



USJ60R320-U2

Power MOSFET

14A, 600V N-CHANNEL SUPER-JUNCTION MOSFET

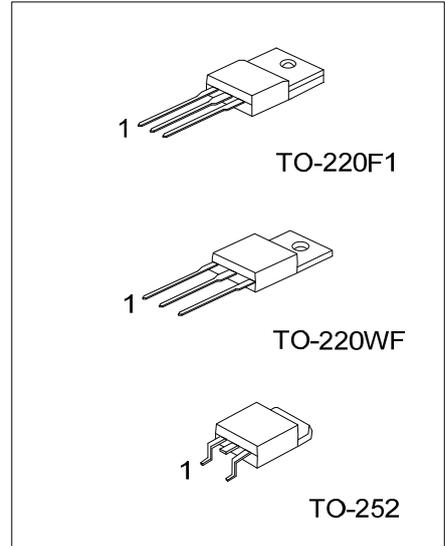
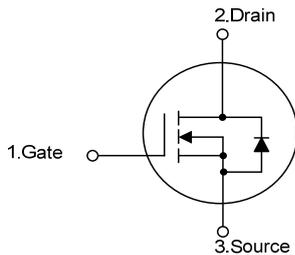
■ DESCRIPTION

The **UTC USJ60R320-U2** 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

- * $R_{DS(ON)} \leq 0.32 \Omega @ V_{GS}=10V, I_D=3.5A$
- * High Switching Speed
- * 100% Avalanche Tested
- * With ESD Protected

■ SYMBOL



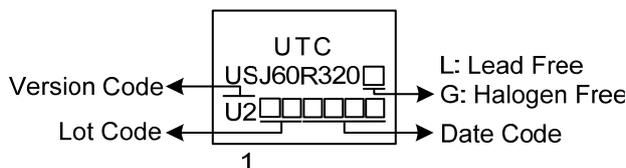
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
USJ60R320L-U2-TF1-T	USJ60R320G-U2-TF1-T	TO-220F1	G	D	S	Tube
USJ60R320L-U2-TW1-T	USJ60R320G-U2-TW1-T	TO-220WF	G	D	S	Tube
USJ60R320L-U2-TN3-R	USJ60R320G-U2-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>USJ60R320G-U2-TF1-T</p>	<p>(1) T: Tube, R: Tape Reel (2) TF1: TO-220F1, TW1: TO-220WF, TN3: TO-252 (3) Version U2 (4) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	14	A
	Pulsed (Note 2)	I_{DM}	42	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	190	mJ
Peak Diode Recovery dv/dt		dv/dt	6.1	V/ns
Power Dissipation	TO-220F1/TO-220WF	P_D	30	W
	TO-252		60	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. $L = 100\text{mH}$, $I_{AS} = 2\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 14\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F1/TO-220WF	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-252		110	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220F1/TO-220WF	θ_{JC}	4.17	$^\circ\text{C}/\text{W}$
	TO-252		2.08(Note)	$^\circ\text{C}/\text{W}$

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

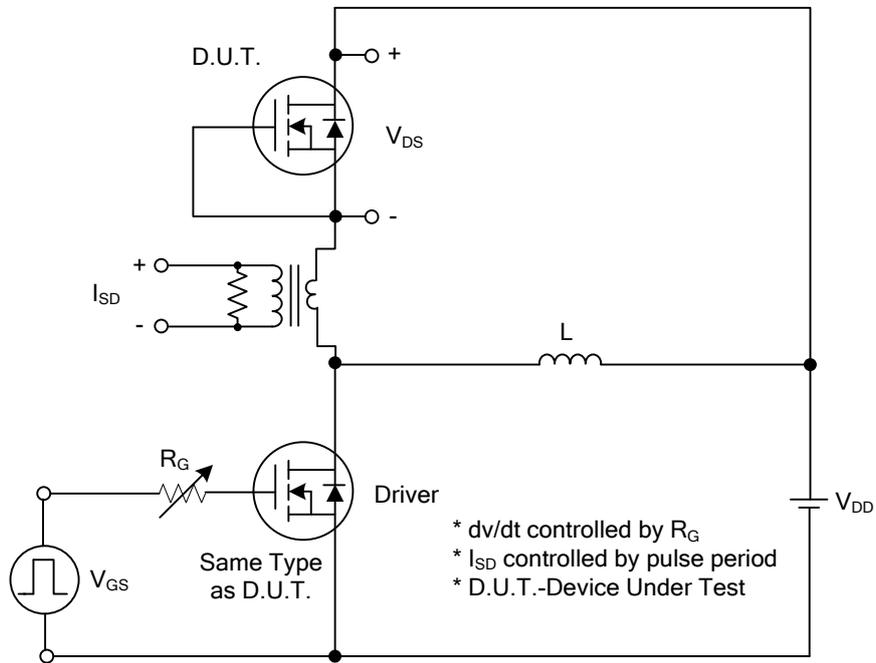
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	600			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =600V, V _{GS} =0V			10	μA
Gate- Source Leakage Current	Forward	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	2.5		4.5	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =3.5A			0.32	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =50V, f=1.0MHz		700		pF
Output Capacitance	C _{OSS}			310		pF
Reverse Transfer Capacitance	C _{RSS}			26		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q _G	V _{DS} =480V, V _{GS} =10V, I _D =14A (Note1, 2)		38		nC
Gate to Source Charge	Q _{GS}			13		nC
Gate to Drain Charge	Q _{GD}			17		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DS} =100V, V _{GS} =10V, I _D =14A, R _G =25Ω (Note1, 2)		8		ns
Rise Time	t _R			41		ns
Turn-OFF Delay Time	t _{D(OFF)}			70		ns
Fall-Time	t _F			33		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				14	A
Drain-Source Diode Forward Voltage	V _{SD}	I _S =14A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time	t _{rr}	I _S =14A, V _{GS} =0V,		378		ns
Body Diode Reverse Recovery Charge	Q _{rr}	dI _F /dt=100A/μs (Note 1)		5.8		uC

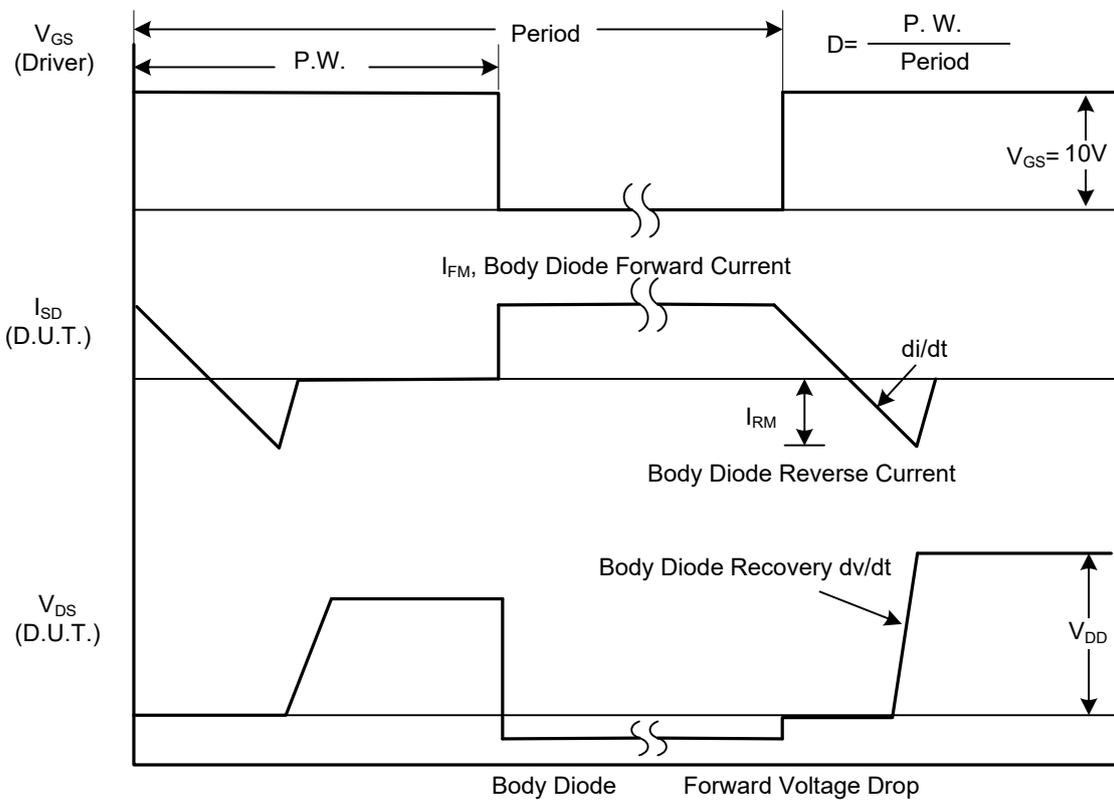
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS

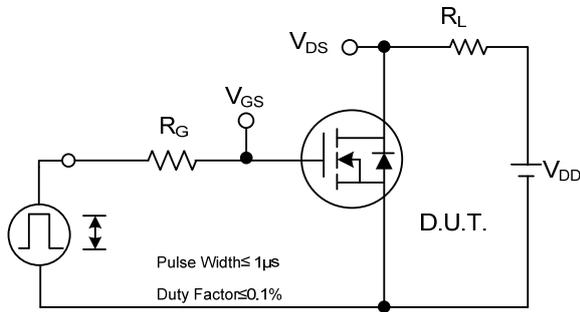


Peak Diode Recovery dv/dt Test Circuit

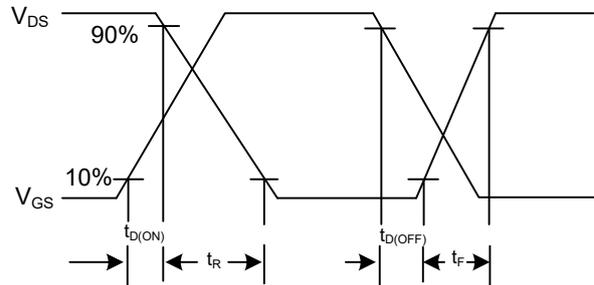


Peak Diode Recovery dv/dt Waveforms

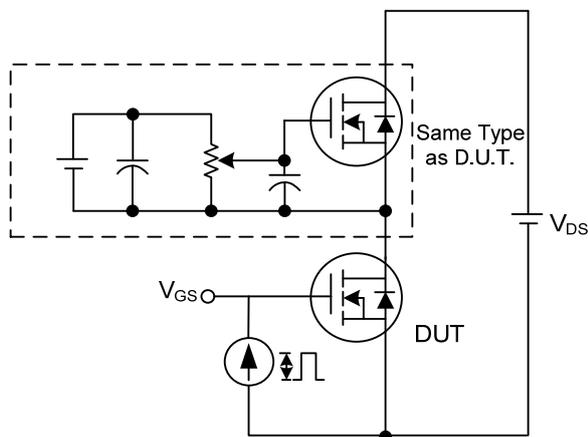
TEST CIRCUITS AND WAVEFORMS



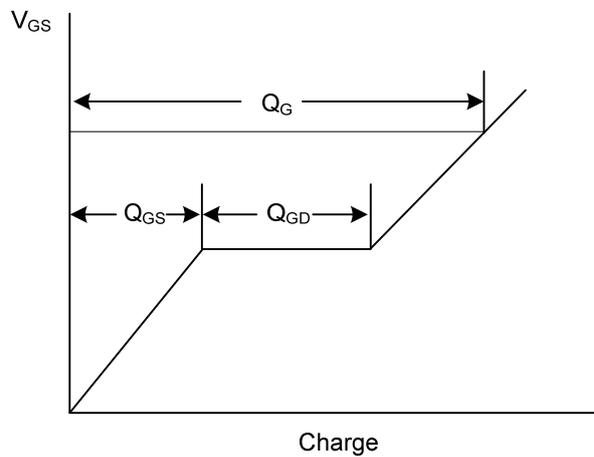
Switching Test Circuit



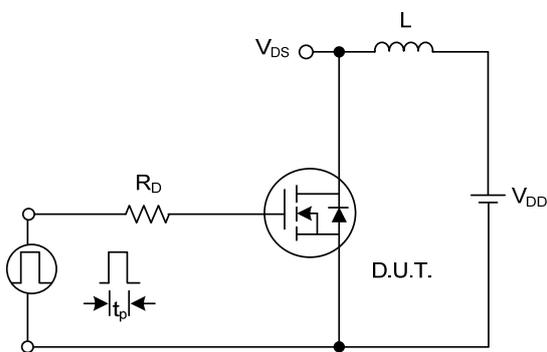
Switching Waveforms



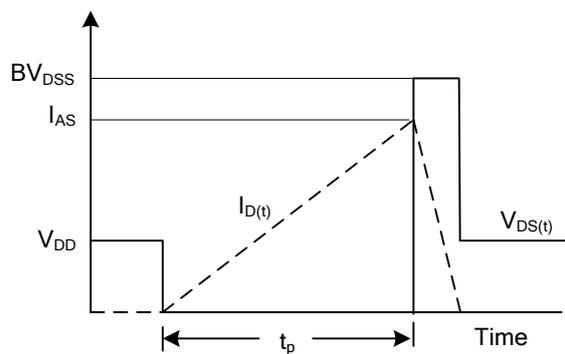
Gate Charge Test Circuit



Gate Charge Waveform

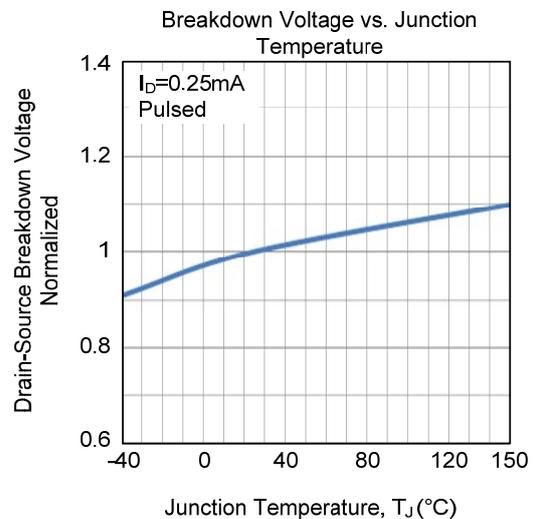
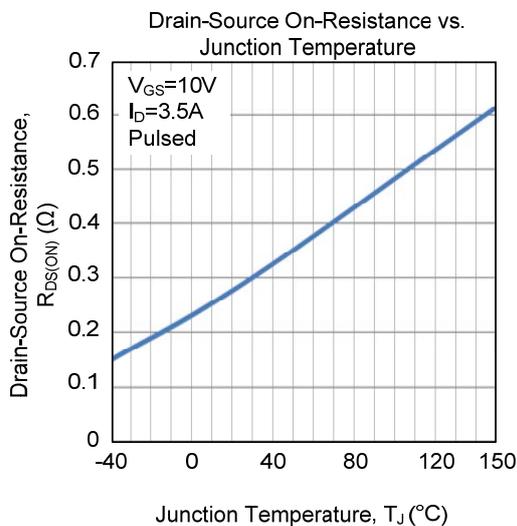
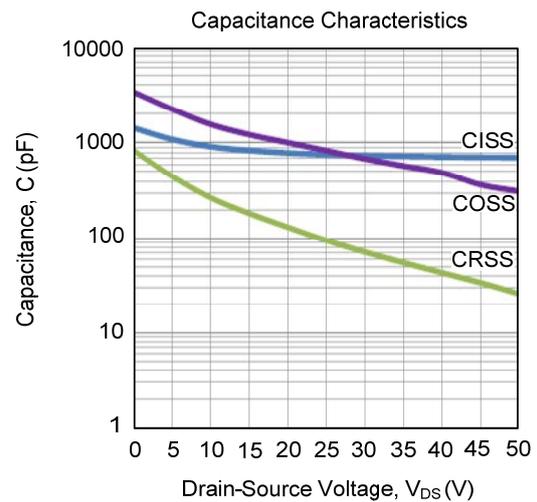
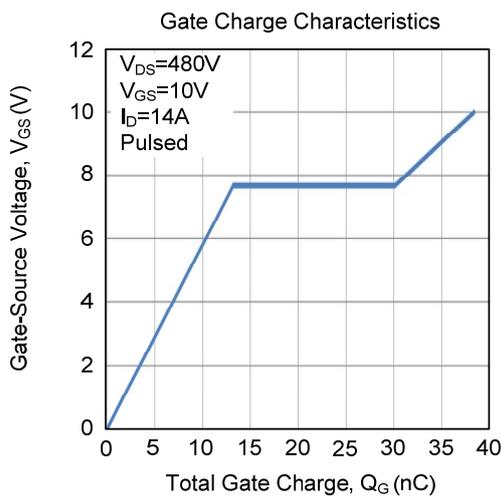
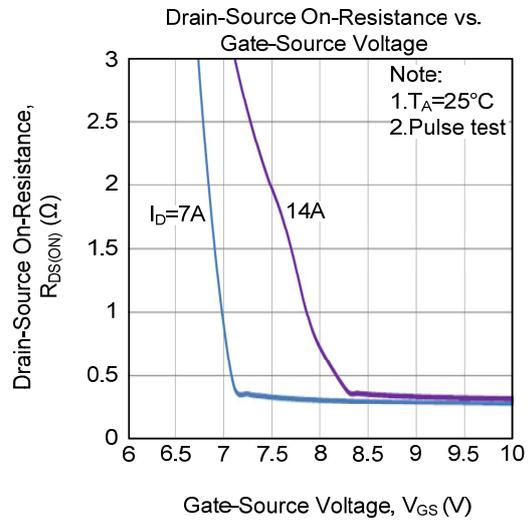
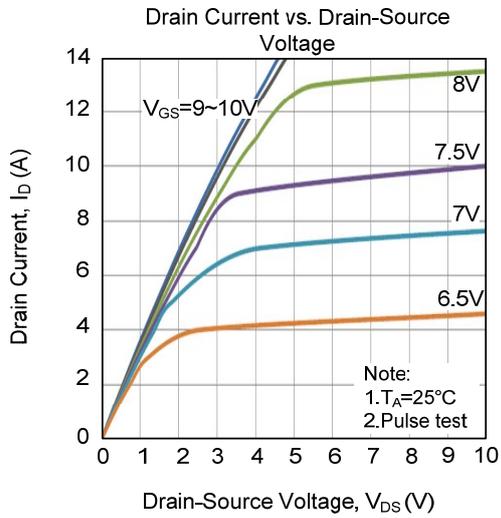


Unclamped Inductive Switching Test Circuit

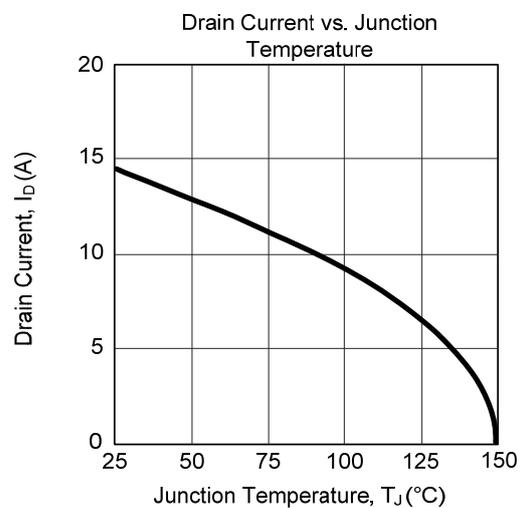
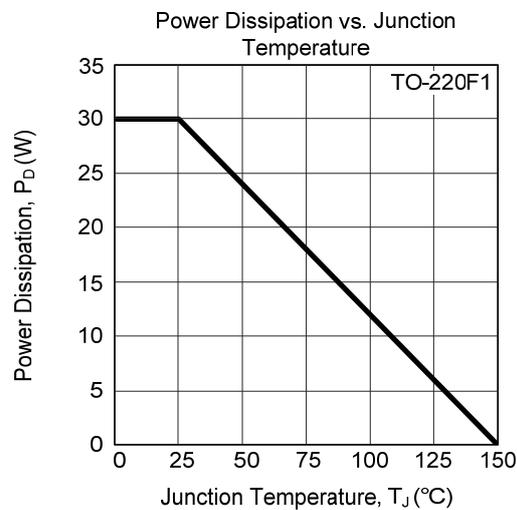
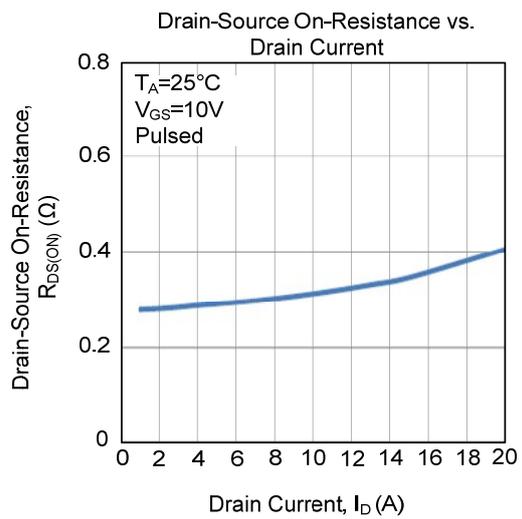
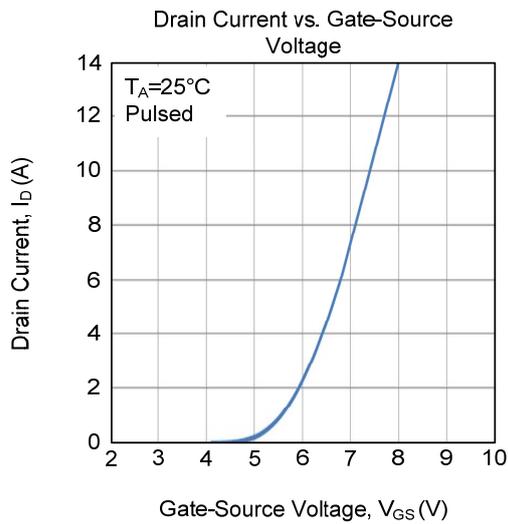
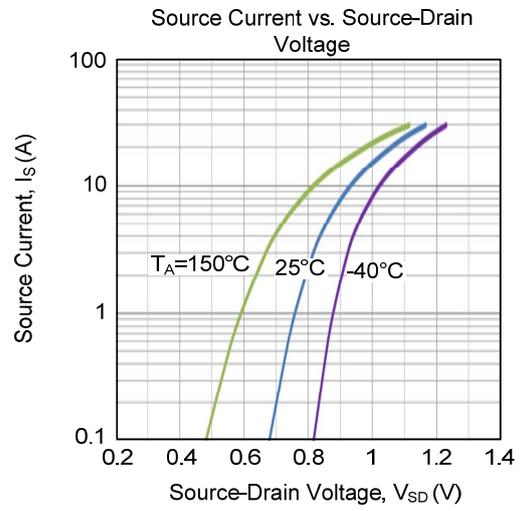
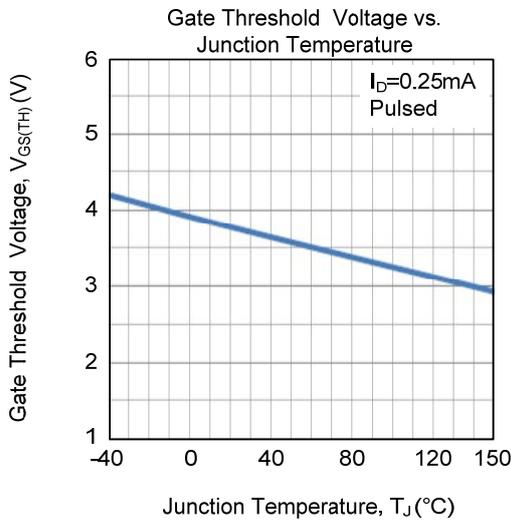


Unclamped Inductive Switching Waveforms

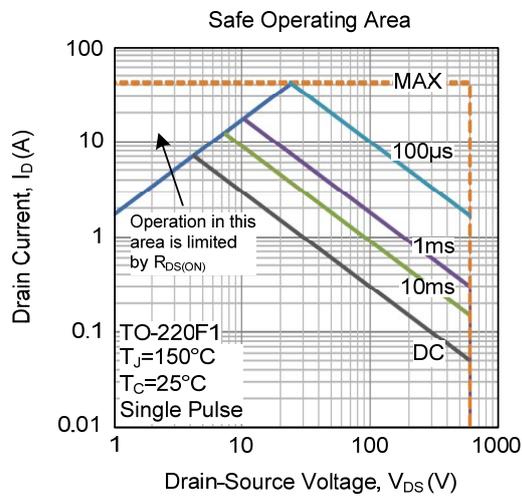
TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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