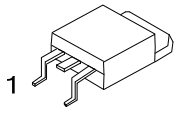
7P20

Power MOSFET

-7.0A, -200V P-CHANNEL POWER MOSFET



TO-252

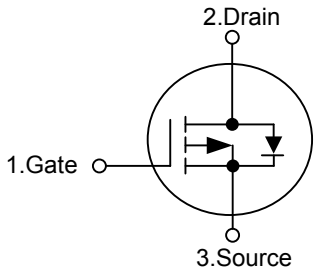
■ DESCRIPTION

The **7P20** uses advanced proprietary, planar stripe, DMOS technology to 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. They are also well suited for high efficiency switching DC/DC converters.

■ FEATURES

* $R_{DS(ON)} \leqq 0.69\ \Omega$ @ V_{GS} = -10 V, I_D= -3.5A
* Fast Switching Capability
* Avalanche Energy Specified
* Improved dv/dt Capability, High Ruggedness

■ SYMBOL



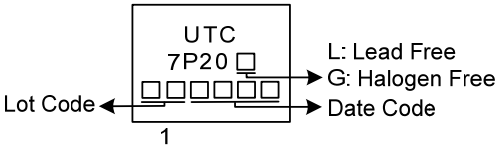
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7P20L-TN3-R	7P20G-TN3-R	TO-252	G	D	S	Tape Reel

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

7P20G-TN3-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) 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_{DSS}	-200	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current		I_D	-7.0	A
Pulsed Drain Current (Note 2)		I_{DM}	-14	A
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	205	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	7.6	V/ns
Power Dissipation	T_A = 25°C	P_D	1.25	W
	T_C = 25°C		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=30mH, I_{AS}=-3.7A, V_{DD}= -50V, R_G=25Ω, Starting T_J=25°C.
4. I_{SD} ≤-7.0A, di/dt ≤200A/μs, V_{DD} ≤BV_{DSS}, Starting T_J=25°C.

■ THERMAL DATA

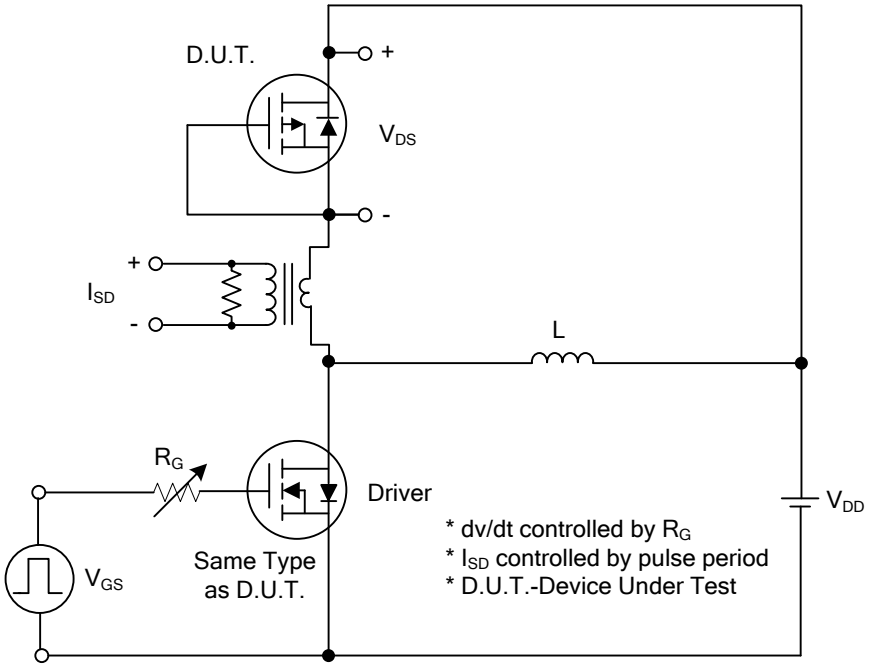
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	100	°C /W
Junction to Case	θ_{JC}	2.5	°C /W

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

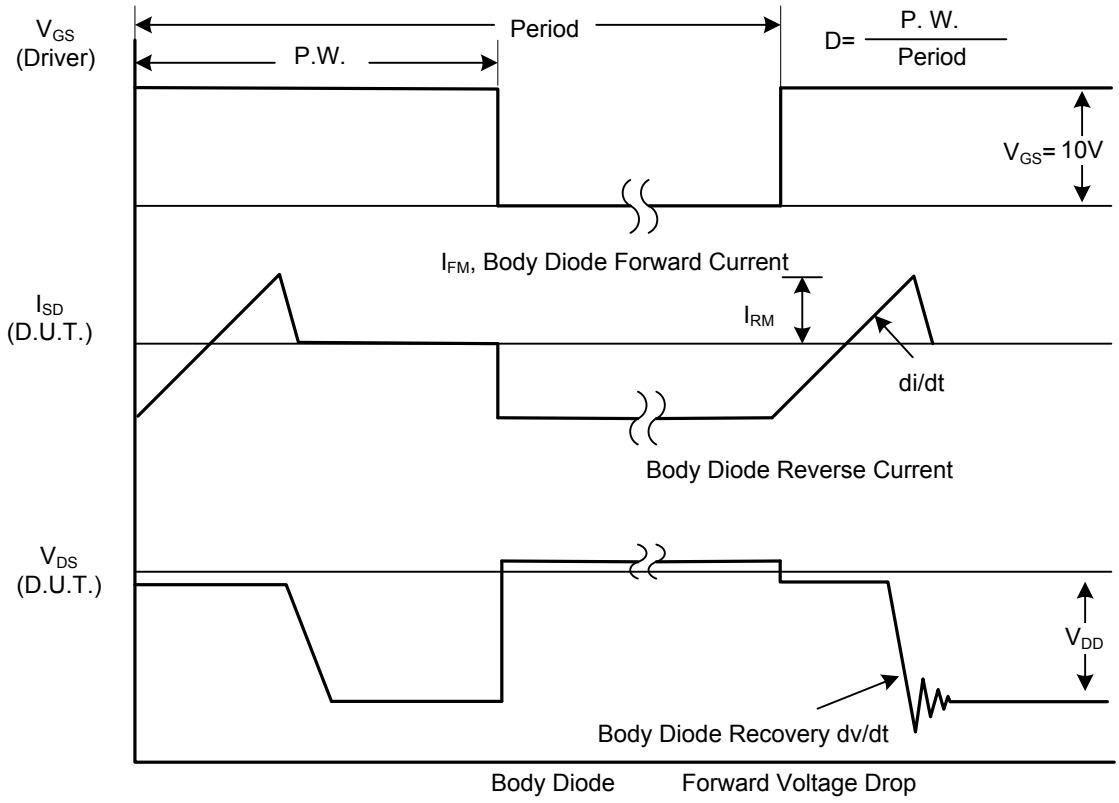
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0 V, I_D=-250 μA	-200			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=-200V, V_{GS}=0V			-1	μA
Gate-Source Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±30V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=-250μA	-2.0		-4.0	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-3.5A		0.54	0.69	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{DS}=-25V, V_{GS}=0V, f=1.0MHz		941		pF
Output Capacitance	C_{OSS}			140		pF
Reverse Transfer Capacitance	C_{RSS}			24.8		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	V_{DS}=-160V, V_{GS}=-10V, I_D=-7.0A (Note 1, 2)		22.9		nC
Gate Source Charge	Q_{GS}			5.2		nC
Gate Drain Charge	Q_{GD}			8		nC
Turn-ON Delay Time	$t_{D(ON)}$	V_{DD}=-100V, I_D=-7.0A, R_G=25Ω(Note 1, 2)		12		ns
Turn-ON Rise Time	t_R			22		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			64		ns
Turn-OFF Fall-Time	t_F			28		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				-7	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				-14	A
Diode Forward Voltage	V_{SD}	I_S=-7.0A, V_{GS}=0V			-5.0	V
Body Diode Reverse Recovery Time	t_{rr}	V_{GS}=0V, I_S=-7.0 A, dI_F/dt=100A/s (Note 1)		122		ns
Body Diode Reverse Recovery Charge	Q_{rr}			0.59		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



Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

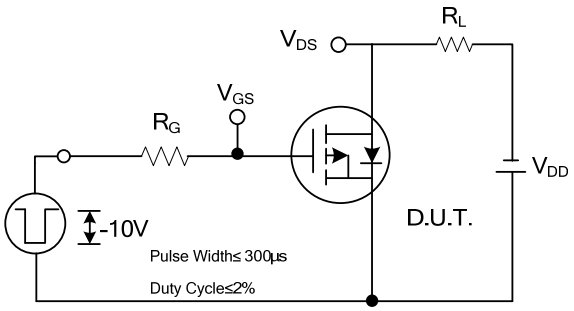


Fig. 2A Switching Test Circuit

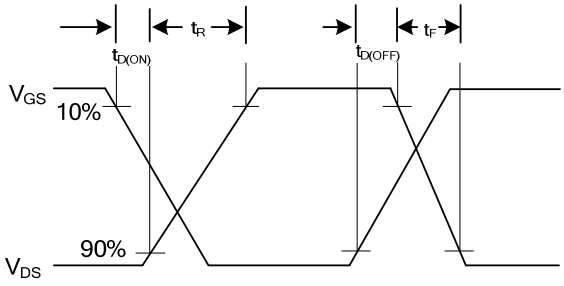


Fig. 2B Switching Waveforms

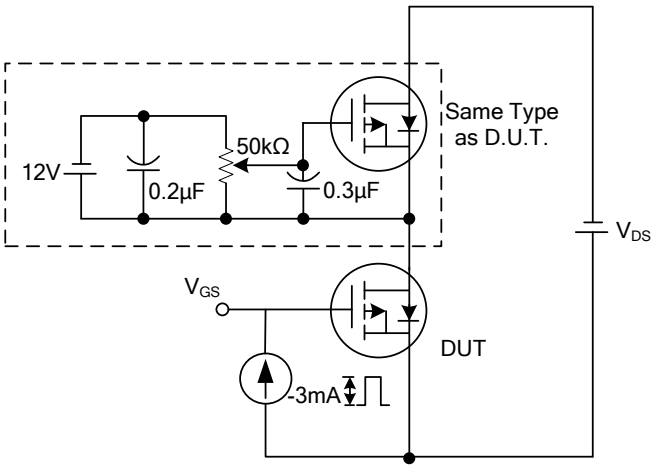


Fig. 3A Gate Charge Test Circuit

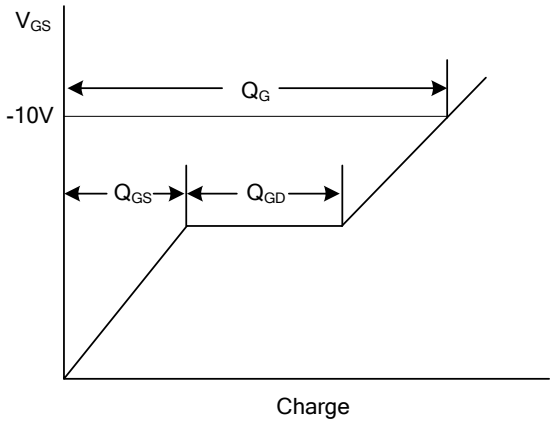


Fig. 3B Gate Charge Waveform

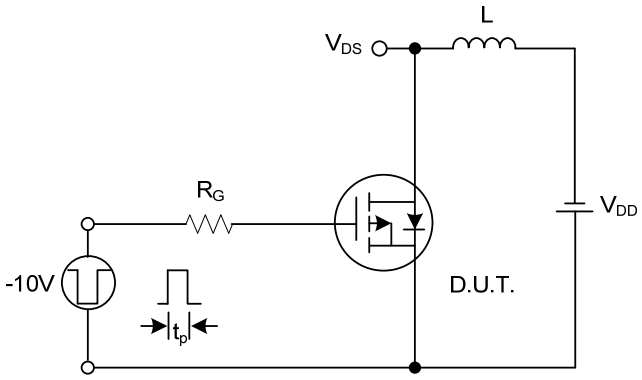


Fig. 4A Unclamped Inductive Switching Test Circuit

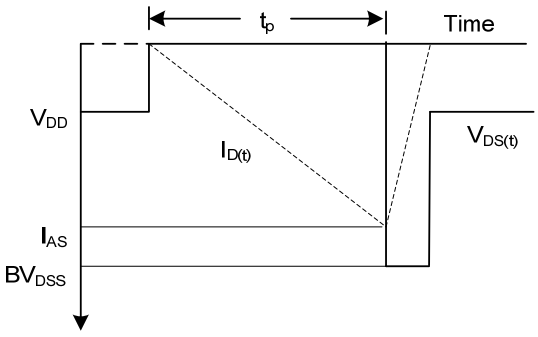
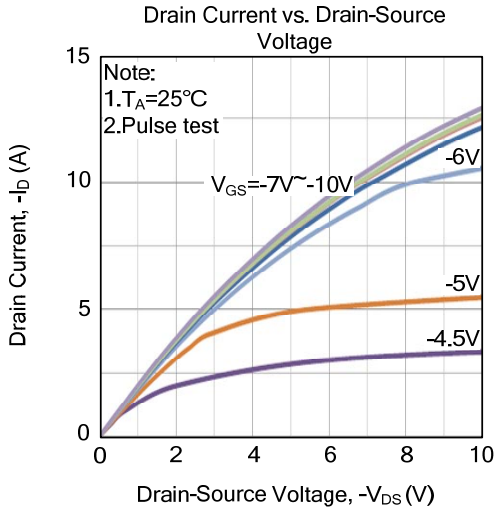
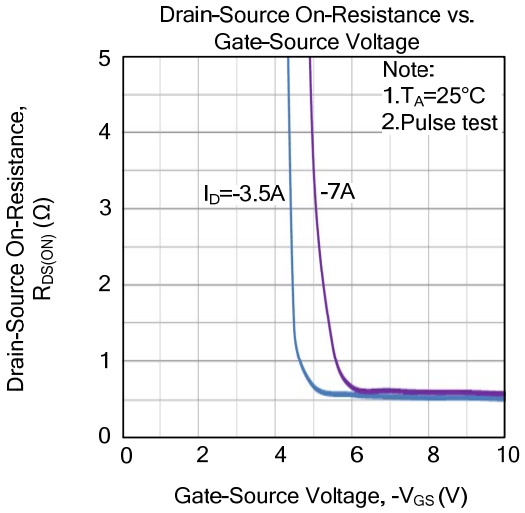
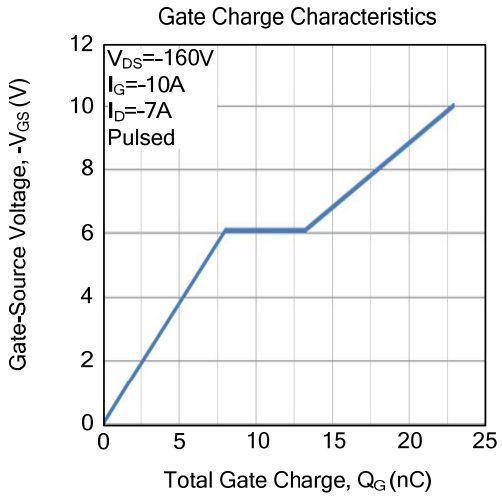


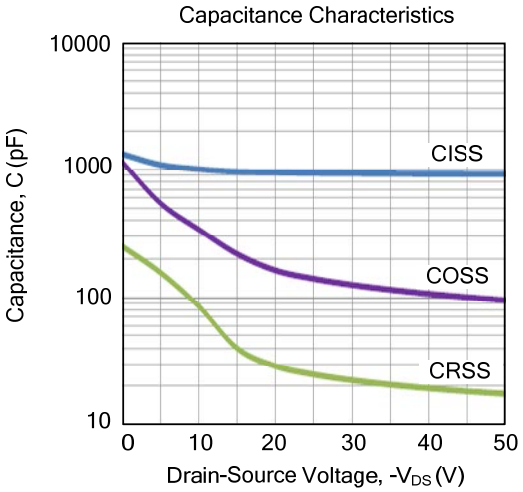
Fig. 4B Unclamped Inductive Switching Waveforms

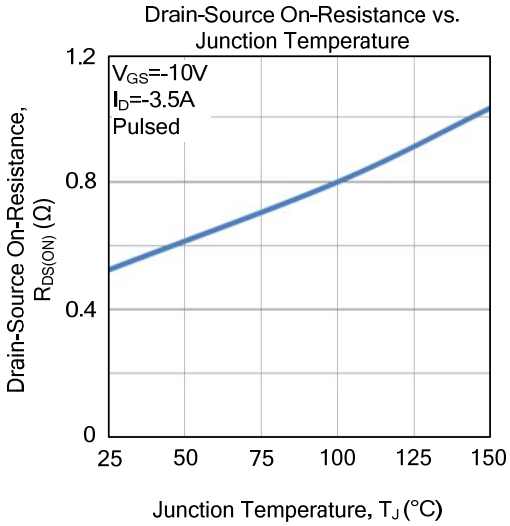
■ TYPICAL CHARACTERISTICS

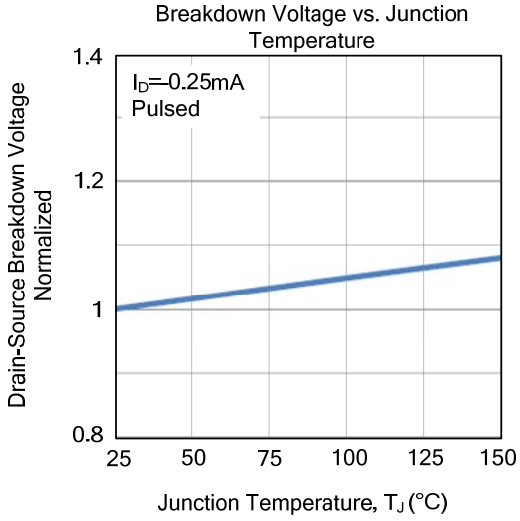






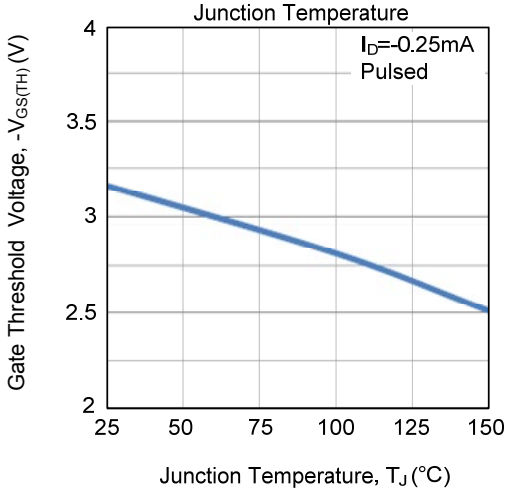




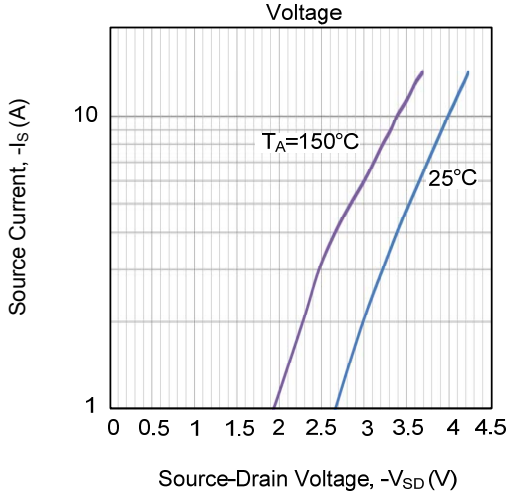


■ TYPICAL CHARACTERISTICS (Cont.)

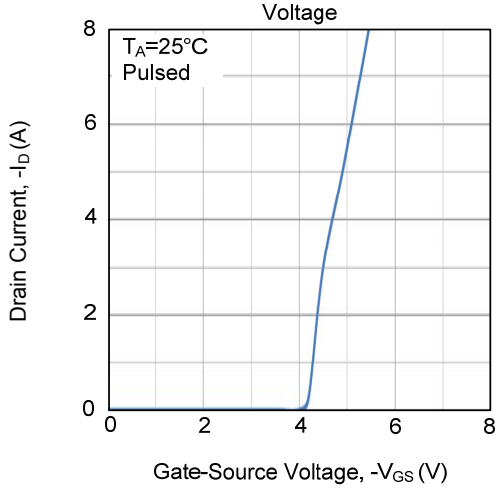
Gate Threshold Voltage vs. Junction Temperature



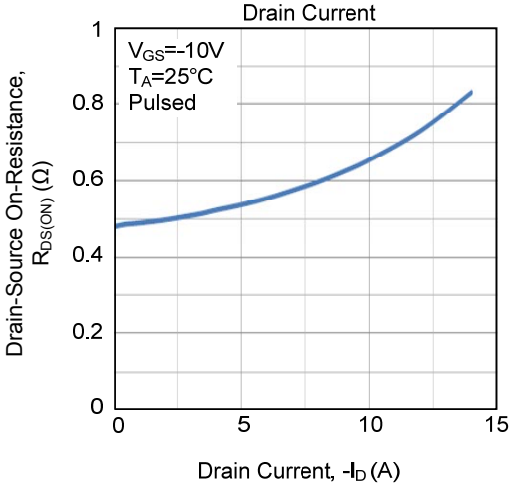
Source Current vs. Source-Drain Voltage



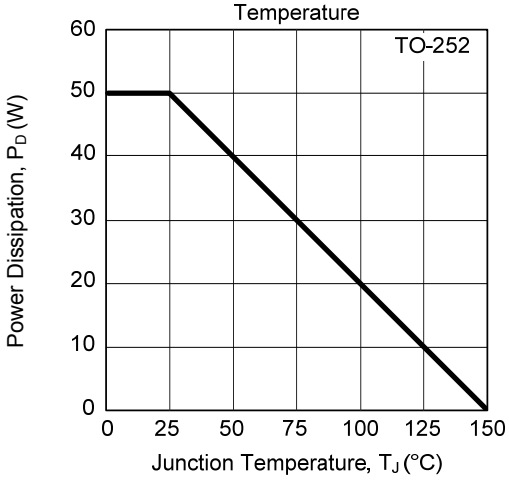
Drain Current vs. Gate-Source Voltage



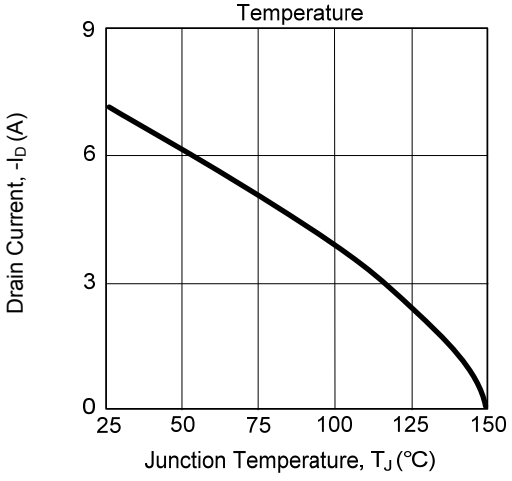
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)