



USJ60R280

Power MOSFET

18A, 600V N-CHANNEL SUPER-JUNCTION MOSFET

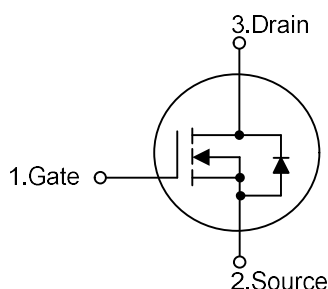
DESCRIPTION

The **UTC USJ60R280** 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

- * $R_{DS(ON)} \leq 0.28 \Omega$ @ $V_{GS} = 10V$, $I_D = 3.8A$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness

SYMBOL

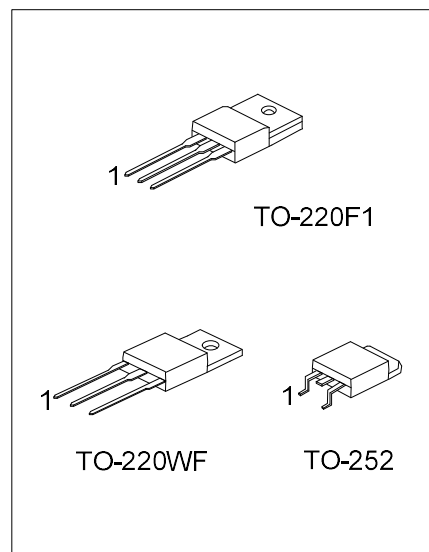


ORDERING INFORMATION

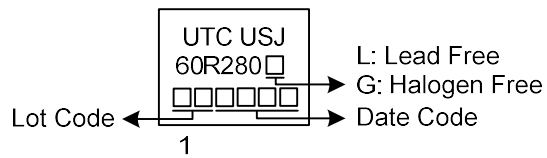
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
USJ60R280L-TF1-T	USJ60R280G-TF1-T	TO-220F1	G	D	S	Tube
USJ60R280L-TW1-T	USJ60R280G-TW1-T	TO-220WF	G	D	S	Tube
USJ60R280L-TN3-R	USJ60R280G-TN3-R	TO-252	G	D	S	Tape Reel

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

USJ60R280G-TF1-T		(1) Packing Type	(1) T: Tube, R: Tape Reel
		(2) Package Type	(2) TF1: TO-220F1, TW1: TO-220WF, TN3: TO-252
		(3) Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free



■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_C=25°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	18	A
	Pulsed (Note 2)	I _{DM}	54	A
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	180	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	0.78	V/ns
Power Dissipation	TO-220F1/TO-220WF	P _D	30	W
	TO-252		61	W
Junction Temperature		T _J	+150	°C
Storage Temperature		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 = 100mH, I_{AS} = 1.9A, V_{DD} = 50V, R_G = 25 Ω Starting T_J = 25°C

4. I_{SD} ≤ 18A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F1/TO-220WF	θ _{JA}	62.5	°C/W
	TO-252		110	°C/W
Junction to Case	TO-220F1/TO-220WF	θ _{JC}	3.9	°C/W
	TO-252		2.6 (Note)	°C/W

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

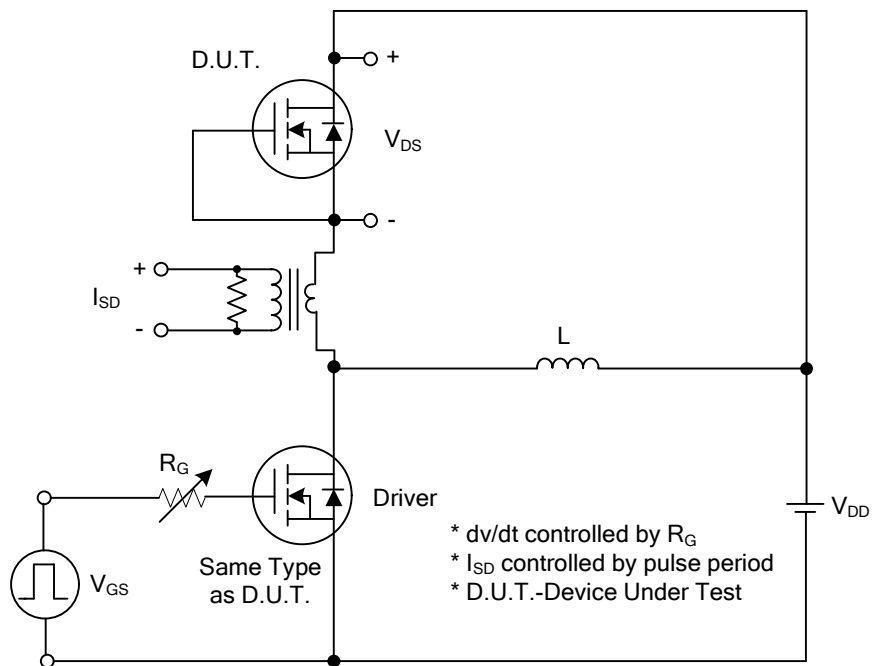
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	600			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =600V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{DS} =0V ,V _{GS} =25V			10	μA
	Reverse		V _{DS} =0V ,V _{GS} =-20V			-10	μA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.5		4.5	V
Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =3.8A			0.28	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =50V, f=1.0MHz		894		pF
Output Capacitance		C _{OSS}			271		pF
Reverse Transfer Capacitance		C _{RSS}			12		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =480V, V _{GS} =10V, I _D =18A (Note 1, 2)		41		nC
Gate to Source Charge		Q _{GS}			10		nC
Gate to Drain Charge		Q _{GD}			17		nC
Internal Gate Input Resistance		R _G	V _{GS} =0V, f=1MHz		2.2		Ω
Turn-ON Delay Time (Note 1)		t _{D(ON)}	V _{DD} =50V, V _{GS} =10V, I _D =18A, R _G =25Ω (Note 1, 2)		17		ns
Rise Time		t _R			36		ns
Turn-OFF Delay Time		t _{D(OFF)}			102		ns
Fall-Time		t _F			50		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				18	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =18A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)		t _{rr}	I _S =18A, V _{GS} =0V, dI _F /dt=100A/μs		374		ns
Body Diode Reverse Recovery Charge		Q _{rr}			5.3		μC

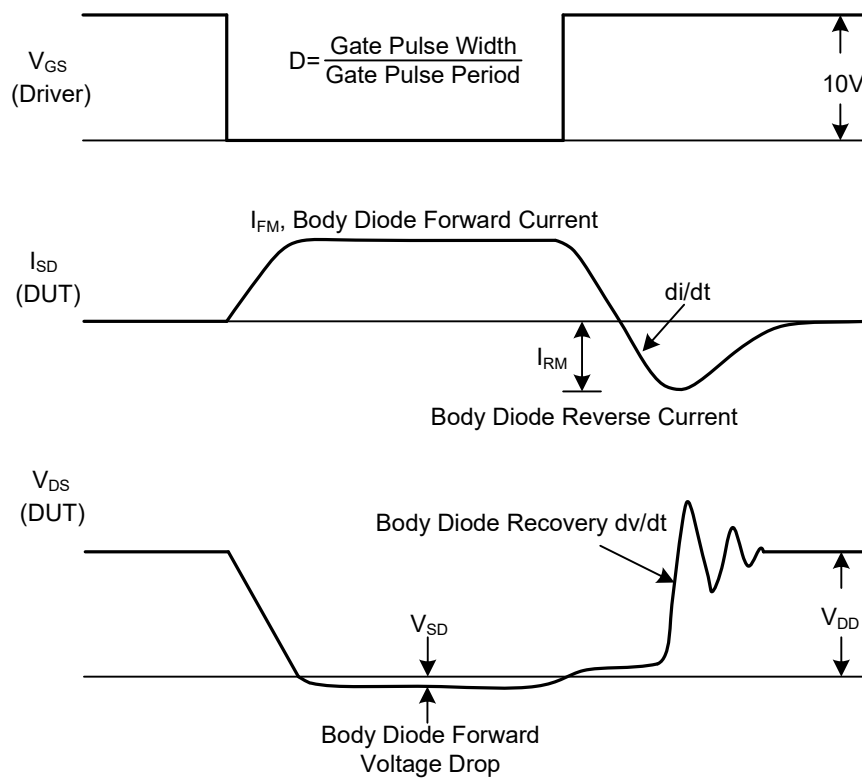
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

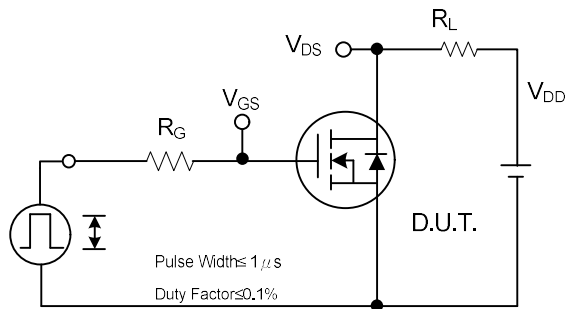


Peak Diode Recovery dv/dt Test Circuit

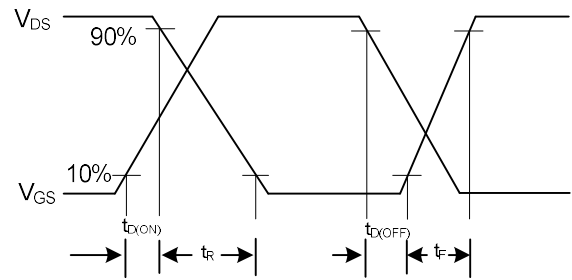


Peak Diode Recovery dv/dt Waveforms

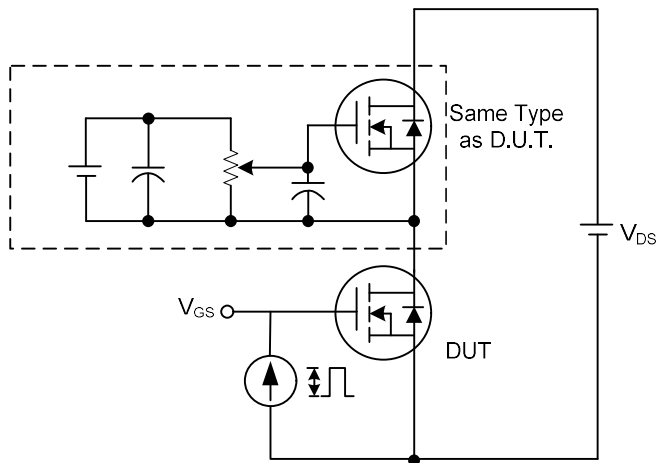
■ TEST CIRCUITS AND WAVEFORMS



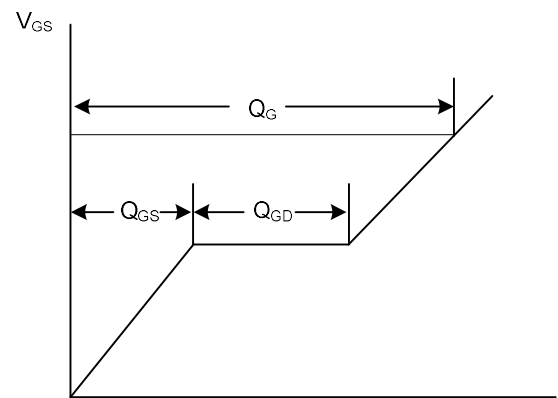
Switching Test Circuit



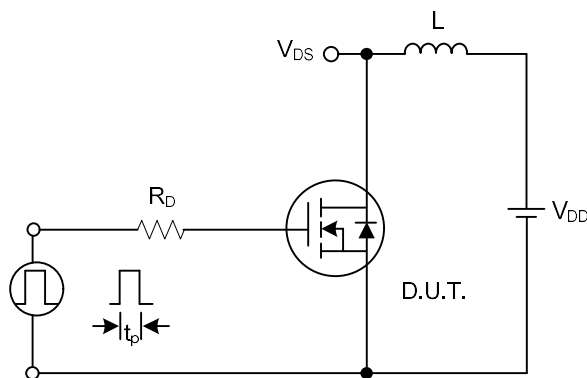
Switching Waveforms



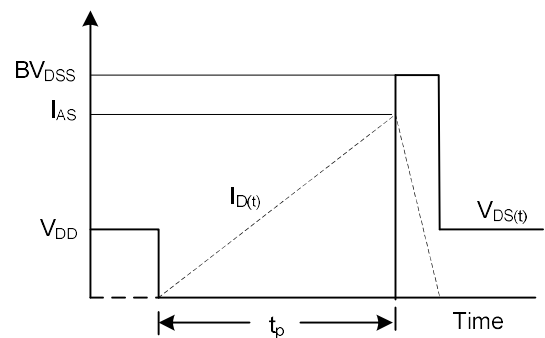
Gate Charge Test Circuit



Charge
Gate Charge Waveform

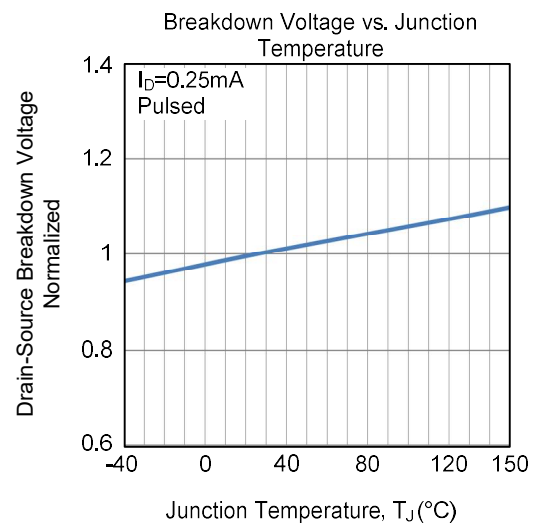
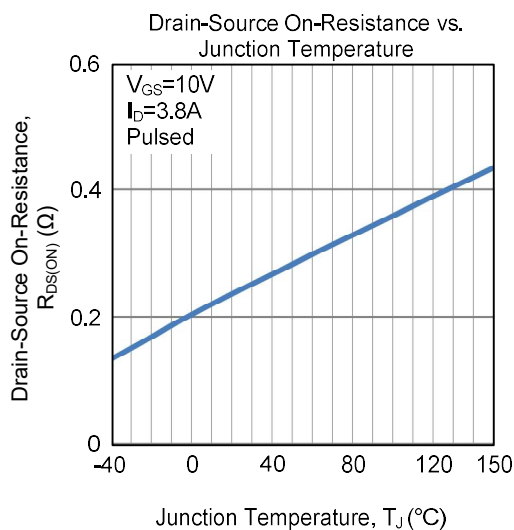
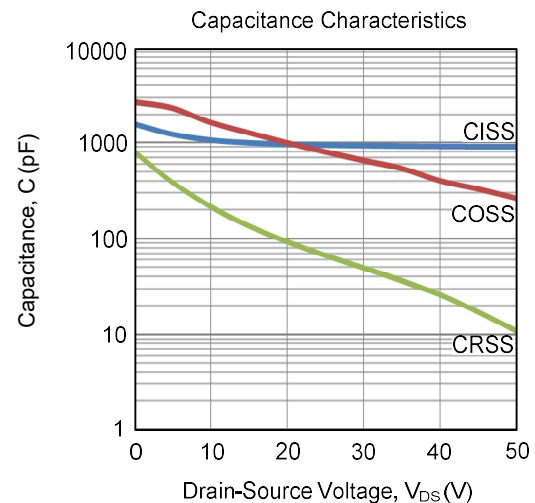
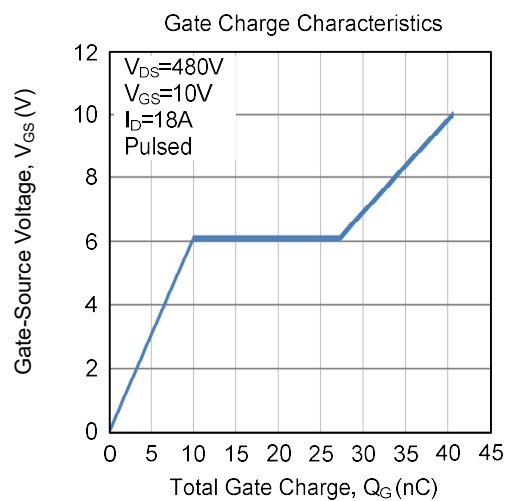
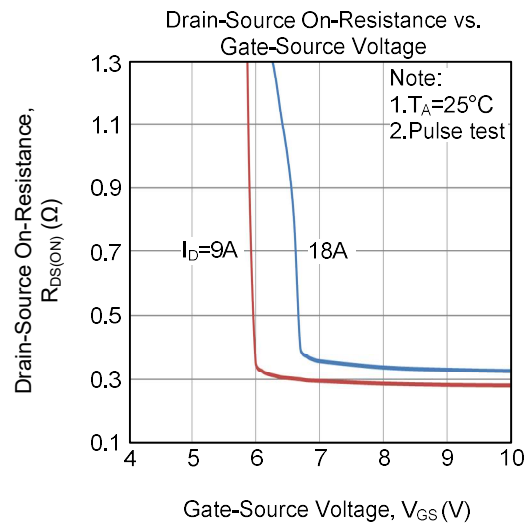
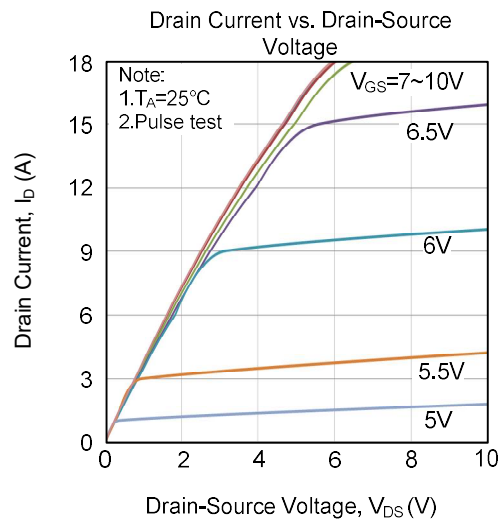


Unclamped Inductive Switching Test Circuit

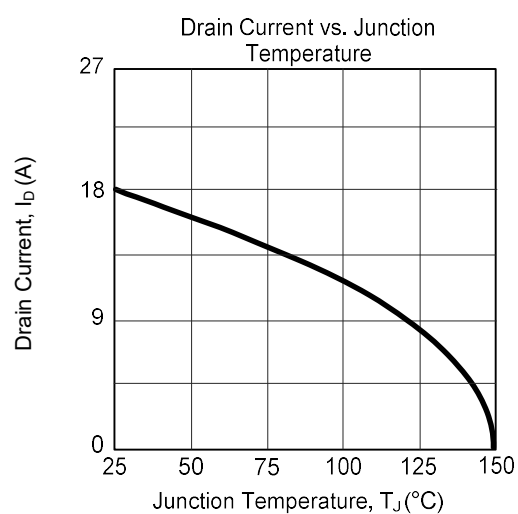
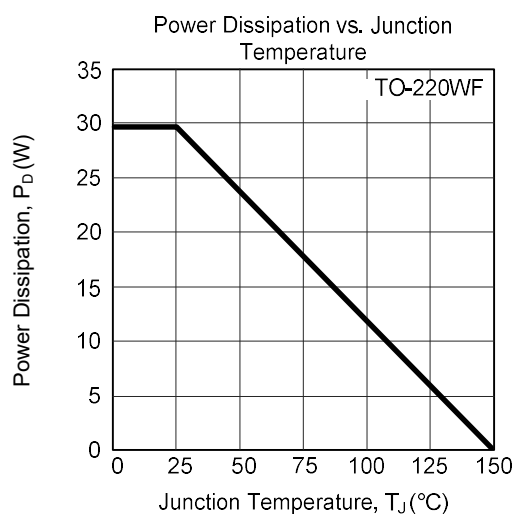
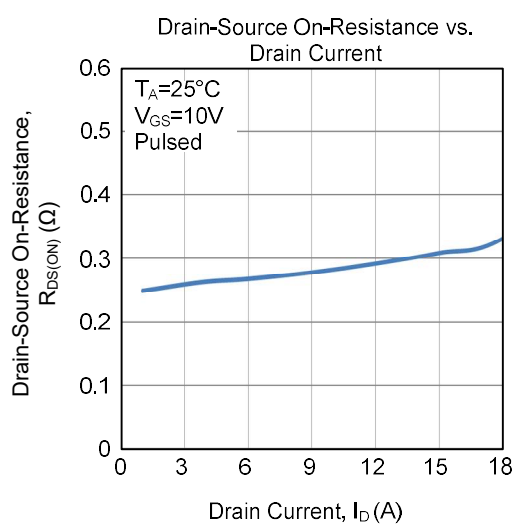
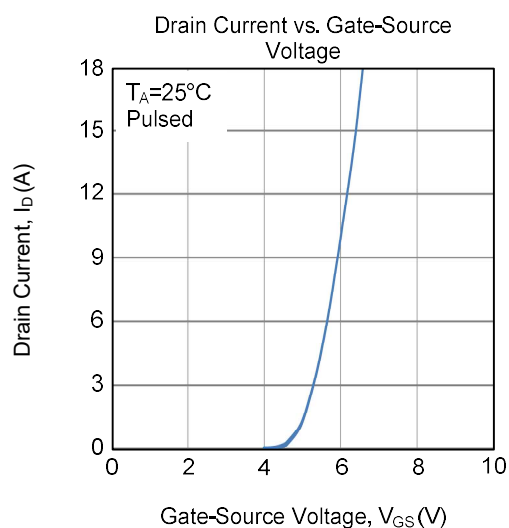
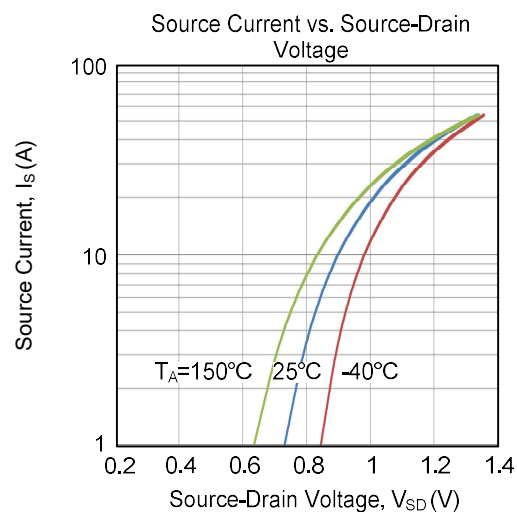
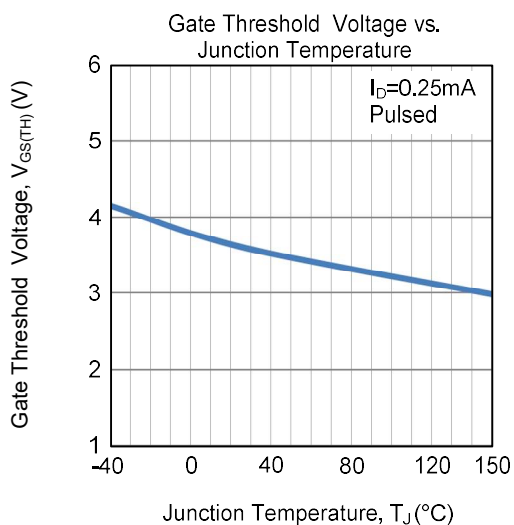


Unclamped Inductive Switching Waveforms

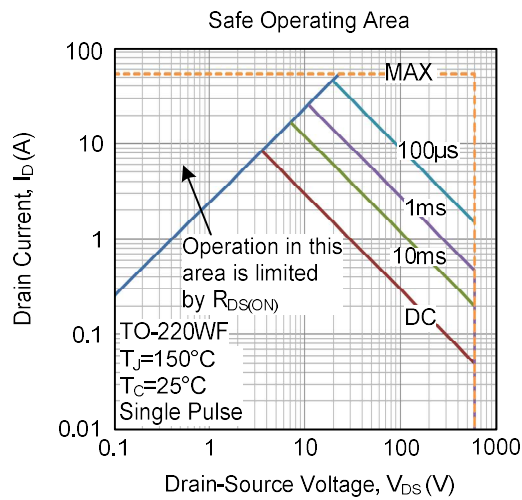
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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