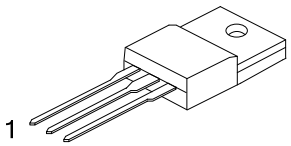
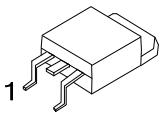
3N80Z

Power MOSFET

3A, 800V N-CHANNEL POWER MOSFET



TO-220F1



TO-252

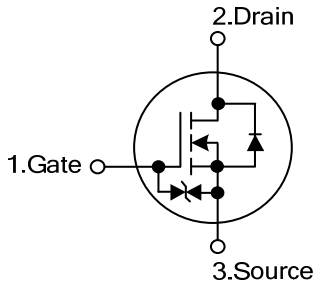
■ DESCRIPTION

The UTC **3N80Z** provide excellent $R_{DS(ON)}$, low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

■ FEATURES

* $R_{DS(ON)}$ < 4.2Ω @ V_{GS}=10V, I_D=1.5A
* Fast Switching Capability
* Avalanche Energy Specified
* Improved dv/dt Capability, High Ruggedness

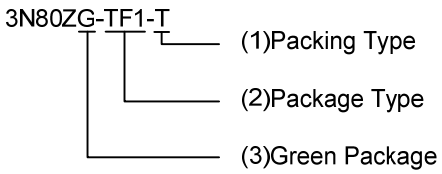
■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
3N80ZL-TF1-T	3N80ZG-TF1-T	TO-220F1	G	D	S	Tube
3N80ZL-TN3-R	3N80ZG-TN3-R	TO-252	G	D	S	Tape Reel

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

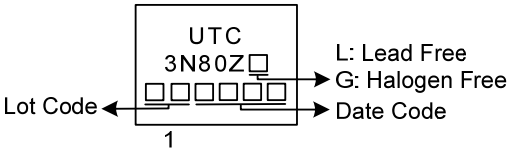


(1) T: Tube, R: Tape Reel

(2) TF1: TO-220F1, TN3: TO-252

(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_{GS}=0V)		V_{DSS}	800	V
Gate-Source Voltage		V_{GSS}	±20	V
Minimum Gate-Source Breakdown Voltage (I_{GS}=±1mA)		BV_{GSO}	30	V
Continuous Drain Current		I_D	3.0	A
Pulsed Drain Current		I_{DM}	12	A
Avalanche Current (Note 2)		I_{AR}	4.0	A
Single Pulse Avalanche Energy (Note 3)		E_{AS}	150	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.1	V/ns
Power Dissipation	TO-220F1	P_D	25	W
	TO-252		50	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=35mH, I_{AS}=3.0A, V_{DD}=50V, R_G=25 Ω, Starting T_J = 25°C.
4. I_{SD}≤3.0A, di/dt≤200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220F1	$θ_{JA}$	62.5	°C/W
	TO-252		110	°C/W
Junction to Case	TO-220F1	$θ_{JC}$	5.0	°C/W
	TO-252		2.5	°C/W

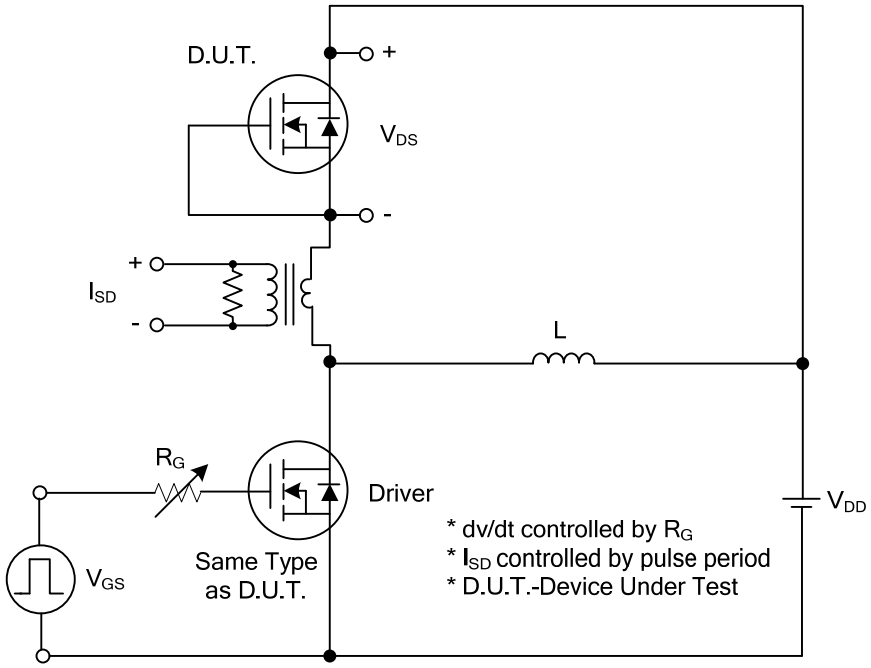
■ ELECTRICAL CHARACTERISTICS (T_J =25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	800			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=800V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V			±10	μA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	3.0		4.5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=1.5A			4.2	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1MHz		625		pF
Output Capacitance	C_{OSS}			63		pF
Reverse Transfer Capacitance	C_{RSS}			9		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q_G	V_{DS}=100V, V_{GS}=10V, I_D=3.0A, I_G=1mA (Note 1, 2)		18.5		nC
Gate to Source Charge	Q_{GS}			5.4		nC
Gate to Drain Charge	Q_{GD}			5.7		nC
Turn-ON Delay Time	$t_{D(ON)}$	V_{DD} =100V, V_{GS}=10V, I_D =3.0A, R_G=25Ω (Note 1, 2)		11.2		ns
Rise Time	t_R			20.2		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			64		ns
Fall-Time	t_F			42.2		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_{SD}				3.0	A
Maximum Body-Diode Pulsed Current	I_{SDM}				12	A
Drain-Source Diode Forward Voltage	V_{SD}	I_S=3.0A ,V_{GS}=0V			1.6	V
Reverse Recovery Time	t_{rr}	I_S=3.0A, V_{GS}=0V, di_F/dt=100A/μs		380		ns
Reverse Recovery Charge	Q_{rr}			3.48		μC

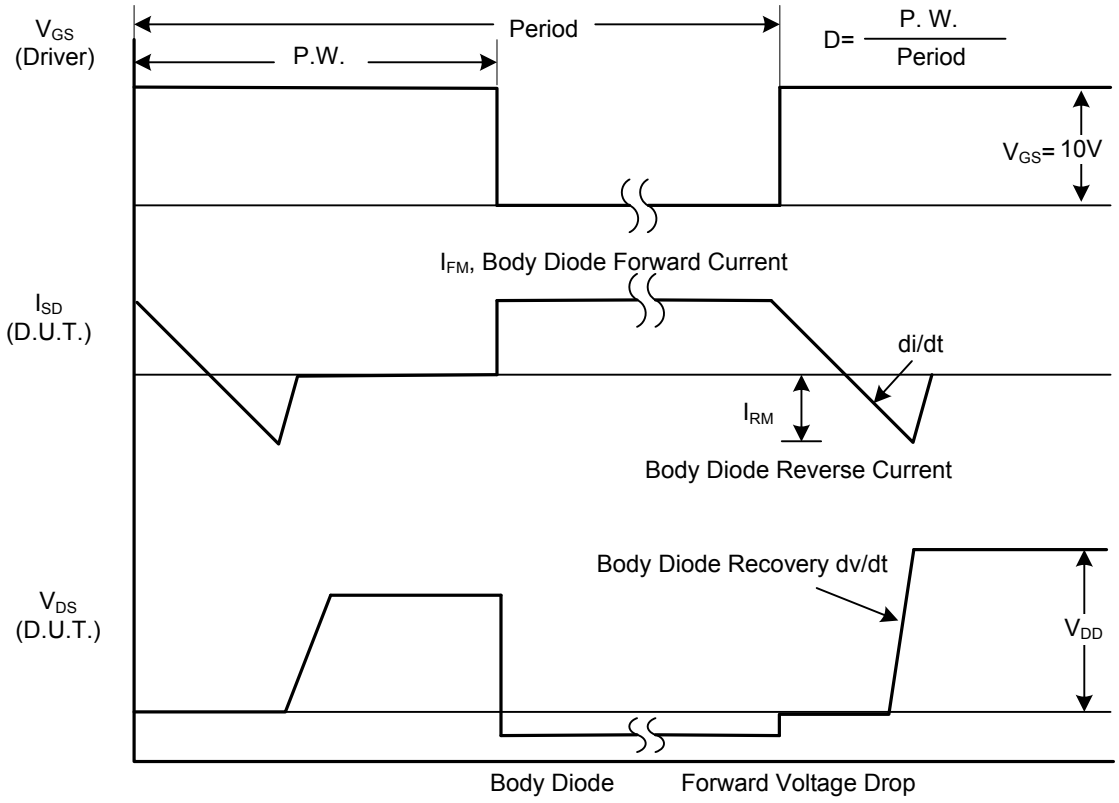
Notes: 1. Pulse width=300μs, Duty cycle ≤1.5%

2. $C_{OSS(EQ)}$ is defined as constant equivalent capacitance giving the same charging time as C_{OSS} when V_{DS} increases from 0to 80% V_{DSS}.

■ TEST CIRCUITS AND WAVEFORMS

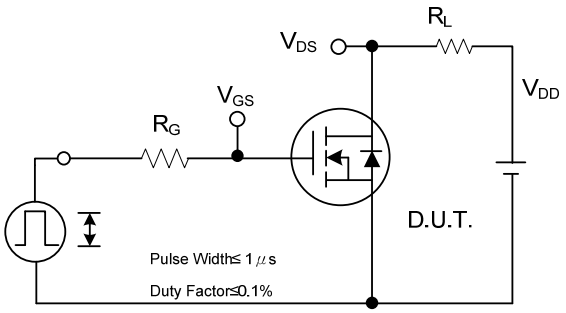


Peak Diode Recovery dv/dt Test Circuit

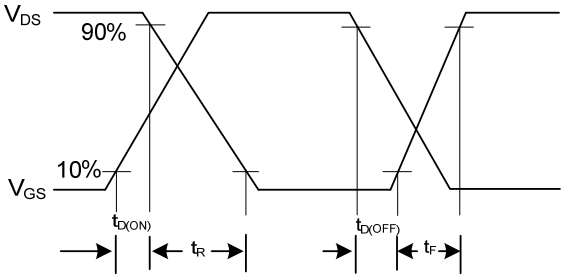


Peak Diode Recovery dv/dt Waveforms

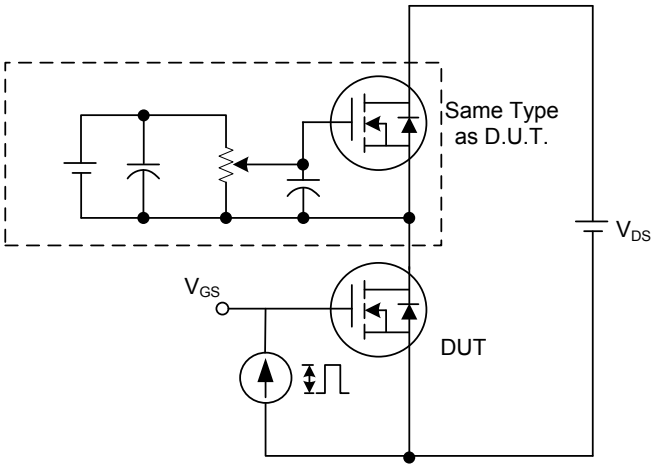
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



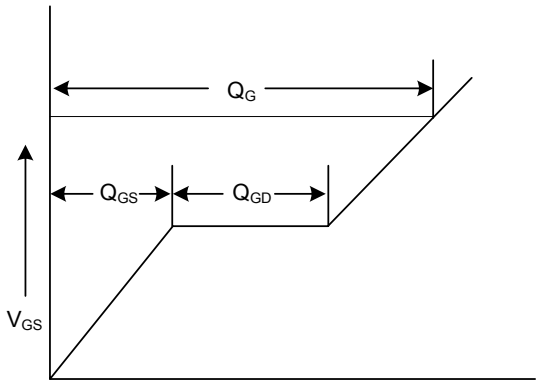
Switching Test Circuit



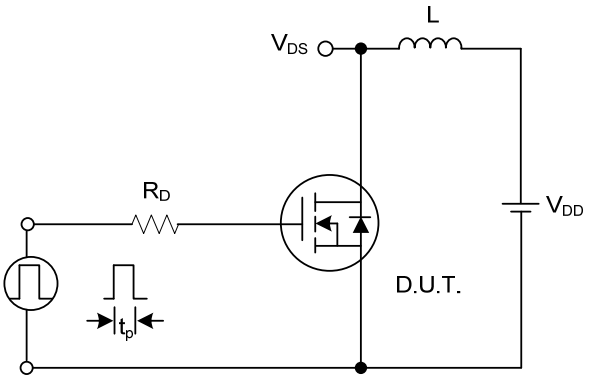
Switching Waveforms



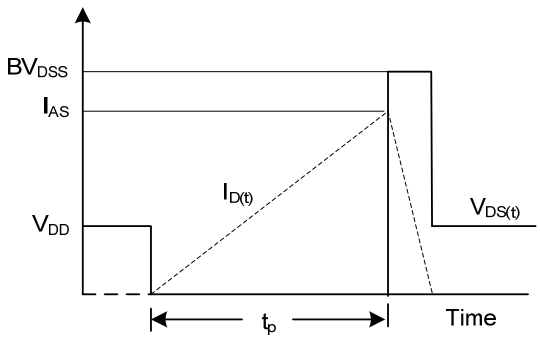
Gate Charge Test Circuit



Gate Charge Waveform



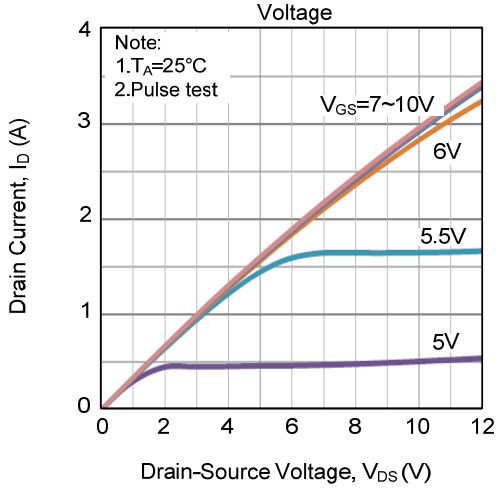
Unclamped Inductive Switching Test Circuit



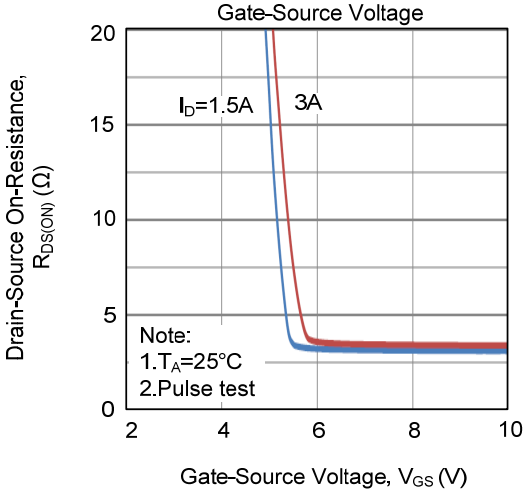
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

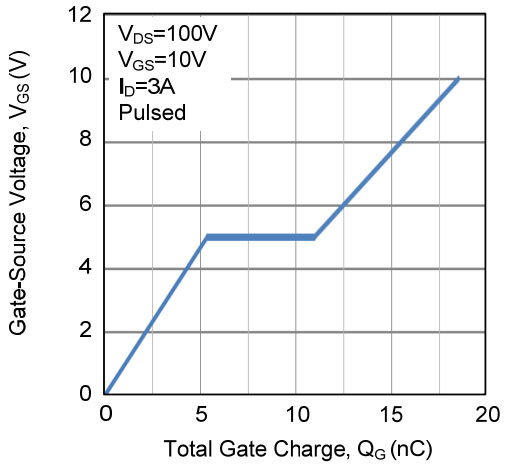
Drain Current vs. Drain-Source Voltage



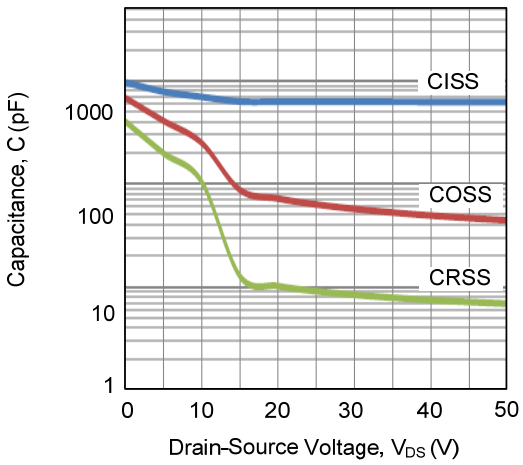
Drain-Source On-Resistance vs. Gate-Source Voltage



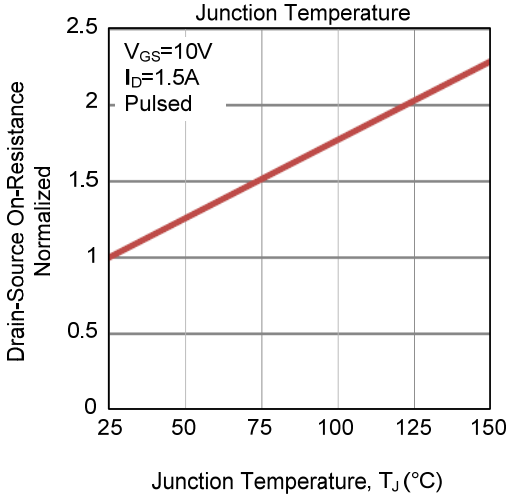
Gate Charge Characteristics



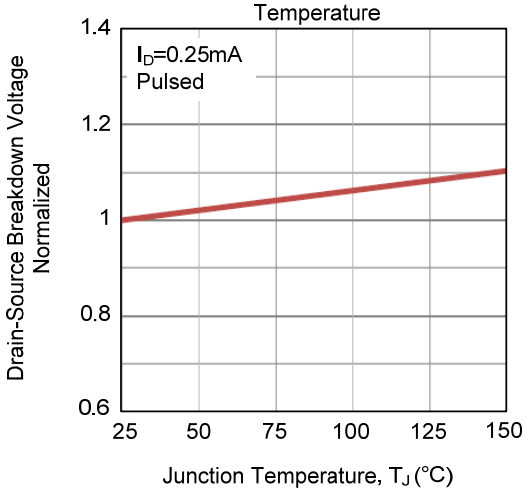
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

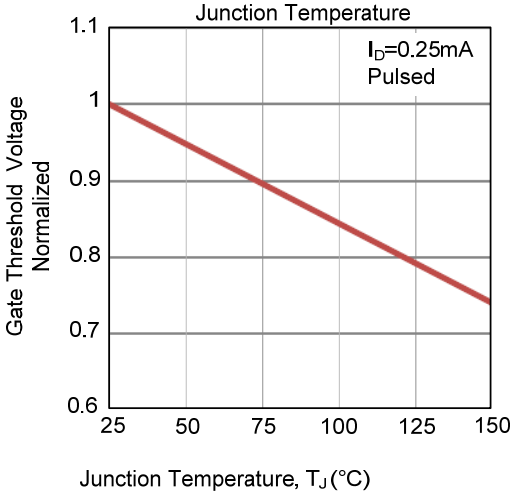


Breakdown Voltage vs. Junction Temperature

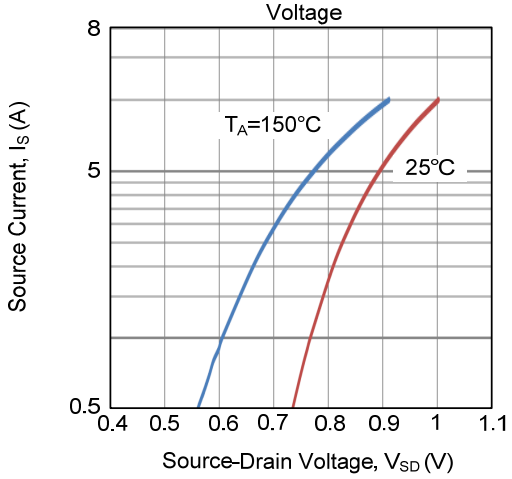


■ TYPICAL CHARACTERISTICS (Cont.)

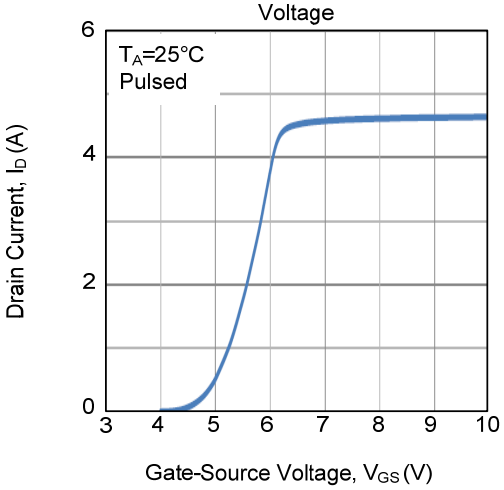
Gate Threshold Voltage vs. Junction Temperature



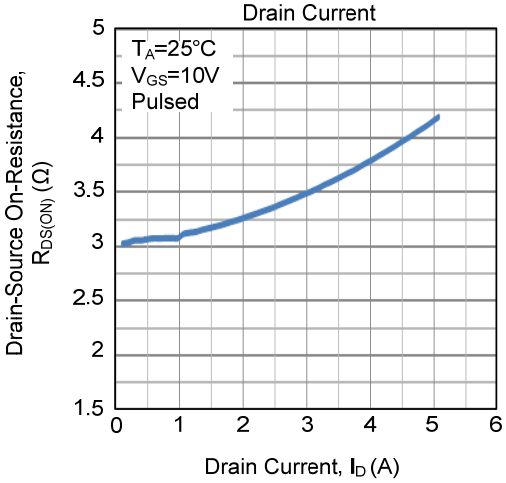
Source Current vs. Source-Drain Voltage



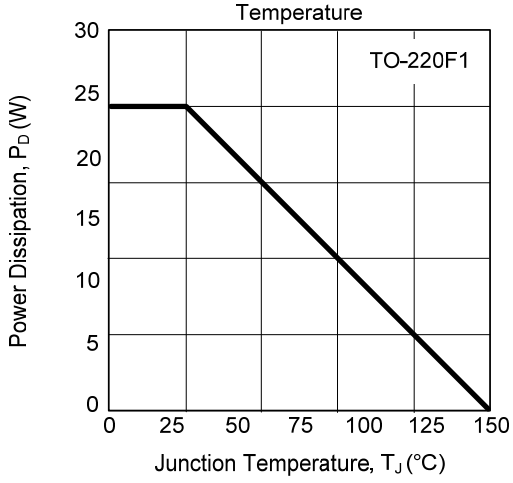
Drain Current vs. Gate-Source Voltage



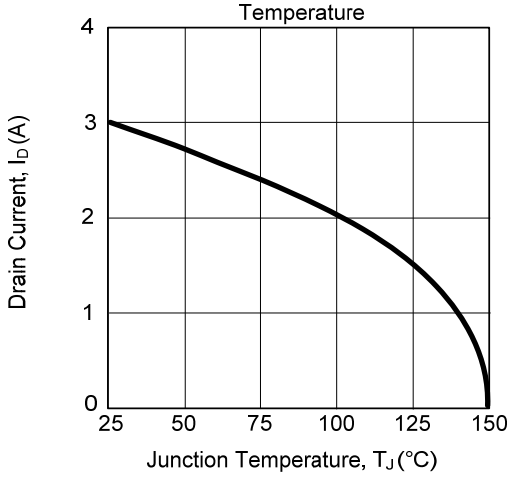
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)