



1N90-FC

Power MOSFET

1A, 900V N-CHANNEL POWER MOSFET

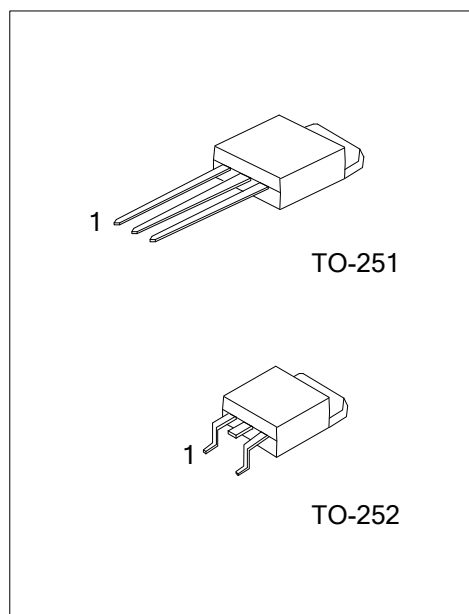
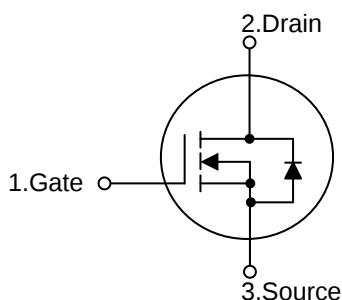
DESCRIPTION

The UTC **1N90-FC** 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

- * $R_{DS(ON)} \leq 15 \Omega$ @ $V_{GS}=10V$, $I_D=0.5A$
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

SYMBOL



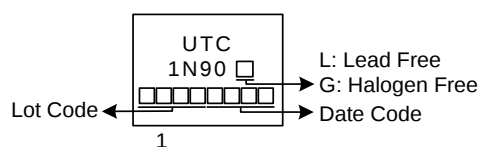
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
1N90L-TM3-T	1N90G-TM3-T	TO-251	G	D	S	Tube
1N90L-TN3-R	1N90G-TN3-R	TO-252	G	D	S	Tape Reel

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

1N90G-TM3-T	(1) T: Tube, R: Tape Reel (2) TM3: TO-251, TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_C=25°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	I _D	1	A
Pulsed Drain Current (Note 2)	I _{DM}	2	A
Avalanche Energy (Note 3) Single Pulsed	E _{AS}	21	mJ
Peak Diode Recovery dv/dt (Note 4)	dv/dt	3	V/ns
Power Dissipation (T _A =25°C)	P _D	40	W
Junction Temperature	T _J	+150	°C
Storage Temperature	T _{STG}	-55 ~ +150	°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=30mH, I_{AS}=1.2A, V_{DD}=50V, R_G=25 Ω, Starting T_J = 25°C

4. I_{SD} ≤ 1.0A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	θ _{JA}	110	°C/W
Junction to Case	θ _{JC}	3.12	°C/W

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

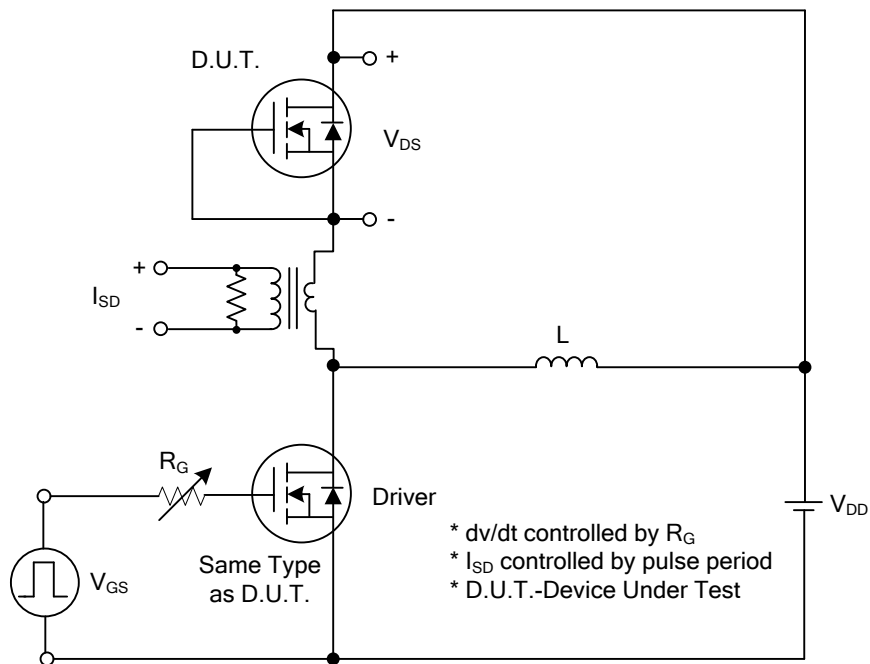
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} = 0V, I _D = 250μA	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 = 250μA	3.0		5.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} = 10V, I _D =0.5A			15	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f =1MHz		182		pF
Output Capacitance		C _{OSS}			26		pF
Reverse Transfer Capacitance		C _{RSS}			2.1		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge		Q _G	V _{DS} =720V, V _{GS} =10V, I _D =1A, I _G =1mA (Note 1, 2)		8		nC
Gate-Source Charge		Q _{GS}			3.5		nC
Gate-Drain Charge		Q _{GD}			1		nC
Turn-On Delay Time		t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =1A, R _G =25Ω (Note 1, 2)		4		ns
Turn-On Rise Time		t _R			16		ns
Turn-Off Delay Time		t _{D(OFF)}			13		ns
Turn-Off Fall Time		t _F			26		ns
DRAIN-SOURCE DIODE CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				1	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SD}				2	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =1A, V _{GS} =0V			1.4	V
Reverse Recovery Time		t _{rr}	I _F =1A, di/dt = 100A/μs		380		ns
Reverse Recovery Charge		Q _{rr}			2.1		μC

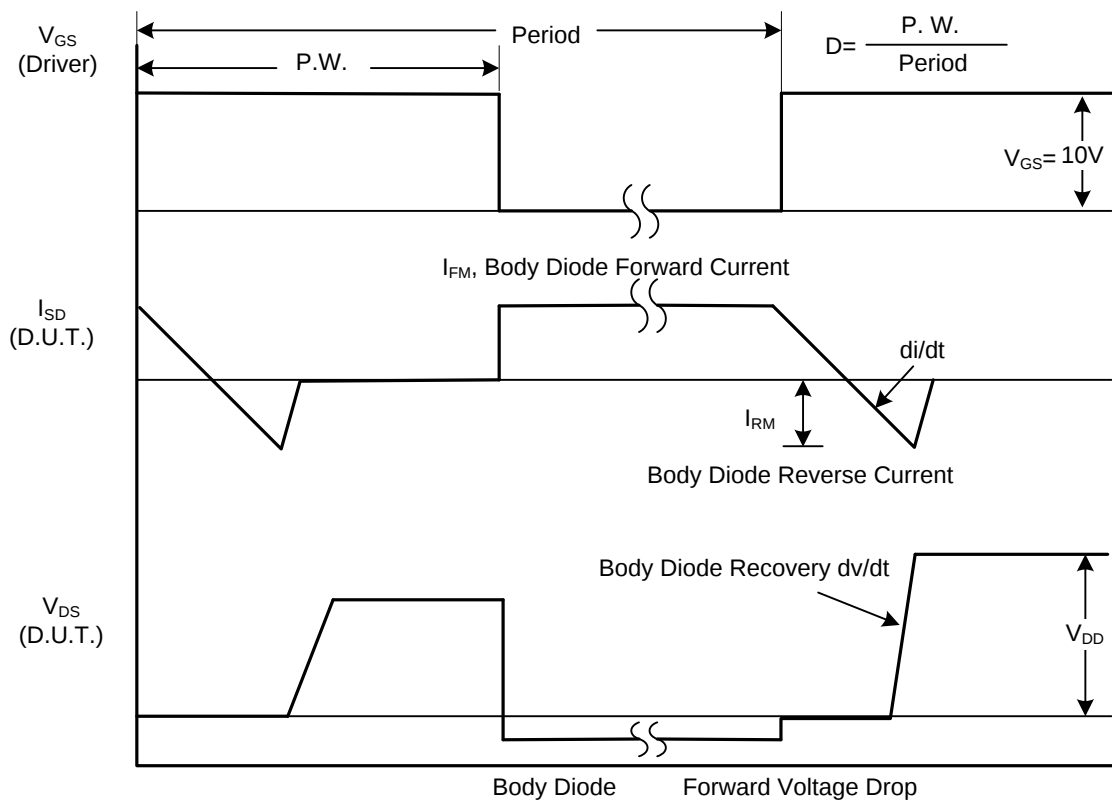
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

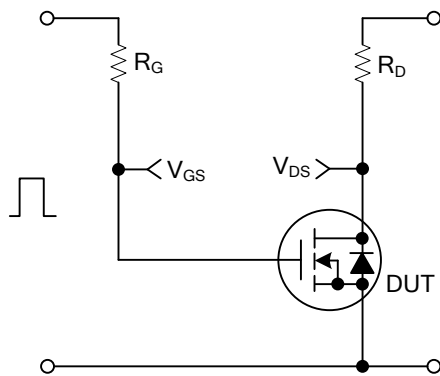


Peak Diode Recovery dv/dt Test Circuit

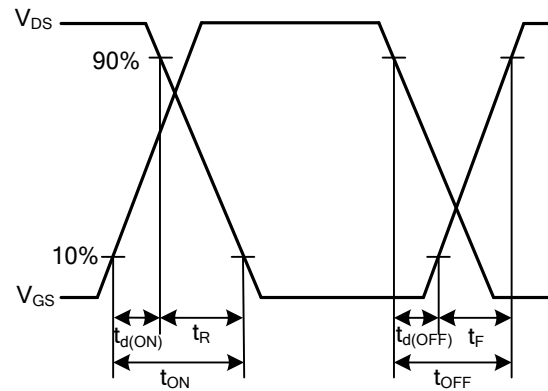


Peak Diode Recovery dv/dt Waveforms

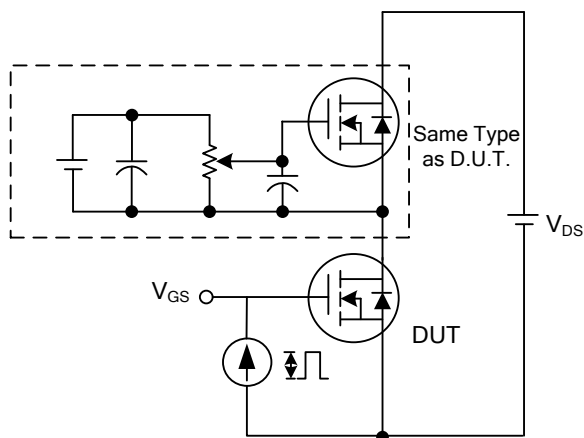
■ TEST CIRCUITS AND WAVEFORMS



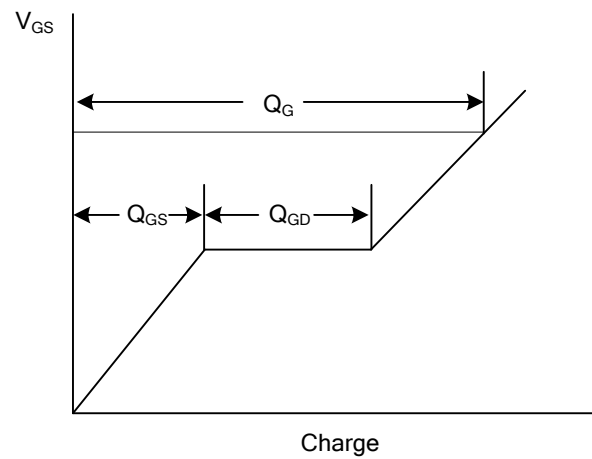
Switching Test Circuit



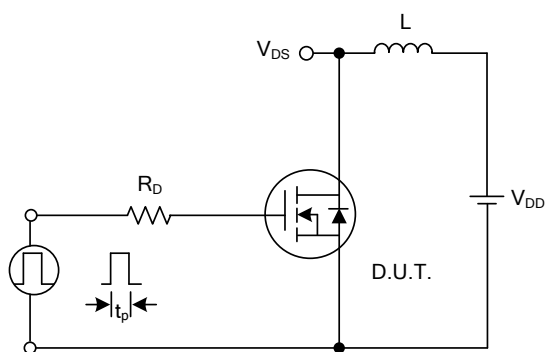
Switching Waveforms



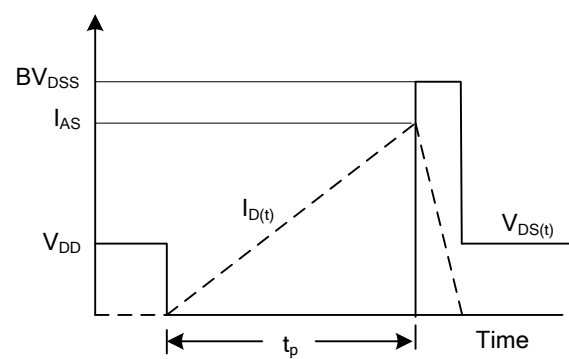
Gate Charge Test Circuit



Gate Charge Waveform

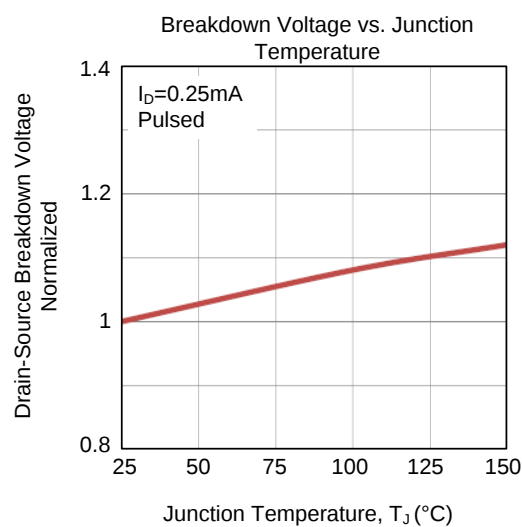
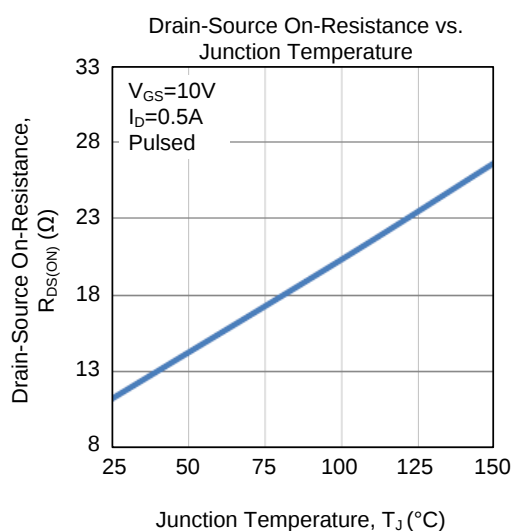
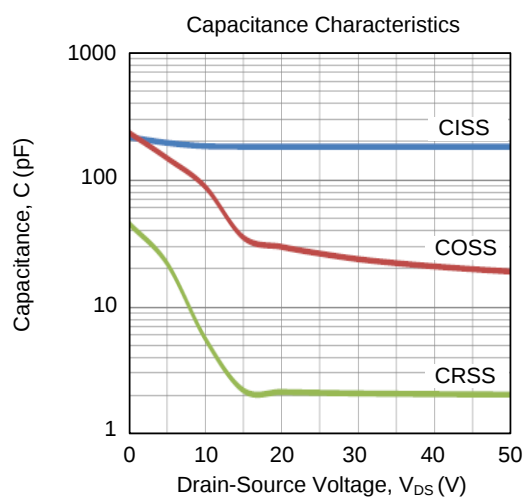
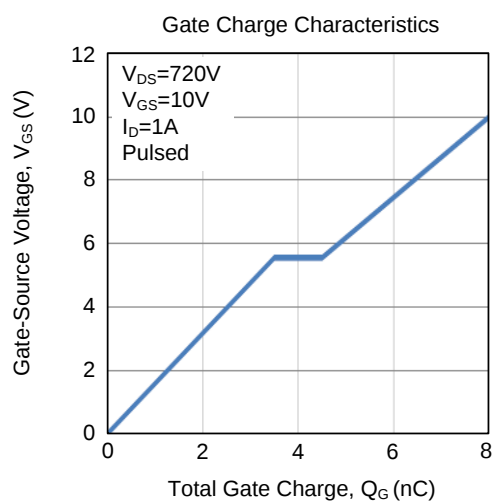
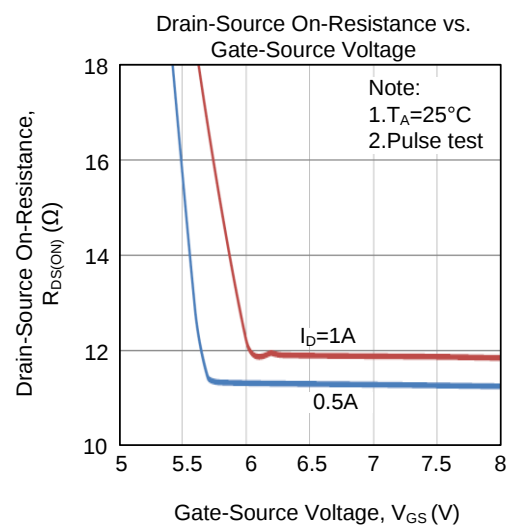
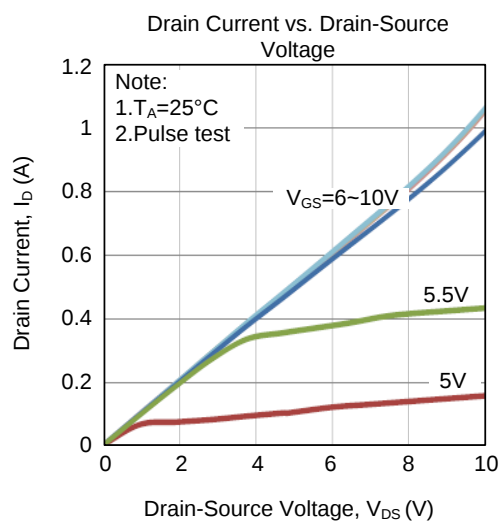


Unclamped Inductive Switching Test Circuit

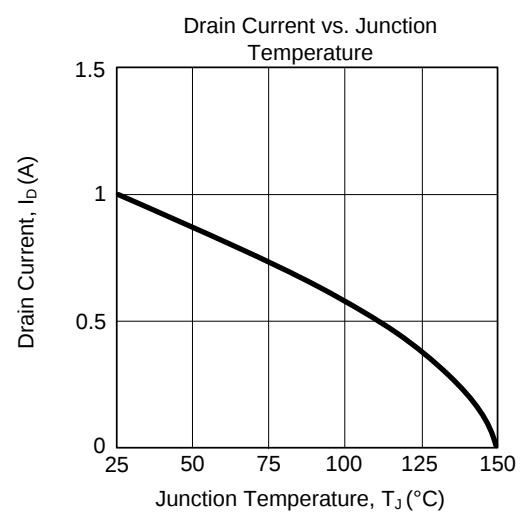
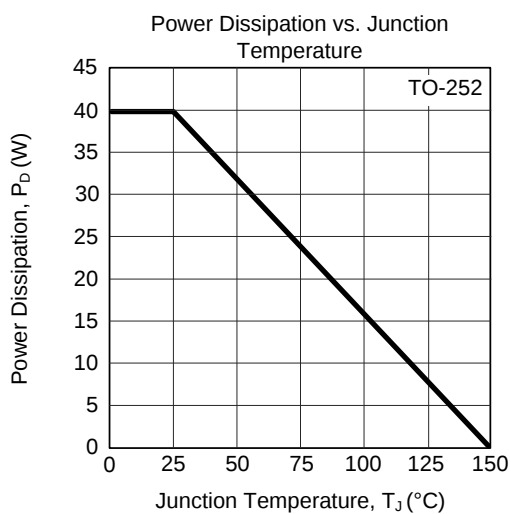
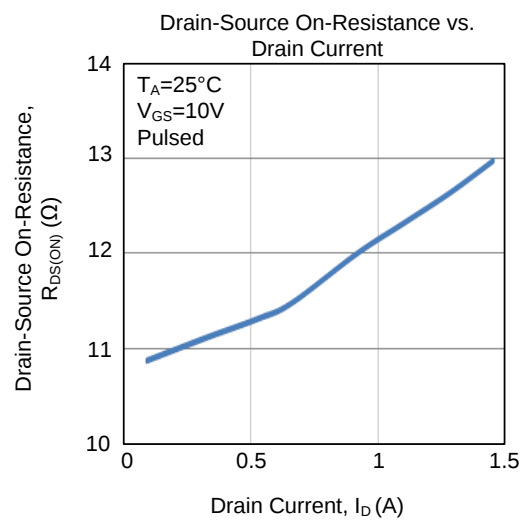
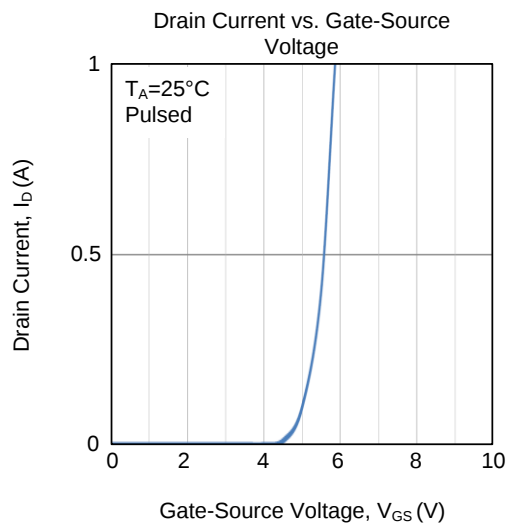
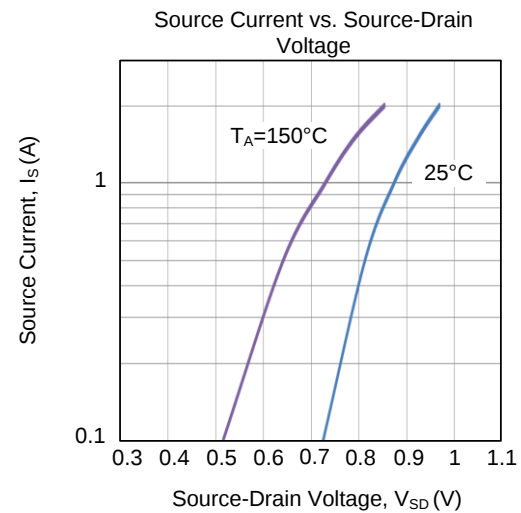
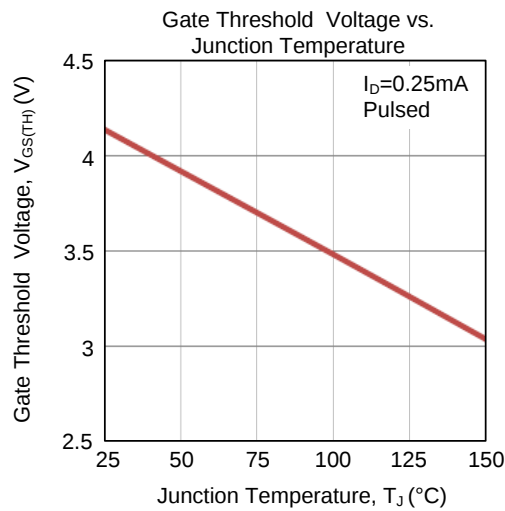


Unclamped Inductive Switching Waveforms

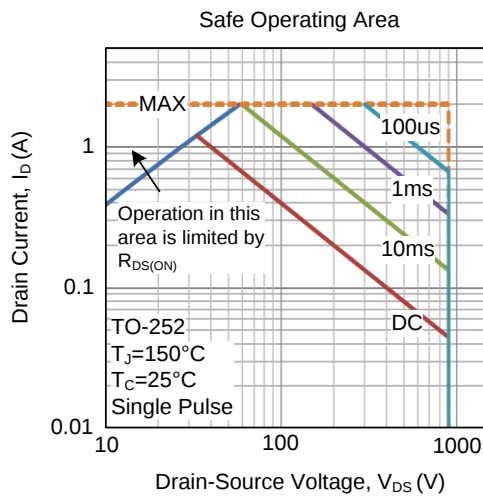
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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