



15NM65

Power MOSFET

15A, 650V N-CHANNEL SUPER-JUNCTION MOSFET

■ DESCRIPTION

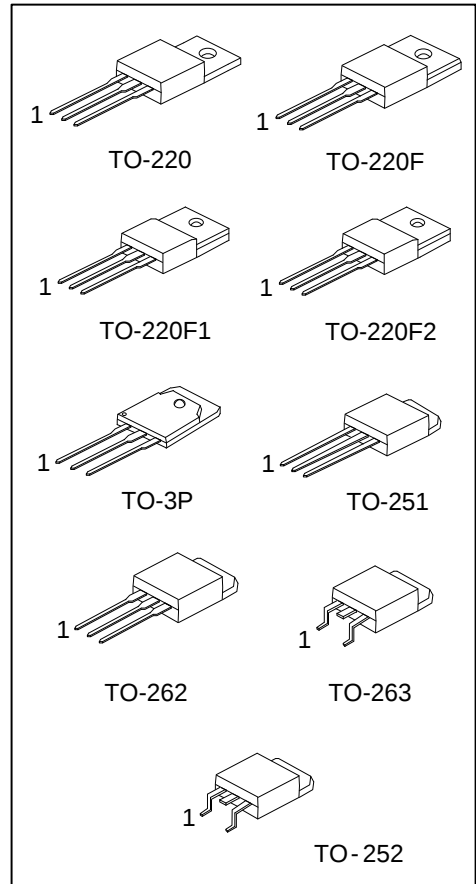
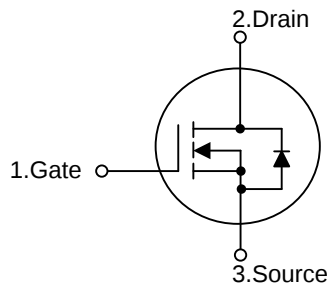
The UTC **15NM65** is a Super Junction MOSFET Structure. It uses UTC advanced planar stripe, DMOS technology to provide customers perfect switching performance, minimal on-state resistance.

The UTC **15NM65** is universally applied in electronic lamp ballasts based on half bridge topology, high efficiency switched mode power supplies, active power factor correction, etc.

■ FEATURES

- * $R_{DS(ON)} \leq 0.35 \Omega$ @ $V_{GS}=10V$, $I_D=7.5A$
- * By using Super Junction Structure
- * Fast Switching
- * With 100% Avalanche Tested

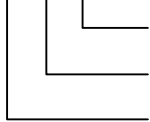
■ SYMBOL



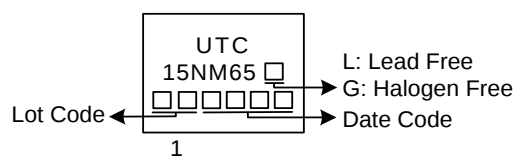
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
15NM65L-TA3-T	15NM65G-TA3-T	TO-220	G	D	S	Tube
15NM65L-TF3-T	15NM65G-TF3-T	TO-220F	G	D	S	Tube
15NM65L-TF1-T	15NM65G-TF1-T	TO-220F1	G	D	S	Tube
15NM65L-TF2-T	15NM65G-TF2-T	TO-220F2	G	D	S	Tube
15NM65L-TM3-T	15NM65G-TM3-T	TO-251	G	D	S	Tube
15NM65L-TN3-R	15NM65G-TN3-R	TO-252	G	D	S	Tape Reel
15NM65L-T2Q-T	15NM65G-T2Q-T	TO-262	G	D	S	Tube
15NM65L-TQ2-T	15NM65G-TQ2-T	TO-263	G	D	S	Tube
15NM65L-TQ2-R	15NM65G-TQ2-R	TO-263	G	D	S	Tape Reel
15NM65L-T3P-T	15NM65G-T3P-T	TO-3P	G	D	S	Tube

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

15NM65G-TA3-T  (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2 TF3: TO-220F, TM3: TO-251, TN3: TO-252, T2Q: TO-262, TQ2: TO-263, T3P: TO-3P (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}	650	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	15	A
	Pulsed (Note 2)	I_{DM}	60	A
Avalanche Current (Note 2)		I_{AR}	2.7	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	485	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220/TO-262 TO-263	P_D	102	W
	TO-220F/TO-220F1 TO-220F2		32	W
	TO-251/TO-252		82	W
	TO-3P		195	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. $L = 133 \text{ mH}$, $I_{AS} = 2.7 \text{ A}$, $V_{DD} = 50 \text{ V}$, $R_G = 25 \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 15 \text{ A}$, $di/dt \leq 200 \text{ A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2 TO-262/TO-263	θ_{JA}	62.5	$^\circ\text{C/W}$
	TO-251/TO-252		110	$^\circ\text{C/W}$
	TO-3P		40	$^\circ\text{C/W}$
Junction to Case	TO-220/TO-262 TO-263	θ_{JC}	1.22	$^\circ\text{C/W}$
	TO-220F/TO-220F1 TO-220F2		3.9	$^\circ\text{C/W}$
	TO-251/TO-252		1.52	$^\circ\text{C/W}$
	TO-3P		0.64	$^\circ\text{C/W}$

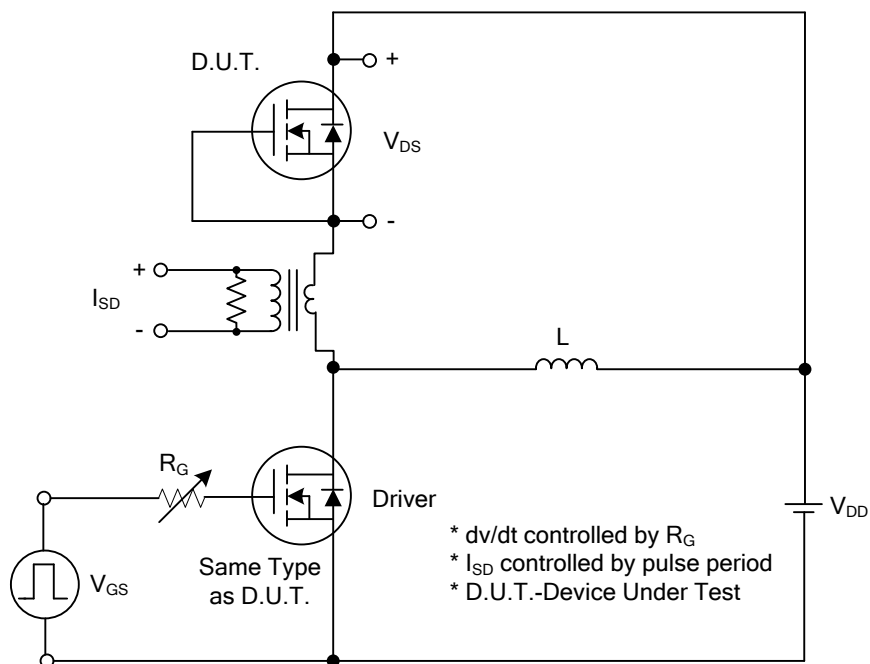
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	650			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =650V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	I _{GSS}	V _{DS} =0V ,V _{GS} =±30V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} = V _{GS} , I _D =250μA	2.5		4.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =7.5A			0.35	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		1100		pF
Output Capacitance	C _{OSS}			870		pF
Reverse Transfer Capacitance	C _{RSS}			96		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q _G	V _{DS} =520V, V _{GS} =10V, I _D =15A , I _G =1mA (Note 1, 2)		40.5		nC
Gate-Source Charge	Q _{GS}			6		nC
Gate-Drain Charge	Q _{GD}			15		nC
Turn-ON Delay Time (Note 1)	t _{D(ON)}	V _{DD} =100V, I _D =15A, R _G =25Ω V _{GS} =10V (Note 1, 2)		14		ns
Turn-ON Rise Time	t _R			30		ns
Turn-OFF Delay Time	t _{D(OFF)}			138		ns
Turn-OFF Fall Time	t _F			63		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				15	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				60	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _S =15A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)	t _{rr}	I _S =15A, V _{GS} =0V,		410		ns
Reverse Recovery Charge	Q _{rr}	dl _F /dt=100A/μs		6.95		μC

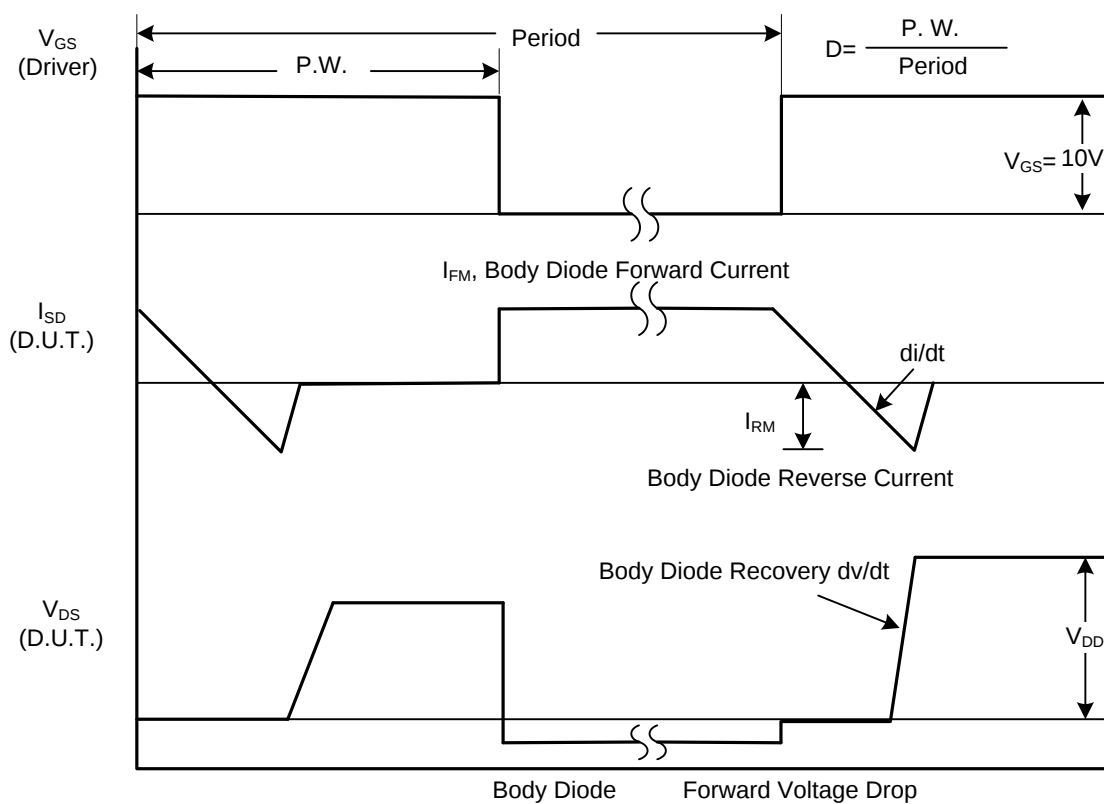
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

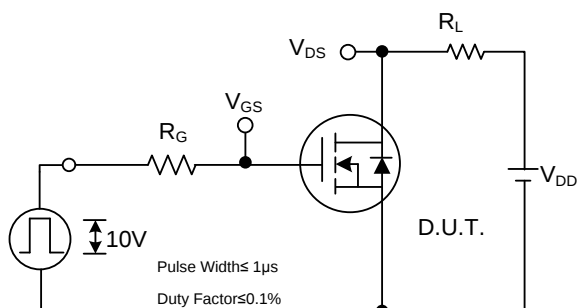


Peak Diode Recovery dv/dt Test Circuit

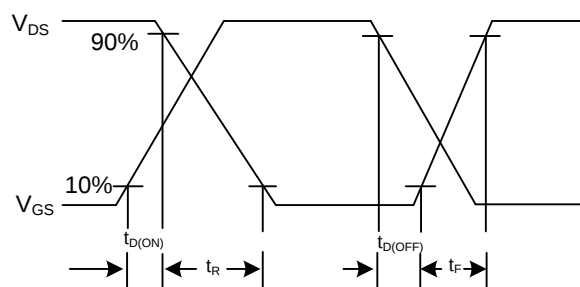


Peak Diode Recovery dv/dt Waveforms

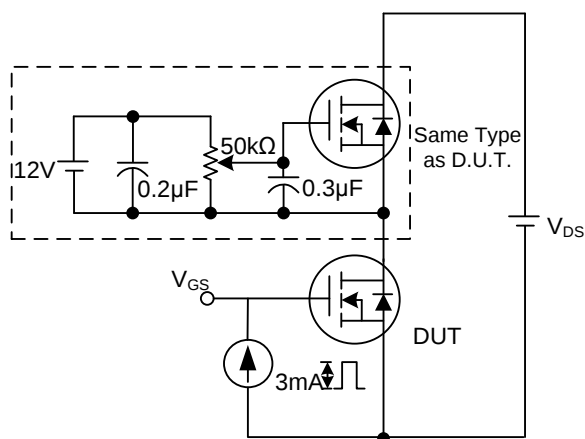
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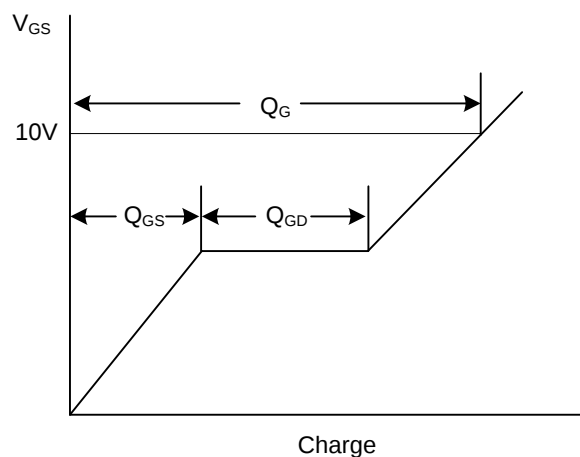
Switching Test Circuit



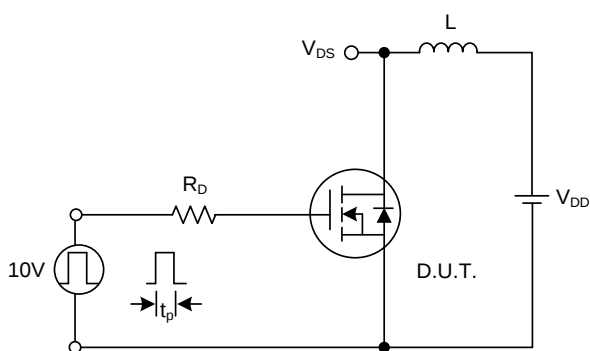
Switching Waveforms



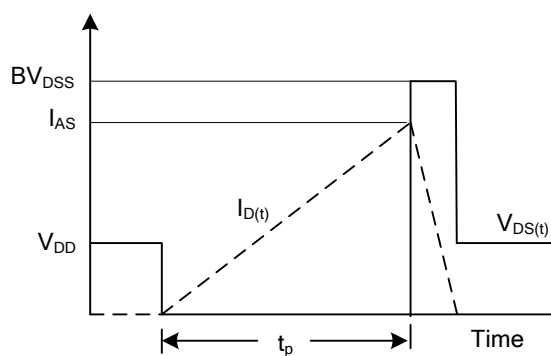
Gate Charge Test Circuit



Gate Charge Waveform

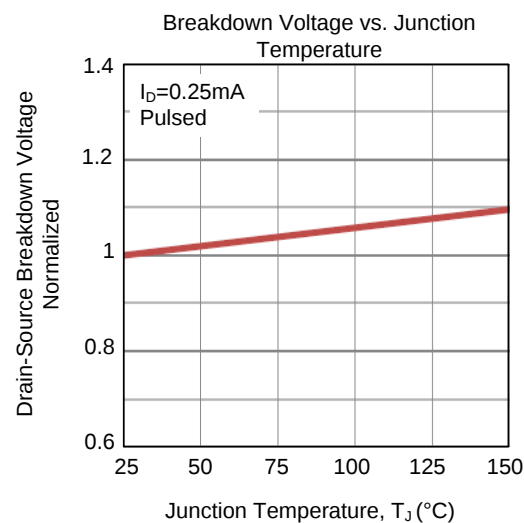
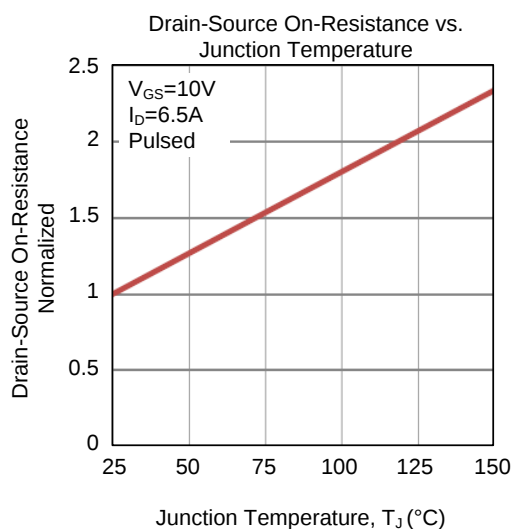
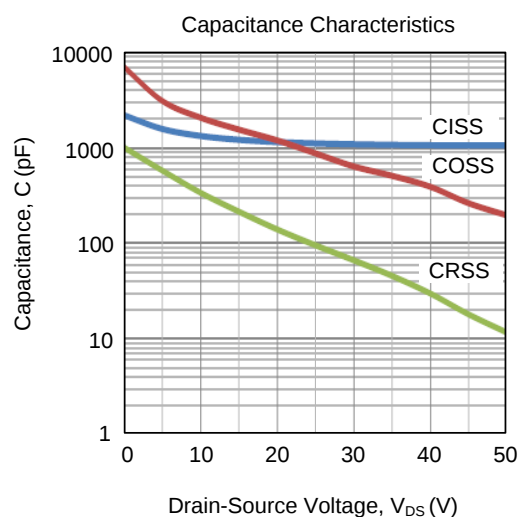
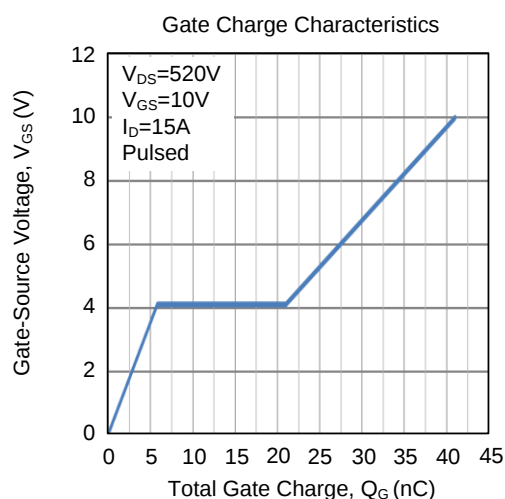
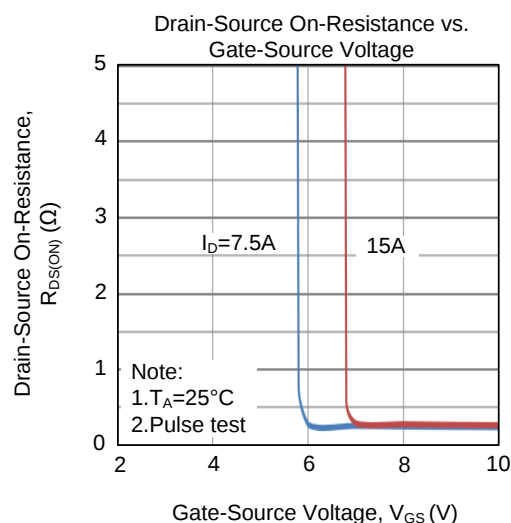
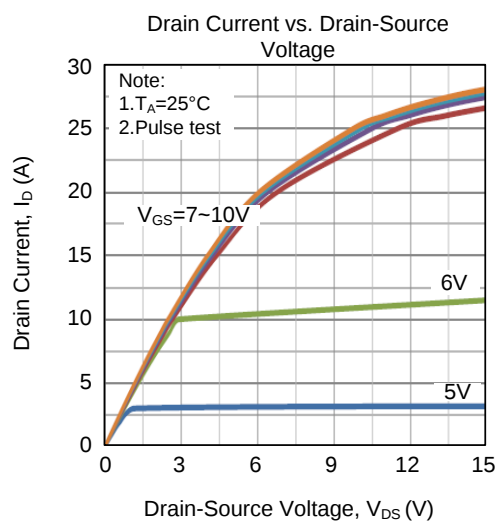


Unclamped Inductive Switching Test Circuit

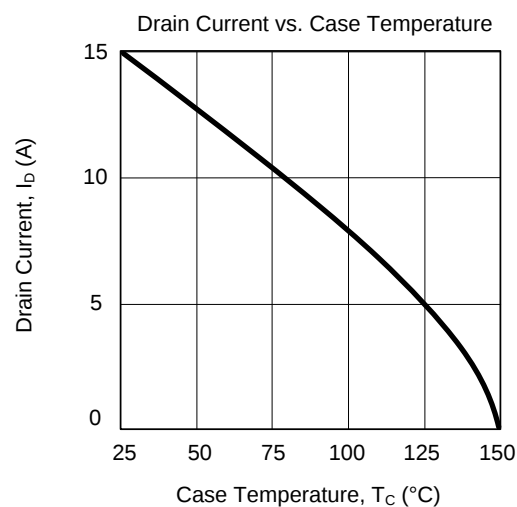
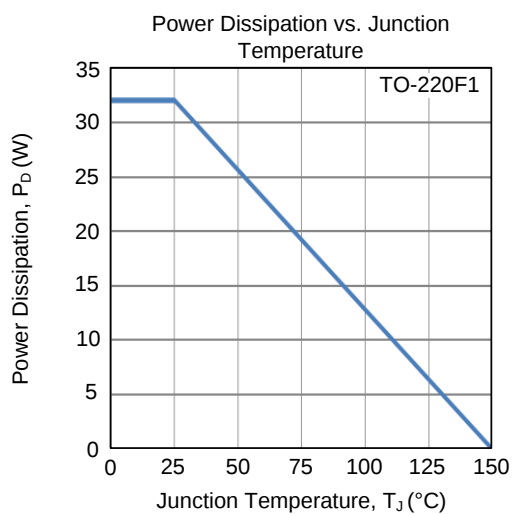
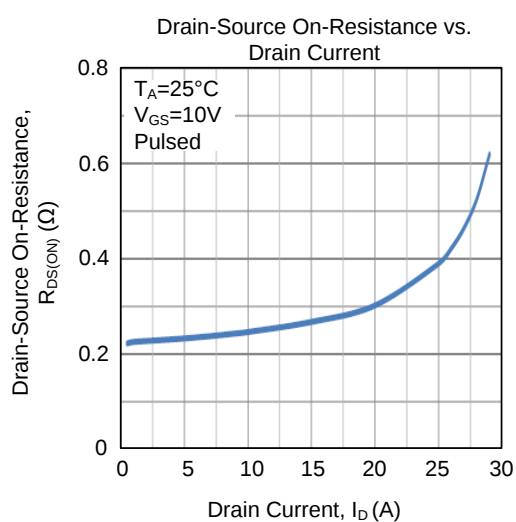
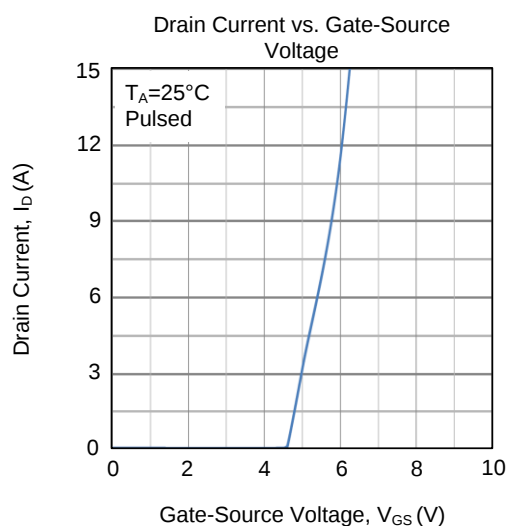
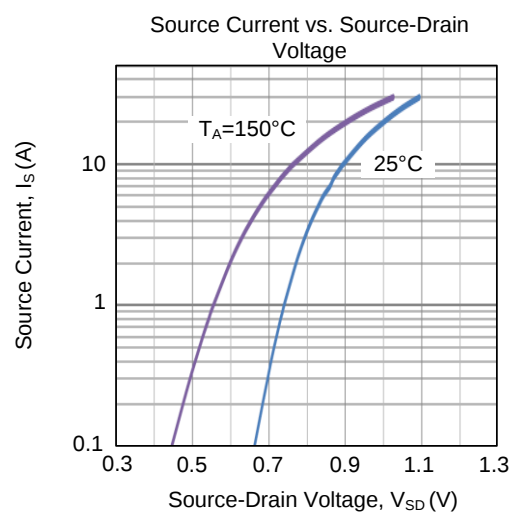
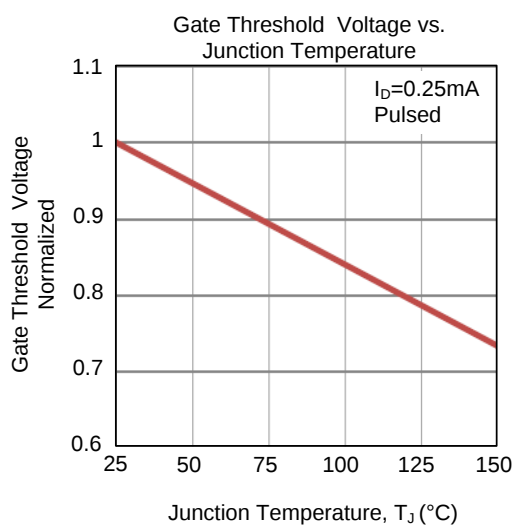


Unclamped Inductive Switching Waveforms

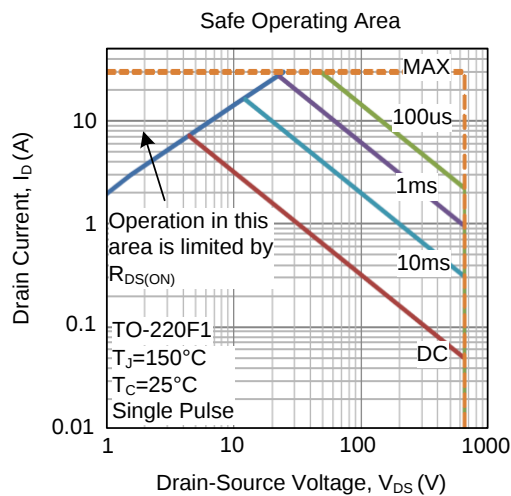
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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