



7N65-TC

Power MOSFET

7A, 650V N-CHANNEL POWER MOSFET

DESCRIPTION

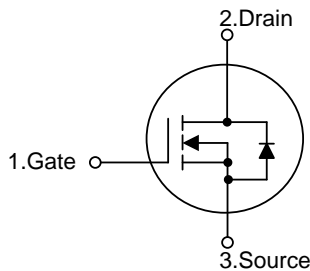
The UTC 7N65-TC is a N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC 7N65-TC is generally applied in high efficiency switch mode power supplies.

FEATURES

- * $R_{DS(ON)} \leq 1.4 \Omega$ @ $V_{GS}=10V, I_D=3.5A$
- * High Switching Speed

SYMBOL

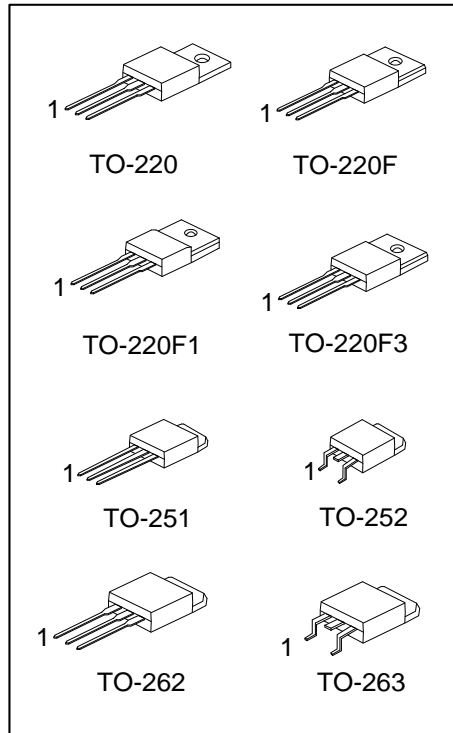


ORDERING INFORMATION

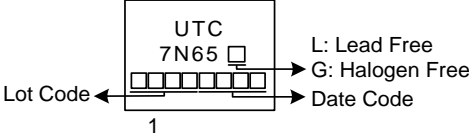
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7N65L-TA3-T	7N65G-TA3-T	TO-220	G	D	S	Tube
7N65L-TF1-T	7N65G-TF1-T	TO-220F1	G	D	S	Tube
7N65L-TF3-T	7N65G-TF3-T	TO-220F	G	D	S	Tube
7N65L-TF3T-T	7N65G-TF3T-T	TO-220F3	G	D	S	Tube
7N65L-TM3-T	7N65G-TM3-T	TO-251	G	D	S	Tube
7N65L-TN3-R	7N65G-TN3-R	TO-252	G	D	S	Tape Reel
7N65L-T2Q-T	7N65G-T2Q-T	TO-262	G	D	S	Tube
7N65L-TQ2-T	7N65G-TQ2-T	TO-263	G	D	S	Tube
7N65L-TQ2-R	7N65G-TQ2-R	TO-263	G	D	S	Tape Reel

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

<p>7N65G-TA3-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO220F1, TF3: TO-220F, TF3T: TO-220F3, TM3: TO-251, TN3: TO-252, T2Q: TO-262, 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}	650	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}	700	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.3	V/ns
Power Dissipation	TO-220/TO-262 TO-263	P_D	125	W
	TO-220F/TO-220F1 TO-220F3		35	W
	TO-251/TO-252		55	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. $L=100\text{mH}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, 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	RATING	UNIT	
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F3 TO-262/TO-263	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$	
	TO-251/TO-252		110	$^\circ\text{C}/\text{W}$	
	Junction to Case		θ_{JC}	1.0	$^\circ\text{C}/\text{W}$
				TO-220/TO-262 TO-263	3.57
TO-220F/TO-220F1 TO-220F3		2.27		$^\circ\text{C}/\text{W}$	
	TO-251/TO-252				

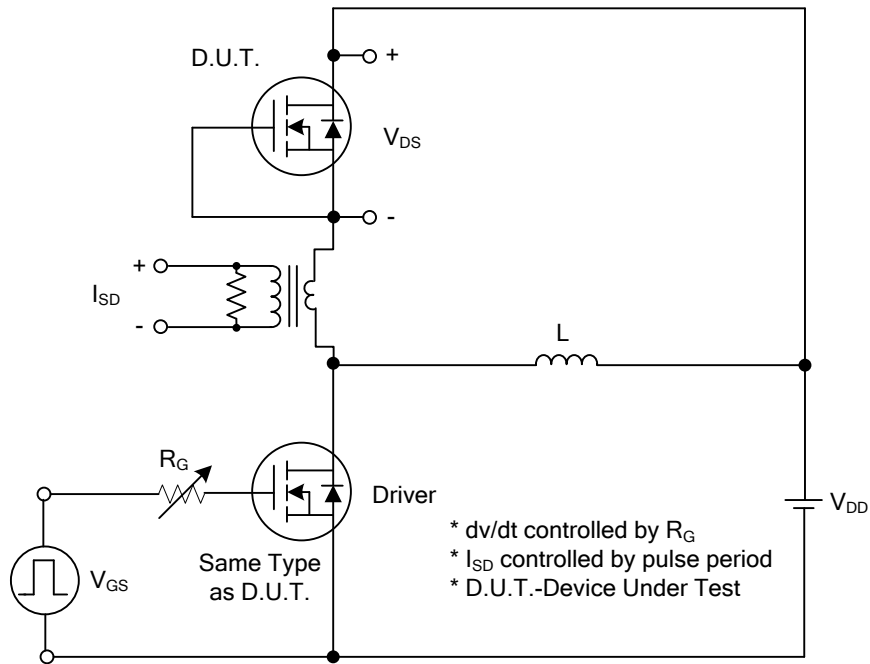
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}			100	nA
	Reverse				$V_{GS}=-30V, V_{DS}=0V$	-100
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	$R_{DS(ON)}$	$V_{GS}=10V, I_D=3.5A$			1.4	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{GS}=0V, V_{DS}=25V, f=1.0\text{ MHz}$		990		pF
Output Capacitance	C_{OSS}			96		pF
Reverse Transfer Capacitance	C_{RSS}			4.2		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q_G	$V_{DS}=520V, V_{GS}=10V, I_D=7.0A$ $I_G=100\mu A$ (Note 1, 2)		23		nC
Gate-source Charge	Q_{GS}			8.4		nC
Gate-drain Charge	Q_{GD}			4.6		nC
Turn-on Delay Time (Note 1)	$t_{D(ON)}$	$V_{DS}=100V, V_{GS}=10V, I_D=7.0A,$ $R_G=25\Omega$ (Note 1, 2)		12		ns
Rise Time	t_R			17.5		ns
Turn-off Delay Time	$t_{D(OFF)}$			60		ns
Fall-Time	t_F			27		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				7	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				14	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}	$V_{GS}=0V, I_S=7.0A,$ $dI_F/dt=100A/\mu s$ (Note1)		424		ns
Reverse Recovery Charge	Q_{rr}			3.2		μC

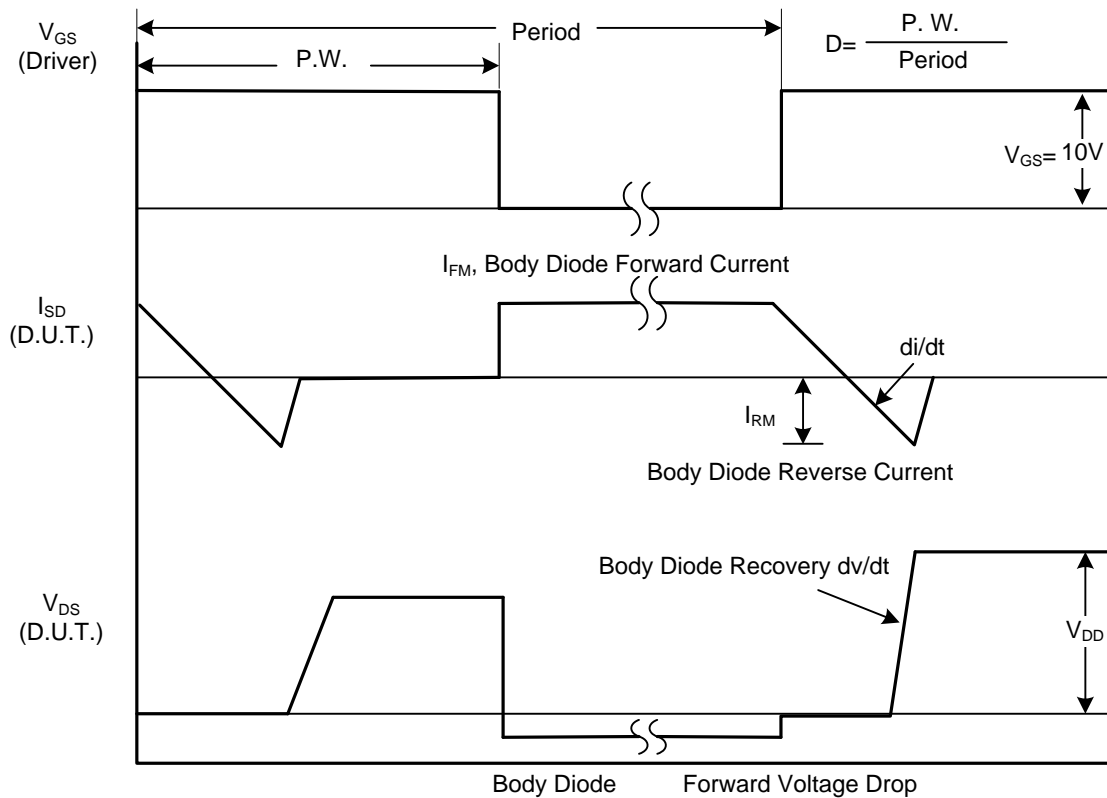
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

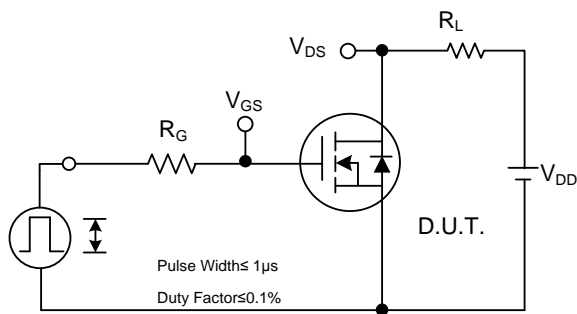


Peak Diode Recovery dv/dt Test Circuit

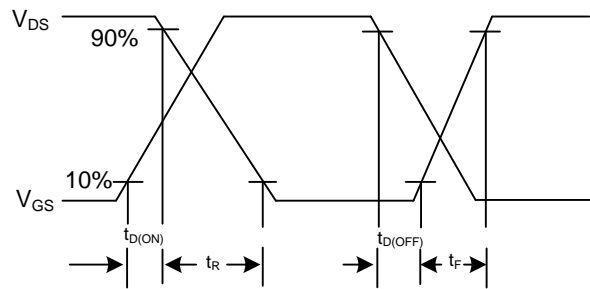


Peak Diode Recovery dv/dt Waveforms

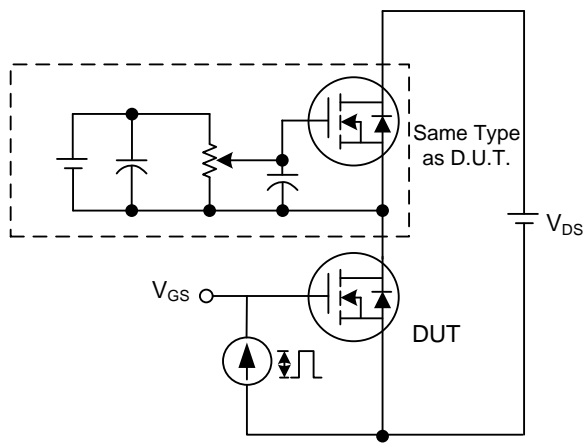
TEST CIRCUITS AND WAVEFORMS



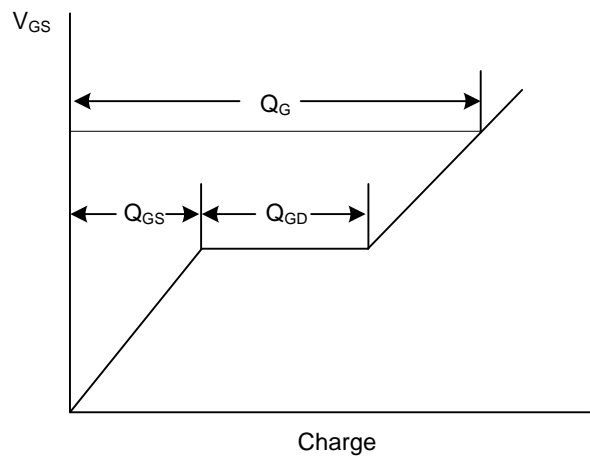
Switching Test Circuit



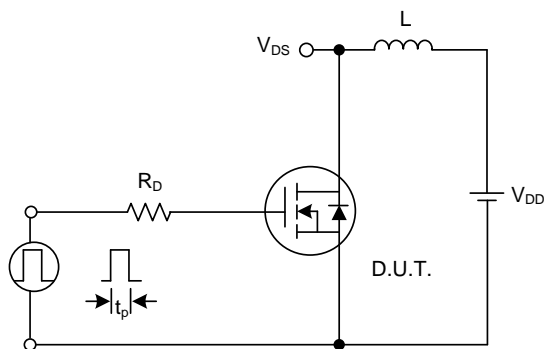
Switching Waveforms



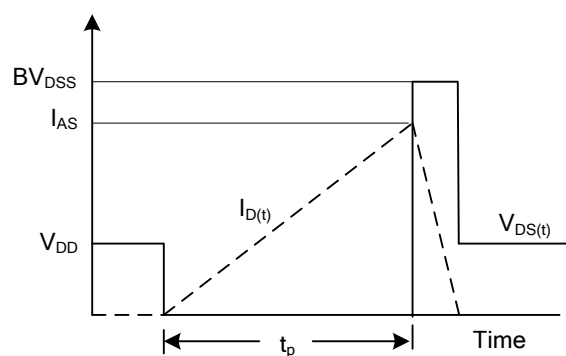
Gate Charge Test Circuit



Gate Charge Waveform

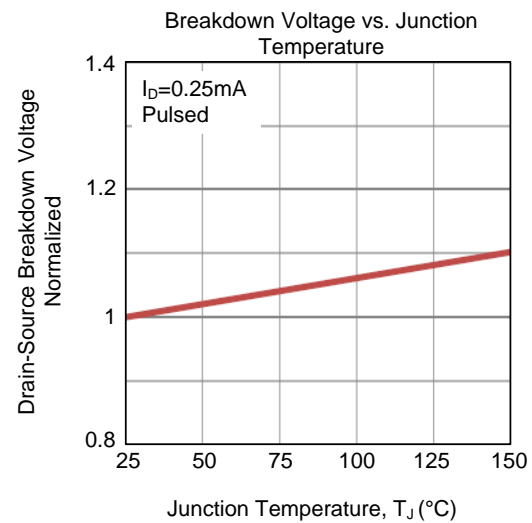
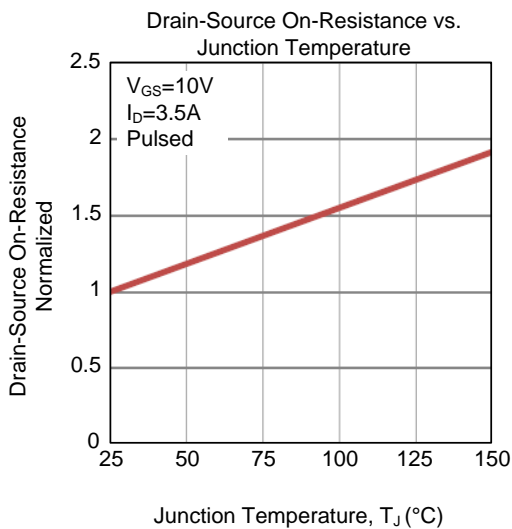
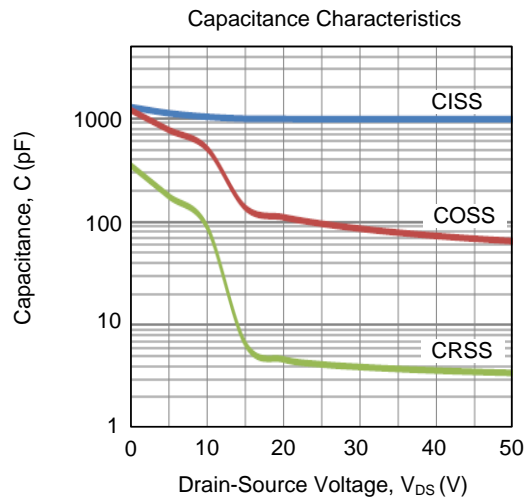
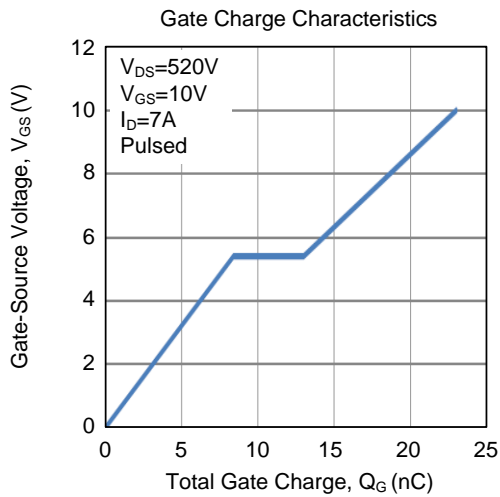
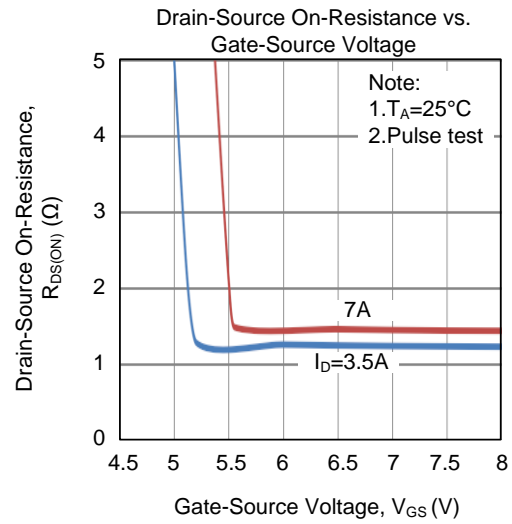
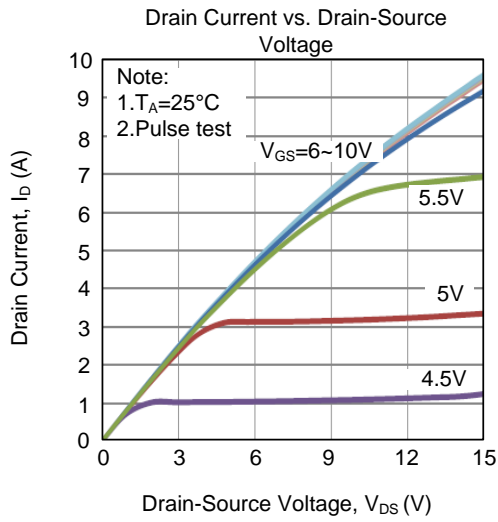


Unclamped Inductive Switching Test Circuit

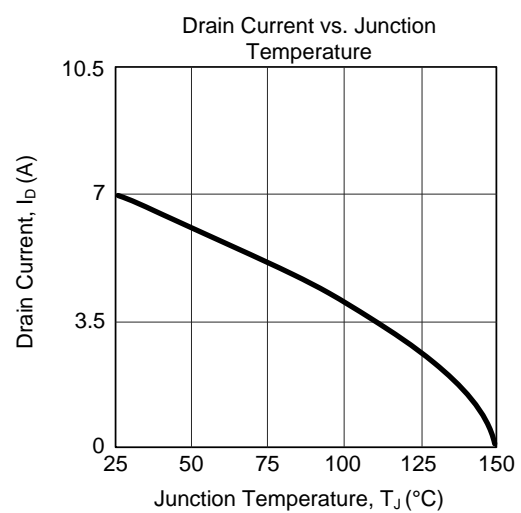
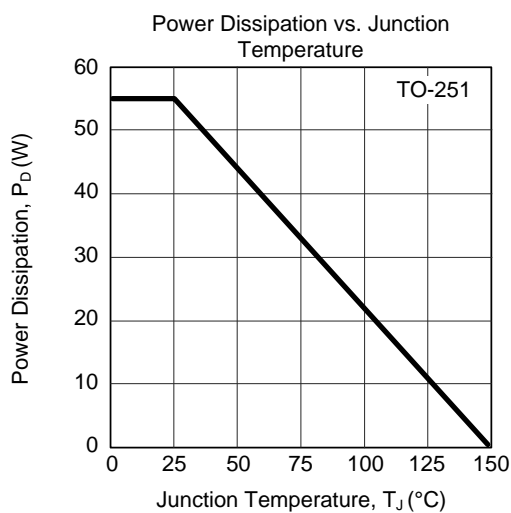
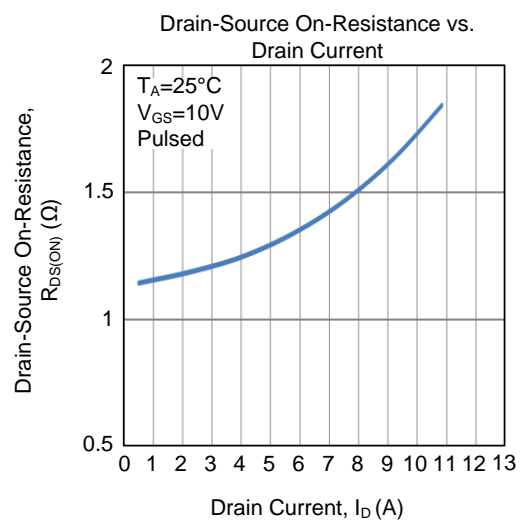
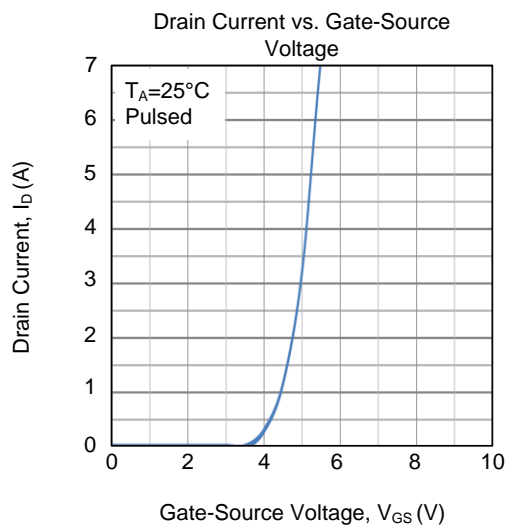
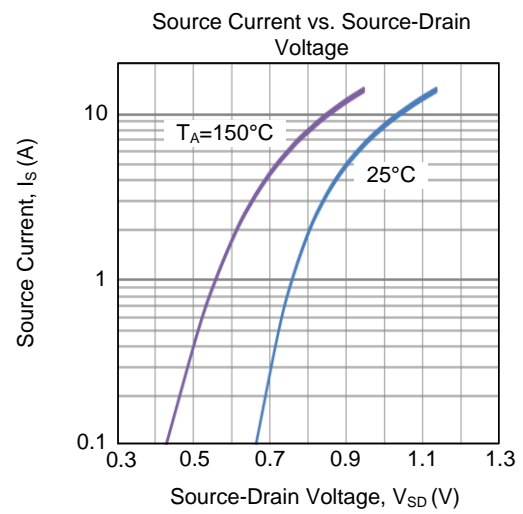
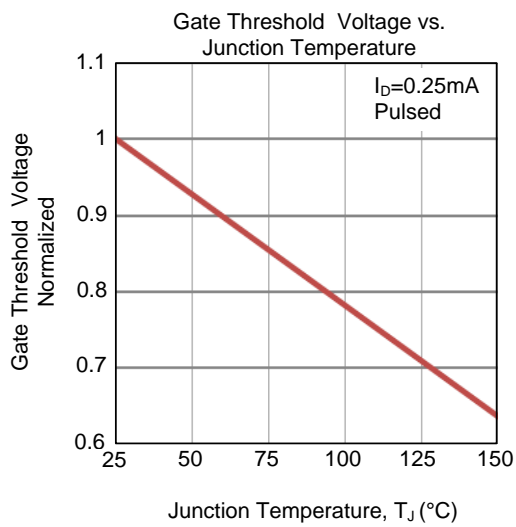


Unclamped Inductive Switching Waveforms

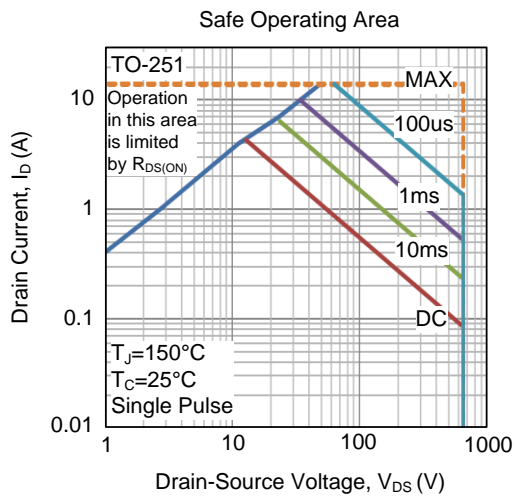
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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