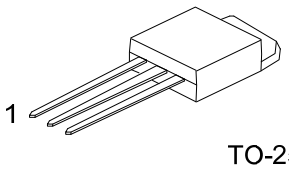
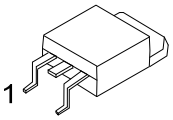
UT12P10

Power MOSFET

-100V, -12A P-CHANNEL POWER MOSFET



TO-251



TO-252

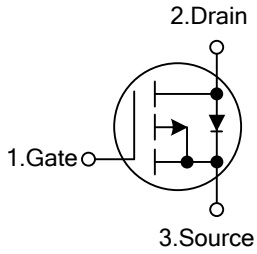
■ DESCRIPTION

The UTC **UT12P10** is a P-channel power MOSFET using UTC's advanced technology to provide the customers with high switching speed, cost-effectiveness and a minimum on-state resistance. It can also withstand high energy in the avalanche.

■ FEATURES

* $R_{DS(ON)} \leq 0.2\ \Omega$ @ V_{GS}=-10V, I_D=-12A
* High Switching Speed

■ SYMBOL



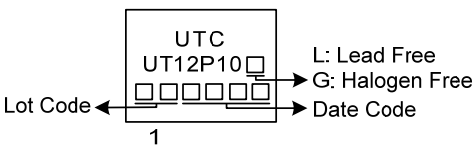
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UT12P10L-TM3-T	UT12P10G-TM3-T	TO-251	G	D	S	Tube
UT12P10L-TN3-R	UT12P10G-TN3-R	TO-252	G	D	S	Tape Reel

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

UT12P10G-TM3-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube, R: Tape Reel (2) TM3: TO-251, TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	-100	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	Continuous, V_{GSS}@-10V T_C=25°C	I_D	-12	A
	Pulsed (Note 2)	I_{DM}	-20	A
	Single Pulsed (Note 2)	E_{AS}	24.4	mJ
Power Dissipation (T_C=25°C)		P_D	44.5	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} = -22.1A, V_{DD} = -25V, R_G = 25 Ω, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	θ_{JA}	110	°C/W
Junction to Case	θ_{JC}	2.8	°C/W

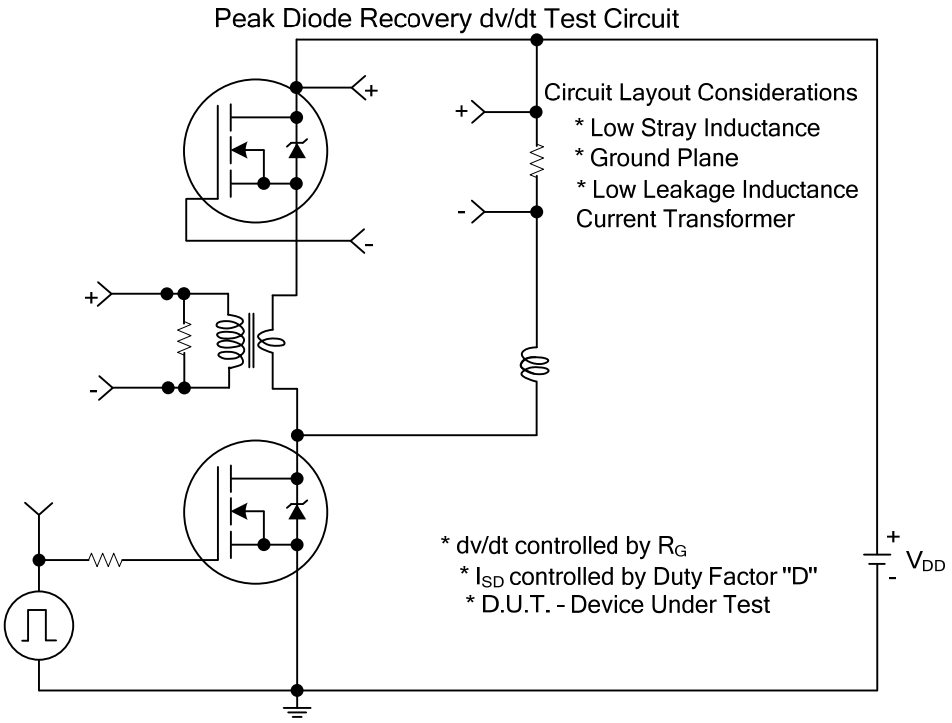
Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

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

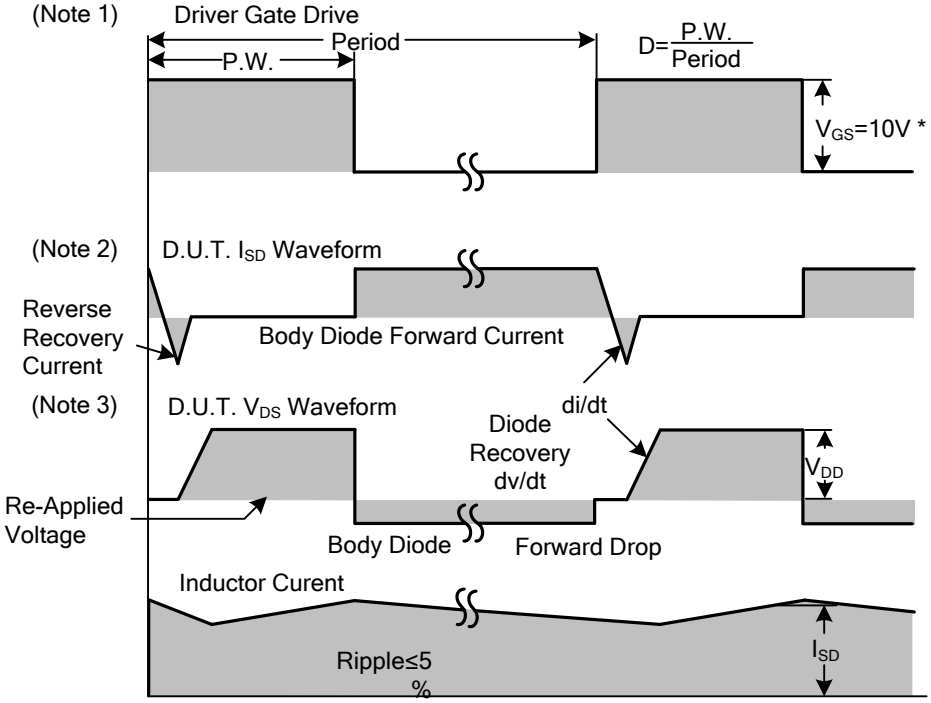
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=-250μA, V_{GS}=0V	-100			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=-100V, V_{GS}=0V			-1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V			+100	nA
	Reverse		V_{GS}=-20V			-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-State Resistance		$R_{DS(ON)}$	V_{GS}=-4.5V, I_D=-6.0A			0.22	Ω
			V_{GS}=-10V, I_D=-6.0A			0.2	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=-25V, V_{GS}=0V, f=1.0MHz		1250		pF
Output Capacitance		C_{OSS}			70		pF
Reverse Transfer Capacitance		C_{RSS}			60		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DS}=-80V, V_{GS}=-10V, I_D=-12A I_G=1mA (Note 1, 2)		36		nC
Gate to Source Charge		Q_{GS}			6.6		nC
Gate to Drain ("Miller") Charge		Q_{GD}			7.8		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DS}=-50V, V_{GS}=-10V, I_D=-12A, R_G=6.0Ω (Note 1, 2)		4.2		ns
Rise Time		t_R			17.4		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			45.6		ns
Fall-Time		t_F			22.4		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				-12	A
Maximum Body-Diode Pulsed Current		I_{SM}				-48	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=-12A,V_{GS}=0V (Note 2)			-5.0	V
Body Diode Reverse Recovery Time		t_{rr}	I_F=-12A,di/dt=100A/μs (Note 2)		125.3		ns
Body Diode Reverse Recovery Charge		Q_{rr}			1.0		μC

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

■ TEST CIRCUITS AND WAVEFORMS



* Reverse Polarity for P-Channel
** Use P-Channel Driver for P-Channel Measurements



*** V_{GS}=5V for Logic Level and 3V Drive Devices

For N and P Channel Power MOSFET

Notes: 1. Repetitive rating; pulse width limited by max. junction temperature.
2. V_{DD}=-25V, starting T_J=25°C, L=2.7mH, R_G=25Ω, I_{AS}=-12A. (See Figure 2)
3. I_{SD}≤-12A, di/dt≤200A/μs, V_{DD}≤BV_{DSS}, T_J≤175°C

■ TEST CIRCUITS AND WAVEFORMS

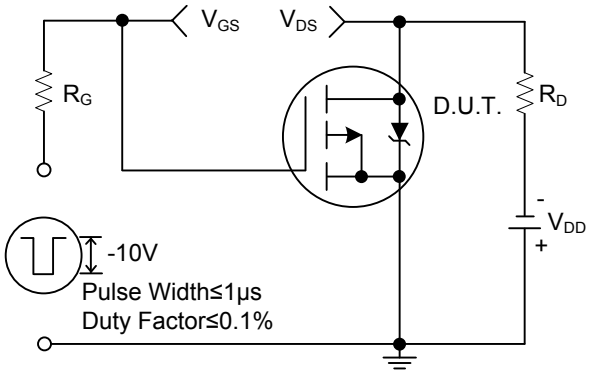


Fig. 1a Switching Time Test Circuit

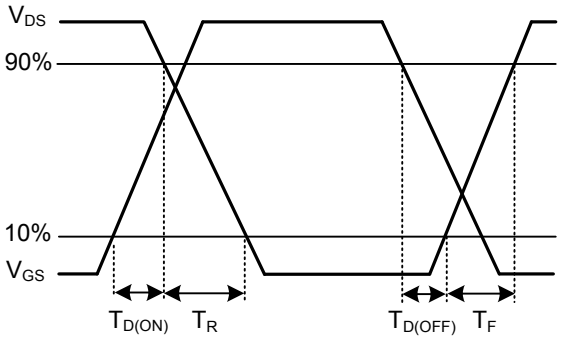


Fig. 1b Switching Time Waveforms

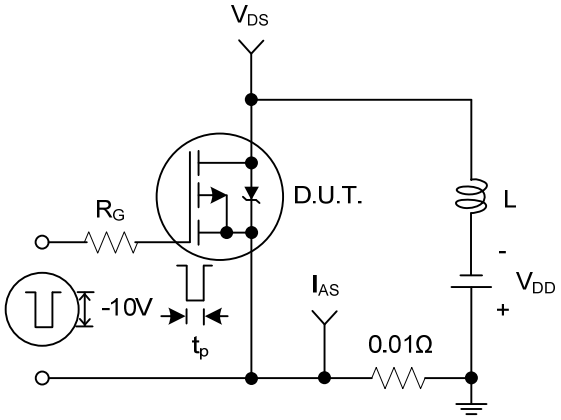


Fig. 2a Unclampled Inductive Test Circuit

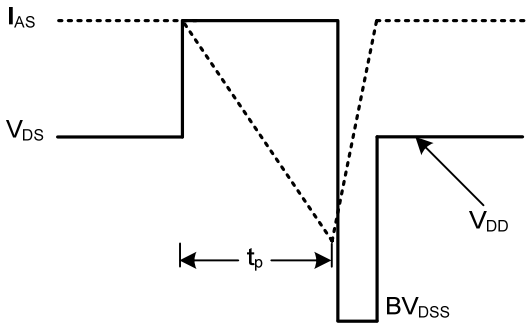


Fig. 2b Unclampled Inductive Waveforms

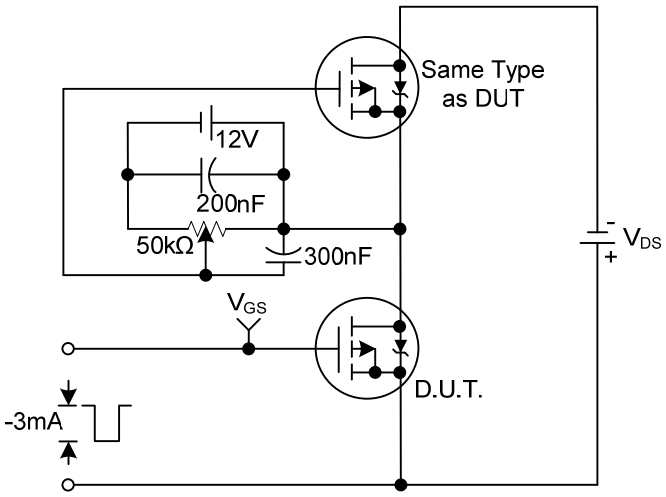


Fig.3a Gate Charge Test Circuit

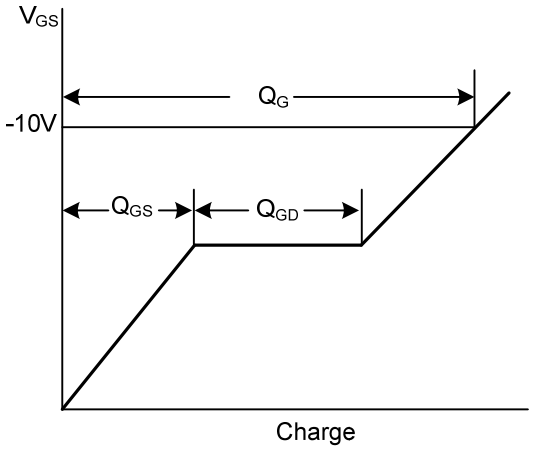
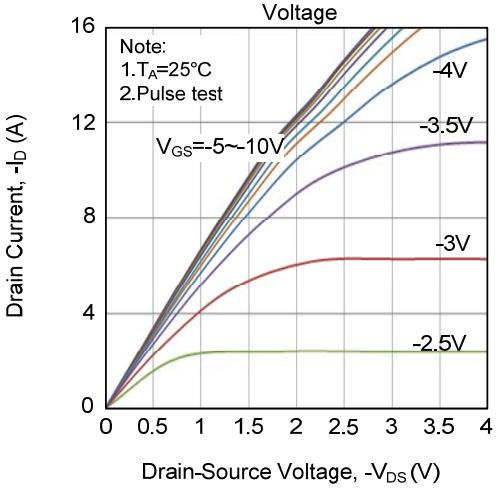


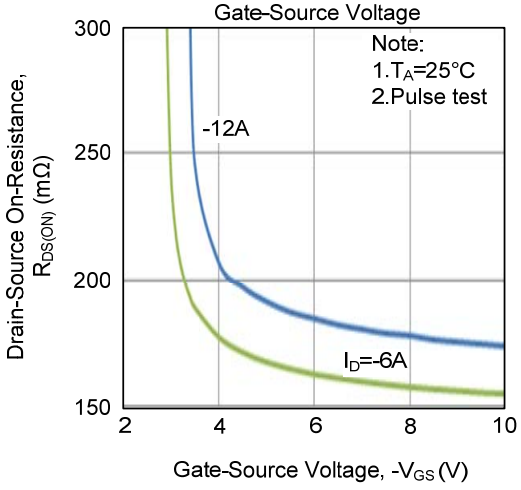
Fig. 3b Gate Charge Waveform

■ TYPICAL CHARACTERISTICS

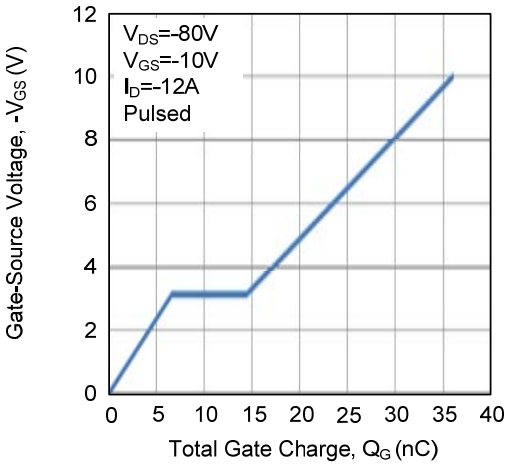
Drain Current vs. Drain-Source Voltage



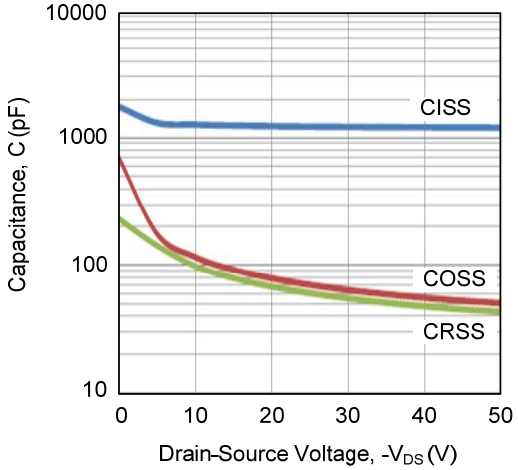
Drain-Source On-Resistance vs. Gate-Source Voltage



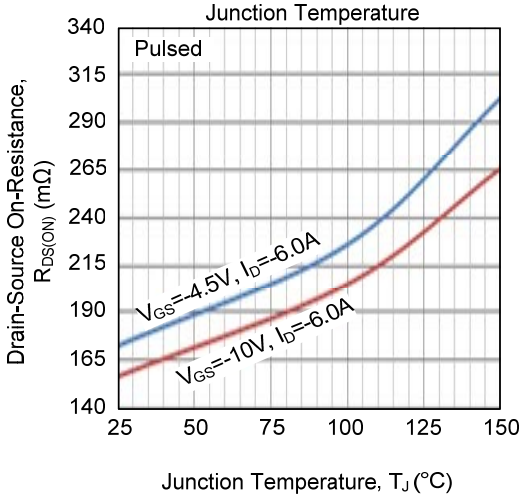
Gate Charge Characteristics



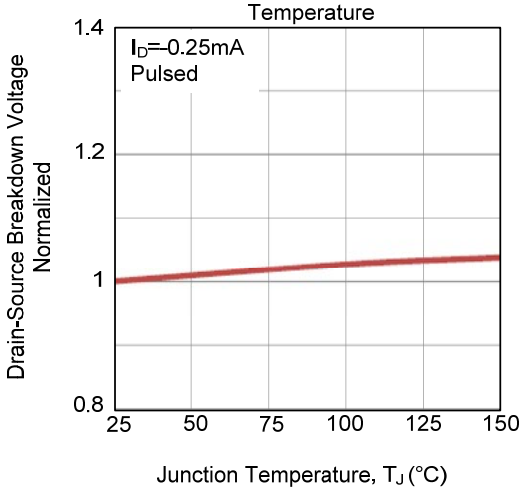
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

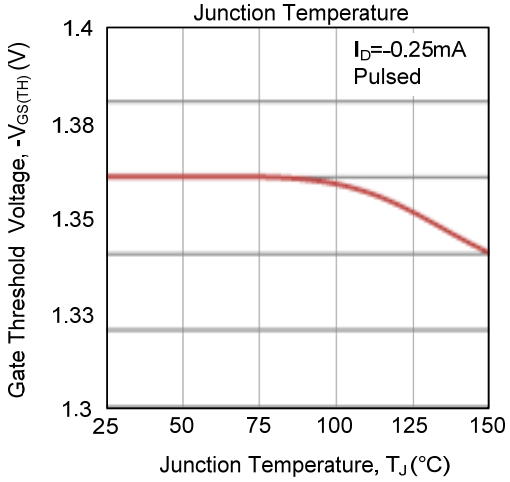


Breakdown Voltage vs. Junction Temperature

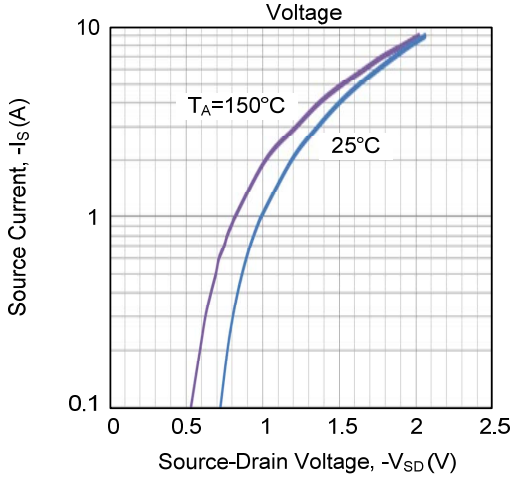


■ TYPICAL CHARACTERISTICS (Cont.)

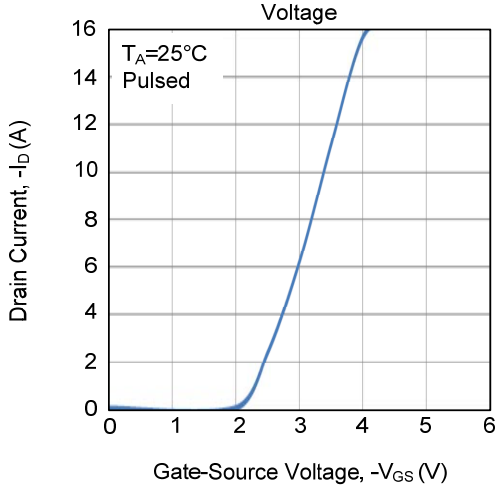
Gate Threshold Voltage vs. Junction Temperature



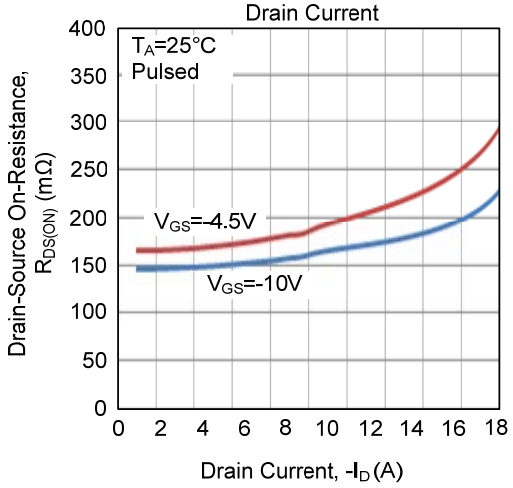
Source Current vs. Source-Drain Voltage



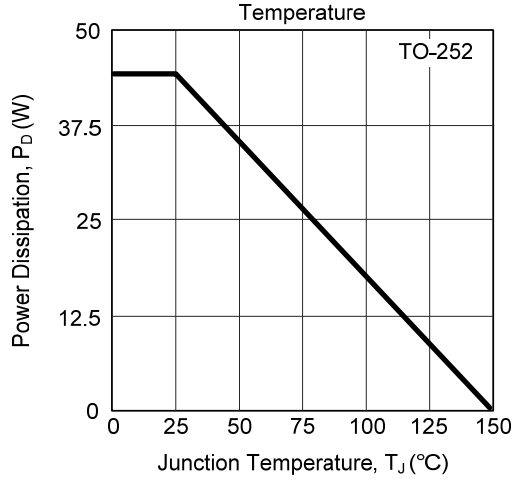
Drain Current vs. Gate-Source Voltage



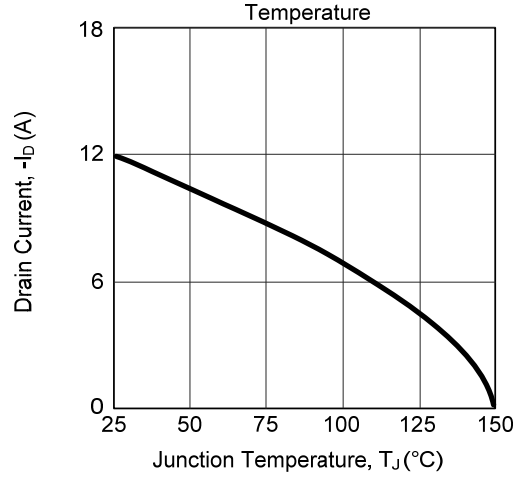
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)