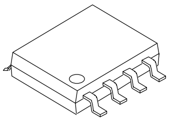
24A, 40V N-CHANNEL POWER MOSFET



SOP-8

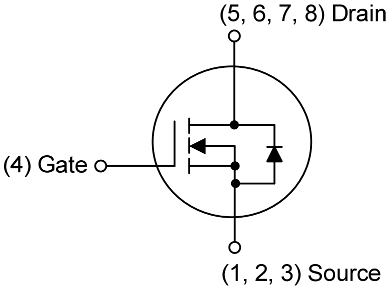
■ DESCRIPTION

The UTC **UT24N04** is a N-channel enhancement MOSFET using UTC's advanced technology to provide the customers with perfect $R_{DS(ON)}$ and high switching speed.

■ FEATURES

* $R_{DS(ON)} \le 17m\Omega$ @ V_{GS}=10V, I_D=12A
$R_{DS(ON)} \le 22m\Omega$ @ V_{GS}=4.5V, I_D=12A
* High Switching Speed

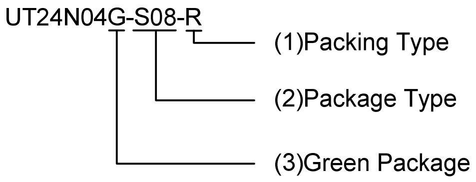
■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT24N04L-S08-R	UT24N04G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

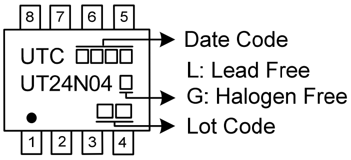


(1) R: Tape Reel

(2) S08: SOP-8

(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATING (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	24	A
	Pulsed (Note 2)	I_{DM}	48	A
Single Pulse Avalanche Energy		E_{AS}	27.1	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.65	V/ns
Power Dissipation		P_D	6.25	W
Junction Temperature		T_J	+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. Repetitive Rating : Pulse width limited by maximum junction temperature.
3. L=0.1mH, I_{AS}=23.3A, V_{DD}=50V, R_G=25Ω, Starting T_J = 25°C
4. I_{SD}≤25.4A, di/dt≤200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	°C/W
Junction to Case	θ_{JC}	20	°C/W

Note: The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.

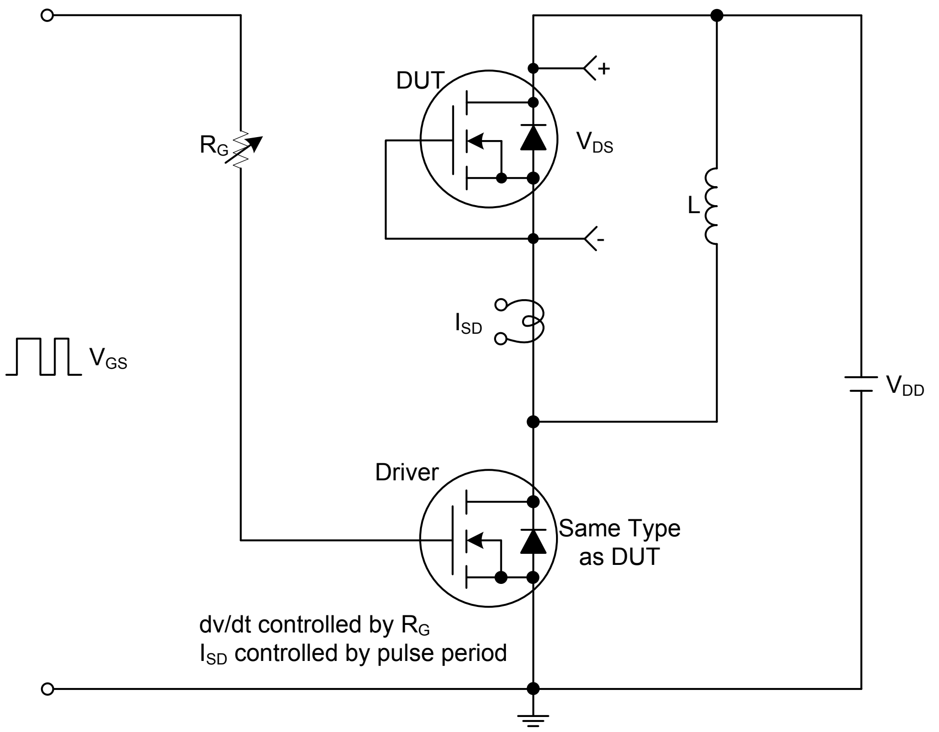
■ ELECTRICAL CHARACTERISTICS (T_J =25°C, unless otherwise specified)

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	0.6		1.8	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=12A			17	mΩ
			V_{GS}=4.5V, I_D=12A			22	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		579		pF
Output Capacitance		C_{OSS}			88		pF
Reverse Transfer Capacitance		C_{RSS}			73		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=20V, V_{GS}=10V, I_D=24A, I_G=1mA (Note 1, 2)		19		nC
Gate to Source Charge		Q_{GS}			1.8		nC
Gate to Drain Charge		Q_{GD}			3.5		nC
Turn-on Delay Time (Note 1)		$t_{D(ON)}$	V_{DD}=20V, V_{GS}=10V, I_D=24A, R_G =3.3Ω (Note 1, 2)		3.2		ns
Rise Time		t_R			16		ns
Turn-off Delay Time		$t_{D(OFF)}$			20		ns
Fall-Time		t_F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				24	A
Maximum Body-Diode Pulsed Current		I_{SM}				48	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=24A, V_{GS}=0V			1.4	V
Reverse Recovery Time (Note 1)		t_{rr}	I_S=24A, V_{GS}=0V, dI_F/dt =100A/μs		24		nS
Reverse Recovery Charge		Q_{rr}			12		nC

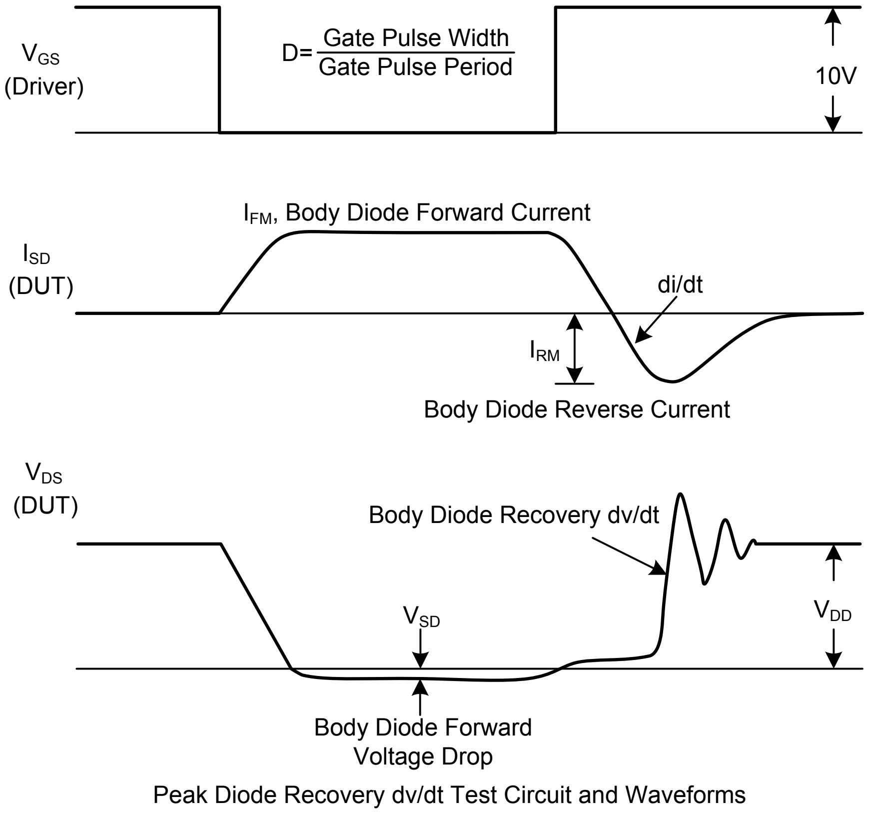
Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS

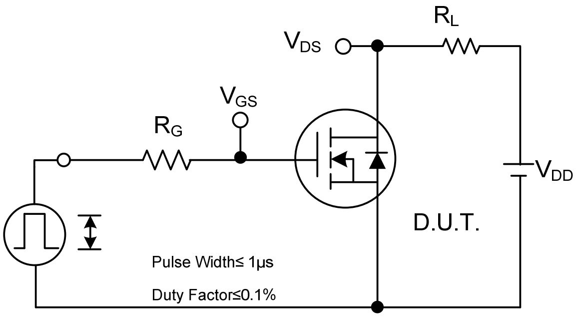


Peak Diode Recovery dv/dt Test Circuit

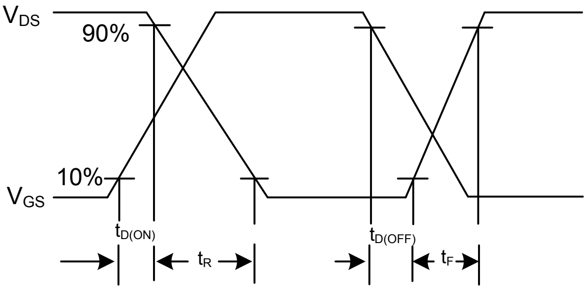


Peak Diode Recovery dv/dt Waveforms

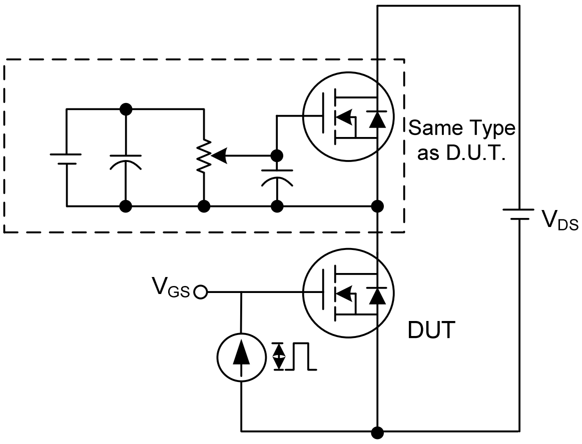
■ TEST CIRCUITS AND WAVEFORMS



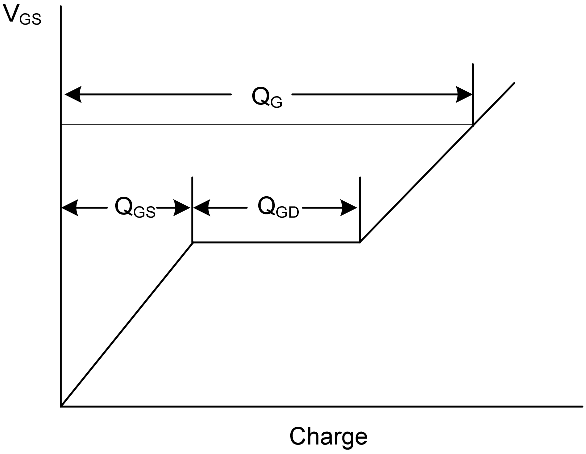
Switching Test Circuit



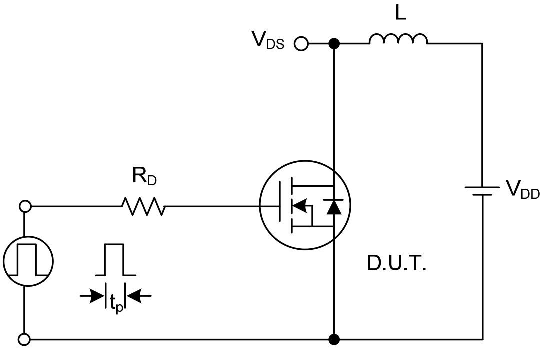
Switching Waveforms



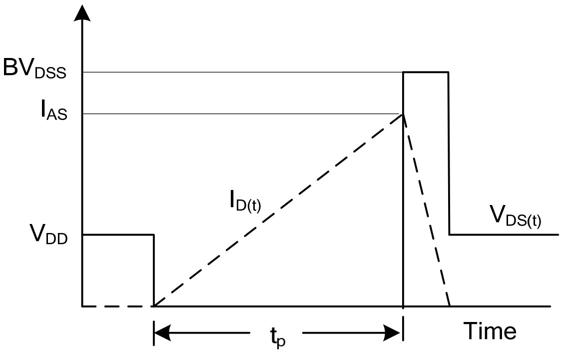
Gate Charge Test Circuit



Gate Charge Waveform

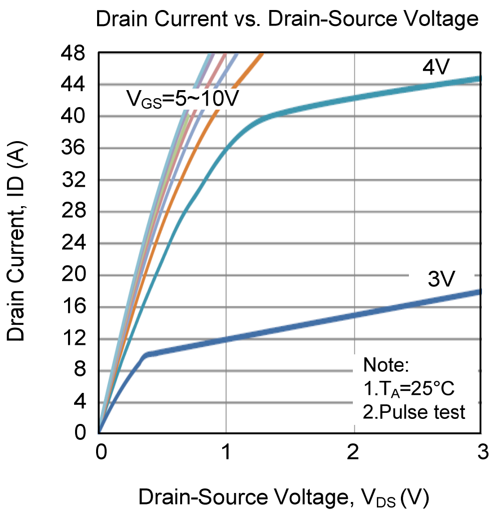


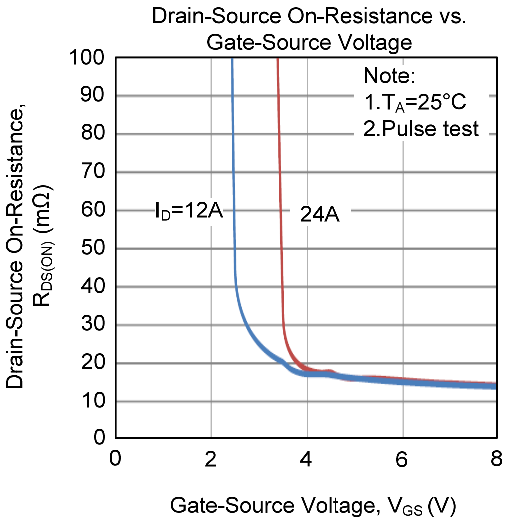
Unclamped Inductive Switching Test Circuit

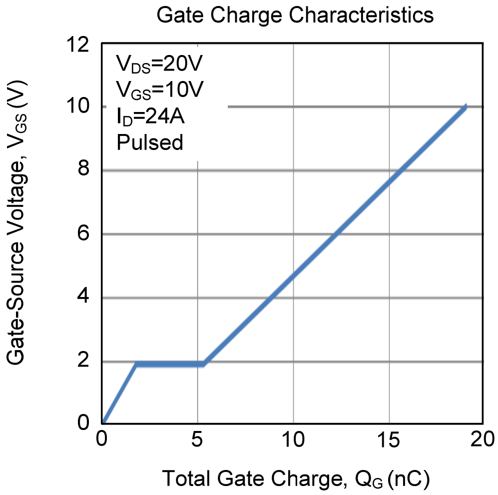


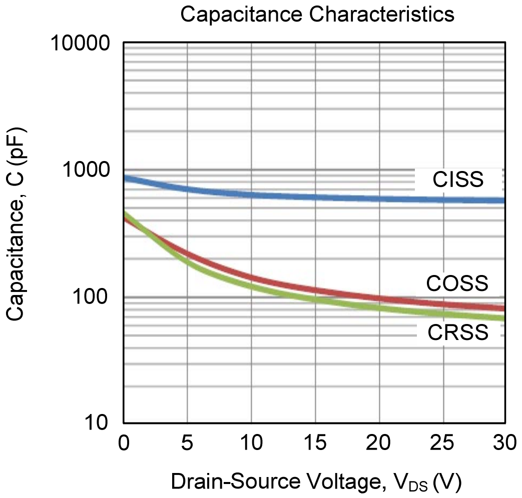
Unclamped Inductive Switching Waveforms

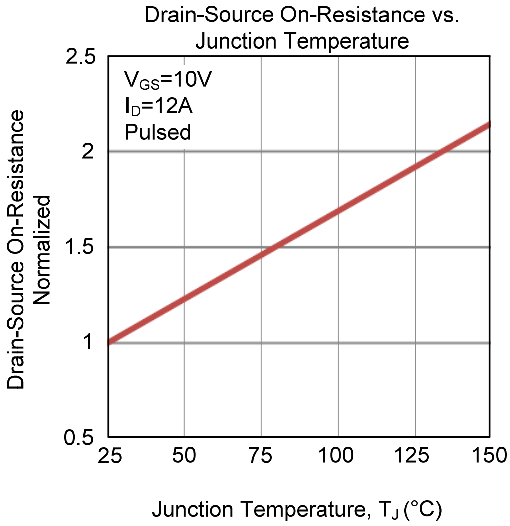
■ TYPICAL CHARACTERISTICS

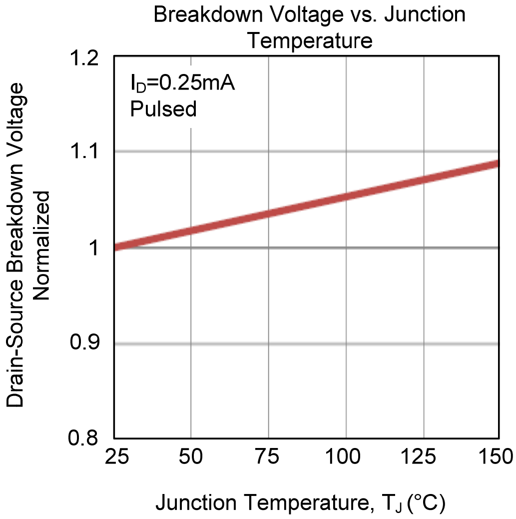






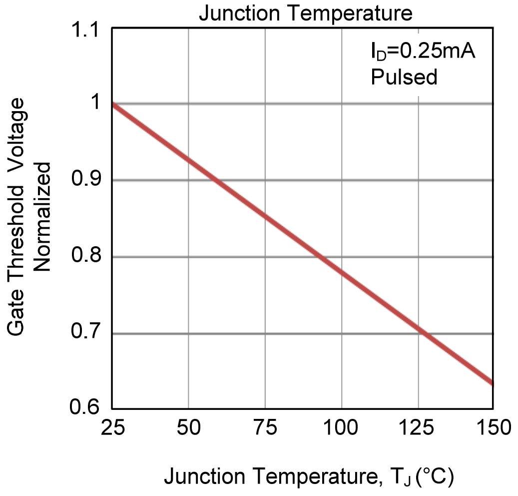




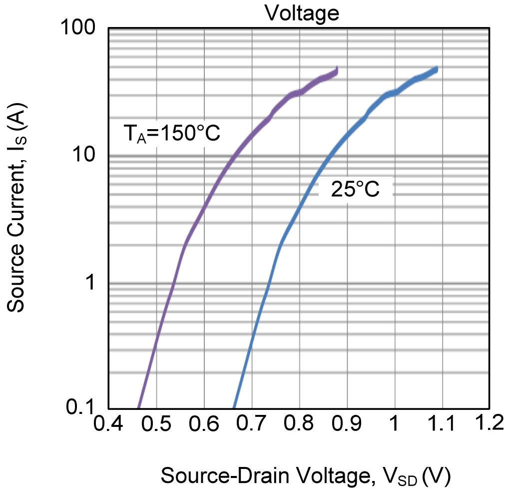


■ TYPICAL CHARACTERISTICS (Cont.)

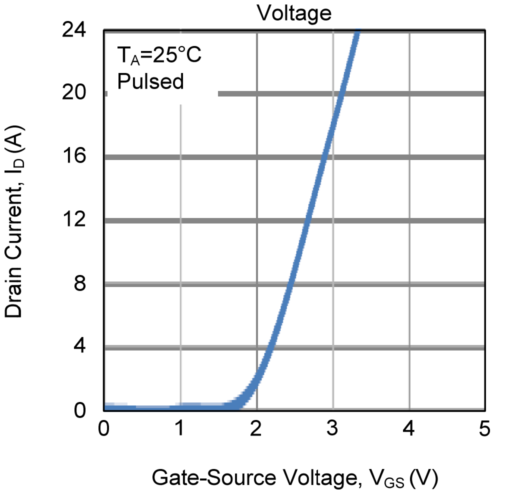
Gate Threshold Voltage vs. Junction Temperature



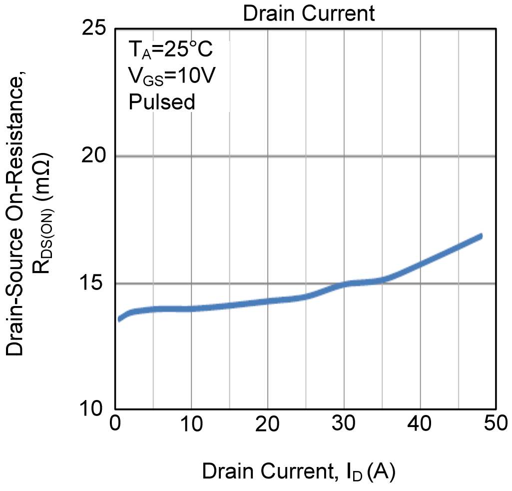
Source Current vs. Source-Drain Voltage



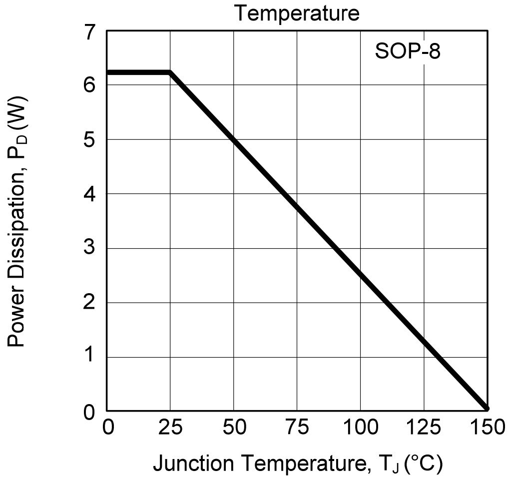
Drain Current vs. Gate-Source Voltage



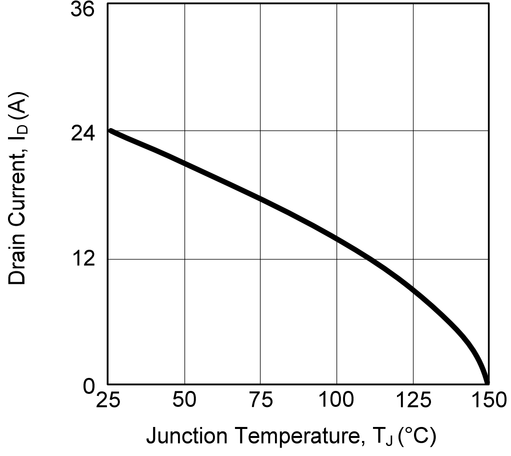
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)