



5N65-TC2

Power MOSFET

5A, 650V N-CHANNEL POWER MOSFET

DESCRIPTION

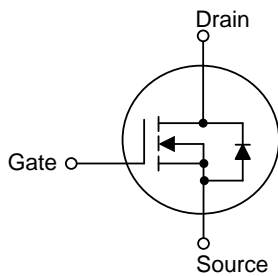
The UTC 5N65-TC2 is a N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC 5N65-TC2 is generally applied in high efficiency switch mode power supplies.

FEATURES

- * $R_{DS(ON)} \leq 2.2\Omega$ @ $V_{GS}=10V, I_D=2.5A$
- * High Switching Speed

SYMBOL

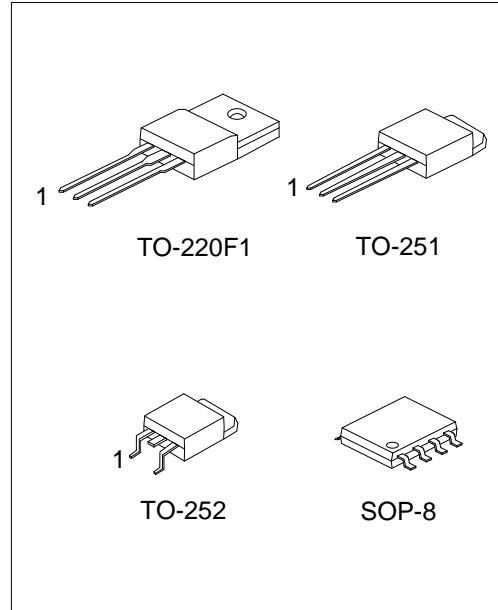


ORDERING INFORMATION

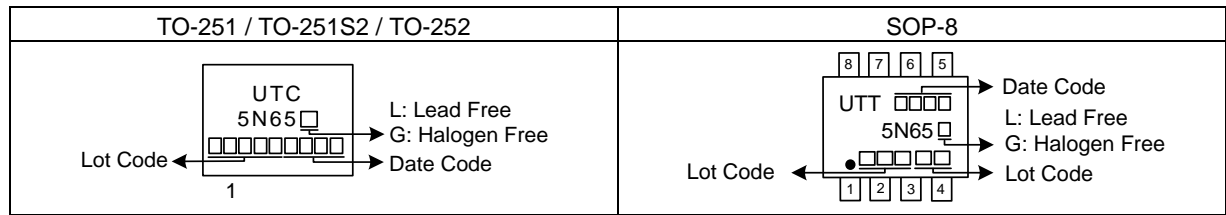
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
5N65L-TF1-T	5N65G-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
5N65L-TM3-T	5N65G-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
5N65L-TN3-R	5N65G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
5N65L-S08-R	5N65G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

<p>5N65G-TF1-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TF1: TO-220F1, TM3: TO-251, TN3: TO-252 S08: SOP-8 (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}	± 30	V
Drain Current	Continuous	I_D	5	A
	Pulsed (Note 2)	I_{DM}	10	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	112	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.2	V/ns
Power Dissipation	TO-220F1	P_D	36	W
	TO-251/TO-252		54	W
	SOP-8		2	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. $L = 10\text{mH}$, $I_{AS} = 4.73\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$ Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 7.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F1	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		110	$^\circ\text{C}/\text{W}$
	SOP-8		190 (Note)	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220F1	θ_{JC}	3.47	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		2.3 (Note)	$^\circ\text{C}/\text{W}$
	SOP-8		62.5 (Note)	$^\circ\text{C}/\text{W}$

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

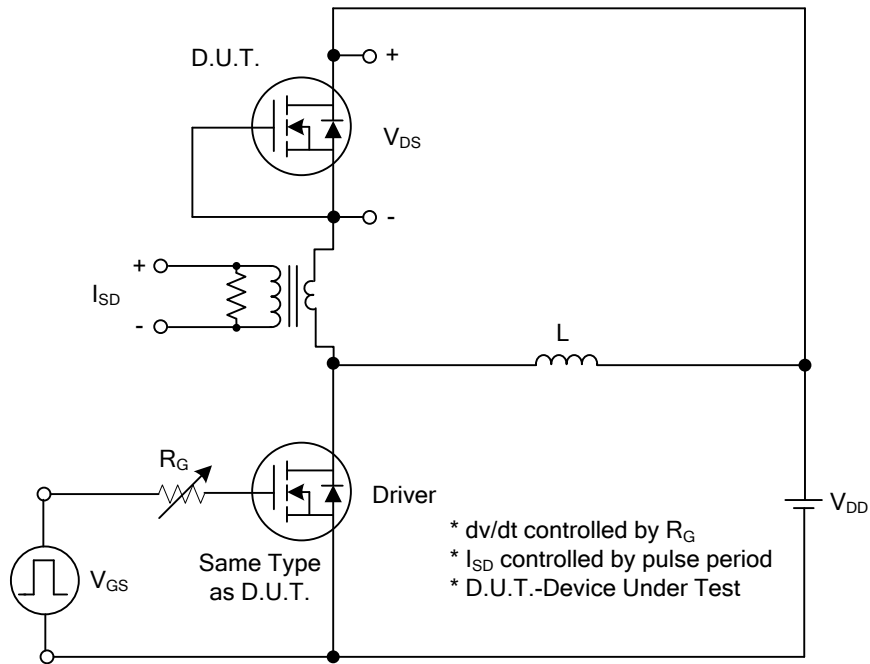
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	650			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=650V, V_{GS}=0V$			10	μA
Gate-Source Leakage Current	Forward	$I_{GSS}, V_{GS}=30V, V_{DS}=0V$			100	nA
	Reverse	$V_{GS}=-30V, V_{DS}=0V$			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2.5A$		1.92	2.2	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{GS}=0V, V_{DS}=25V, f=1.0\text{ MHz}$		623		pF
Output Capacitance	C_{OSS}			62		pF
Reverse Transfer Capacitance	C_{RSS}			2.9		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q_G	$V_{DS}=100V, V_{GS}=10V, I_D=2.0A$ $I_G=1\text{ mA}$ (Note 1, 2)		15		nC
Gate-source Charge	Q_{GS}			5.6		nC
Gate-drain Charge	Q_{GD}			2.5		nC
Turn-on Delay Time (Note 1)	$t_{D(ON)}$	$V_{DS}=30V, V_{GS}=10V, I_D=0.5A,$ $R_G=25\Omega$ (Note 1, 2)		4.4		ns
Rise Time	t_R			24		ns
Turn-off Delay Time	$t_{D(OFF)}$			122		ns
Fall-Time	t_F			25		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				5	A
Maximum Body-Diode Pulsed Current	I_{SM}				10	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$V_{GS}=0V, I_S=5.0A$			1.4	V
Reverse Recovery Time (Note 1)	t_{rr}	$V_{GS}=0V, I_S=5.0A,$		328		ns
Reverse Recovery Charge	Q_{rr}	$dI_F/dt=100A/\mu s$ (Note1)		2.65		μC

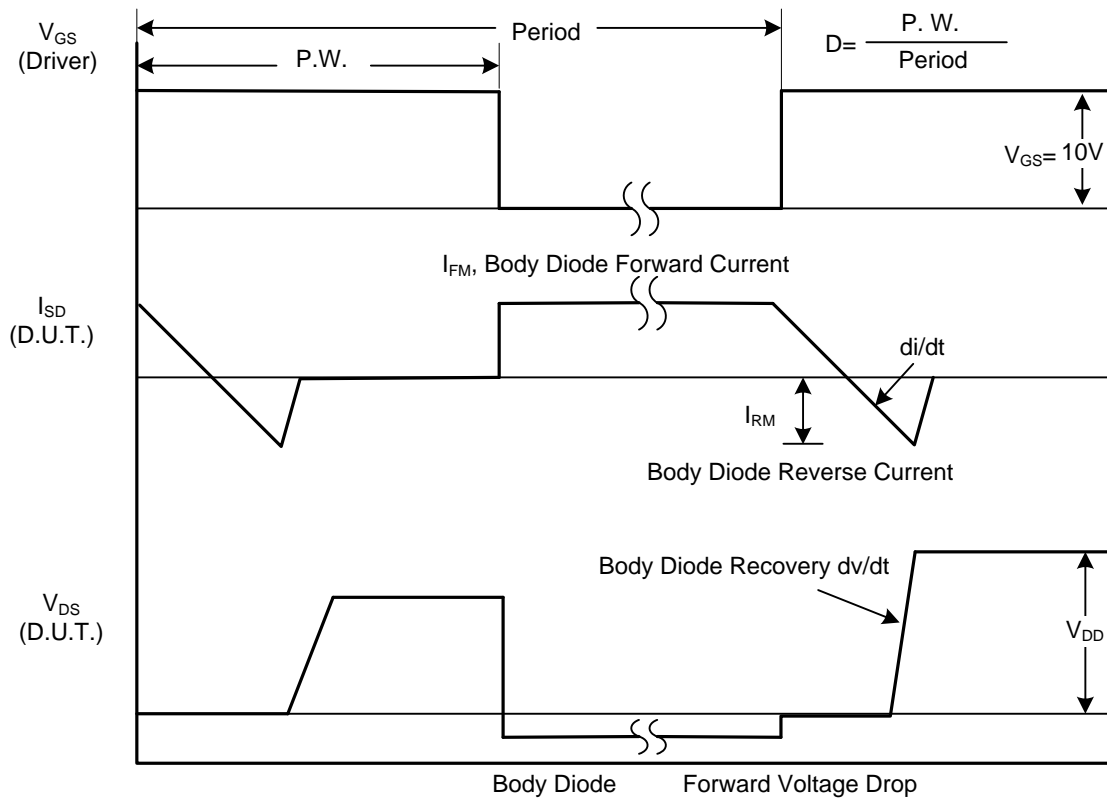
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

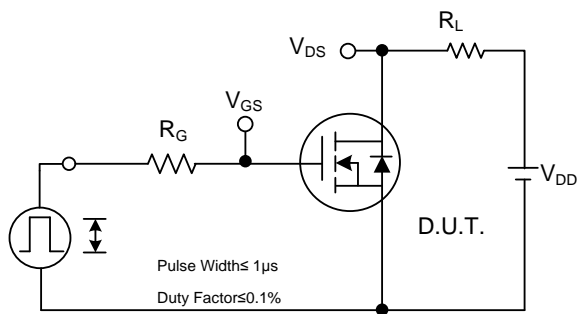


Peak Diode Recovery dv/dt Test Circuit

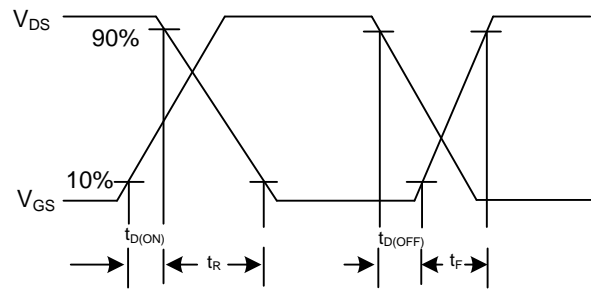


Peak Diode Recovery dv/dt Waveforms

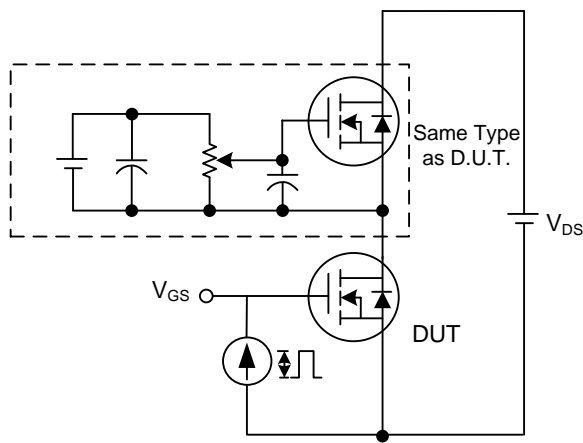
TEST CIRCUITS AND WAVEFORMS



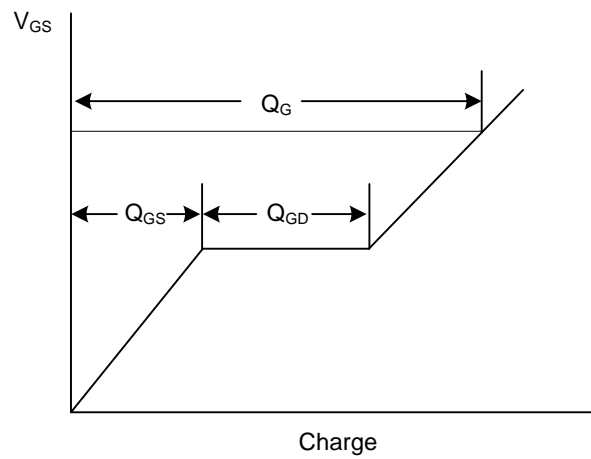
Switching Test Circuit



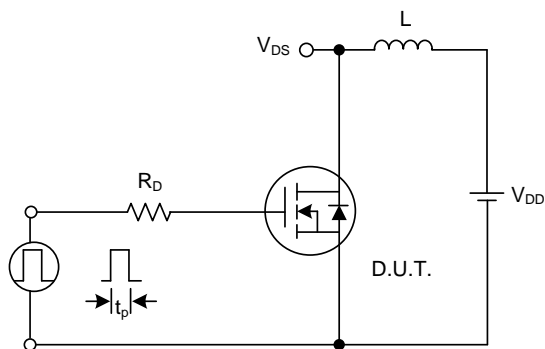
Switching Waveforms



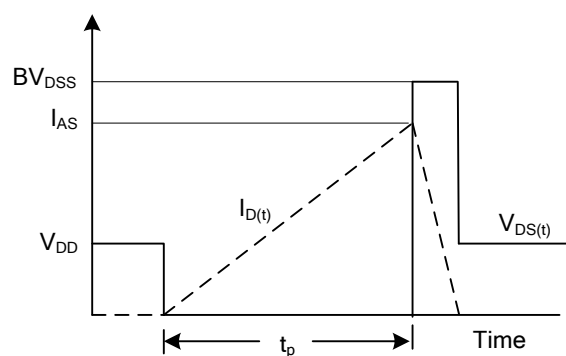
Gate Charge Test Circuit



Gate Charge Waveform

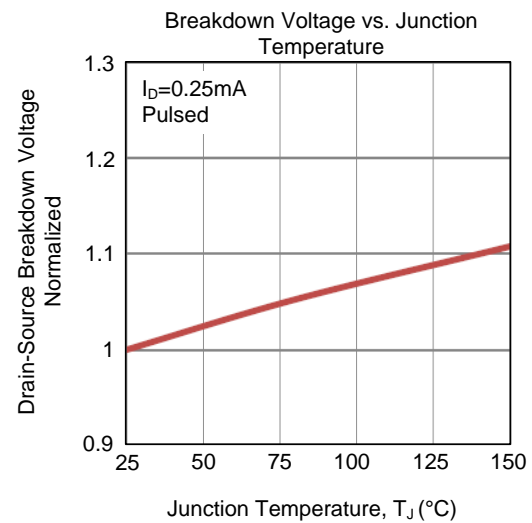
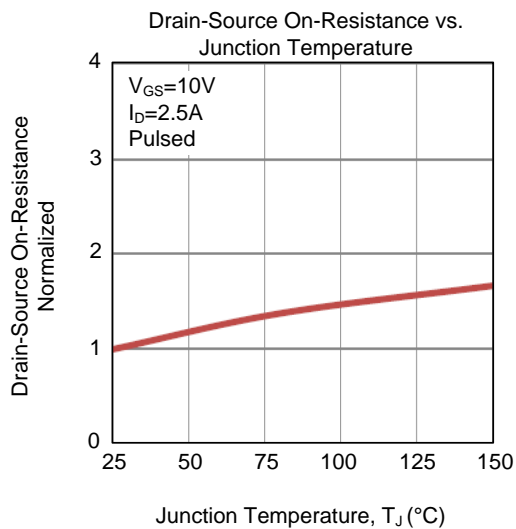
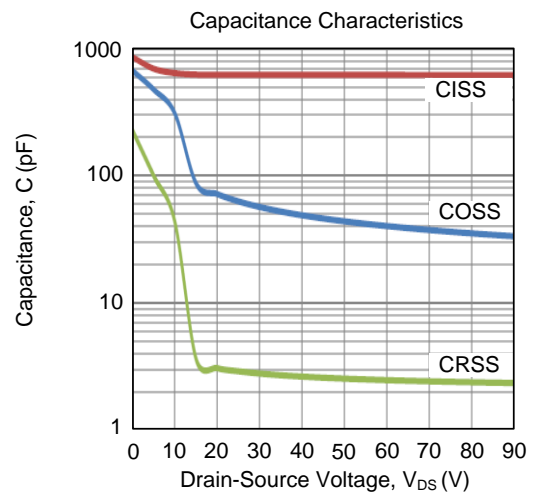
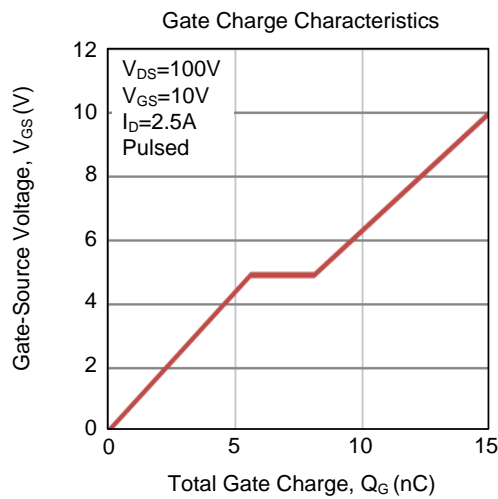
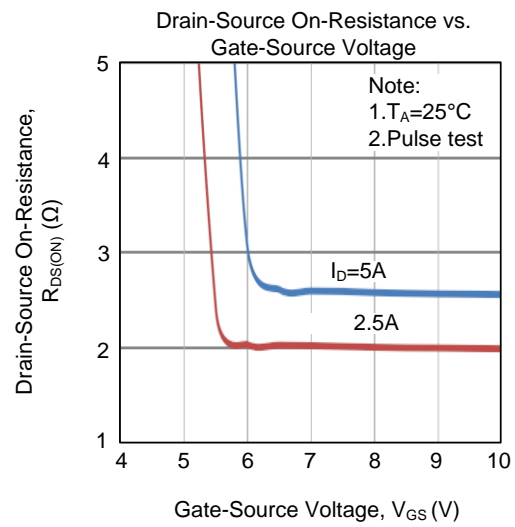
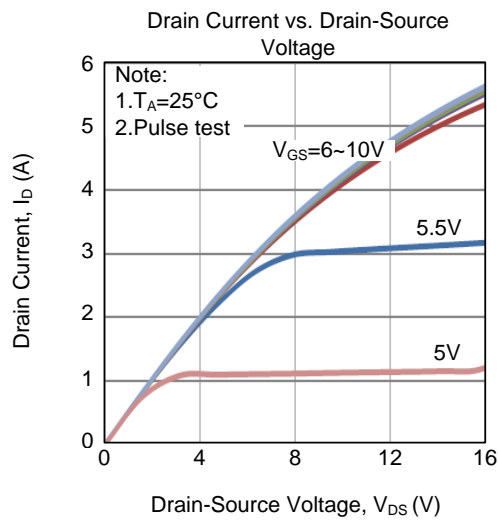


Unclamped Inductive Switching Test Circuit

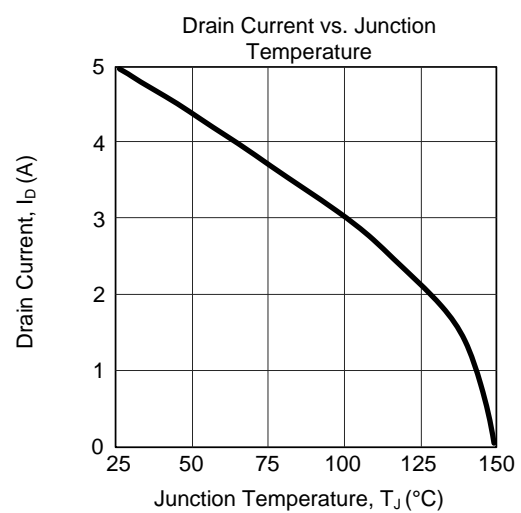
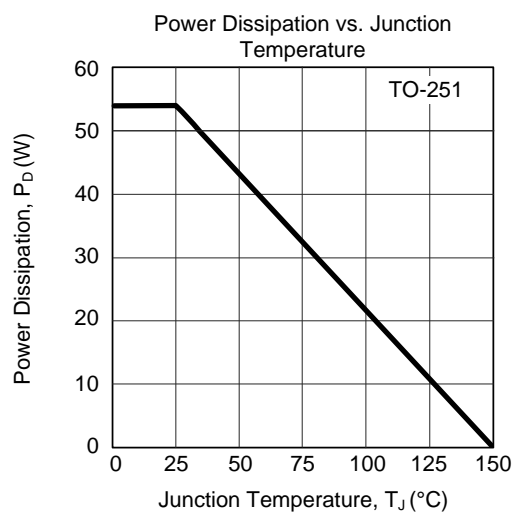
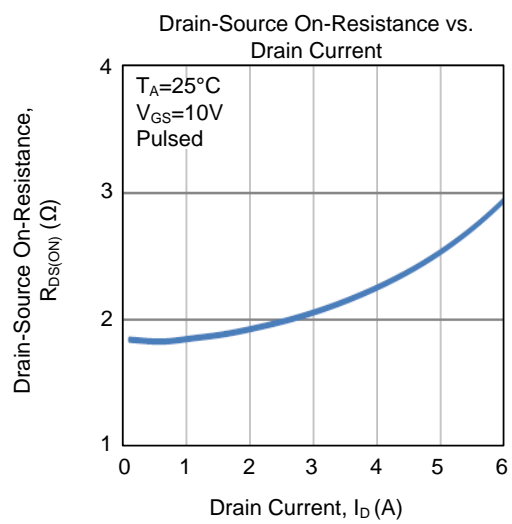
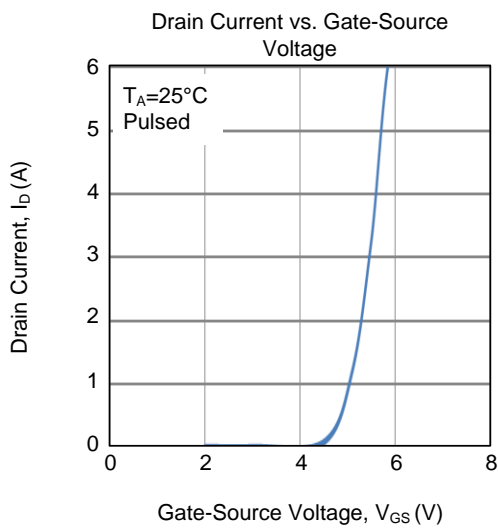
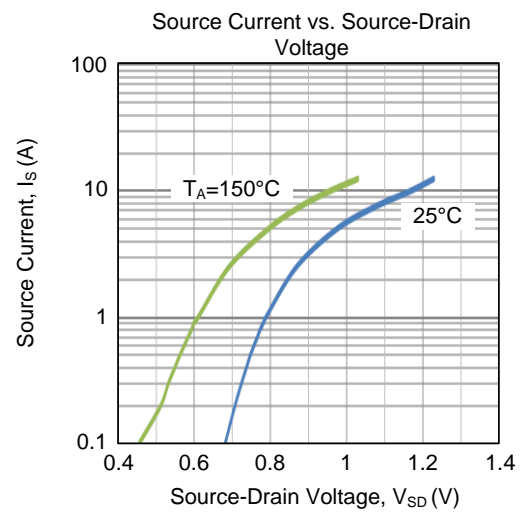
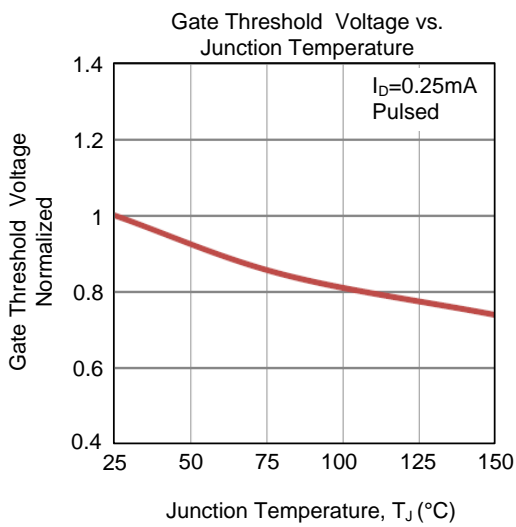


Unclamped Inductive Switching Waveforms

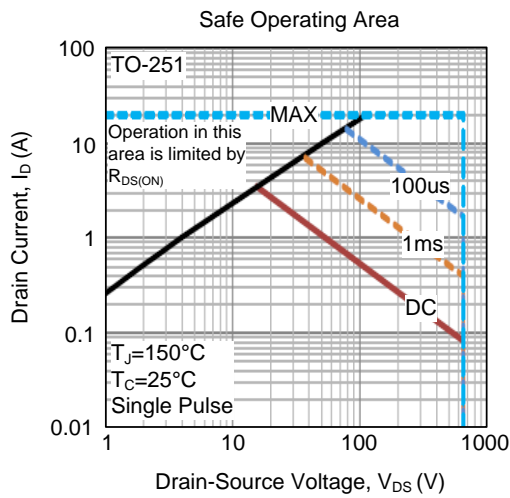
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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