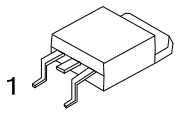
-4A, -500V P-CHANNEL POWER MOSFET



TO-252

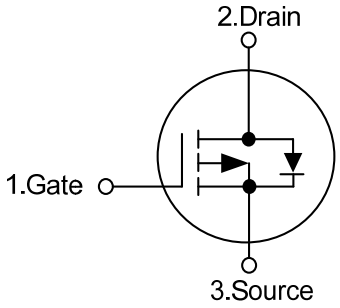
■ DESCRIPTION

The **4P50H** 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 to be used in low voltage applications such as audio amplifier, high efficiency switching DC/DC converters, and DC motor control.

■ FEATURES

* $R_{DS(ON)}$ < 5.5Ω @ V_{GS}=-10V, I_D=-2.0A
* Low capacitance
* Low gate charge
* Fast switching capability
* Avalanche energy specified

■ SYMBOL



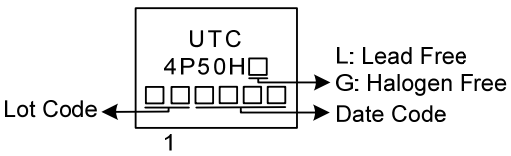
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
4P50HL-TN3-R	4P50HG-TN3-R	TO-252	G	D	S	Tape Reel

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

4P50HG-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}	-500	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current	Continuous	I_D	-4	A
Pulsed Drain Current	Pulsed (Note 2)	I_{DM}	-8	A
Single Pulsed Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	438	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2	V/ns
Power Dissipation		P_D	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=60mH, I_{AS}=-3.8A, V_{DD}=-150V, R_G=25Ω, Starting T_J=25°C
4. I_{SD} ≤ -4.0A, di/dt ≤ 200μA/s, V_{DD} ≤ BV_{DSS}, Starting T_J=25°C

■ THERMAL DATA

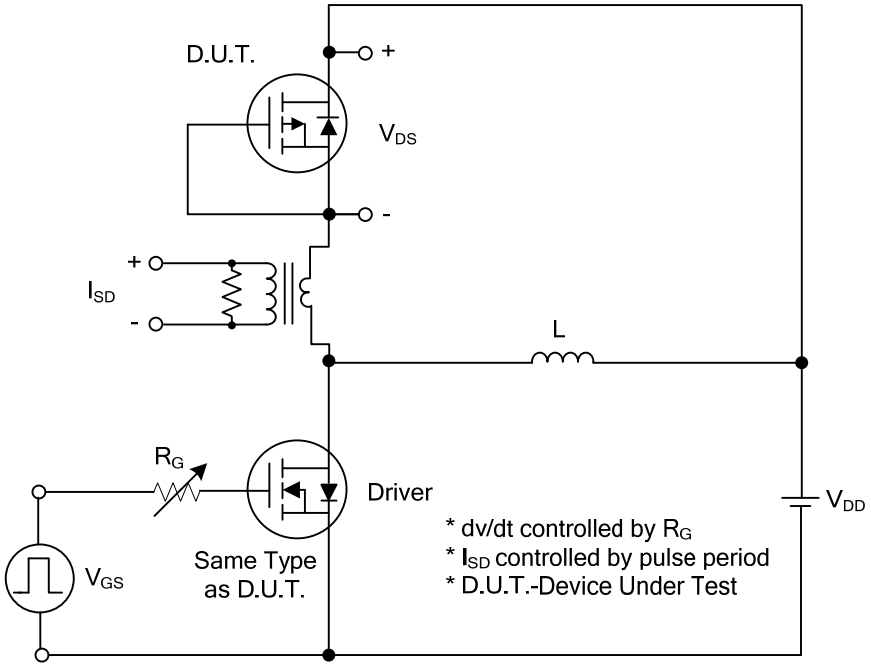
PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	θ_{JA}	110	°C/W
Junction to Case	θ_{JC}	2.7	°C/W

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

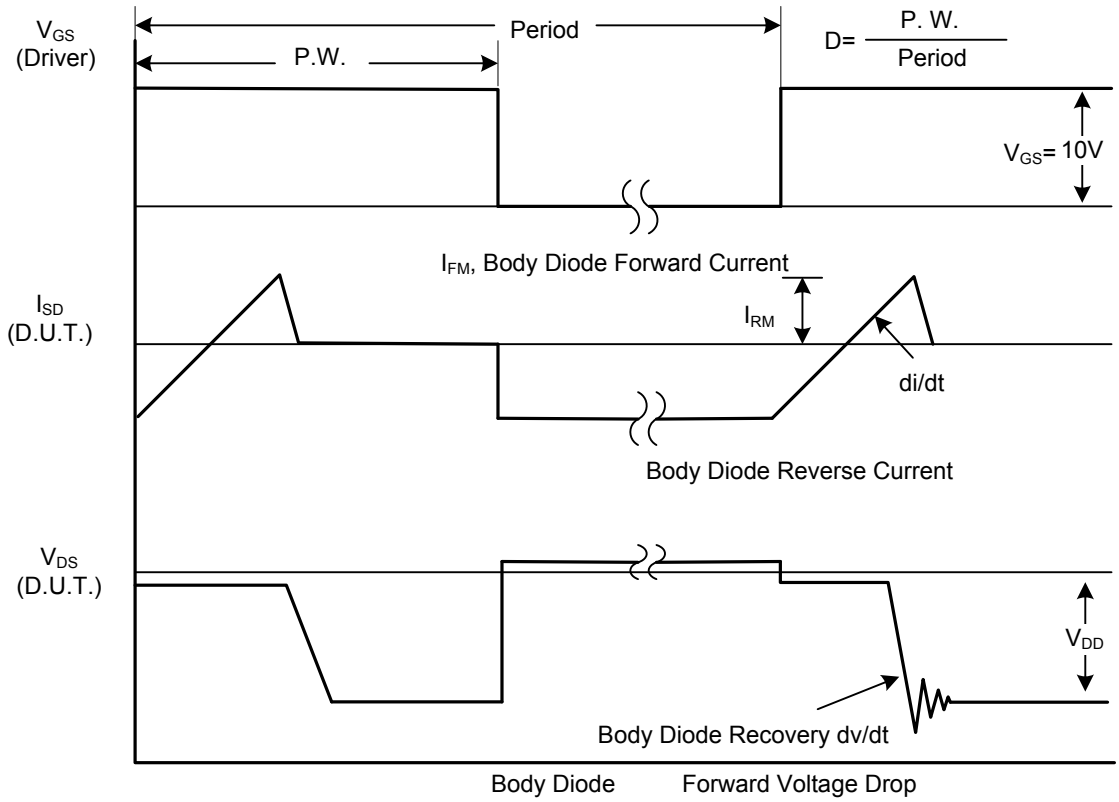
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0 V, I_D=-250μA	-500			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=-500V, V_{GS}=0V			-10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{DS}=0V, V_{GS}=+30V			100	nA
	Reverse		V_{DS}=0V, V_{GS}=-30V			-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-Resistance		$R_{DS(ON)}$	V_{GS}=-10V, I_D=-2.0A			5.5	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=-25V, V_{GS}=0V, f=1.0MHz		576		pF
Output Capacitance		C_{OSS}			85		pF
Reverse Transfer Capacitance		C_{RSS}			10		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=-50V, V_{GS}=-10V, I_D=-1.3A, I_G=-100μA (Note 1, 2)		52		nC
Gate Source Charge		Q_{GS}			5.2		nC
Gate Drain Charge		Q_{GD}			8.4		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	V_{DD}=-30V, V_{GS}=-10V, I_D=-0.5A, R_G=25Ω (Note 1, 2)		9.6		ns
Turn-ON Rise Time		t_R			15.4		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			40.4		ns
Turn-OFF Fall-Time		t_F			28.7		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				-4	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				-8	A
Diode Forward Voltage (Note 1)		V_{SD}	I_S=-4.0A, V_{GS}=0V			-3.5	V
Body Diode Reverse Recovery Time(Note 1)		t_{rr}	I_S=-4.0A, V_{GS}=0V, dI_F/dt=100A/μs		230		ns
Body Diode Reverse Recovery Charge		Q_{rr}			2.2		μC

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

■ TEST CIRCUITS AND WAVEFORMS

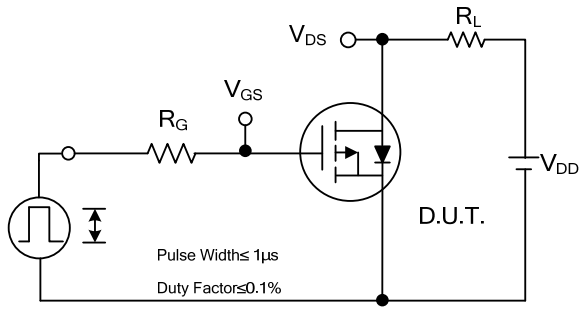


Peak Diode Recovery dv/dt Test Circuit

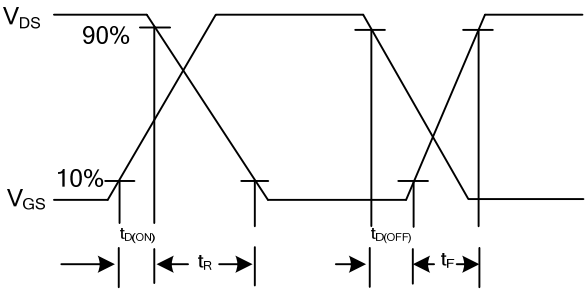


Peak Diode Recovery dv/dt Waveforms

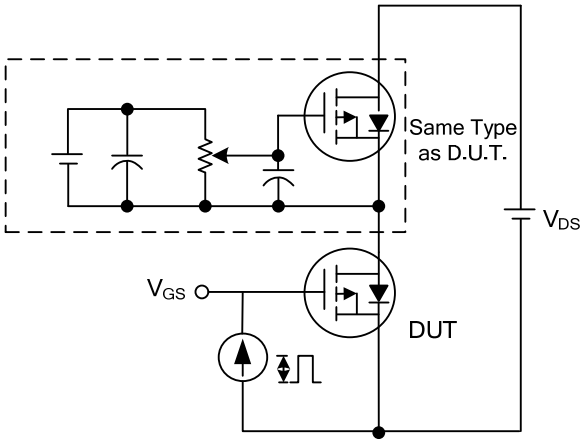
■ TEST CIRCUITS AND WAVEFORMS



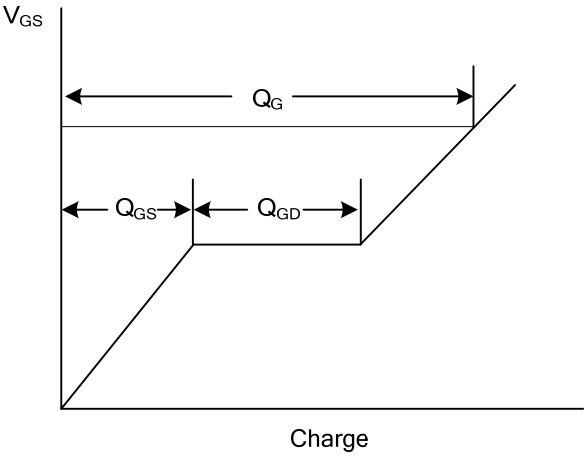
Switching Test Circuit



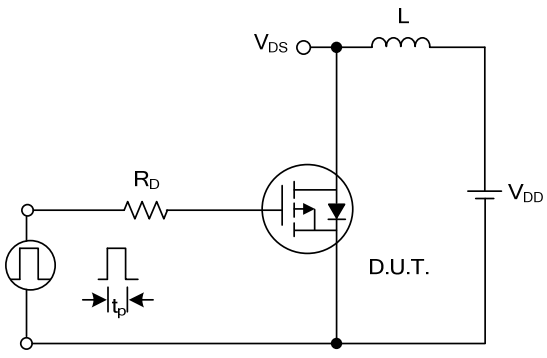
Switching Waveforms



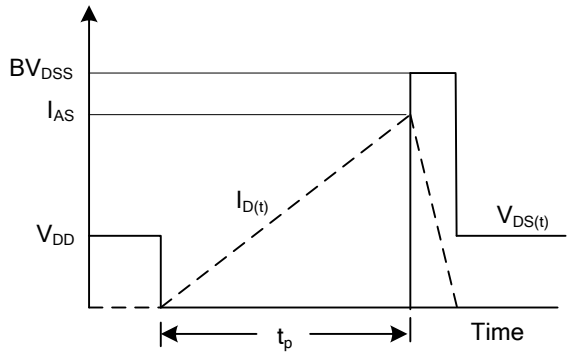
Gate Charge Test Circuit



Gate Charge Waveform

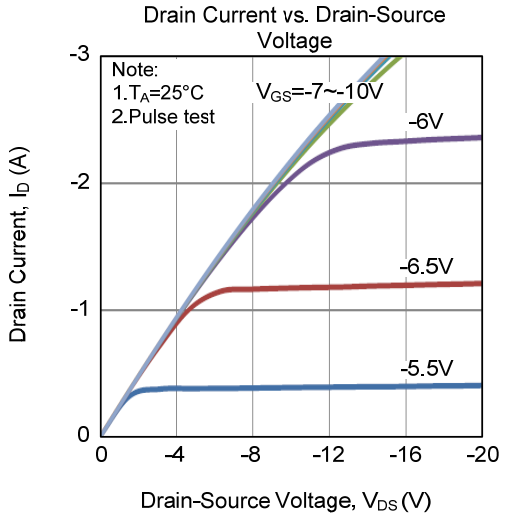


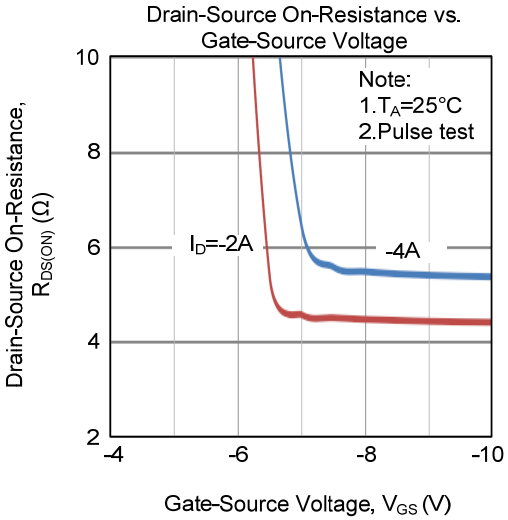
Unclamped Inductive Switching Test Circuit

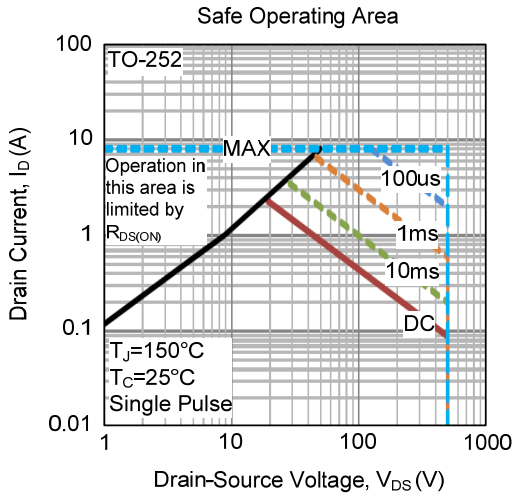


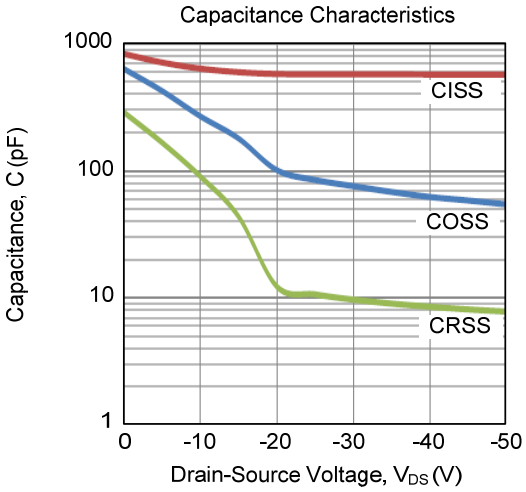
Unclamped Inductive Switching Waveforms

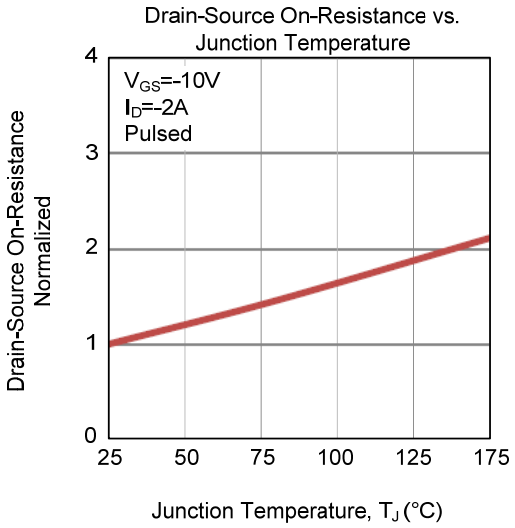
■ TYPICAL CHARACTERISTICS

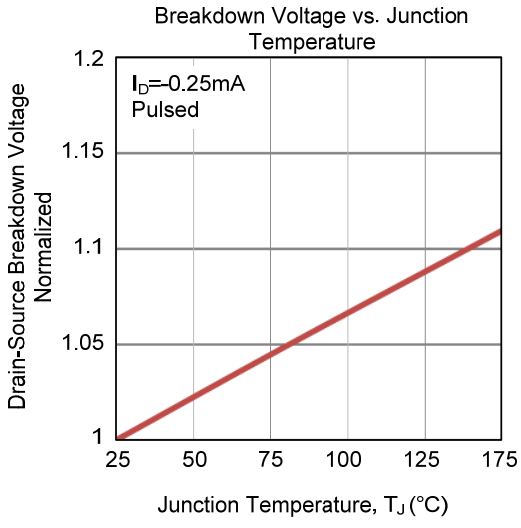






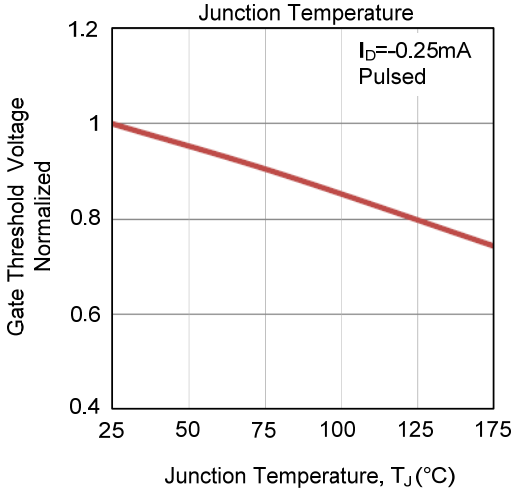




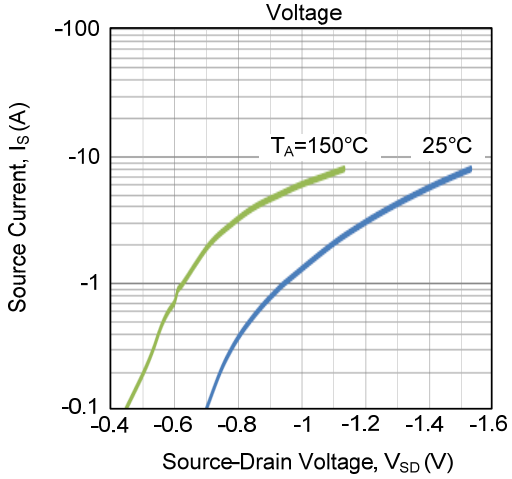


■ TYPICAL CHARACTERISTICS (Cont.)

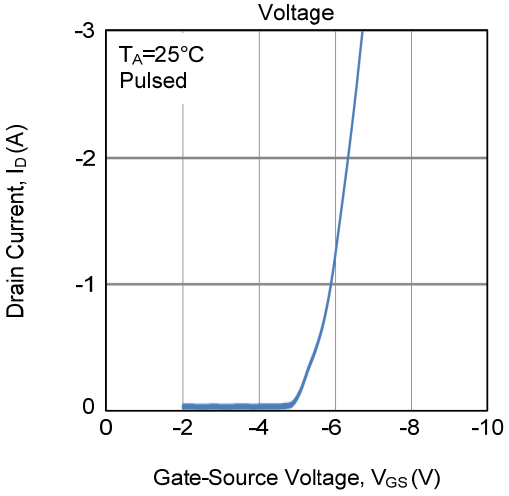
Gate Threshold Voltage vs. Junction Temperature



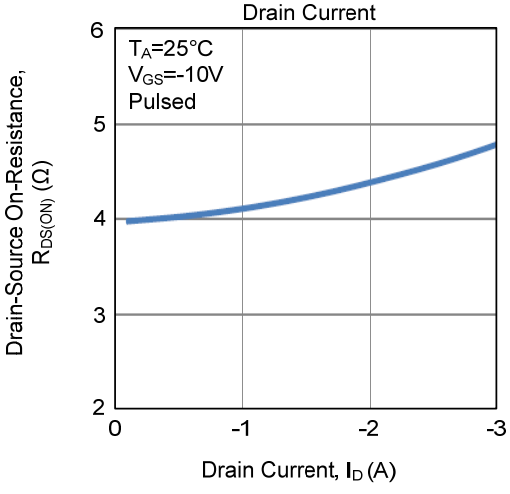
Source Current vs. Source-Drain Voltage



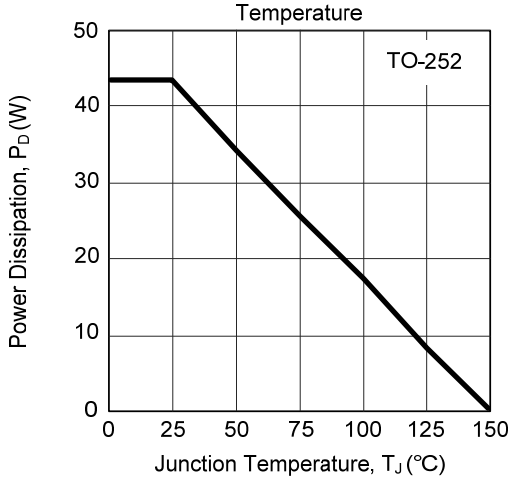
Drain Current vs. Gate-Source Voltage



Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature