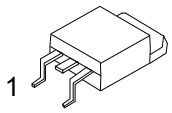
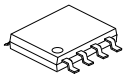
UT15P04

Power MOSFET

-40V, -15A P-CHANNEL POWER MOSFET



TO-252



SOP-8

■ DESCRIPTION

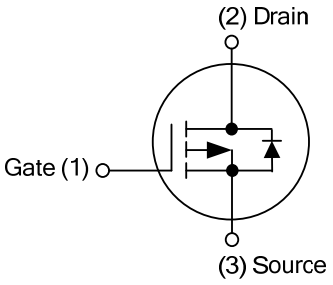
The UTC **UT15P04** is a P-channel power MOSFET using UTC's advanced technology to provide the customers with high switching speed and a minimum on-state resistance, and it can also withstand high energy in the avalanche.

This UTC **UT15P04** is suitable for motor drivers, high-side switch and 12V board net, etc.

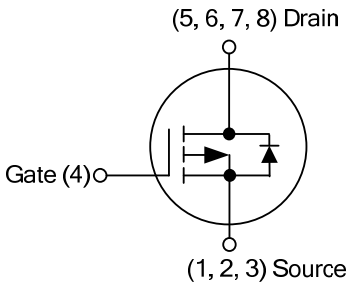
■ FEATURES

* $R_{DS(ON)}$ ≤ 64 mΩ @ V_{GS}=-10V, I_D=-7.5A
  $R_{DS(ON)}$ ≤ 100 mΩ @ V_{GS}=-10V, I_D=-7.5A
* High Switching Speed

■ SYMBOL



TO-252



SOP-8

■ ORDERING INFORMATION

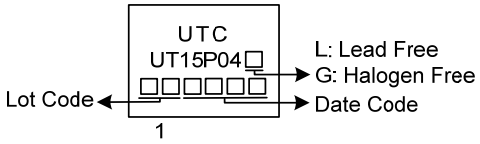
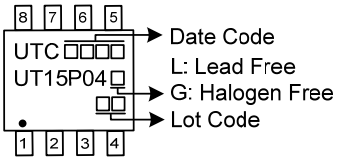
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT15P04L-TN3-R	UT15P04G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UT15P04L-S08-R	UT15P04G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

UT15P04G-TN3-R

(1)Packing Type	(1) R: Tape Reel
(2)Package Type	(2) TN3: TO-252, S08: SOP-8
(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

TO-252	SOP-8
	

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	-40	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	Continuous	I_D	-15	A
	Pulsed	I_{DM}	-30	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	18.2	mJ
Power Dissipation	TO-252	P_D	32	W
	SOP-8		1.2	W
Junction Temperature		T_J	-55 ~ +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} = 19.1A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-252	θ_{JA}	50	°C/W
	SOP-8		125	°C/W
Junction to Case	TO-252	θ_{JC}	3.9	°C/W
	SOP-8		104	°C/W

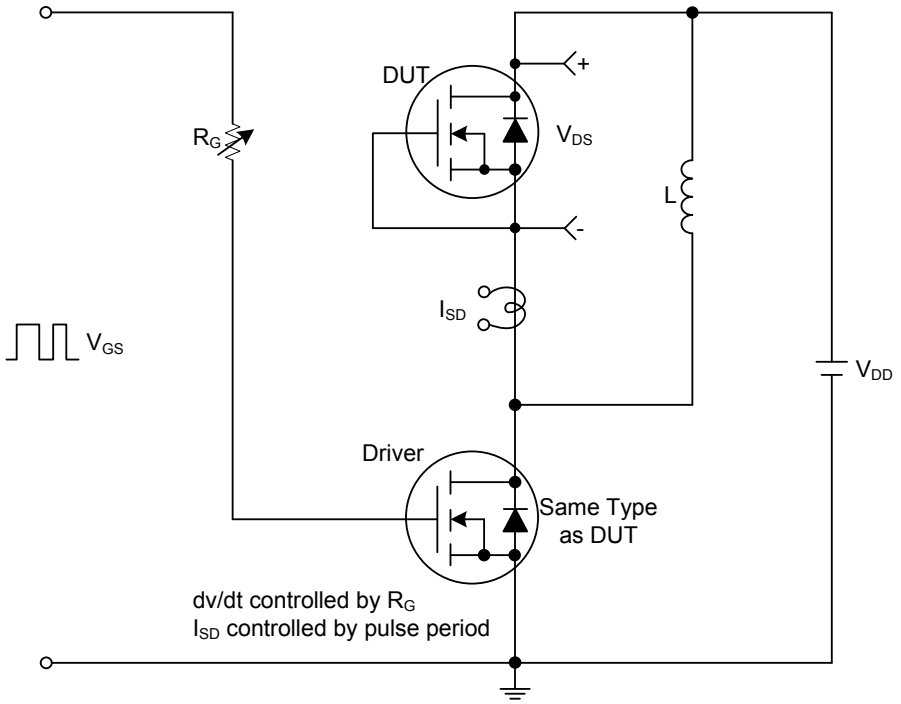
Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

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

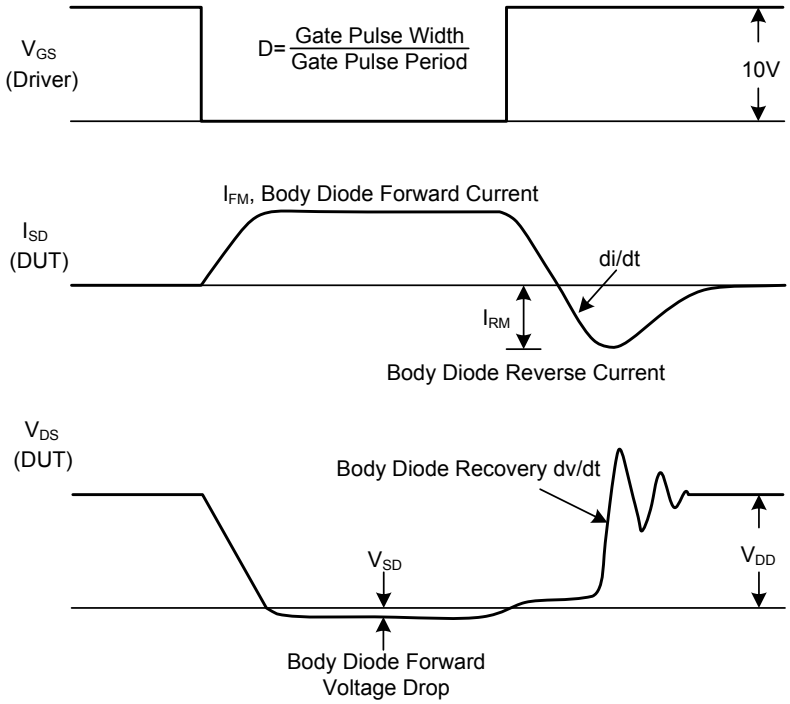
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=-250μA, V_{GS}=0V	-40			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=-40V, V_{GS}=0V			-1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-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 (Note 1)		$R_{DS(ON)}$	V_{GS}=-10V, I_D=-7.5A			64	mΩ
			V_{GS}=−4.5V, I_D=−7.5A			100	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=-25V, V_{GS}=0V, f=1MHz		679		pF
Output Capacitance		C_{OSS}			77.2		pF
Reverse Transfer Capacitance		C_{RSS}			67.5		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DS}=-32V, V_{GS}=-10V, I_D=-15A (Note 1, 2)		18		nC
Gate to Source Charge		Q_{GS}			2.5		nC
Gate to Drain Charge		Q_{GD}			3.7		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DS}=-20V, V_{GS}=-10V, I_D=-15A, R_G=3Ω (Note 1, 2)		5.6		ns
Rise Time		t_R			16.8		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			22.8		ns
Fall-Time		t_F			18.8		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I_S				-15	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				-30	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=-15A , V_{GS}=0V			1.4	V

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

■ TEST CIRCUITS AND WAVEFORMS



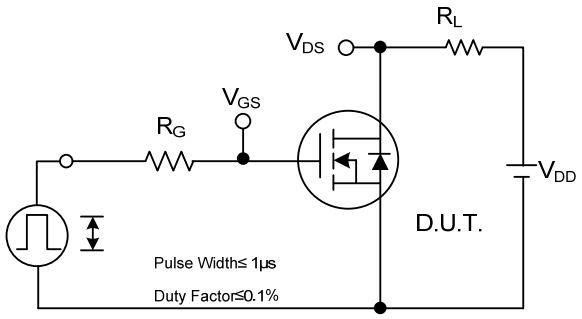
Peak Diode Recovery dv/dt Test Circuit



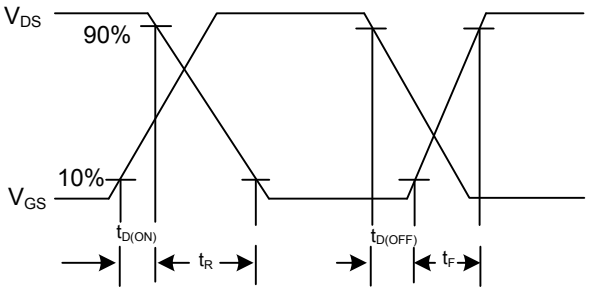
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

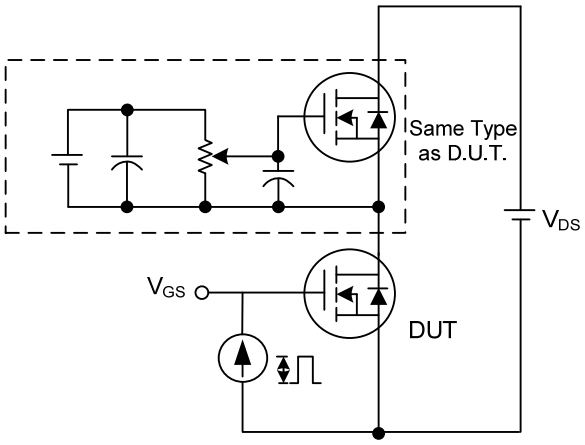
■ TEST CIRCUITS AND WAVEFORMS



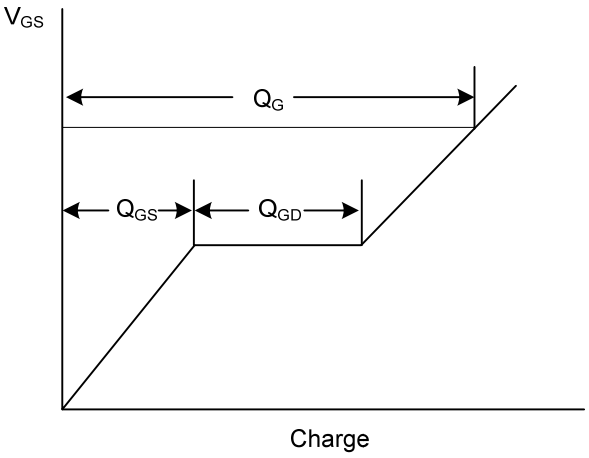
Switching Test Circuit



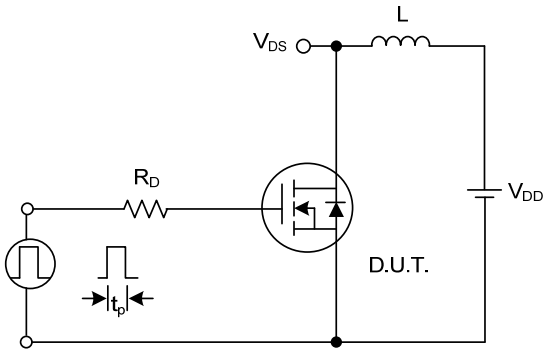
Switching Waveforms



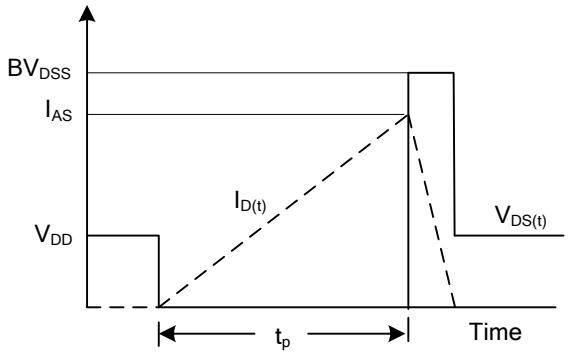
Gate Charge Test Circuit



Gate Charge Waveform



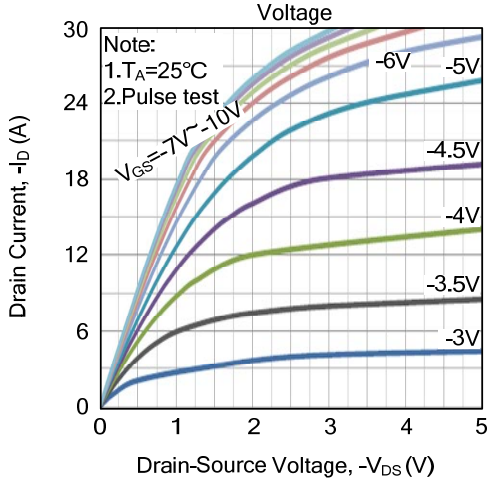
Unclamped Inductive Switching Test Circuit



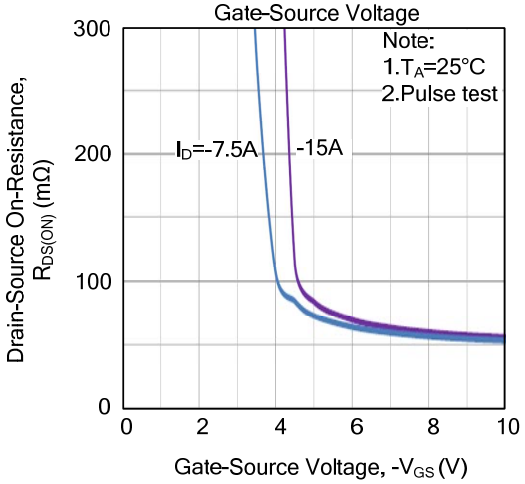
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

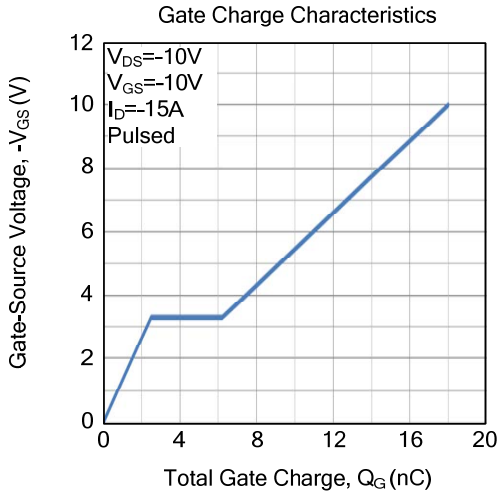
Drain Current vs. Drain-Source Voltage



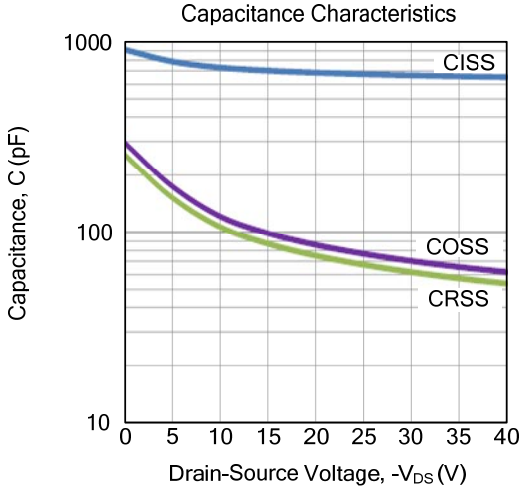
Drain-Source On-Resistance vs. Gate-Source Voltage



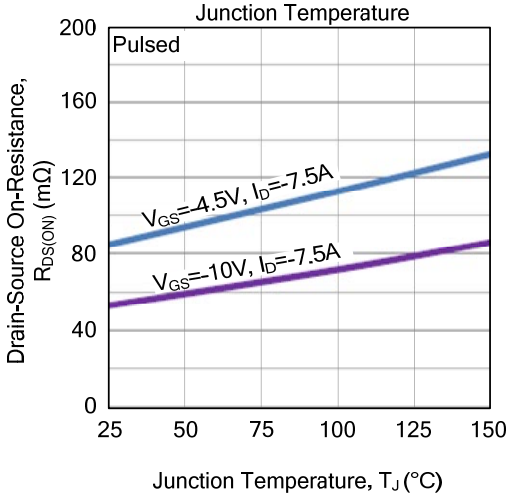
Gate Charge Characteristics



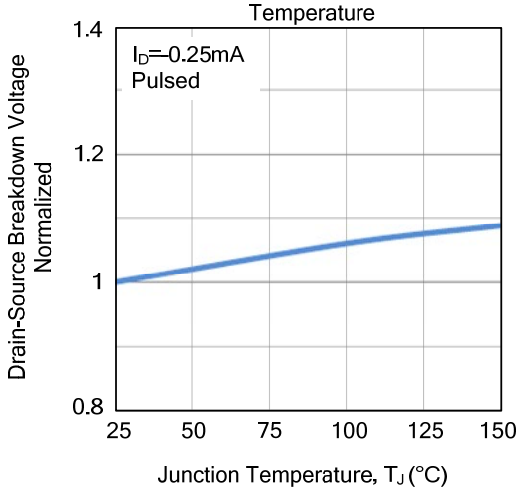
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

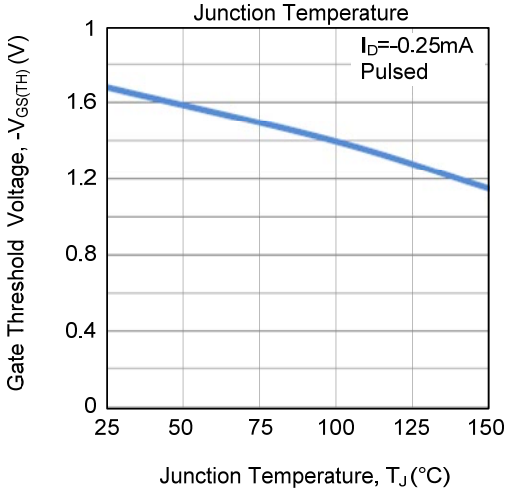


Breakdown Voltage vs. Junction Temperature

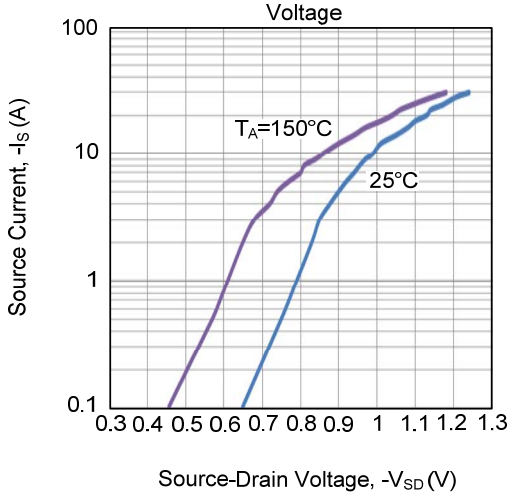


■ TYPICAL CHARACTERISTICS (Cont.)

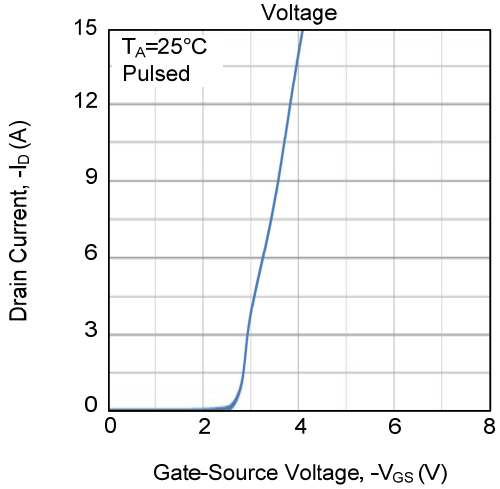
Gate Threshold Voltage vs. Junction Temperature



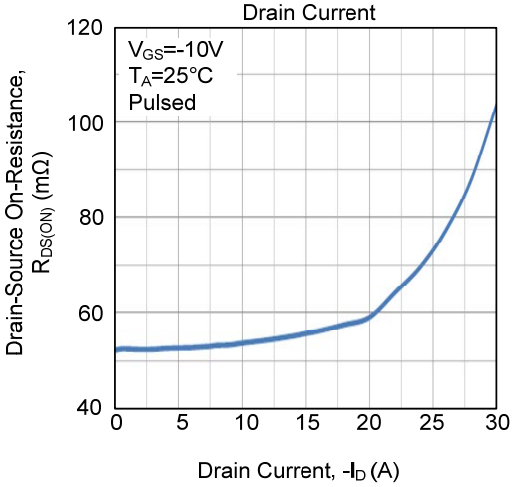
Source Current vs. Source-Drain Voltage



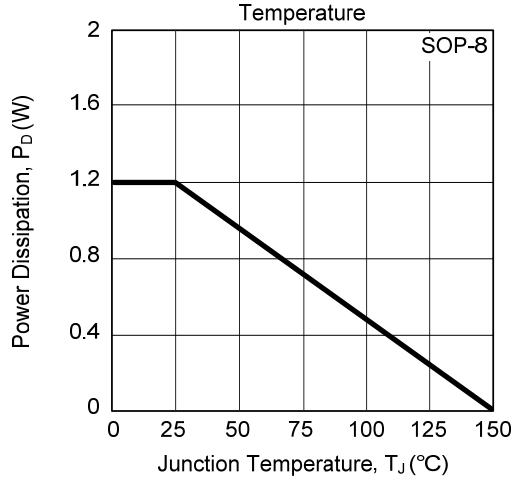
Drain Current vs. Gate-Source Voltage



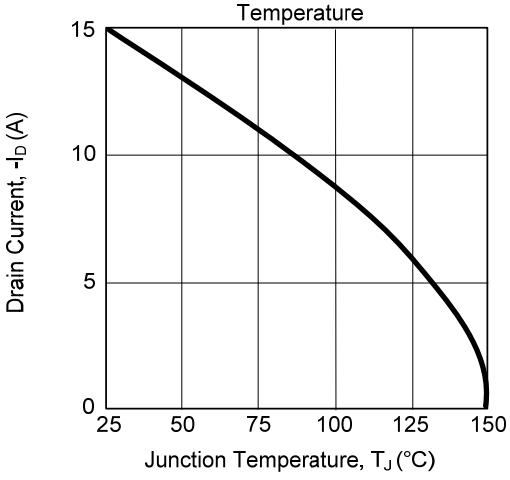
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)