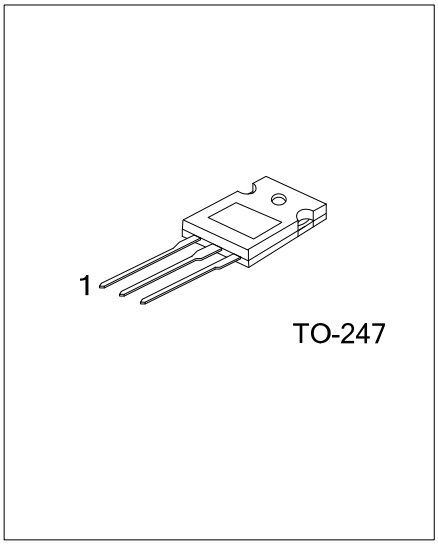
F80NM60Z

Power MOSFET

80A, 600V N-CHANNEL SUPER-JUNCTION MOSFET



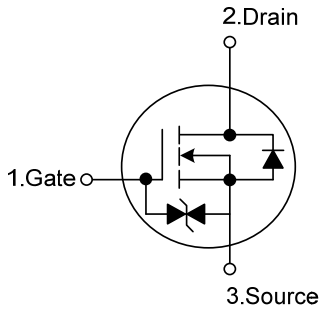
■ DESCRIPTION

The **UTC F80NM60Z** is an N-channel enhancement mode silicon-gate power MOSFET with fast body diode and ESD Type, designed for high-voltage, high-speed power switching applications. such as fast switching time, low gate charge, low on-state resistance and high rugged avalanche characteristics.

■ FEATURES

* $R_{DS(ON)} \leq 35\ m\Omega$ @ V_{GS}=10V, I_D=40A
* Fast body diode MOSFET technology
* Low switching losses due to reduced Qrr
* Single Pulse Avalanche Energy Rated
* Fast Switching Speeds
* Linear Transfer Characteristics
* High Input Impedance
* Avalanche energy tested

■ SYMBOL



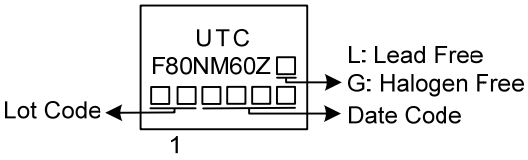
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
F80NM60ZL-T47-T	F80NM60ZG-T47-T	TO-247	G	D	S	Tube

Note: Pin Assignment: G: Gate C: Collector E: Emitter

F80NM60ZG-T47-T (1)Packing Type (2)Package Type (3)Green Package	(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}	600	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	Continuous	I_D	80	A
	Pulsed (Note 2)	I_{DM}	160	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	1150	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	12.7	V/nS
Power Dissipation		P_D	420	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 =100mH, I_{AS} = 4.8A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
4. I_{SD} ≤ 80A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	40	°C/W
Junction to Case	θ_{JC}	0.29	°C/W

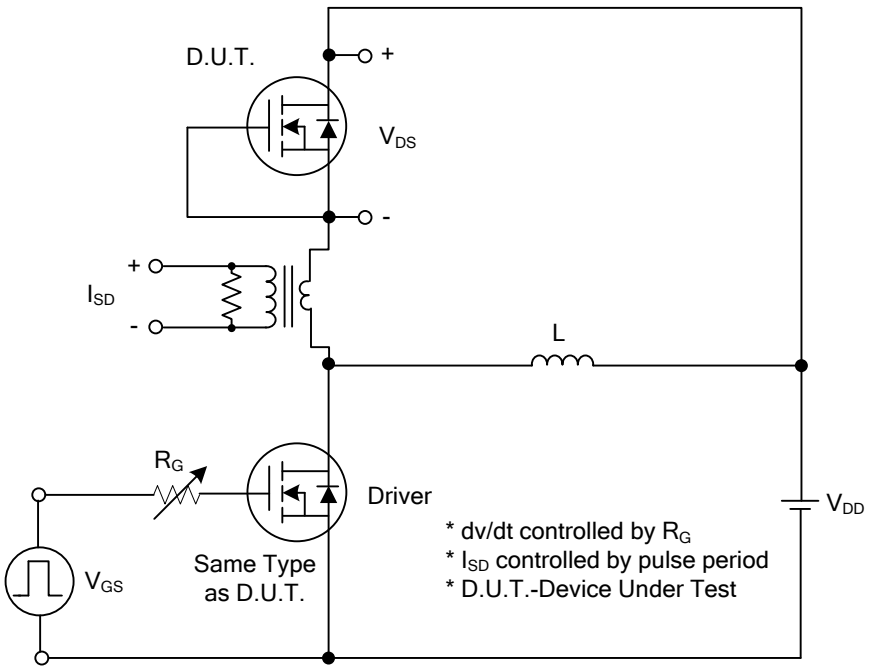
Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

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

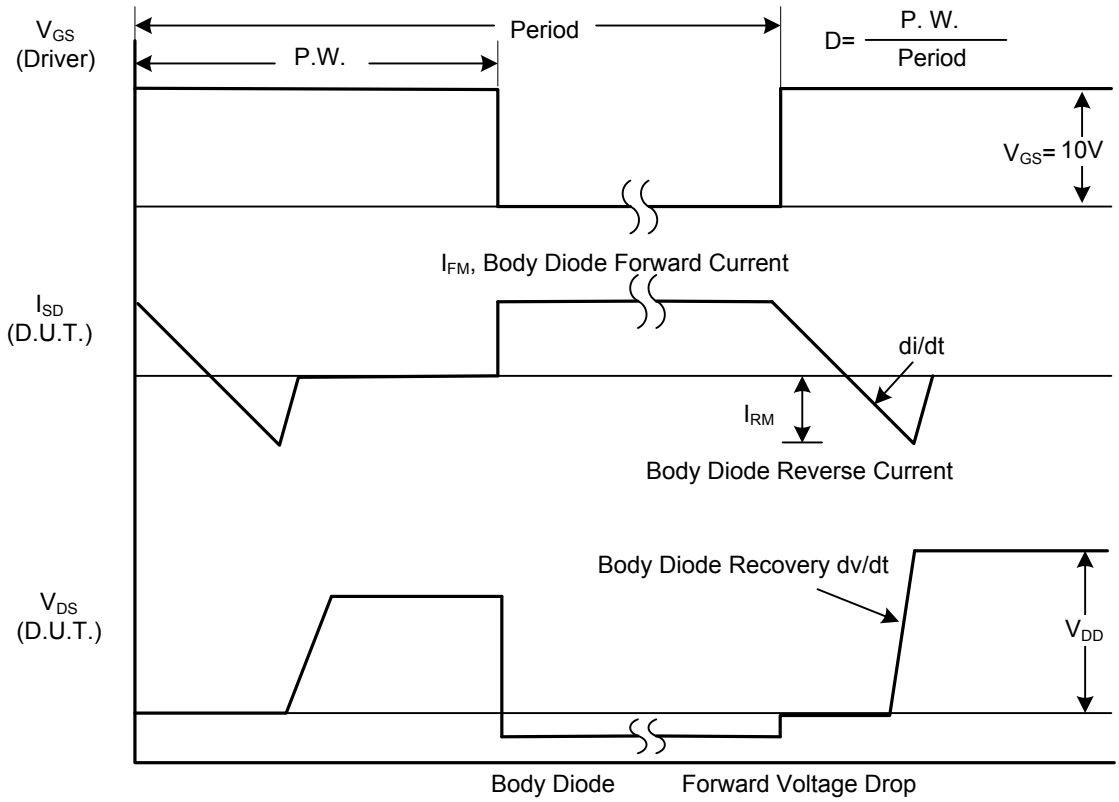
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	600			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=600V, V_{GS}=0V			10	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+30V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-30V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.5		4.5	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=40A			35	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=50V, f=1.0MHz		9140		pF
Output Capacitance		C_{OSS}			890		pF
Reverse Transfer Capacitance		C_{RSS}			2.5		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=480V, V_{GS}=10V, I_D=80A (Note1, 2)		195		nC
Gate to Source Charge		Q_{GS}			58		nC
Gate to Drain Charge		Q_{GD}			61		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	V_{DS}=100V, V_{GS}=10V, I_D=80A, R_G=2Ω (Note1, 2)		42		ns
Rise Time		t_R			25		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			138		ns
Fall-Time		t_F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				80	A
Maximum Body-Diode Pulsed Current		I_{SM}				160	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=80A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)		t_{rr}	I_S=30A, V_{GS}=0V, dI_F/dt=100A/μs		397		ns
Body Diode Reverse Recovery Charge		Q_{rr}			3.2		μC

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

■ TEST CIRCUITS AND WAVEFORMS



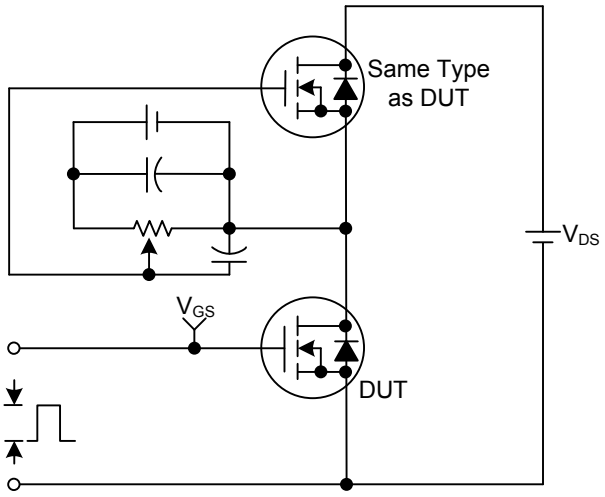
Peak Diode Recovery dv/dt Test Circuit



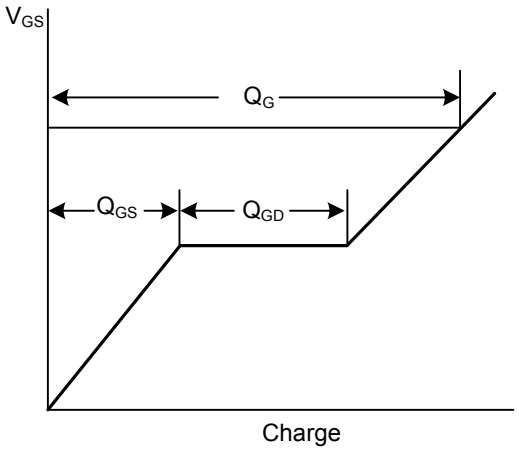
Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS

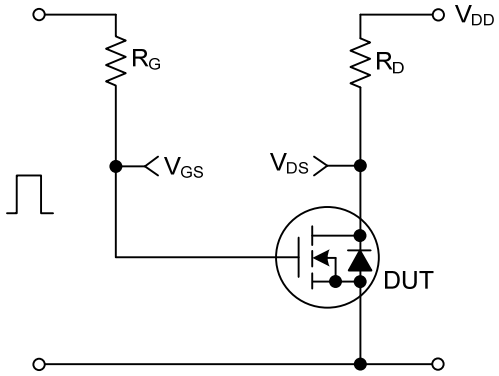
Gate Charge Test Circuit



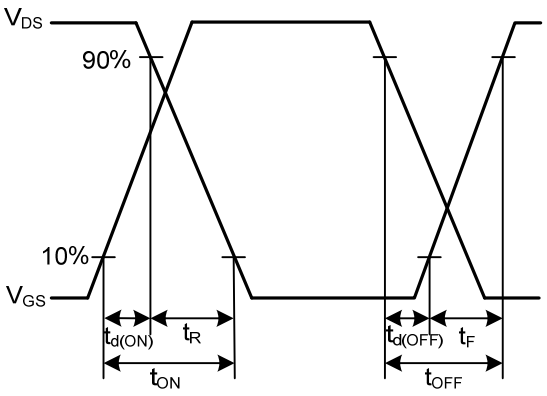
Gate Charge Waveforms



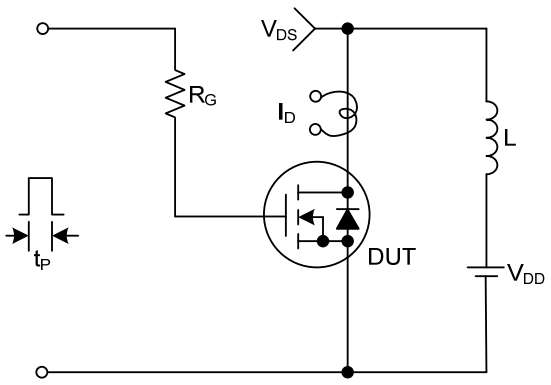
Resistive Switching Test Circuit



Resistive Switching Waveforms

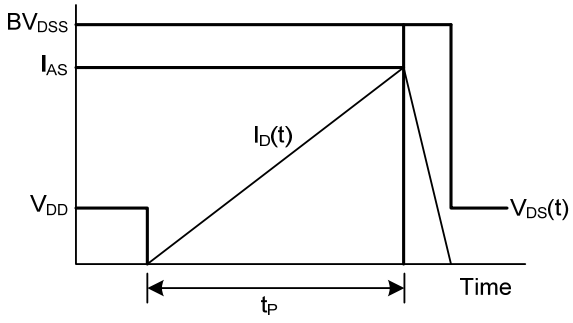


Unclamped Inductive Switching Test Circuit



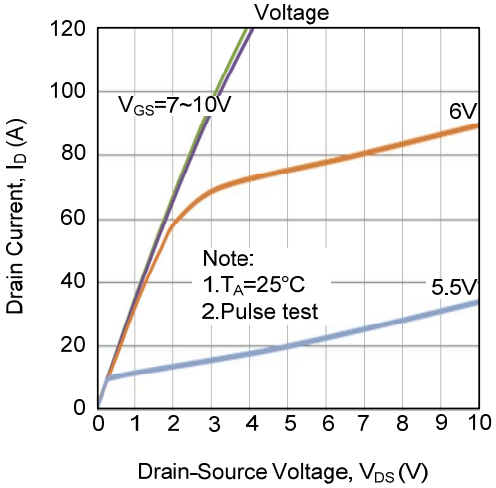
Unclamped Inductive Switching Waveforms

$$E_{AS}=\frac{1}{2}LI_{AS}^{2}\frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

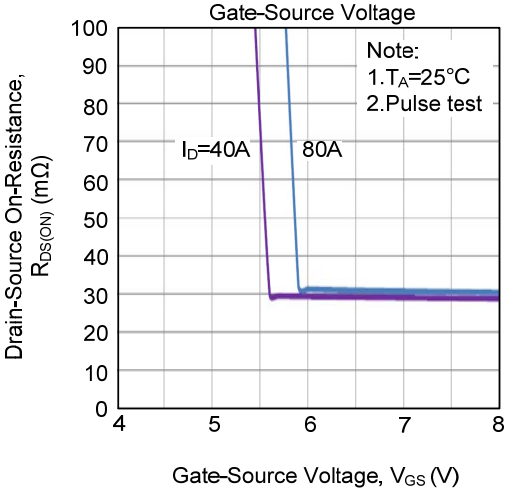


■ TYPICAL CHARACTERISTICS

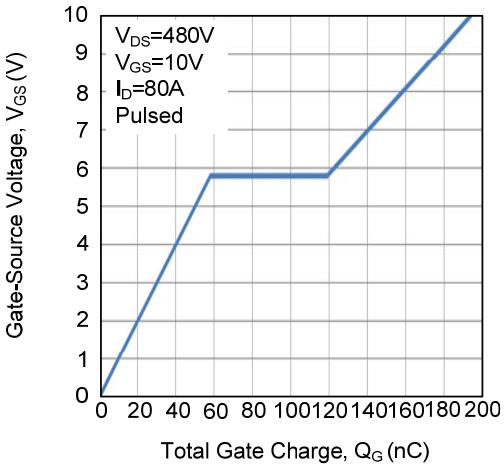
Drain Current vs. Drain-Source Voltage



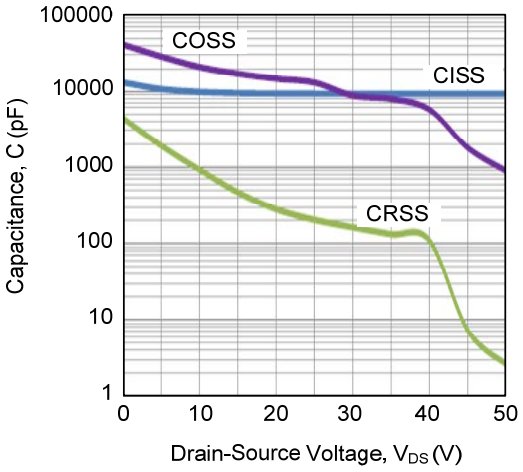
Drain-Source On-Resistance vs. Gate-Source Voltage



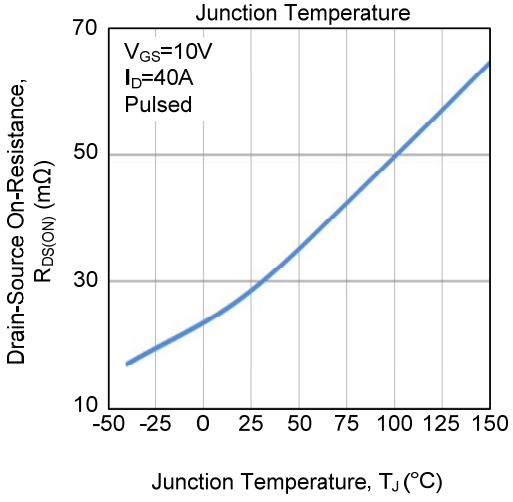
Gate Charge Characteristics



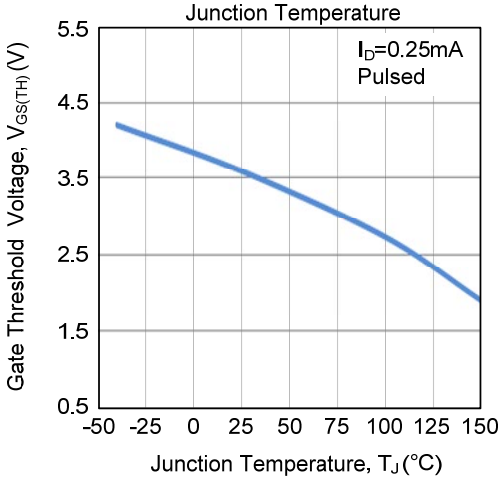
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

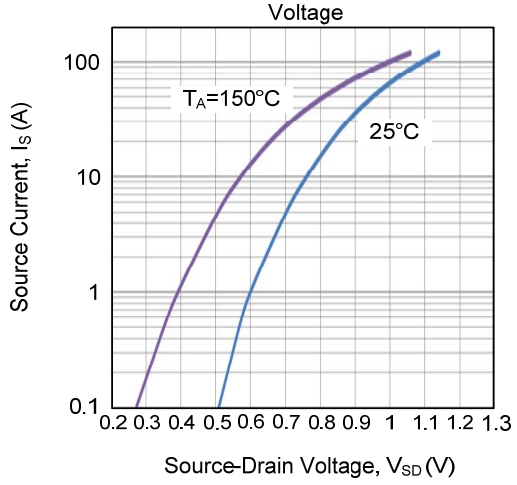


Gate Threshold Voltage vs. Junction Temperature

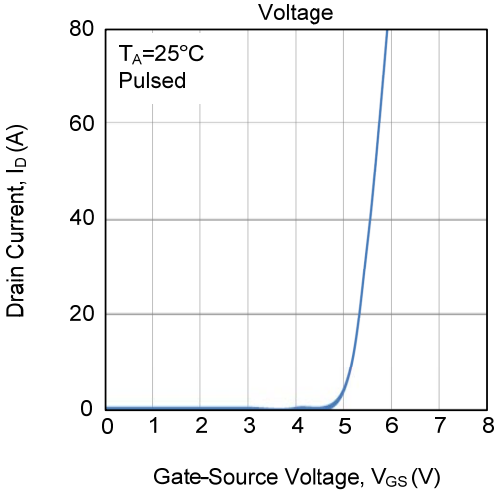


■ TYPICAL CHARACTERISTICS (Cont.)

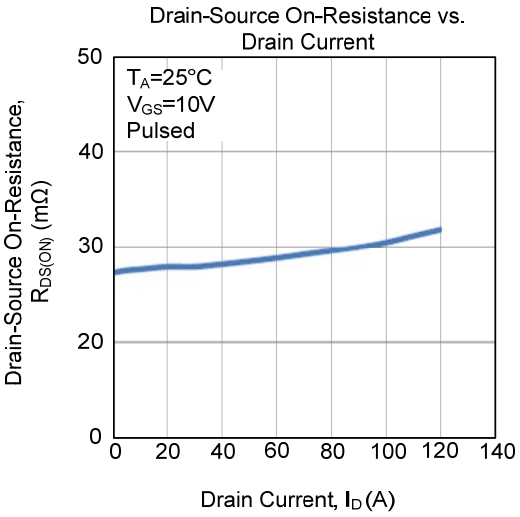
Source Current vs. Source-Drain Voltage



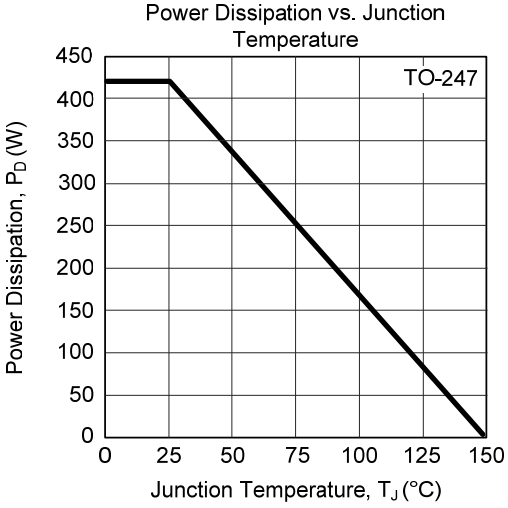
Drain Current vs. Gate-Source Voltage



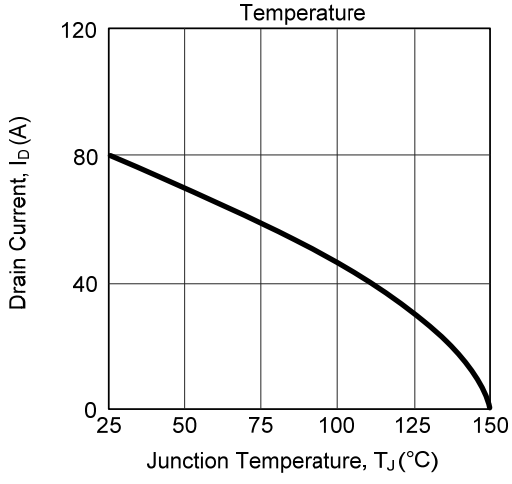
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



Safe Operating Area