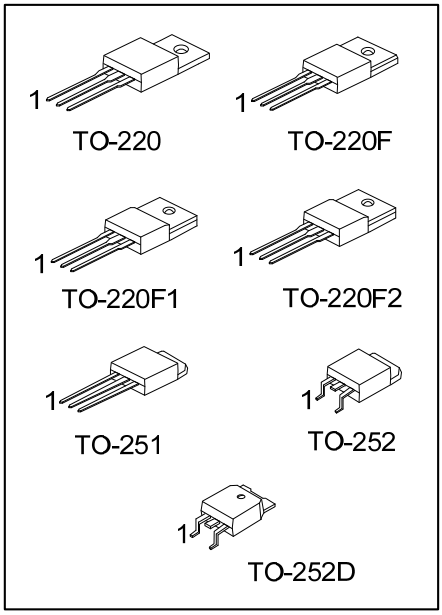
2.4A, 800V N-CHANNEL POWER MOSFET



■ DESCRIPTION

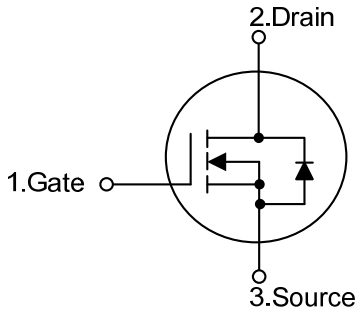
The UTC **2N80** is an N-channel mode power MOSFET using UTC's advanced technology to provide costumers planar stripe and DMOS technology. This technology is specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **2N80** is universally applied in high efficiency switch mode power supply.

■ FEATURES

* $R_{DS(on)} \leq 6.3\ \Omega$ @ V_{GS}=10V, I_D=1.2A
* High switching speed

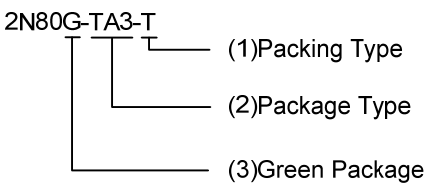
■ SYMBOL



■ ORDERING INFORMATION

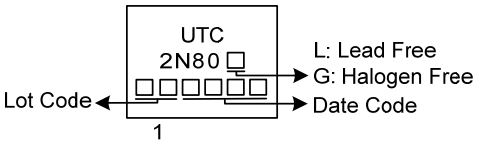
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
2N80L-TA3-T	2N80G-TA3-T	TO-220	G	D	S	Tube
2N80L-TF1-T	2N80G-TF1-T	TO-220F1	G	D	S	Tube
2N80L-TF2-T	2N80G-TF2-T	TO-220F2	G	D	S	Tube
2N80L-TF3-T	2N80G-TF3-T	TO-220F	G	D	S	Tube
2N80L-TM3-T	2N80G-TM3-T	TO-251	G	D	S	Tube
2N80L-TN3-R	2N80G-TN3-R	TO-252	G	D	S	Tape Reel
2N80L-TND-R	2N80G-TND-R	TO-252D	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, TF3: TO-220F, TM3: TO-251, TN3: TO-252 TND: TO-252D
(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}	800	V
Gate-Source Voltage		V_{GSS}	±30	V
Avalanche Current (Note 2)		I_{AR}	2.4	A
Drain Current	Continuous	I_D	2.4	A
	Pulsed (Note 2)	I_{DM}	4	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	195	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.47	V/ns
Power Dissipation	TO-220	P_D	85	W
	TO-220F/TO-220F1 TO-220F2		24	W
	TO-251/TO-252 TO-252D		44	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} = 3.4A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
4. I_{SD} ≤ 2.0A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

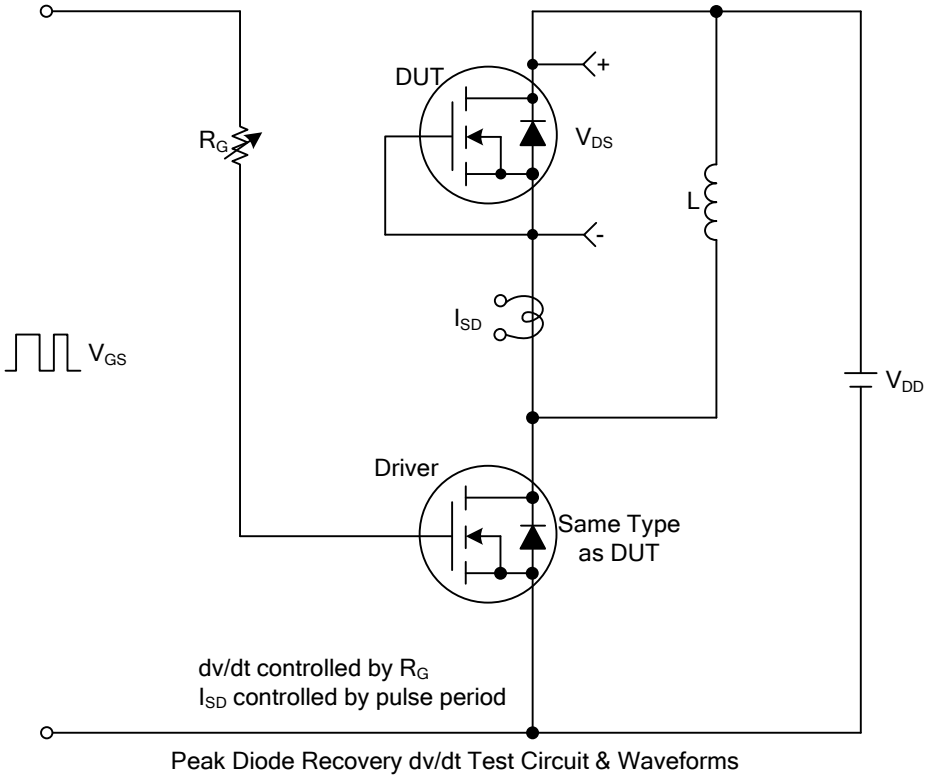
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/ TO-220F TO-220F1/TO-220F2	θ_{JA}	62.5	°C/W
	TO-251/TO-252 TO-252D		110	°C/W
Junction to Case	TO-220	θ_{JC}	1.47	°C/W
	TO-220F/TO-220F1 TO-220F2		5.2	°C/W
	TO-251/TO-252 TO-252D		2.84	°C/W

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

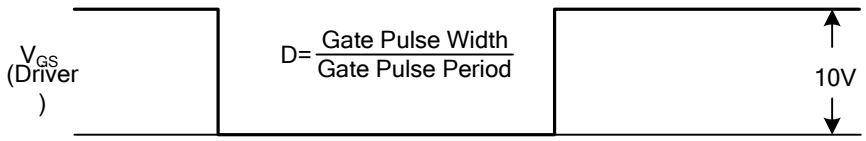
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	800			V
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	Reference to 25°C, I_D=250μA		0.9		V/°C
Drain-Source Leakage Current		I_{DSS}	V_{DS}=800V, V_{GS}=0V			10	μA
			V_{DS}=640V, T_C=125°C			100	
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	3.0		5.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=1.2A		4.8	6.3	Ω
Forward Transconductance (Note 1)		g_{FS}	V_{DS}=50V, I_D=1.2A		2.65		S
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		520	650	pF
Output Capacitance		C_{OSS}			51	60	pF
Reverse Transfer Capacitance		C_{RSS}			7	9	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DS}=640V, V_{GS}=10V I_D=2A, I_G=1mA (Note 1,2)		20		nC
Gate to Source Charge		Q_{GS}			7.8		nC
Gate to Drain Charge		Q_{GD}			4.6		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=100V, V_{GS}=10V, I_D=2A, R_G=25Ω (Note 1,2)		8.8		ns
Rise Time		t_R			17		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			42		ns
Fall-Time		t_F			32		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I_S				2.4	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				4	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=2.4A, V_{GS}=0V			1.4	V
Reverse Recovery Time (Note 1)		t_{rr}	I_S=2.0A, V_{GS}=0V, dI_F/dt=100A/μs		367		ns
Reverse Recovery Charge (Note 1)		Q_{rr}			5		μC

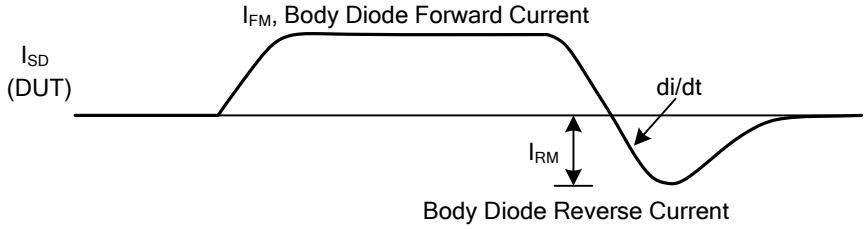
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%
2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

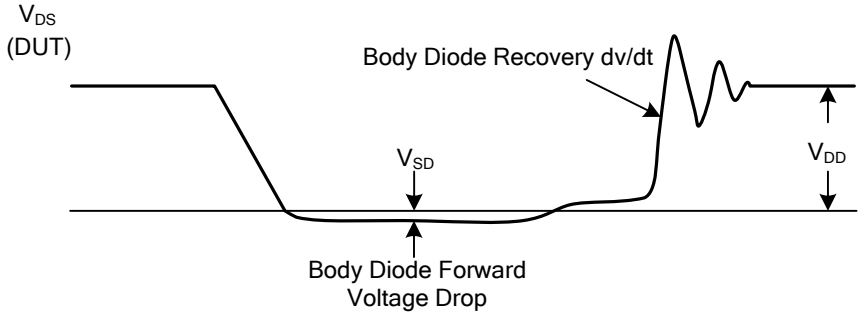


Peak Diode Recovery dv/dt Test Circuit & Waveforms

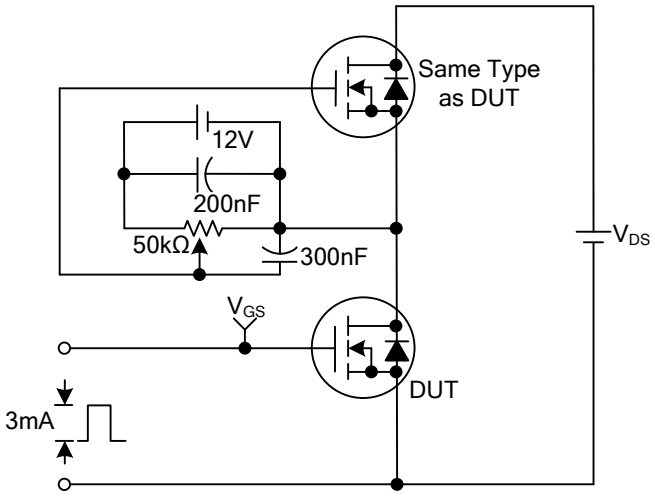




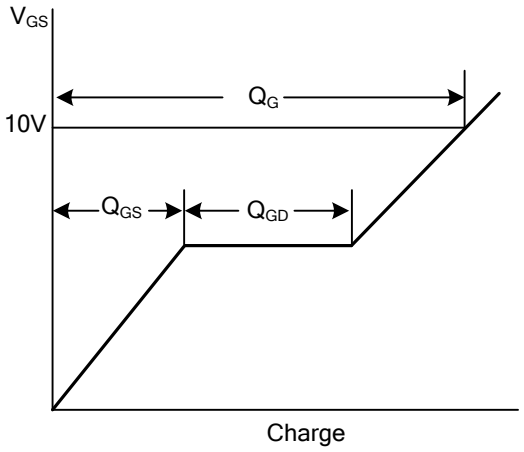
Body Diode Reverse Current



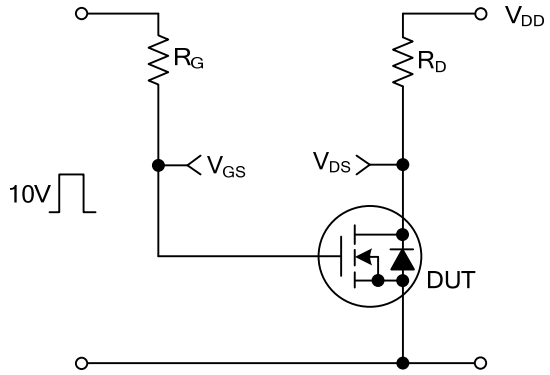
■ TEST CIRCUITS AND WAVEFORMS



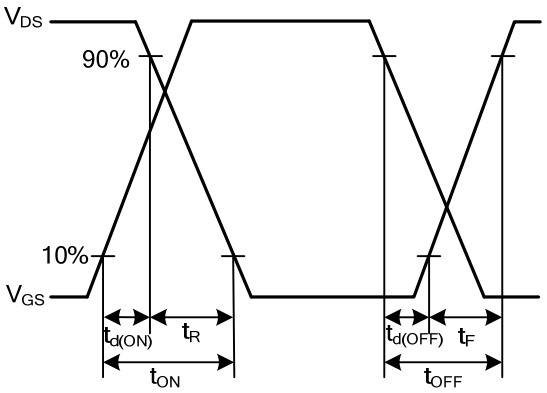
Gate Charge Test Circuit



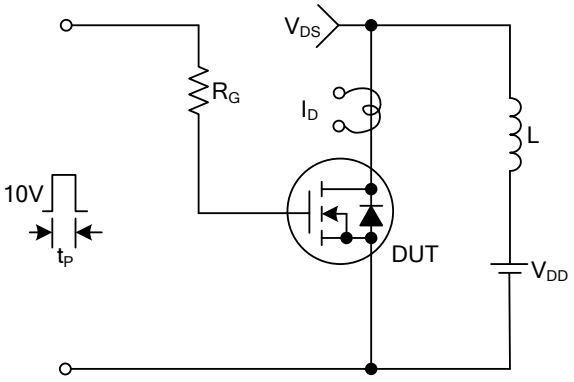
Gate Charge Waveforms



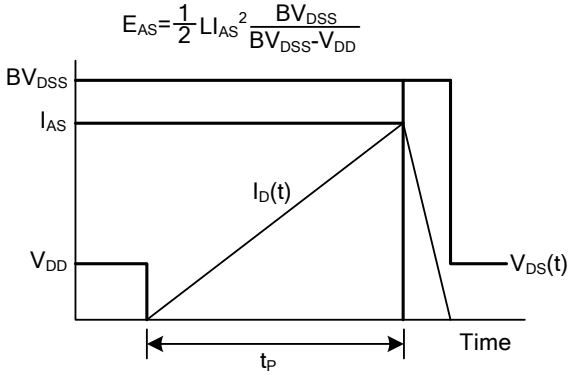
Resistive Switching Test Circuit



Resistive Switching Waveforms



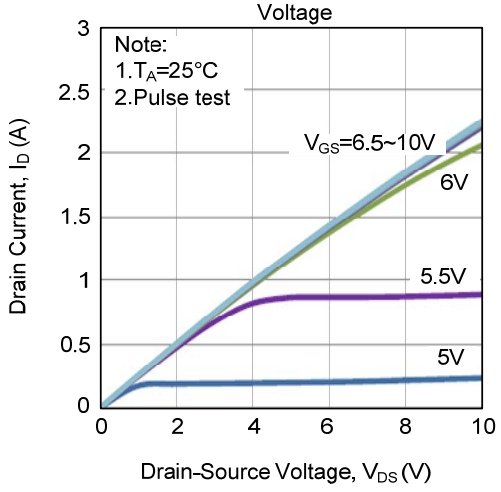
Unclamped Inductive Switching Test Circuit



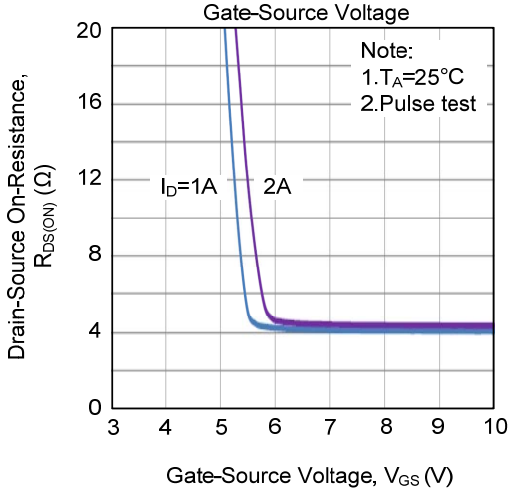
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

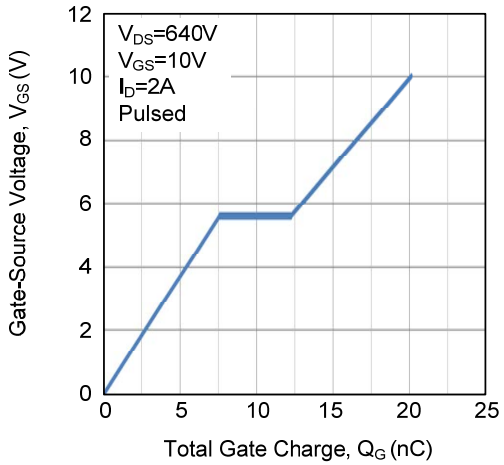
Drain Current vs. Drain-Source Voltage



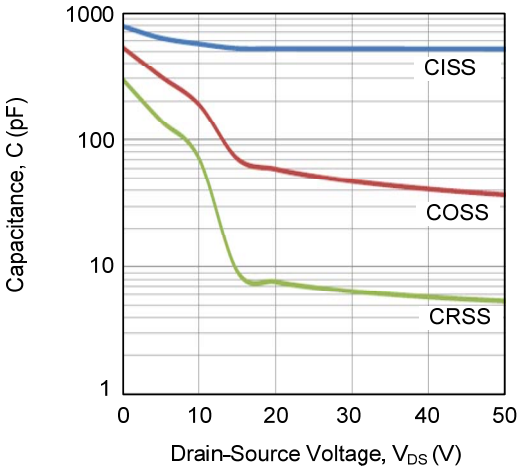
Drain-Source On-Resistance vs. Gate-Source Voltage



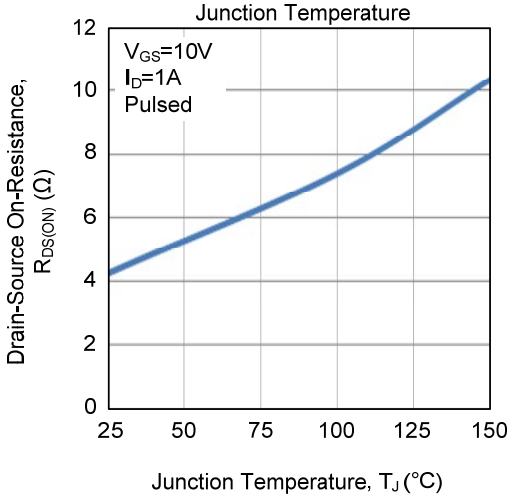
Gate Charge Characteristics



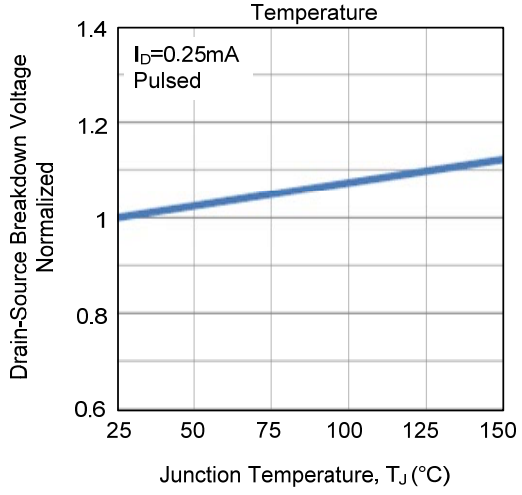
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

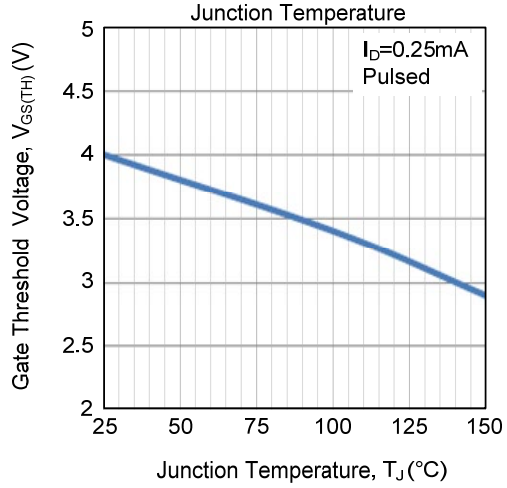


Breakdown Voltage vs. Junction Temperature

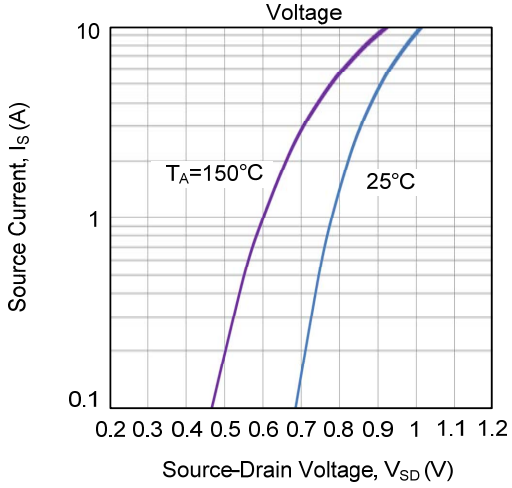


■ TYPICAL CHARACTERISTICS (Cont.)

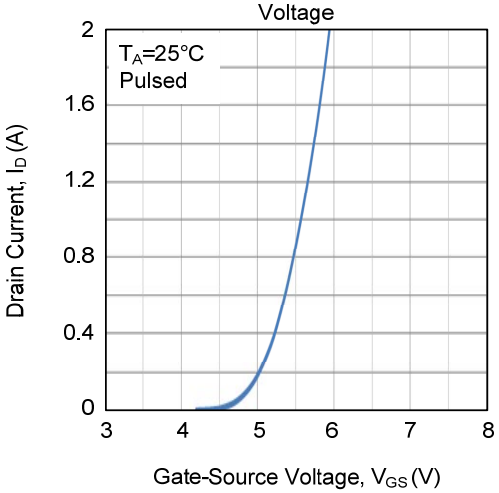
Gate Threshold Voltage vs. Junction Temperature



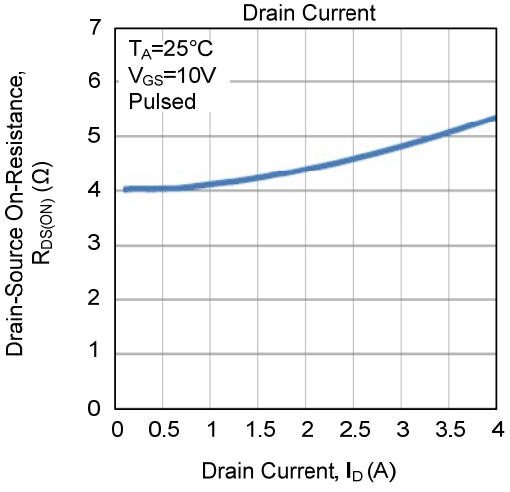
Source Current vs. Source-Drain Voltage



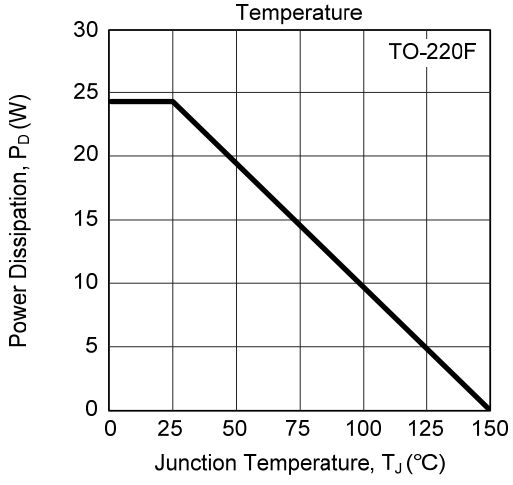
Drain Current vs. Gate-Source Voltage



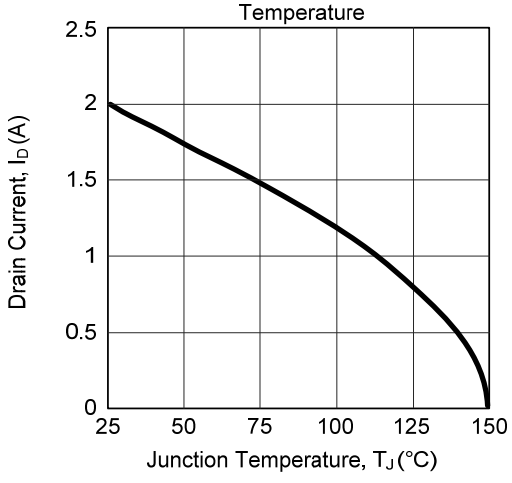
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)