



UTT20N15

POWER MOSFET

20A, 150V N-CHANNEL POWER MOSFET

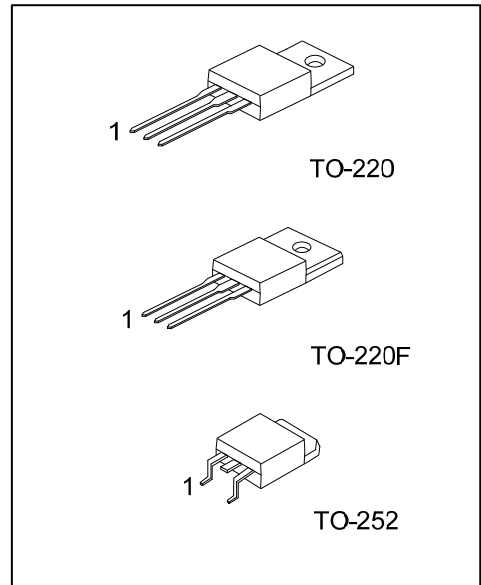
DESCRIPTION

The UTC **UTT20N15** is a N-channel mode power MOSFET using UTC's advanced technology to provide customers with a minimum on-state resistance, low gate charge and high switching speed.

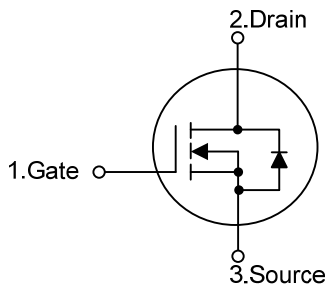
The UTC **UTT20N15** is suitable for high voltage synchronous rectifier and DC/DC converters, etc.

FEATURES

- * $R_{DS(ON)} \leq 145 \text{ m}\Omega @ V_{GS}=10\text{V}, I_D=10\text{A}$
- $R_{DS(ON)} \leq 165 \text{ m}\Omega @ V_{GS}=4.5\text{V}, I_D=10\text{A}$
- * High Switching Speed
- * High Cell Density Trench Technology



SYMBOL



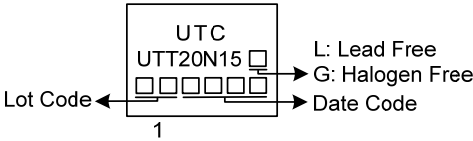
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTT20N15L-TA3-T	UTT20N15G-TA3-T	TO-220	G	D	S	Tube
UTT20N15L-TF3-T	UTT20N15G-TF3-T	TO-220F	G	D	S	Tube
UTT20N15L-TN3-R	UTT20N15G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>UTT20N15G-TA3-T</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TF3: TO-220F, TN3: TO-252</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	150	V
Gate-Source Voltage		V_{GSS}	± 20	V
Drain Current ($T_C=25^\circ\text{C}$)	Continuous	I_D	20	A
	Pulsed (Note 2)	I_{DM}	40	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	194	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	1.6	V/nS
Power Dissipation	TO-220	P_D	80	W
	TO-220F		32	W
	TO-252		44	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. $L=30\text{mH}$, $I_{AS}=3.6\text{A}$, $V_{DD}=50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 20\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 25^\circ\text{C}$.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-252		110	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	1.56	$^\circ\text{C}/\text{W}$
	TO-220F		3.9	$^\circ\text{C}/\text{W}$
	TO-252		2.84 (Note)	$^\circ\text{C}/\text{W}$

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

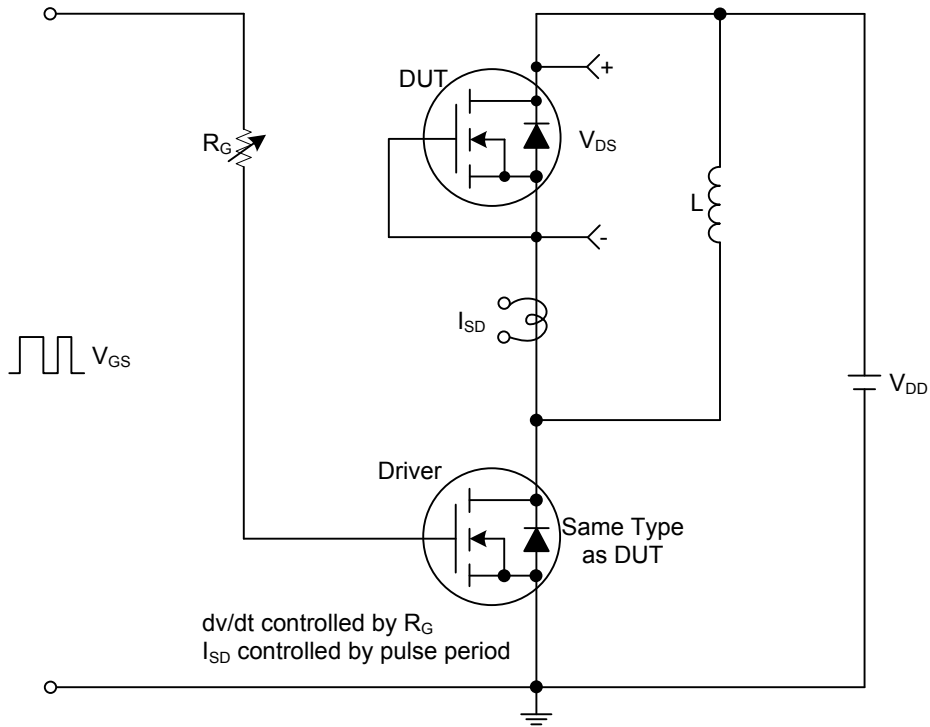
■ ELECTRICAL CHARACTERISTICS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	150			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =150V, V _{GS} =0V, T _J =25°C			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}			+100	nA
	Reverse				-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 =10A			145	mΩ
		V _{GS} =4.5V, I _D =10A			165	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		2295		pF
Output Capacitance	C _{OSS}			93		pF
Reverse Transfer Capacitance	C _{RSS}			76		pF
Gate Resistance	R _G	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		3.3		Ω
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q _G	V _{DS} =120V, V _{GS} =10V, I _D =20A I _G =1mA (Note 1, 2)		75		nC
Gate to Source Charge	Q _{GS}			13		nC
Gate to Drain Charge	Q _{GD}			20		nC
Turn-on Delay Time (Note 1)	t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =20A, R _G =3Ω (Note 1, 2)		10		ns
Rise Time	t _R			17		ns
Turn-off Delay Time	t _{D(OFF)}			42		ns
Fall-Time	t _F			21		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				20	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				40	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _S =20A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)	t _{rr}	I _S =20A, V _{GS} =0V, dI/dt=100A/μs		73		nS
Reverse Recovery Charge	Q _{rr}			150		nC

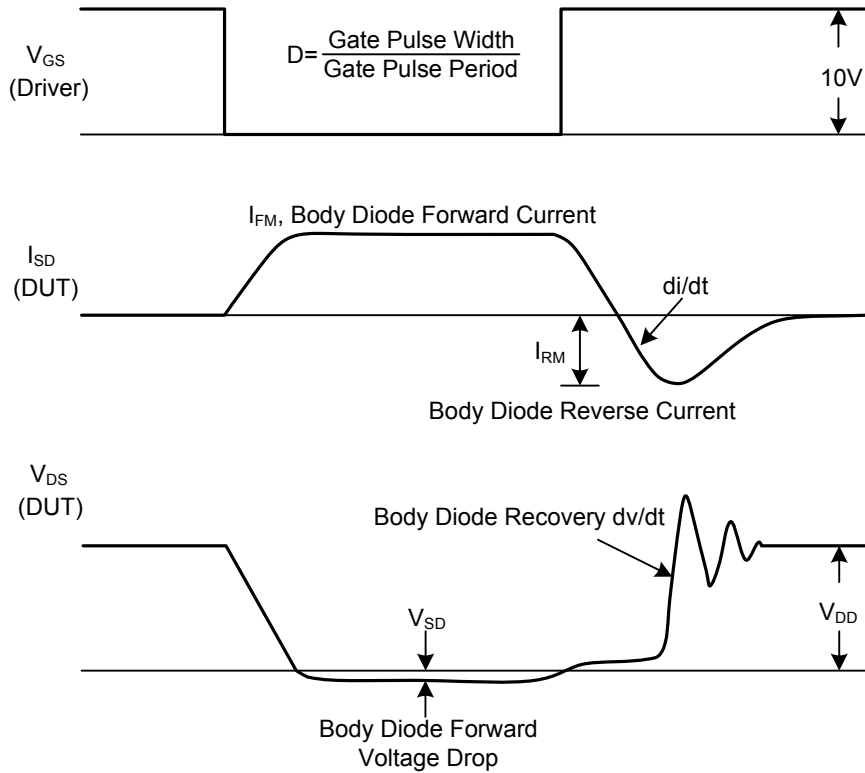
Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS



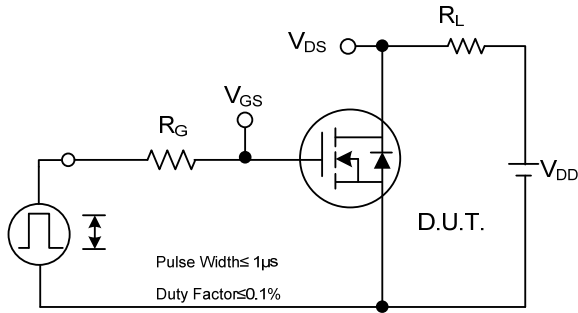
Peak Diode Recovery dv/dt Test Circuit



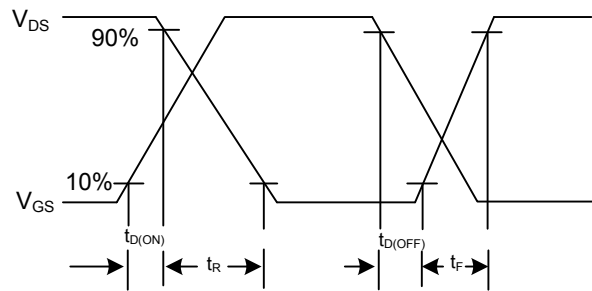
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

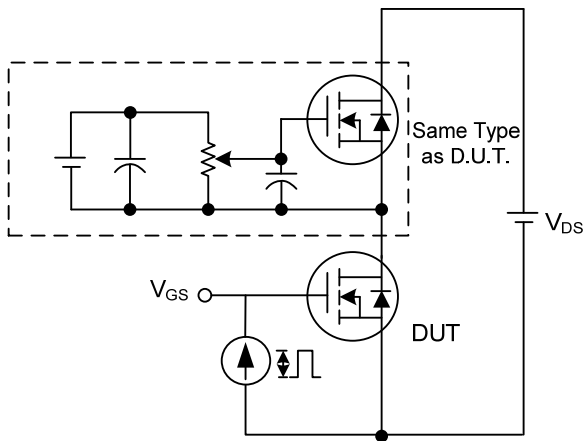
■ TEST CIRCUITS AND WAVEFORMS



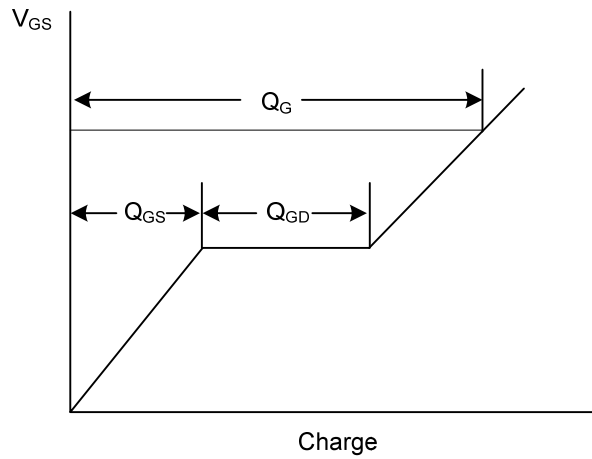
Switching Test Circuit



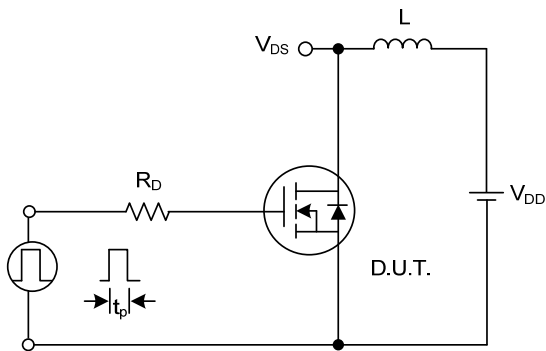
Switching Waveforms



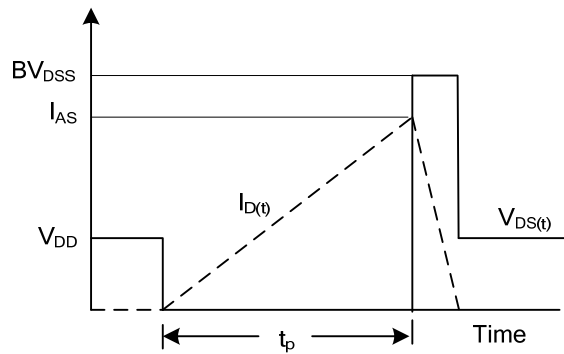
Gate Charge Test Circuit



Gate Charge Waveform

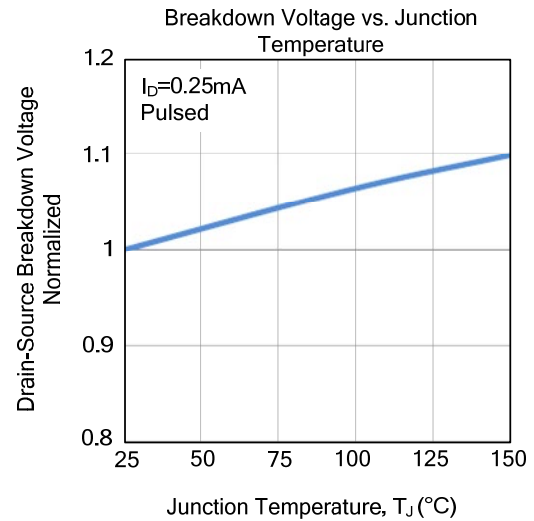
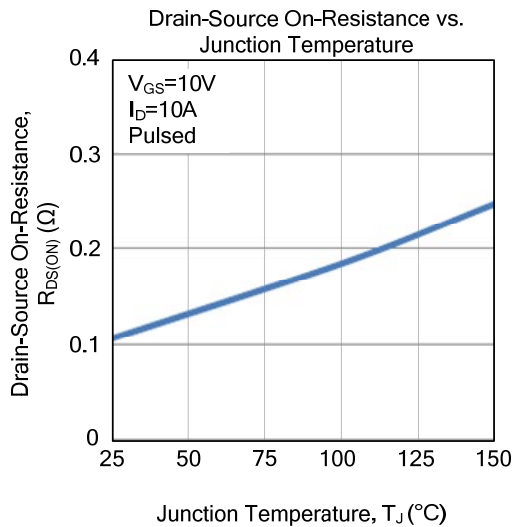
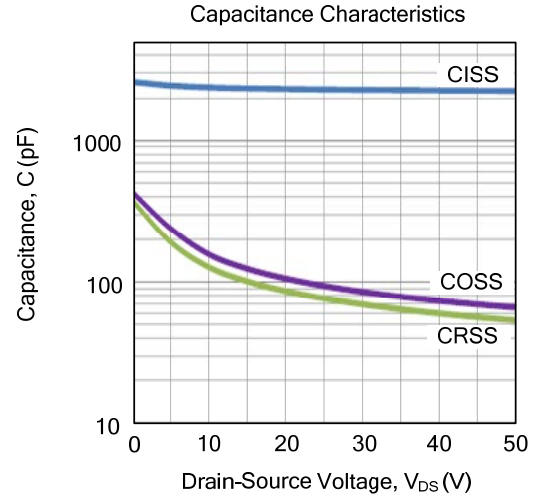
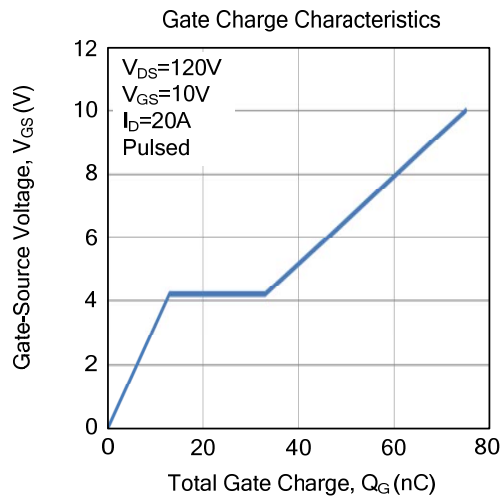
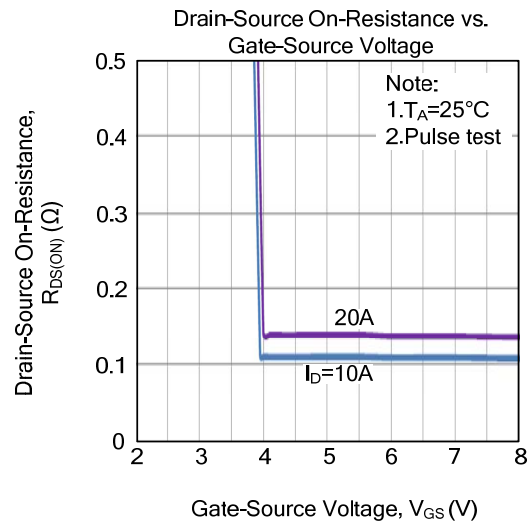
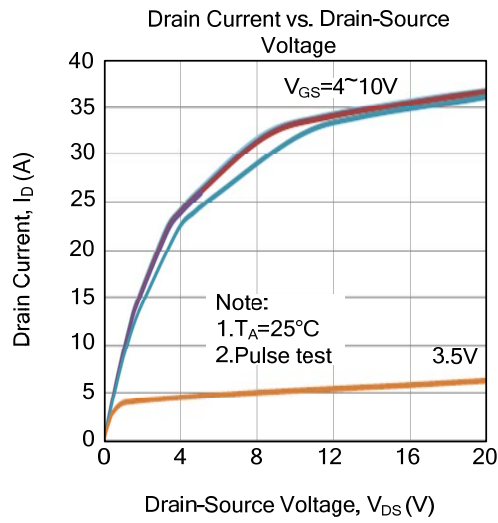


Unclamped Inductive Switching Test Circuit

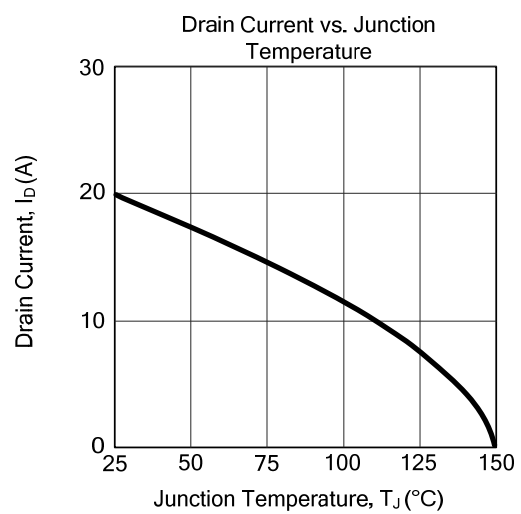
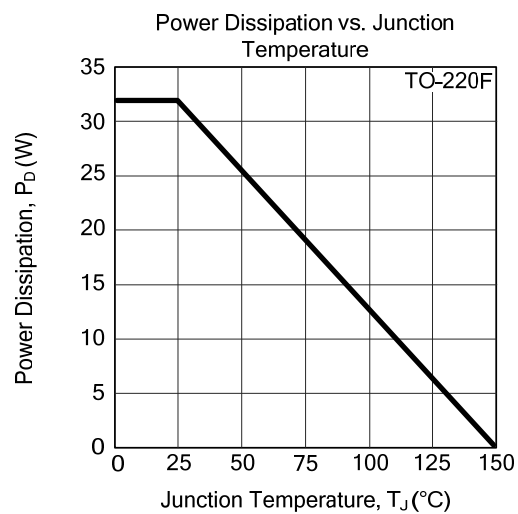
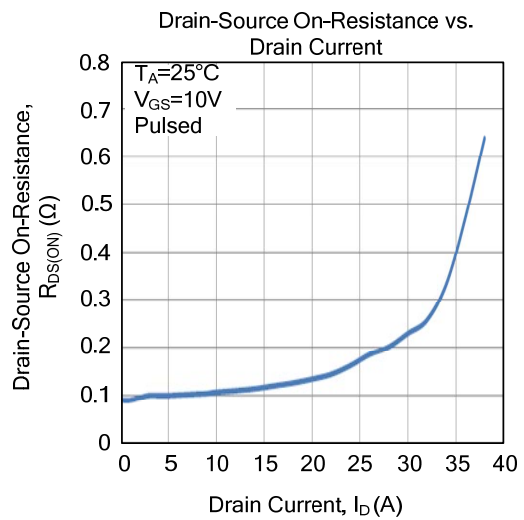
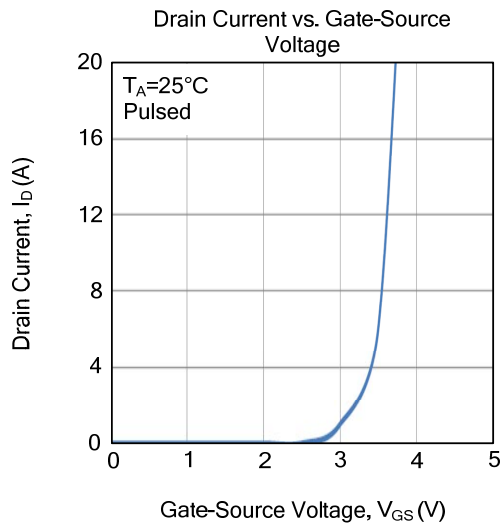
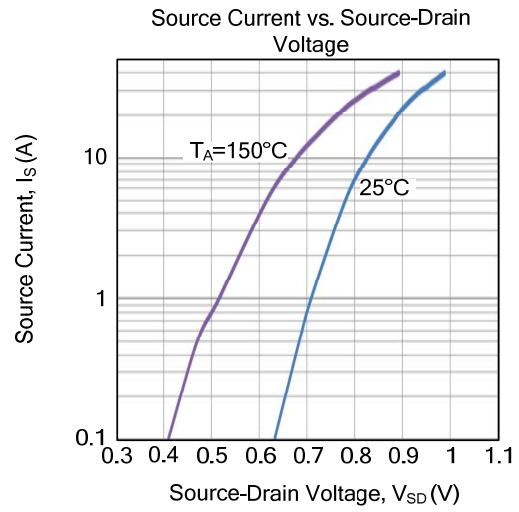
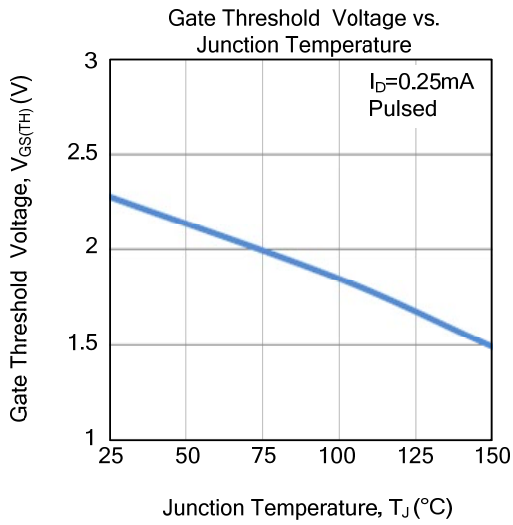


Unclamped Inductive Switching Waveforms

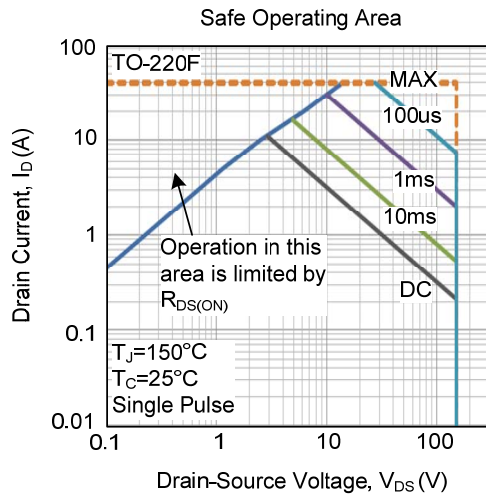
TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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