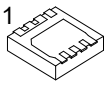
-40A, -20V P-CHANNEL POWER MOSFET



PDFN3×3

■ DESCRIPTION

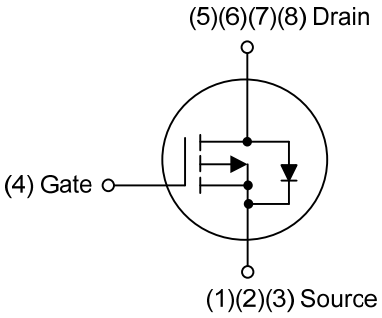
The UTC **UT7407** is a P-channel Power Mosfet, it uses UTC's advanced technology to provide the customers with a minimum on state resistance, etc.

The UTC **UT7407** is suitable for load switch and battery protection applications.

■ FEATURES

* $R_{DS(ON)} \leq 9.5\ m\Omega$ @ V_{GS}=-4.5V, I_D=-14A
  $R_{DS(ON)} \leq 15.5\ m\Omega$ @ V_{GS}=-2.5V, I_D=-13A
  $R_{DS(ON)} \leq 20\ m\Omega$ @ V_{GS}=-1.8V, I_D=-11A
* Low thermal resistance

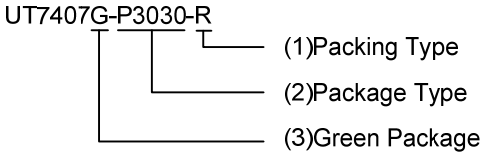
■ SYMBOL



■ ORDERING INFORMATION

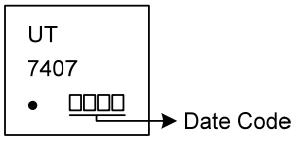
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT7407L-P3030-R	UT7407G-P3030-R	PDFN3×3	S	S	S	G	D	D	D	D	Tape Reel

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



(1) R: Tape Reel
(2) P3030: PDFN3×3
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	-20	V
Gate-Source Voltage		V_{GSS}	±8	V
Continuous Drain Current		I_D	-40	A
Pulsed Drain Current (Note 2)		I_{DM}	-80	A
Avalanche Energy L=0.1mH (Note 3)		E_{AS}	96	mJ
Power Dissipation	T_C=25°C	P_D	32	W
Junction Temperature		T_J	-55 ~ +150	°C
Storage Temperature Range		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. Pulse width limited by maximum junction temperature.
3. L = 0.1mH, I_{AS} = -43.8A, V_{DD} = -50V, R_G = 25Ω, Starting T_J = 25°C.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	75	°C/W
Junction to Case	θ_{JC}	3.9	°C/W

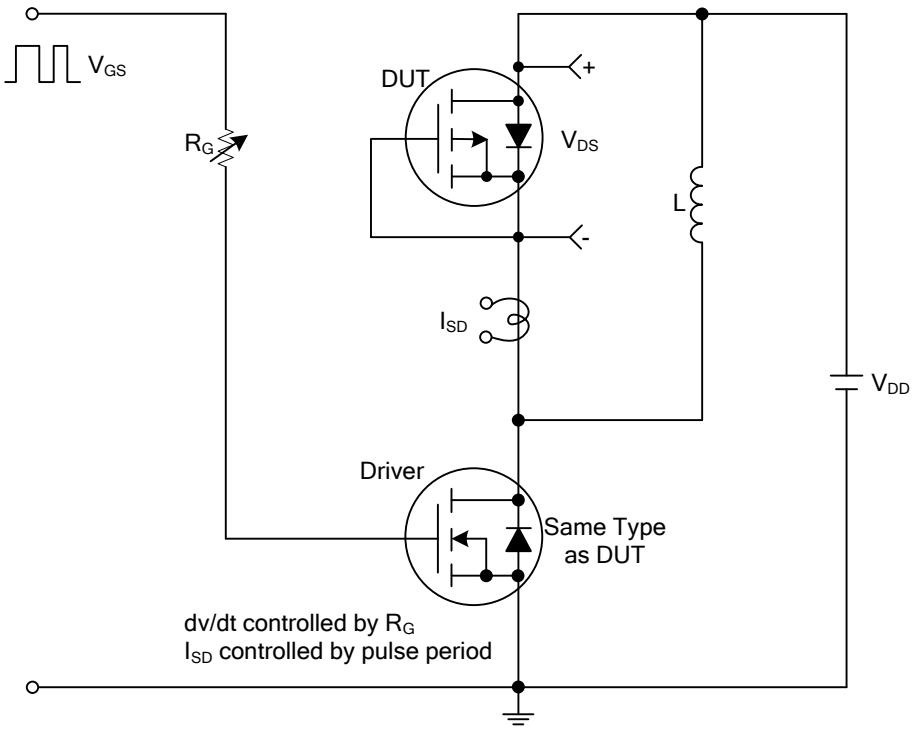
Notes: 1. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%.

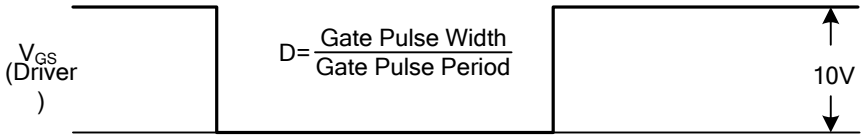
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise noted)

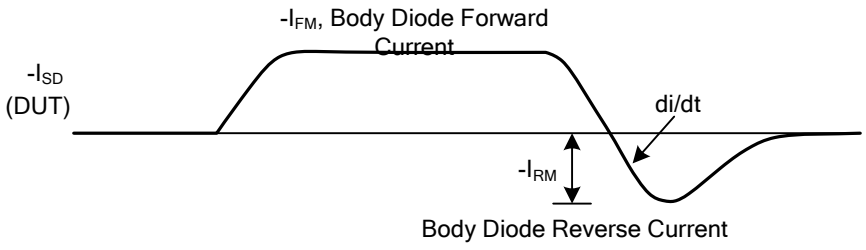
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=-250μA, V_{GS}=0V	-20			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-20V, V_{GS}=0V			-1	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±8V, V_{DS}=0V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=-250μA	-0.3		-0.9	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D=-14A			9.5	mΩ
		V_{GS}=-2.5V, I_D=-13A			15.5	mΩ
		V_{GS}=-1.8V, I_D=-11A			20	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=-10V, f=1.0MHz		3834		pF
Output Capacitance	C_{OSS}			910		pF
Reverse Transfer Capacitance	C_{RSS}			772		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	V_{GS}=-4.5V, V_{DS}=-16V, I_D=-40A		48		nC
Gate to Source Charge	Q_{GS}			4		nC
Gate to Drain Charge	Q_{GD}			21		nC
Turn-ON Delay Time	$t_{D(ON)}$	V_{DD}=-10V, V_{GS}=-4.5V, I_D=-40A, R_G=3Ω (Note 1, 2)		14		ns
Rise Time	t_R			23		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			124		ns
Fall-Time	t_F			116		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current (Note)	I_S				-40	A
Diode Forward Voltage	V_{SD}	I_S=-1.0A,V_{GS}=0V			-1.2	V

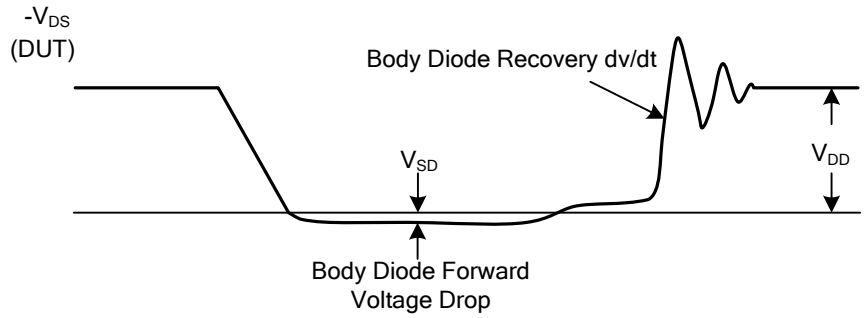
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



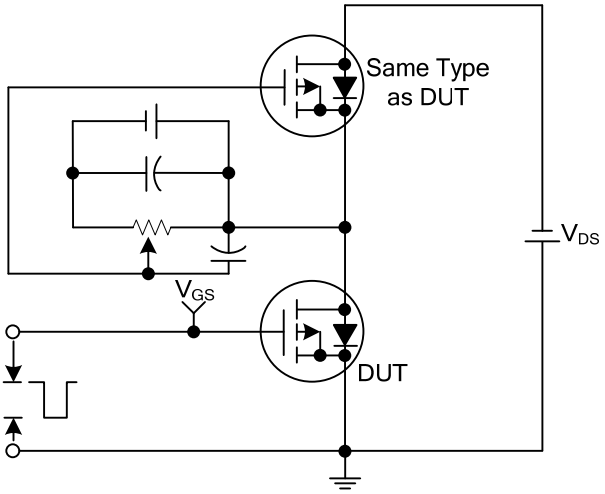




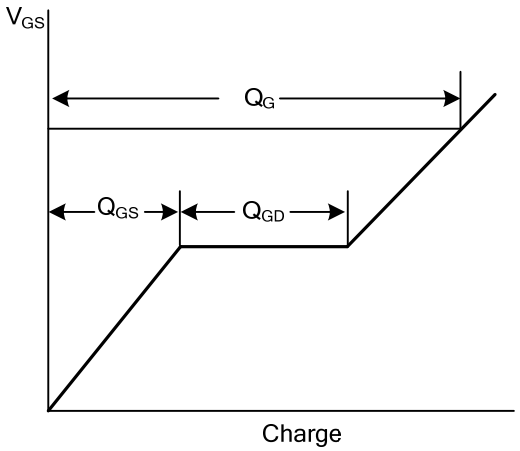


Peak Diode Recovery dv/dt Test Circuit and Waveforms

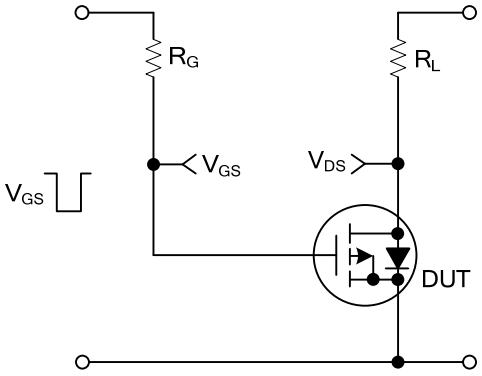
■ TEST CIRCUITS AND WAVEFORMS



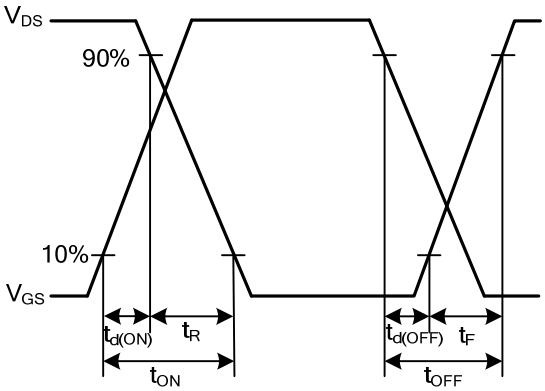
Gate Charge Test Circuit



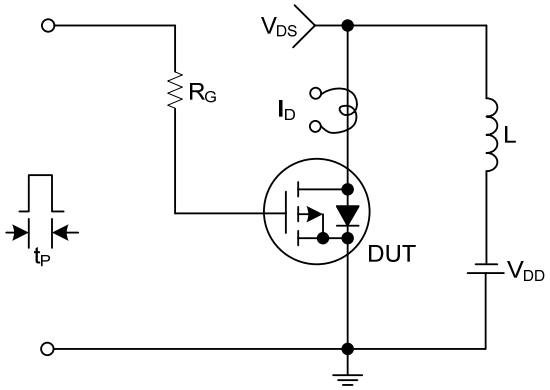
Gate Charge Waveforms



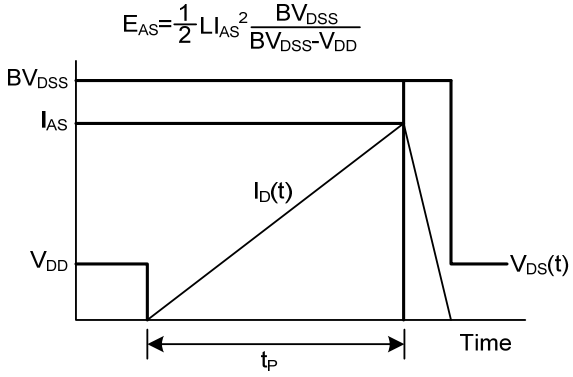
Resistive Switching Test Circuit



Resistive Switching Waveforms

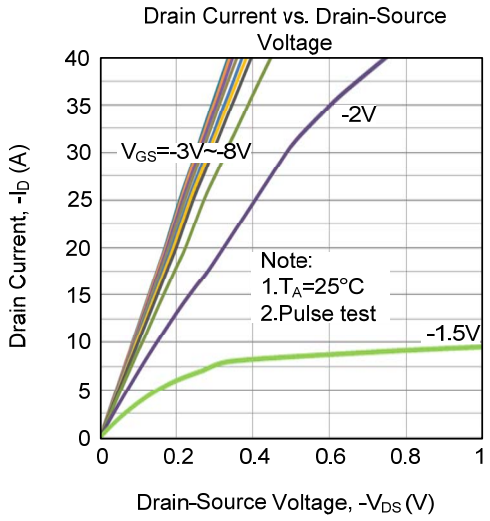


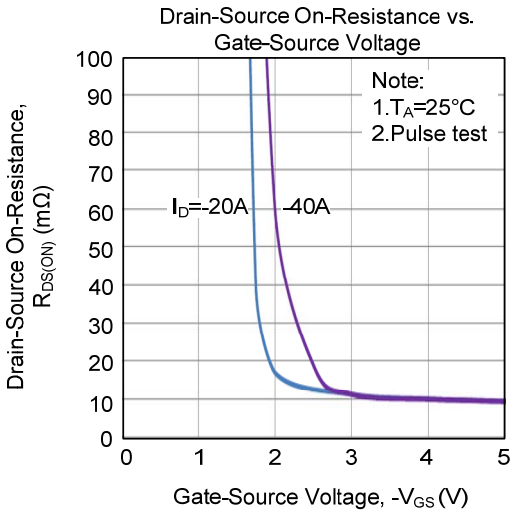
Unclamped Inductive Switching Test Circuit

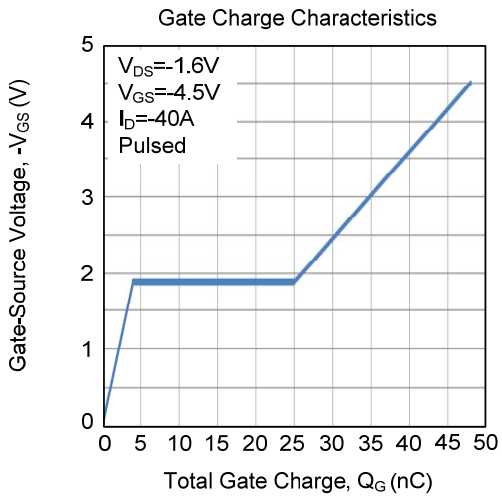


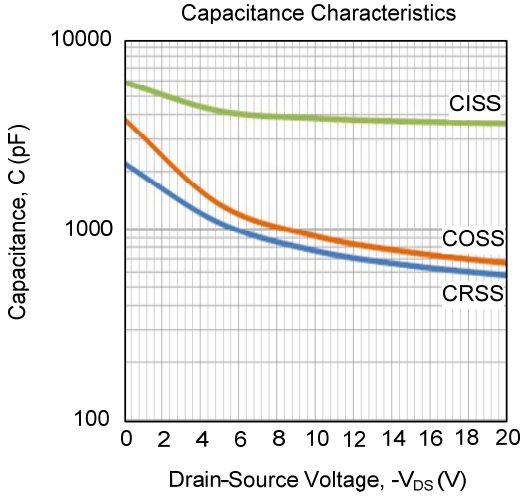
Unclamped Inductive Switching Waveforms

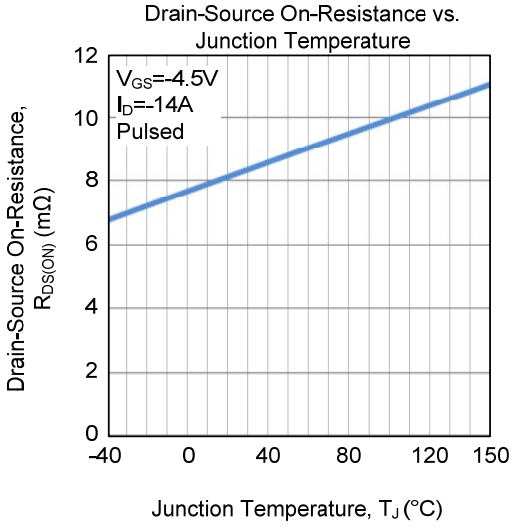
■ TYPICAL CHARACTERISTICS

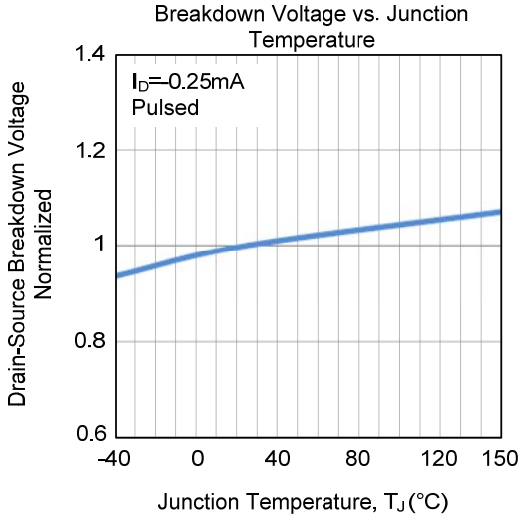






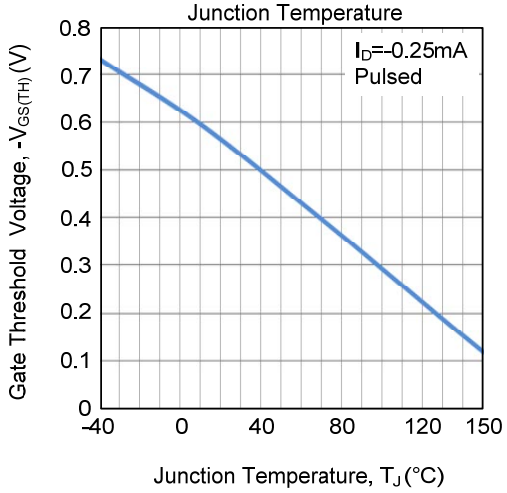




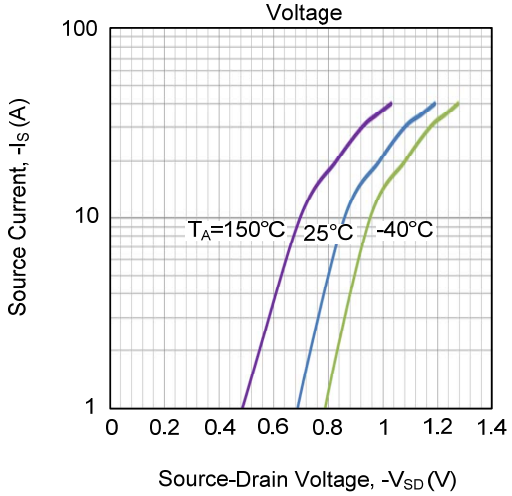


■ TYPICAL CHARACTERISTICS (Cont.)

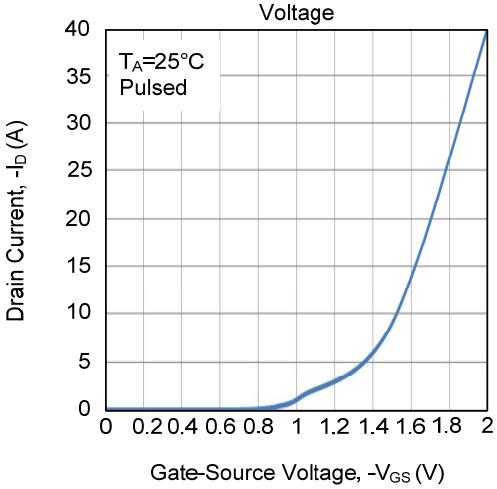
Gate Threshold Voltage vs. Junction Temperature



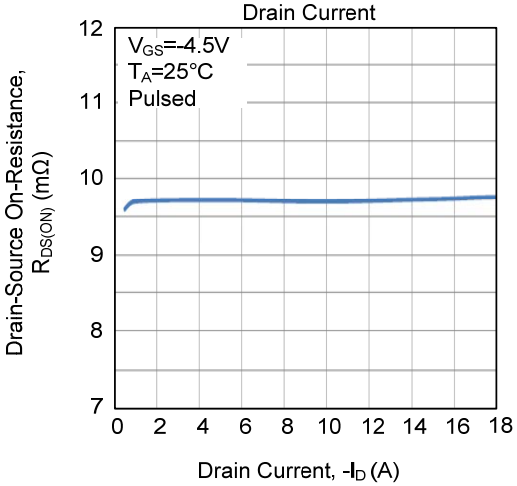
Source Current vs. Source-Drain Voltage



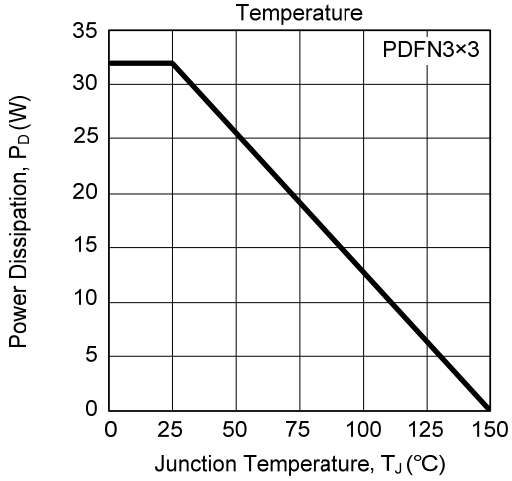
Drain Current vs. Gate-Source Voltage



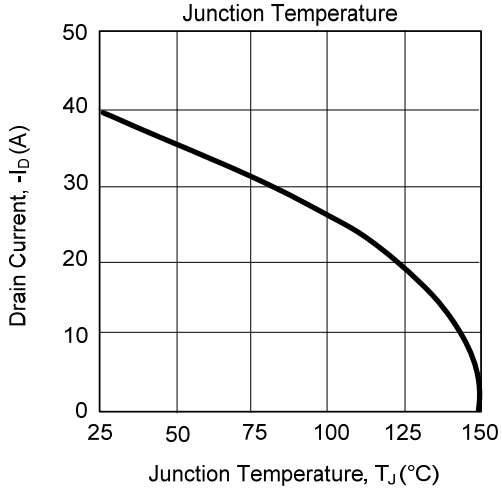
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)