



6NL50

Power MOSFET

6A, 500V N-CHANNEL SUPER-JUNCTION MOSFET

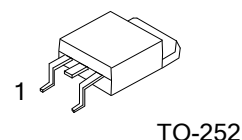
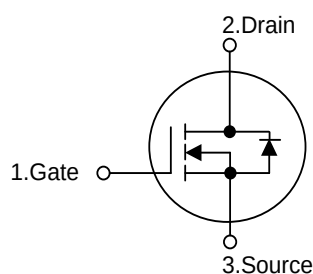
DESCRIPTION

The UTC 6NL50 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 AC-DC converters for power applications.

FEATURES

- * $R_{DS(ON)} \leq 1.5 \Omega$ @ $V_{GS}=10V$, $I_D=3.0A$
- * Fast switching
- * 100% avalanche tested
- * Improved dv/dt capability

SYMBOL



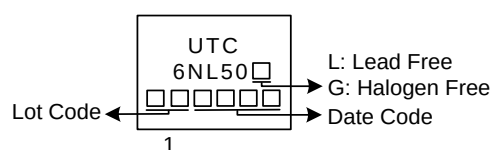
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6NL50L-TN3-R	6NL50G-TN3-R	TO-252	G	D	S	Tape Reel

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

6NL50G-TN3-R (1) Packing Type (2) Package Type (3) Green Package		(1) R: Tape Reel (2) 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}	500	V
Gate-Source Voltage		V _{GSS}	± 30	V
Drain Current	Continuous	I _D	6	A
	Pulsed (Note 2)	I _{DM}	12	A
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	126	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.8	V/ns
Power Dissipation		P _D	50	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} = 2.9A, V_{DD} = 100V, R_G = 25 Ω Starting T_J = 25°C

4. I_{SD} ≤ 6.0A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ _{JA}	110	°C/W
Junction to Case	θ _{JC}	2.5 (Note)	°C/W

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

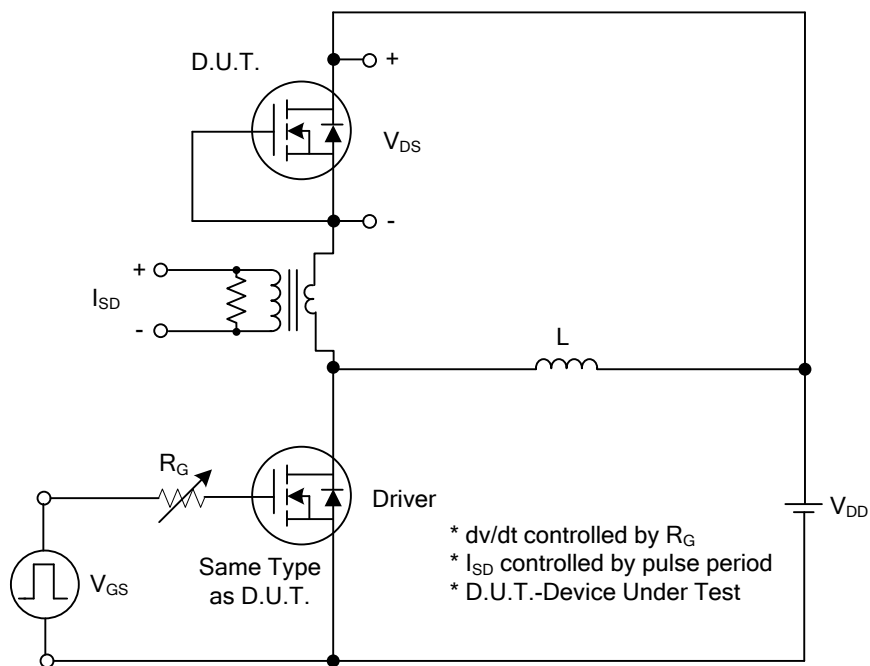
■ **ELECTRICAL CHARACTERISTICS** (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D = 250μA	500			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =500V, 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	2.0		4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =3.0A			1.5	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0 MHz		368		pF
Output Capacitance		C _{OSS}			172		pF
Reverse Transfer Capacitance		C _{RSS}			19		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge		Q _G	V _{DS} =400V, V _{GS} =10V, I _D =6A I _G = 1mA (Note1, 2)		13.8		nC
Gate-Source Charge		Q _{GS}			3.2		nC
Gate-Drain Charge		Q _{GD}			4		nC
Turn-On Delay Time		t _{D(ON)}	V _{DS} =100V, V _{GS} =10V, I _D =6A, R _G =25Ω (Note1, 2)		5.2		ns
Turn-On Rise Time		t _R			17		ns
Turn-Off Delay Time		t _{D(OFF)}			40		ns
Turn-Off Fall Time		t _F			24		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				6	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				12	A
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V, I _S =6A			1.4	V
Reverse Recovery Time		t _{rr}	V _{GS} =0V, I _S =6A,		240		ns
Reverse Recovery Charge		Q _{rr}	dl _F /dt=100A/μs (Note1)		4.3		μC

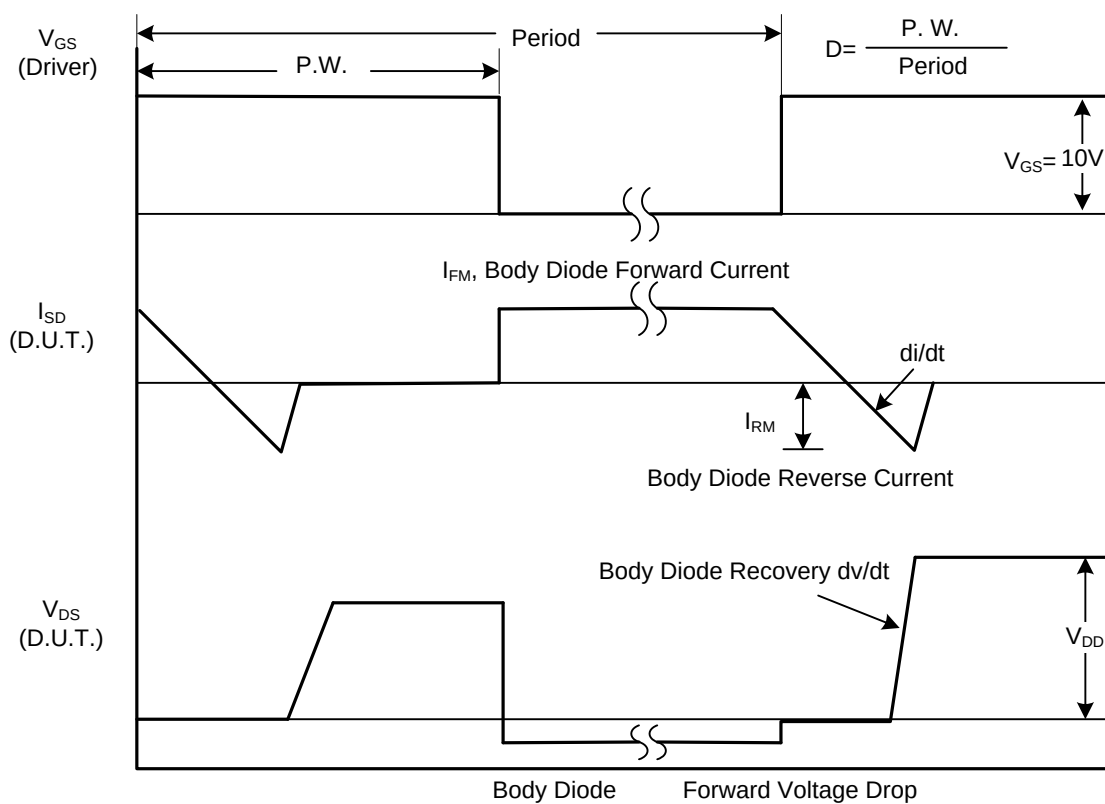
Notes: 1. Pulse Test : Pulse width ≤300μs, Duty cycle ≤2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

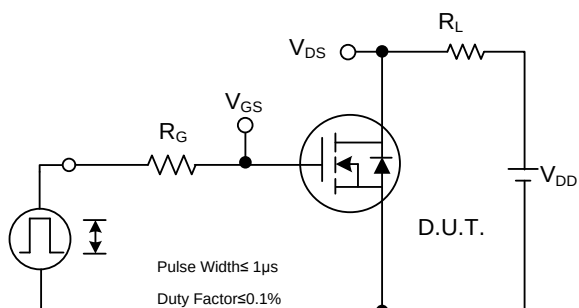


Peak Diode Recovery dv/dt Test Circuit

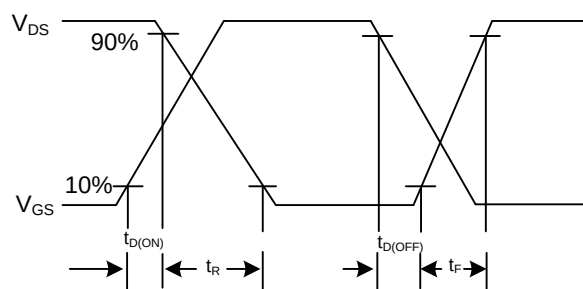


Peak Diode Recovery dv/dt Waveforms

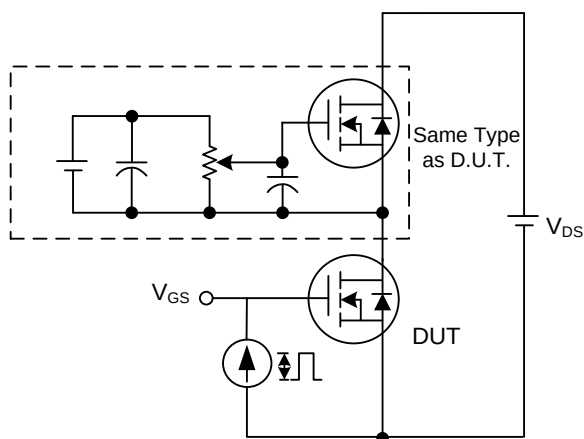
■ TEST CIRCUITS AND WAVEFORMS



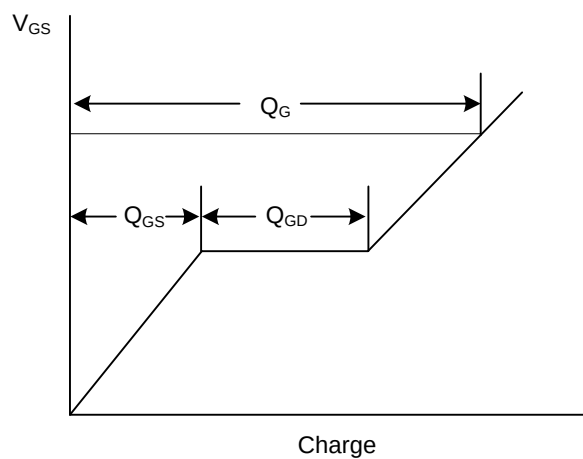
Switching Test Circuit



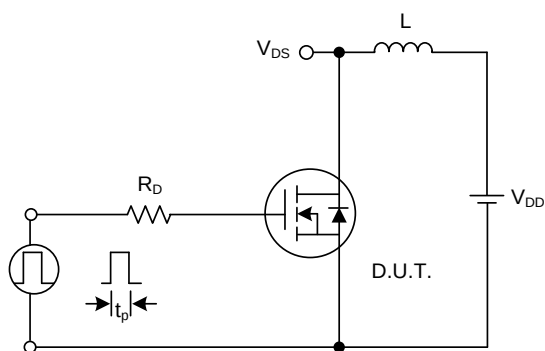
Switching Waveforms



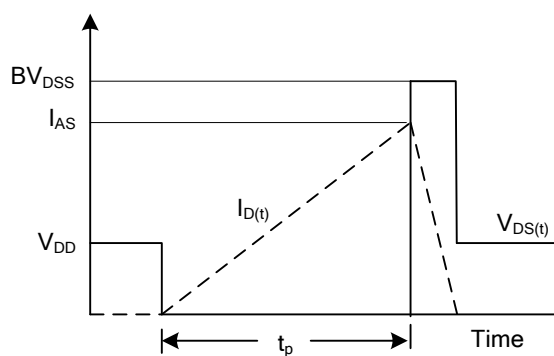
Gate Charge Test Circuit



Gate Charge Waveform

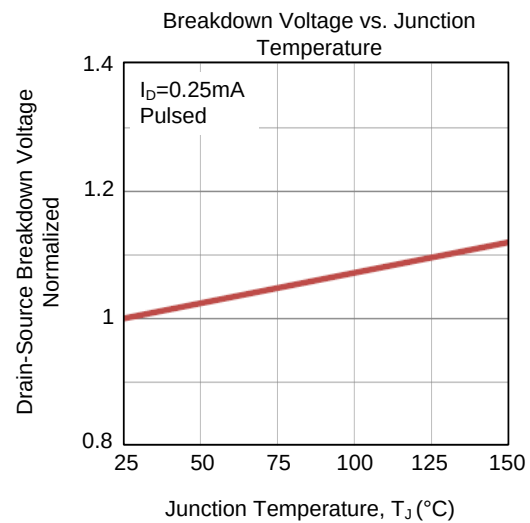
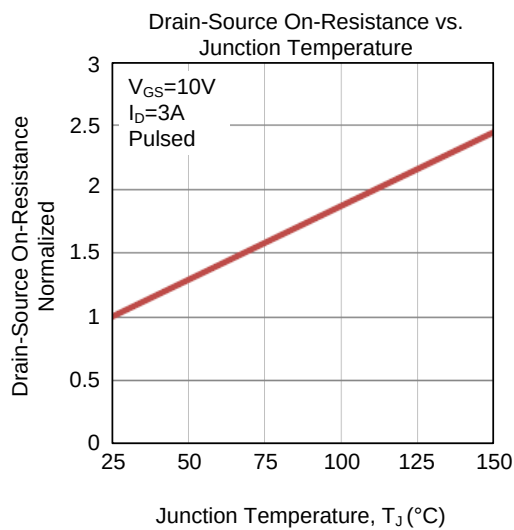
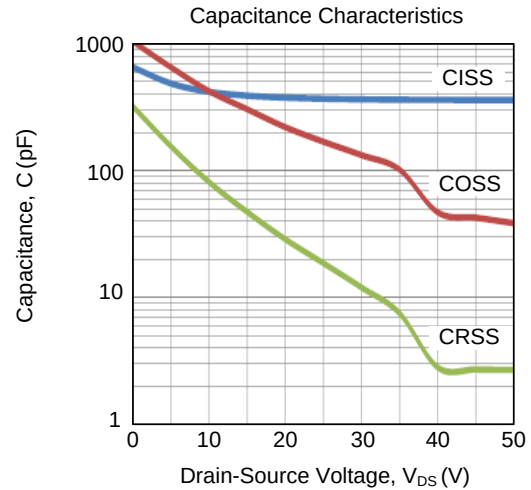
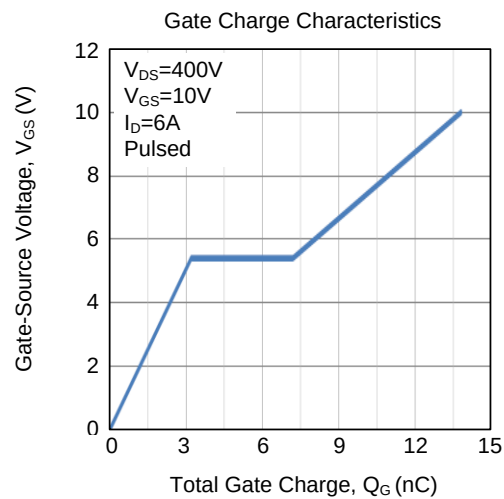
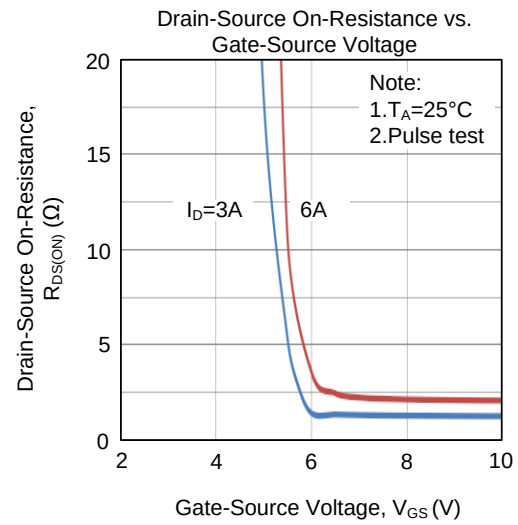
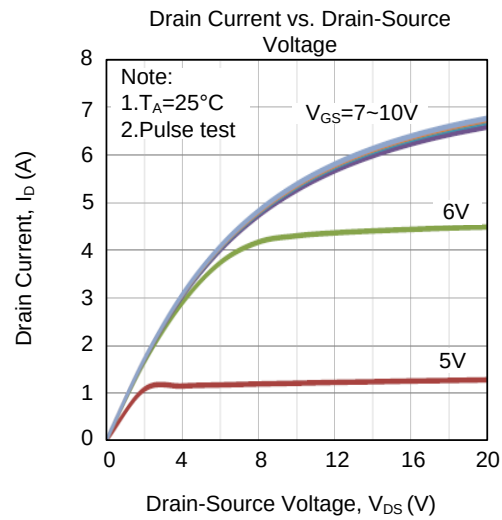


Unclamped Inductive Switching Test Circuit

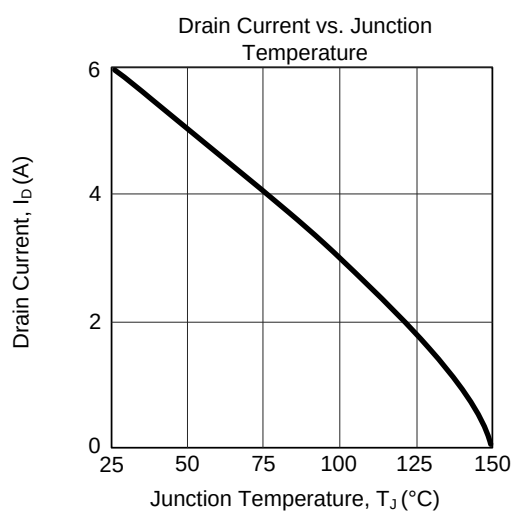
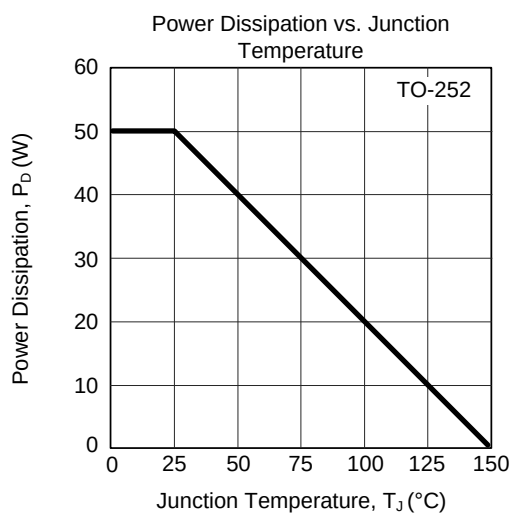
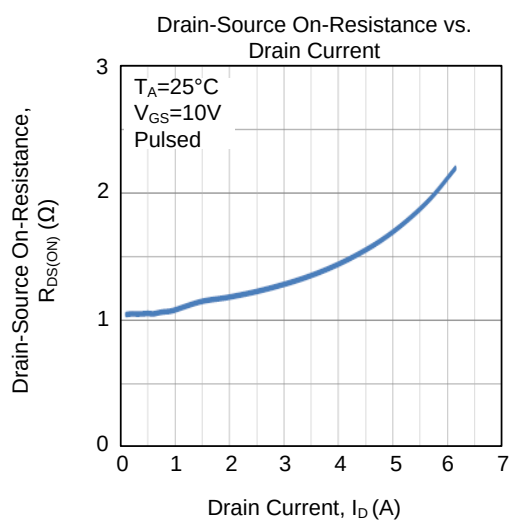
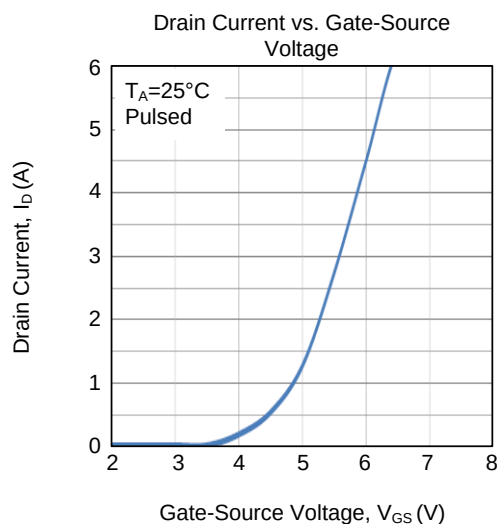
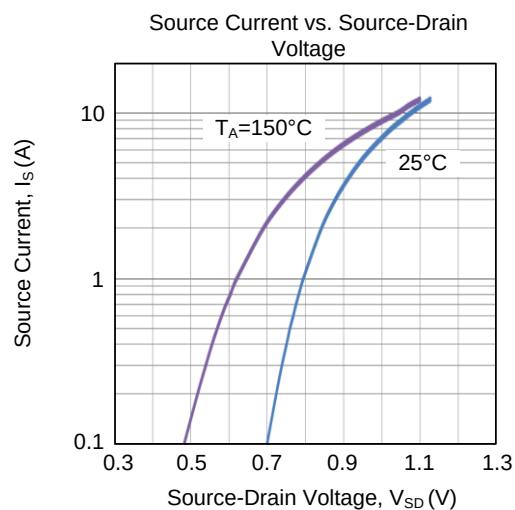
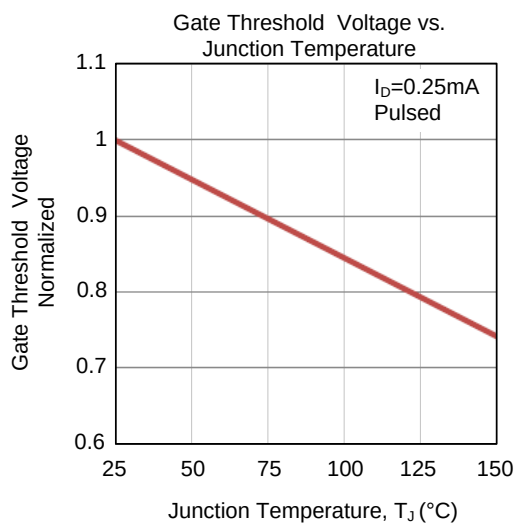


Unclamped Inductive Switching Waveforms

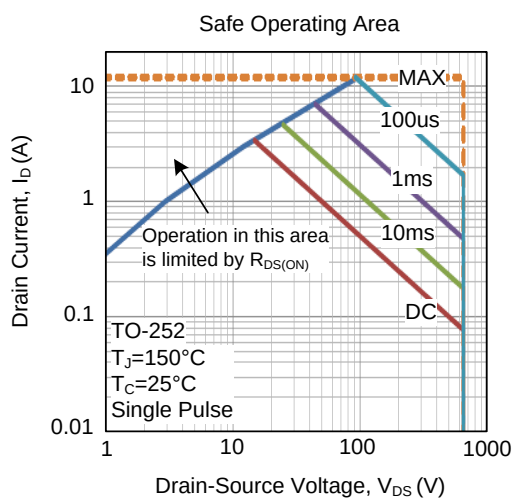
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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