



UTT60N10M

POWER MOSFET

60A, 100V N-CHANNEL ENHANCEMENT MODE TRENCH POWER MOSFET

■ DESCRIPTION

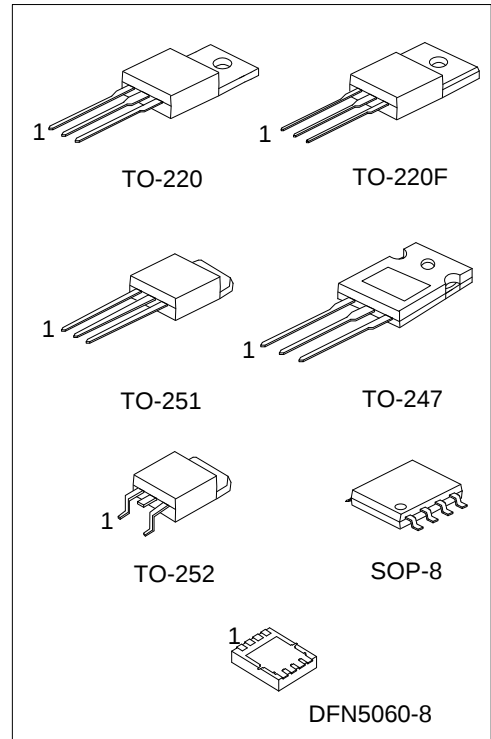
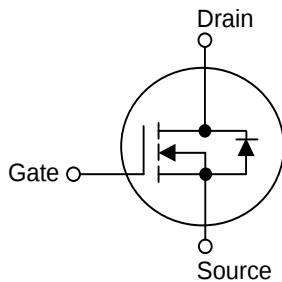
The UTC **UTT60N10M** is N-channel enhancement mode power MOSFET using UTC's advanced technology to provide customers with high switching speed, a extremely low $R_{DS(ON)}$ and low gate charge.

The UTC **UTT60N10M** is suitable for high frequency Point -of-Load Synchronous, Networking DC-DC System, CCFL Back-light Inverter, etc.

■ FEATURES

- * $R_{DS(ON)} \leq 18 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=20\text{A}$
- * $R_{DS(ON)} \leq 25 \text{ m}\Omega$ @ $V_{GS}=4.5\text{V}$, $I_D=15\text{A}$
- * Green Device Available
- * Low Gate Charge
- * Surface mount package

■ SYMBOL



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTT60N10ML-TA3-T	UTT60N10MG-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UTT60N10ML-TF3-T	UTT60N10MG-TF3-T	TO-220F	G	D	S	-	-	-	-	-	Tube
UTT60N10ML-TM3-T	UTT60N10MG-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
UTT60N10ML-TN3-R	UTT60N10MG-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UTT60N10ML-T47-T	UTT60N10MG-T47-T	TO-247	G	D	S	-	-	-	-	-	Tube
UTT60N10ML-S08-R	UTT60N10MG-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel
UTT60N10ML-K08-5060-R	UTT60N10MG-K08-5060-R	DFN5060-8	S	S	S	G	D	D	D	D	Tape Reel

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

UTT60N10MG-TA3-T (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TM3: TO-251, TN3: TO-252, T47: TO-247, S08: SOP-8, K08-5060: DFN5060-8 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING

Package	Marking
TO-220 / TO-220F TO-247 / TO-251 TO-252	Lot Code ← UTC UTT 60N10M 1 → Date Code L: Lead Free G: Halogen Free
SOP-8	Date Code Lot Code
DFN5060-8	Lot Code ← UTC UTT 60N10M 1 → Date Code

■ ABSOLUTE MAXIMUM RATING ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V _{DSS}	100	V
Gate-Source Voltage			V _{GSS}	±20	V
Drain Current	Continuous	TO-220/TO-220F TO-251/TO-252	I _D	60	A
		SOP-8		30	A
		DFN5060-8		40	A
	Pulsed (Note 2)	TO-220/TO-220F TO-251/TO-252	I _{DM}	100	A
		SOP-8		50	A
		DFN5060-8		67	A
Avalanche Current			I _{AS}	20	A
Avalanche Energy (Note 3)			E _{AS}	200	mJ
Power Dissipation		TO-220	P _D	125	W
		TO-220F		30	W
		TO-247		312	W
		TO-251/TO-252		50	W
		SOP-8		6	W
		DFN5060-8		14	W
Junction Temperature			T _J	-40 ~ +150	°C
Storage Temperature Range			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. $L=1\text{mH}$, $I_{AS}=20\text{A}$, $V_{DD}=25\text{V}$, $R_G=25\Omega$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-247	θ_{JA}	62.5	$^\circ\text{C/W}$
	TO-251/TO-252		110	$^\circ\text{C/W}$
	SOP-8		90	$^\circ\text{C/W}$
	DFN5060-8		65	$^\circ\text{C/W}$
Junction to Case	TO-220	θ_{JC}	1	$^\circ\text{C/W}$
	TO-220F		4.17	$^\circ\text{C/W}$
	TO-247		0.4	$^\circ\text{C/W}$
	TO-251/TO-252		2.5	$^\circ\text{C/W}$
	SOP-8		20.8	$^\circ\text{C/W}$
	DFN5060-8		8.93	$^\circ\text{C/W}$

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

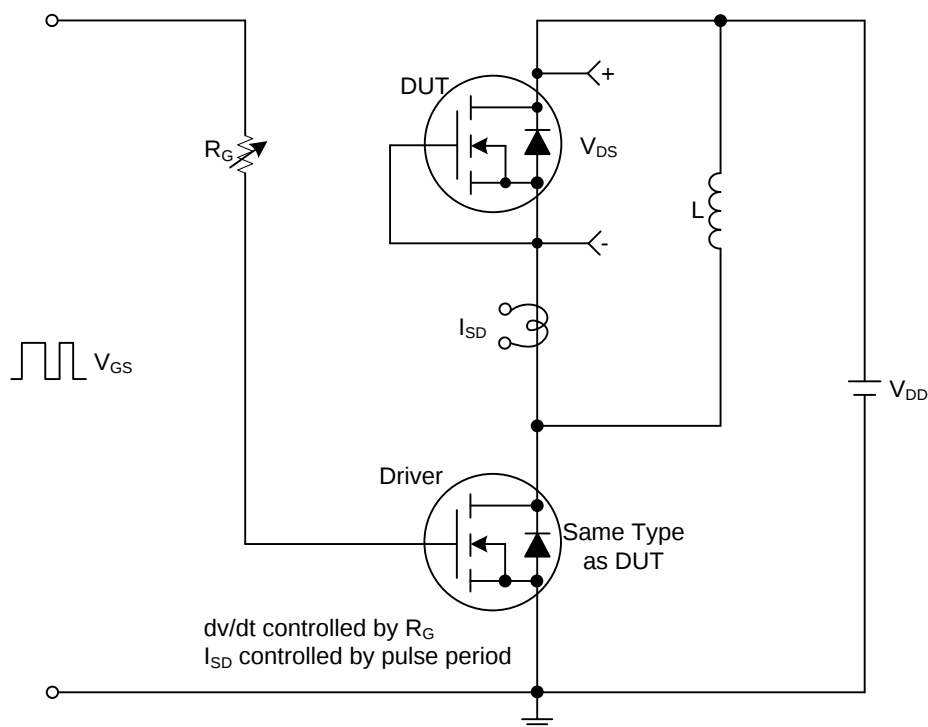
■ ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	100			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =100V, V _{GS} =0V, T _j =25°C			1	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} =+20V, V _{DS} =0V			+100	nA
	Reverse		V _{GS} =-20V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	1.0		3.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =30A			18	mΩ
			V _{GS} =4.5V, I _D =15A			25	mΩ
Forward Transconductance		g _{FS}	V _{DS} =-10V, I _D =-20A		30		S
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		5500		pF
Output Capacitance		C _{OSS}			250		pF
Reverse Transfer Capacitance		C _{RSS}			160		pF
Gate Resistance		R _G	V _{DS} =0V, f=1.0MHz		1		Ω
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =80V, V _{GS} =10V, I _D =60A I _G = 1mA (Note1, 2)		100		nC
Gate to Source Charge		Q _{GS}			12		nC
Gate to Drain Charge		Q _{GD}			18		nC
Turn-on Delay Time (Note 1)		t _{D(ON)}	V _{DS} =50V, V _{GS} =10V, I _D =60A, R _G =3Ω (Note1, 2)		12		ns
Rise Time		t _R			17		ns
Turn-off Delay Time		t _{D(OFF)}			64		ns
Fall-Time		t _F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				60	A
Forward On Voltage (Note 1)		V _{SD}	I _S =60A, V _{GS} =0V			1.2	V
Reverse Recovery Time (Note 1)		t _{rr}	I _S =30A, V _{GS} =0V,		100		ns
Reverse Recovery Charge		Q _{rr}	di/dt=100A/μs		210		nC

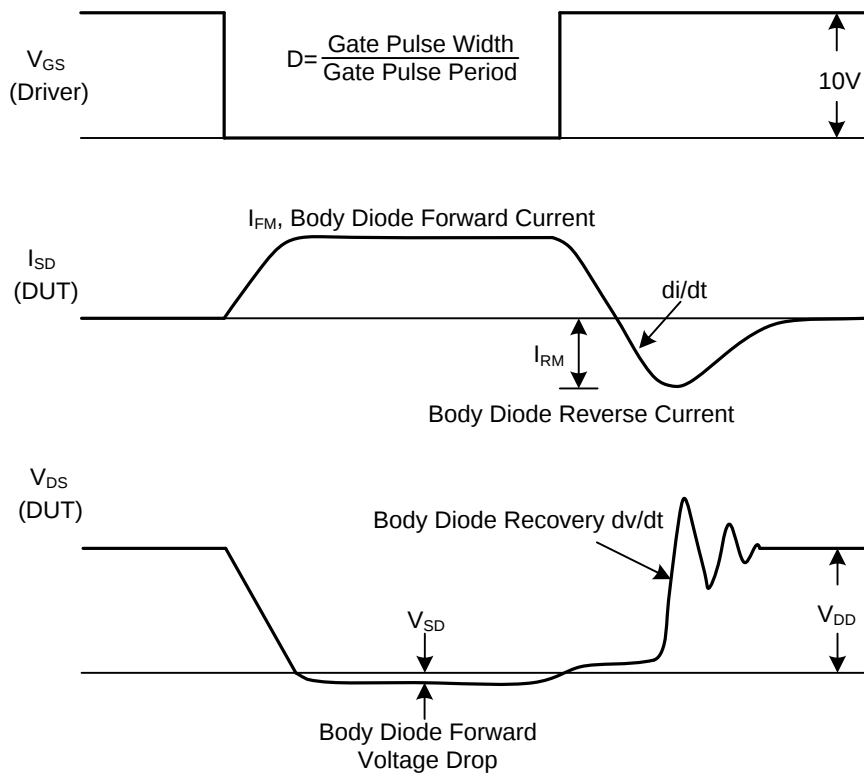
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



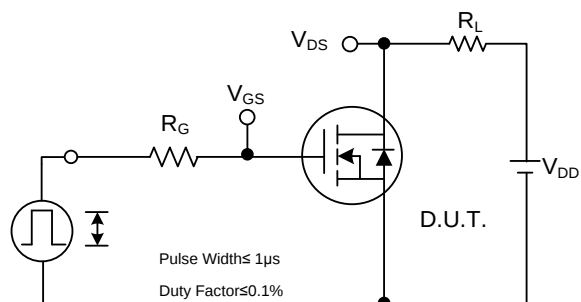
Peak Diode Recovery dv/dt Test Circuit



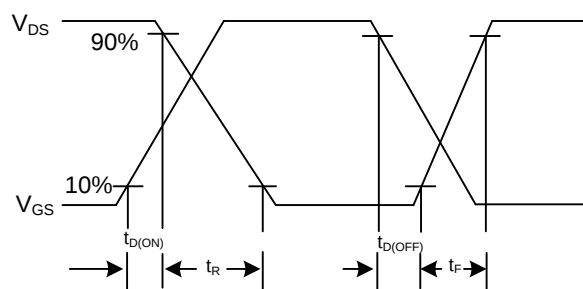
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

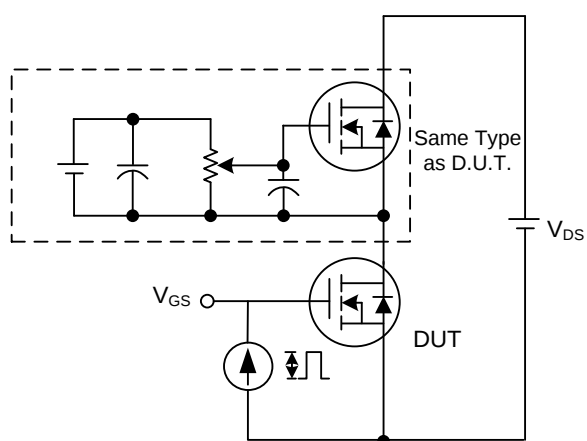
■ TEST CIRCUITS AND WAVEFORMS



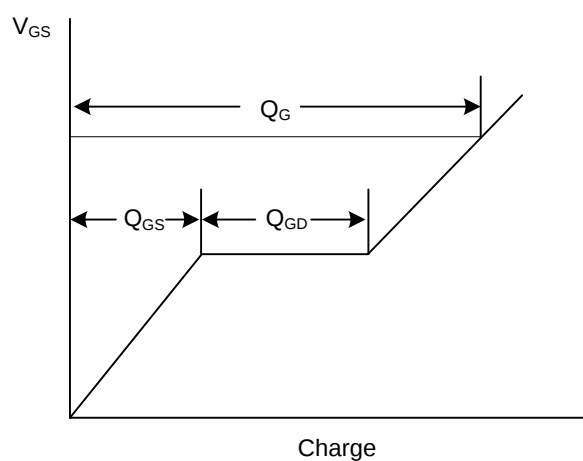
Switching Test Circuit



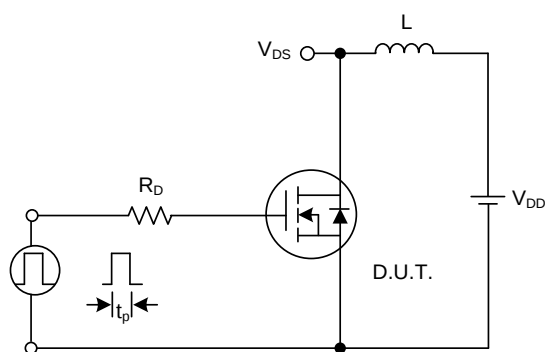
Switching Waveforms



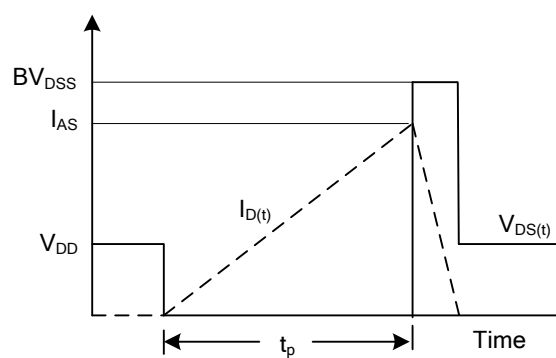
Gate Charge Test Circuit



Gate Charge Waveform

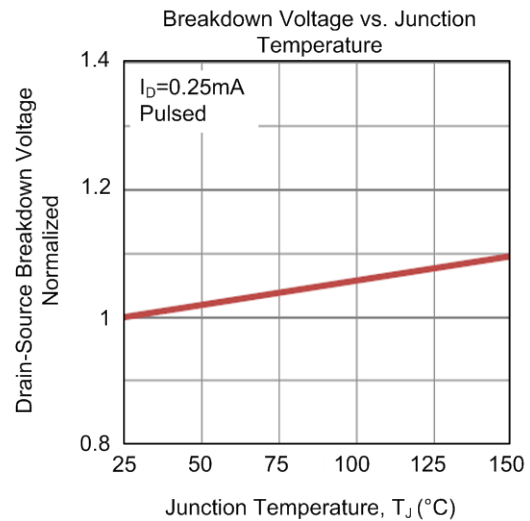
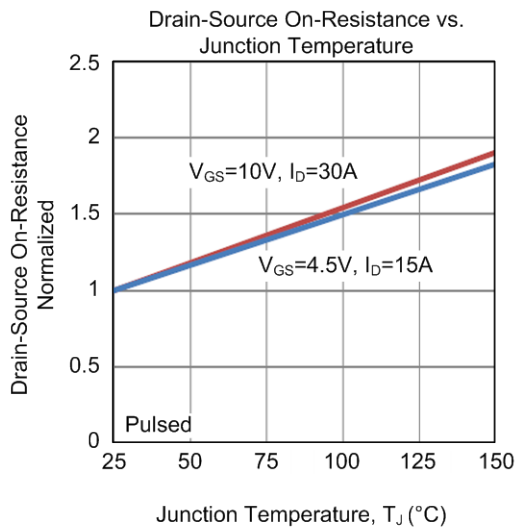
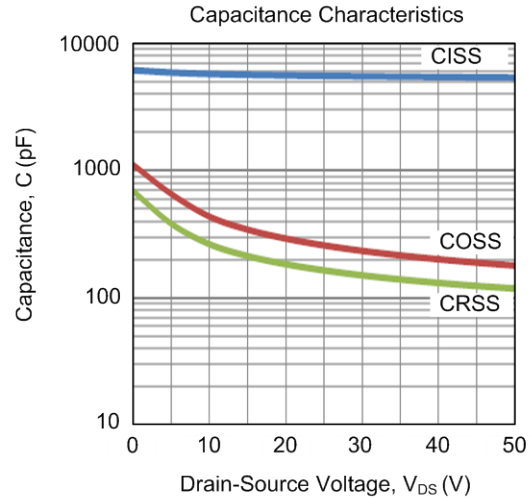
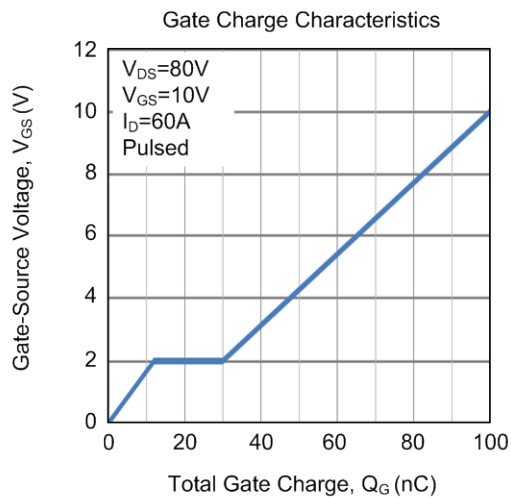
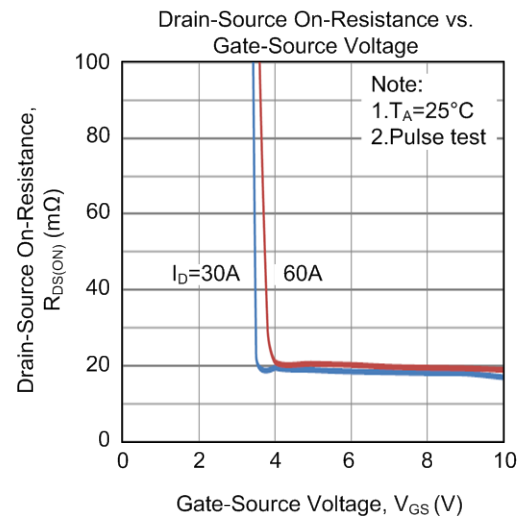
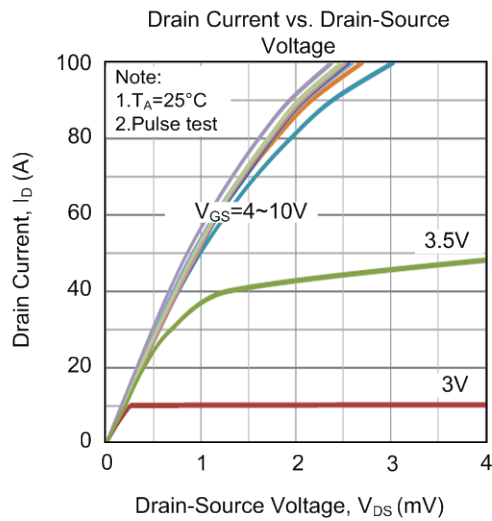


Unclamped Inductive Switching Test Circuit

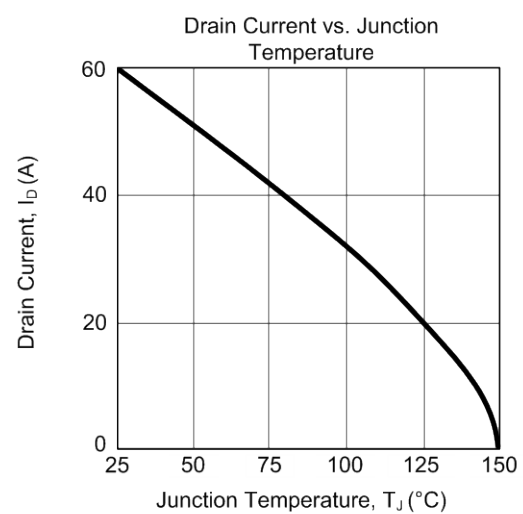
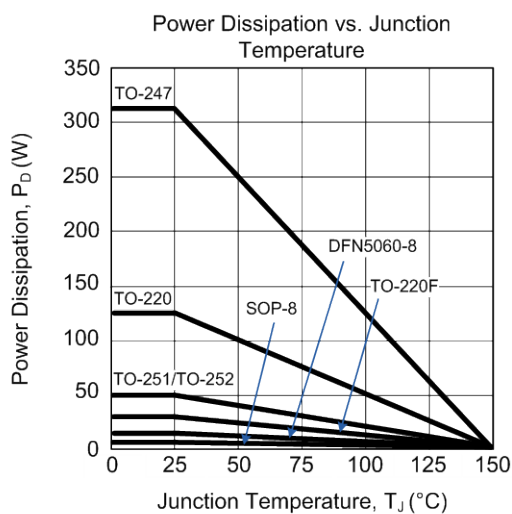
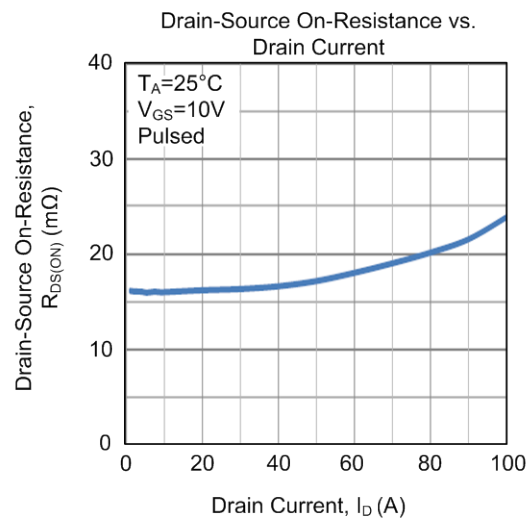
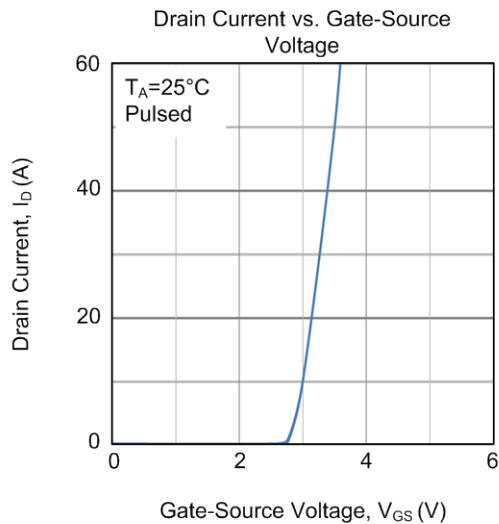
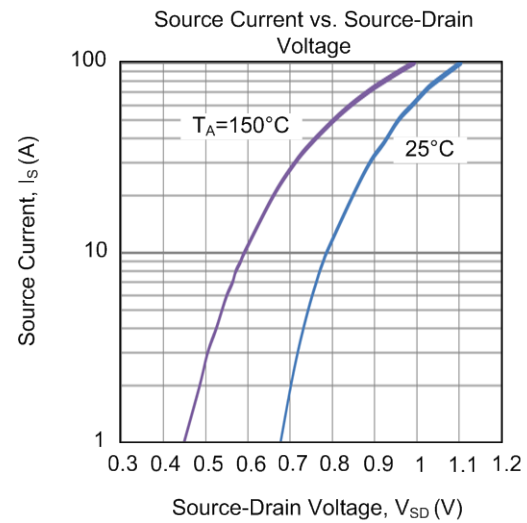
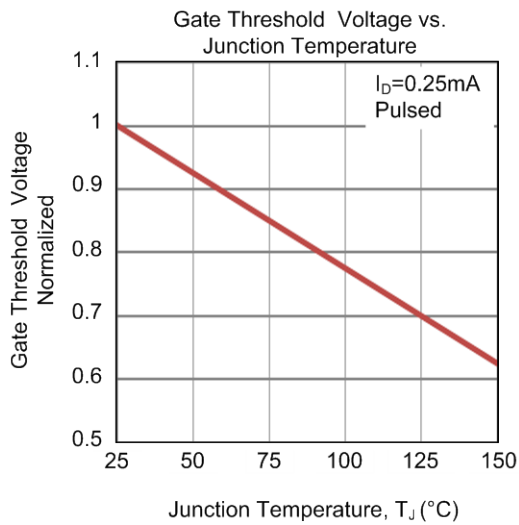


Unclamped Inductive Switching Waveforms

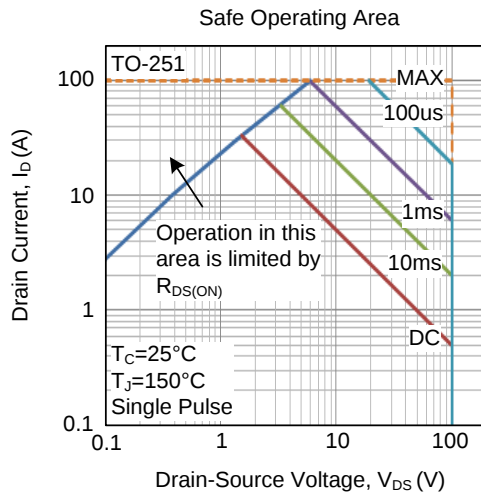
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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