



4N50-TC3

Power MOSFET

**4A, 500V N-CHANNEL
POWER MOSFET**

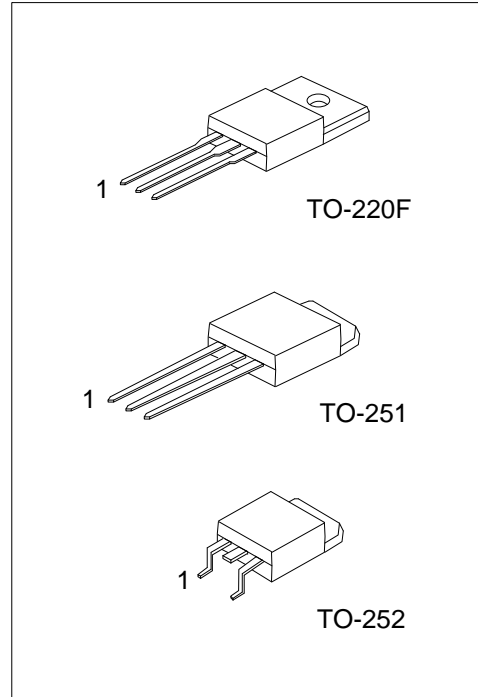
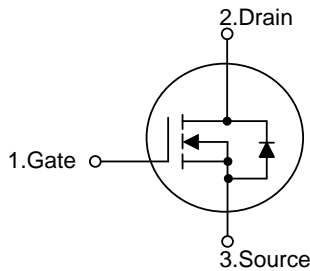
■ **DESCRIPTION**

The UTC **4N50-TC3** is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient AC to DC converters and bridge circuits.

■ **FEATURES**

- * $R_{DS(ON)} \leq 2.5 \Omega @ V_{GS}=10V, I_D=2.0A$
- * High Switching Speed

■ **SYMBOL**



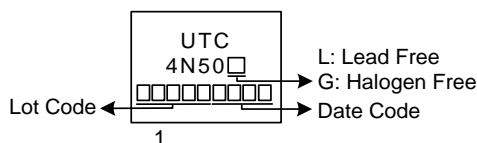
■ **ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
4N50L-TF3-T	4N50G-TF3-T	TO-220F	G	D	S	Tube
4N50L-TM3-T	4N50G-TM3-T	TO-251	G	D	S	Tube
4N50L-TN3-R	4N50G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>4N50G-TF3-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) TF3: TO-220F, TM3: TO-251, 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}	500	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current ($T_C=25^\circ\text{C}$)	Continuous	I_D	4	A
	Pulsed (Note 2)	I_{DM}	8	A
Avalanche Energy (Note 3)	Single Pulsed	E_{AS}	88	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220F	P_D	27	W
	TO-251/TO-252		50	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. $L=10\text{mH}$, $I_{AS}=4.2\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$.

4. $I_{SD}\leq 4.0\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$.

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		110	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220F	θ_{JC}	4.62	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		2.5 (Note)	$^\circ\text{C}/\text{W}$

Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

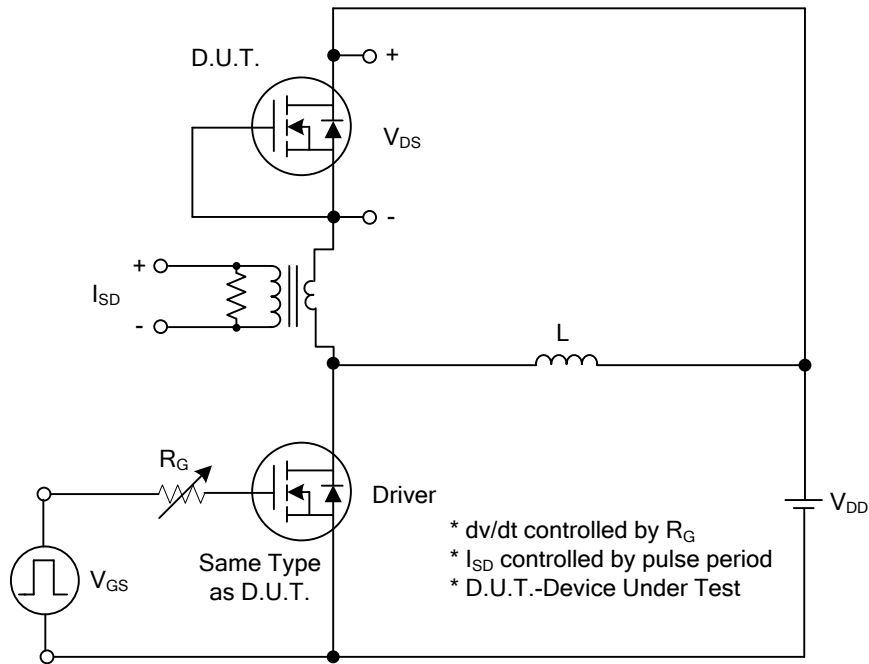
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	500			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =500V, V _{GS} =0V			10	μA
Gate- Source Leakage Current	I _{GSS}	Forward			+100	nA
		Reverse			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.0		4.0	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =2.0A			2.5	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		330		pF
Output Capacitance	C _{OSS}			43		pF
Reverse Transfer Capacitance	C _{RSS}			3		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q _G	V _{DS} =400V, V _{GS} =10V, I _D =4.0A, I _G =1mA (Note 1, 2)		8.3		nC
Gate to Source Charge	Q _{GS}			3		nC
Gate to Drain Charge	Q _{GD}			1		nC
Turn-ON Delay Time (Note 1)	t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =4.0A, R _G =25Ω (Note 1, 2)		4		ns
Rise Time	t _R			15		ns
Turn-OFF Delay Time	t _{D(OFF)}			20		ns
Fall-Time	t _F			22		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I _S				4	A
Maximum Body-Diode Pulsed Current	I _{SM}				8	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _S =4.0A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)	t _{rr}	I _S =4.0A, V _{GS} =0V,		206		ns
Reverse Recovery Charge	Q _{rr}	dI _F /dt = 100A/μs		1.45		μC

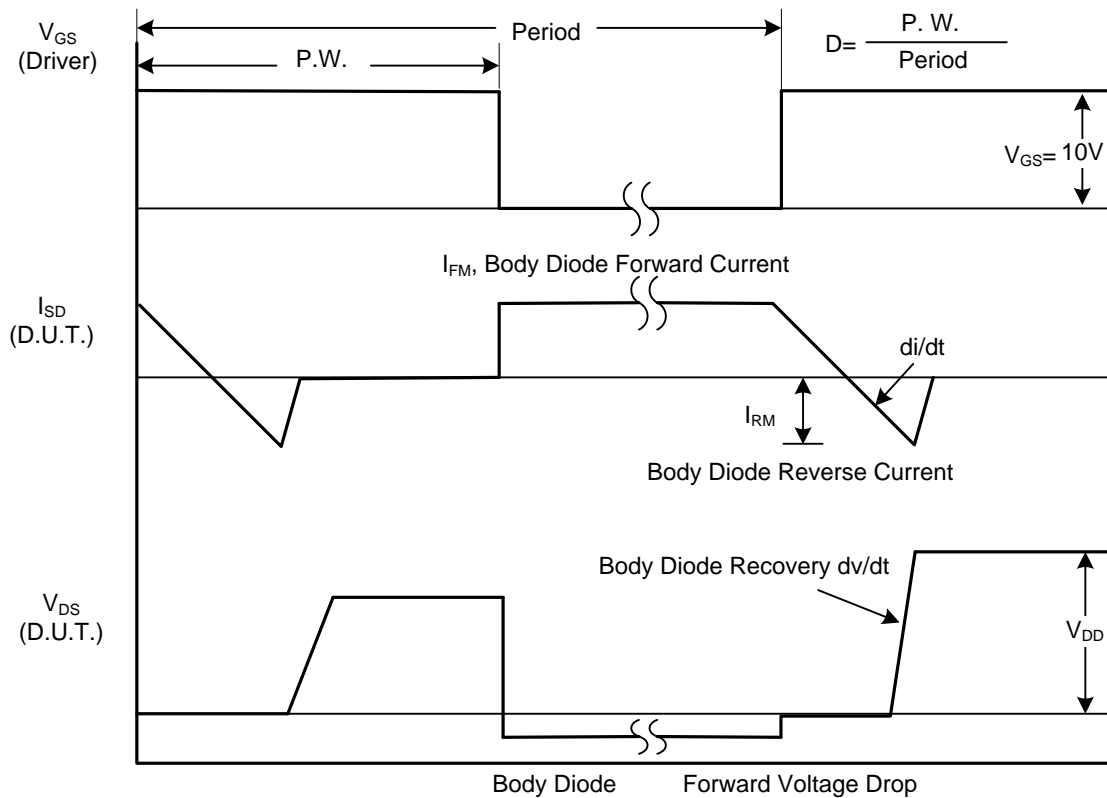
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

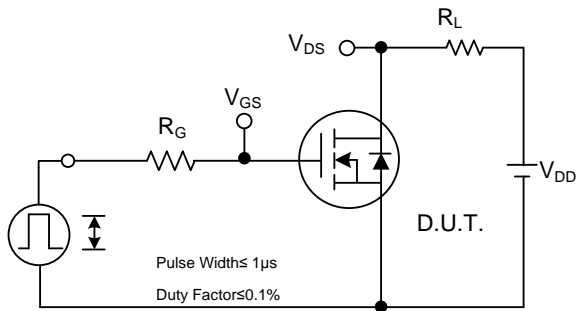


Peak Diode Recovery dv/dt Test Circuit

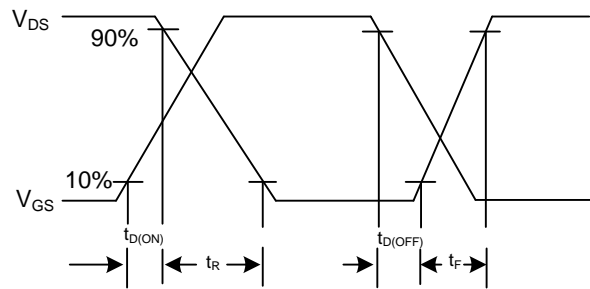


Peak Diode Recovery dv/dt Waveforms

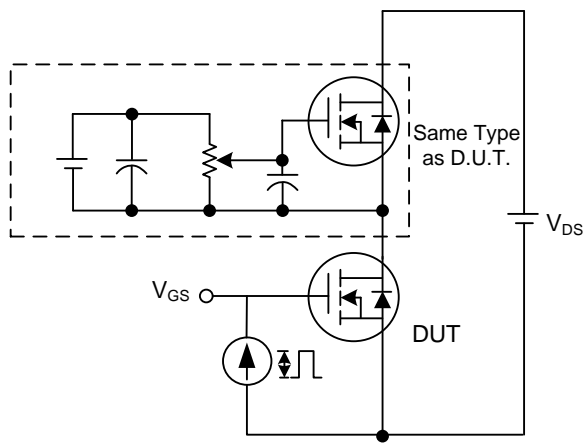
TEST CIRCUITS AND WAVEFORMS



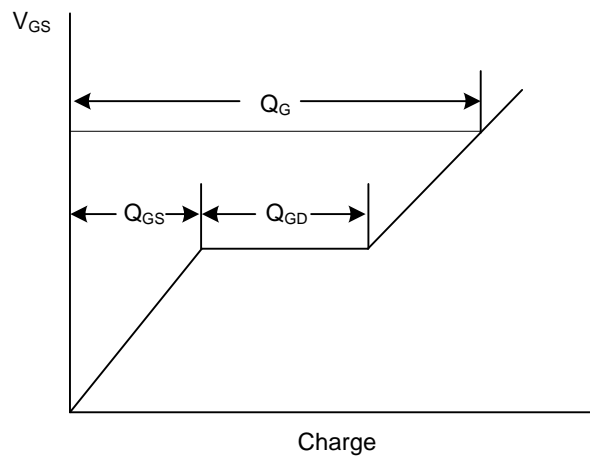
Switching Test Circuit



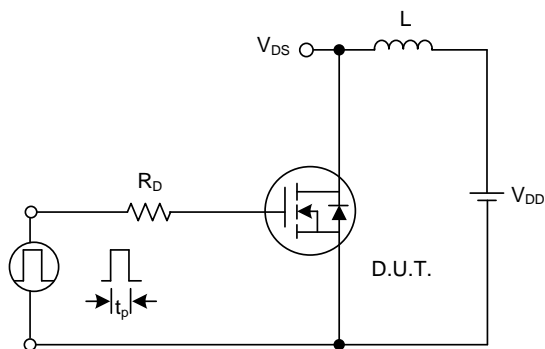
Switching Waveforms



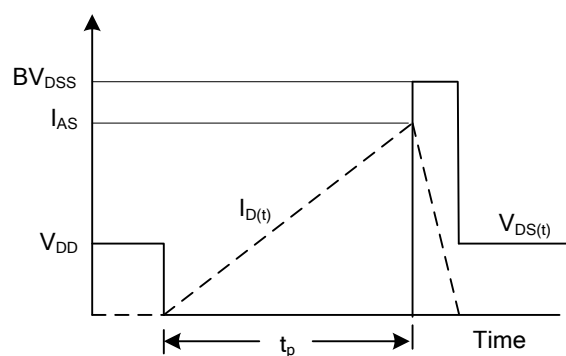
Gate Charge Test Circuit



Gate Charge Waveform

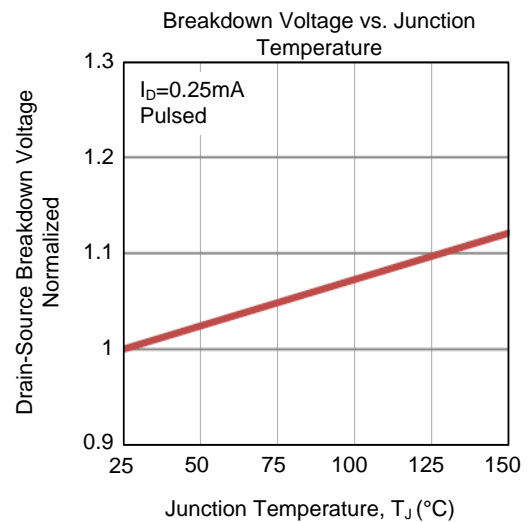
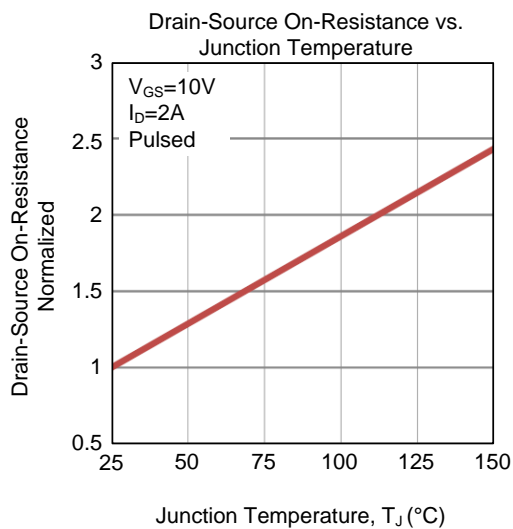
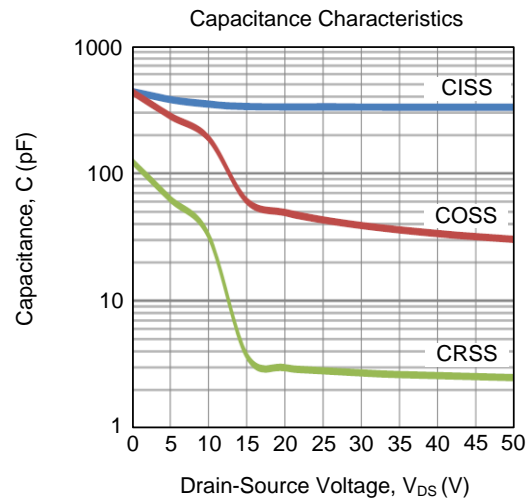
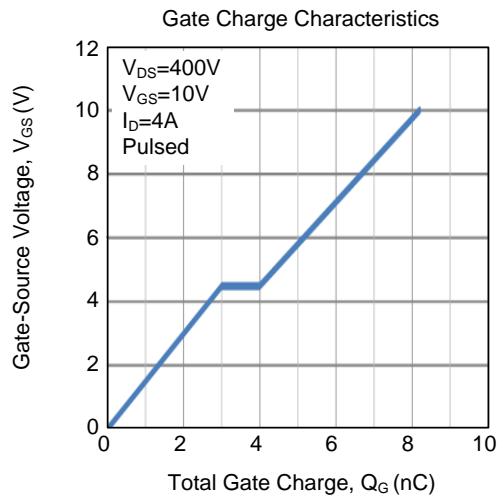
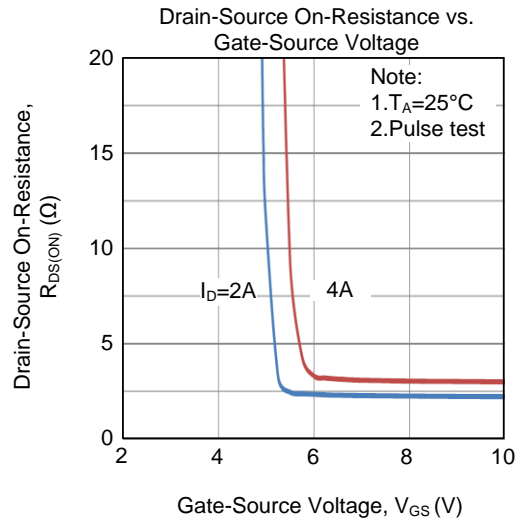
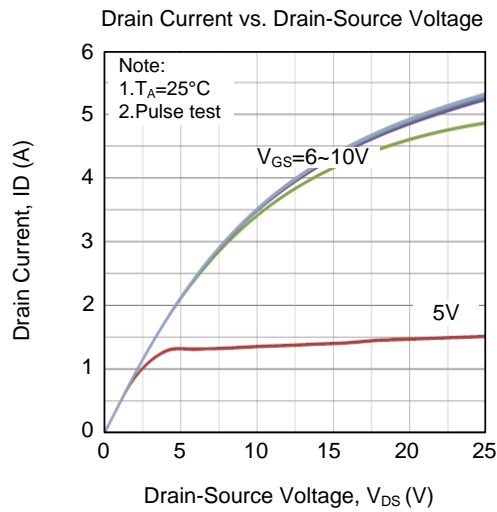


Unclamped Inductive Switching Test Circuit

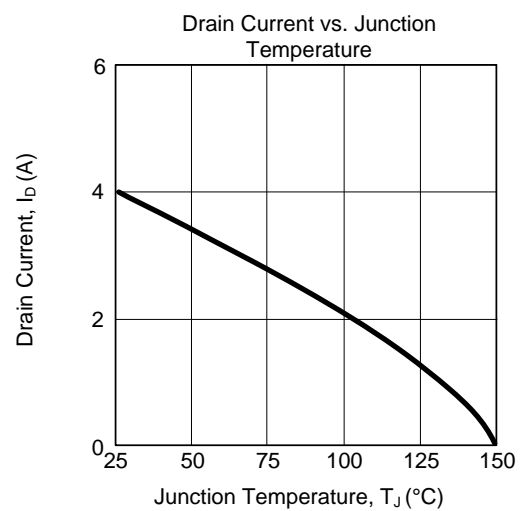
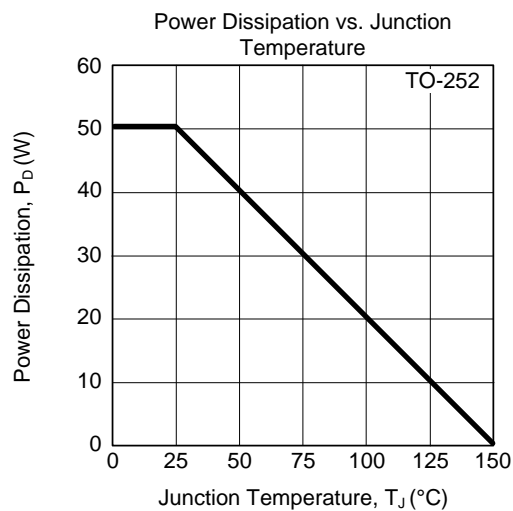
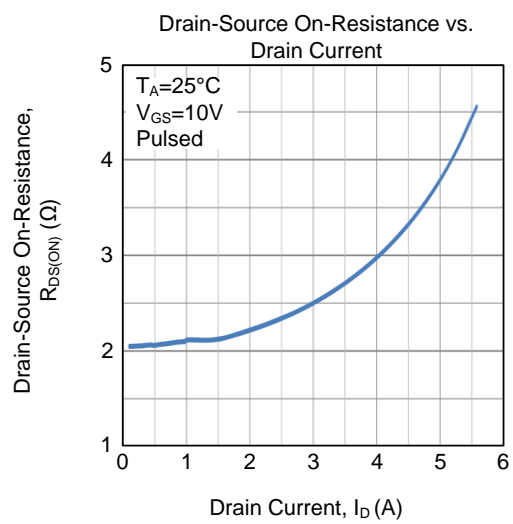
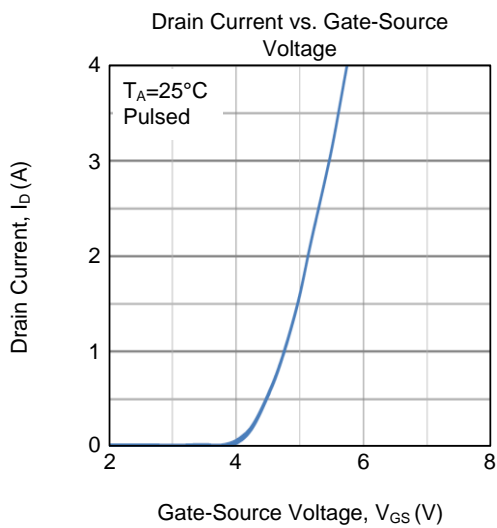
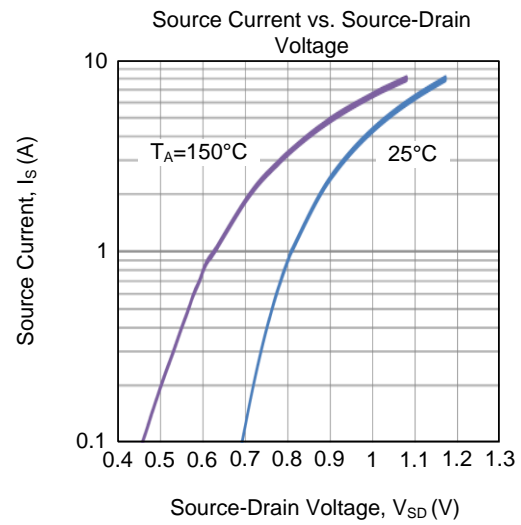
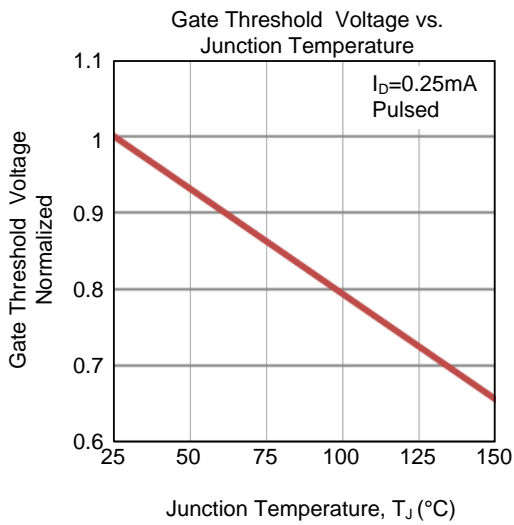


Unclamped Inductive Switching Waveforms

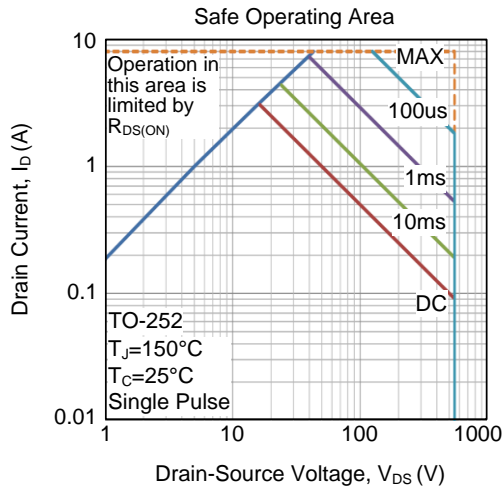
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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