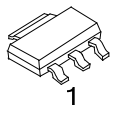
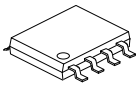
UT9971P

Power MOSFET

5.0A, 60V N-CHANNEL POWER MOSFET



SOT-223



SOP-8

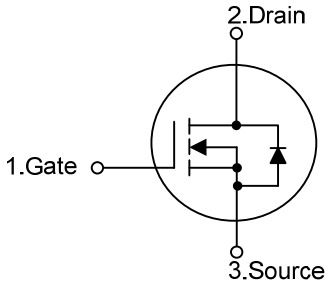
■ DESCRIPTION

The UTC **UT9971P** is an N-Channel enhancement mode power MOSFET providing customers with high switching speed, cost-effectiveness and minimum on-state resistance.

■ FEATURES

* $R_{DS(ON)}$ ≤ 63 mΩ @ V_{GS}=10V, I_D=5.0A
  $R_{DS(ON)}$ ≤ 86 mΩ @ V_{GS}=4.5V, I_D=2.5A
* High switching speed

■ SYMBOL



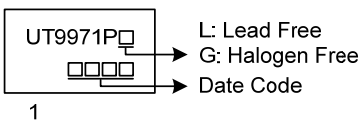
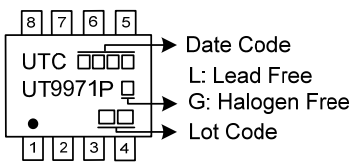
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT9971PL-AA3-R	UT9971PG-AA3-R	SOT-223	G	D	S	-	-	-	-	-	Tape Reel
UT9971PL-S08-R	UT9971PG-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

UT9971PG-AA3-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) AA3: SOT-223, S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

SOT-223	SOP-8
	

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	60	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current (V_{GS}=10V)		I_D	5	A
Pulsed Drain Current (Note 2,3)		I_{DM}	30	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	13	mJ
Power Dissipation	SOT-223	P_D	2.7	W
	SOP-8		1.92	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=0.1mH, I_{AS}=16.1A, V_{DD}=50V, R_G=25 Ω, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223	θ_{JA}	45	°C/W
	SOP-8		85	°C/W

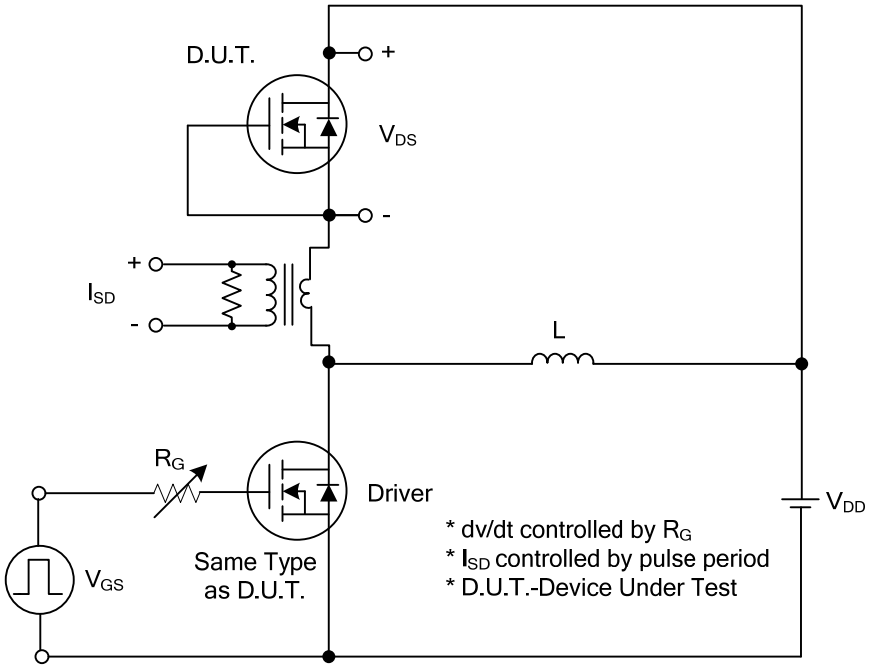
Notes: 1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%.

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

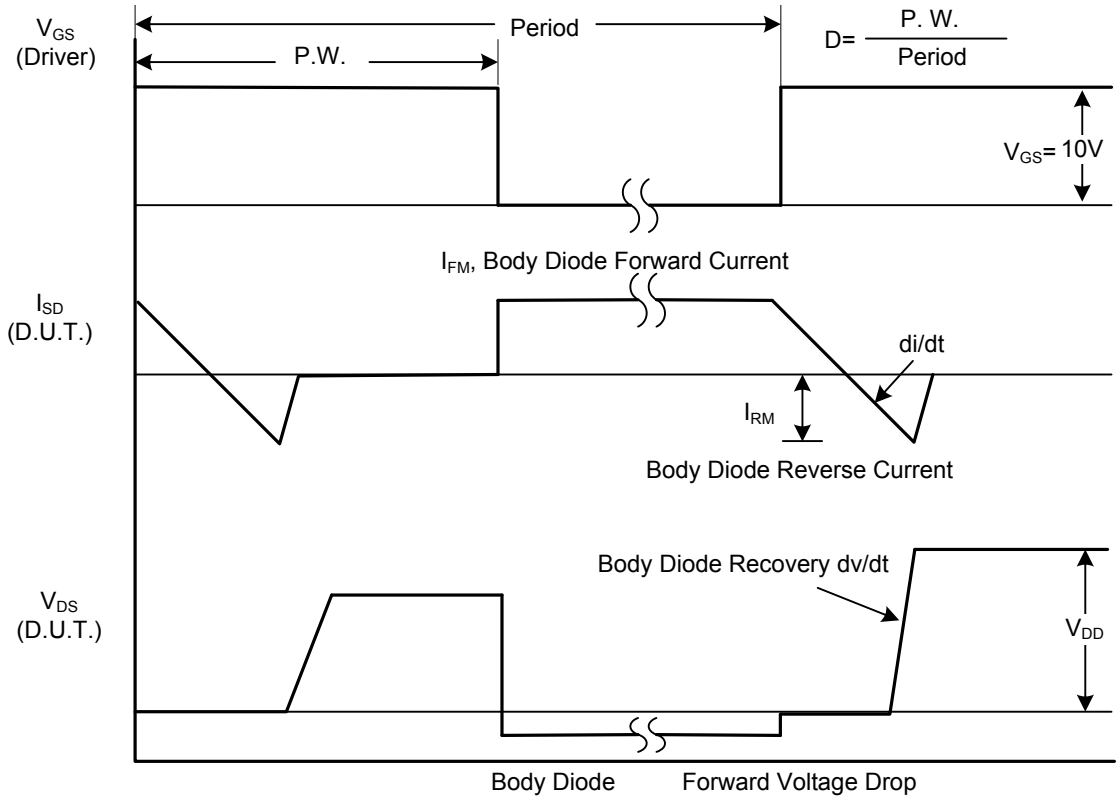
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	60			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60 V, V_{GS}=0V			1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	1.0		3.0	V
Static Drain-Source On-Resistance (Note)	$R_{DS(ON)}$	V_{GS}=10V, I_D=5.0A			63	mΩ
		V_{GS}=4.5V, I_D=2.5A			86	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz		620		pF
Output Capacitance	C_{OSS}			48		pF
Reverse Transfer Capacitance	C_{RSS}			36		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note)	Q_G	V_{DS}=48V, V_{GS}=10V, I_D=5A I_G=1mA (Note 1, 2)		16		nC
Gate Source Charge	Q_{GS}			2.5		nC
Gate Drain Charge	Q_{GD}			2.4		nC
Turn-ON Delay Time (Note)	$t_{D(ON)}$	V_{DD} =30V, V_{GS}=10V, I_D=8A, R_G=3.3Ω (Note 1, 2)		4		ns
Turn-ON Rise Time	t_R			15		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			17		ns
Turn-OFF Fall-Time	t_F			18		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				5	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				30	A
Diode Forward Voltage (Note)	V_{SD}	I_S =5.0A,V_{GS} =0V			1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_S=5.0A, V_{GS}=0V, di/dt=100A/μs		40		ns
Body Diode Reverse Recovery Charge	Q_{rr}			45		nC

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

■ TEST CIRCUITS AND WAVEFORMS

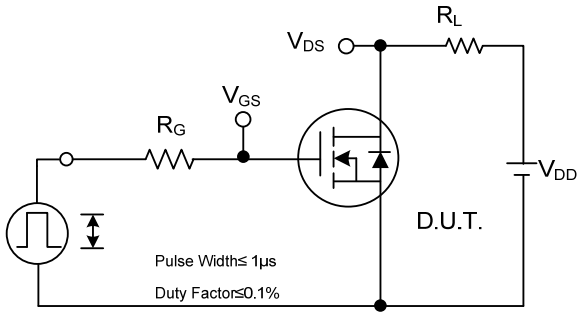


Peak Diode Recovery dv/dt Test Circuit

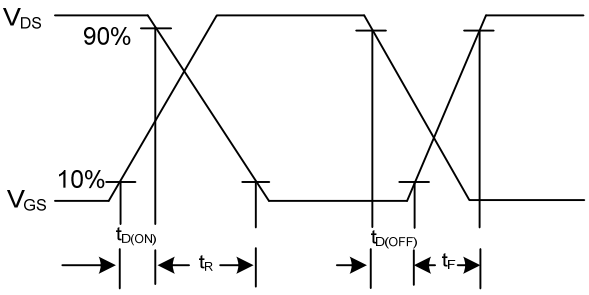


Peak Diode Recovery dv/dt Waveforms

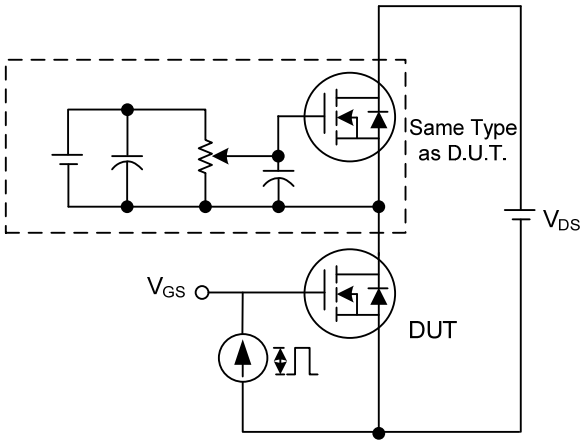
■ TEST CIRCUITS AND WAVEFORMS



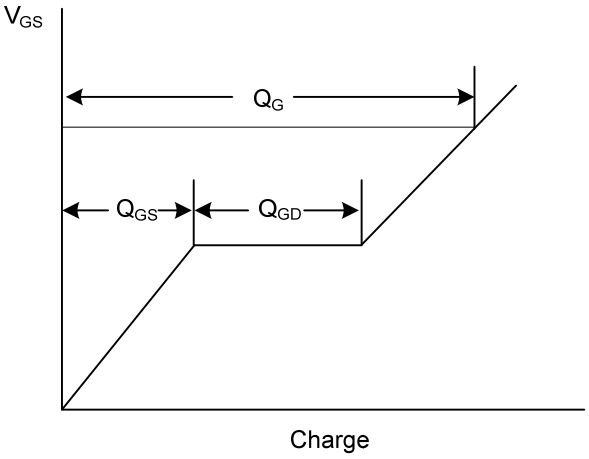
Switching Test Circuit



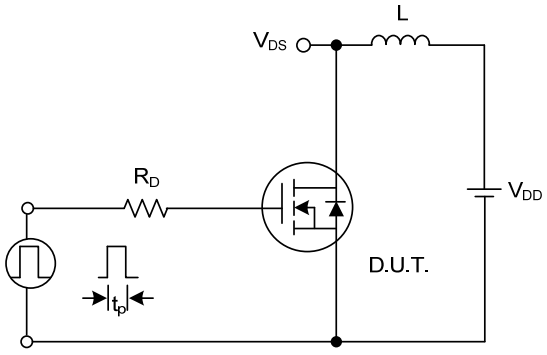
Switching Waveforms



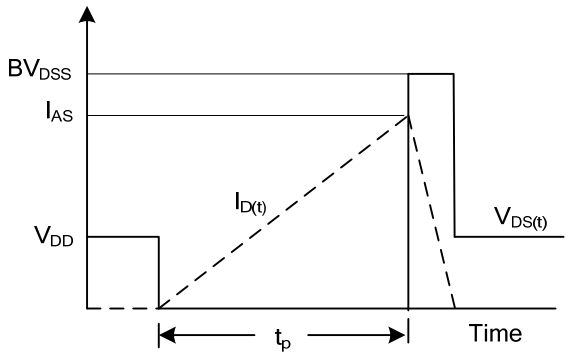
Gate Charge Test Circuit



Gate Charge Waveform

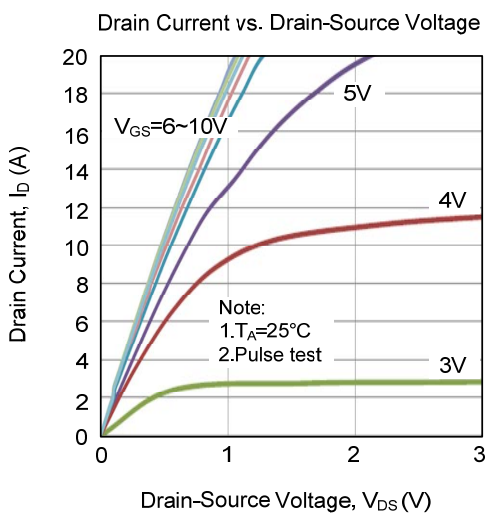


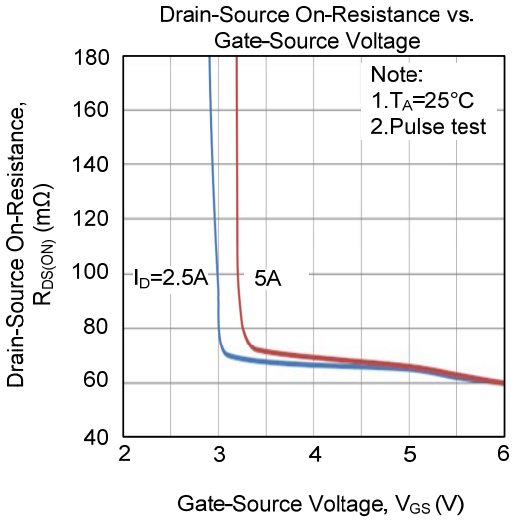
Unclamped Inductive Switching Test Circuit

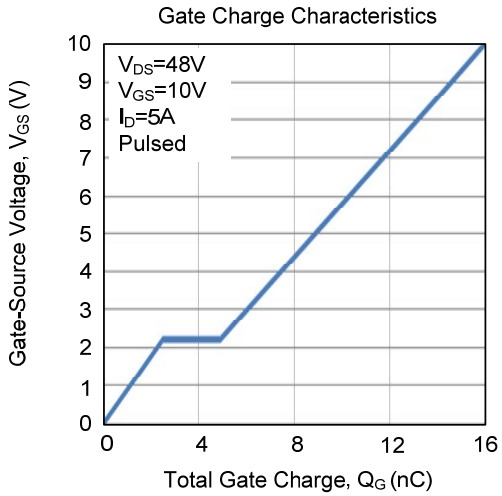


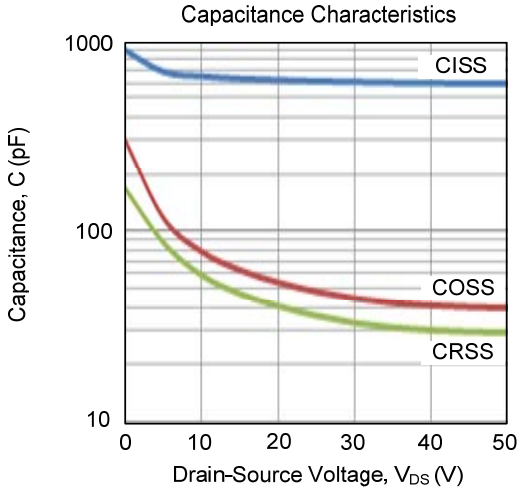
Unclamped Inductive Switching Waveforms

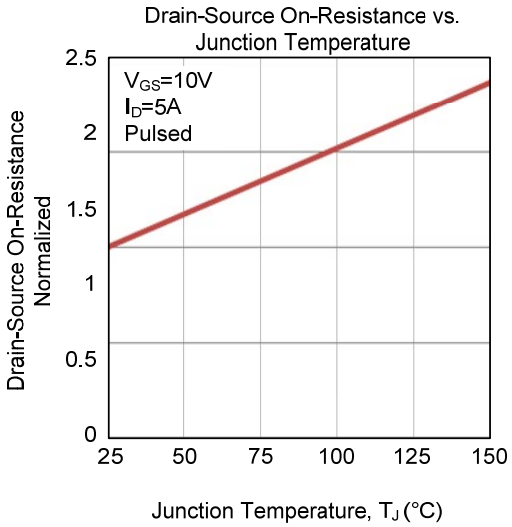
■ TYPICAL CHARACTERISTICS

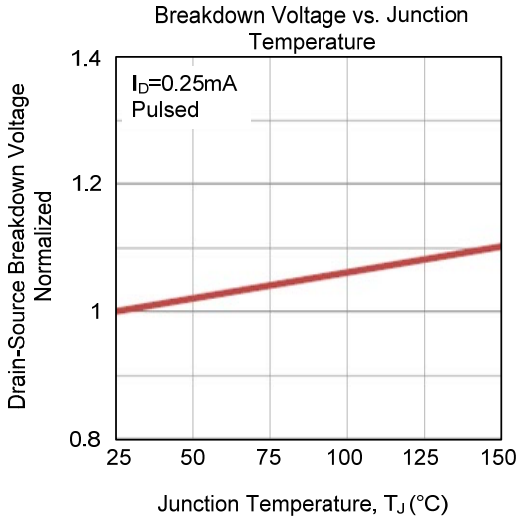






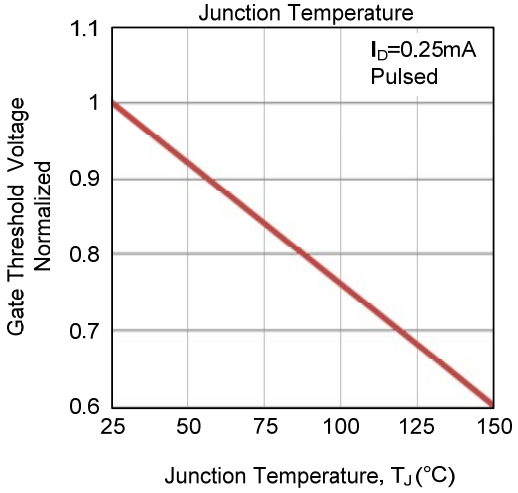




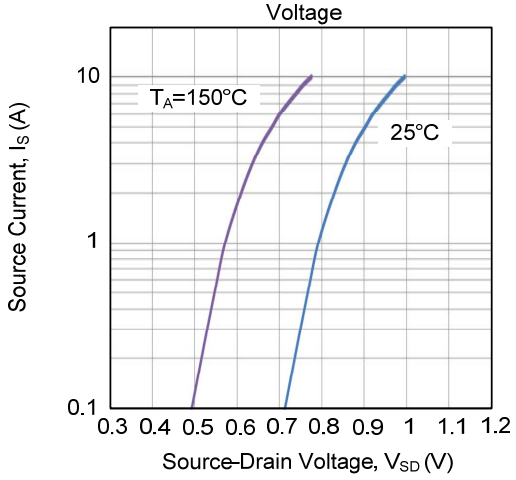


■ TYPICAL CHARACTERISTICS (Cont.)

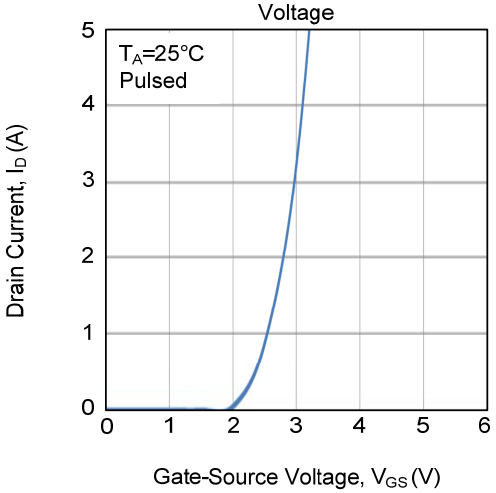
Gate Threshold Voltage vs. Junction Temperature



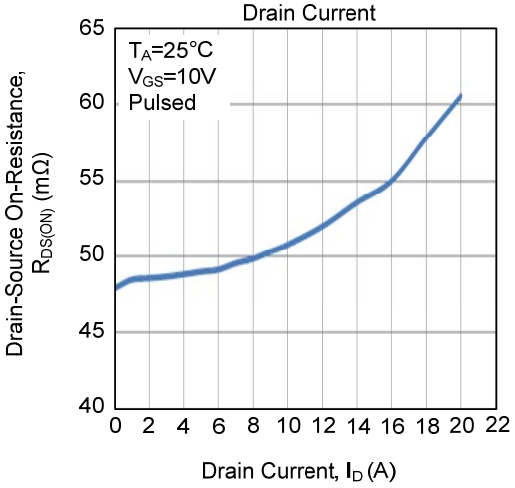
Source Current vs. Source-Drain Voltage



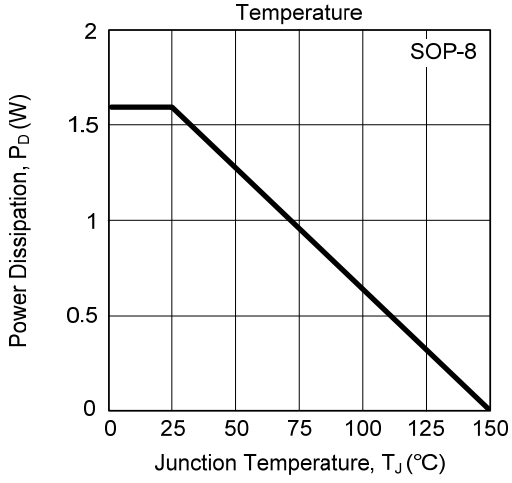
Drain Current vs. Gate-Source Voltage



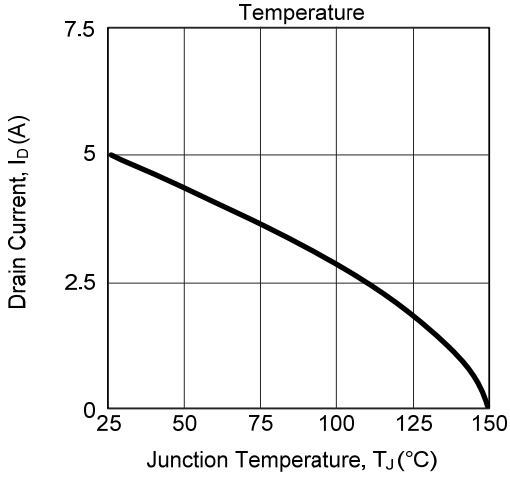
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)