



3N80

Power MOSFET

3.0A, 800V N-CHANNEL POWER MOSFET

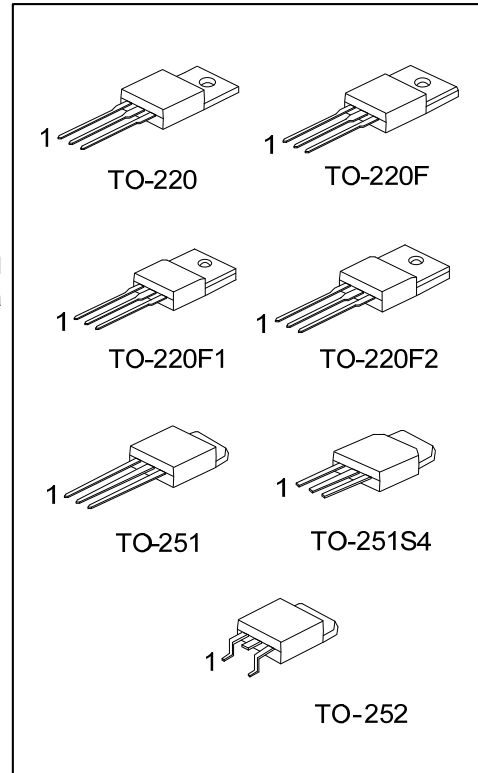
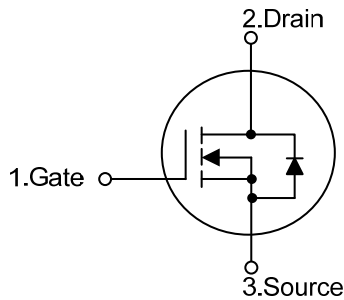
■ DESCRIPTION

The UTC **3N80** provide excellent $R_{DS(ON)}$, low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

■ FEATURES

- * $R_{DS(ON)} \leq 3.8 \Omega @ V_{GS}=10V, I_D=1.5A$
- * Fast Switching Capability
- * Avalanche Energy Specified
- * Improved dv/dt Capability, High Ruggedness

■ SYMBOL



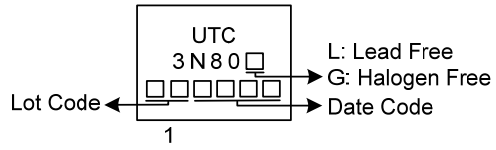
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
3N80L-TA3-T	3N80G-TA3-T	TO-220	G	D	S	Tube
3N80L-TF1-T	3N80G-TF1-T	TO-220F1	G	D	S	Tube
3N80L-TF2-T	3N80G-TF2-T	TO-220F2	G	D	S	Tube
3N80L-TF3-T	3N80G-TF3-T	TO-220F	G	D	S	Tube
3N80L-TM3-T	3N80G-TM3-T	TO-251	G	D	S	Tube
3N80L-TMS4-T	3N80G-TMS4-T	TO-251S4	G	D	S	Tube
3N80L-TN3-R	3N80G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>3N80G-TA3-T</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2 TF3: TO-220F, TM3: TO-251, TMS4: TO-251S4 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 ($V_{GS}=0\text{V}$)		V_{DSS}	800	V
Drain-Gate Voltage ($R_G=20\text{k}\Omega$)		V_{DGR}	800	V
Gate-Source Voltage		V_{GSS}	± 30	V
Continuous Drain Current		I_D	3	A
Pulsed Drain Current		I_{DM}	6	A
Single Pulse Avalanche Energy (Note 3)		E_{AS}	126	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.7	V/ns
Power Dissipation	TO-220	P_D	70	W
	TO-220F/TO-220F1 TO-220F2		25	W
	TO-251/TO-251S4 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. $L=30\text{mH}$, $I_{AS}=2.9\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$

4. $I_{SD}\leq 3.0\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq$, Starting $T_J = 25^{\circ}\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220 TO-220F TO-220F1/TO-220F2	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	TO-251/TO-251S4 TO-252		110	$^{\circ}\text{C}/\text{W}$
	TO-220		1.78	$^{\circ}\text{C}/\text{W}$
	TO-220F/TO-220F1 TO-220F2		5	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-251/TO-251S4 TO-252	θ_{JC}	2.5	$^{\circ}\text{C}/\text{W}$
	TO-220		1.78	$^{\circ}\text{C}/\text{W}$
	TO-220F/TO-220F1 TO-220F2		5	$^{\circ}\text{C}/\text{W}$
	TO-251/TO-251S4 TO-252		2.5	$^{\circ}\text{C}/\text{W}$

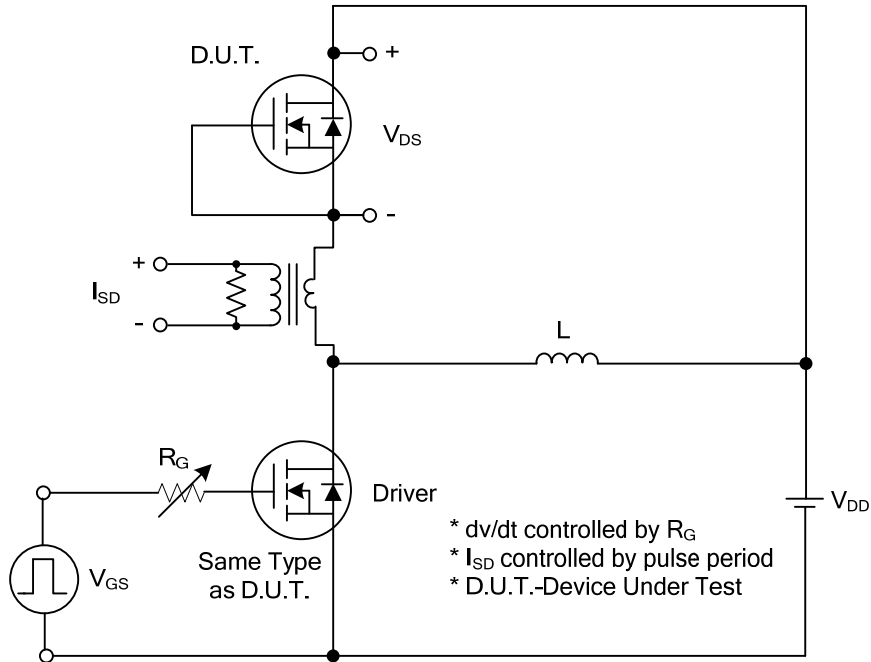
■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	800			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =800V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±30V, V _{DS} =0V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	3.0		5.0	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =1.5A			3.8	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1MHz		525		pF
Output Capacitance	C _{OSS}			68.6		pF
Reverse Transfer Capacitance	C _{RSS}			7.5		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q _G	V _{DD} =640V, I _D =3A, V _{GS} =10V		20.8		nC
Gate-Source Charge	Q _{GS}			9		nC
Gate-Drain Charge	Q _{DD}			4.5		nC
Turn-On Delay Time	t _{D(ON)}	V _{DD} =400V, I _D =3 A, R _G =25Ω V _{GS} =10V		11		ns
Turn-On Rise Time	t _R			17		ns
Turn-Off Delay Time	t _{D(OFF)}			41		ns
Turn-Off Fall Time	t _F			29		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _{SD}				3	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				6	A
Diode Forward Voltage(Note 1)	V _{SD}	I _{SD} =3A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time	t _{rr}	I _S =3.0A, V _{GS} =0V,		472		ns
Body Diode Reverse Recovery Charge	Q _{rr}	dI _F /dt=100A/μs		3.1		μC

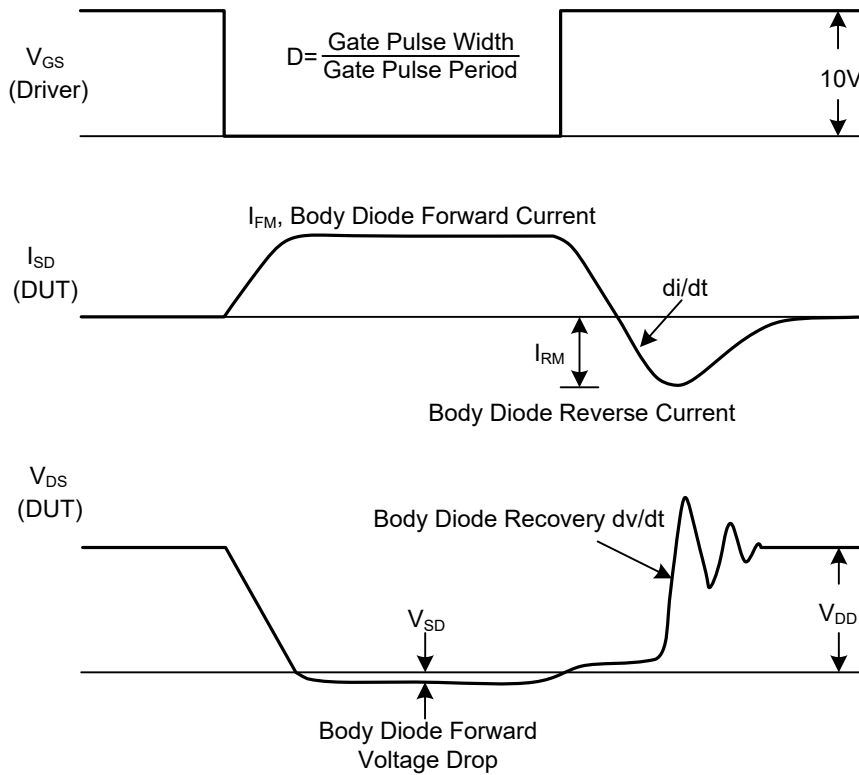
Notes: 1. Pulse width = 300μs, Duty cycle ≤ 1.5%.

2. C_{OSS(EQ)} is defined as constant equivalent capacitance giving the same charging time as C_{OSS} when V_{DS} increases from 0 to 80% V_{DSS}.

■ TEST CIRCUITS AND WAVEFORMS

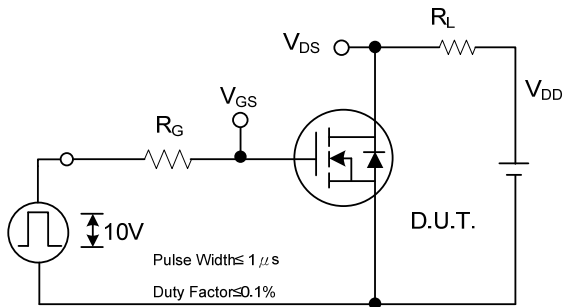


Peak Diode Recovery dv/dt Test Circuit

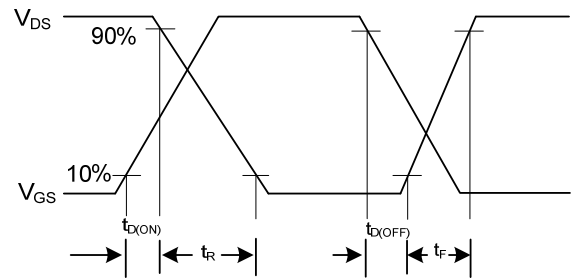


Peak Diode Recovery dv/dt Waveforms

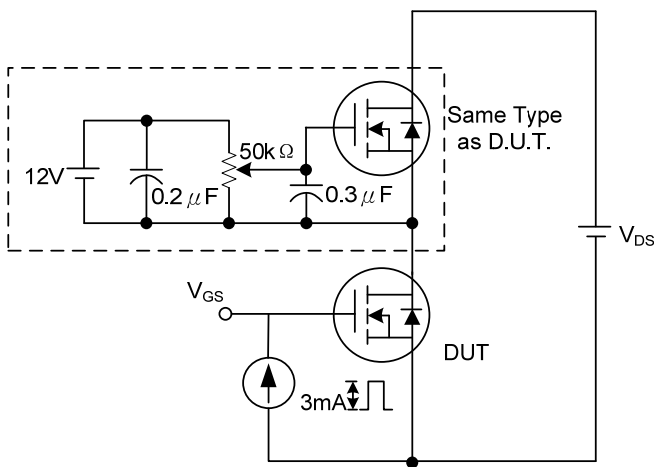
TEST CIRCUITS AND WAVEFORMS



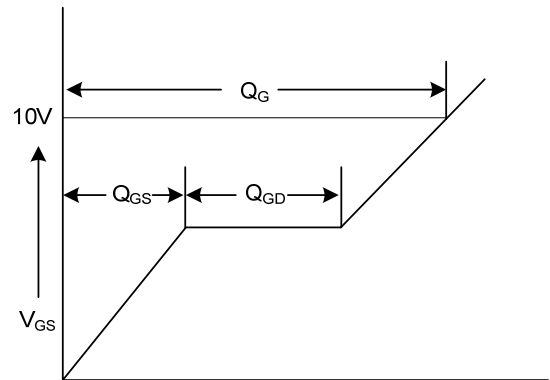
Switching Test Circuit



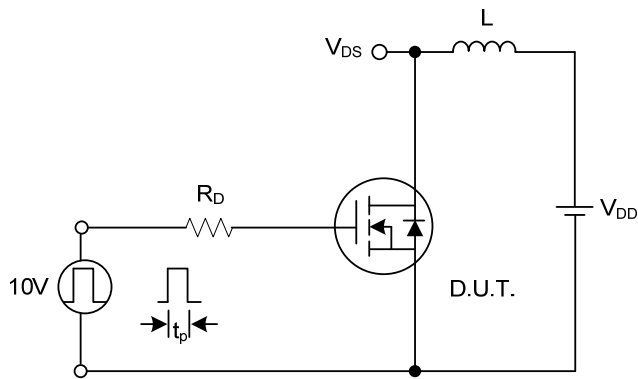
Switching Waveforms



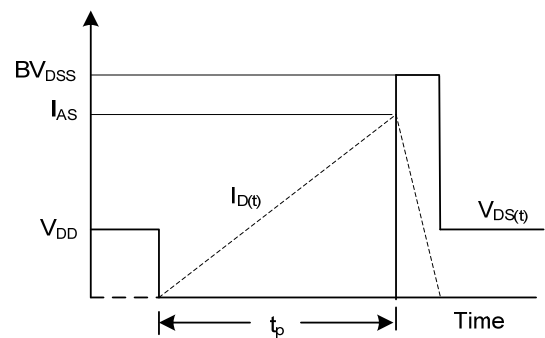
Gate Charge Test Circuit



Charge Gate Charge Waveform

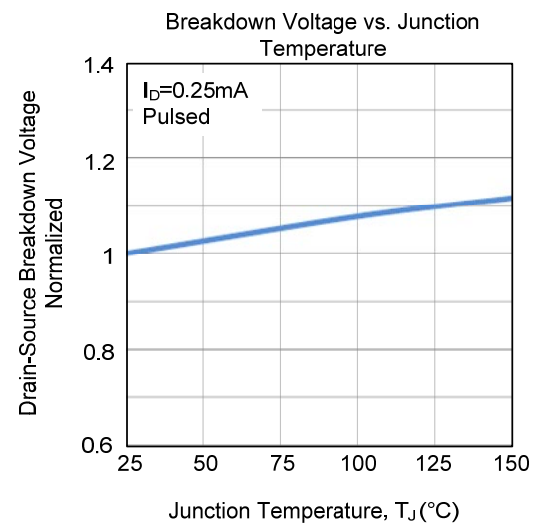
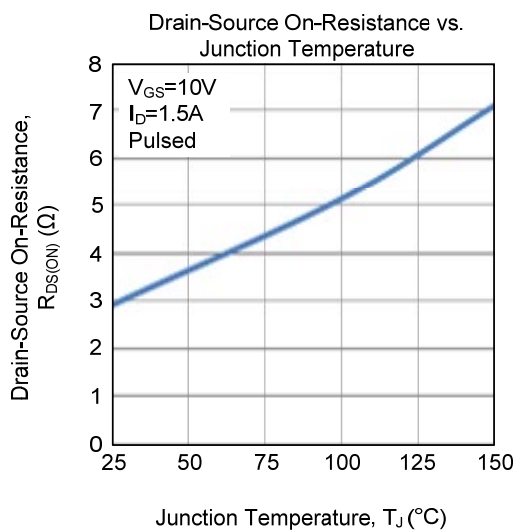
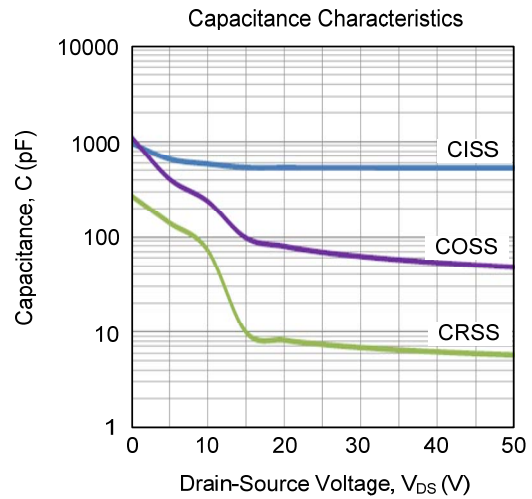
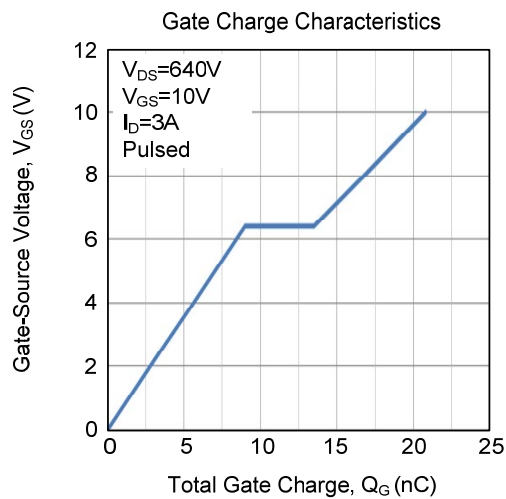
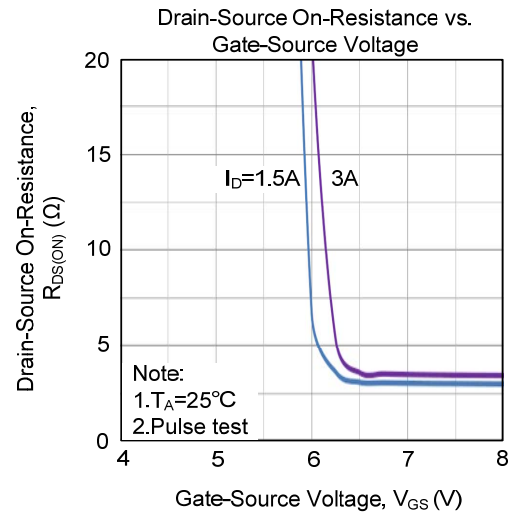
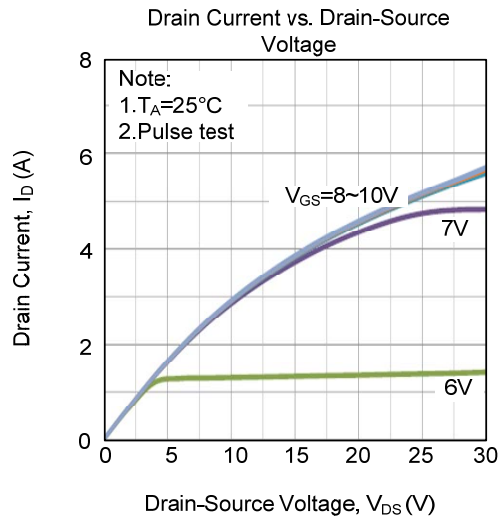


Unclamped Inductive Switching Test Circuit

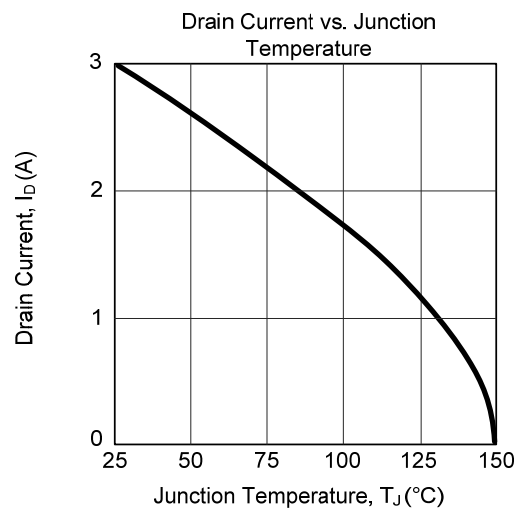
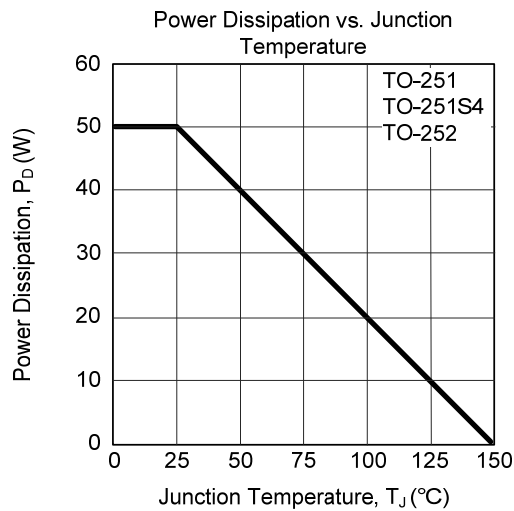
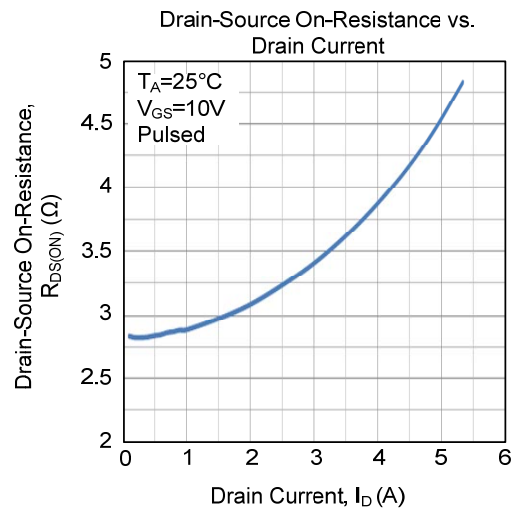
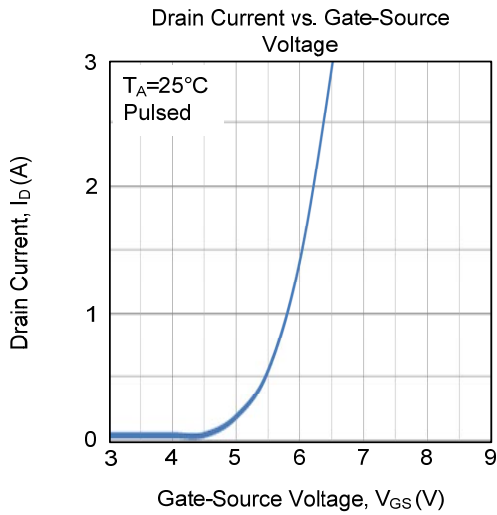
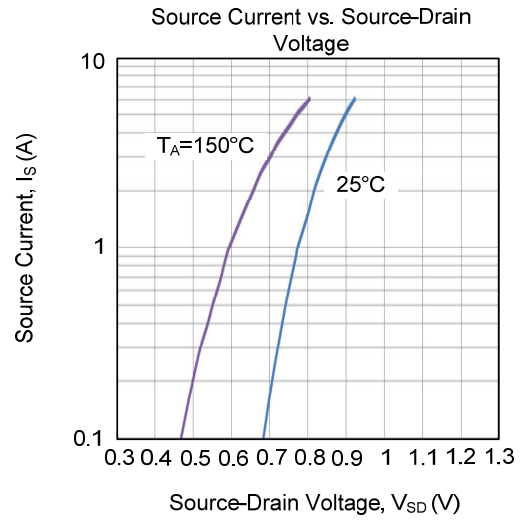
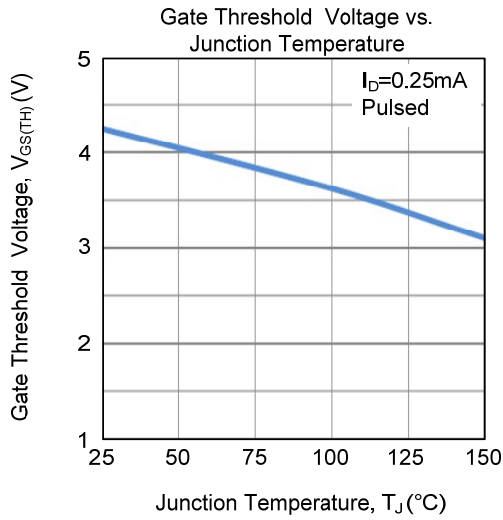


Unclamped Inductive Switching Waveforms

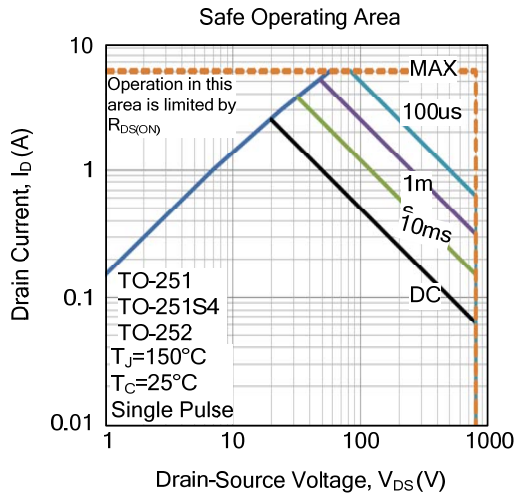
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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