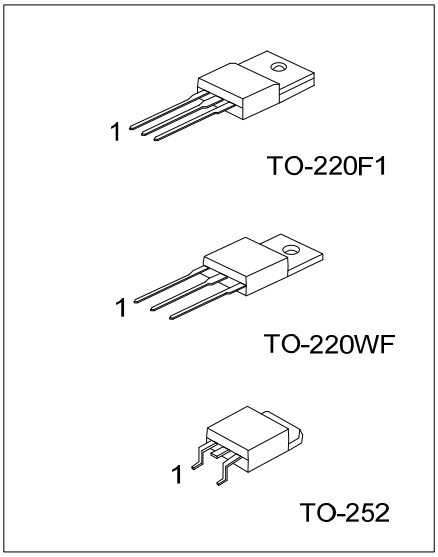
USJ65R320

Power MOSFET

14A, 650V N-CHANNEL SUPER-JUNCTION MOSFET



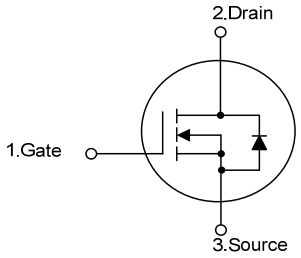
■ DESCRIPTION

The **UTC USJ65R320** 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



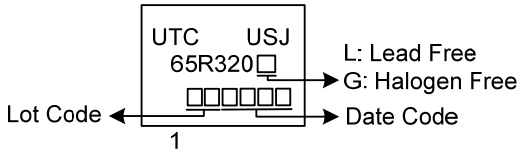
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
USJ65R320L-TF1-T	USJ65R320G-TF1-T	TO-220F1	G	D	S	Tube
USJ65R320L-TW1-T	USJ65R320G-TW1-T	TO-220WF	G	D	S	Tube
USJ65R320L-TN3-R	USJ65R320G-TN3-R	TO-252	G	D	S	Tape Reel

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

USJ65R320G-TF1-T (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube, R: Tape Reel (2) TF1: TO-220F1, TW1: TO-220WF, TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



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■ 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	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	°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 = 25Ω, Starting T_J = 25°C
4. I_{SD} ≤ 14A, 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}	4.17	°C/W
	TO-252		2.08 (Note)	°C/W

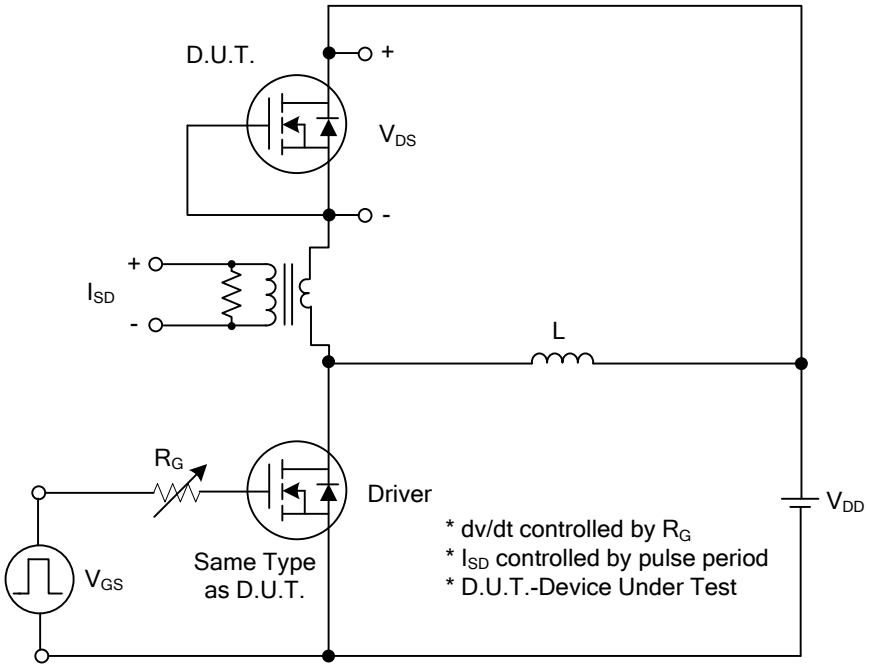
Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

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

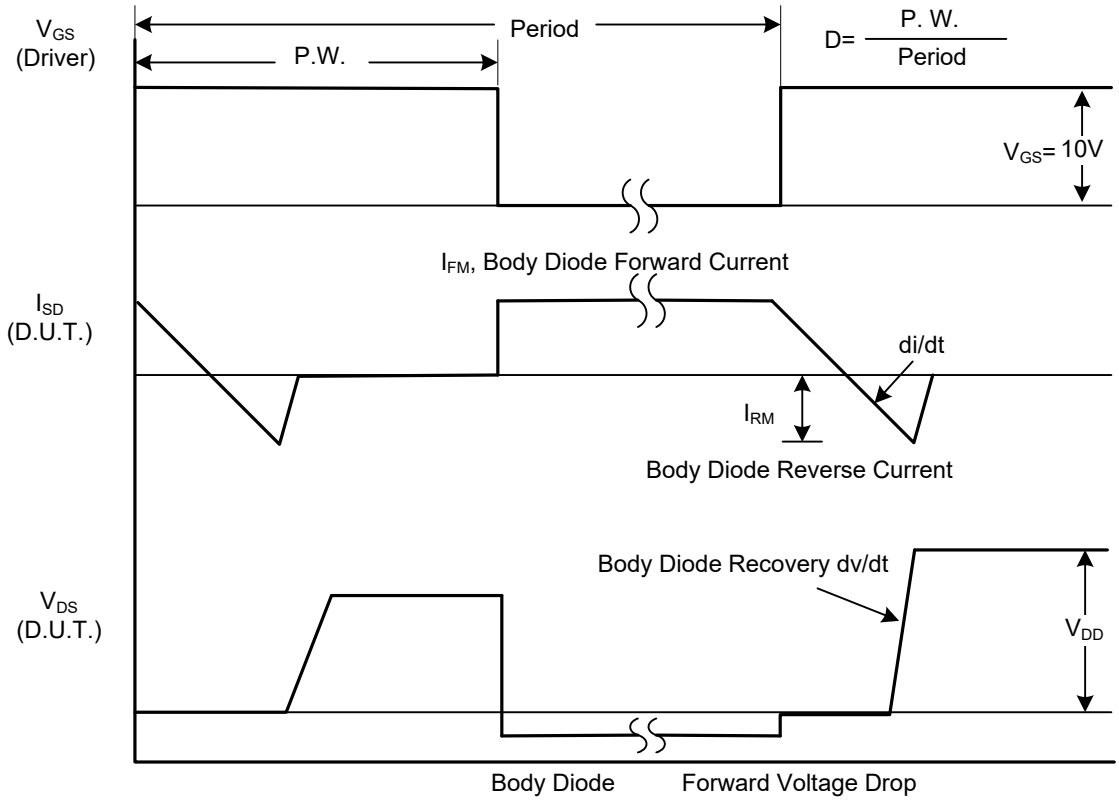
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	650			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=650V, V_{GS}=0V			10	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+30V, V_{DS}=0V			+100	nA
	Reverse		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}=520V, 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, dI_F/dt=100A/μs (Note 1)		378		ns
Body Diode Reverse Recovery Charge		Q_{rr}			5.8		μC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS

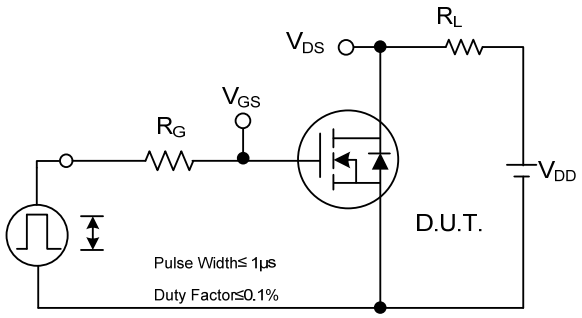


Peak Diode Recovery dv/dt Test Circuit

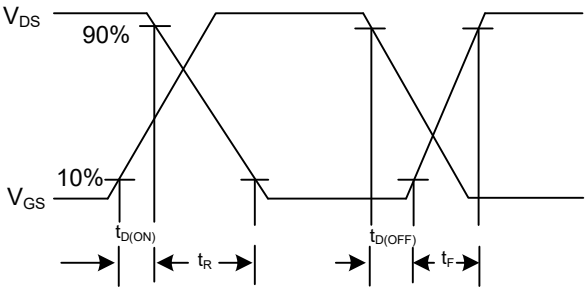


Peak Diode Recovery dv/dt Waveforms

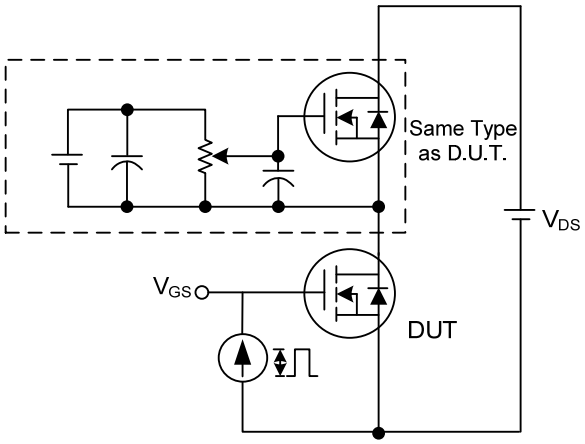
■ TEST CIRCUITS AND WAVEFORMS



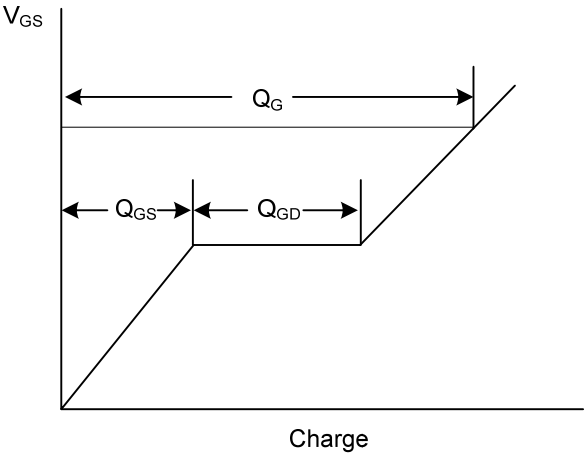
Switching Test Circuit



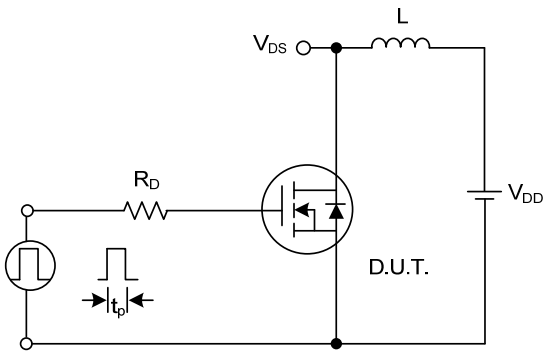
Switching Waveforms



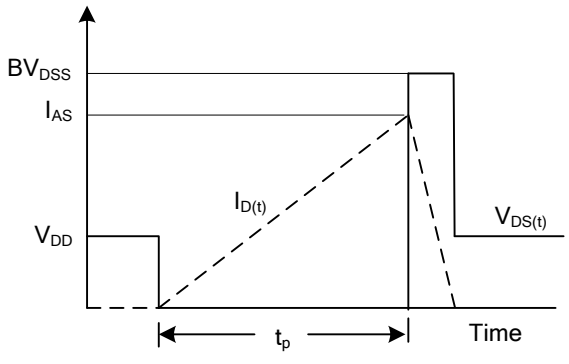
Gate Charge Test Circuit



Gate Charge Waveform



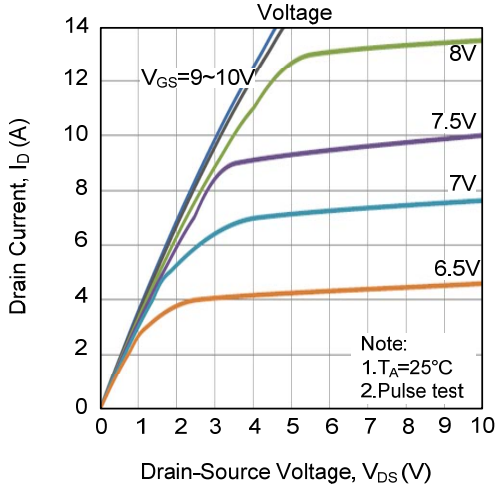
Unclamped Inductive Switching Test Circuit



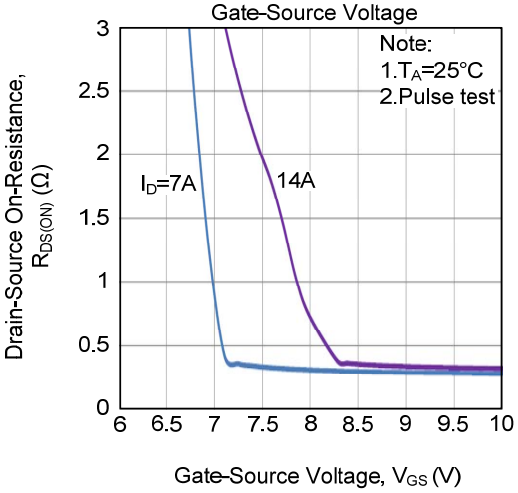
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

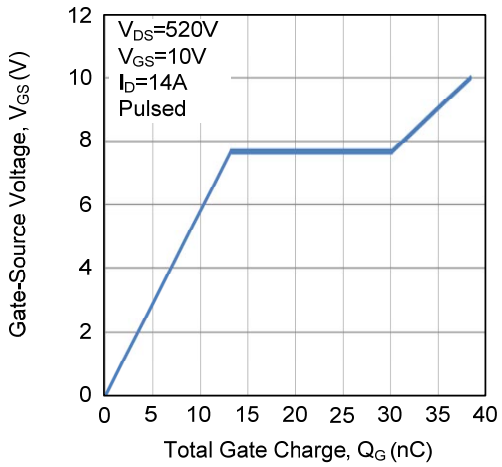
Drain Current vs. Drain-Source Voltage



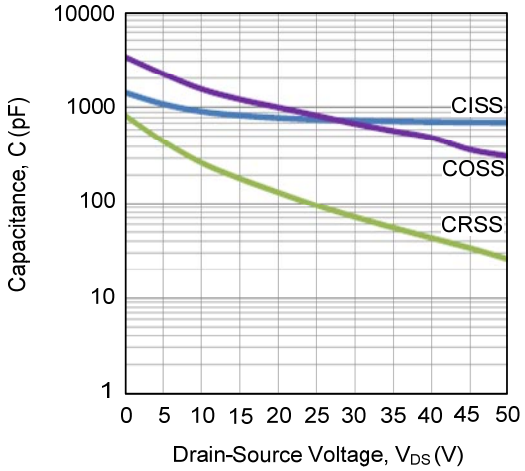
Drain-Source On-Resistance vs. Gate-Source Voltage



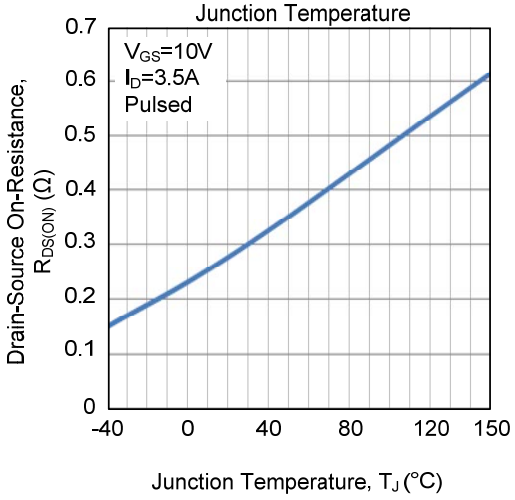
Gate Charge Characteristics



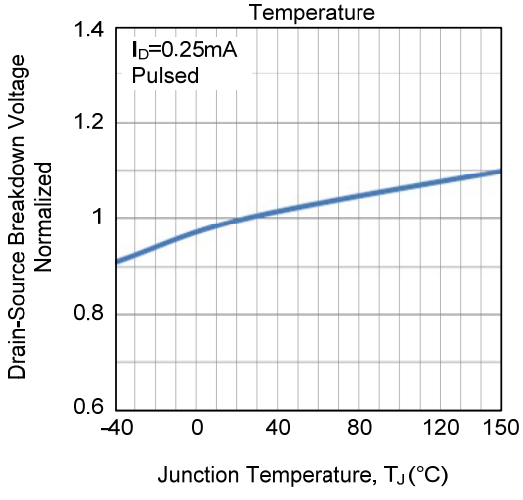
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

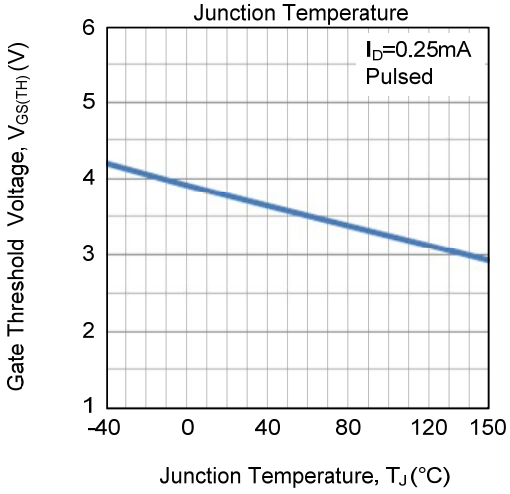


Breakdown Voltage vs. Junction Temperature

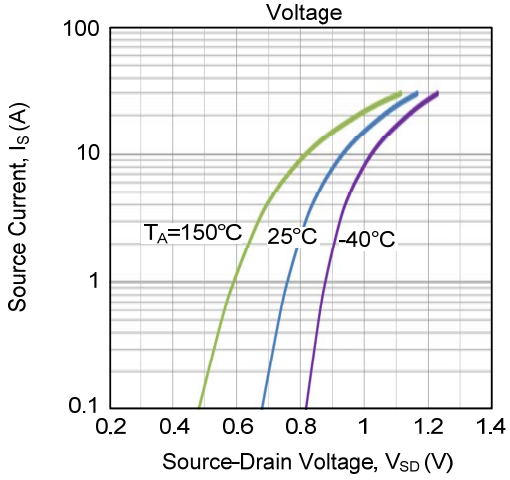


■ TYPICAL CHARACTERISTICS (Cont.)

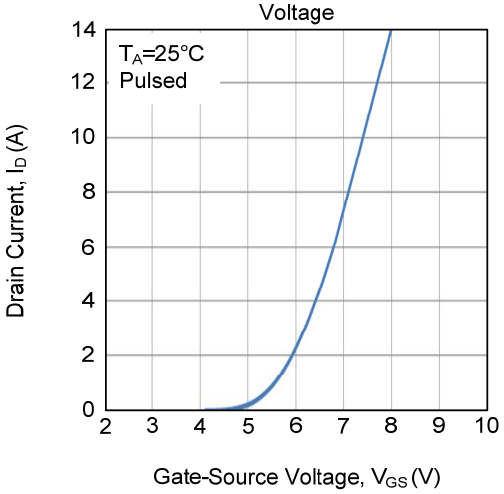
Gate Threshold Voltage vs. Junction Temperature



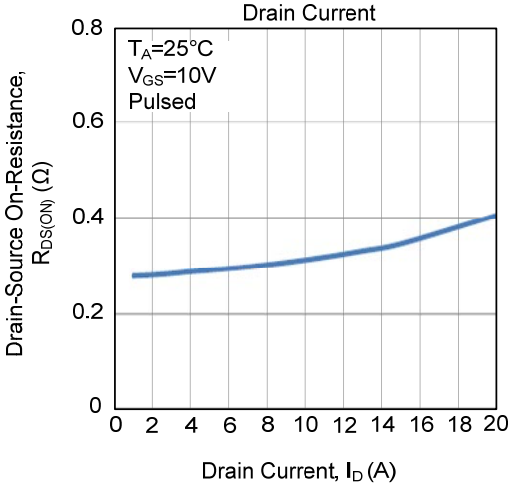
Source Current vs. Source-Drain Voltage



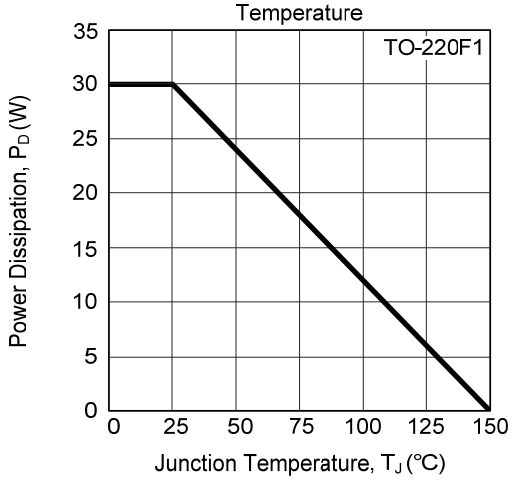
Drain Current vs. Gate-Source Voltage



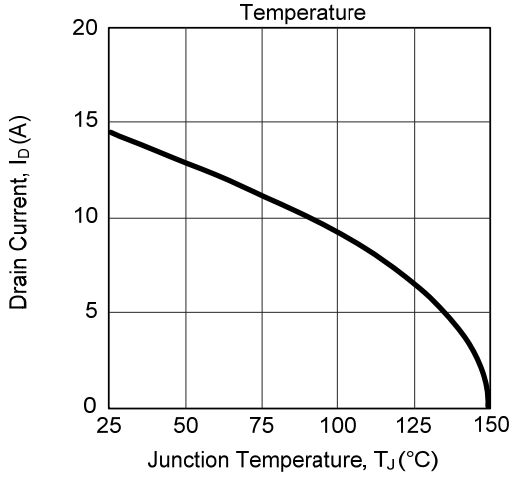
Drain-Source On-Resistance vs. Drain Current



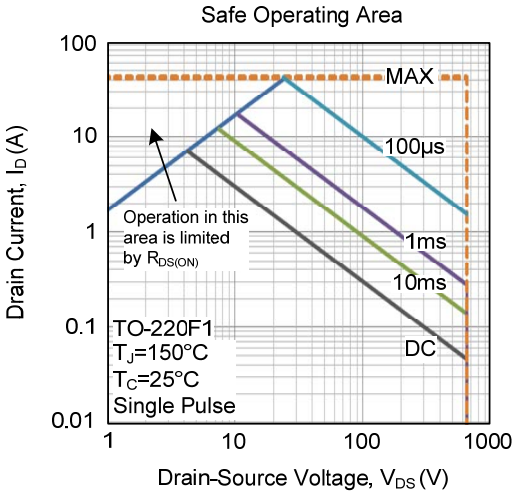
Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)



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