



# 10N65K-MT

**Power MOSFET**

## 10A, 650V N-CHANNEL POWER MOSFET

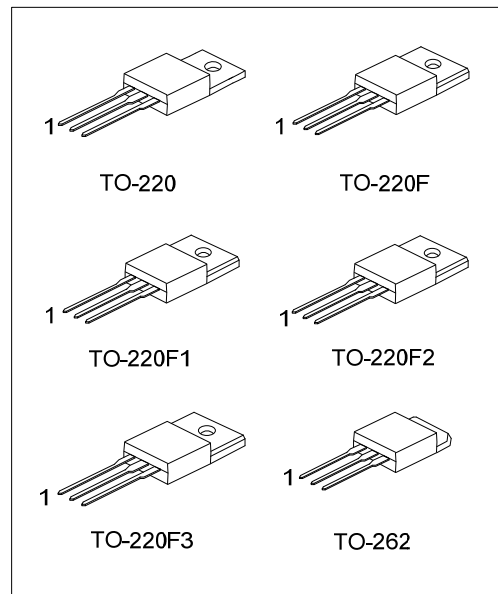
### DESCRIPTION

The UTC **10N65K-MT** is an N-channel Power MOSFET using UTC's advanced technology to provide customers a minimum on-state resistance and superior switching performance, etc.

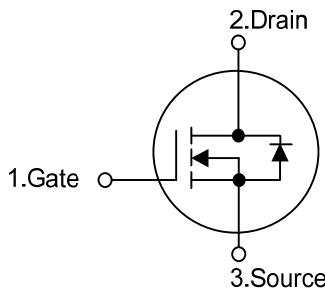
The UTC **10N65K-MT** is generally applied in high efficient AC to DC converters, PWM motor controls and bridge circuits, etc.

### FEATURES

- \*  $R_{DS(ON)} \leq 0.82 \Omega @ V_{GS}=10V, I_D=5.0A$
- \* High Switching Speed
- \* Improved dv/dt capability



### SYMBOL



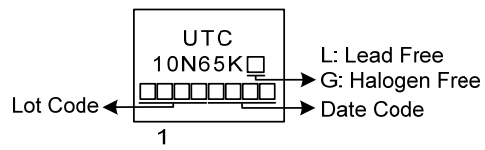
### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
10N65KL-TA3-T	10N65KG-TA3-T	TO-220	G	D	S	Tube
10N65KL-TF3-T	10N65KG-TF3-T	TO-220F	G	D	S	Tube
10N65KL-TF1-T	10N65KG-TF1-T	TO-220F1	G	D	S	Tube
10N65KL-TF2-T	10N65KG-TF2-T	TO-220F2	G	D	S	Tube
10N65KL-TF3T-T	10N65KG-TF3T-T	TO-220F3	G	D	S	Tube
10N65KL-T2Q-T	10N65KG-T2Q-T	TO-262	G	D	S	Tube

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

<p>10N65KG-TA3-T</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) T: Tube (2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1 TF2: TO-220F2, TF3T: TO-220F3, T2Q: TO-262 (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	$I_D$	10	A
	Pulsed (Note 2)	$I_{DM}$	20	A
Avalanche Current (Note 2)		$I_{AR}$	6	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	540	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.4	V/ns
Power Dissipation	TO-220/TO-262	$P_D$	140	W
	TO-220F/TO-220F1		40	W
	TO-220F3/ TO-220F2			
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.  $L=30\text{mH}$ ,  $I_{AS}=6.0\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\ \Omega$ , Starting  $T_J = 25^{\circ}\text{C}$

4.  $I_{SD} \leq 10\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^{\circ}\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient		$\theta_{JA}$	62.5	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-220/TO-262	$\theta_{JC}$	0.89	$^{\circ}\text{C}/\text{W}$
	TO-220F/TO-220F1		3.125	$^{\circ}\text{C}/\text{W}$
	TO-220F3/TO-220F2			

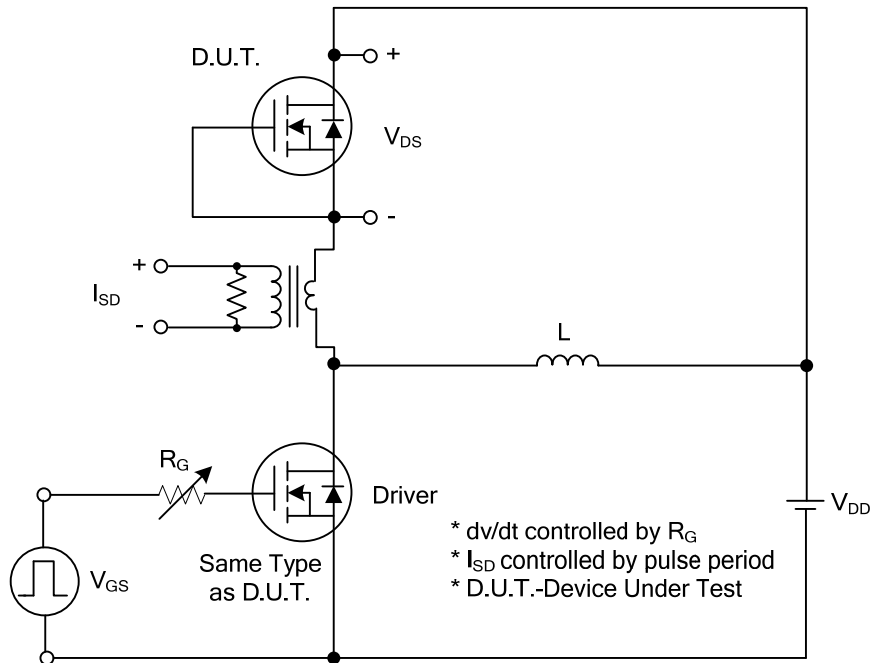
■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

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
<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	2.0		4.0	V
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =5.0A			0.82	Ω
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0 MHz		1550		pF
Output Capacitance	C <sub>OSS</sub>			145		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			12		pF
<b>SWITCHING CHARACTERISTICS</b>						
Total Gate Charge (Note 1)	Q <sub>G</sub>	V <sub>DS</sub> =520V, I <sub>D</sub> =5.0A, V <sub>GS</sub> =10V (Note1, 2)		36		nC
Gate to Source Charge	Q <sub>GS</sub>			8		nC
Gate to Drain Charge	Q <sub>GD</sub>			11		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> =10A, R <sub>G</sub> =25Ω (Note1, 2)		23		ns
Rise Time	t <sub>R</sub>			24		ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			115		ns
Fall-Time	t <sub>F</sub>			38		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>				10	A
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>				20	A
Drain-Source Diode Forward Voltage (Note 1)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =10A			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =10A, dI <sub>F</sub> /dt=100A/μs (Note1)		470		ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>				6	

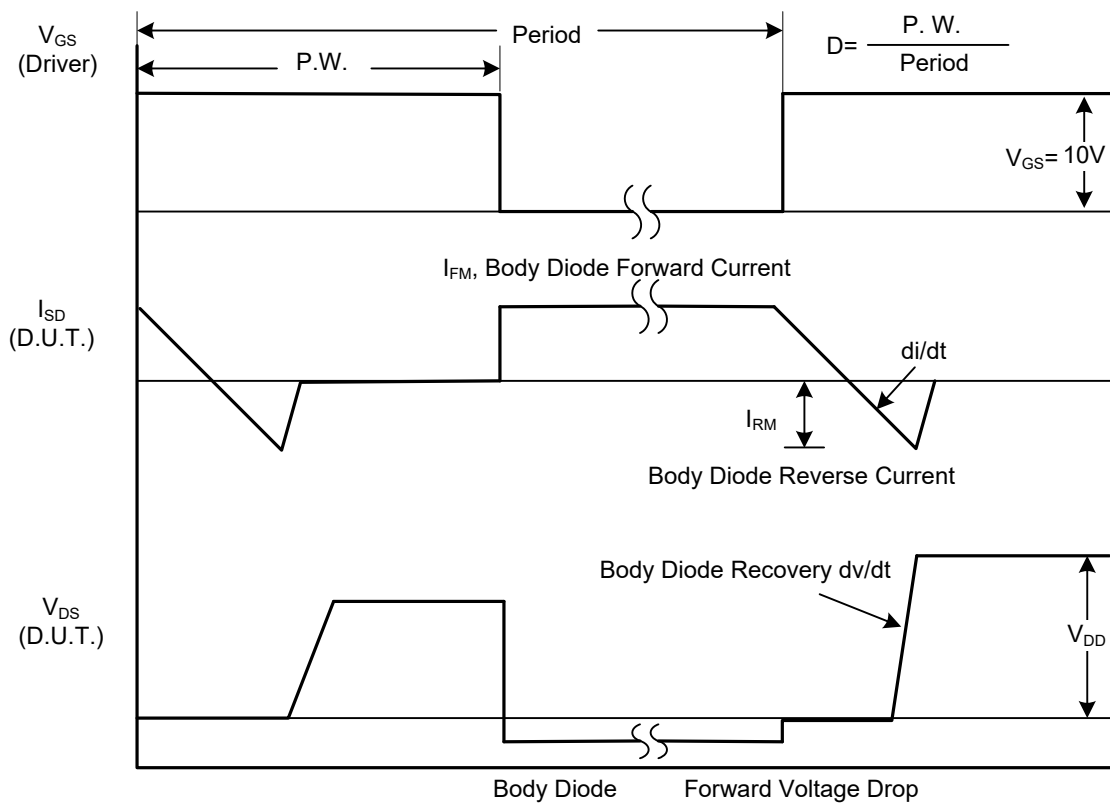
Note: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%

2. Essentially independent of operating temperature.

## TEST CIRCUITS AND WAVEFORMS

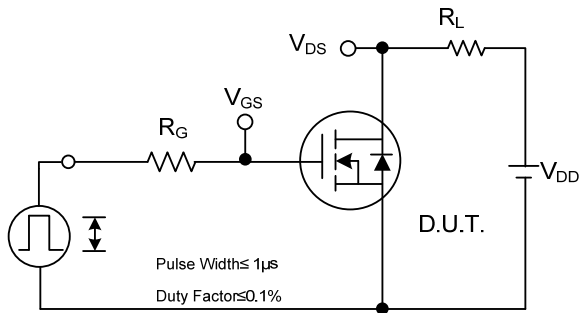


**Peak Diode Recovery dv/dt Test Circuit**

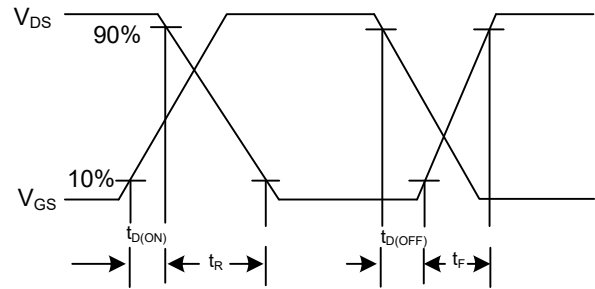


**Peak Diode Recovery dv/dt Waveforms**

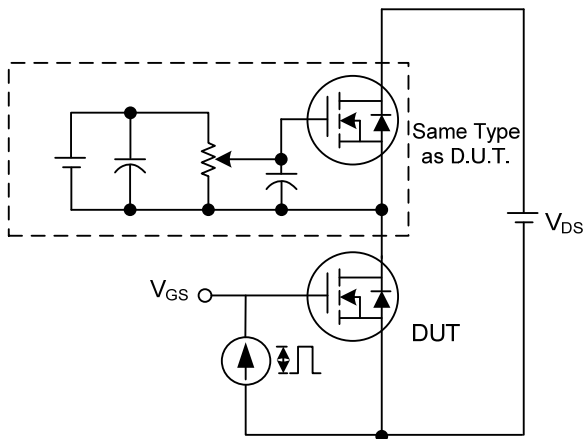
## TEST CIRCUITS AND WAVEFORMS



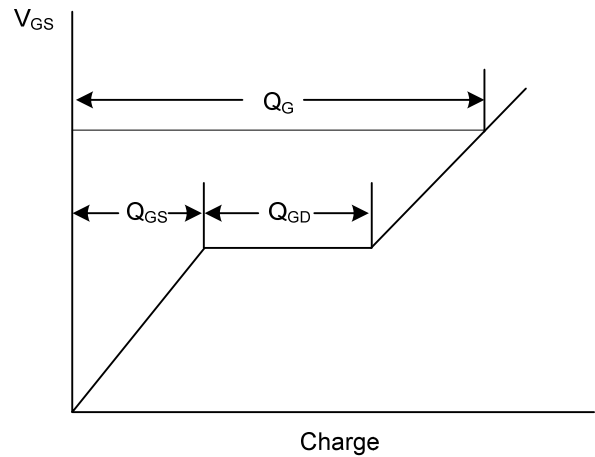
**Switching Test Circuit**



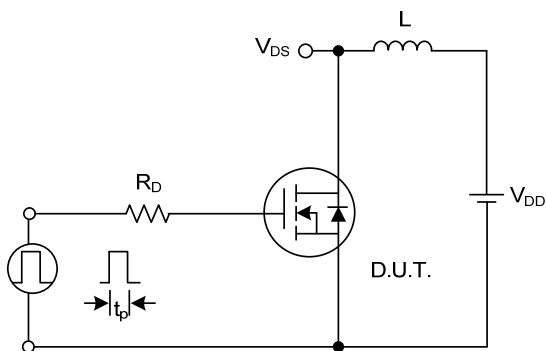
**Switching Waveforms**



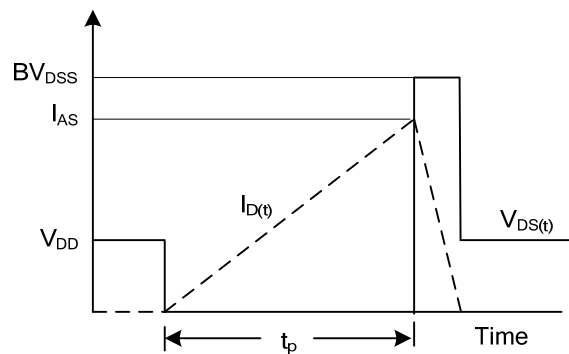
**Gate Charge Test Circuit**



**Gate Charge Waveform**

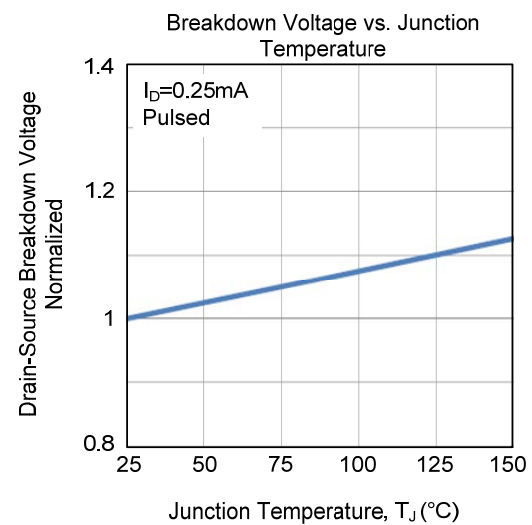
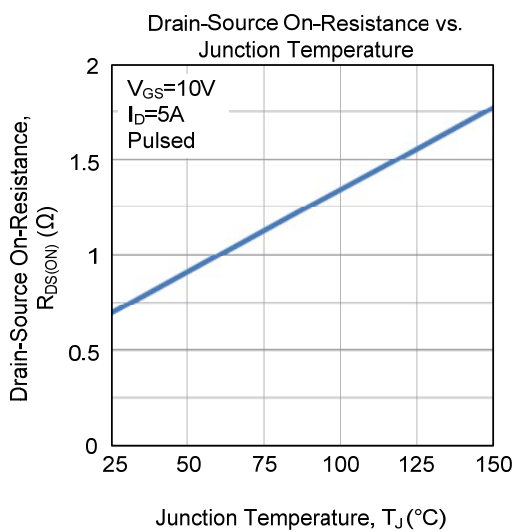
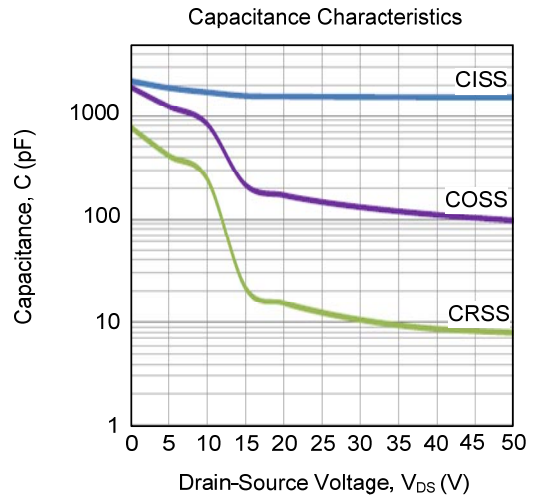
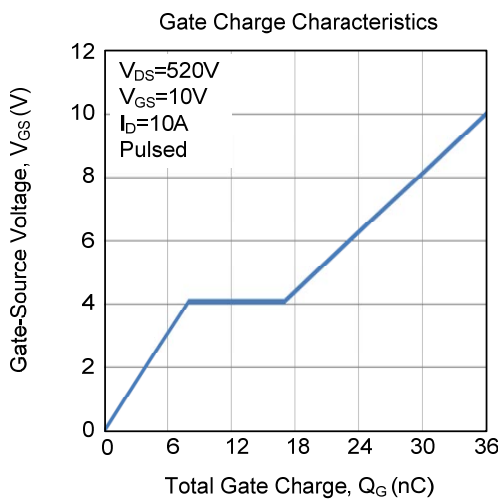
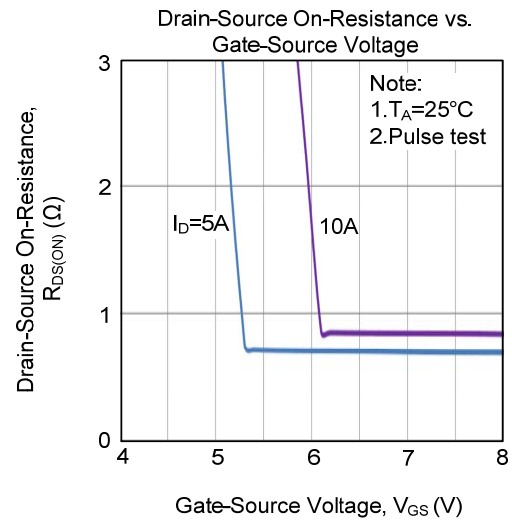
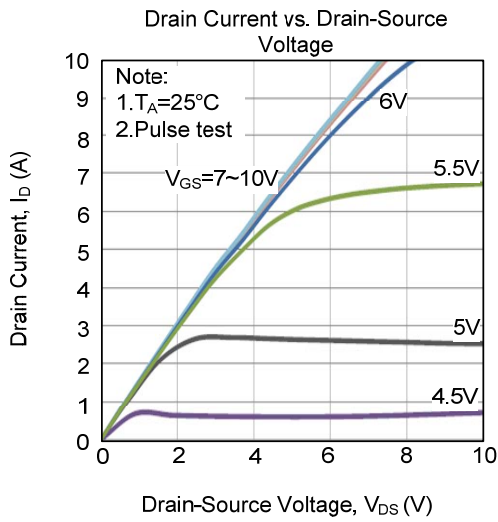


**Unclamped Inductive Switching Test Circuit**

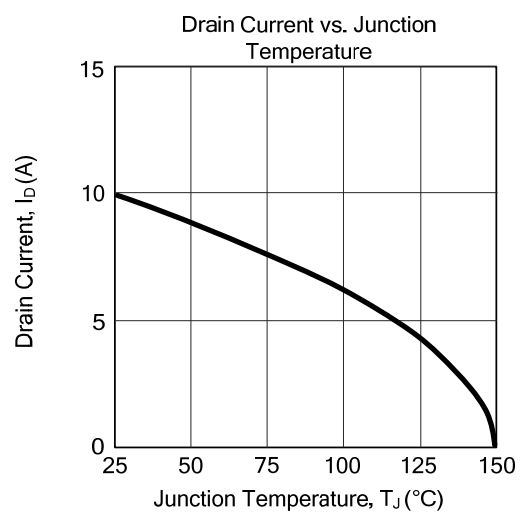
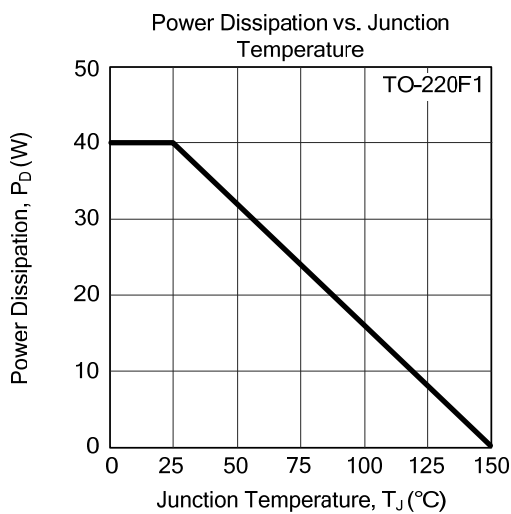
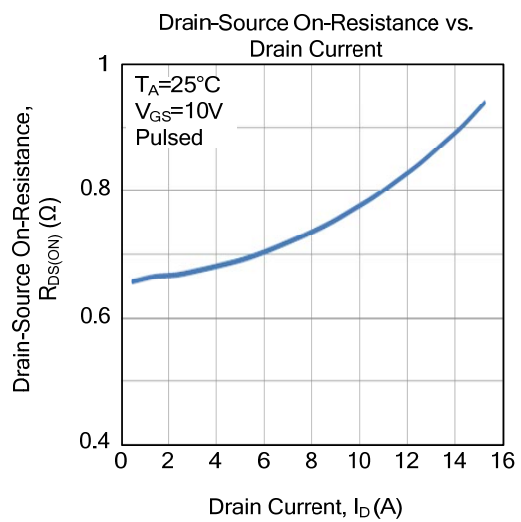
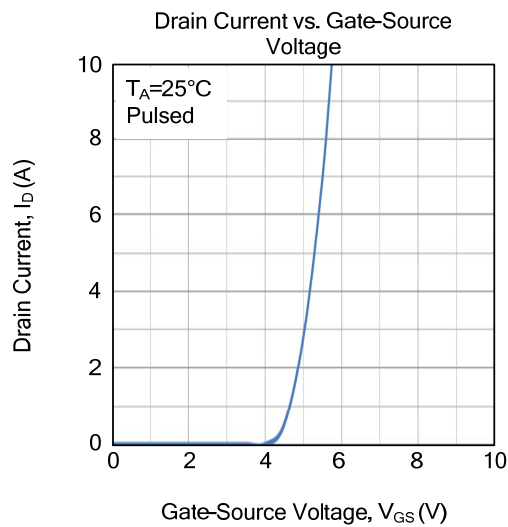
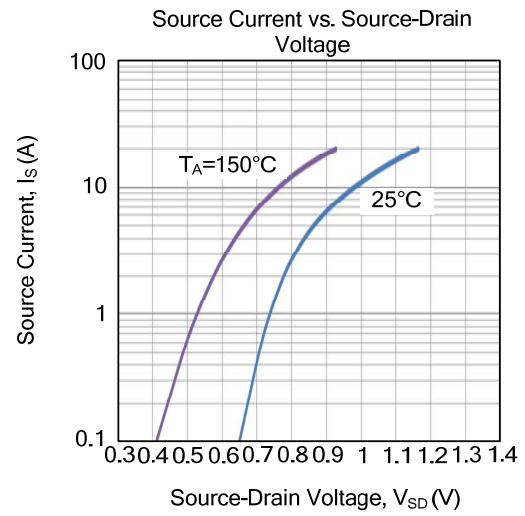
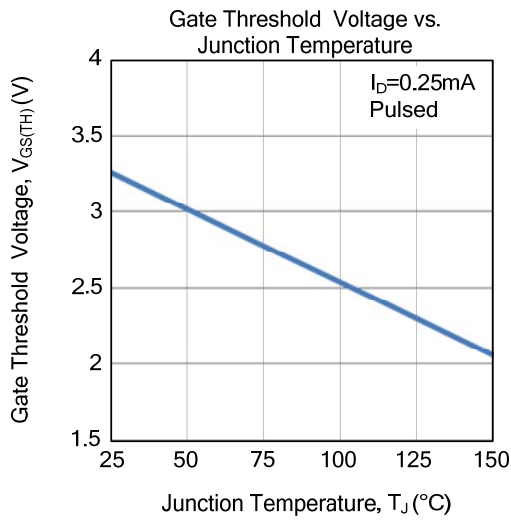


**Unclamped Inductive Switching Waveforms**

## TYPICAL CHARACTERISTICS

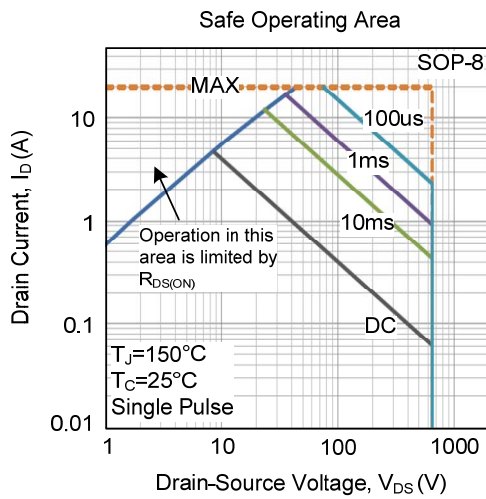


■ TYPICAL CHARACTERISTICS (Cont.)





■ TYPICAL CHARACTERISTICS (Cont.)



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