



7N70-TC

Power MOSFET

7A, 700V N-CHANNEL POWER MOSFET

DESCRIPTION

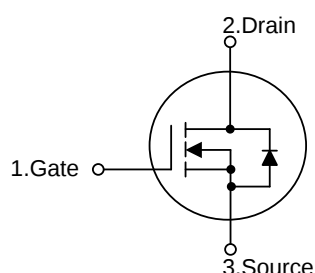
The UTC 7N70-TC is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient AC to DC converters and bridge circuits.

FEATURES

* $R_{DS(ON)} \leq 1.7 \Omega$ @ $V_{GS}=10V$, $I_D=3.5A$

* High Switching Speed

SYMBOL

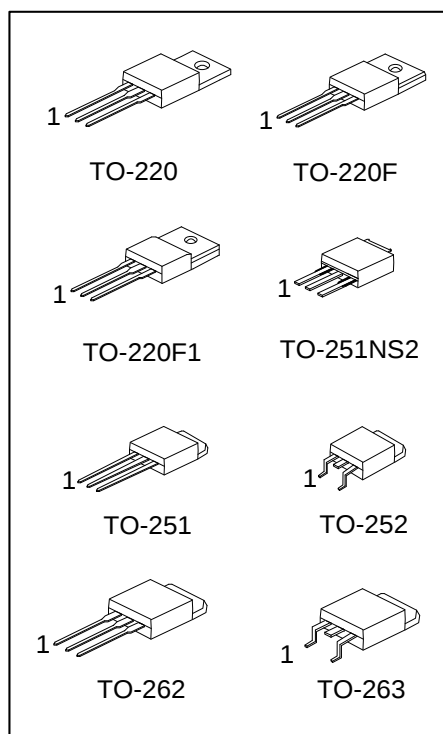


ORDERING INFORMATION

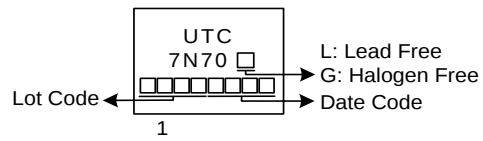
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7N70L-TA3-T	7N70G-TA3-T	TO-220	G	D	S	Tube
7N70L-TF3-T	7N70G-TF3-T	TO-220F	G	D	S	Tube
7N70L-TF1-T	7N70G-TF1-T	TO-220F1	G	D	S	Tube
7N70L-TM3-T	7N70G-TM3-T	TO-251	G	D	S	Tube
7N70L-TMN2-T	7N70G-TMN2-T	TO-251NS2	G	D	S	Tube
7N70L-TN3-R	7N70G-TN3-R	TO-252	G	D	S	Tape Reel
7N70L-T2Q-T	7N70G-T2Q-T	TO-262	G	D	S	Tube
7N70L-TQ2-T	7N70G-TQ2-T	TO-263	G	D	S	Tube
7N70L-TQ2-R	7N70G-TQ2-R	TO-263	G	D	S	Tape Reel

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

7N70G-TA3-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF3: TO-220F TM3: TO-251, TN3: TO-252, T2Q: TO-262 TQ2: TO-263 (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}	700	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	7	A
	Pulsed (Note 2)	I_{DM}	14	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	80	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.2	V/ns
Power Dissipation	TO-220/TO-262 TO-263	P_D	142	W
	TO-220F/TO-220F1		40	W
	TO-251/TO-251NS2 TO-252		57	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. $L = 10\text{mH}$, $I_{AS} = 4.0\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$ Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 7.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-262 TO-263	θ_{JA}	62.5	$^\circ\text{C/W}$
	TO-251/TO-251NS2 TO-252		110	
Junction to Case	TO-220/TO-262 TO-263	θ_{JC}	0.88	$^\circ\text{C/W}$
	TO-220F/TO-220F1		3.125	
	TO-251/TO-251NS2 TO-252		2.08	

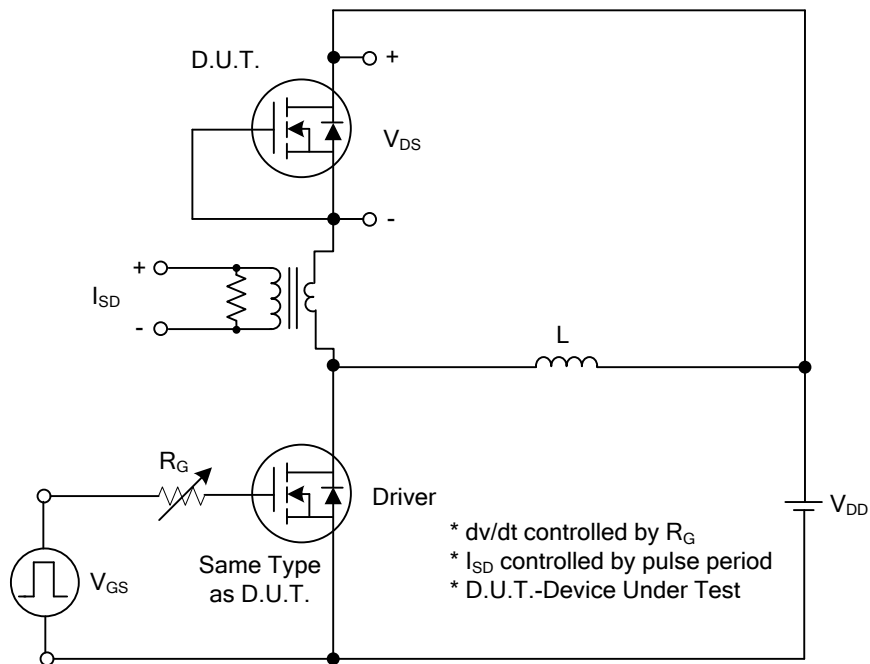
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D = 250μA	700			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =700V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} =30V, V _{DS} =0V			100	nA
	Reverse		V _{GS} =-30V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =3.5A			1.7	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0 MHz		1035		pF
Output Capacitance		C _{OSS}			85		pF
Reverse Transfer Capacitance		C _{RSS}			2.4		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =100V, V _{GS} =10V, I _D =7.0A I _G =1mA (Note 1, 2)		20		nC
Gateource Charge		Q _{GS}			8		nC
Gate-Drain Charge		Q _{GD}			4		nC
Turn-on Delay Time (Note 1)		t _{D(ON)}	V _{DS} =100V, V _{GS} =10V, I _D =7.0A, R _G =25Ω (Note 1, 2)		18		ns
Rise Time		t _R			20		ns
Turn-off Delay Time		t _{D(OFF)}			56		ns
Fall-Time		t _F			23		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				7	A
Maximum Body-Diode Pulsed Current		I _{SM}				28	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	V _{GS} =0V, I _S =7.0A			1.4	V
Reverse Recovery Time (Note 1)		t _{rr}	V _{GS} =0V, I _S =7.0A,		330		ns
Reverse Recovery Charge		Q _{rr}	dl _F /dt=100A/μs (Note1)		3.8		μC

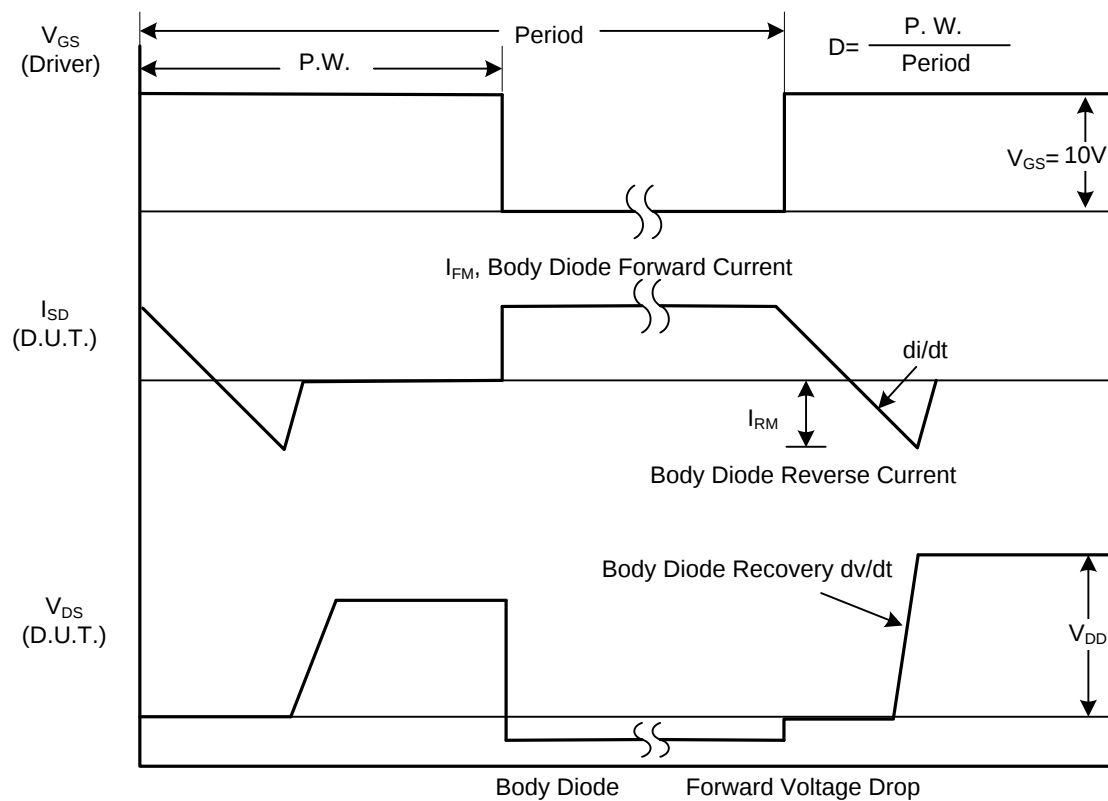
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

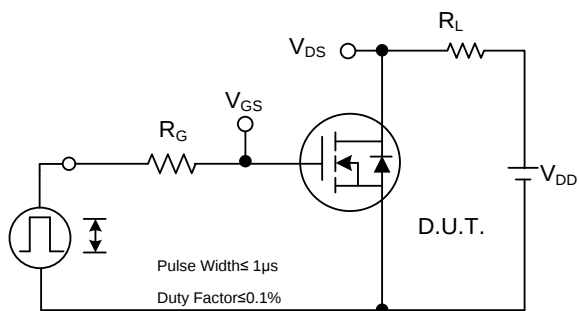


Peak Diode Recovery dv/dt Test Circuit

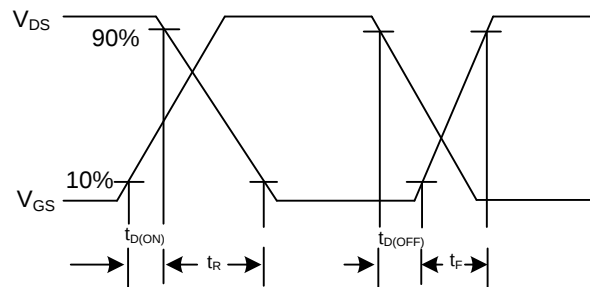


Peak Diode Recovery dv/dt Waveforms

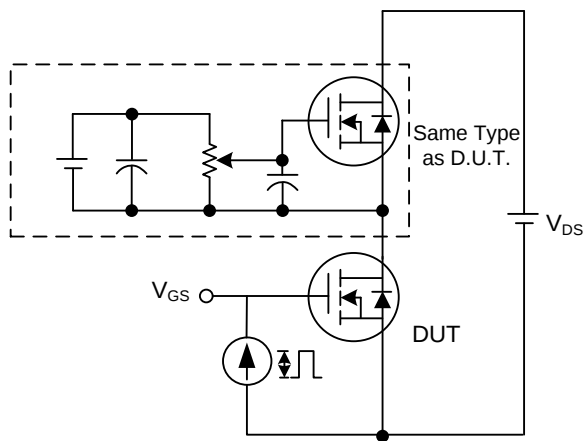
■ TEST CIRCUITS AND WAVEFORMS



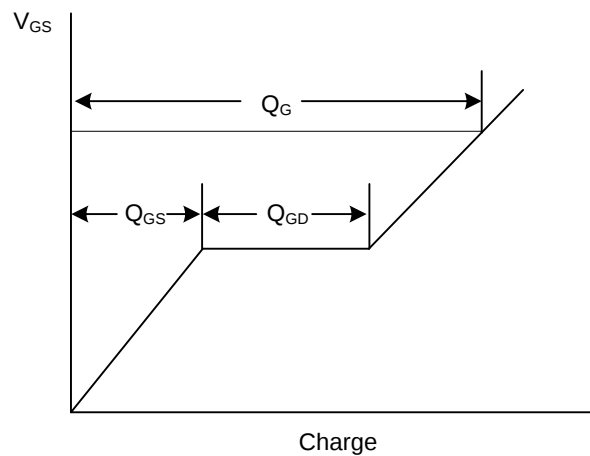
Switching Test Circuit



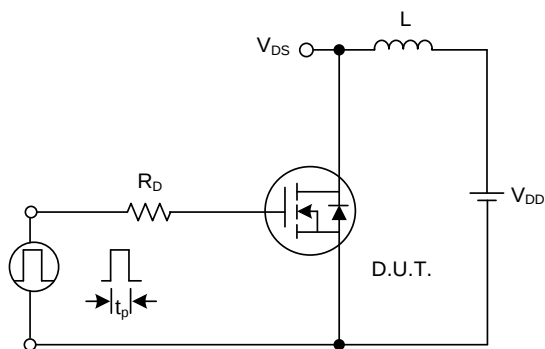
Switching Waveforms



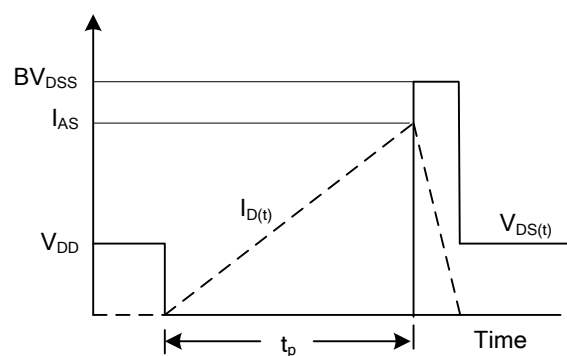
Gate Charge Test Circuit



Gate Charge Waveform

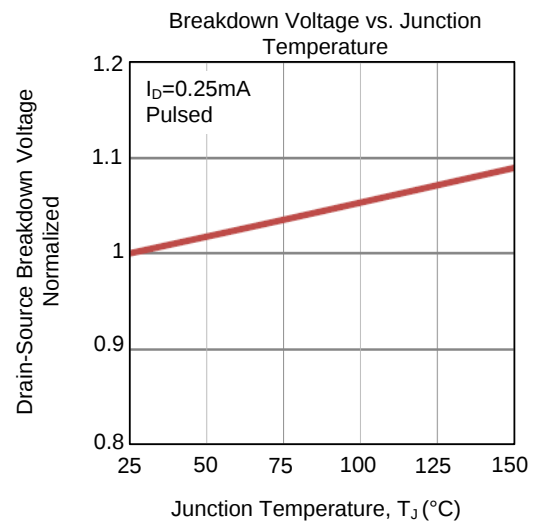
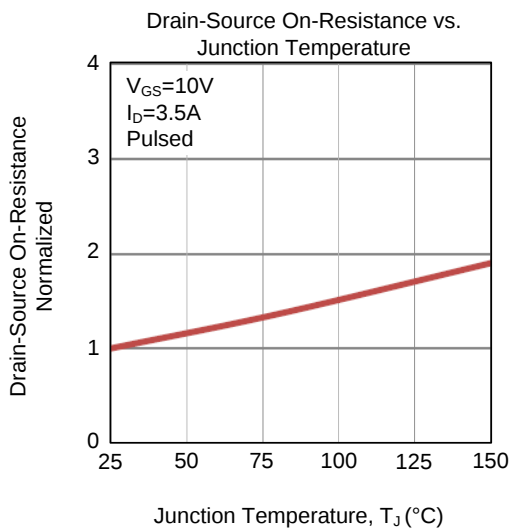
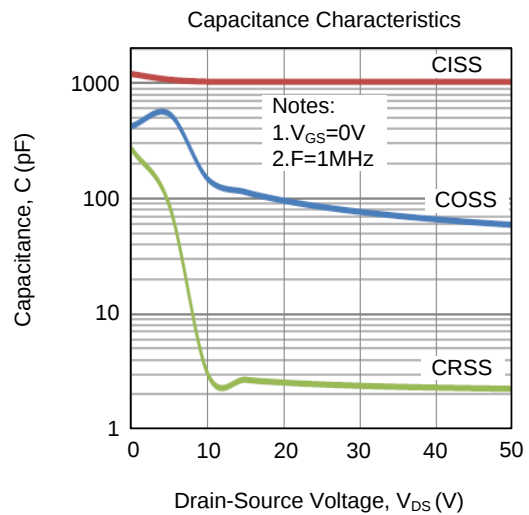
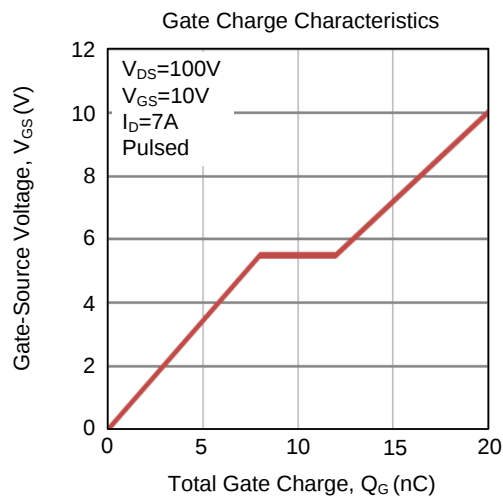
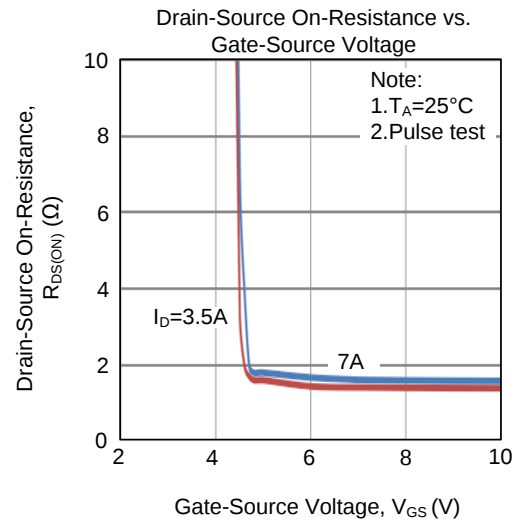
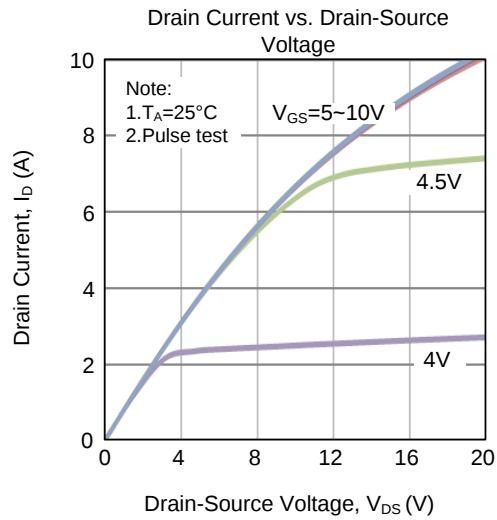


Unclamped Inductive Switching Test Circuit

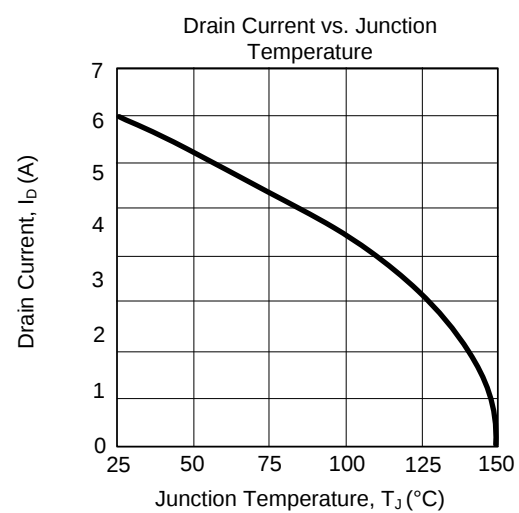
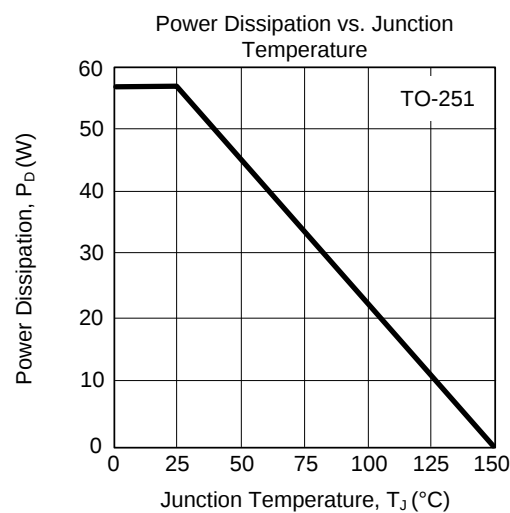
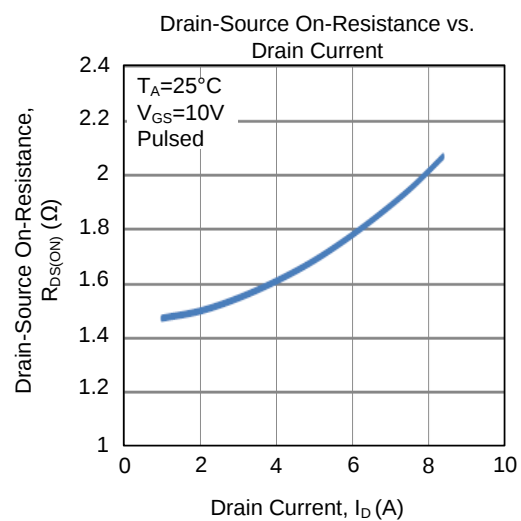
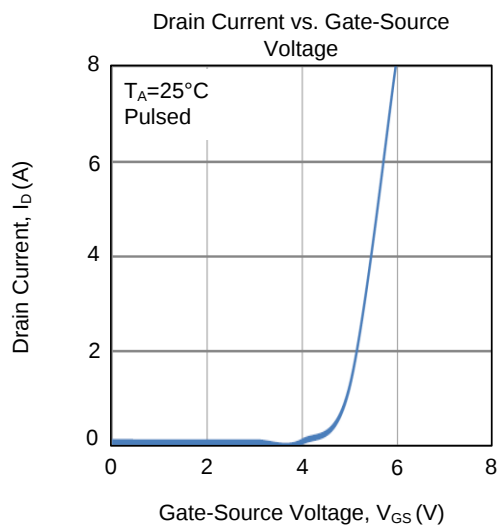
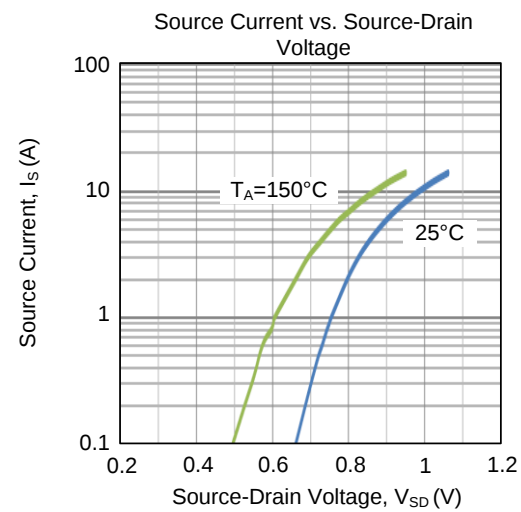
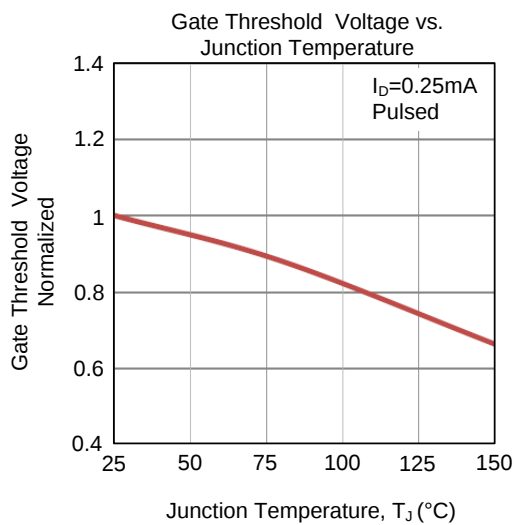


Unclamped Inductive Switching Waveforms

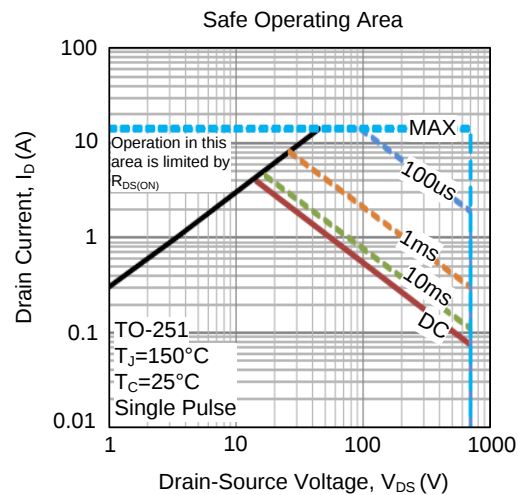
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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