



## 8NM65-U2

Power MOSFET

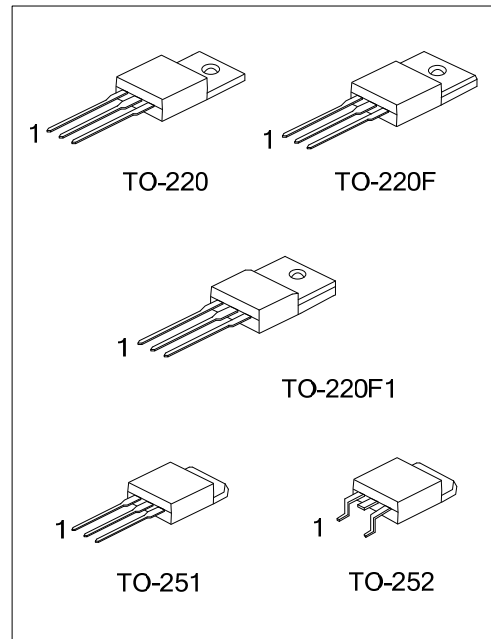
### 8A, 650V N-CHANNEL SUPER-JUNCTION MOSFET

#### DESCRIPTION

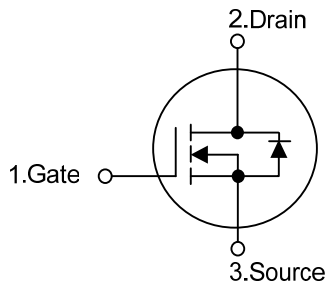
The **UTC 8NM65-U2** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

#### FEATURES

- \*  $R_{DS(ON)} \leq 0.9 \Omega @ V_{GS}=10V, I_D=4.0A$
- \* Fast Switching Capability
- \* Avalanche Energy Tested
- \* Improved dv/dt Capability, High Ruggedness



#### SYMBOL



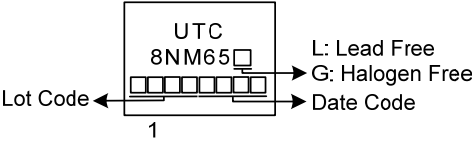
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
8NM65L-TA3-T	8NM65G-TA3-T	TO-220	G	D	S	Tube
8NM65L-TF3-T	8NM65G-TF3-T	TO-220F	G	D	S	Tube
8NM65L-TF1-T	8NM65G-TF1-T	TO-220F1	G	D	S	Tube
8NM65L-TM3-T	8NM65G-TM3-T	TO-251	G	D	S	Tube
8NM65L-TN3-R	8NM65G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>8NM65G-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: TO-220F1, TF3: TO-220F TM3: TO-251, TN3: TO-252 (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		$V_{GSS}$	$\pm 30$	V
Drain Current	Continuous	$I_D$	8.0	A
	Pulsed (Note 2)	$I_{DM}$	32	A
Avalanche Current (Note 2)		$I_{AR}$	2.7	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	39.2	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.1	V/ns
Power Dissipation	TO-220	$P_D$	74	W
	TO-220F/TO-220F1		26	W
	TO-251/TO-252		48	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.  $L=10\text{mH}$ ,  $I_{AS}=2.8\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\ \Omega$ , Starting  $T_J = 25^\circ\text{C}$

4.  $I_{SD}\leq 8\text{A}$ ,  $di/dt\leq 200\text{A}/\mu\text{s}$ ,  $V_{DD}\leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

■ THERMAL DATA

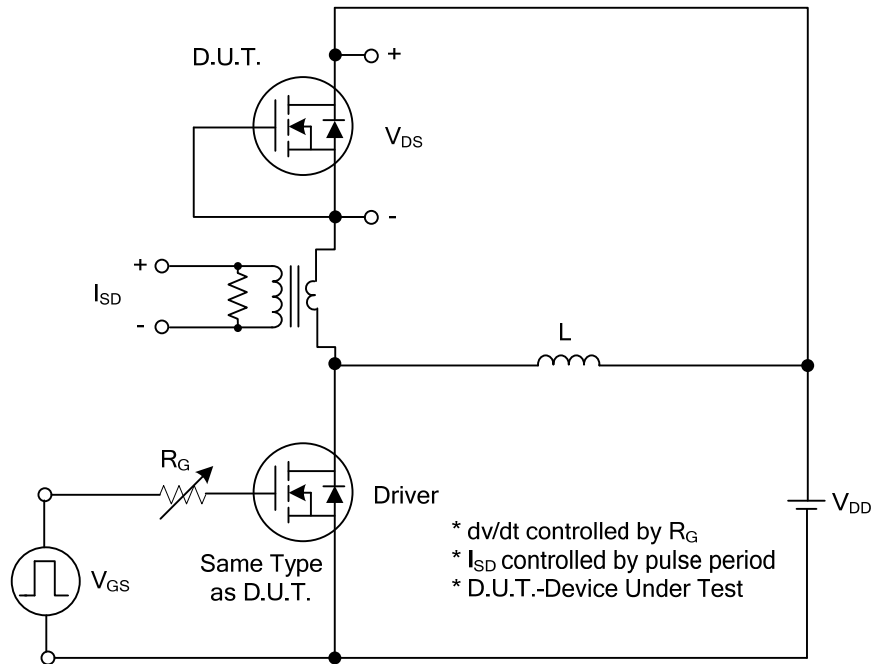
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
	TO-220F1			
	TO-251/TO-252			
Junction to Case	TO-220	$\theta_{JC}$	1.68	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		4.8	
	TO-251/TO-252		2.6	

■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

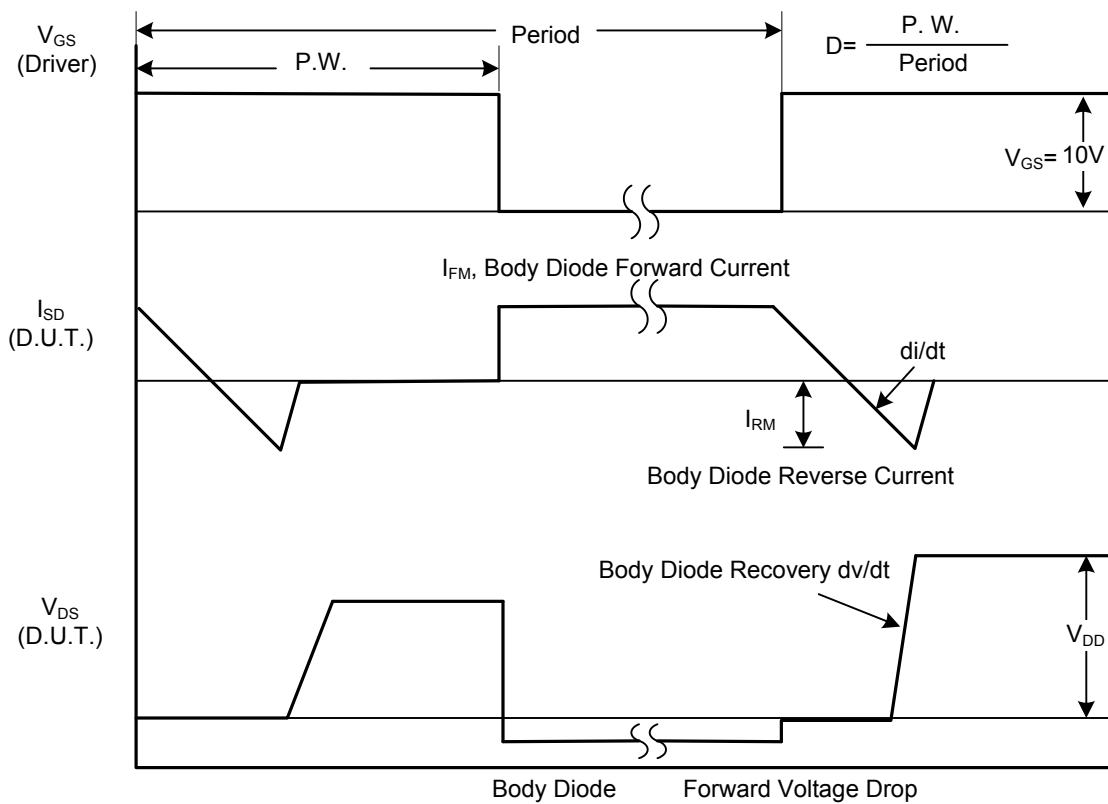
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>OFF CHARACTERISTICS</b>								
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	650			V	
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> = 650V, V <sub>GS</sub> = 0V			10	μA	
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>	V <sub>GS</sub> = 30V, V <sub>DS</sub> = 0V			100	nA	
	Reverse		V <sub>GS</sub> = -30V, V <sub>DS</sub> = 0V			-100	nA	
<b>ON CHARACTERISTICS</b>								
Gate Threshold Voltage		V <sub>GS(TH)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	2.5		4.5	V	
Static Drain-Source On-State Resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 4.0A		0.67	0.9	Ω	
<b>DYNAMIC CHARACTERISTICS</b>								
Input Capacitance		C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0 MHz		422		pF	
Output Capacitance		C <sub>OSS</sub>				336		pF
Reverse Transfer Capacitance		C <sub>RSS</sub>				32		pF
<b>SWITCHING CHARACTERISTICS</b>								
Total Gate Charge (Note 1)		Q <sub>G</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =10V, I <sub>D</sub> =8A, I <sub>G</sub> =1mA (Note 1, 2)		21		nC	
Gate to Source Charge		Q <sub>GS</sub>				3.5		nC
Gate to Drain Charge		Q <sub>GD</sub>				7		nC
Turn-ON Delay Time (Note 1)		t <sub>D(ON)</sub>	V <sub>DD</sub> =100V, V <sub>GS</sub> =10V, I <sub>D</sub> =8A, R <sub>G</sub> =25Ω (Note 1, 2)		6.4		ns	
Rise Time		t <sub>R</sub>				20		ns
Turn-OFF Delay Time		t <sub>D(OFF)</sub>				50		ns
Fall-Time		t <sub>F</sub>				31		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>								
Maximum Body-Diode Continuous Current		I <sub>S</sub>				8	A	
Maximum Body-Diode Pulsed Current		I <sub>SM</sub>				32	A	
Drain-Source Diode Forward Voltage (Note 1)		V <sub>SD</sub>	I <sub>S</sub> =8.0A, V <sub>GS</sub> =0V			1.4	V	
Body Diode Reverse Recovery Time (Note 1)		t <sub>rr</sub>	I <sub>S</sub> =8.0A, V <sub>GS</sub> =0V, di <sub>F</sub> /dt=100A/μs			316	ns	
Body Diode Reverse Recovery Charge		Q <sub>rr</sub>				3.4		μC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.  
 2. Essentially independent of operating temperature.

## TEST CIRCUITS AND WAVEFORMS

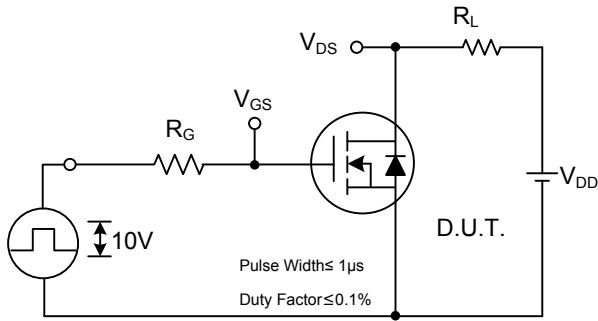


**Peak Diode Recovery dv/dt Test Circuit**

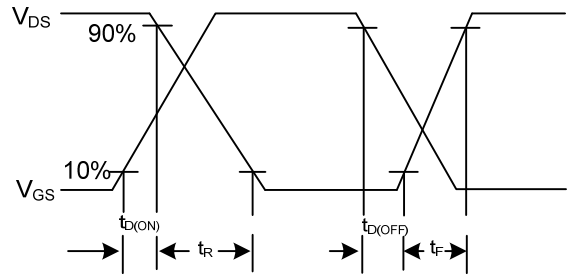


**Peak Diode Recovery dv/dt Waveforms**

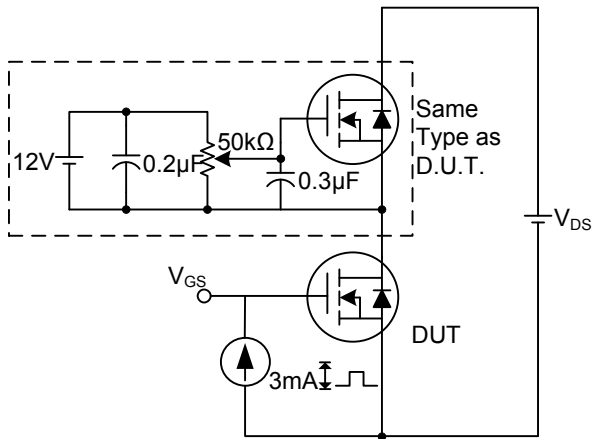
## TEST CIRCUITS AND WAVEFORMS (Cont.)



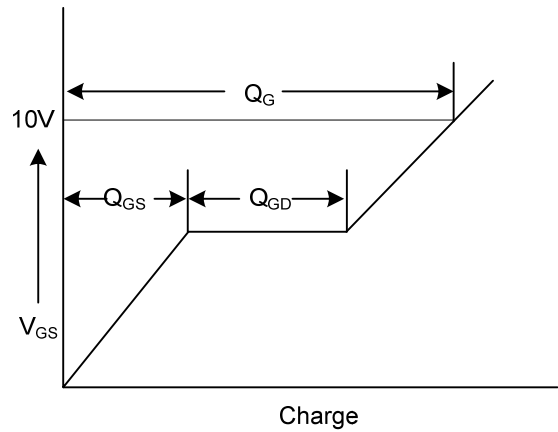
**Switching Test Circuit**



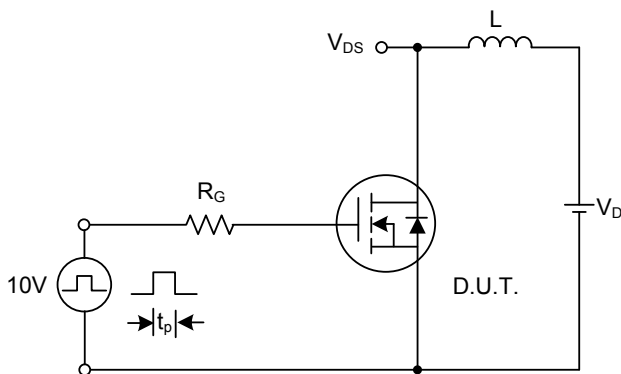
**Switching Waveforms**



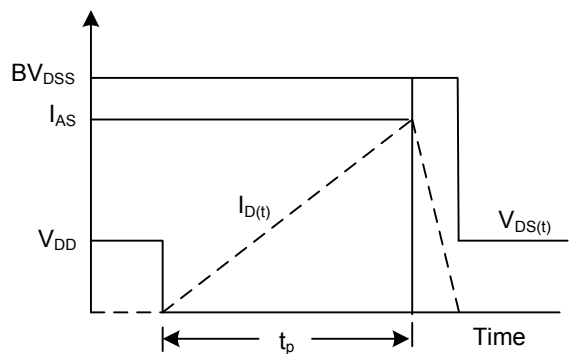
**Gate Charge Test Circuit**



**Gate Charge Waveform**

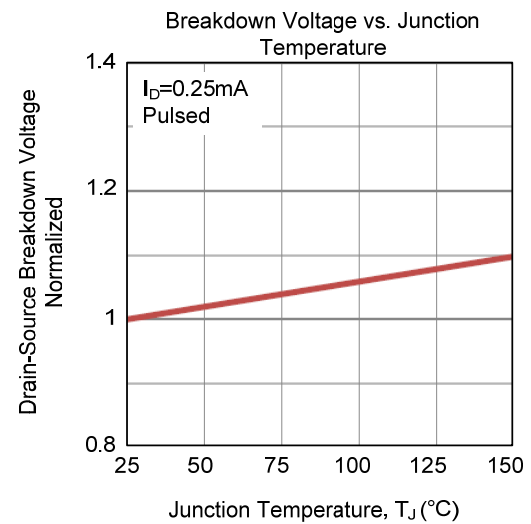
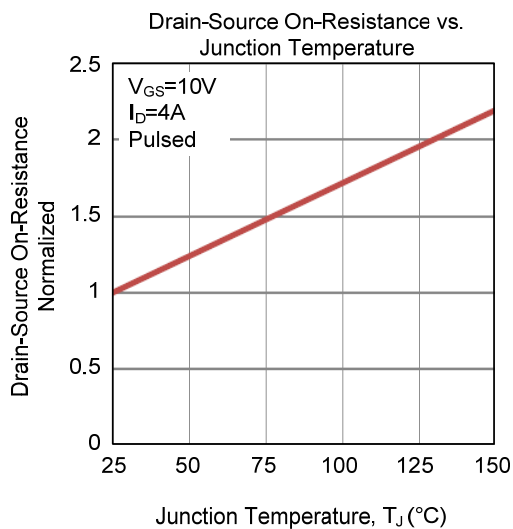
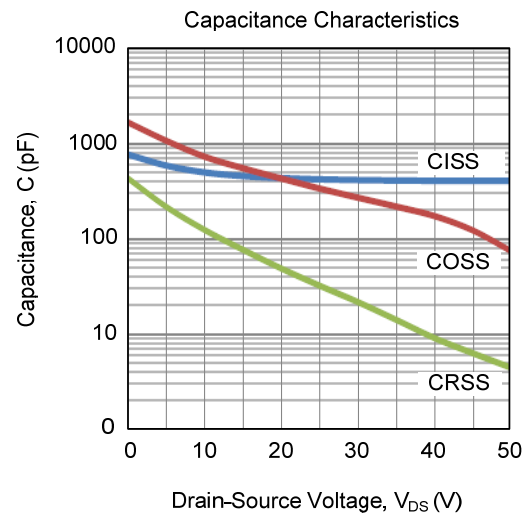
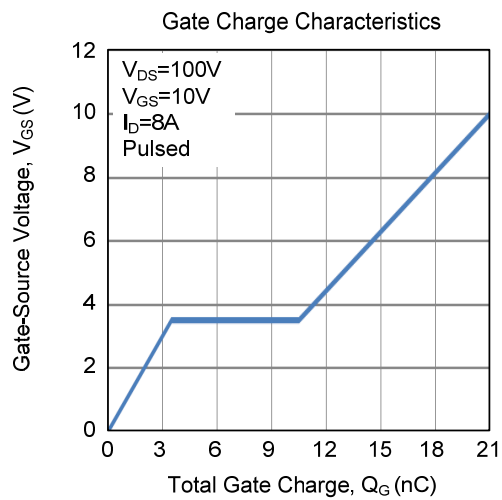
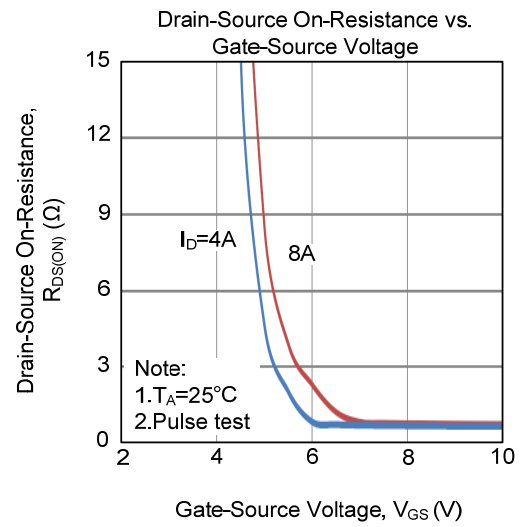
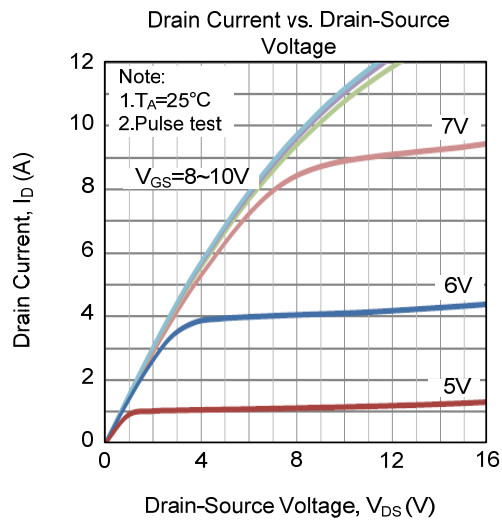


**Unclamped Inductive Switching Test Circuit**

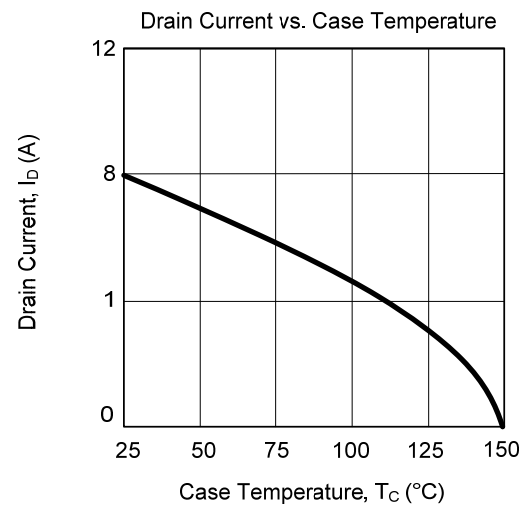
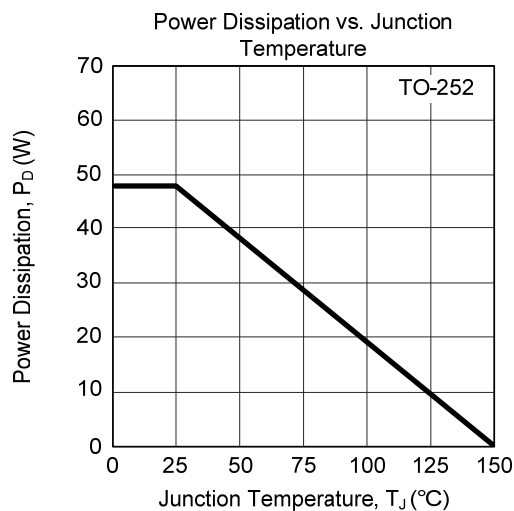
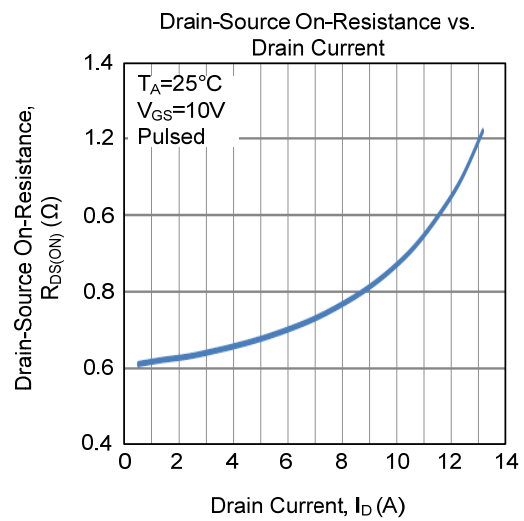
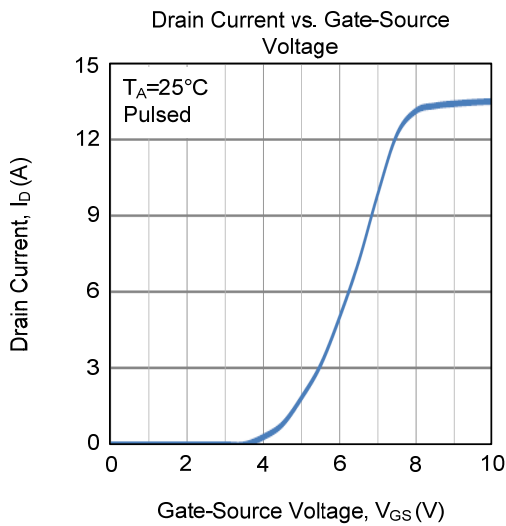
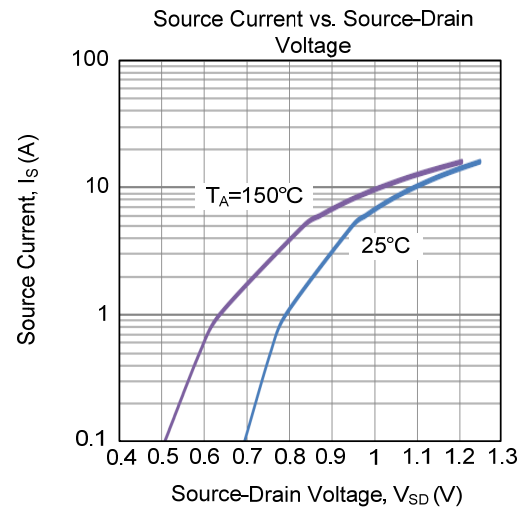
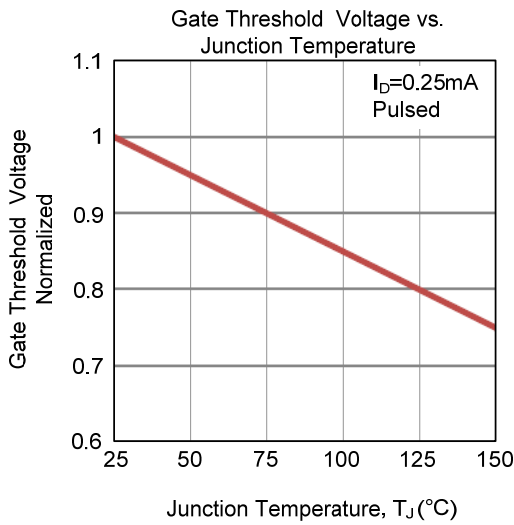


**Unclamped Inductive Switching Waveforms**

## TYPICAL CHARACTERISTICS

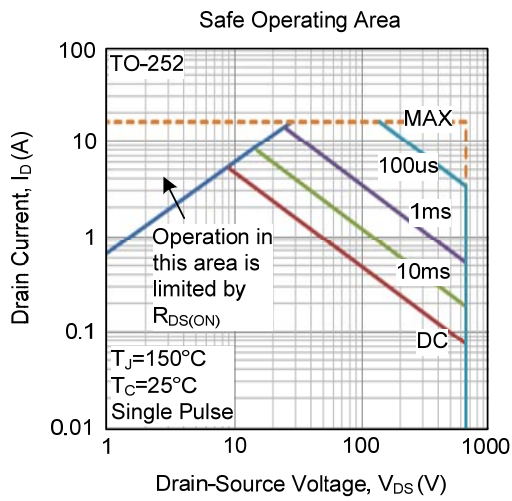


### ■ TYPICAL CHARACTERISTICS (Cont.)





■ TYPICAL CHARACTERISTICS (Cont.)



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