



USG80N10

POWER MOSFET

80A, 100V N-CHANNEL ENHANCEMENT MODE TRENCH POWER MOSFET

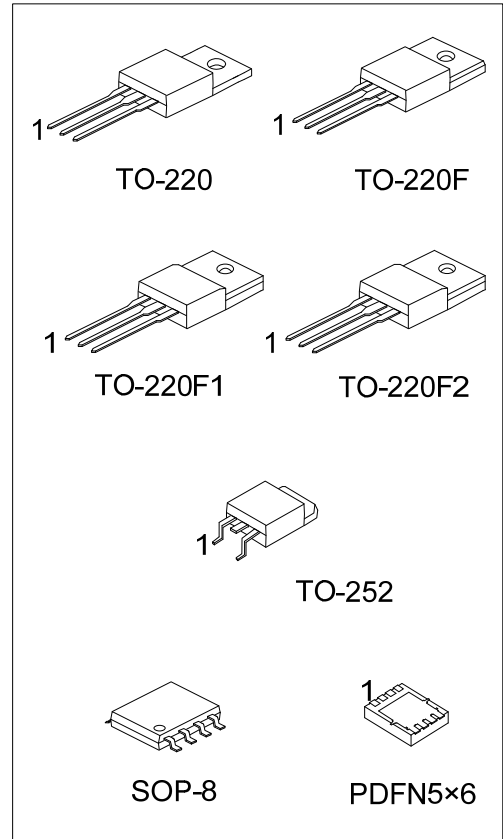
■ DESCRIPTION

The UTC **USG80N10** is a N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with low $R_{DS(ON)}$ characteristic by high cell density trench technology.

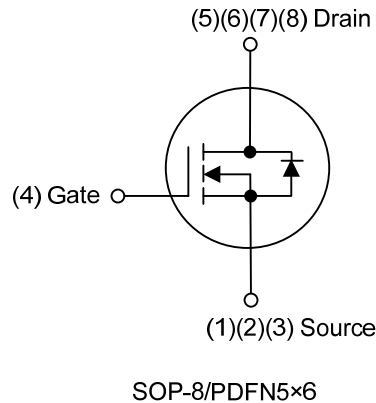
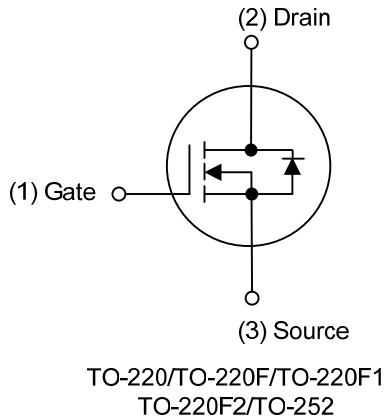
The UTC **USG80N10** is suitable for high efficiency synchronous rectification in SMPS, UPS, hard switched and high frequency circuits.

■ FEATURES

- * $R_{DS(ON)} \leq 8.0 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=20\text{A}$
 $R_{DS(ON)} \leq 12 \text{ m}\Omega$ @ $V_{GS}=4.5\text{V}$, $I_D=20\text{A}$
- * Optimized for high speed switching, Logic level
- * Enhanced Body diode dv/dt capability
- * Enhanced Avalanche Ruggedness



■ SYMBOL



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
USG80N10L-TA3-T	USG80N10G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
USG80N10L-TF1-T	USG80N10G-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
USG80N10L-TF2-T	USG80N10G-TF2-T	TO-220F2	G	D	S	-	-	-	-	-	Tube
USG80N10L-TF3-T	USG80N10G-TF3-T	TO-220F	G	D	S	-	-	-	-	-	Tube
USG80N10L-TN3-R	USG80N10G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
USG80N10L-S08-R	USG80N10G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel
USG80N10L-P5060-R	USG80N10G-P5060-R	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

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

USG80N10G-TA3-T (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F, TN3: TO-252, S08: SOP-8 P5060: PDFN5×6 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING

PACKAGE	MARKING
TO-220 / TO-220F TO-220F1 TO-220F2 / TO-252	UTC USG80N10 1 Lot Code ← → Date Code L: Lead Free G: Halogen Free
SOP-8	UTC USG80N10 1 Date Code L: Lead Free G: Halogen Free Lot Code
PDFN5×6	UTC USG 80N10 1 Lot Code ← → Date Code L: Lead Free G: Halogen Free

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	Continuous	I_D	80	A
Pulsed Drain Current	Pulsed (Note 2)	I_{DM}	160	A
Power Dissipation	TO-220	P_D	120	W
	TO-220F/TO-220F1		30	W
	TO-220F2			
	TO-252		70	W
	SOP-8		12	W
	PDFN5×6		60	W
Junction Temperature		T_J	+150	$^{\circ}\text{C}$
Storage Temperature Range		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. $I_{SD} \leq 30\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	TO-220F1/TO-220F2			
	TO-252		50	$^{\circ}\text{C}/\text{W}$
	SOP-8		90	$^{\circ}\text{C}/\text{W}$
Junction to Case	PDFN5×6	θ_{JC}	65	$^{\circ}\text{C}/\text{W}$
	TO-220		0.96	$^{\circ}\text{C}/\text{W}$
	TO-220F/TO-220F1		4.16	$^{\circ}\text{C}/\text{W}$
	TO-220F2			
	TO-252		1.78 (Note)	$^{\circ}\text{C}/\text{W}$
	SOP-8		10.4 (Note)	$^{\circ}\text{C}/\text{W}$
	PDFN5×6		2.08 (Note)	$^{\circ}\text{C}/\text{W}$

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

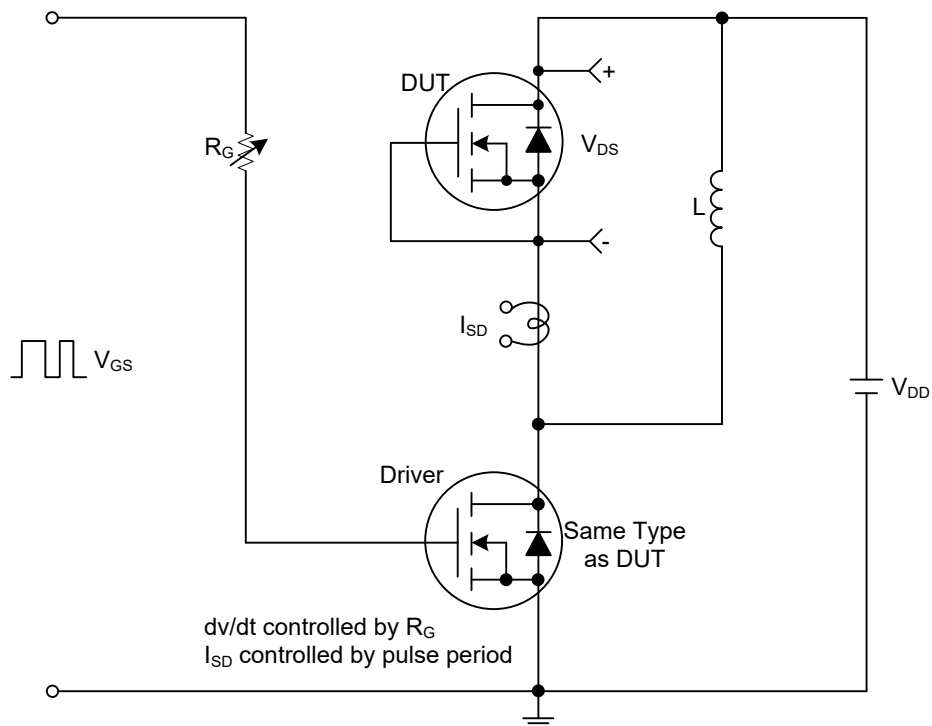
■ ELECTRICAL CHARACTERISTICS (T_J = 25°C, unless otherwise specified)

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			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		2.5	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =20A			8.0	mΩ
			V _{GS} =4.5V, I _D =20A			12	mΩ
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		2690		pF
Output Capacitance		C _{OSS}			1150		pF
Reverse Transfer Capacitance		C _{RSS}			120		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =50V, V _{GS} =10V, I _D =20A, I _G =1mA (Note 1, 2)		56		nC
Gate to Source Charge		Q _{GS}			7		nC
Gate to Drain Charge		Q _{GD}			15		nC
Turn-on Delay Time (Note 1)		t _{D(ON)}	V _{DD} =50V, V _{GS} =10V, I _D =20A, R _G =3.0Ω (Note 1, 2)		11		ns
Rise Time		t _R			18		ns
Turn-off Delay Time		t _{D(OFF)}			43		ns
Fall-Time		t _F			22		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				80	A
Maximum Body-Diode Pulsed Current		I _{SM}				160	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _F =20A, V _{GS} =0V			1.2	V
Reverse Recovery Time (Note 1)		t _{rr}	I _S =2.0A, V _{GS} =0V,		63		ns
Reverse Recovery Charge		Q _{rr}	dI/dt=100A/μs		290		nC

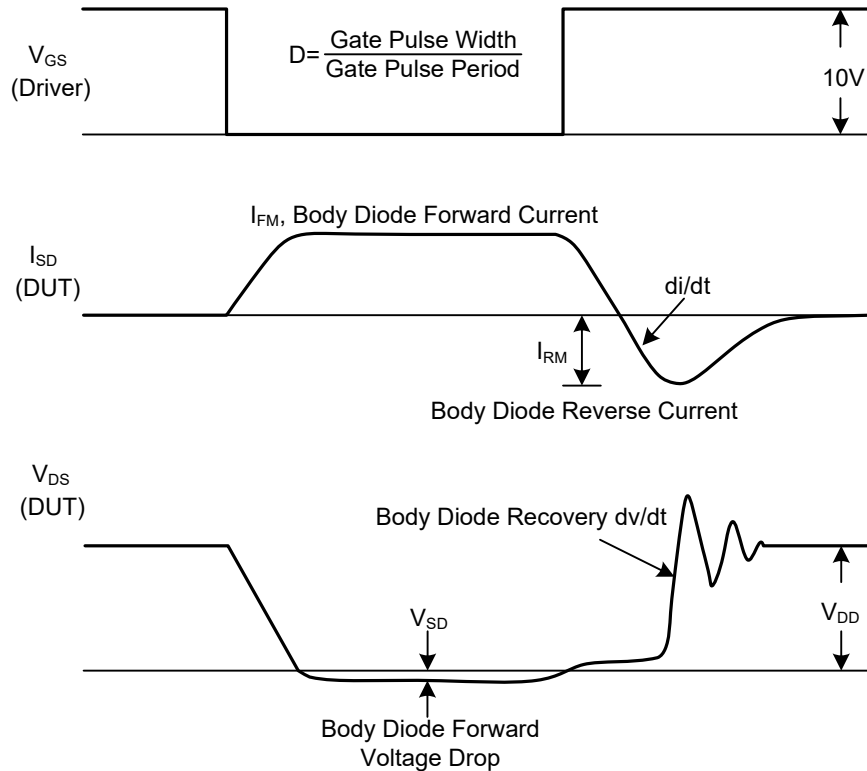
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

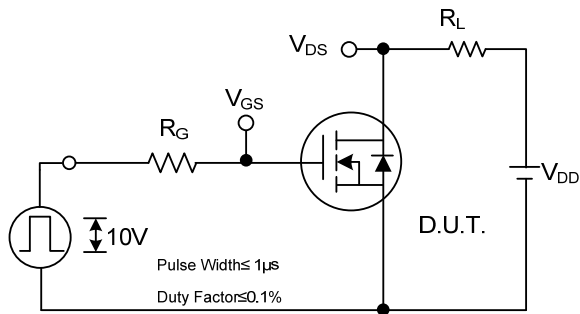


Peak Diode Recovery dv/dt Test Circuit

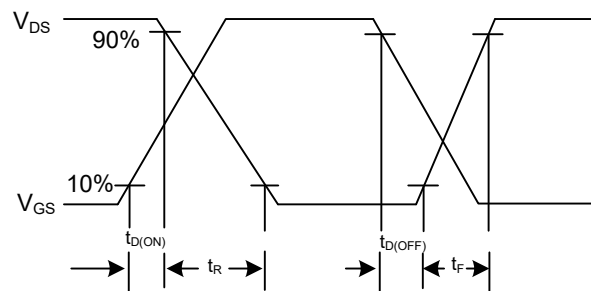


Peak Diode Recovery dv/dt Waveforms

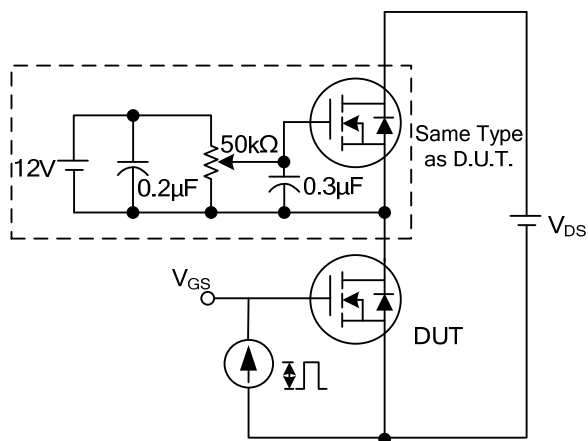
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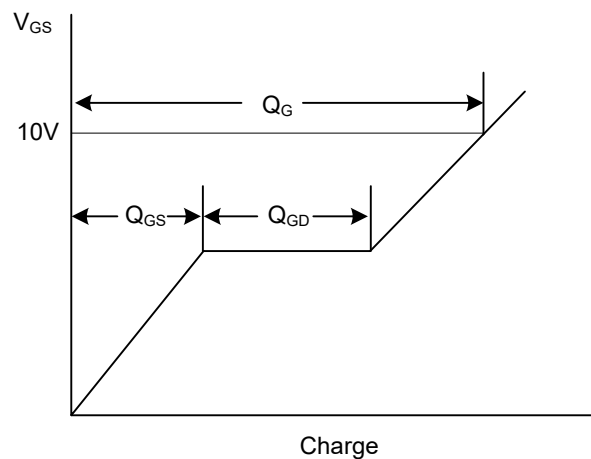
Switching Test Circuit



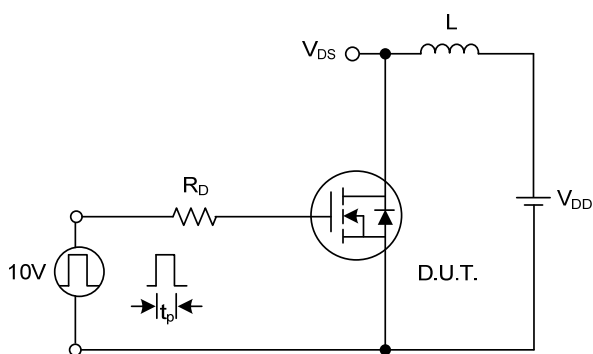
Switching Waveforms



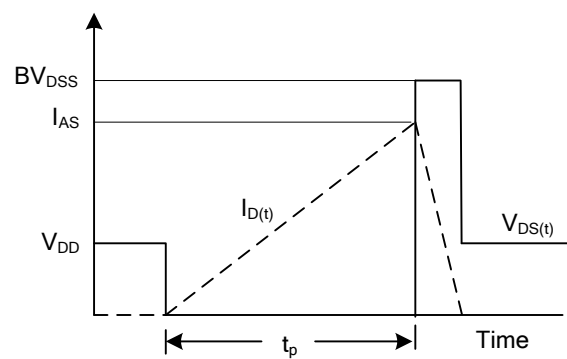
Gate Charge Test Circuit



Gate Charge Waveform

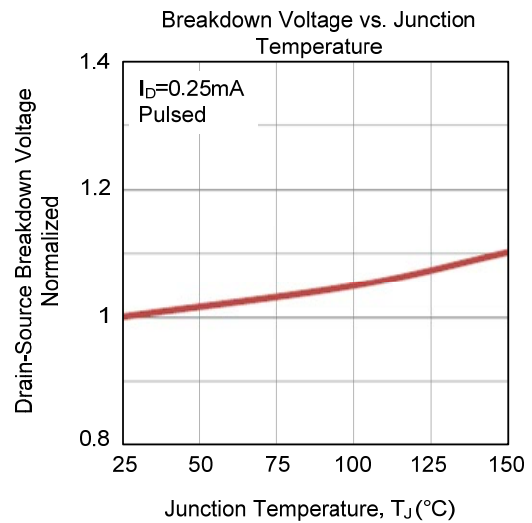
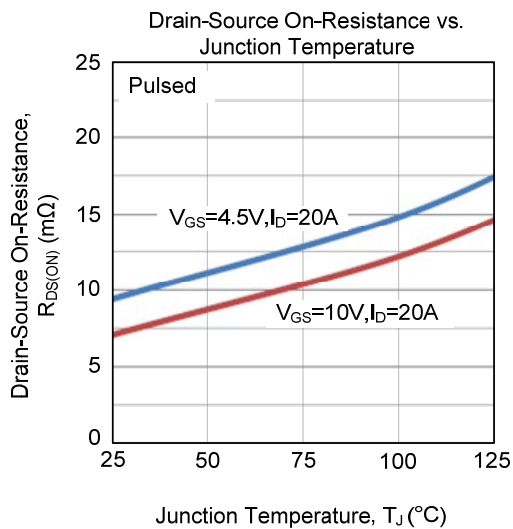
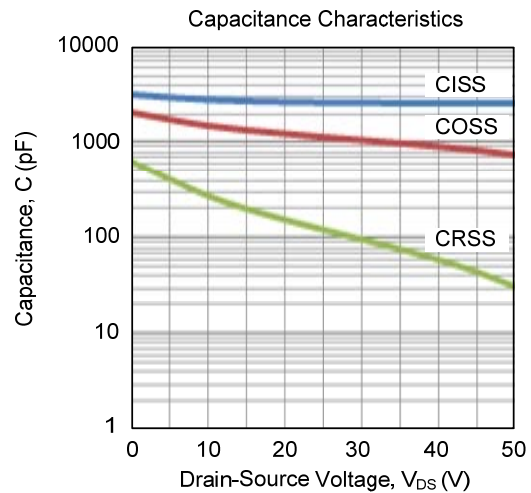
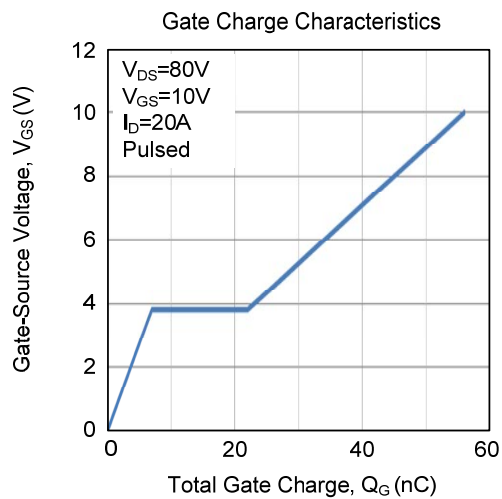
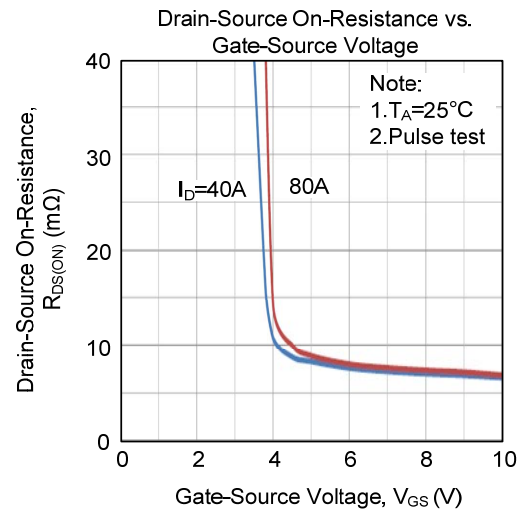
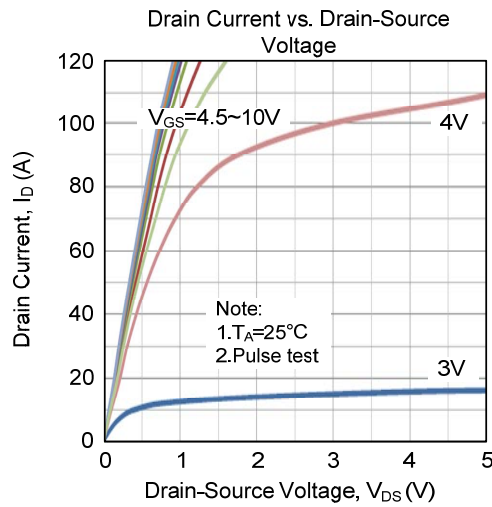


Unclamped Inductive Switching Test Circuit

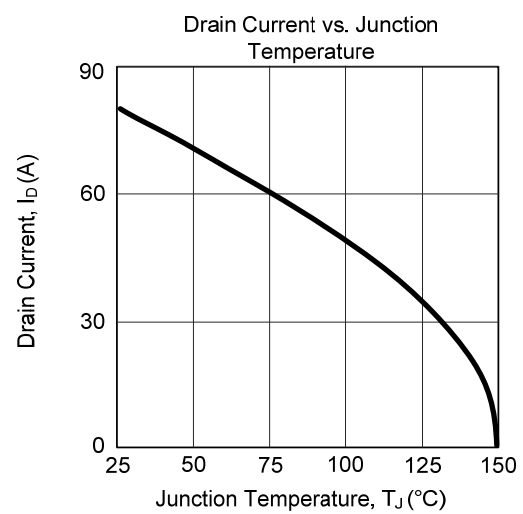
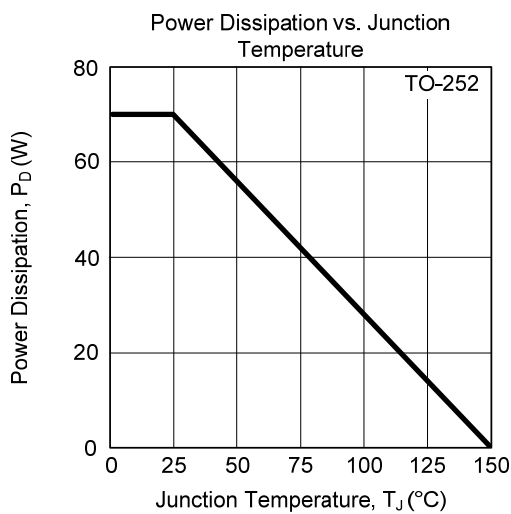
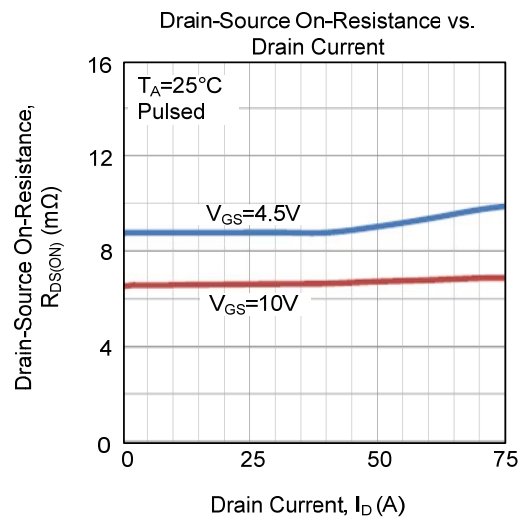
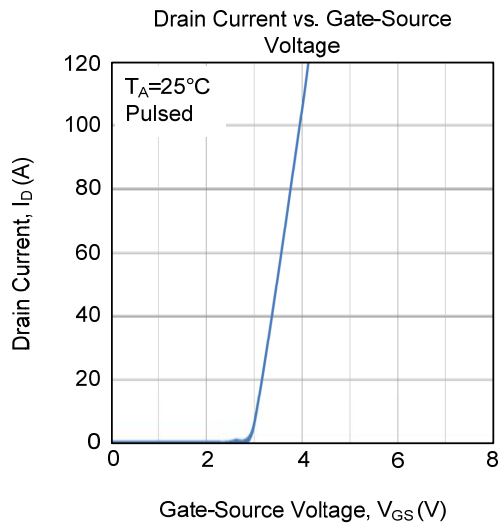
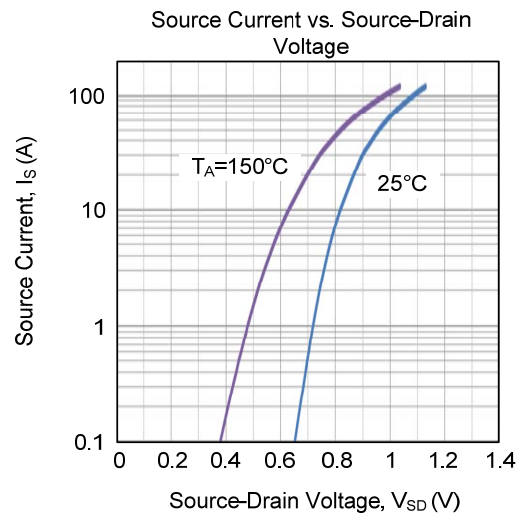
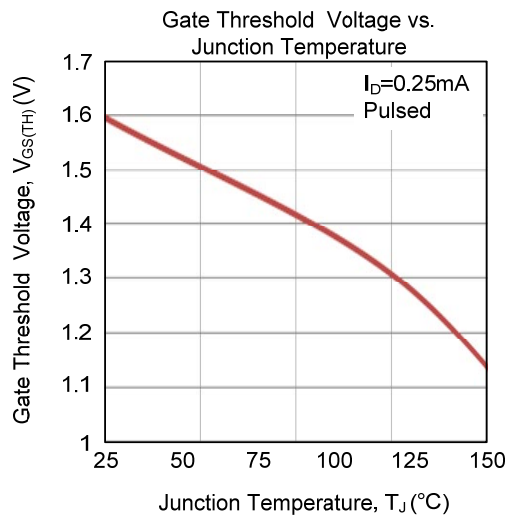


Unclamped Inductive Switching Waveforms

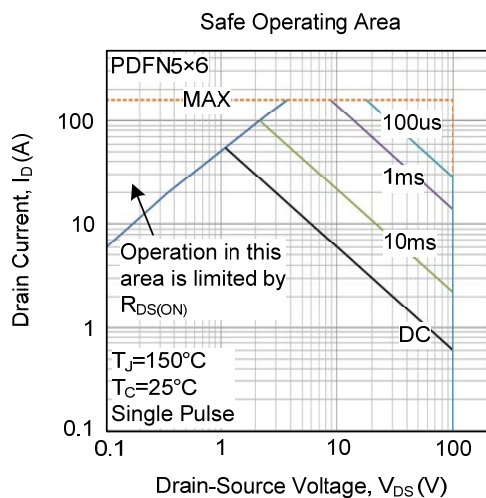
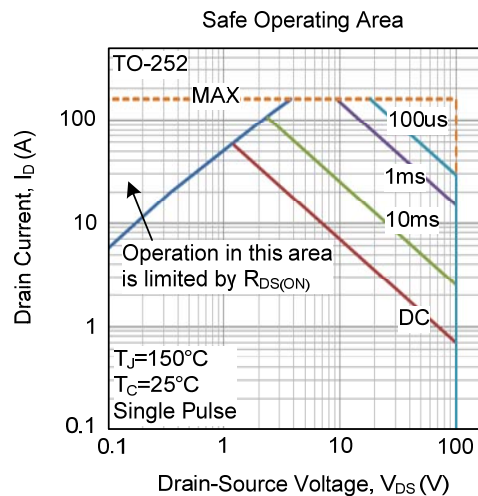
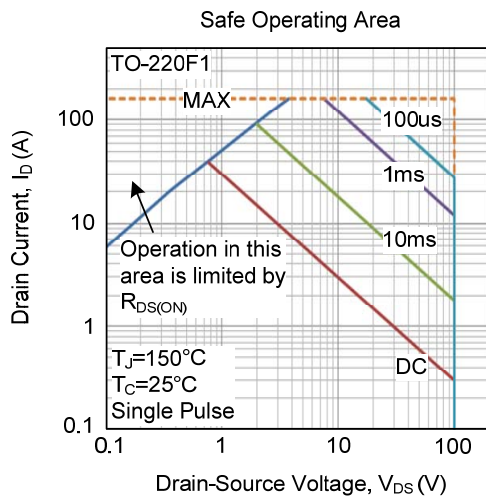
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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