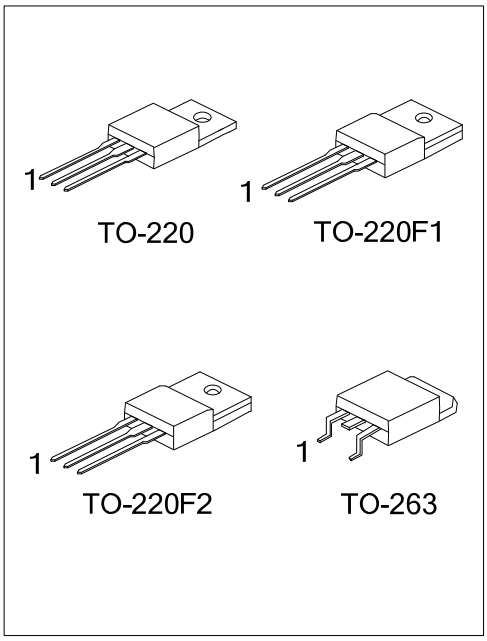
UFP254

Power MOSFET

23A, 250V N-CHANNEL POWER MOSFET



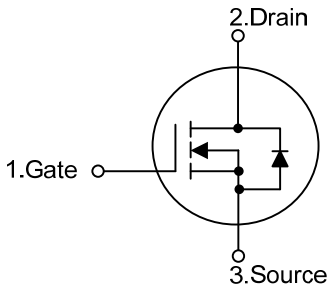
■ DESCRIPTION

The UTC **UFP254** is an N-channel mode Power FET, it uses UTC's advanced technology. This technology allows a minimum on-state resistance, superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

■ FEATURES

* $R_{DS(ON)} \leq 140\ m\Omega$ @ V_{GS}=10V, I_D=14A
* Low Gate Charge (Maximum 140nC)
* High Switching Speed

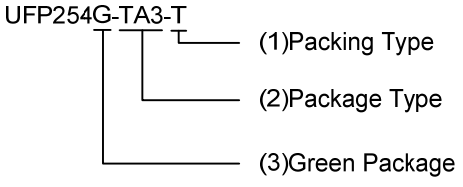
■ SYMBOL



■ ORDERING INFORMATION

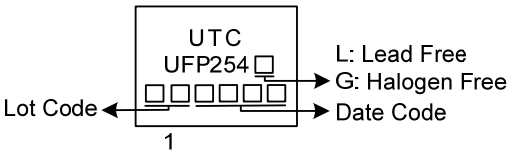
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UFP254L-TA3-T	UFP254G-TA3-T	TO-220	G	D	S	Tube
UFP254L-TF1-T	UFP254G-TF1-T	TO-220F1	G	D	S	Tube
UFP254L-TF2-T	UFP254G-TF2-T	TO-220F2	G	D	S	Tube
UFP254L-TQ2-T	UFP254G-TQ2-T	TO-263	G	D	S	Tube
UFP254L-TQ2-R	UFP254G-TQ2-R	TO-263	G	D	S	Tape Reel

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



(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2
TQ2: TO-263
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	250	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	Continuous	I_D	23	A
	Pulsed (Note 2)	I_{DM}	92	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	1780	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	9	V/ns
Power Dissipation	TO-220/TO-263	P_D	150	W
	TO-220F1/TO-220F2		42	W
Junction Temperature		T_J	+150	°C
Storage Temperature Range		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}=10A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
4. I_{SD} ≤ 23A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

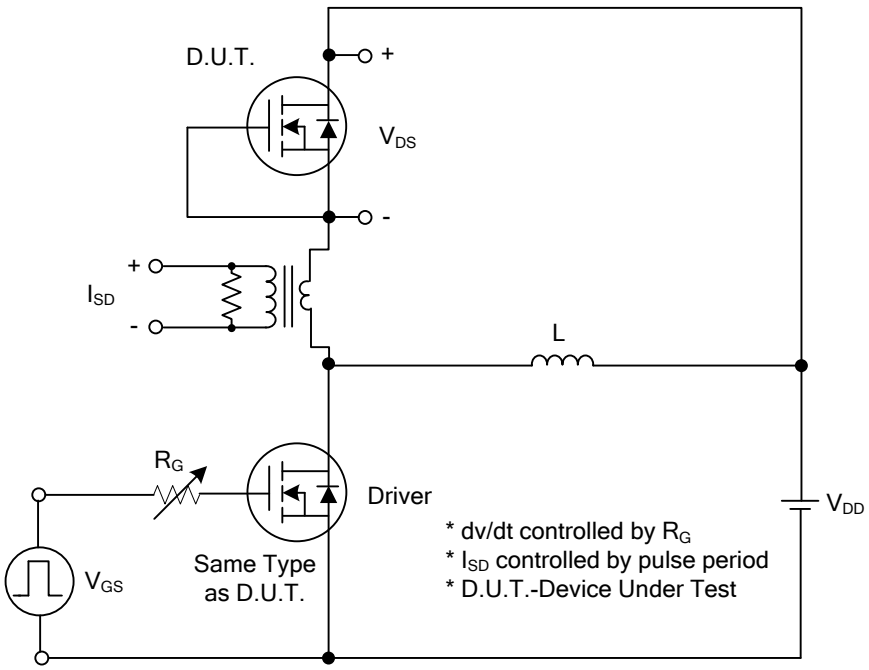
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ_{JA}	62.5	°C/W
Junction to Case	TO-220/TO-263	θ_{JC}	0.83	°C/W
	TO-220F1/TO-220F2		2.97	°C/W

■ ELECTRICAL CHARACTERISTICS

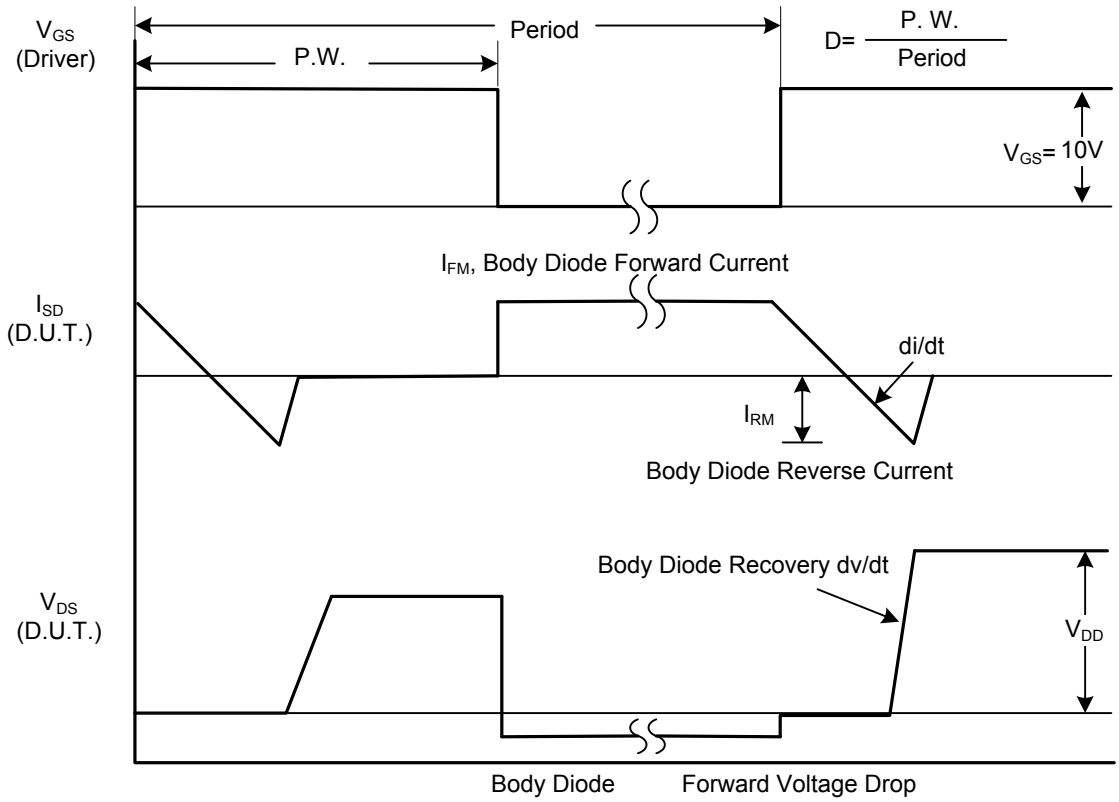
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	250			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=250V			25	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	I_D=250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=14A			140	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1MHz		2900		pF
Output Capacitance		C_{OSS}			400		pF
Reverse Transfer Capacitance		C_{RSS}			42		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DS}=200V, V_{GS}=10V, I_D=23A (Note 1, 2)		92		nC
Gate to Source Charge		Q_{GS}			26		nC
Gate to Drain Charge		Q_{GD}			52		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=100V, V_{GS}=10V, I_D=23A, R_G=25Ω (Note 1, 2)		30		ns
Rise Time		t_R			25		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			220		ns
Fall-Time		t_F			42		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				23	A
Maximum Body-Diode Pulsed Current		I_{SM}				92	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=23A, V_{GS}=0V			1.8	V
Reverse Recovery Time		t_{rr}	I_S=23A, V_{GS}=0V, dI_F/dt=100A/μs (Note 1)		240		ns
Reverse Recovery Charge		Q_{rr}			2		μC

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

■ TEST CIRCUITS AND WAVEFORMS

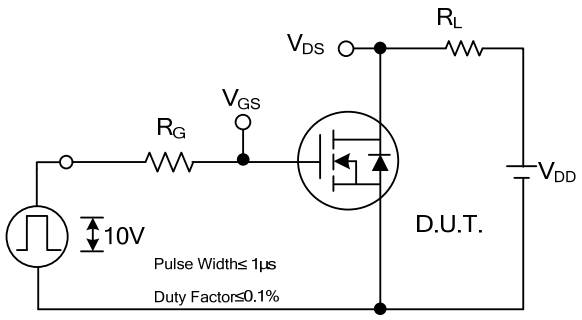


Peak Diode Recovery dv/dt Test Circuit

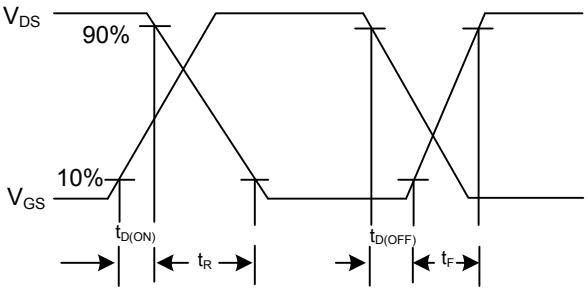


Peak Diode Recovery dv/dt Waveforms

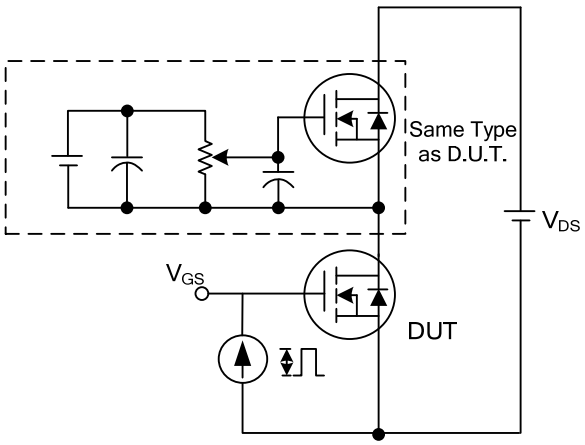
■ TEST CIRCUITS AND WAVEFORMS



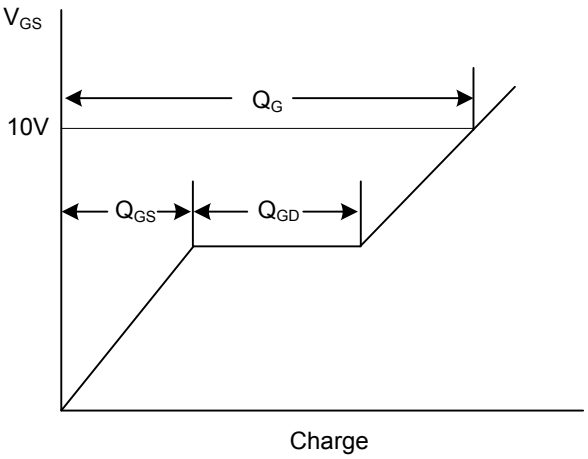
Switching Test Circuit



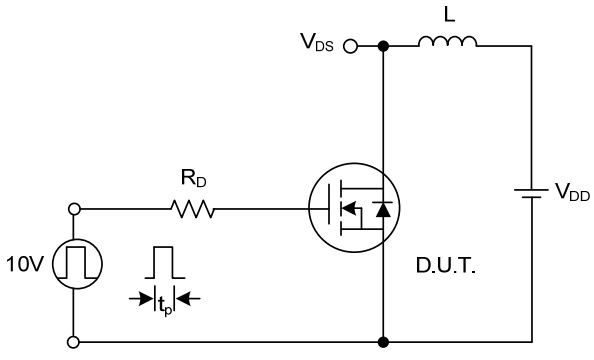
Switching Waveforms



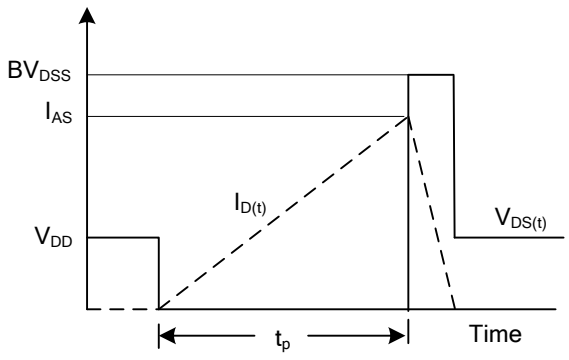
Gate Charge Test Circuit



Gate Charge Waveform



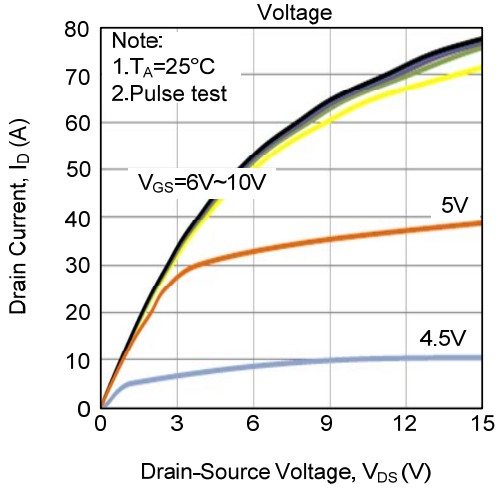
Unclamped Inductive Switching Test Circuit



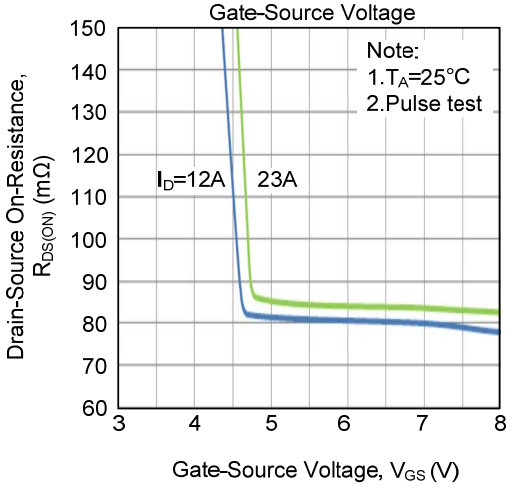
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

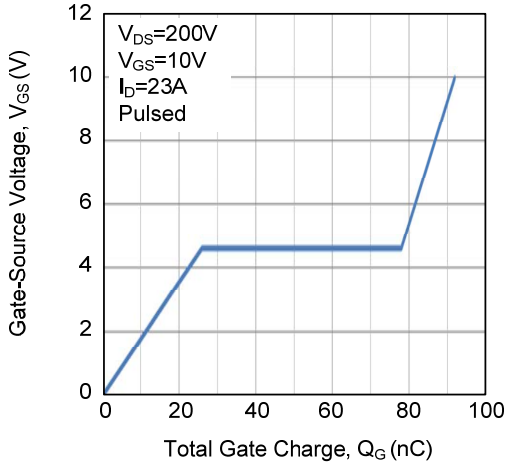
Drain Current vs. Drain-Source Voltage



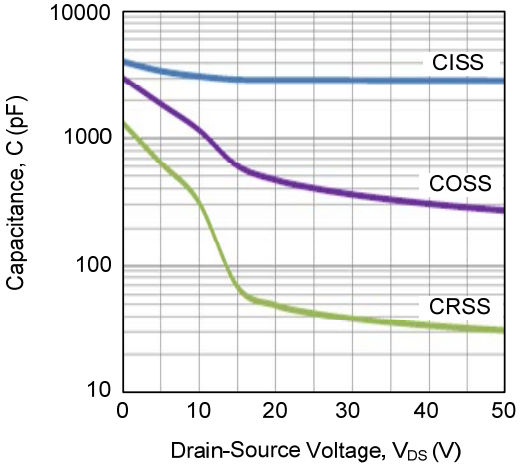
Drain-Source On-Resistance vs. Gate-Source Voltage



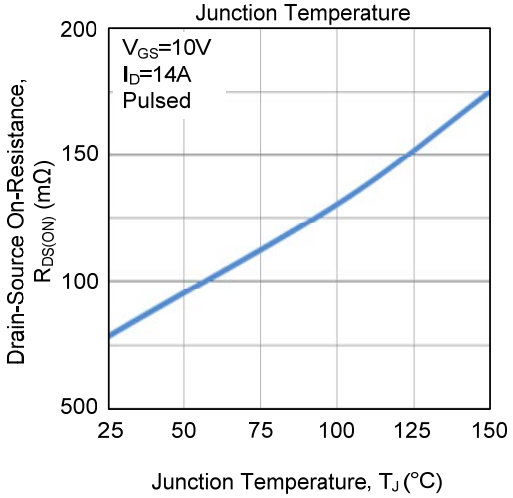
Gate Charge Characteristics



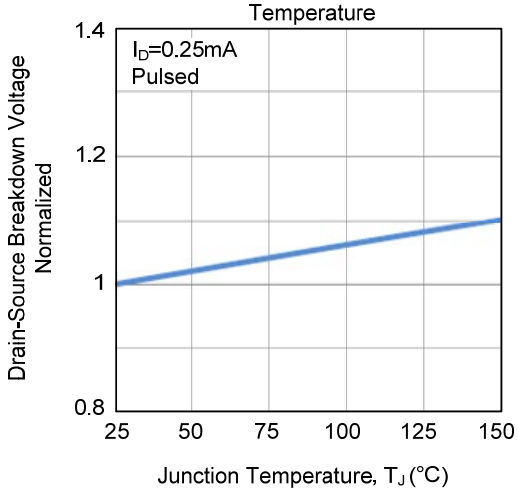
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

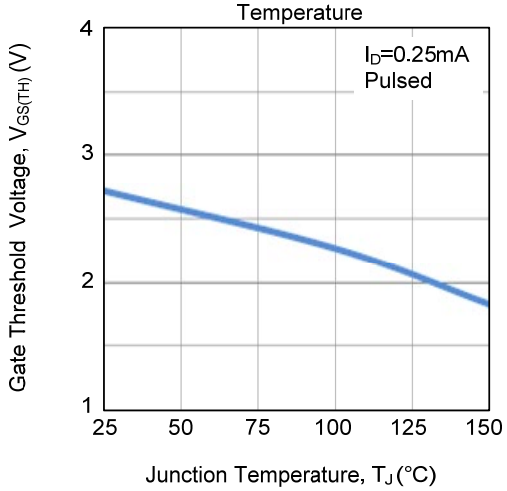


Breakdown Voltage vs. Junction Temperature

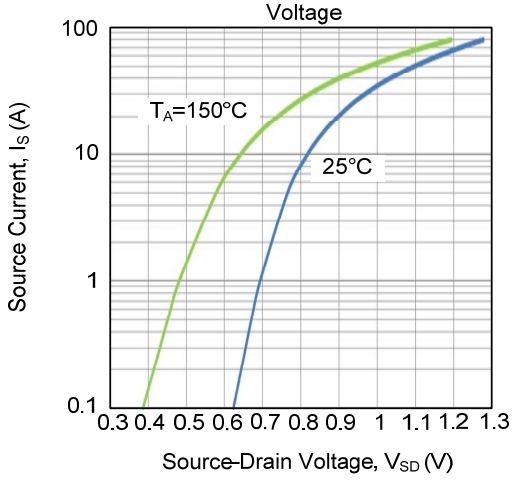


■ TYPICAL CHARACTERISTICS (Cont.)

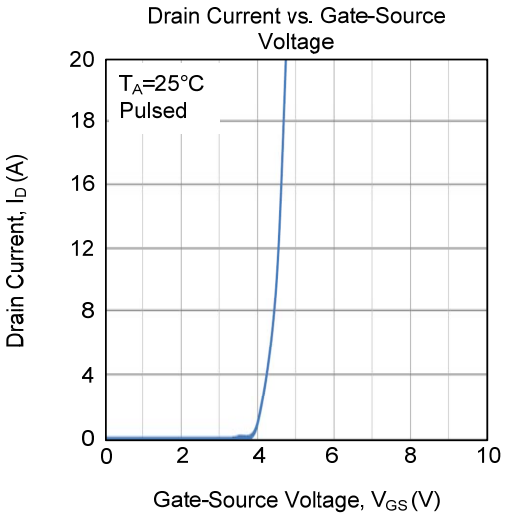
Gate Threshold Voltage vs. Junction Temperature



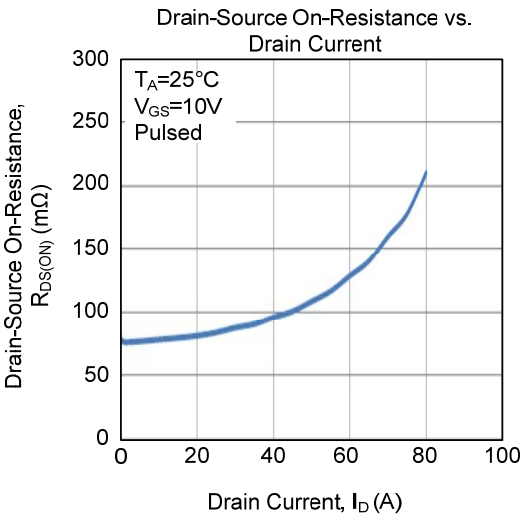
Source Current vs. Source-Drain Voltage



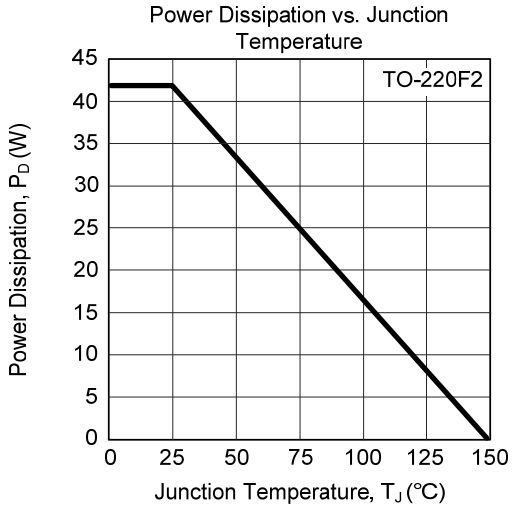
Drain Current vs. Gate-Source Voltage



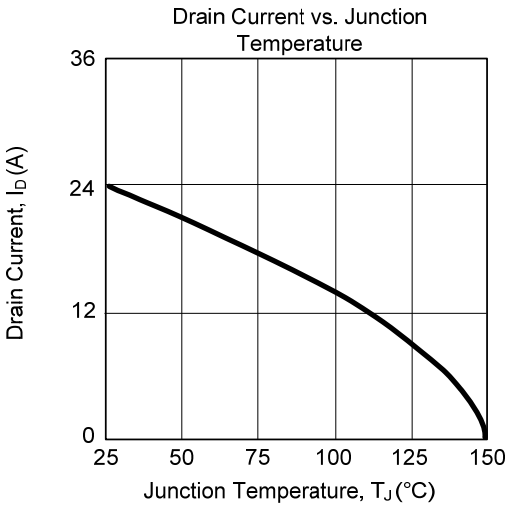
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)