



8NM65

Power MOSFET

8.0A, 650V N-CHANNEL SUPER-JUNCTION MOSFET

■ DESCRIPTION

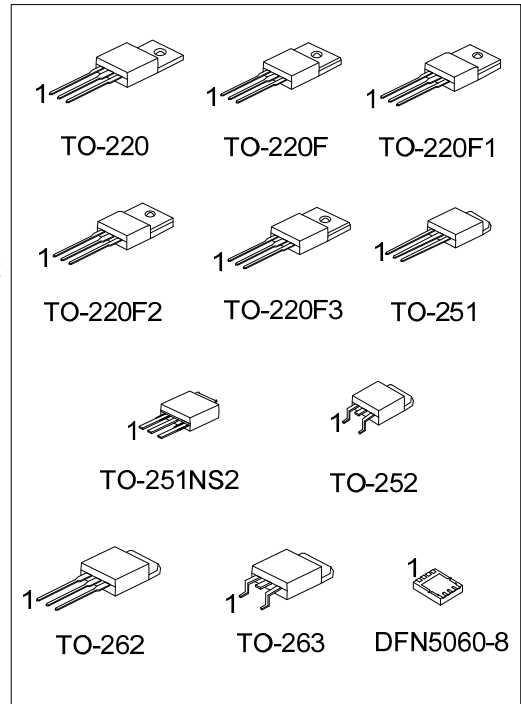
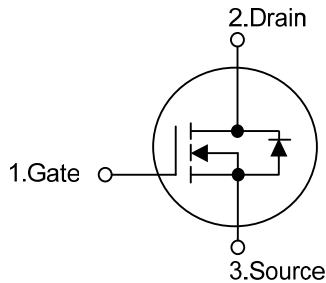
The UTC **8NM65** is a Super Junction MOSFET Structure. It uses UTC advanced planar stripe, DMOS technology to provide customers perfect switching performance, minimal on-state resistance.

The UTC **8NM65** is universally applied in electronic lamp ballasts based on half bridge topology, high efficiency switched mode power supplies, active power factor correction, etc.

■ FEATURES

- * $R_{DS(ON)} \leq 0.75 \Omega$ @ $V_{GS}=10V$, $I_D=4.0A$
- * Fast Switching Capability
- * Avalanche Energy Tested
- * Improved dv/dt Capability, High Ruggedness

■ SYMBOL



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
8NM65L-TA3-T	8NM65G-TA3-T	TO-220	G	D	S						Tube
8NM65L-TF1-T	8NM65G-TF1-T	TO-220F1	G	D	S						Tube
8NM65L-TF2-T	8NM65G-TF2-T	TO-220F2	G	D	S						Tube
8NM65L-TF3-T	8NM65G-TF3-T	TO-220F	G	D	S						Tube
8NM65L-TM3-T	8NM65G-TM3-T	TO-251	G	D	S						Tube
8NM65L-TMN2-T	8NM65G-TMN2-T	TO-251NS2	G	D	S						Tube
8NM65L-TN3-R	8NM65G-TN3-R	TO-252	G	D	S						Tape Reel
8NM65L-T2Q-T	8NM65G-T2Q-T	TO-262	G	D	S						Tube
8NM65L-TQ2-T	8NM65G-TQ2-T	TO-263	G	D	S						Tube
8NM65L-TQ2-R	8NM65G-TQ2-R	TO-263	G	D	S						Tape Reel
8NM65L-K08-5060-R	8NM65G-K08-5060-R	DFN5060-8	S	S	S	G	D	D	D	D	Tape Reel

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

8NM65G-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, TMN2: TO-251NS2 TN3: TO-252, T2Q: TO-262, TQ2: TO-263 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING

PACKAGE		MARKING	
TO-220 TO-220F TO-220F1 TO-220F2	TO-251 TO-251NS2 TO-252 TO-262 TO-263	UTC 8NM65 Lot Code ← [] [] [] [] → Date Code 1 L: Lead Free G: Halogen Free	
DFN5060-8		UTC 8NM65 Lot Code ← [•] [] [] [] → Date Code	

■ **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	8.0	A
	Pulsed (Note 2)	I_{DM}	32	A
Avalanche Current (Note 2)		I_{AR}	1.9	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	260	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	5.0	V/ns
Power Dissipation	TO-220/TO-262 TO-263	P_D	75	W
	TO-220F/TO-220F1 TO-220F2		27	W
	TO-251/TO-251NS2 TO-252		50	W
	DFN5060-8		26	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. $L=144\text{mH}$, $I_{AS}=1.9\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD}\leq 8.0\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2 TO-262/ TO-263	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-251/TO-251NS2 TO-252		110	$^\circ\text{C}/\text{W}$
	DFN5060-8		75	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220/TO-262 TO-263	θ_{JC}	1.66	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1 TO-220F2		4.6	$^\circ\text{C}/\text{W}$
	TO-251/TO-251NS2 TO-252		2.55	$^\circ\text{C}/\text{W}$
	DFN5060-8		4.8	$^\circ\text{C}/\text{W}$

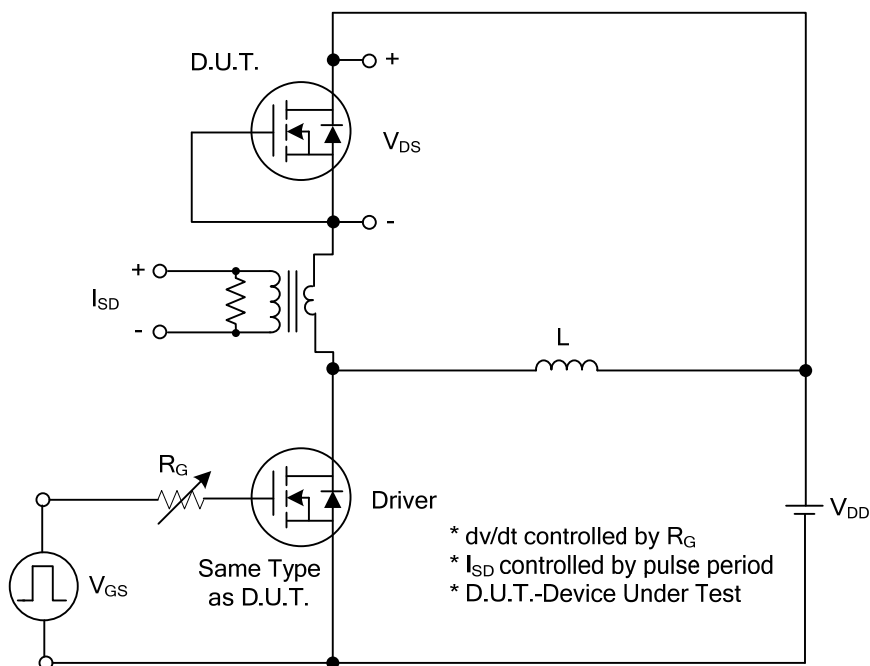
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

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	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	2.5		4.5	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =4.0A		0.57	0.75	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0 MHz		330		pF
Output Capacitance		C _{OSS}			248		pF
Reverse Transfer Capacitance		C _{RSS}			3.5		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =520V, V _{GS} =10V I _D =8A, I _G =1mA (Note 1,2)		17		nC
Gate to Source Charge		Q _{GS}			4		nC
Gate to Drain Charge		Q _{GD}			5.5		nC
Turn-on Delay Time (Note 1)		t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =8.0A, R _G =25Ω (Note 1, 2)		9		ns
Rise Time		t _R			20		ns
Turn-off Delay Time		t _{D(OFF)}			58		ns
Fall-Time		t _F			36		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Pulsed Current		I _S				8	A
Drain-Source Diode Forward Voltage (Note 1)		I _{SM}				32	A
Maximum Body-Diode Continuous Current		V _{SD}	I _S =8.0A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)		t _{rr}	I _S =8.0A, V _{GS} =0V		320		ns
Reverse Recovery Charge		Q _{rr}	dl _F /dt=100A/μs		3.6		μC

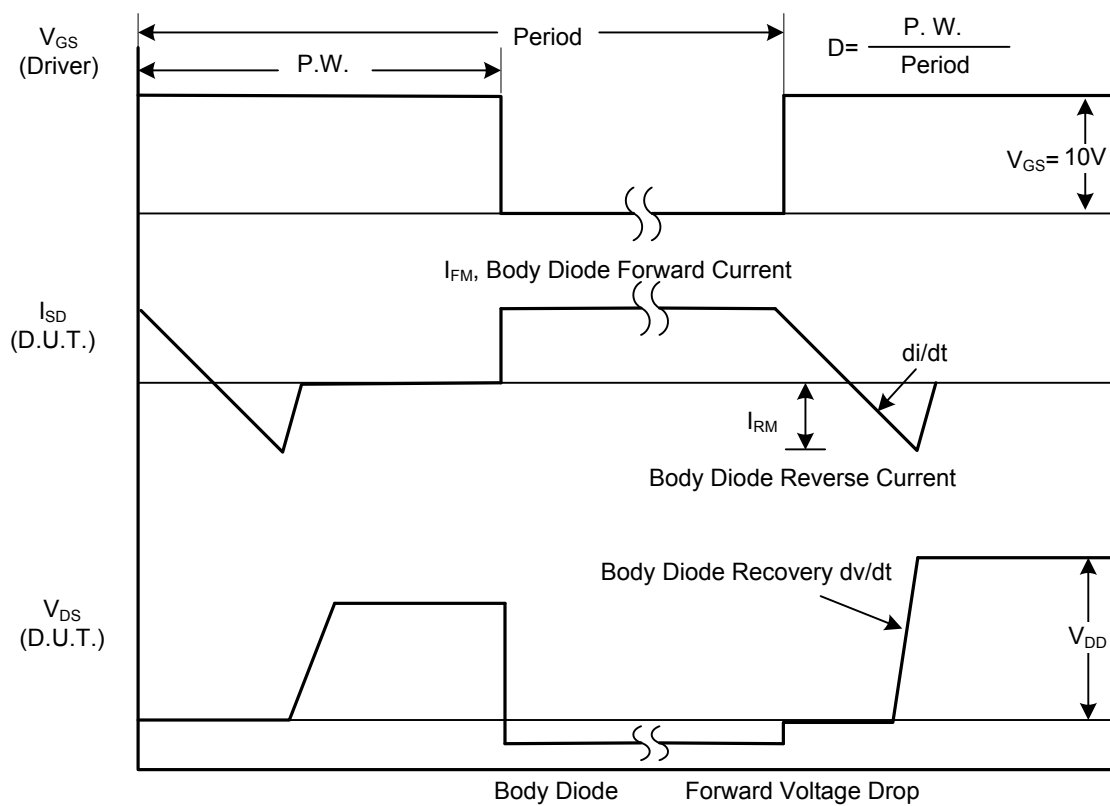
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

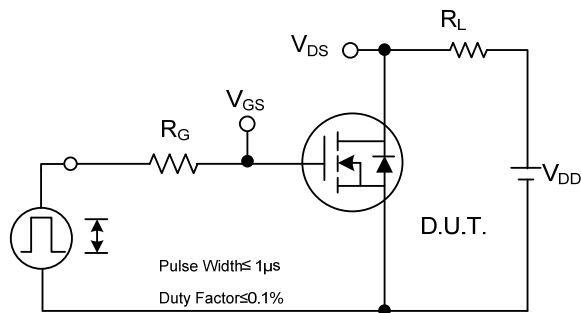


Peak Diode Recovery dv/dt Test Circuit

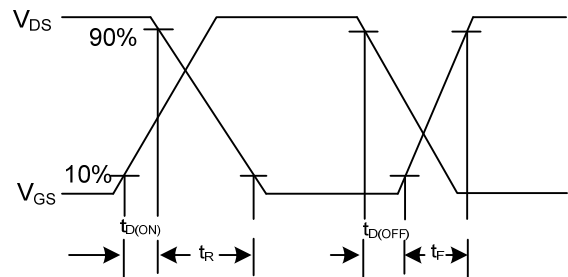


Peak Diode Recovery dv/dt Waveforms

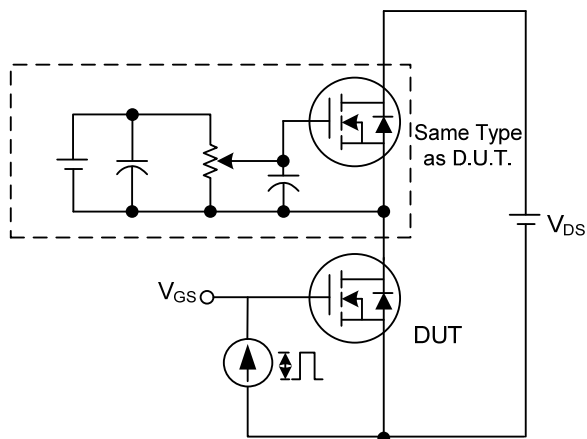
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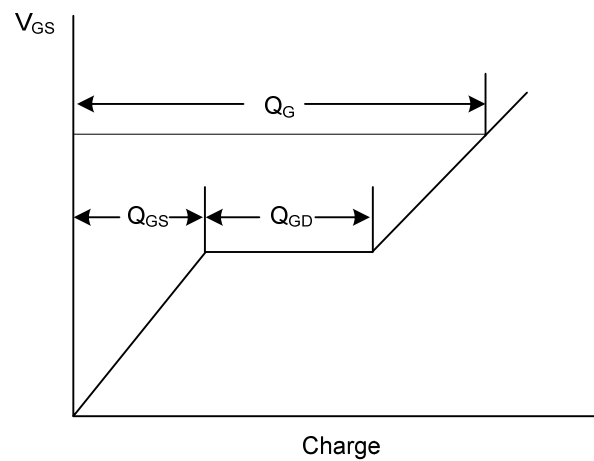
Switching Test Circuit



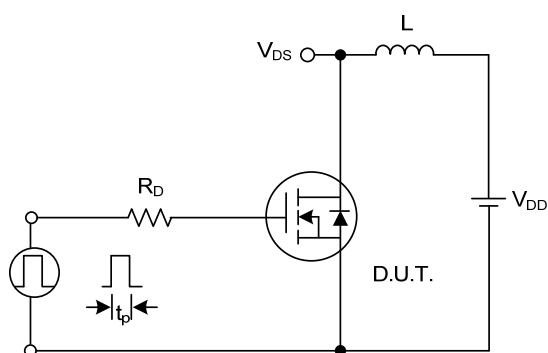
Switching Waveforms



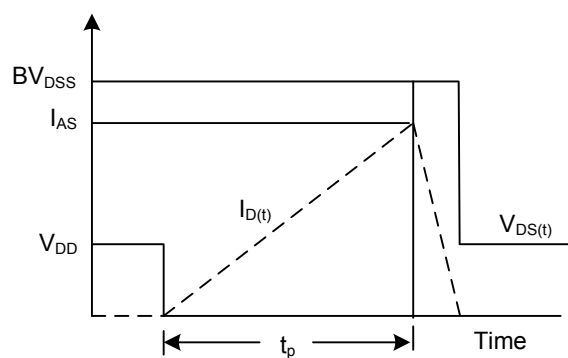
Gate Charge Test Circuit



Gate Charge Waveform

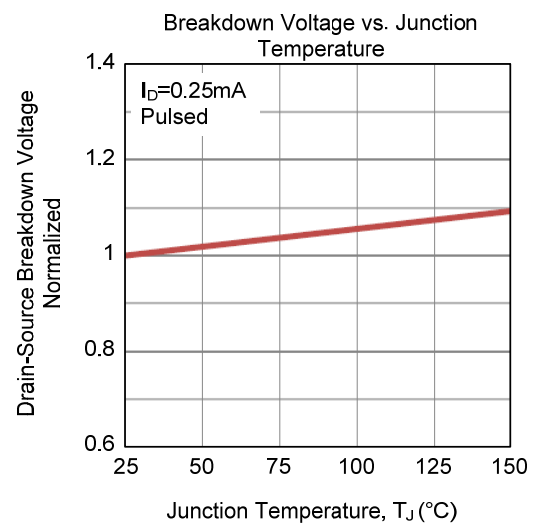
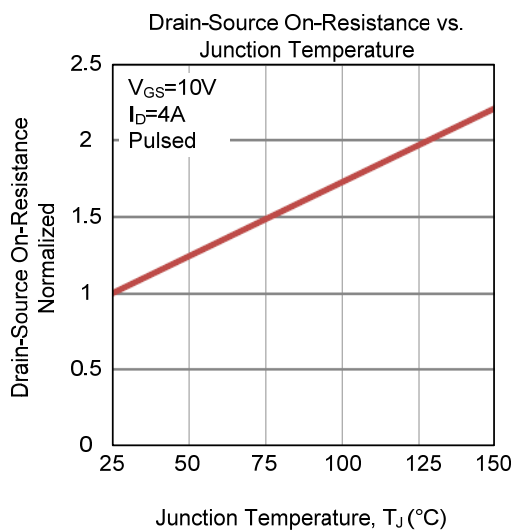
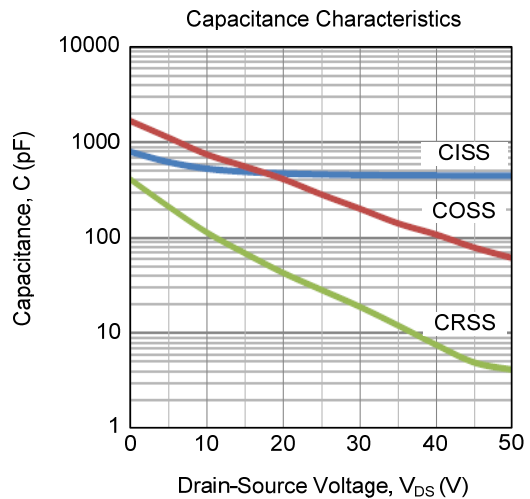
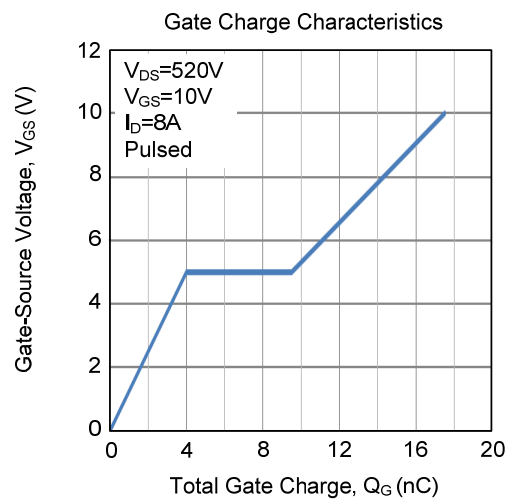
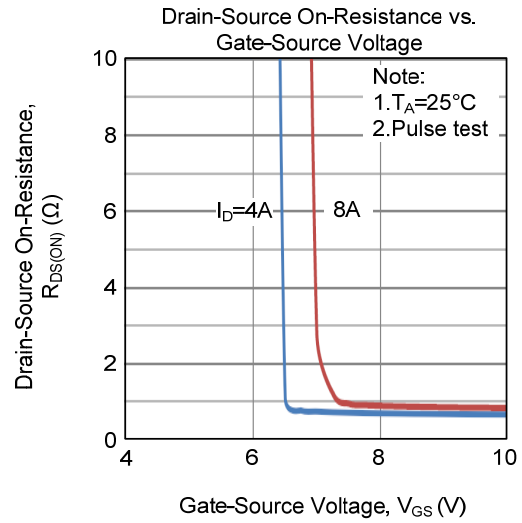
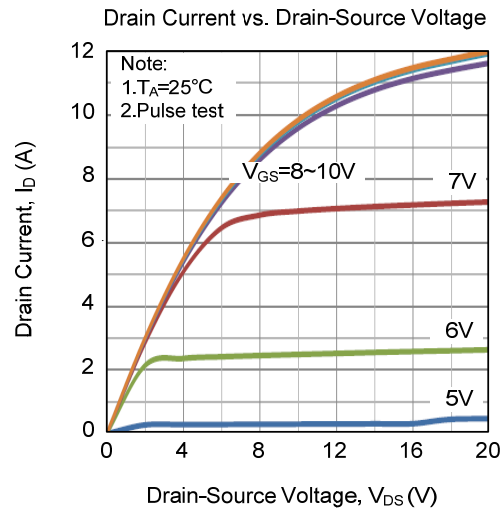


Unclamped Inductive Switching Test Circuit

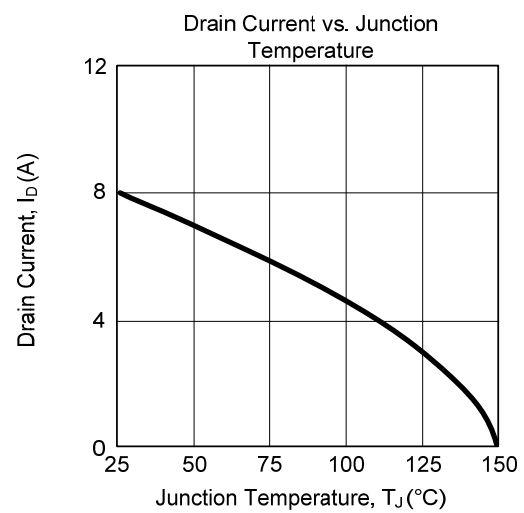
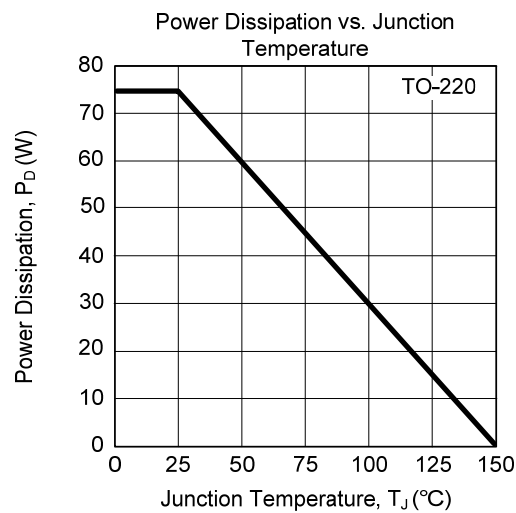
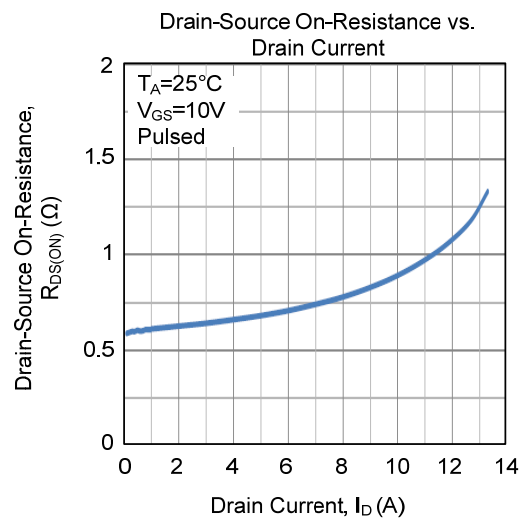
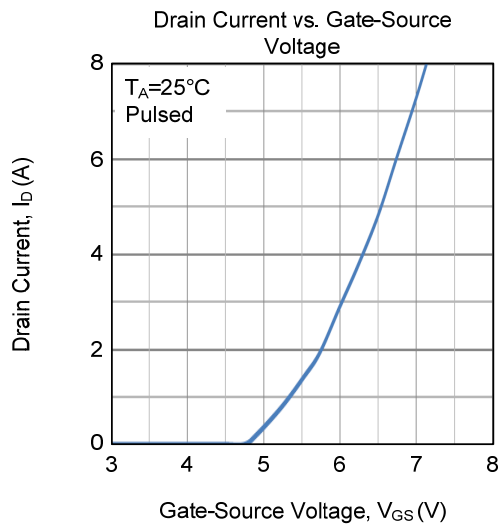
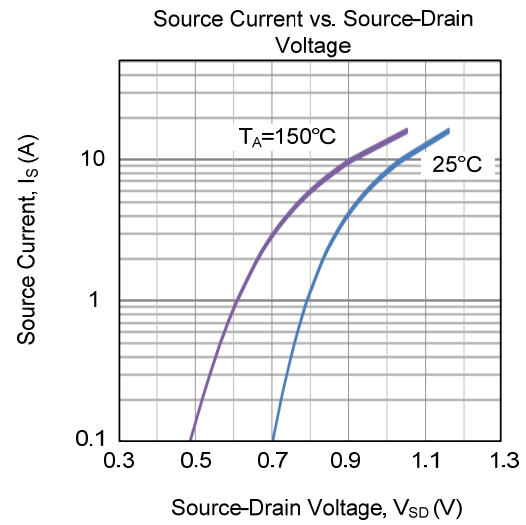
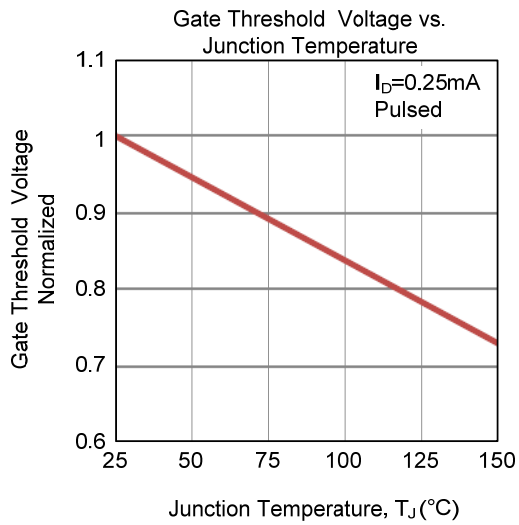


Unclamped Inductive Switching Waveforms

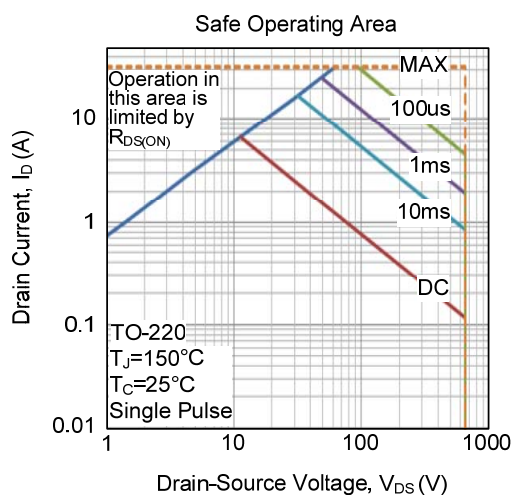
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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