



UTT9N20

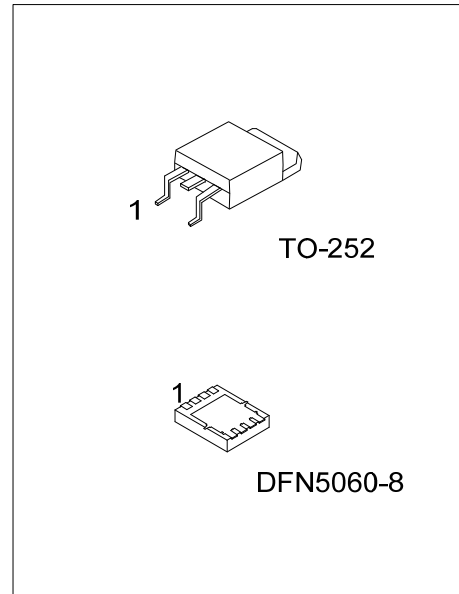
Power MOSFET

9A, 200V N-CHANNEL POWER MOSFET

DESCRIPTION

The UTC **UTT9N20** 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.

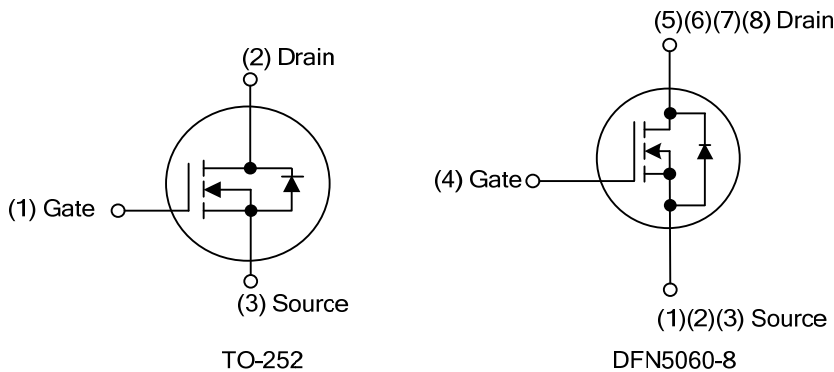
The UTC **UTT9N20** is generally applied in high efficiency switch mode power supplies.



FEATURES

- * $R_{DS(ON)} \leq 0.33\Omega$ @ $V_{GS}=10V, I_D=4.5A$
- * Fast Switching Capability
- * Avalanche Energy Tested
- Improved dv/dt Capability, High Ruggedness

SYMBOL



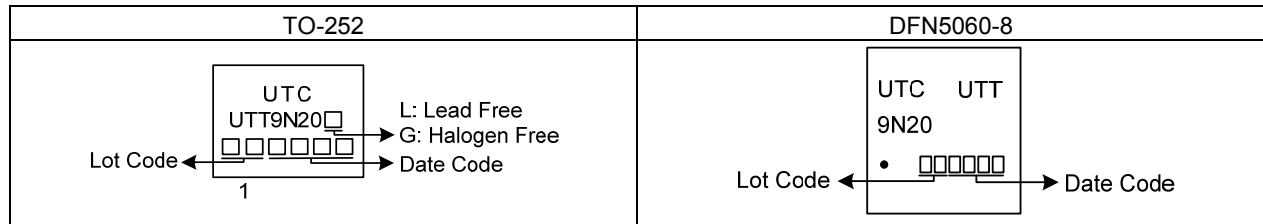
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTT9N20L-TN3-R	UTT9N20G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UTT9N20L-K08-5060-R	UTT9N20G-K08-5060-R	DFN5060-8	S	S	S	G	D	D	D	D	Tape Reel

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

UTT9N20G-TN3-R	(1) Packing Type	(1) R: Tape Reel
	(2) Package Type	(2) TN3: TO-252, K08-5060: DFN5060-8
	(3) Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

■ 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}	200	V
Gate-Source Voltage		V_{GSS}	± 20	V
Drain Current	Continuous	I_D	9	A
	Pulsed (Note 2)	I_{DM}	18	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	80	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.4	V/ns
Power Dissipation	TO-252	P_D	54	W
	DFN5060-8		41.67	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. $L=10\text{mH}$, $I_{AS}=4.0\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD}\leq 4.0\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-252	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	DFN5060-8		75	$^\circ\text{C}/\text{W}$
Junction to Case (Note)	TO-252	θ_{JC}	2.3	$^\circ\text{C}/\text{W}$
	DFN5060-8		3.0	$^\circ\text{C}/\text{W}$

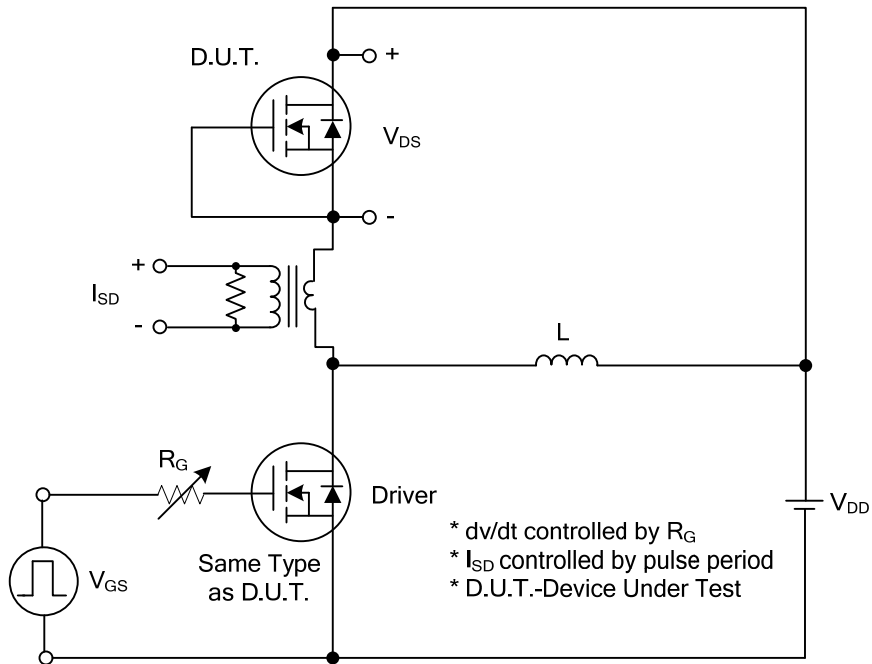
Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

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

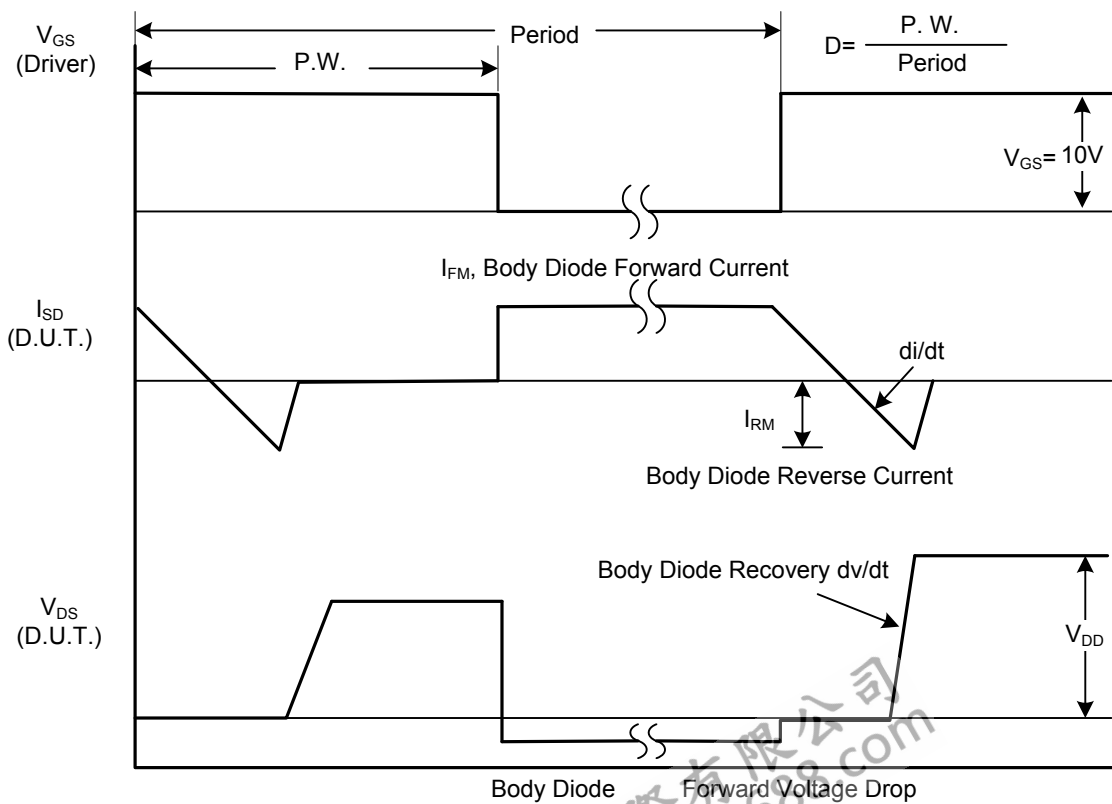
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	200			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =200V, V _{GS} =0V			10	μA
Gate- Source Leakage Current	Forward	V _{GS} =20V, V _{DS} =0V			100	nA
	Reverse		V _{GS} =-20V, V _{DS} =0V			-100
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 =4.5A			0.33	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1MHz		810		pF
Output Capacitance	C _{OSS}			57		pF
Reverse Transfer Capacitance	C _{RSS}			35		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q _G	V _{DS} =100V, V _{GS} =10V, I _D =9A, I _D =1mA (Note 1, 2)		21		nC
Gate-Source Charge	Q _{GS}			4.3		nC
Gate-Drain Charge	Q _{GD}			5		nC
Turn-ON Delay Time (Note 1)	t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =9A, R _G =25Ω (Note 1, 2)		10		ns
Rise Time	t _R			20		ns
Turn-OFF Delay Time	t _{D(OFF)}			54		ns
Fall-Time	t _F			35		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I _S				9	A
Maximum Body-Diode Pulsed Current	I _{SM}				18	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _S =9A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t _{rr}	I _S =9A, V _{GS} =0V, di/dt=100A/μs		86		ns
Body Diode Reverse Recovery Charge	Q _{rr}				0.36	

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
 2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

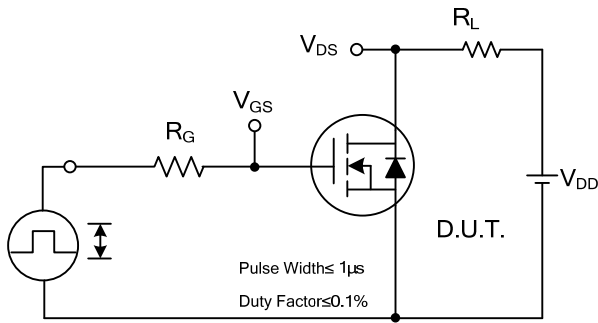


Peak Diode Recovery dv/dt Test Circuit

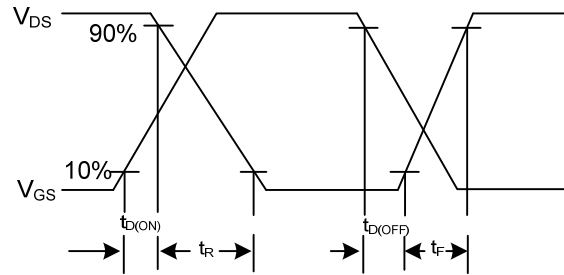


Peak Diode Recovery dv/dt Waveforms

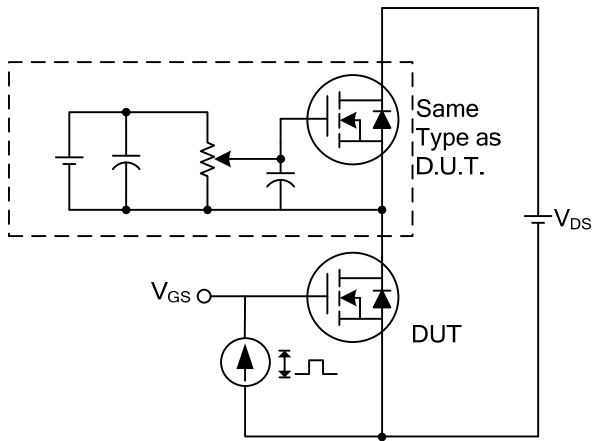
TEST CIRCUITS AND WAVEFORMS



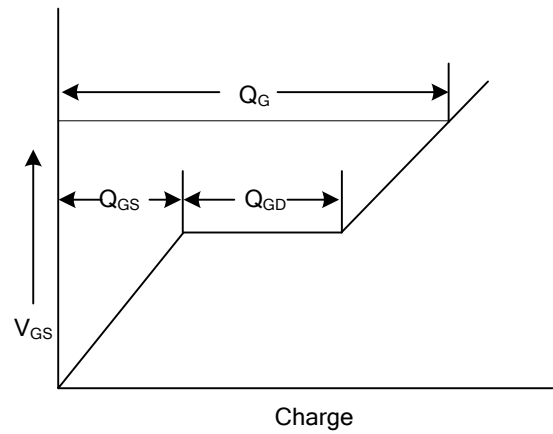
Switching Test Circuit



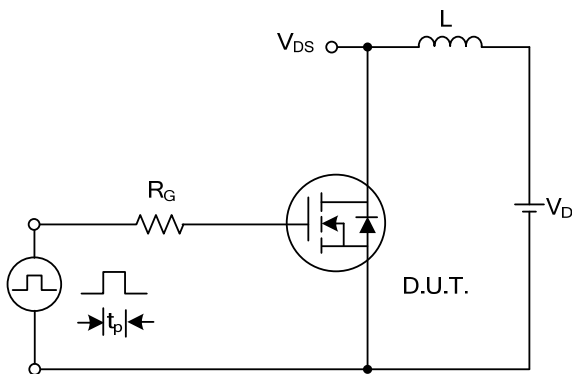
Switching Waveforms



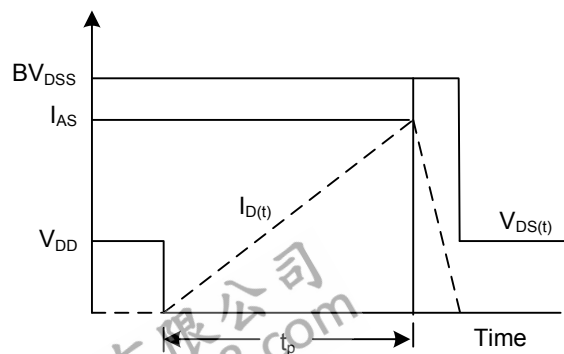
Gate Charge Test Circuit



Gate Charge Waveform

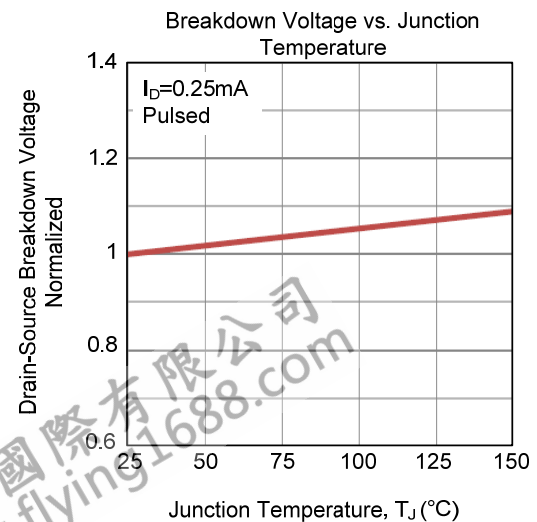
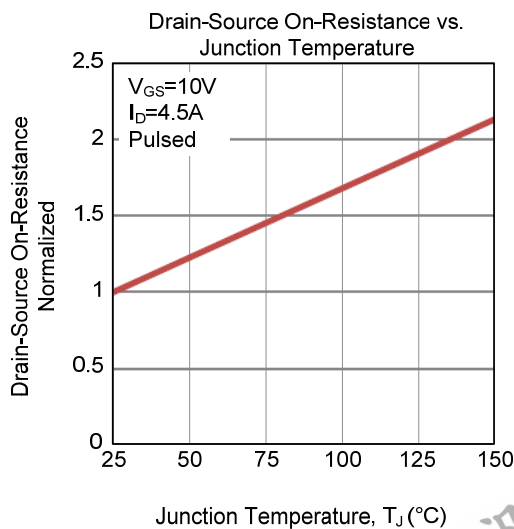
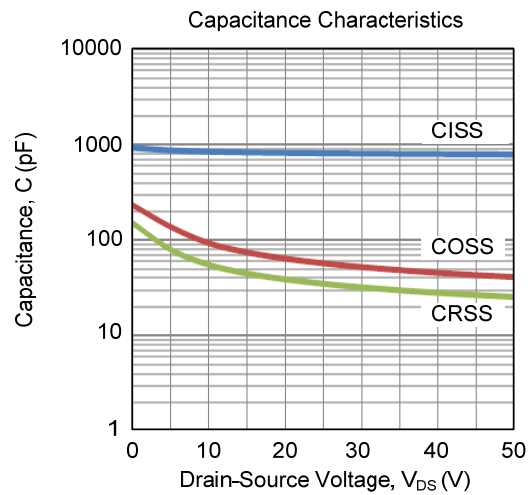
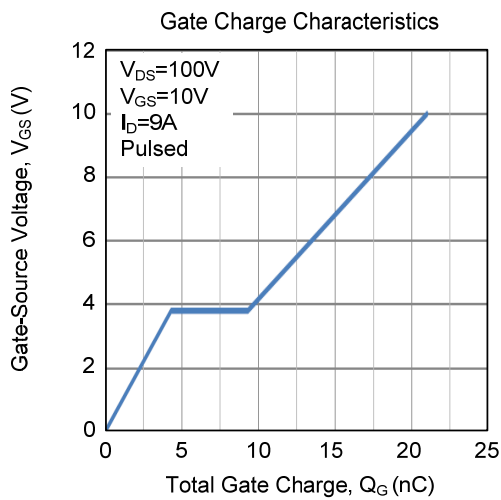
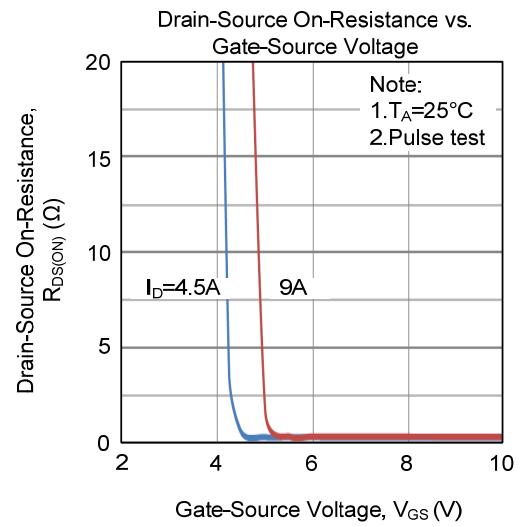
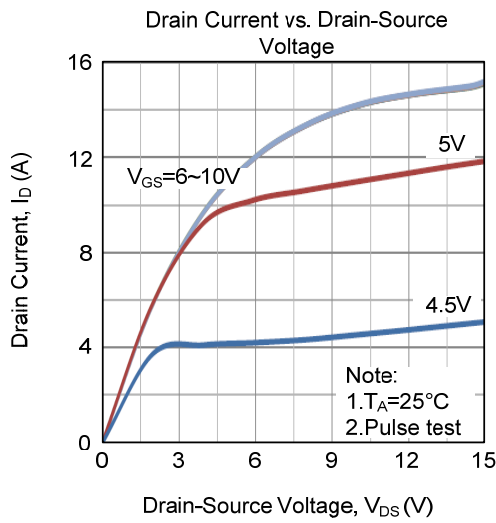


Unclamped Inductive Switching Test Circuit

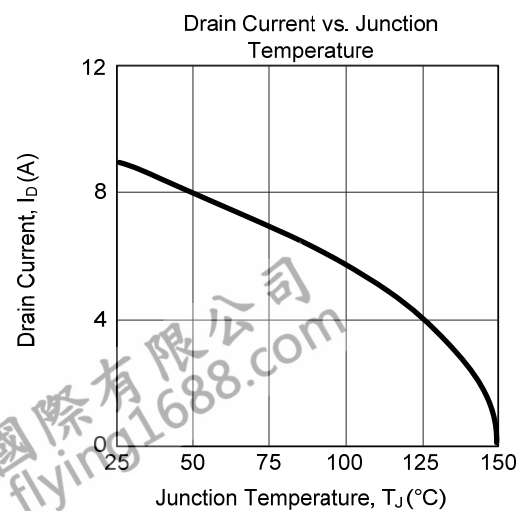
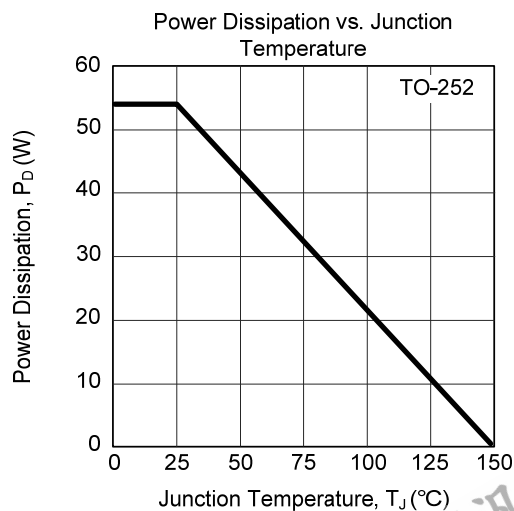
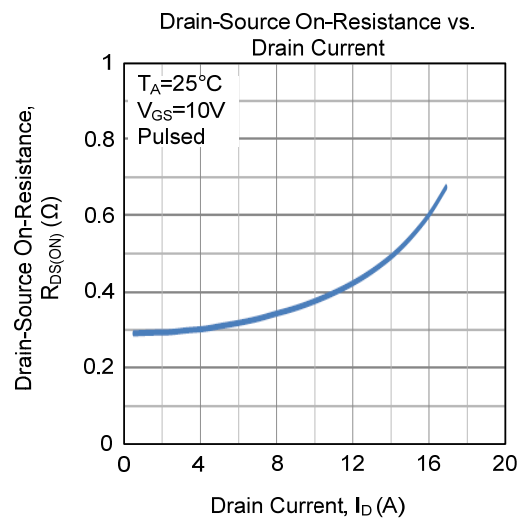
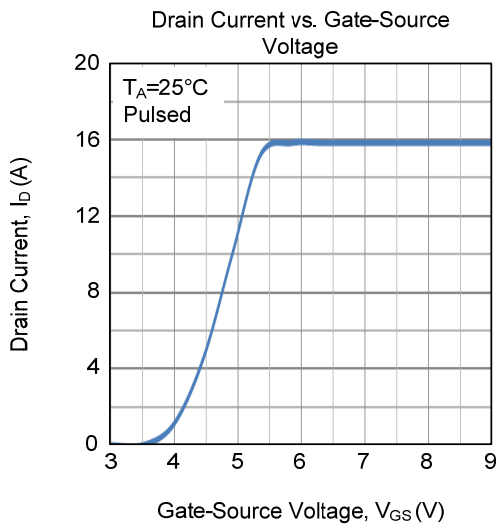
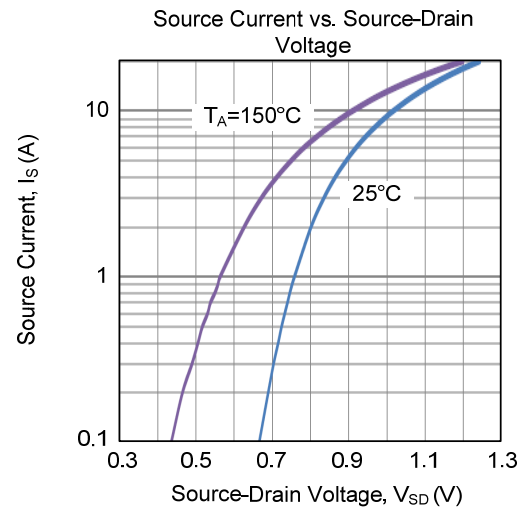
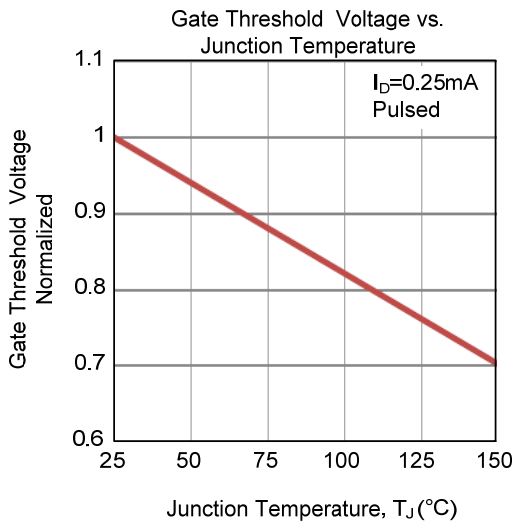


Unclamped Inductive Switching Waveforms

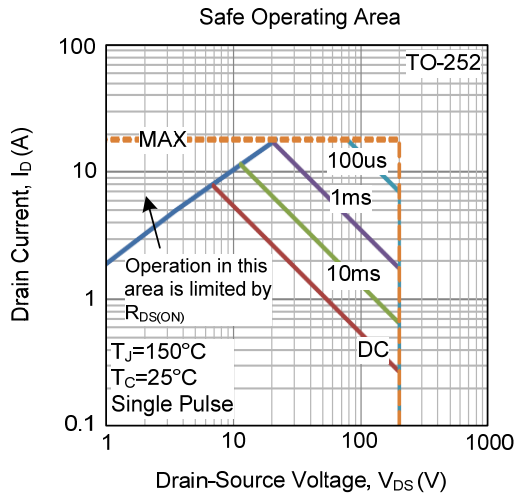
TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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