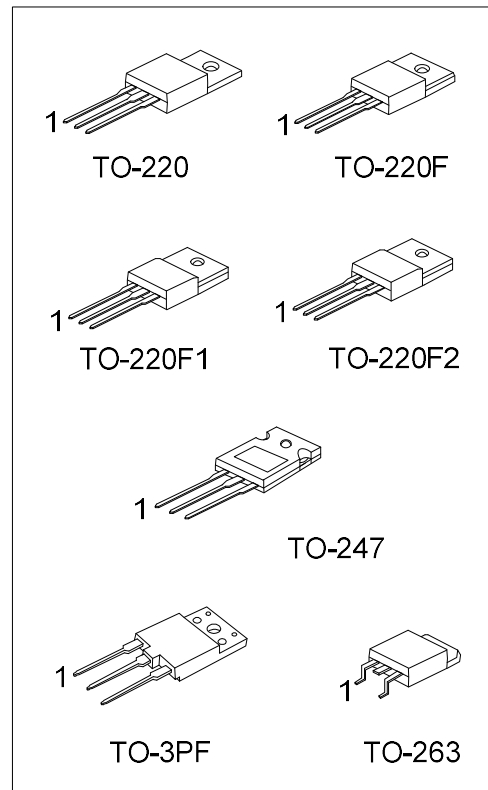
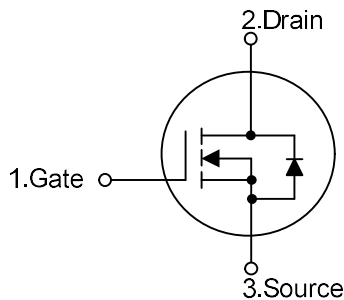
DESCRIPTION

The UTC 4N120 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

- * $R_{DS(ON)} \leq 4.0 \Omega$ @ $V_{GS}=10V, I_D=2.0A$
- * Low Reverse Transfer Capacitance
- * Fast Switching Capability
- * Avalanche Energy Specified
- * Improved dv/dt Capability, High Ruggedness

SYMBOL



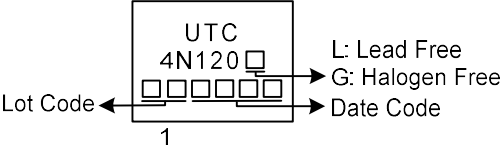
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
4N120L-TA3-T	4N120G-TA3-T	TO-220	G	D	S	Tube
4N120L-TF1-T	4N120G-TF1-T	TO-220F1	G	D	S	Tube
4N120L-TF2-T	4N120G-TF2-T	TO-220F2	G	D	S	Tube
4N120L-TF3-T	4N120G-TF3-T	TO-220F	G	D	S	Tube
4N120L-TQ2-T	4N120G-TQ2-T	TO-263	G	D	S	Tube
4N120L-TQ2-R	4N120G-TQ2-R	TO-263	G	D	S	Tape Reel
4N120L-T47-T	4N120G-T47-T	TO-247	G	D	S	Tube
4N120L-T3F-T	4N120G-T3F-T	TO-3PF	G	D	S	Tube

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

<p>4N120G-TA3-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F, TQ2: TO-263, T47: TO-247 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°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V _{DSS}	1200	V
Gate-Source Voltage		V _{GSS}	±30	V
Drain Current	Continuous	I _D	4	A
	Pulsed (Note 2)	I _{DM}	8	A
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	845	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.2	V/ns
Power Dissipation	TO-220/TO-263	P _D	140	W
	TO-220F/TO-220F1		40	W
	TO-220F2		155	W
	TO-247		42	W
	TO-3PF			
Junction Temperature		T _J	+150	°C
Storage Temperature		T _{STG}	-55 ~ +150	°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=155mH, I_{AS}=3.3A, V_{DD}=90V, R_G=25 Ω, Starting T_J = 25°C

4. I_{SD}≤4.0A, di/dt≤200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F	θ _{JA}	62.5	°C/W
	TO-220F1/TO-220F2			
	TO-263			
	TO-247			
	TO-3PF			
Junction to Case	TO-220/TO-263	θ _{JC}	0.89	°C/W
	TO-220F/TO-220F1		3.125	°C/W
	TO-220F2		0.8	°C/W
	TO-247		2.97	°C/W
	TO-3PF			

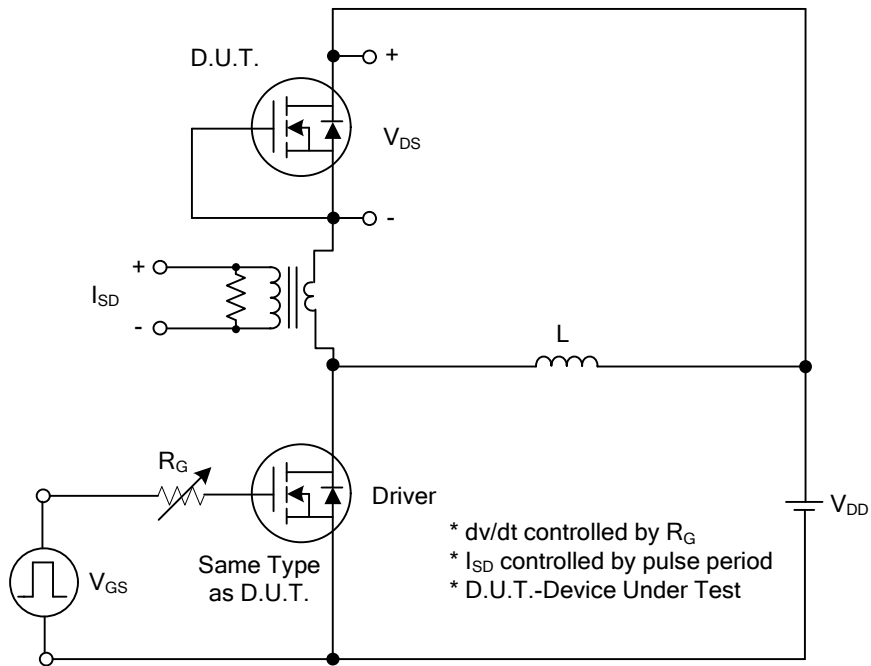
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	1200			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=1200V, V_{GS}=0V$			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		6.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2.0A$			4.0	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1MHz$		1340		pF
Output Capacitance	C_{OSS}			105		pF
Reverse Transfer Capacitance	C_{RSS}			18		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q_G	$V_{DS}=100V, V_{GS}=10V, I_D=4A$ $I_G=1mA$ (Note 1, 2)		41		nC
Gate-Source Charge	Q_{GS}			11		nC
Gate-Drain Charge	Q_{GD}			18		nC
Turn-On Delay Time (Note 1)	$t_{D(ON)}$	$V_{DD}=100V, V_{GS}=10V, I_D=4A,$ $R_G=25\Omega$ (Note 1, 2)		40		ns
Turn-On Rise Time	t_R			48		ns
Turn-Off Delay Time	$t_{D(OFF)}$			120		ns
Turn-Off Fall Time	t_F			44		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				4	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				8	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_S=4.0A, V_{GS}=0V$			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t_{rr}	$I_S=4.0A, V_{GS}=0V,$ $dI_F/dt=100A/\mu s$		840		ns
Body Diode Reverse Recovery Charge	Q_{rr}				11.5	

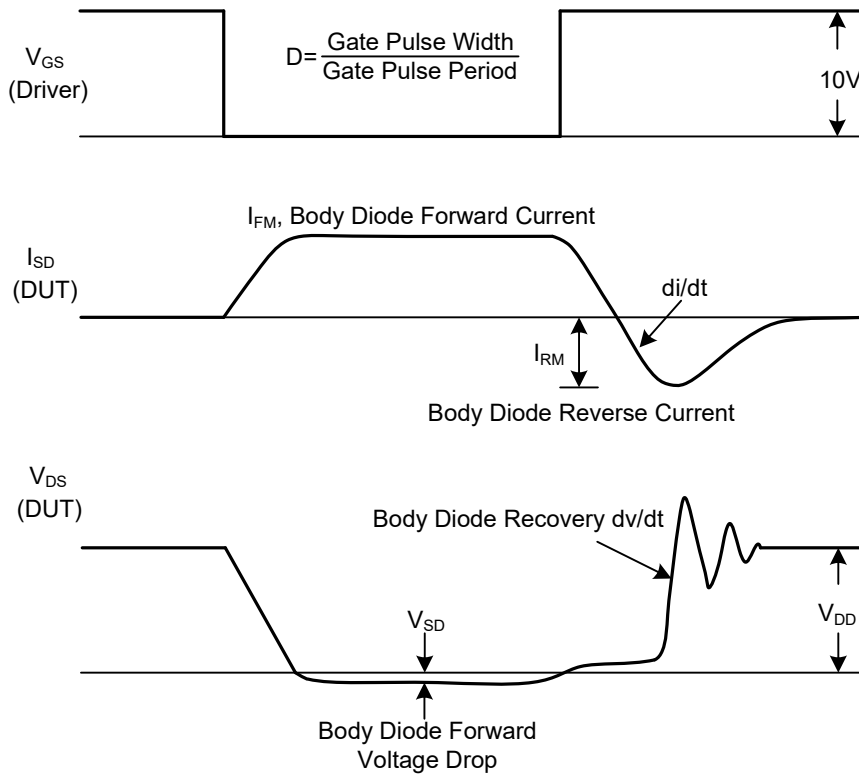
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

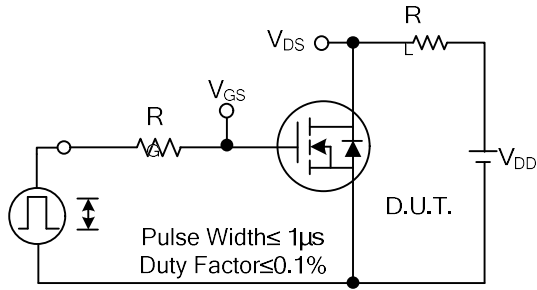


Peak Diode Recovery dv/dt Test Circuit

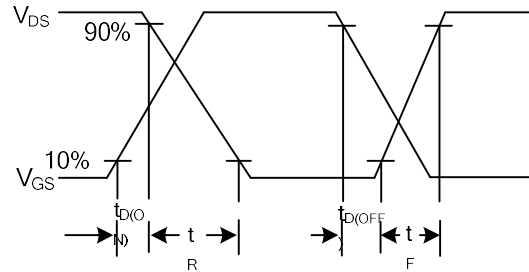


Peak Diode Recovery dv/dt Waveforms

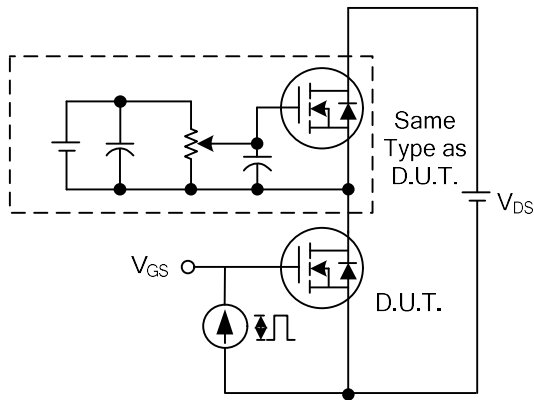
TEST CIRCUITS AND WAVEFORMS



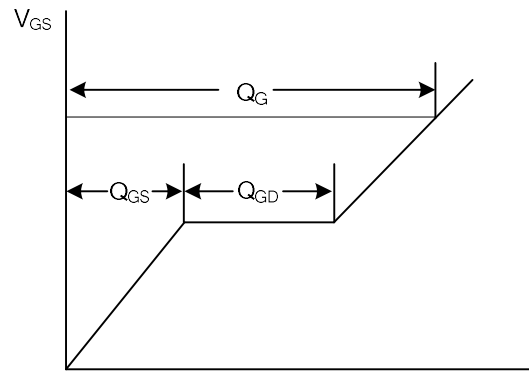
Switching Test Circuit



Switching Waveforms

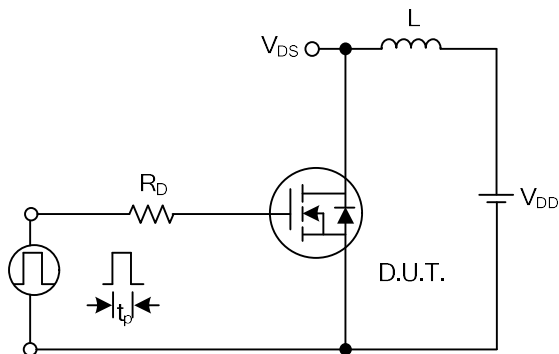


Gate Charge Test Circuit

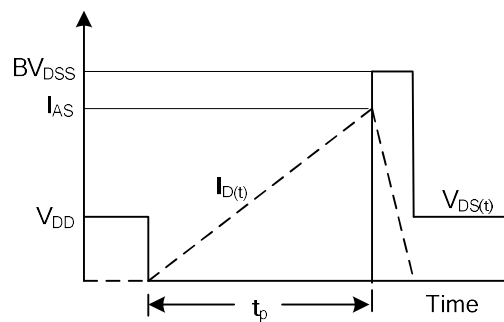


Charge

Gate Charge Waveform

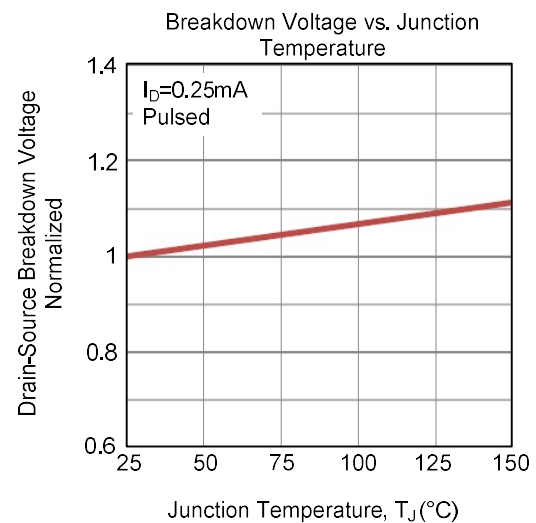
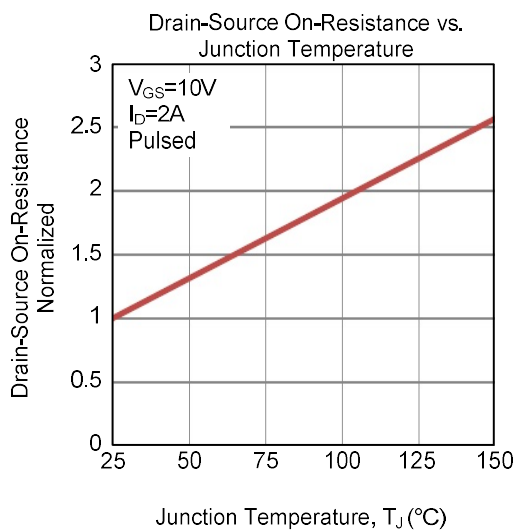
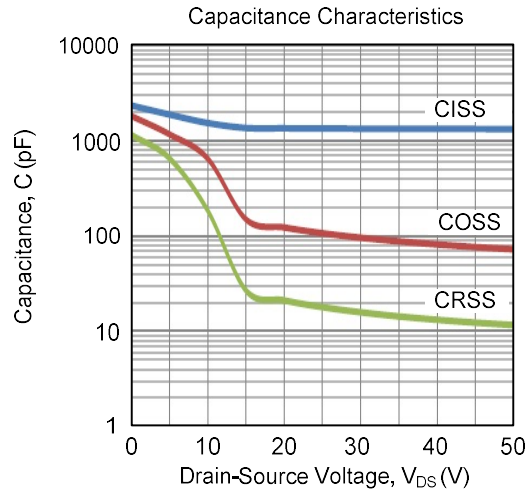
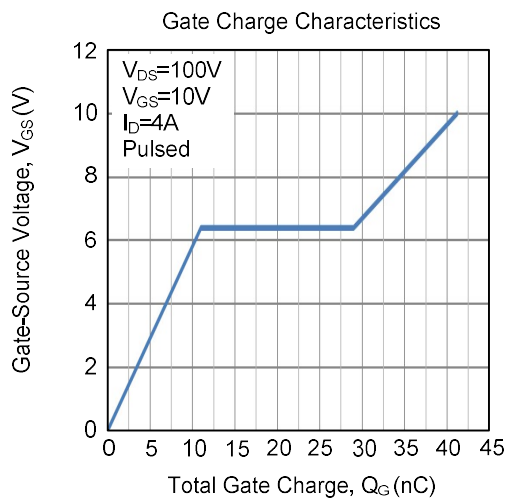
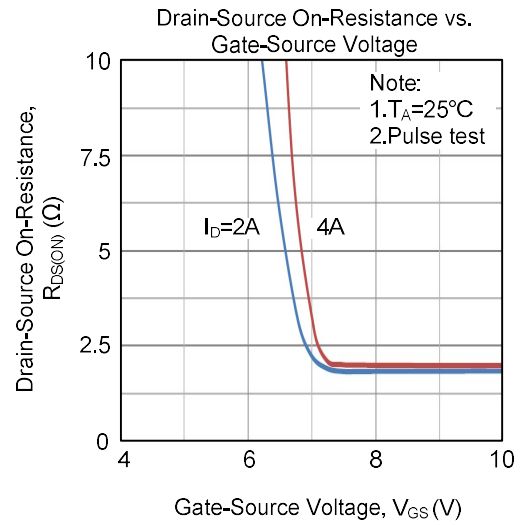
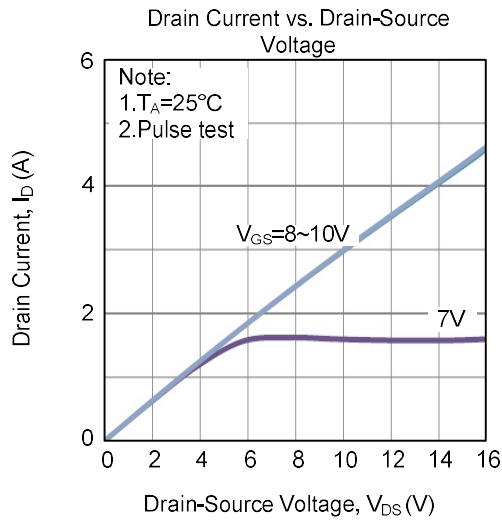


Unclamped Inductive Switching Test Circuit

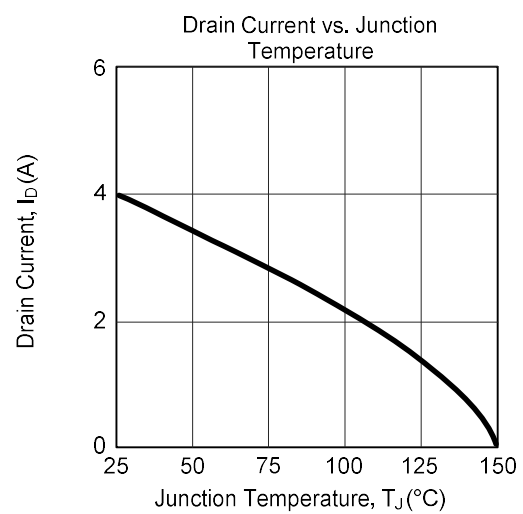
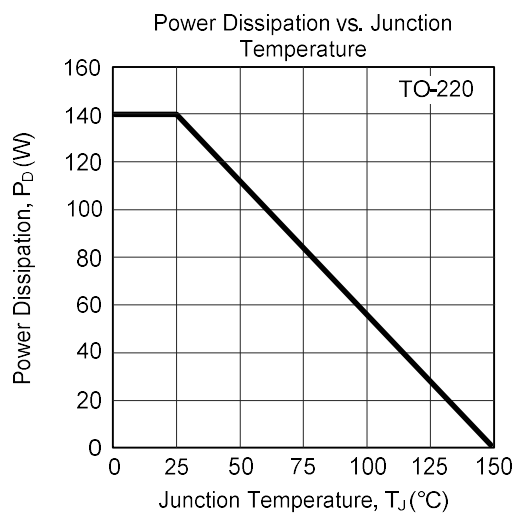
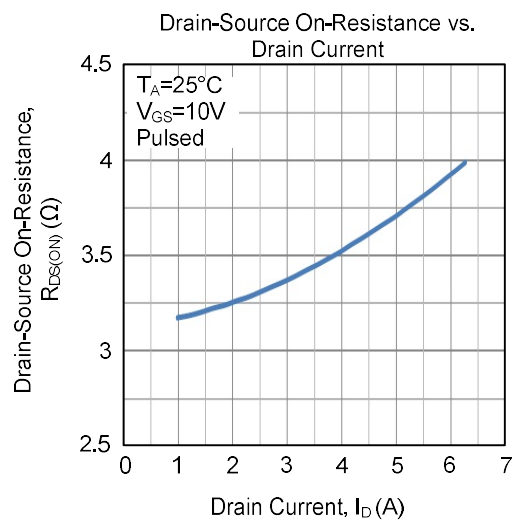
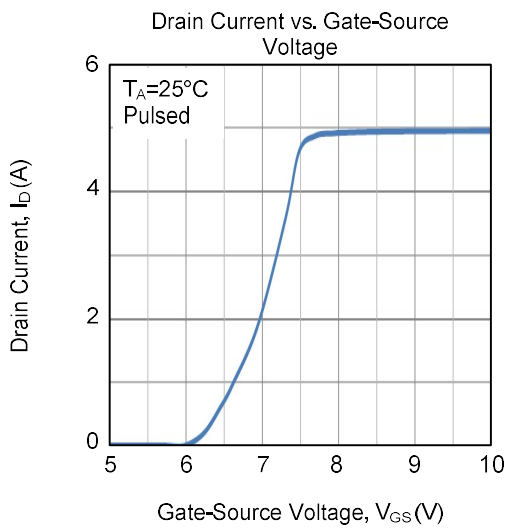
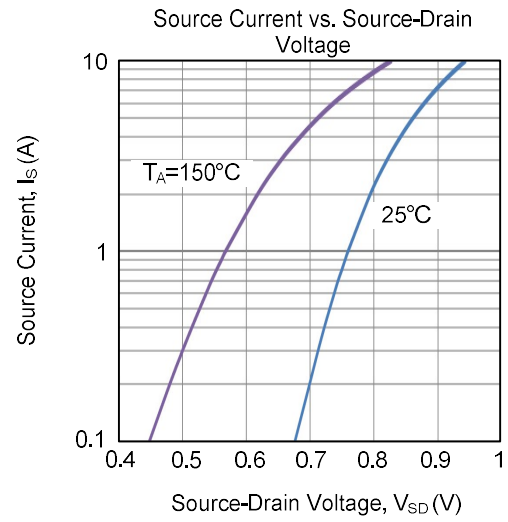
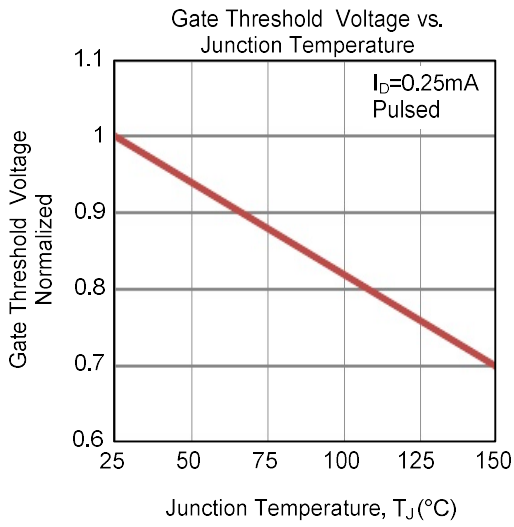


Unclamped Inductive Switching Waveforms

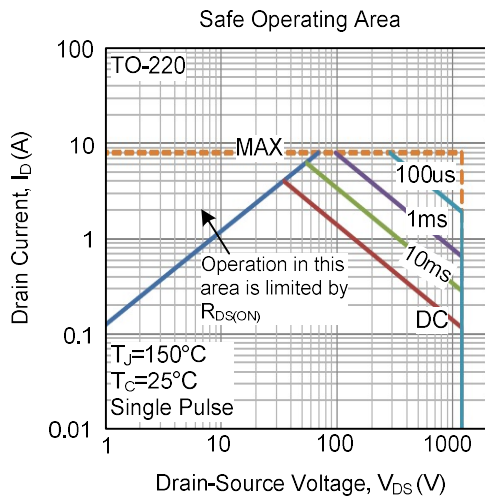
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ **TYPICAL CHARACTERISTICS (Cont.)**



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