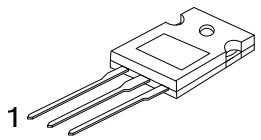
28N50-CB

Power MOSFET

28A, 500V N-CHANNEL POWER MOSFET



TO-247

■ DESCRIPTION

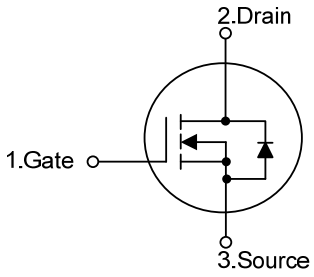
The UTC **28N50-CB** is a N-Channel enhancement mode power MOSFET. The device adopts planar stripe and uses DMOS technology to minimize and provide lower on-state resistance and faster switching speed. It can also withstand high energy pulse under the avalanche and commutation mode conditions.

The UTC **28N50-CB** is ideally suitable for high efficiency switch mode power supply, power factor correction, electronic lamp ballast based on half bridge topology.

■ FEATURES

* $R_{DS(ON)} \leq 0.22\Omega$ @ V_{GS}=10V, I_D=14A
* Fast switching capability
* Avalanche energy tested
* Improved dv/dt capability, high ruggedness

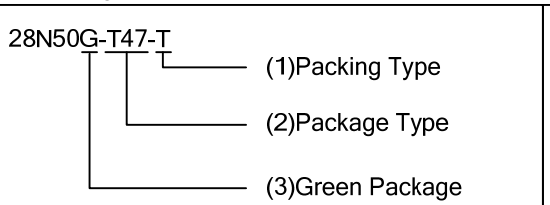
■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
28N50L-T47-T	28N50G-T47-T	TO-247	G	D	S	Tube

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

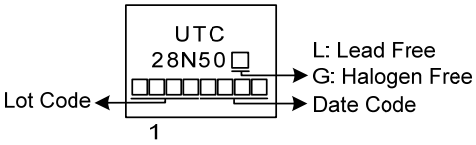


(1) T: Tube

(2) T47: TO-247

(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
Drain Current	Continuous	I_D	28	A
	Pulsed (Note 2)	I_{DM}	56	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	240	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.8	V/ns
Power Dissipation		P_D	280	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 = 10mH, I_{AS} = 6.9A, V_{DD} = 50V, R_G= 25Ω ,Starting T_J = 25°C
4. I_{SD}≤28A, di/dt ≤200A/μs, V_{DD}≤ BV_{DSS}, Starting T_J= 25°C

■ THERMAL DATA

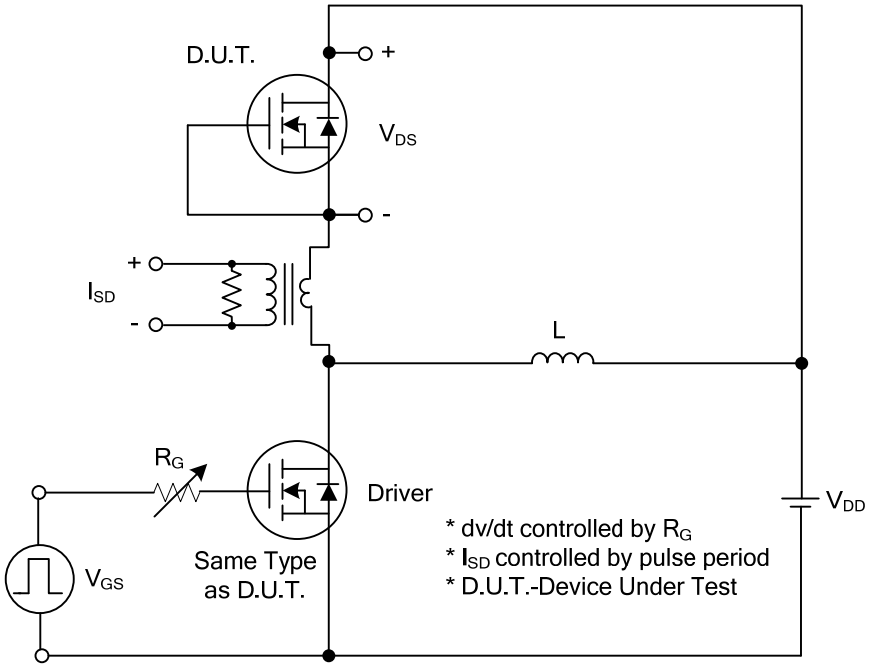
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	60	°C/W
Junction to Case	θ_{JC}	2.24	°C/W

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

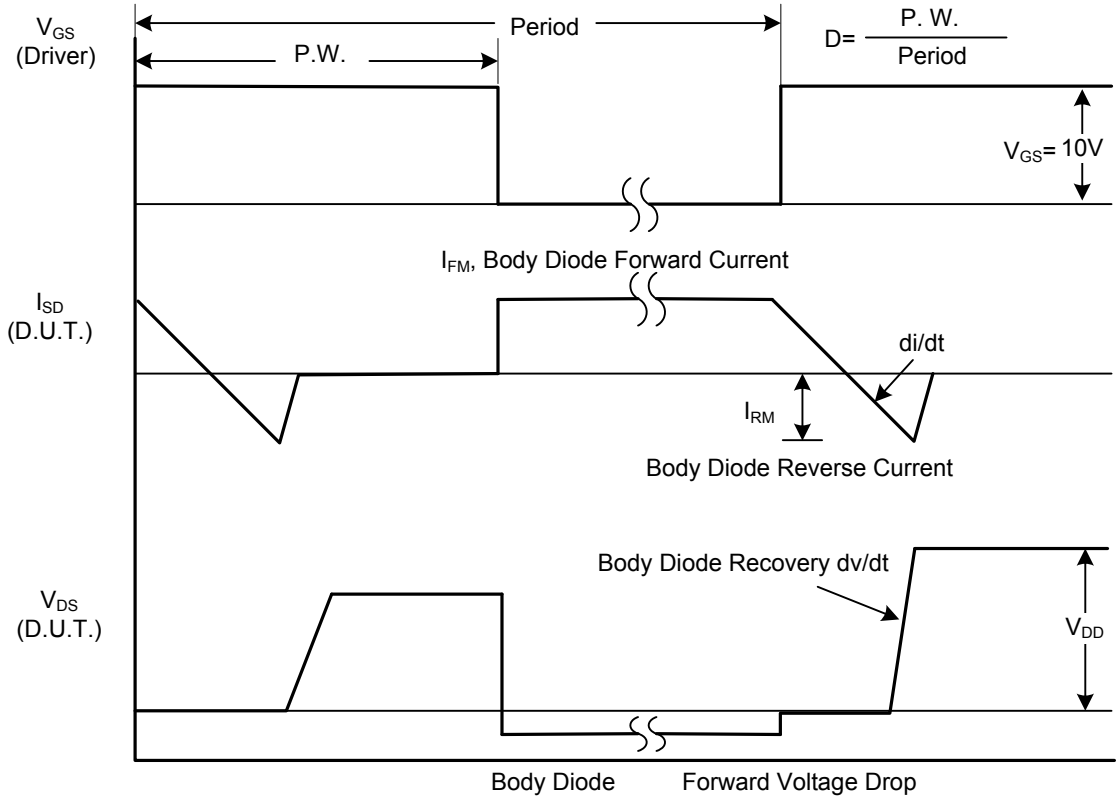
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	500			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=500V, V_{GS}=0V			10	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=30V, V_{DS}=0V			100	nA
		V_{GS}=-30V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=14A			0.22	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz		4100		pF
Output Capacitance	C_{OSS}			380		pF
Reverse Transfer Capacitance	C_{RSS}			8.5		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q_G	V_{DS}=100V, V_{GS}=10V, I_D=28A I_G=1mA (Note 1, 2)		72		nC
Gate-Source Charge	Q_{GS}			17		nC
Gate-Drain Charge	Q_{GD}			12		nC
Turn-On Delay Time (Note 1)	$t_{D(ON)}$	V_{DD}=100V, V_{GS}=10V, I_D=28A, R_G=25Ω (Note 1, 2)		50		nS
Turn-On Rise Time	t_R			22		nS
Turn-Off Delay Time	$t_{D(OFF)}$			180		nS
Turn-Off Fall Time	t_F			53		nS
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				28	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				56	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	I_S=28A, V_{GS} = 0V			1.4	V
Body Diode Reverse Recovery Time	t_{rr}	I_S=28A, V_{GS}=0V, dI_F/dt=100A/μs		360		ns
Body Diode Reverse Recovery Charge	Q_{rr}			4.6		μC

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

■ TEST CIRCUITS AND WAVEFORMS

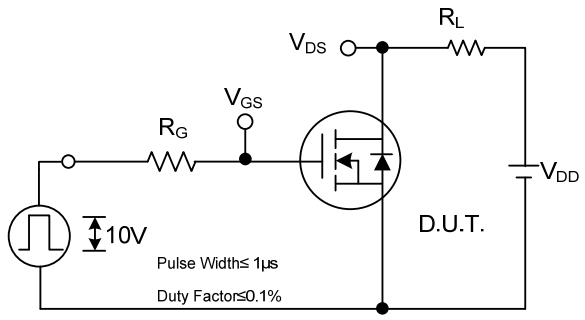


Peak Diode Recovery dv/dt Test Circuit

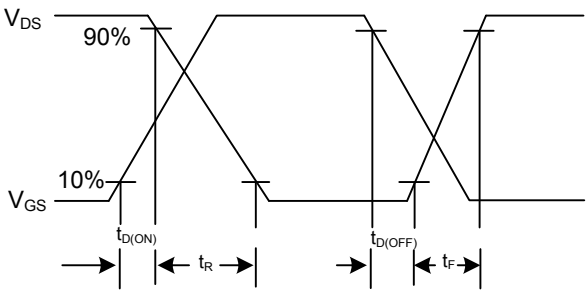


Peak Diode Recovery dv/dt Waveforms

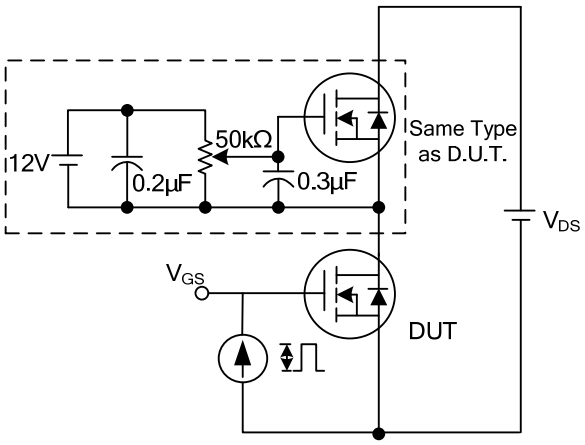
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



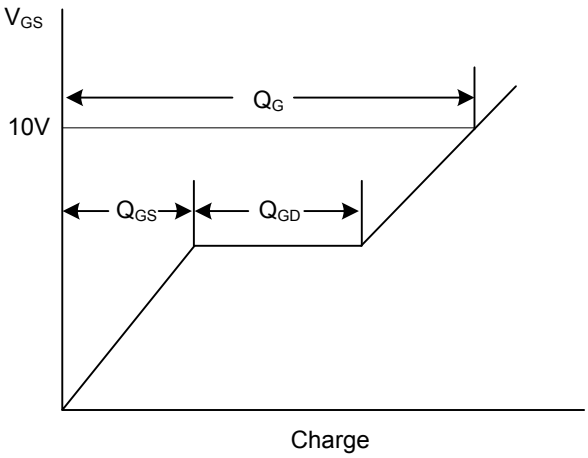
Switching Test Circuit



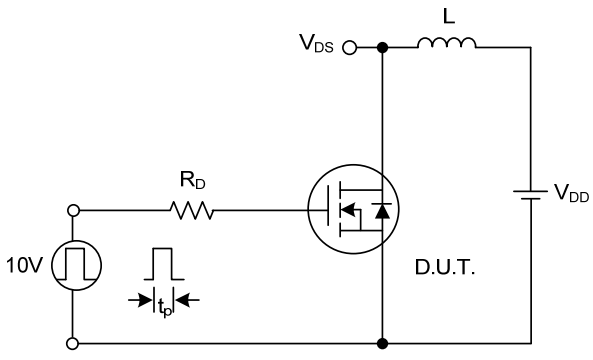
Switching Waveforms



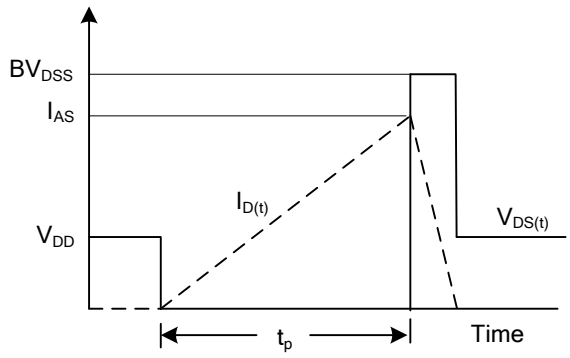
Gate Charge Test Circuit



Gate Charge Waveform



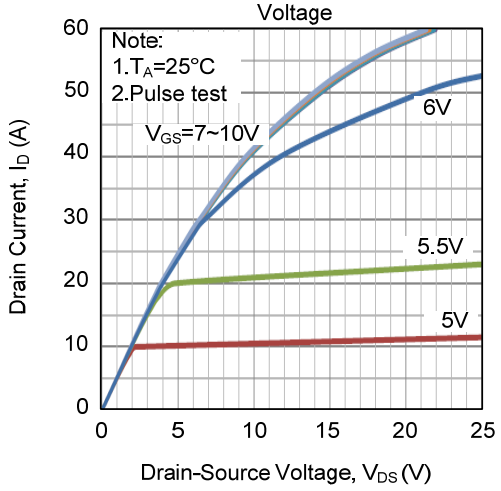
Unclamped Inductive Switching Test Circuit



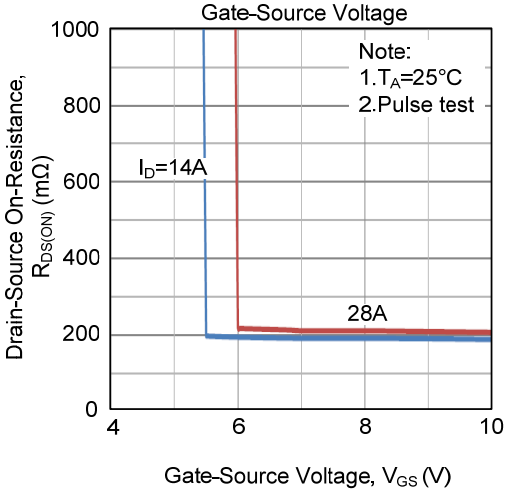
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

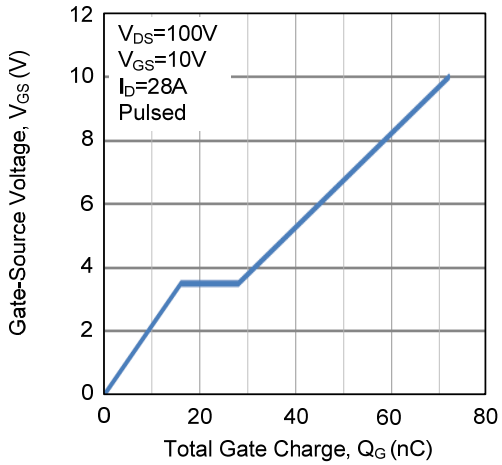
Drain Current vs. Drain-Source Voltage



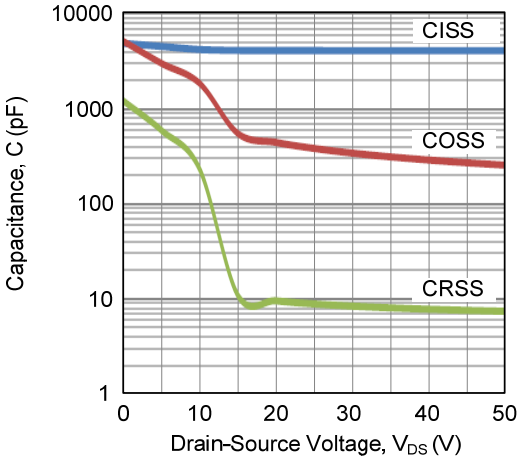
Drain-Source On-Resistance vs. Gate-Source Voltage



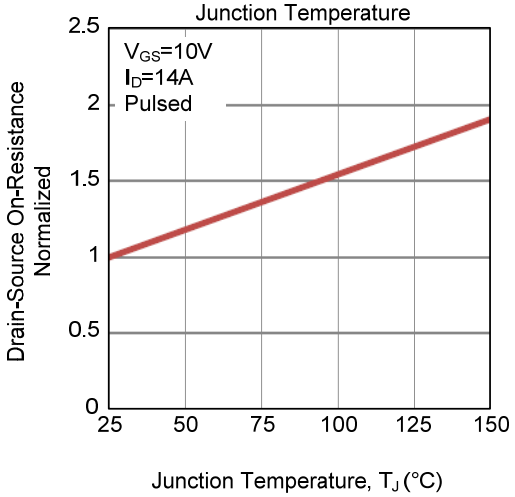
Gate Charge Characteristics



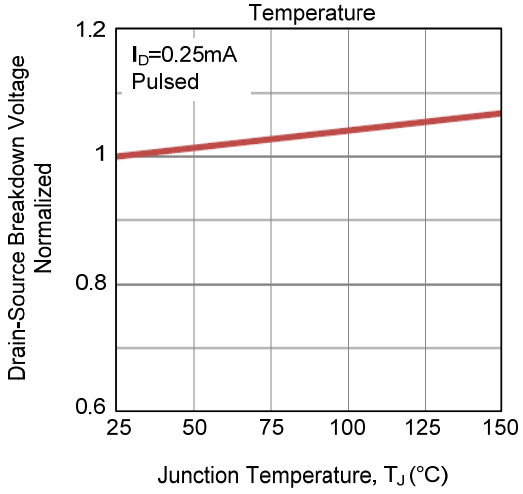
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

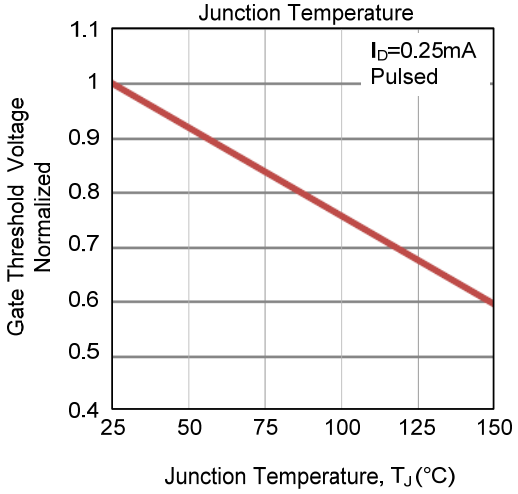


Breakdown Voltage vs. Junction Temperature

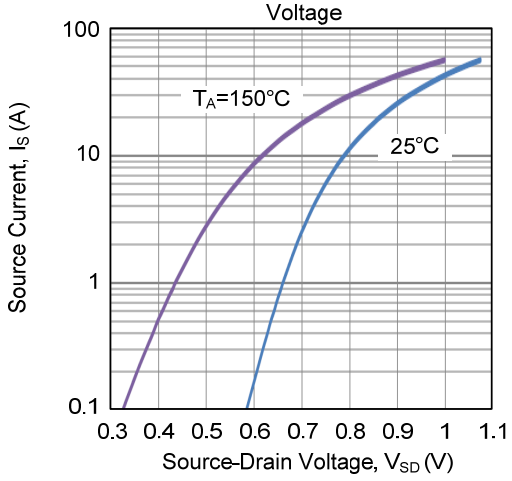


■ TYPICAL CHARACTERISTICS (Cont.)

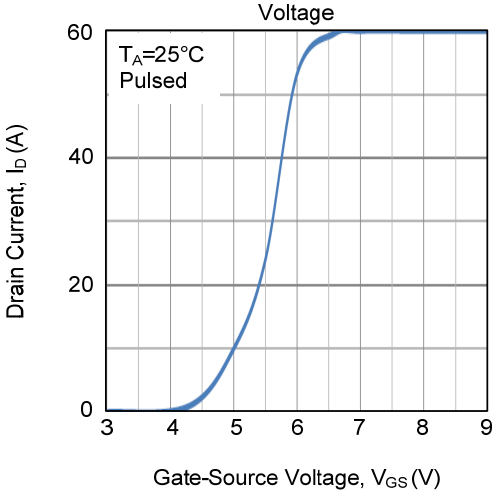
Gate Threshold Voltage vs. Junction Temperature



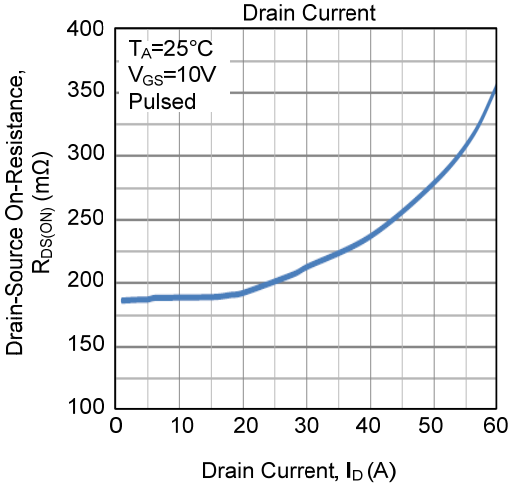
Source Current vs. Source-Drain Voltage



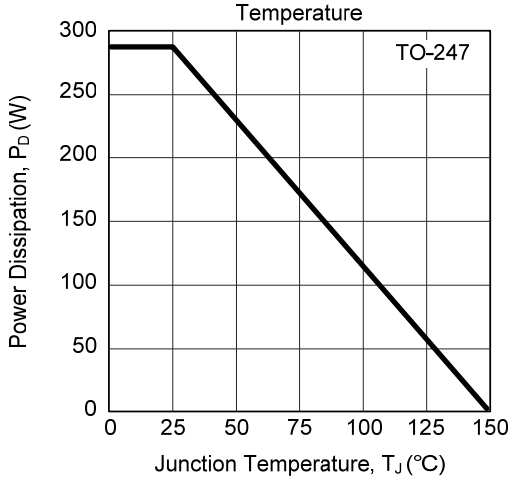
Drain Current vs. Gate-Source Voltage



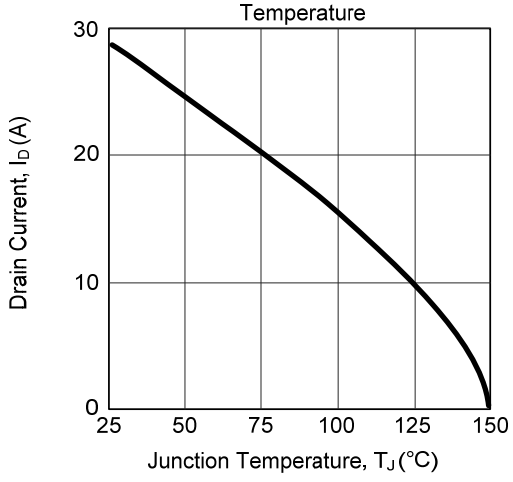
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)