



USJ65R200Z

Power MOSFET

20A, 650V N-CHANNEL SUPER-JUNCTION MOSFET

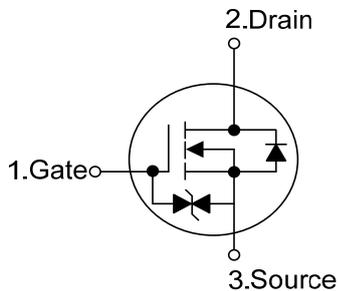
DESCRIPTION

The **UTC USJ65R200Z** 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

- * $R_{DS(ON)} \leq 0.2 \Omega @ V_{GS}=10V, I_D=5.0A$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness
- * With ESD protection

SYMBOL

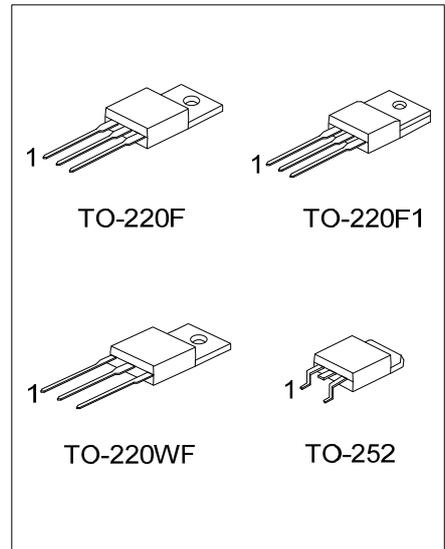


ORDERING INFORMATION

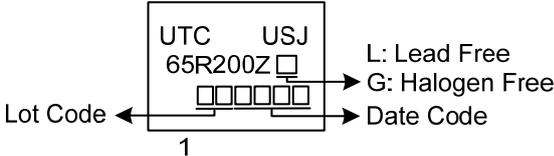
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
USJ65R200ZL-TF1-T	USJ65R200ZG-TF1-T	TO-220F1	G	D	S	Tube
USJ65R200ZL-TF3-T	USJ65R200ZG-TF3-T	TO-220F	G	D	S	Tube
USJ65R200ZL-TW1-T	USJ65R200ZG-TW1-T	TO-220WF	G	D	S	Tube
USJ65R200ZL-TN3-R	USJ65R200ZG-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>USJ65R200ZG-TF1-T</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TF3: TO-220F, TF1: TO-220F1, TW1: TO-220WF TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_c=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V _{DSS}	650	V
Gate-Source Voltage		V _{GSS}	±30	V
Drain Current	Continuous	I _D	20	A
	Pulsed (Note 2)	I _{DM}	60	A
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	215	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	0.6	V/ns
Power Dissipation	TO-220F/TO-220F1	P _D	29	W
	TO-220WF			
	TO-252		64	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} = 2.0A, V_{DD} = 50V, R_G = 25 Ω Starting T_J = 25°C

4. I_{SD} ≤ 20A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F/TO-220F1	θ _{JA}	62.5	°C/W
	TO-220WF			
	TO-252		110	°C/W
Junction to Case	TO-220F/TO-220F1	θ _{JC}	4.31	°C/W
	TO-220WF			
	TO-252		1.95 (Note)	°C/W

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

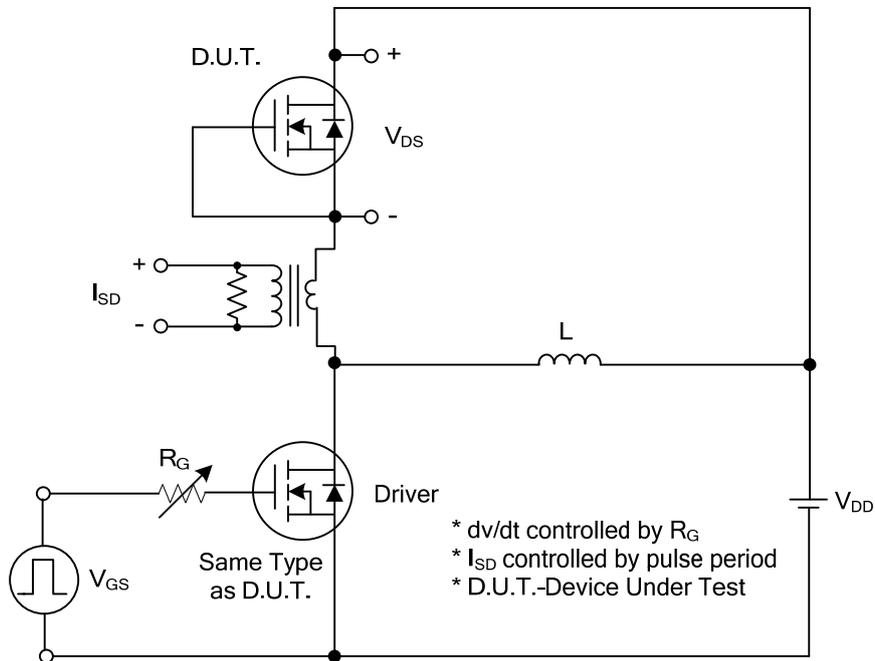
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	650			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =650V, 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
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 =5.0A			0.2	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =50V, f=1.0MHz		1156		nF
Output Capacitance	C _{OSS}			523		nF
Reverse Transfer Capacitance	C _{RSS}			37		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q _G	V _{DS} =520V, V _{GS} =10V, I _D =20A (Note 1, 2)		60		nC
Gate to Source Charge	Q _{GS}			13		nC
Gate to Drain Charge	Q _{GD}			27		nC
Turn-ON Delay Time (Note 1)	t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =20A, R _G =25Ω (Note 1, 2)		25		ns
Rise Time	t _R			54		ns
Turn-OFF Delay Time	t _{D(OFF)}			185		ns
Fall-Time	t _F			62		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				20	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _S =20A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t _{rr}	I _S =20A, V _{GS} =0V, dI _F /dt=100A/μs		416		ns
Body Diode Reverse Recovery Charge	Q _{rr}				6.5	

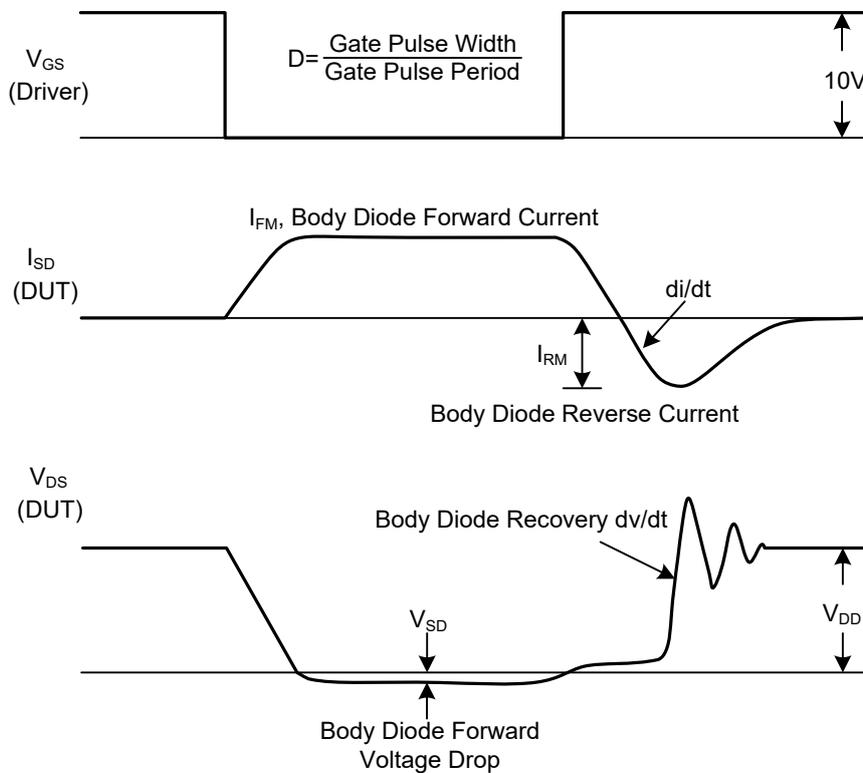
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

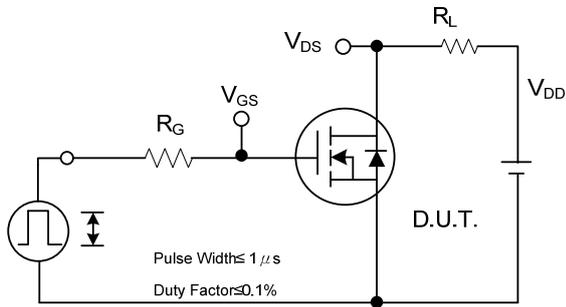


Peak Diode Recovery dv/dt Test Circuit

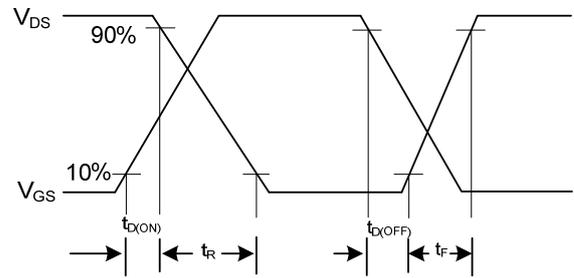


Peak Diode Recovery dv/dt Waveforms

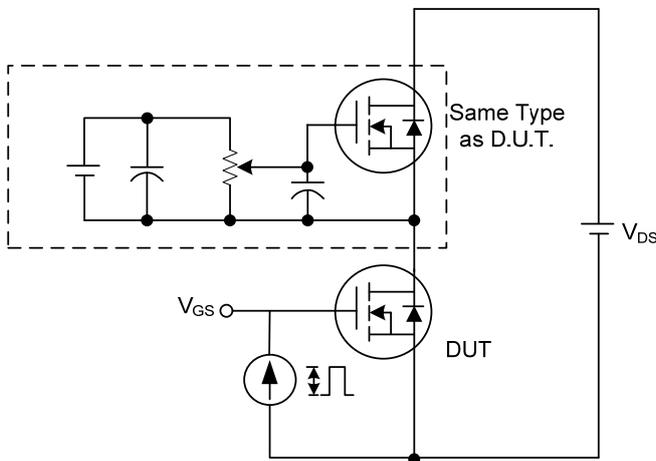
TEST CIRCUITS AND WAVEFORMS



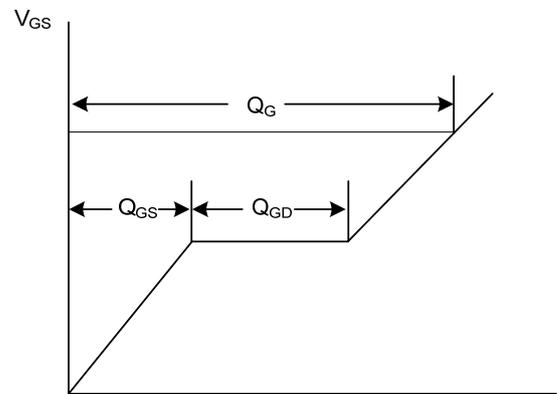
Switching Test Circuit



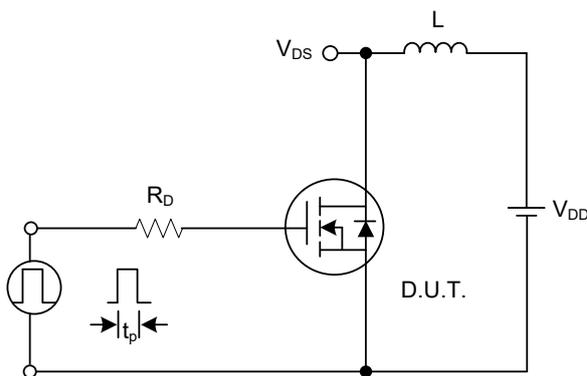
Switching Waveforms



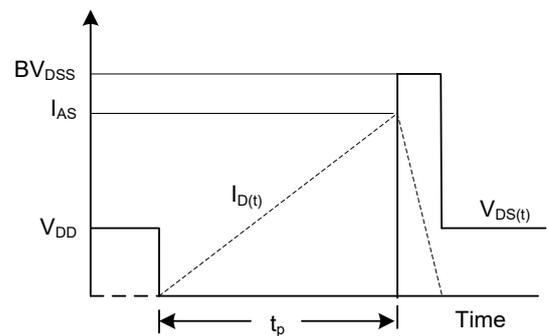
Gate Charge Test Circuit



Charge
Gate Charge Waveform

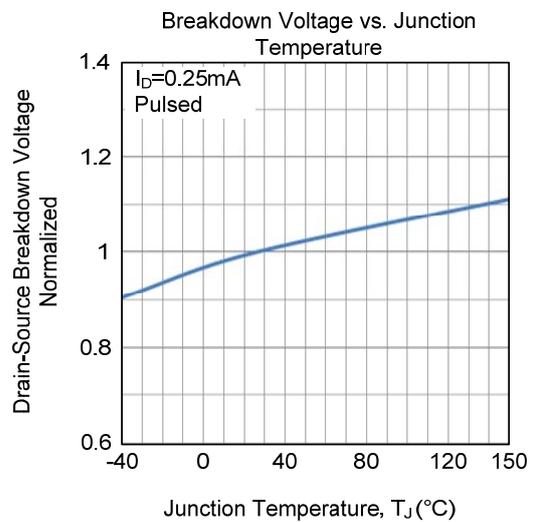
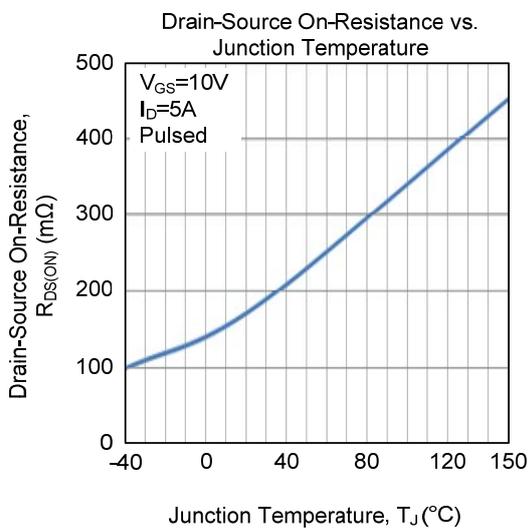
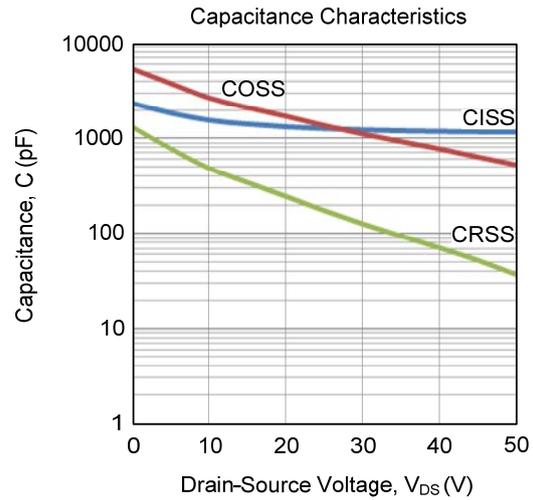
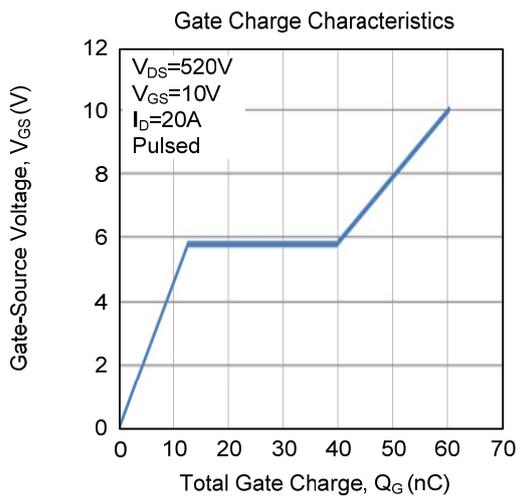
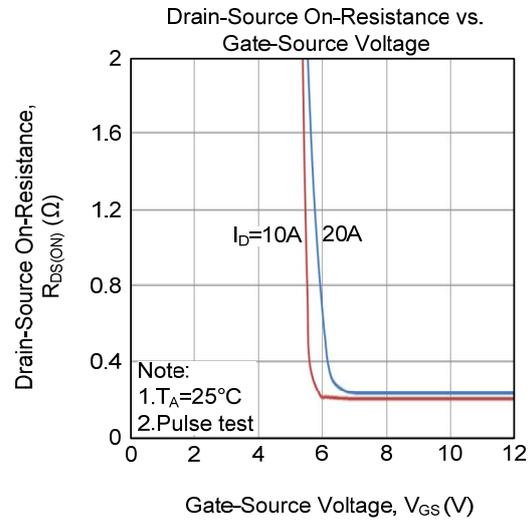
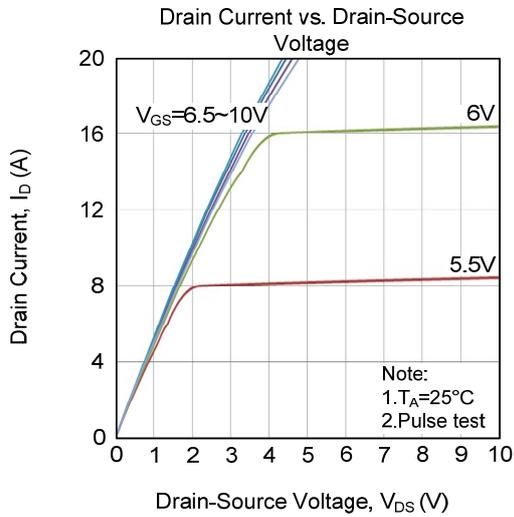


Unclamped Inductive Switching Test Circuit

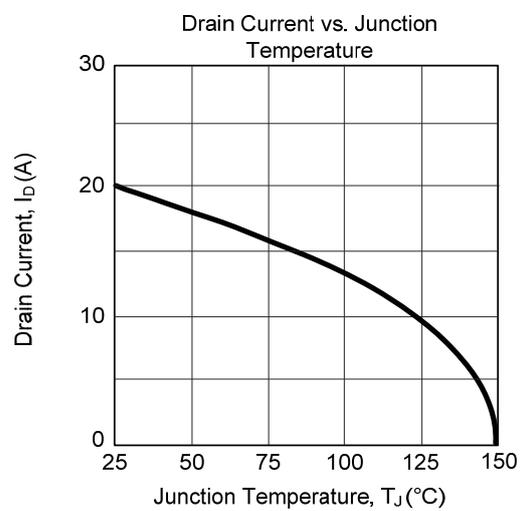
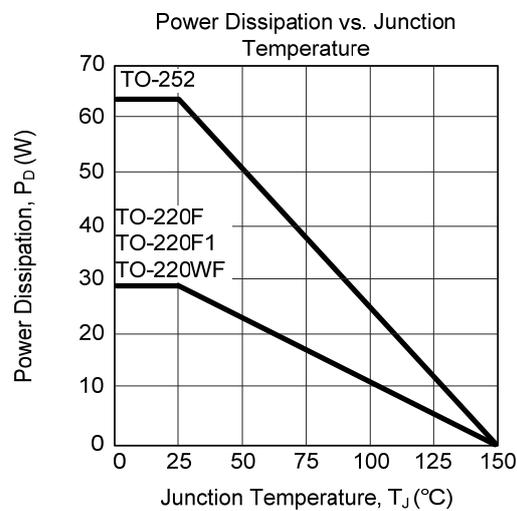
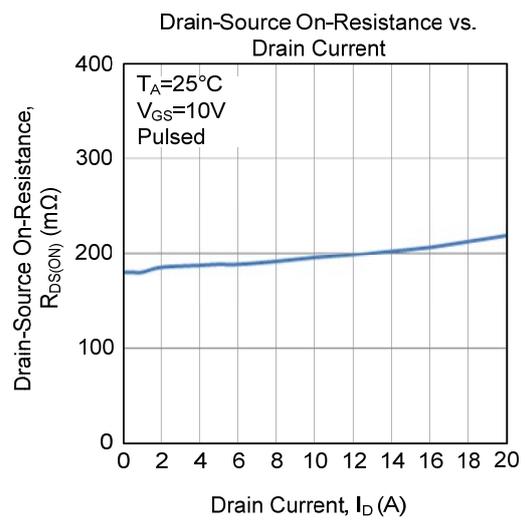
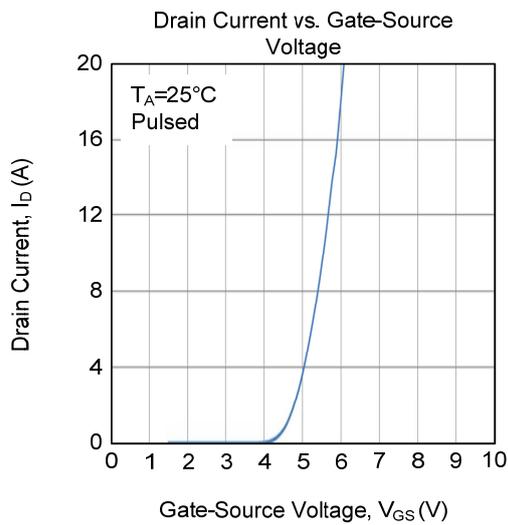
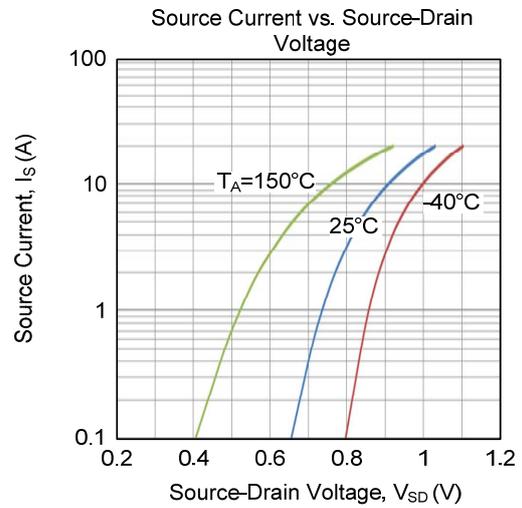
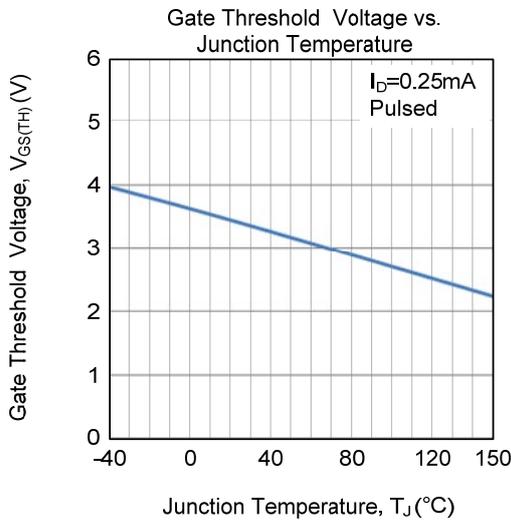


Unclamped Inductive Switching Waveforms

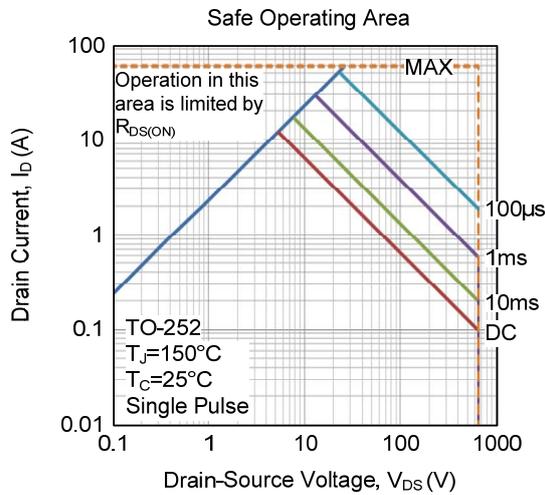
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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