

8NM90

Power MOSFET

8A, 900V N-CHANNEL SUPER-JUNCTION MOSFET

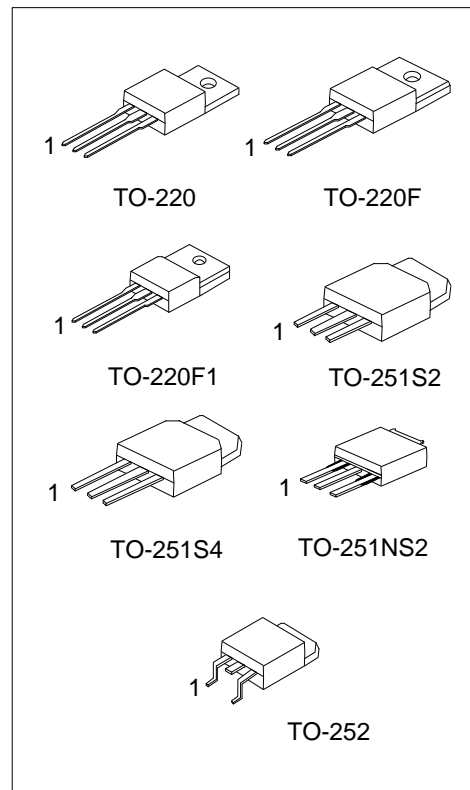
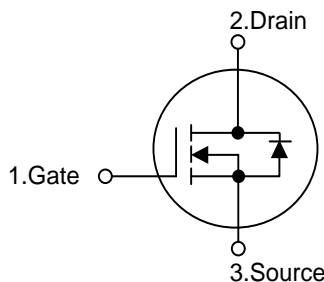
DESCRIPTION

The UTC 8NM90 is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at DC-DC, AC-DC converters for power applications.

FEATURES

- * $R_{DS(ON)} \leq 1.2 \Omega @ V_{GS}=10V, I_D=4.0A$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness

SYMBOL



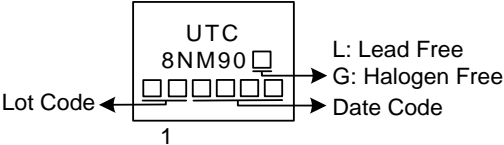
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
8NM90L-TA3-T	8NM90G-TA3-T	TO-220	G	D	S	Tube
8NM90L-TF1-T	8NM90G-TF1-T	TO-220F1	G	D	S	Tube
8NM90L-TF3-T	8NM90G-TF3-T	TO-220F	G	D	S	Tube
8NM90L-TMS2-T	8NM90G-TMS2-T	TO-251S2	G	D	S	Tube
8NM90L-TMS4-T	8NM90G-TMS4-T	TO-251S4	G	D	S	Tube
8NM90L-TMN2-T	8NM90G-TMN2-T	TO-251NS2	G	D	S	Tube
8NM90L-TN3-R	8NM90G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>8NM90G-TA3-T</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF3: TO-220F TMS2: TO-251S2, TMS4: TO-251S4, TMN2: TO-251NS2, TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



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■ **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}	± 30	V
Continuous Drain Current	Continuous	I_D	8	A
Pulsed Drain Current	Pulsed (Note 2)	I_{DM}	16	A
Avalanche Current (Note 2)		I_{AR}	2.3	A
Single Pulsed Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	84	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.23	V/ns
Power Dissipation	TO-220	P_D	73	W
	TO-220F/TO-220F1		28	W
	TO-25S2/TO-25S4		60	W
	TO-251NS2/TO-252			
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. $L = 10\text{mH}$, $I_{AS} = 4.1\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$.

4. $I_{SD} \leq 8.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$.

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-25S2/TO-25S4 TO-251NS2/TO-252		110	$^\circ\text{C}/\text{W}$
	TO-220		1.71	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220F/TO-220F1	θ_{JC}	4.46	$^\circ\text{C}/\text{W}$
	TO-25S2/TO-25S4 TO-251NS2/TO-252		2.08 (Note)	$^\circ\text{C}/\text{W}$

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

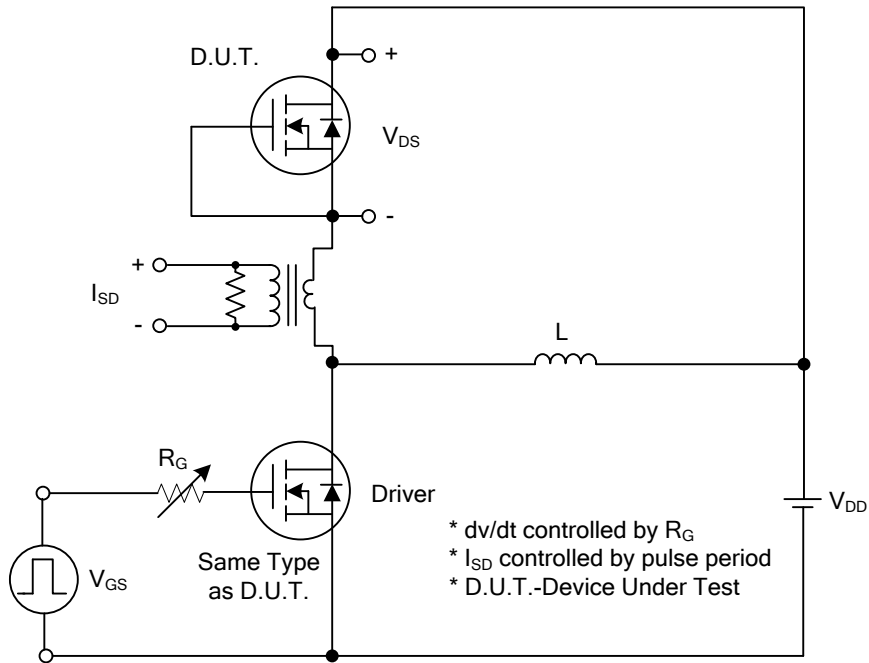
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	900			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=900V, V_{GS}=0V$			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	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5		4.5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=4.0A$			1.2	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{GS}=0V, V_{DS}=50V, f=1.0\text{MHz}$		813.3		pF
Output Capacitance	C_{OSS}			54		pF
Reverse Transfer Capacitance	C_{RSS}			1.6		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q_G	$V_{DS}=720V, V_{GS}=10V, I_D=8A,$ $I_G=1\text{mA}(\text{Note } 1, 2)$		31		nC
Gate to Source Charge	Q_{GS}			6.4		nC
Gate to Drain Charge	Q_{GD}			8.8		nC
Turn-ON Delay Time (Note 1)	$t_{D(ON)}$	$V_{DD}=100V, V_{GS}=8V, I_D=8A,$ $R_G=25\Omega, (\text{Note } 1, 2)$		12		nS
Rise Time	t_R			20		nS
Turn-OFF Delay Time	$t_{D(OFF)}$			96		nS
Fall-Time	t_F			38		nS
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				8	A
Maximum Body-Diode Pulsed Current	I_{SM}				16	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_S=8.0A, V_{GS}=0V$			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t_{rr}	$I_S=8.0A, V_{GS}=0V,$ $dI_F/dt=100A/\mu s$		535		nS
Body Diode Reverse Recovery Charge	Q_{rr}			7.4		μC

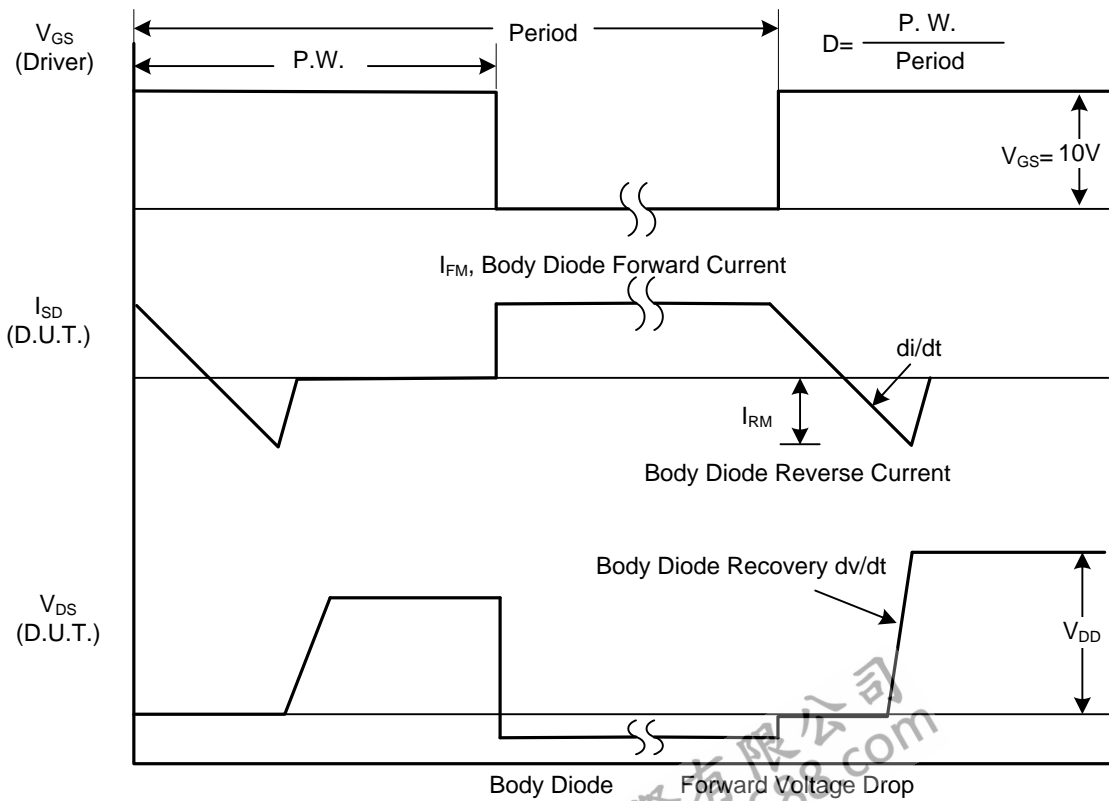
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS

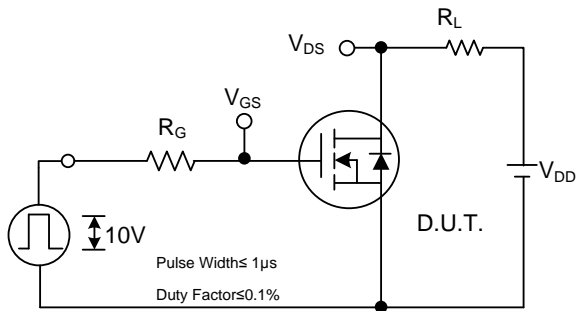


Peak Diode Recovery dv/dt Test Circuit

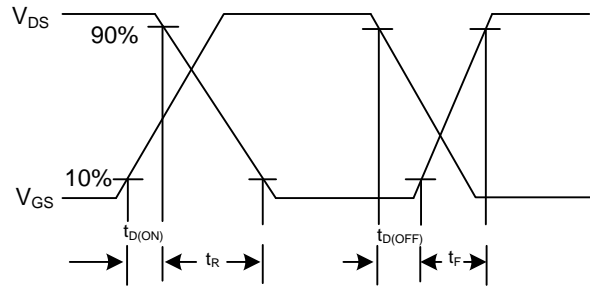


Peak Diode Recovery dv/dt Waveforms

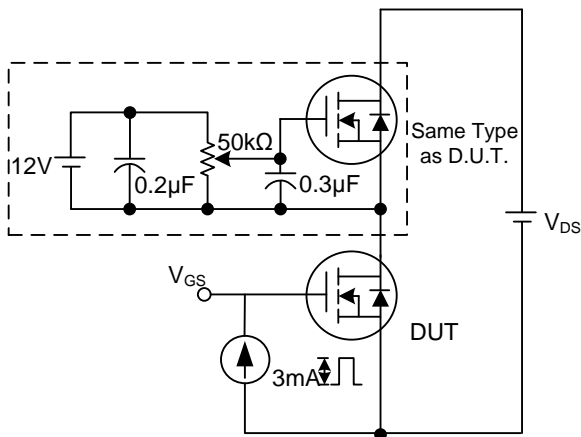
TEST CIRCUITS AND WAVEFORMS



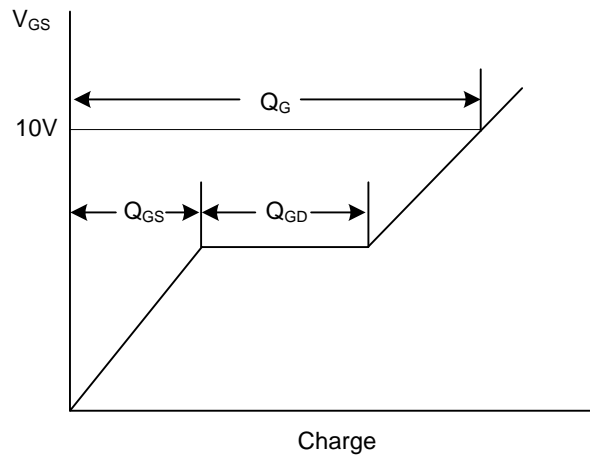
Switching Test Circuit



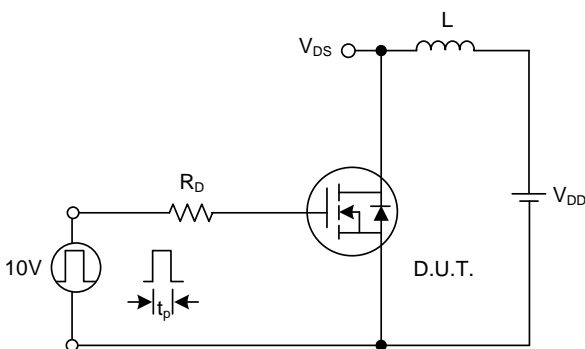
Switching Waveforms



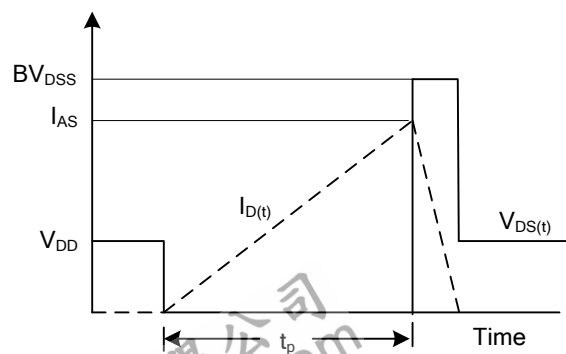
Gate Charge Test Circuit



Gate Charge Waveform

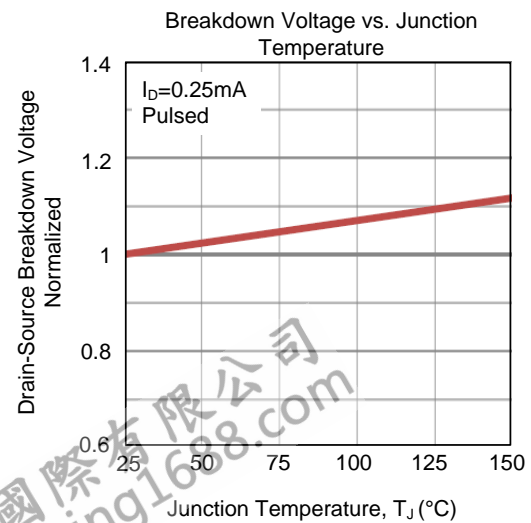
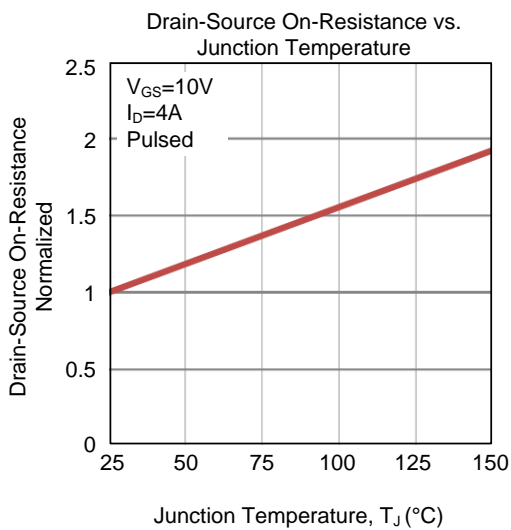
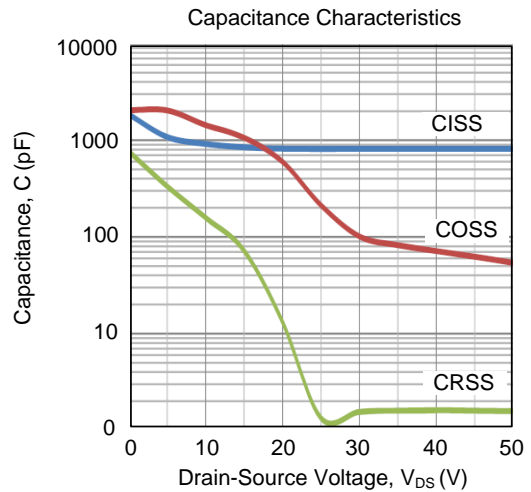
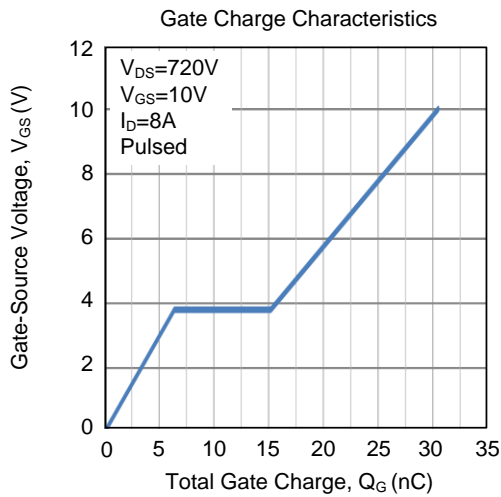
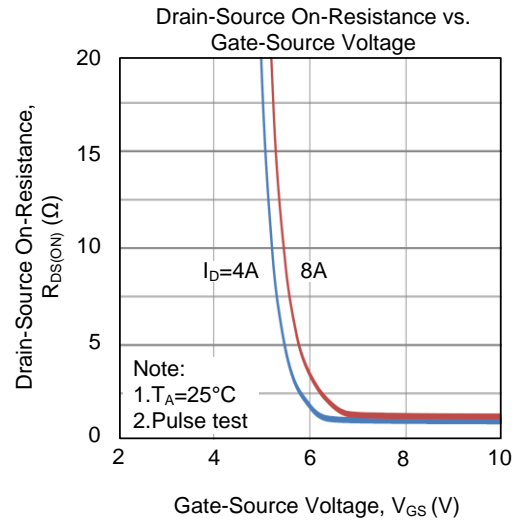
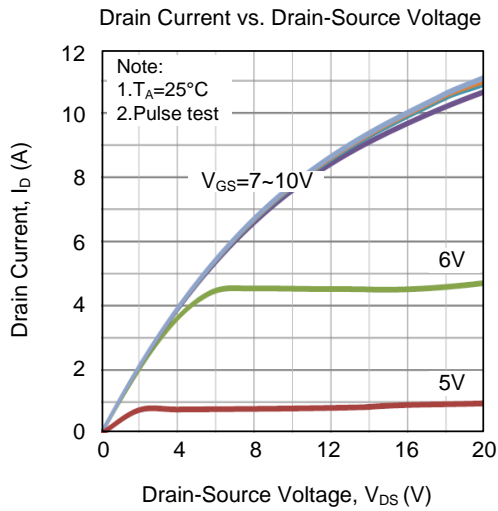


Unclamped Inductive Switching Test Circuit

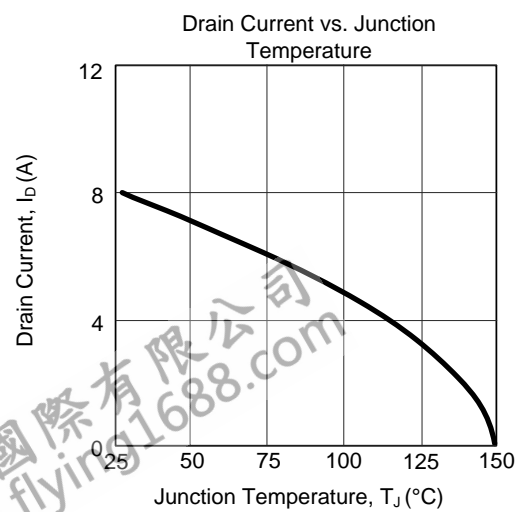
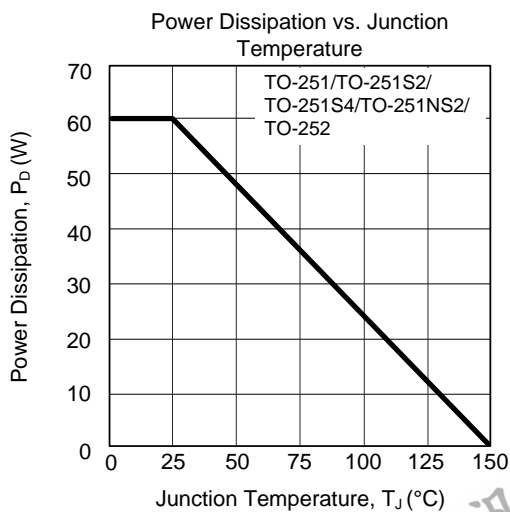
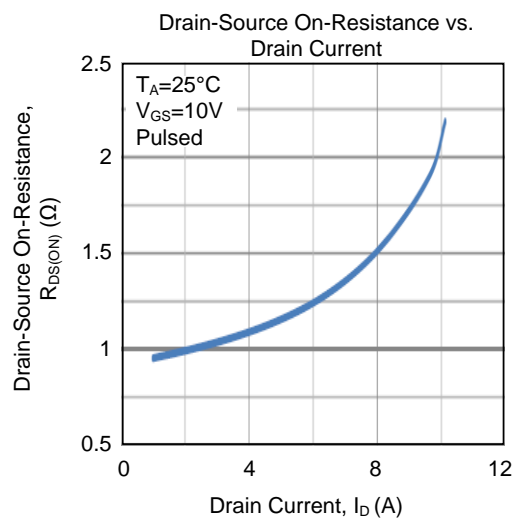
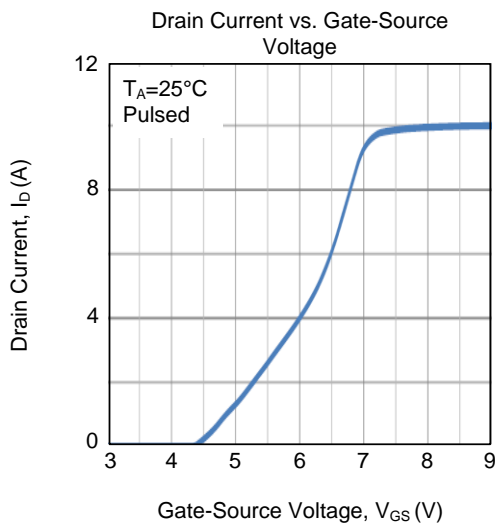
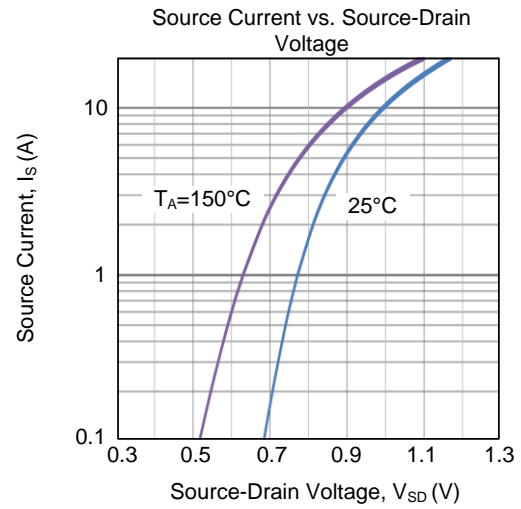
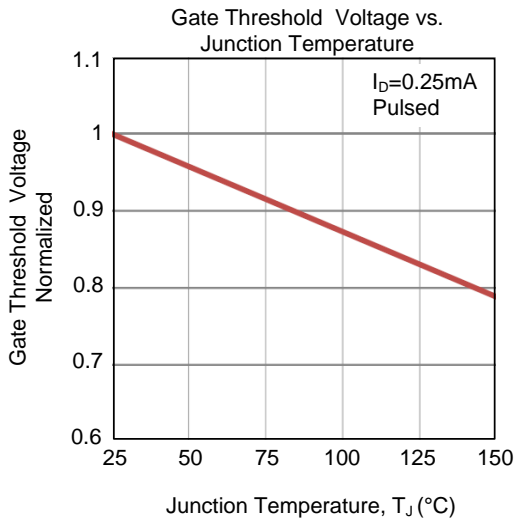


Unclamped Inductive Switching Waveforms

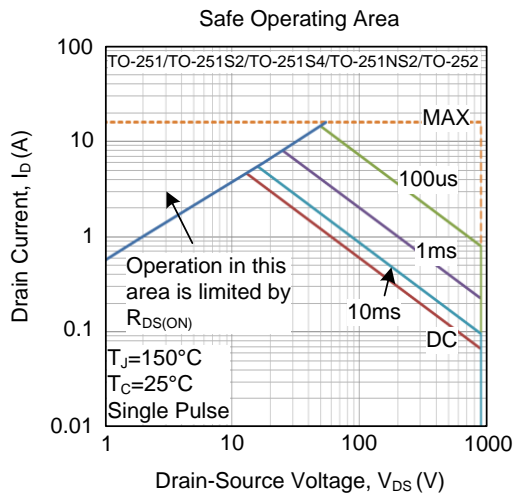
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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