



UF9Z24-F

Power MOSFET

-12A, -55V P-CHANNEL POWER MOSFET

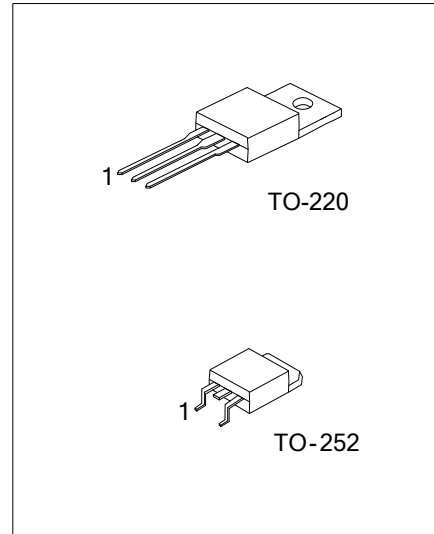
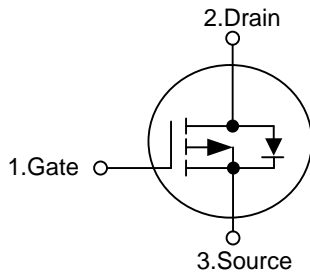
DESCRIPTION

The UTC **UF9Z24** is a P-channel power MOSFET using UTC's advanced technology to provide the customers with high switching speed, cost-effectiveness and minimum on-state resistance. It can also withstand high energy in the avalanche.

FEATURES

- * $R_{DS(ON)} \leq 150 \text{ m}\Omega$ @ $V_{GS} = -10\text{V}$, $I_D = -7.2\text{A}$
- * High Switching Speed

SYMBOL



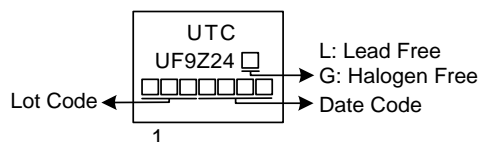
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UF9Z24L-TA3-T	UF9Z24G-TA3-T	TO-220	G	D	S	Tube
UF9Z24L-TN3-R	UF9Z24G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>UF9Z24G-TA3-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TN3: TO-252</p> <p>(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}	-55	V
Gate-Source Voltage		V_{GSS}	± 20	V
Drain Current	Continuous	I_D	-12	A
	Pulsed	I_{DM}	-24	A
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	390	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.2	V/ns
Power Dissipation	TO-220	P_D	60	W
	TO-252		25	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. $L=30\text{mH}$, $I_{AS}=-5.1\text{A}$, $V_{DD}=-50\text{V}$, $R_G=25\Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD}\leq -12\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	TO-252		110	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	2.1	$^{\circ}\text{C}/\text{W}$
	TO-252		5	$^{\circ}\text{C}/\text{W}$

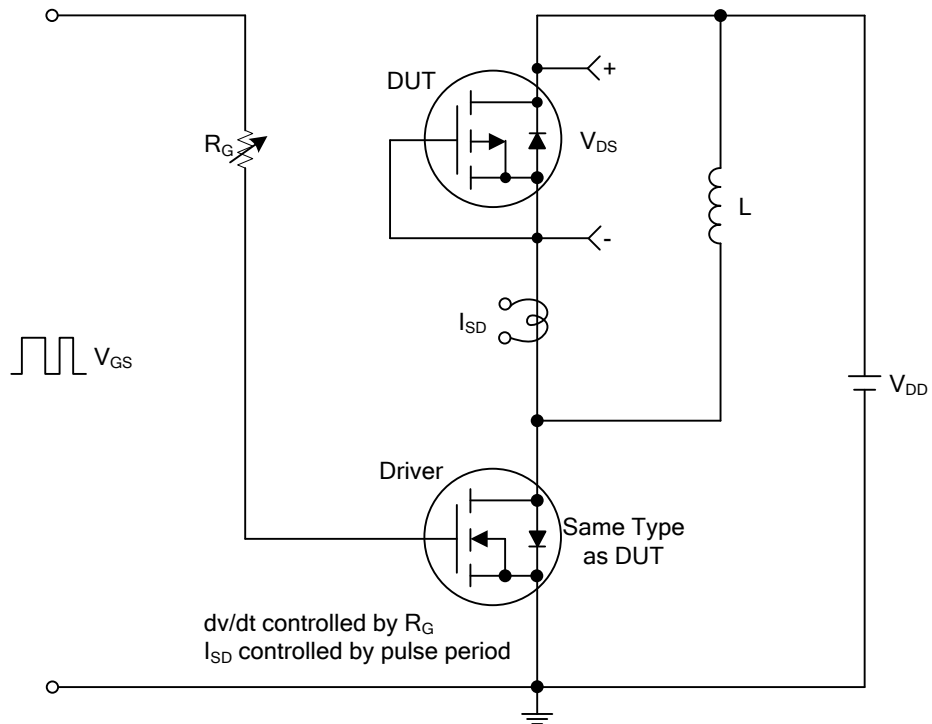
■ **Electrical Characteristics** ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$	-55			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=-55\text{V}$, $V_{GS}=0\text{V}$			-1	μA
Gate-Source Leakage Current	Forward	$V_{GS}=+20\text{V}$			+100	nA
	Reverse	$V_{GS}=-20\text{V}$			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$	-2.0		-4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10\text{V}$, $I_D=-7.2\text{A}$ (Note 1)			150	m Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS}=0\text{V}$, $V_{DS}=-25\text{V}$, $f=1.0\text{MHz}$ (Note 2)		640		pF
Output Capacitance	C_{OSS}			180		pF
Reverse Transfer Capacitance	C_{RSS}			40		pF
SWITCHING PARAMETERS						
Total Gate Charge(Note 1)	Q_G	$V_{DS}=-44\text{V}$, $V_{GS}=-10\text{V}$, $I_D=-12\text{A}$		19.3		nC
Gate to Source Charge	Q_{GS}			3		nC
Gate to Drain Charge	Q_{GD}			6		nC
Turn-ON Delay Time(Note 1)	$t_{D(ON)}$	$V_{DD}=-30\text{V}$, $I_D=-12\text{A}$, $R_G=25\Omega$		6.8		ns
Rise Time	t_R			17		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			20		ns
Fall-Time	t_F			17		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS (Note 2)						
Maximum Body-Diode Continuous Current	I_S				-12	A
Maximum Body-Diode Pulsed Current	I_{SM}				-24	A
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0\text{V}$, $I_S=-12\text{A}$ (Note 1)			-1.6	V
Body Diode Reverse Recovery Time(Note 1)	t_{rr}	$V_{GS}=0\text{V}$, $I_S=-12\text{A}$		48		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$di_F/dt=100\text{A}/\mu\text{s}$		85		nC

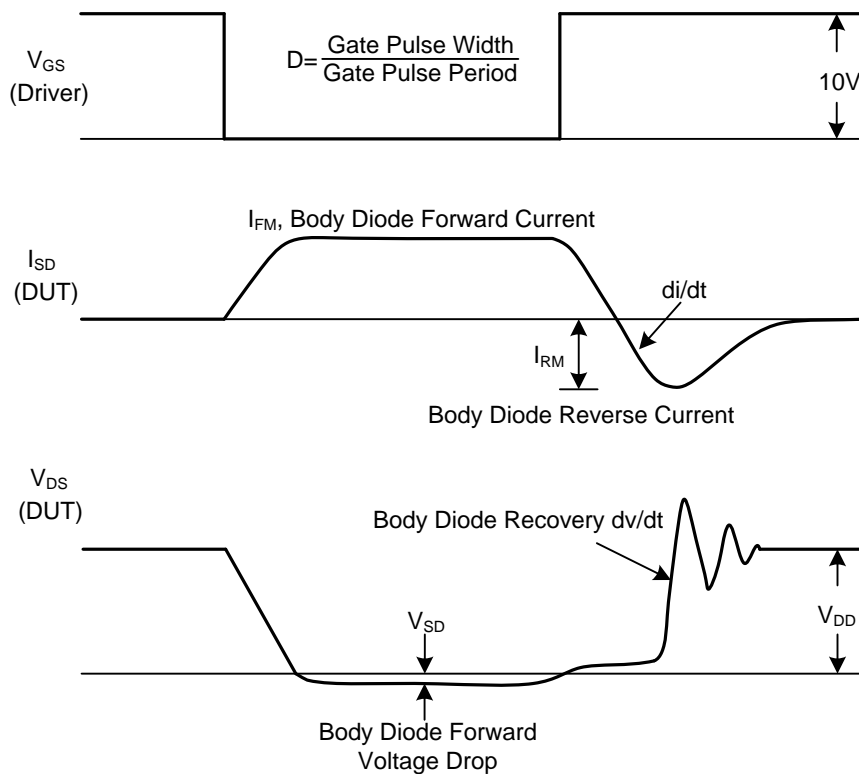
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



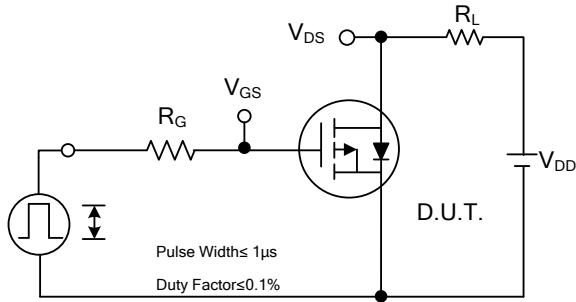
Peak Diode Recovery dv/dt Test Circuit



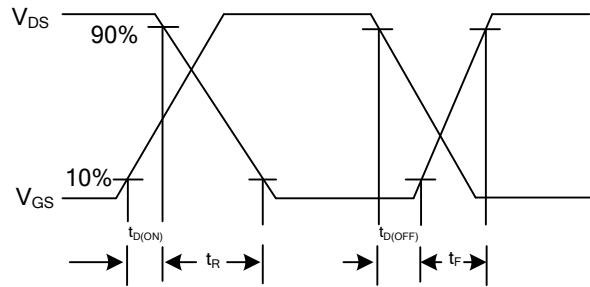
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

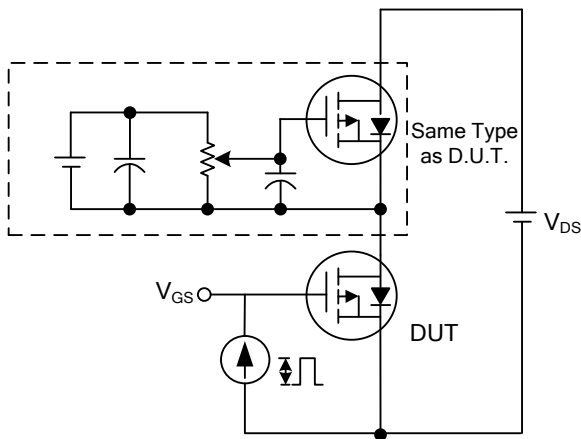
TEST CIRCUITS AND WAVEFORMS



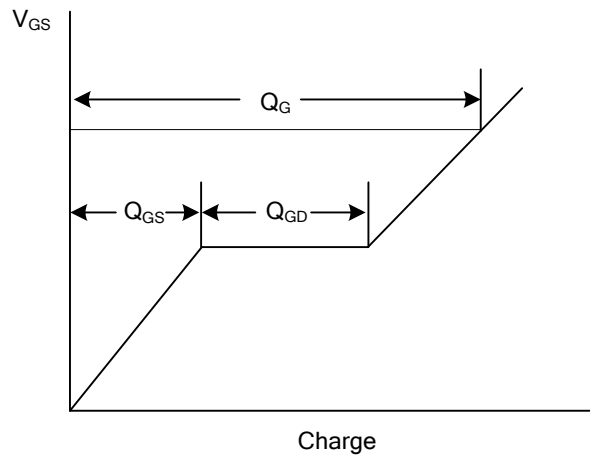
Switching Test Circuit



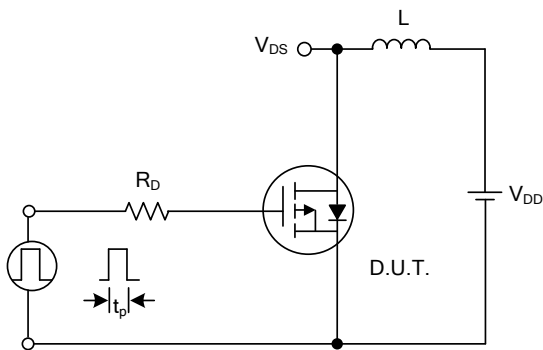
Switching Waveforms



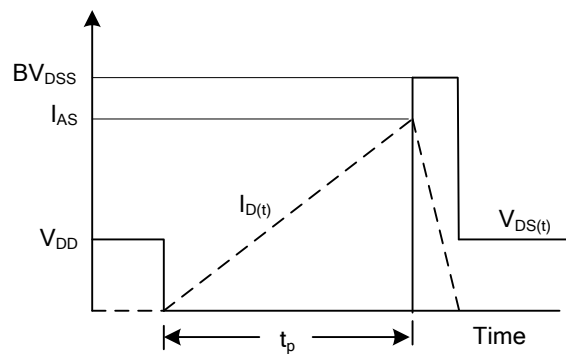
Gate Charge Test Circuit



Gate Charge Waveform

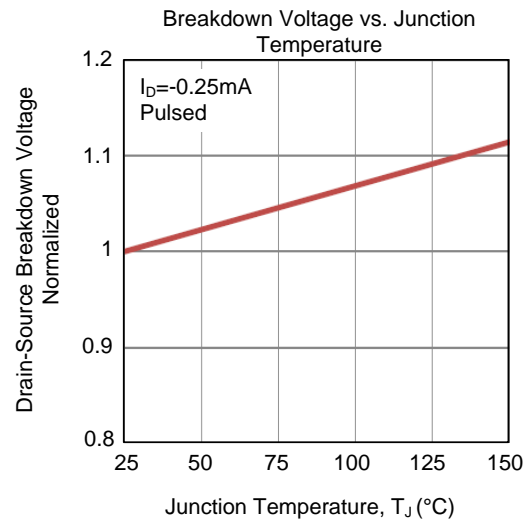
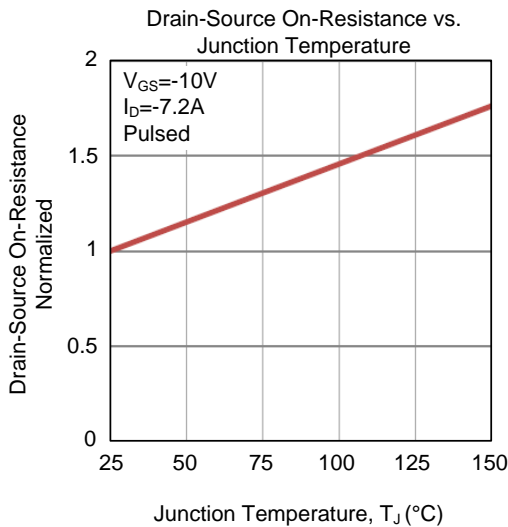
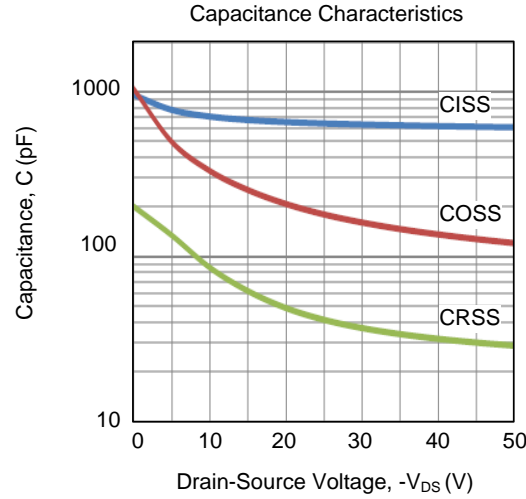
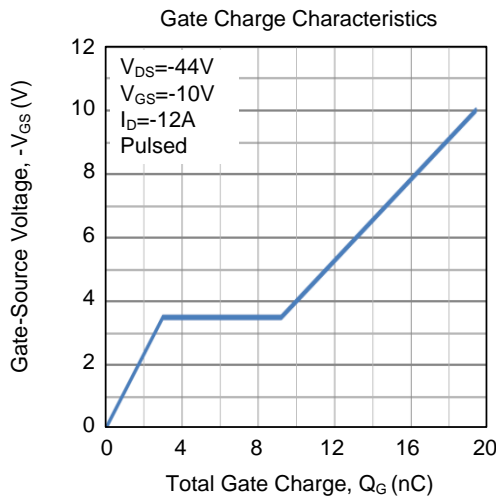
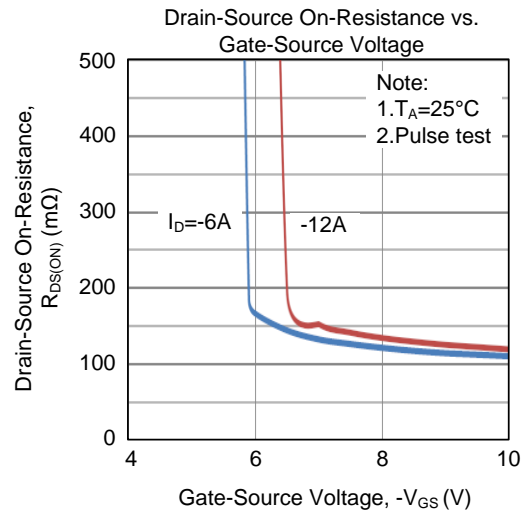
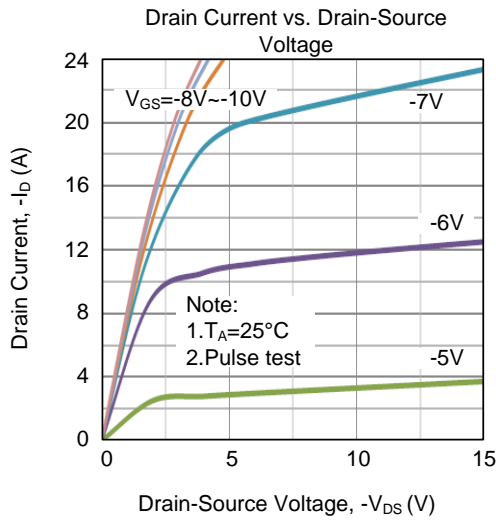


Unclamped Inductive Switching Test Circuit

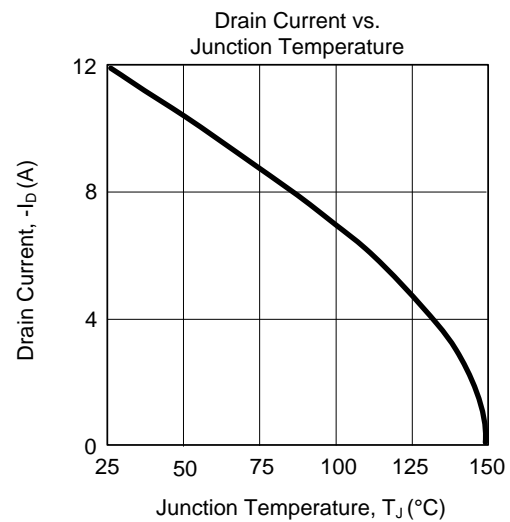
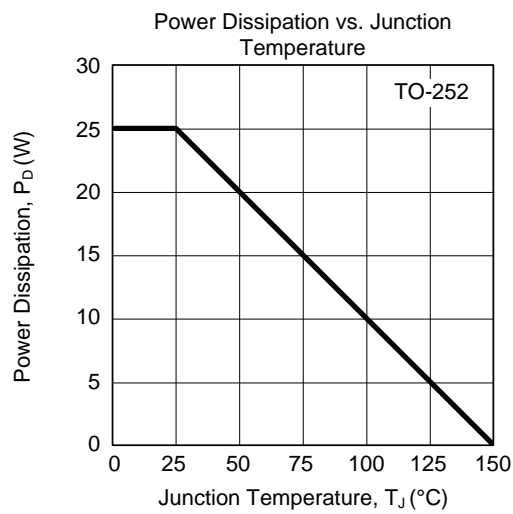
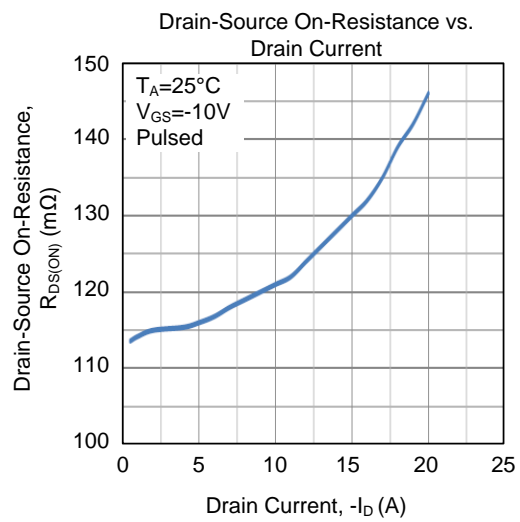
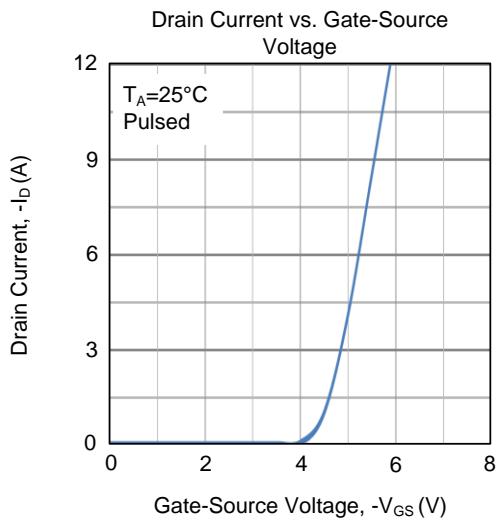
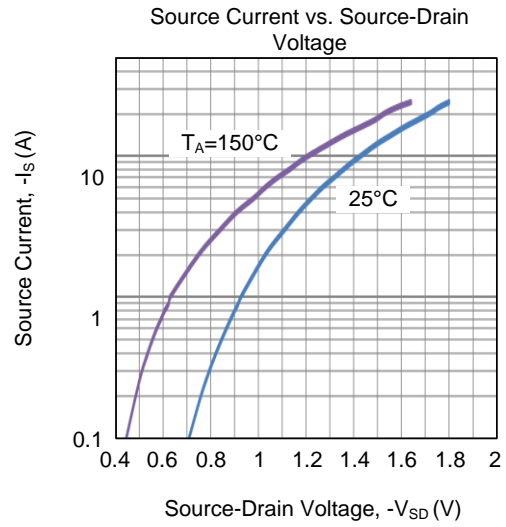
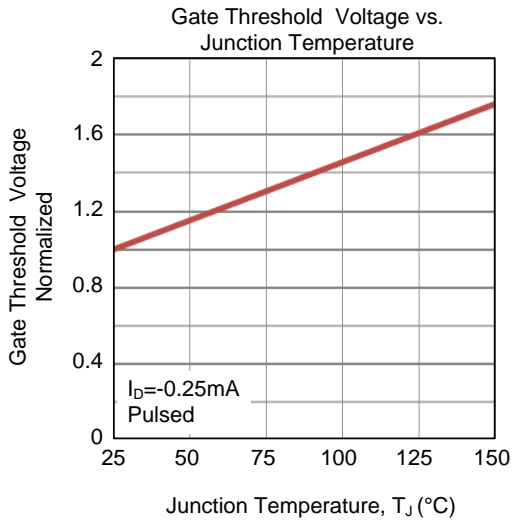


Unclamped Inductive Switching Waveforms

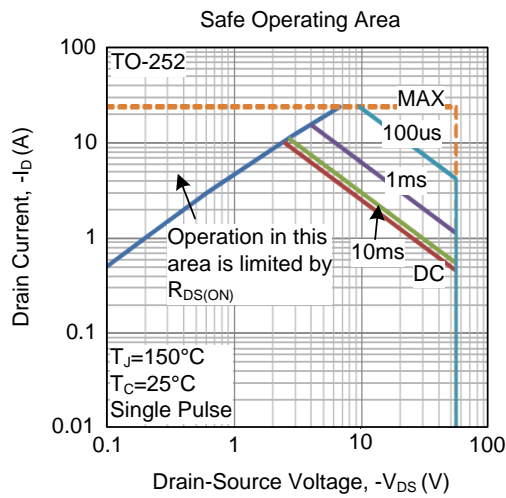
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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