



# 6N90

Power MOSFET

## 6.2A, 900V N-CHANNEL POWER MOSFET

### DESCRIPTION

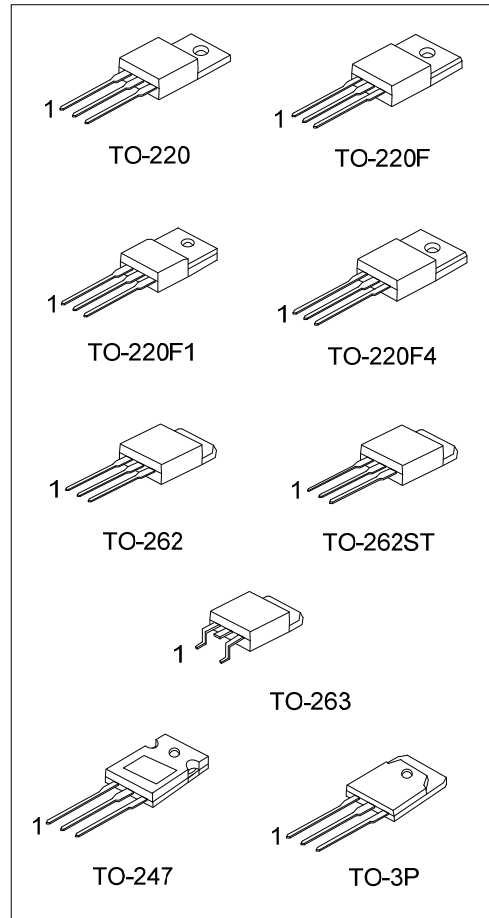
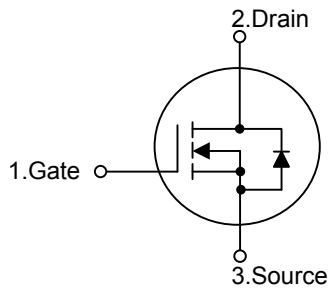
The UTC **6N90** is a N-channel enhancement mode power MOSFET using UTC's advanced technology to provide costumers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **6N90** is generally applied in high efficiency switch mode power supplies.

### FEATURES

- \*  $R_{DS(ON)} \leq 1.75 \Omega @ V_{GS}=10V, I_D=3.1A$
- \* Fast switching
- \* 100% avalanche tested
- \* Improved dv/dt capability

### SYMBOL



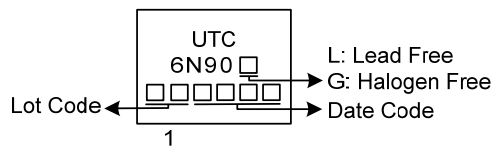
### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6N90L-TA3-T	6N90G-TA3-T	TO-220	G	D	S	Tube
6N90L-TF3-T	6N90G-TF3-T	TO-220F	G	D	S	Tube
6N90L-TF1-T	6N90G-TF1-T	TO-220F1	G	D	S	Tube
6N90L-TF34-T	6N90G-TF34-T	TO-220F4	G	D	S	Tube
6N90L-T2Q-T	6N90G-T2Q-T	TO-262	G	D	S	Tube
6N90L-T2ST-T	6N90G-T2ST-T	TO-262ST	G	D	S	Tube
6N90L-TQ2-T	6N90G-TQ2-T	TO-263	G	D	S	Tube
6N90L-TQ2-R	6N90G-TQ2-R	TO-263	G	D	S	Tape Reel
6N90L-T3P-T	6N90G-T3P-T	TO-3P	G	D	S	Tube
6N90L-T47-T	6N90G-T47-T	TO-247	G	D	S	Tube

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

<p>6N90G-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, TF3: TO-220F, TF1: TO-220F1 TF34: TO-220F4, T2Q: TO-262, T2ST: TO-262ST, TQ2: TO-263, T3P: TO-3P, T47: TO-247 (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		$V_{DSS}$	900	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Drain Current	Continuous ( $T_C=25^\circ\text{C}$ )	$I_D$	6.2	A
	Pulsed (Note 2)	$I_{DM}$	24	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	65	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220/TO-262 TO-262ST/TO-263	$P_D$	140	W
	TO-220F/TO220F1 TO-220F4		36	W
	TO-3P		230	W
	TO-247		220	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.  $L = 10\text{mH}$ ,  $I_{AS} = 3.6\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$

4.  $I_{SD} \leq 6.0\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO220F1/TO-220F4 TO-262/TO-262ST TO-263	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
	TO-3P		40	$^\circ\text{C}/\text{W}$
	TO-247		50	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220/TO-262 TO-262ST/TO-263	$\theta_{JC}$	0.89	$^\circ\text{C}/\text{W}$
	TO-220F/TO220F1 TO-220F4		3.47	$^\circ\text{C}/\text{W}$
	TO-3P		0.54	$^\circ\text{C}/\text{W}$
	TO-247		0.57	$^\circ\text{C}/\text{W}$

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

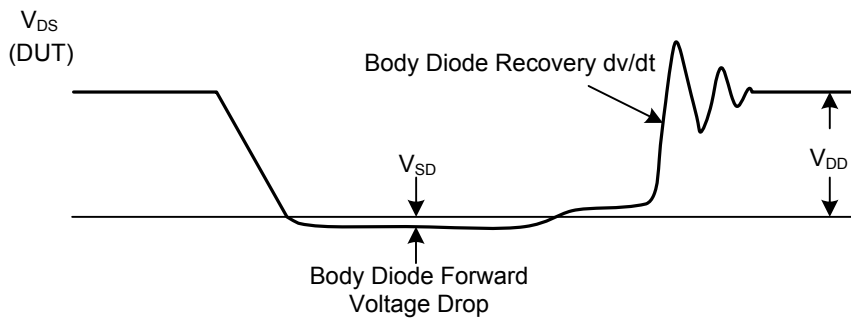
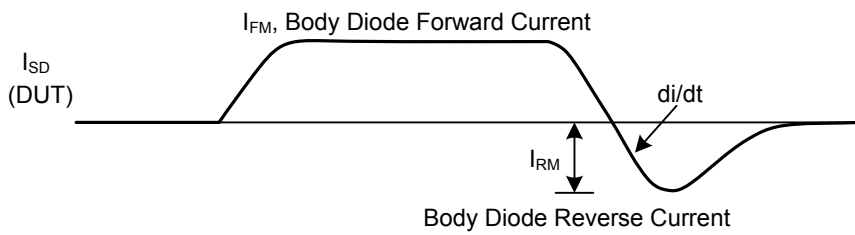
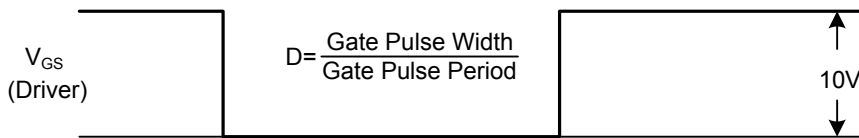
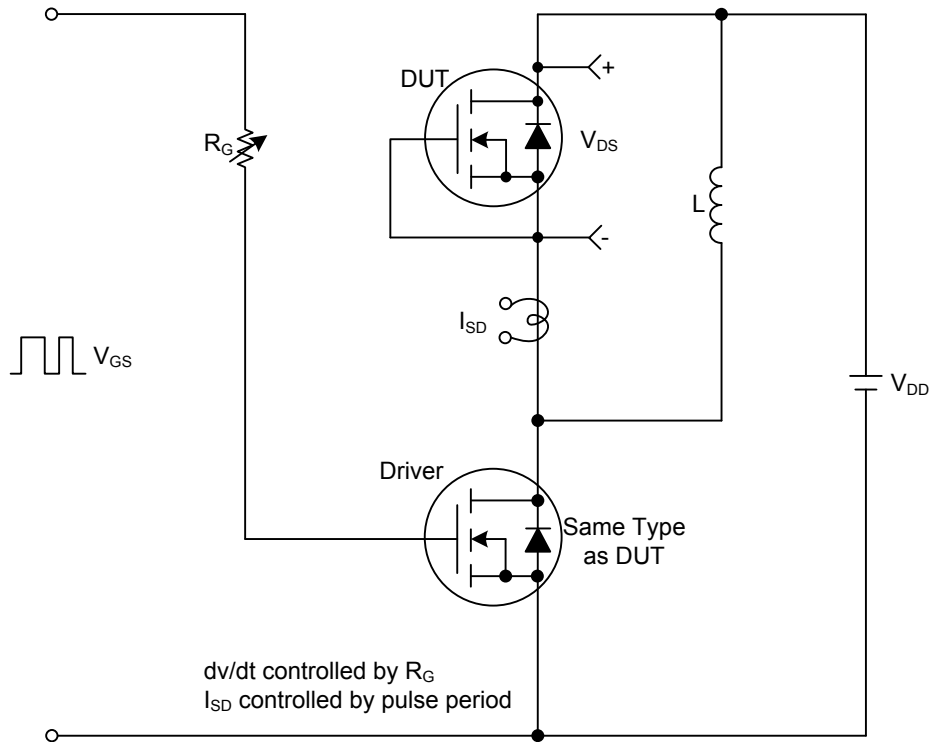
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	900			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =900V, V <sub>GS</sub> =0V			10	μA
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>			+100	nA
	Reverse				-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	3.0		5.0	V
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =3.1A			1.75	Ω
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		1330		pF
Output Capacitance	C <sub>OSS</sub>			140		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			14		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge (Note 1, 2)	Q <sub>G</sub>	V <sub>DS</sub> =720V, V <sub>GS</sub> =10V, I <sub>D</sub> =6.0A I <sub>G</sub> =1mA (Note 1, 2)		50		nC
Gate to Source Charge	Q <sub>GS</sub>			15		nC
Gate to Drain Charge	Q <sub>GD</sub>			17		nC
Turn-ON Delay Time (Note 1, 2)	t <sub>D(ON)</sub>	V <sub>DD</sub> =100V, V <sub>GS</sub> =10V, I <sub>D</sub> =6.0A, R <sub>G</sub> =25Ω (Note 1, 2)		25		ns
Rise Time	t <sub>R</sub>			22		ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			100		ns
Fall-Time	t <sub>F</sub>			45		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>				6.0	A
Maximum Pulsed Drain-Source Diode Forward Current	I <sub>SM</sub>				24	A
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =6.2A, V <sub>GS</sub> =0V			1.4	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>S</sub> =6.2A, V <sub>GS</sub> =0V, dI <sub>F</sub> /dt=100A/μs (Note 1)		670		ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>				5.5	

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

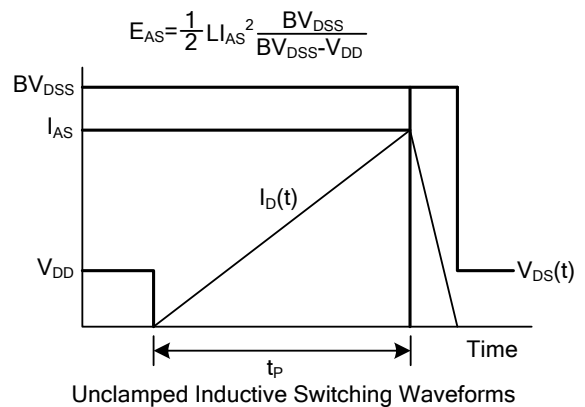
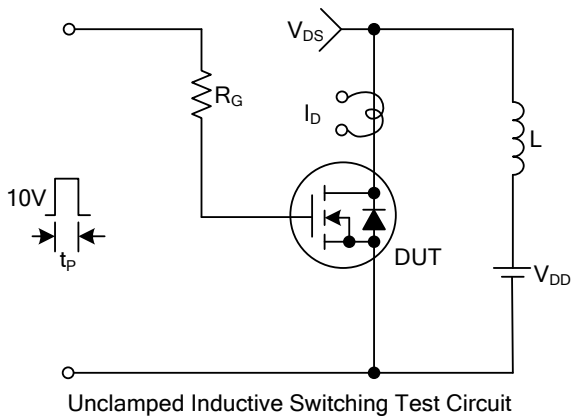
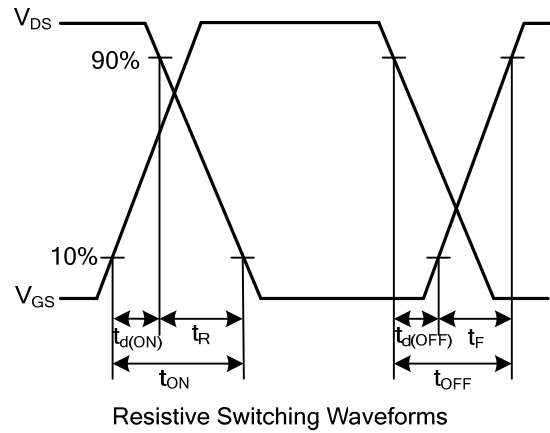
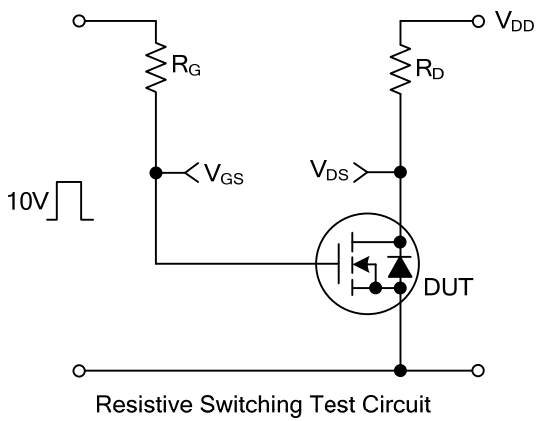
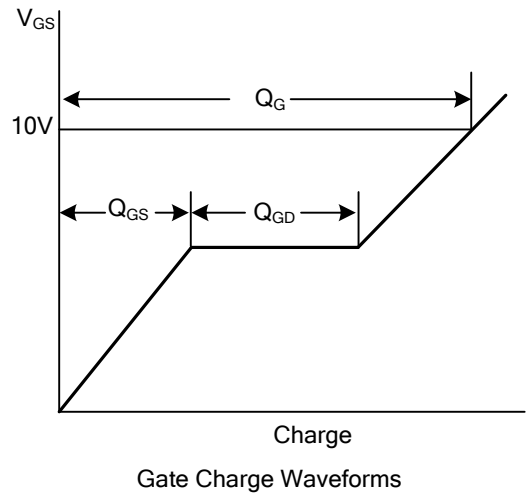
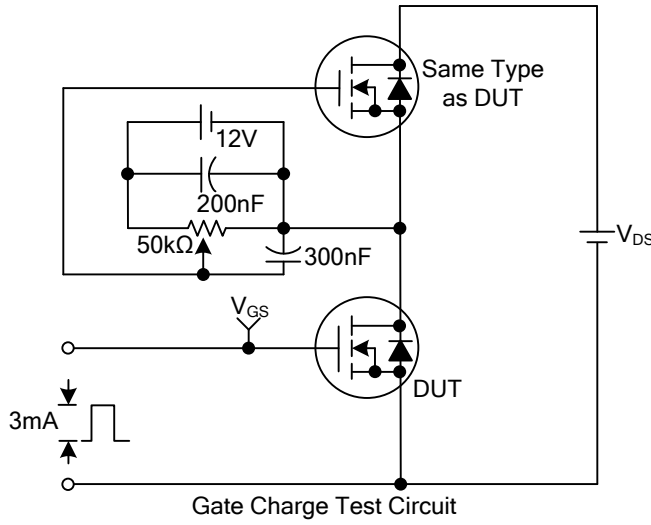
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

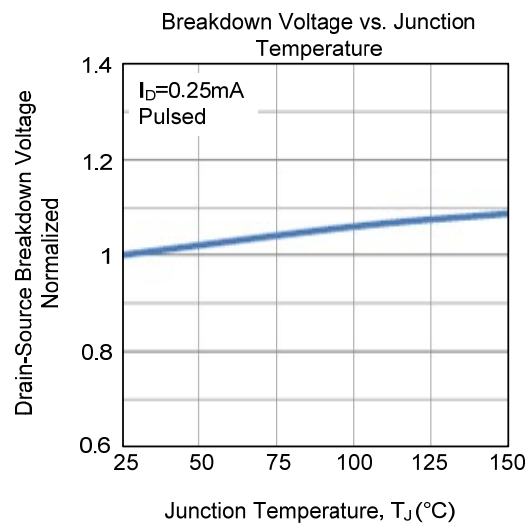
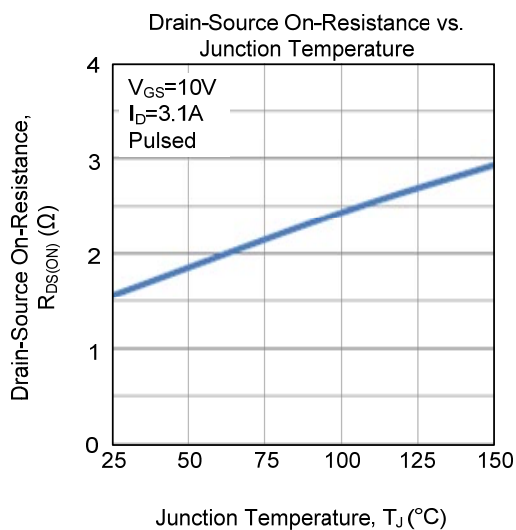
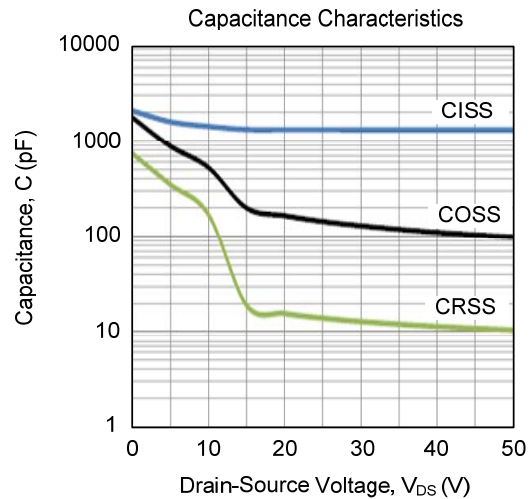
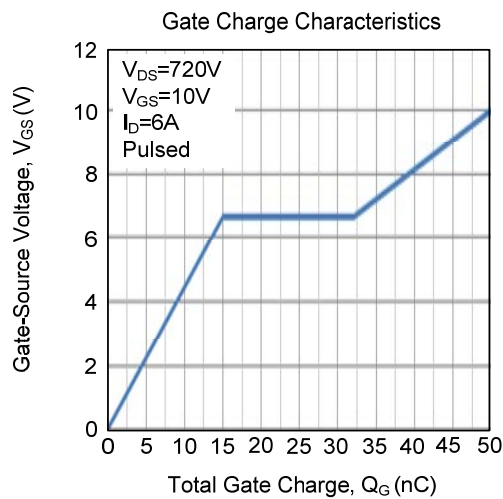
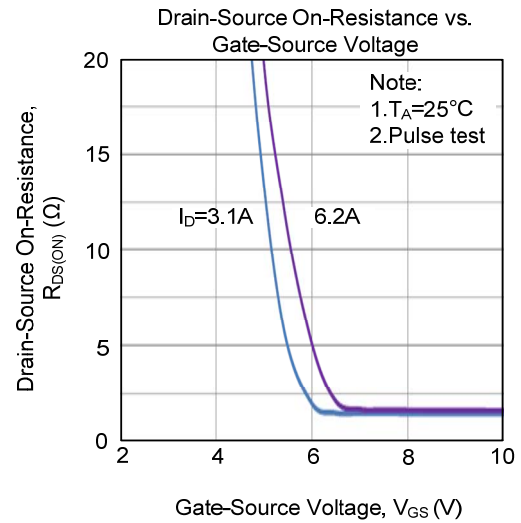
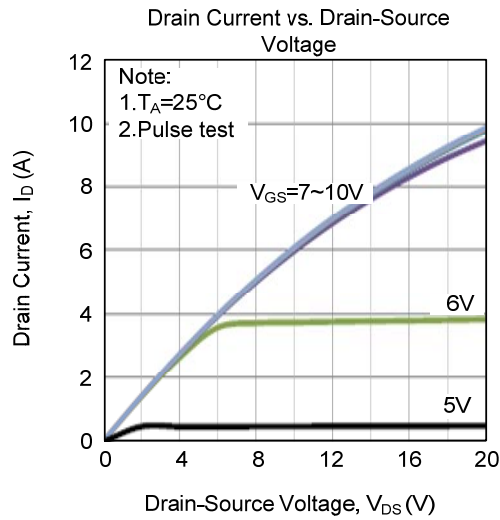
Peak Diode Recovery dv/dt Test Circuit & Waveforms



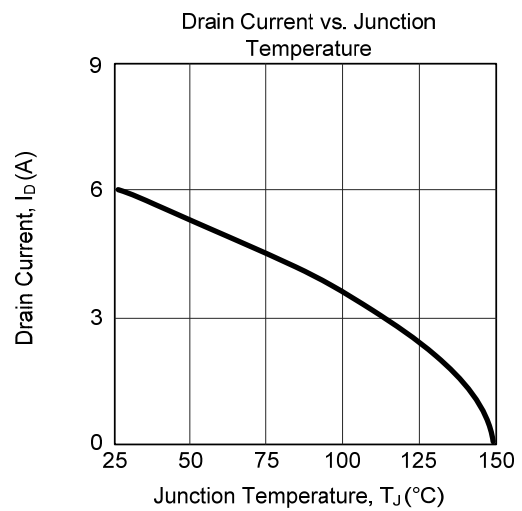
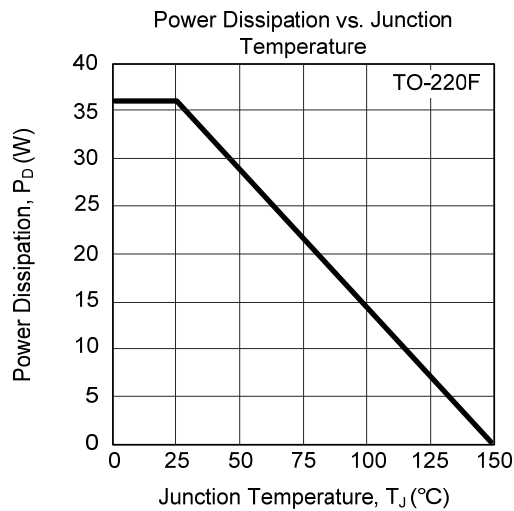
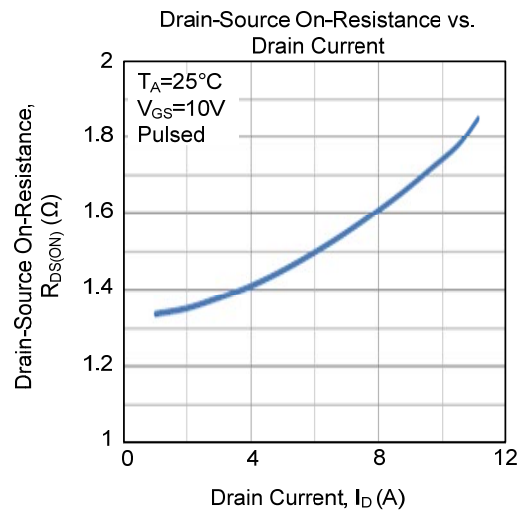
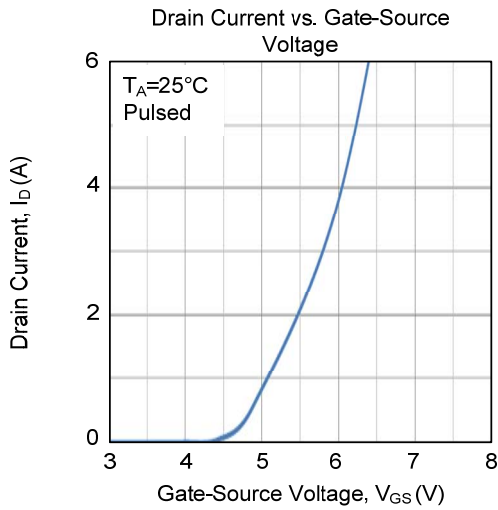
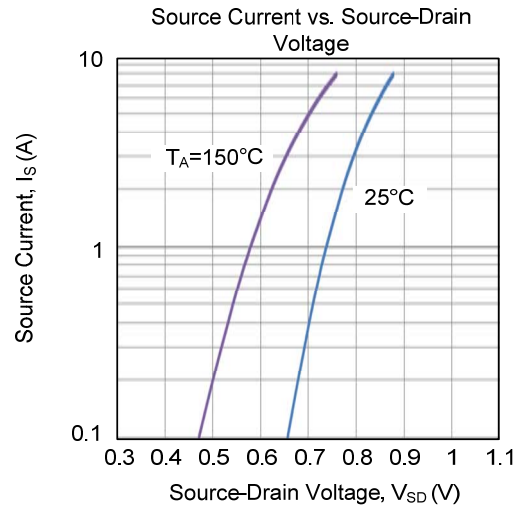
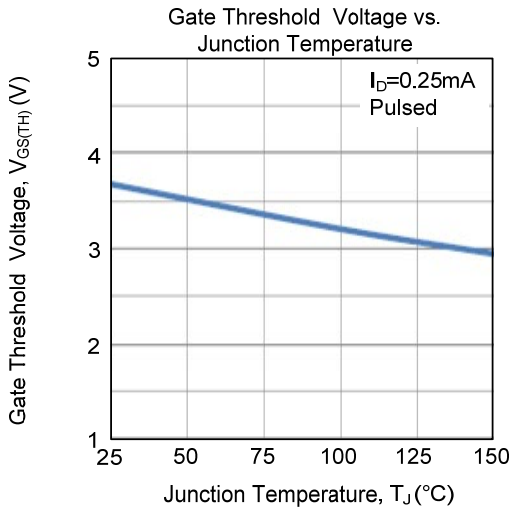
## ■ TEST CIRCUITS AND WAVEFORMS



## ■ TYPICAL CHARACTERISTICS

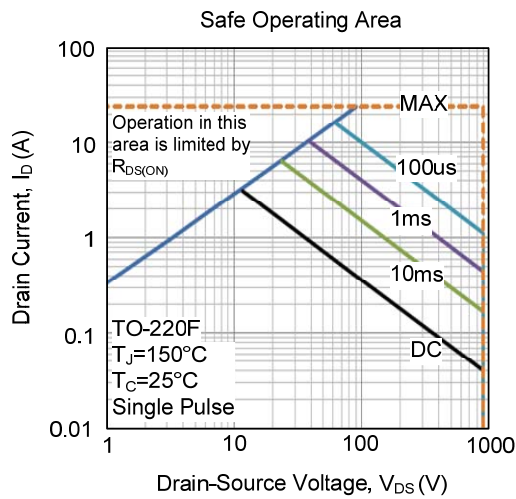


■ TYPICAL CHARACTERISTICS (Cont.)





■ TYPICAL CHARACTERISTICS (Cont.)



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