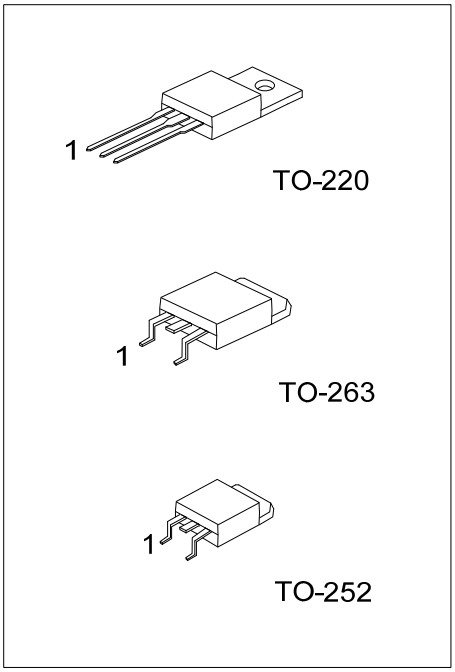
UF9Z24-F

Power MOSFET

-12A, -55V P-CHANNEL POWER MOSFET



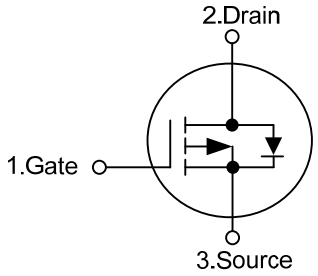
■ DESCRIPTION

The UTC **UF9Z24-F** is a P-channel power MOSFET using UTC's advanced technology to provide the customers with high switching speed, cost-effectiveness and minimum on-state resistance. It can also withstand high energy in the avalanche.

■ FEATURES

* $R_{DS(ON)}$ ≤ 150 mΩ @ V_{GS}=-10V, I_D=-7.2A
* High Switching Speed

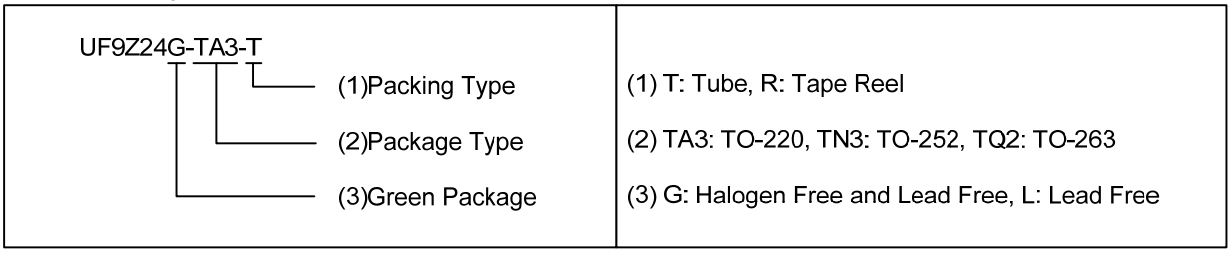
■ SYMBOL



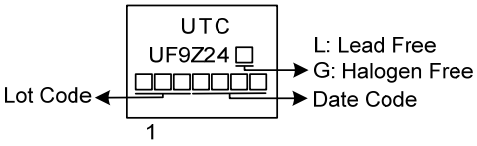
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UF9Z24L-TA3-T	UF9Z24G-TA3-T	TO-220	G	D	S	Tube
UF9Z24L-TN3-R	UF9Z24G-TN3-R	TO-252	G	D	S	Tape Reel
UF9Z24L-TQ2-T	UF9Z24G-TQ2-T	TO-263	G	D	S	Tube
UF9Z24L-TQ2-R	UF9Z24G-TQ2-R	TO-263	G	D	S	Tape Reel

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



■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	-55	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	Continuous	I_D	-12	A
	Pulsed	I_{DM}	-24	A
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	390	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.2	V/ns
Power Dissipation	TO-220/TO-263	P_D	60	W
	TO-252		25	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=30mH, I_{AS}=-5.1A, V_{DD}=-50V, R_G=25Ω, Starting T_J = 25°C
4. I_{SD}≤-12A, di/dt≤200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

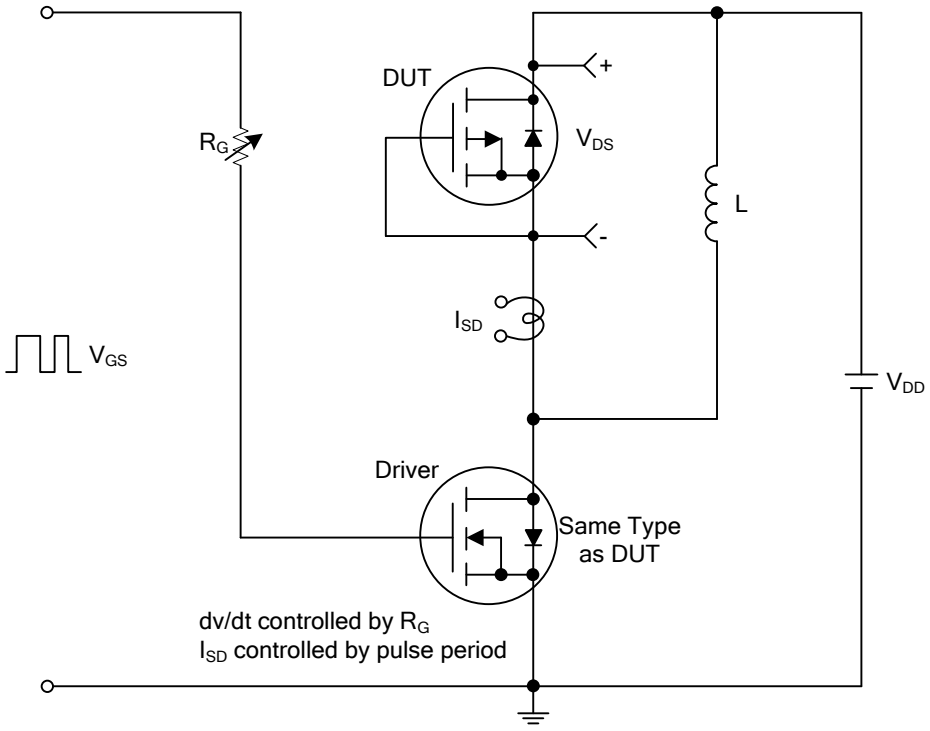
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-263	θ_{JA}	62.5	°C/W
	TO-252		110	°C/W
Junction to Case	TO-220/TO-263	θ_{JC}	2.1	°C/W
	TO-252		5	°C/W

■ Electrical Characteristics (T_J=25°C, unless otherwise specified)

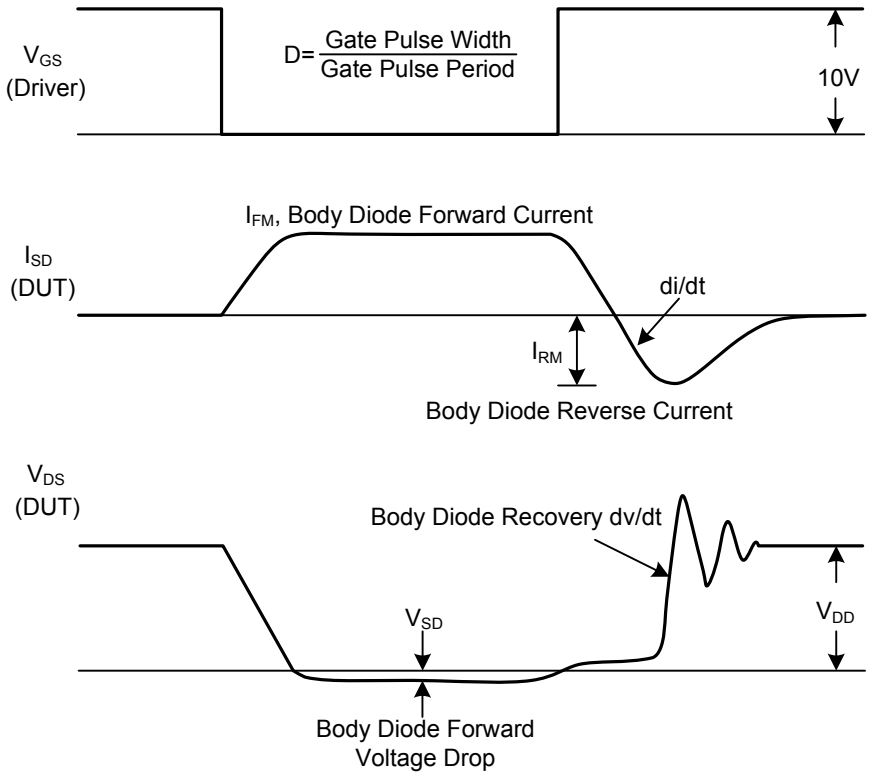
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=-250μA, V_{GS}=0V	-55			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=-55V, V_{GS}=0V			-1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V			+100	nA
	Reverse		V_{GS}=-20V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=-250μA	-2.0		-4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=-10V, I_D=-7.2A (Note 1)			150	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=-25V, f=1.0MHz (Note 2)		640		pF
Output Capacitance		C_{OSS}			180		pF
Reverse Transfer Capacitance		C_{RSS}			40		pF
SWITCHING PARAMETERS							
Total Gate Charge(Note 1)		Q_G	V_{DS}=-44V, V_{GS}=-10V, I_D=-12A		19.3		nC
Gate to Source Charge		Q_{GS}			3		nC
Gate to Drain Charge		Q_{GD}			6		nC
Turn-ON Delay Time(Note 1)		$t_{D(ON)}$	V_{DD}=-30V, I_D=-12A, R_G=25Ω		6.8		ns
Rise Time		t_R			17		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			20		ns
Fall-Time		t_F			17		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS (Note 2)							
Maximum Body-Diode Continuous Current		I_S				-12	A
Maximum Body-Diode Pulsed Current		I_{SM}				-24	A
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S=-12A (Note 1)			-1.6	V
Body Diode Reverse Recovery Time(Note 1)		t_{rr}	V_{GS}=0V, I_S=-12A, dI_F/dt=100A/μs		48		ns
Body Diode Reverse Recovery Charge		Q_{rr}			85		nC

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

■ TEST CIRCUITS AND WAVEFORMS



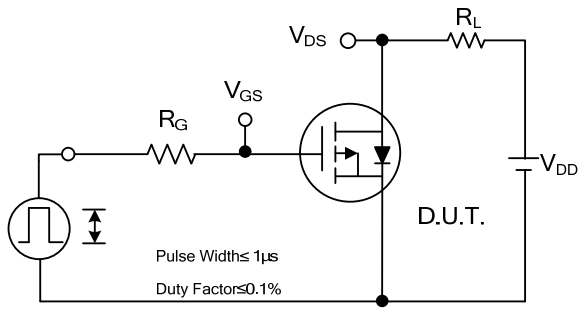
Peak Diode Recovery dv/dt Test Circuit



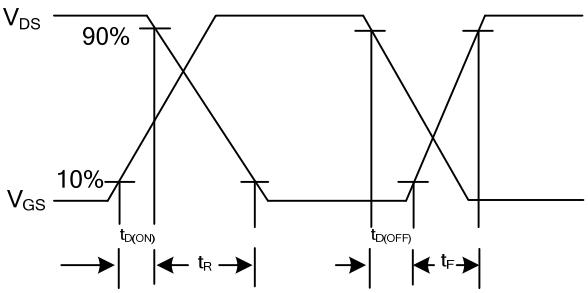
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

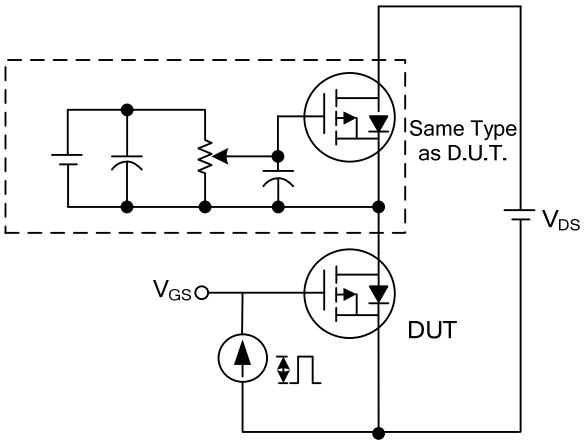
■ TEST CIRCUITS AND WAVEFORMS



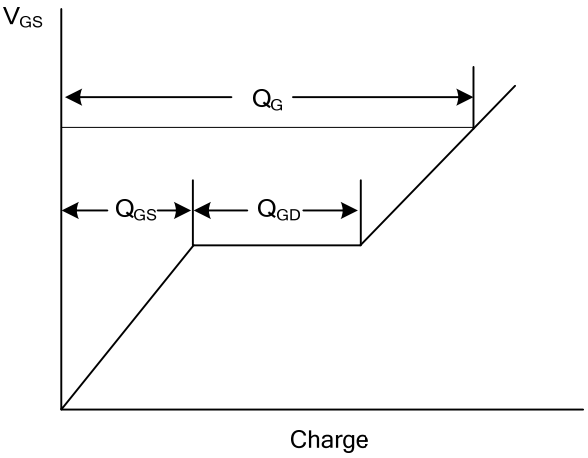
Switching Test Circuit



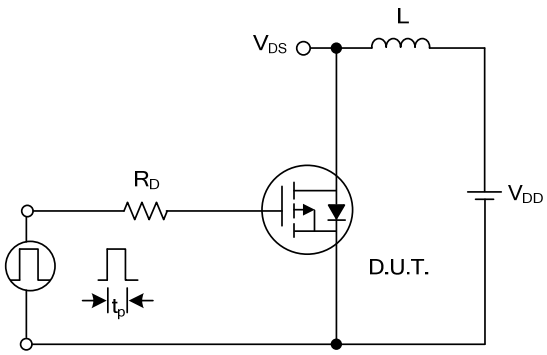
Switching Waveforms



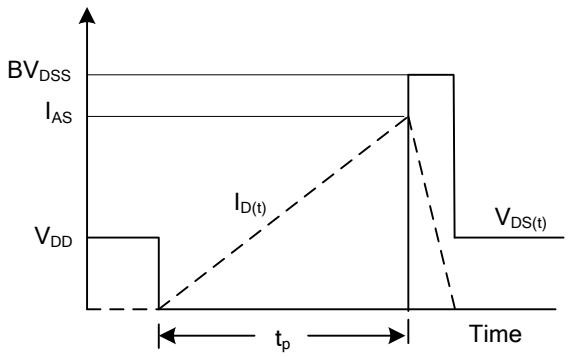
Gate Charge Test Circuit



Gate Charge Waveform

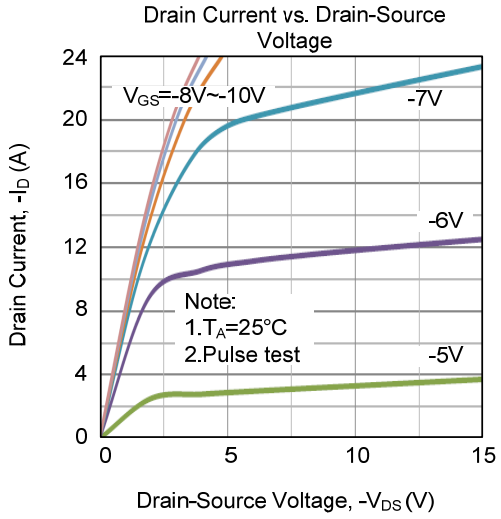


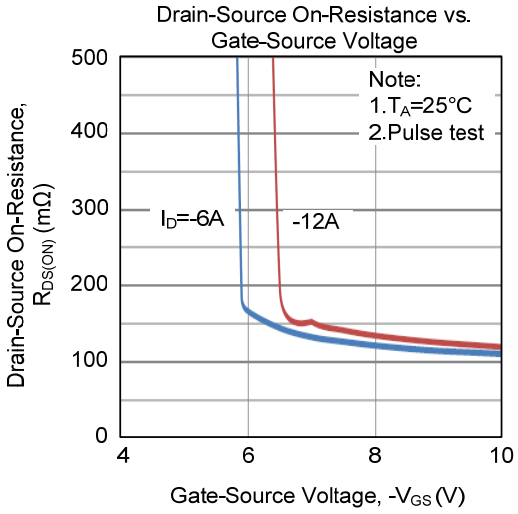
Unclamped Inductive Switching Test Circuit

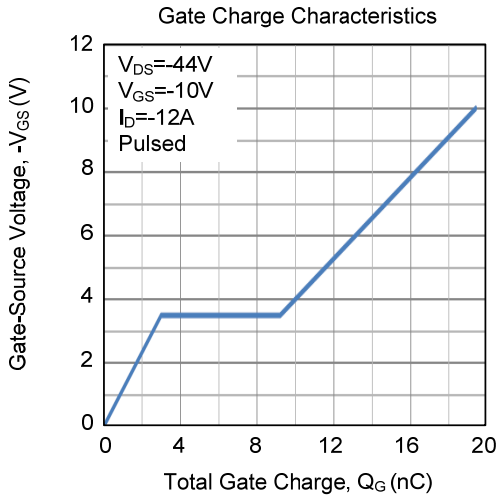


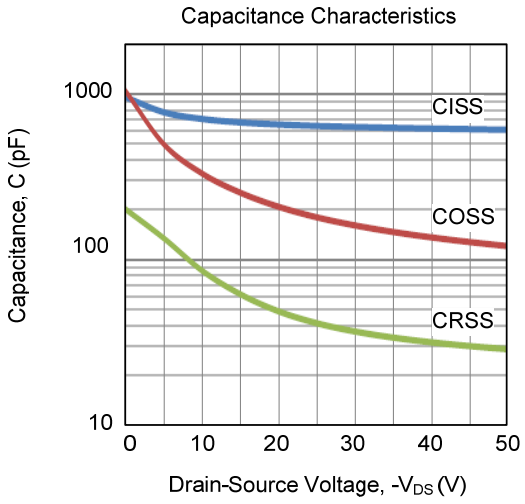
Unclamped Inductive Switching Waveforms

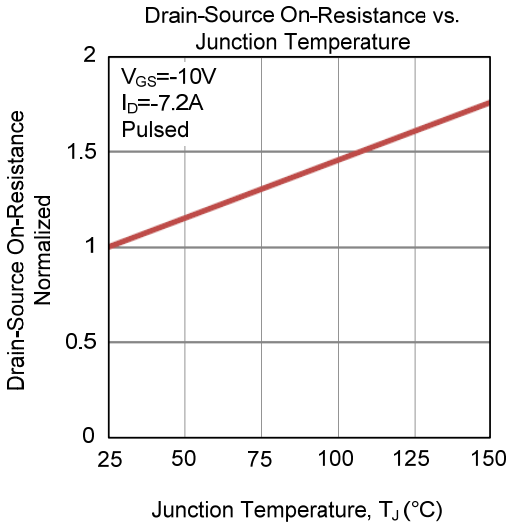
■ TYPICAL CHARACTERISTICS

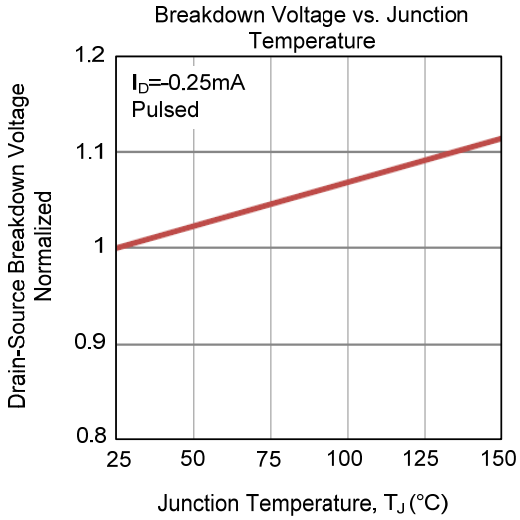






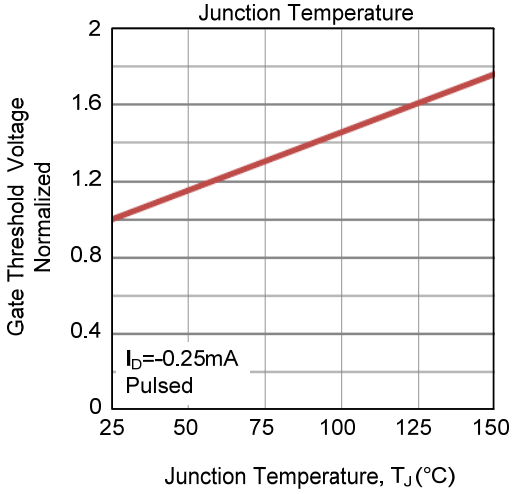




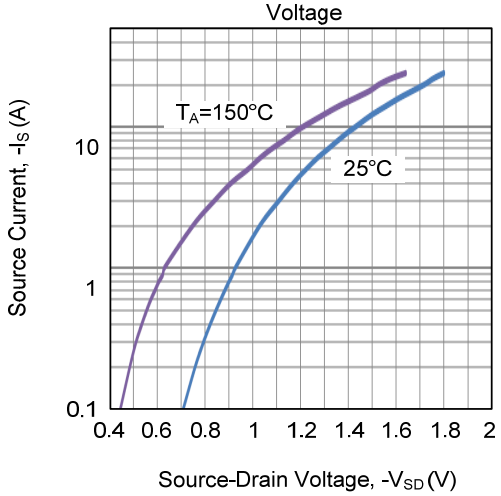


■ TYPICAL CHARACTERISTICS (Cont.)

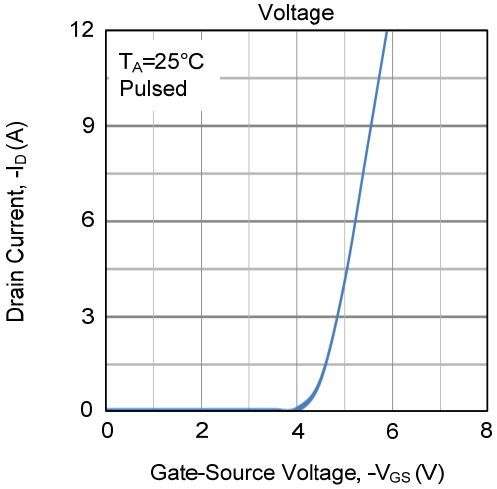
Gate Threshold Voltage vs. Junction Temperature



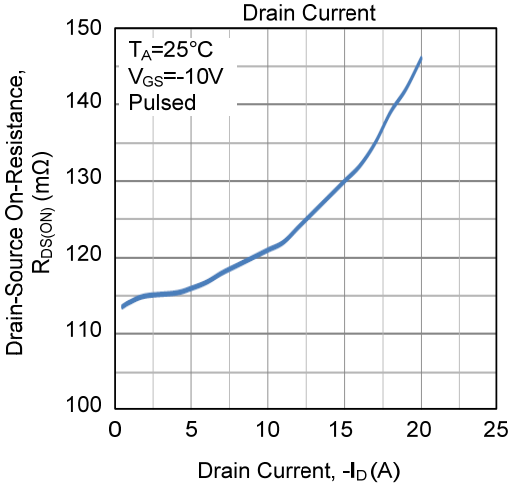
Source Current vs. Source-Drain Voltage



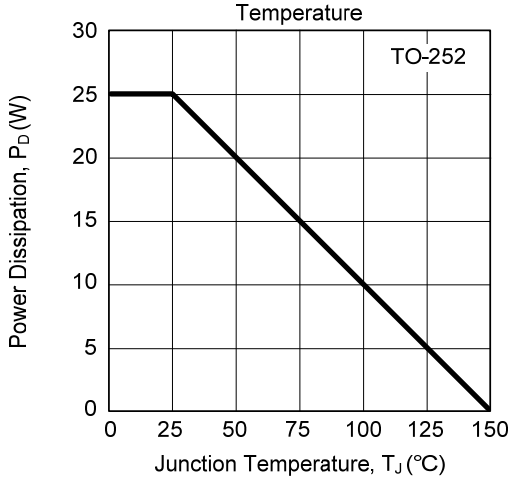
Drain Current vs. Gate-Source Voltage



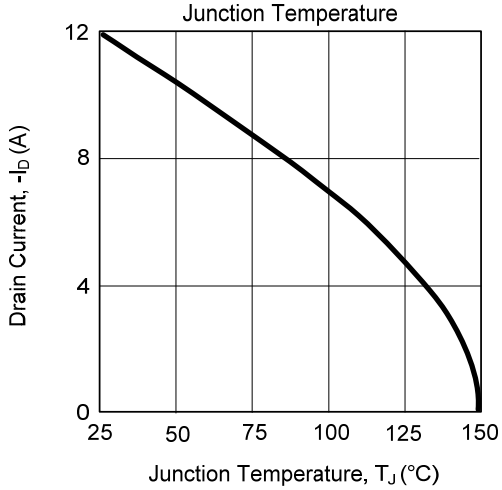
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)