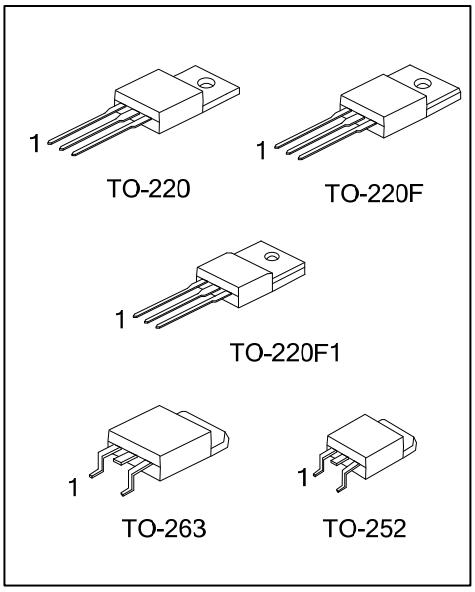
UF840K-MTQ

Power MOSFET

8.0A, 500V N-CHANNEL POWER MOSFET



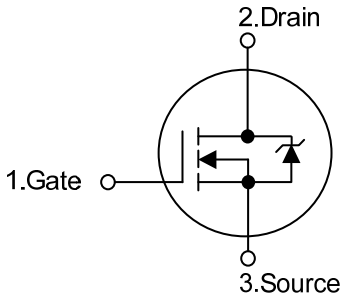
■ DESCRIPTION

The N-Channel enhancement mode silicon gate power MOSFET is designed for high voltage, high speed power switching applications such as switching regulators, switching converters, solenoid, motor drivers, relay drivers.

■ FEATURES

* $R_{DS(ON)} \leq 0.87\ \Omega$ @ V_{GS}=10V. I_D=4.4A
* Single Pulse Avalanche Energy Rated
* Fast Switching Speeds
* Linear Transfer Characteristics
* High Input Impedance

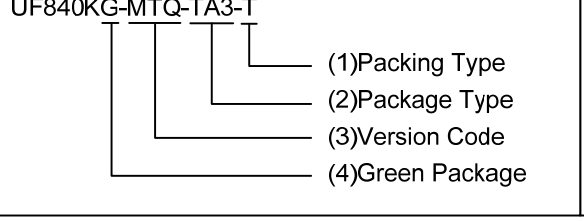
■ SYMBOL



■ ORDERING INFORMATION

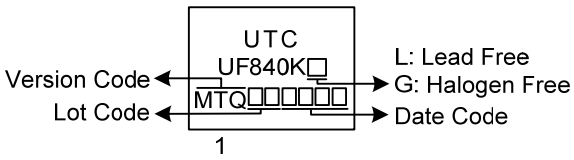
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen-Free		1	2	3	
UF840KL-MTQ-TA3-T	UF840KG-MTQ-TA3-T	TO-220	G	D	S	Tube
UF840KL-MTQ-TF3-T	UF840KG-MTQ-TF3-T	TO-220F	G	D	S	Tube
UF840KL-MTQ-TF1-T	UF840KG-MTQ-TF1-T	TO-220F1	G	D	S	Tube
UF840KL-MTQ-TN3-R	UF840KG-MTQ-TN3-R	TO-252	G	D	S	Tape Reel
UF840KL-MTQ-TQ2-T	UF840KG-MTQ-TQ2-T	TO-263	G	D	S	Tube
UF840KL-MTQ-TQ2-R	UF840KG-MTQ-TQ2-R	TO-263	G	D	S	Tape Reel

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



(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TN3: TO-252, TQ2: TO-263
(3) Version MLQ
(4) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING


UTC
UF840K□
MTQ□□□□□□
1
Version Code
Lot Code
L: Lead Free
G: Halogen Free
Date Code

■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless Otherwise Specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain to Source Voltage (T_J =25°C ~125°C)		V_{DSS}	500	V
Drain to Gate Voltage (R_{GS} = 20kΩ, T_J =25°C ~125°C)		V_{DGR}	500	V
Gate to Source Voltage		V_{GSS}	±30	V
Drain Current (Note 2)	Continuous	I_D	8	A
	Pulsed	I_{DM}	32	A
Single Pulse Avalanche Energy (Note 3)		E_{AS}	265	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	5.3	V/ns
Power Dissipation	TO-220/TO-263	P_D	120	W
	TO-220F/ TO-220F1		38	W
	TO-252		52	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} = 7.3A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C.
4. I_{SD} ≤ 8.0A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C.

■ THERMAL RESISTANCES CHARACTERISTICS

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-263	θ_{JA}	62.5	°C/W
	TO-252		110	°C/W
Junction to Case	TO-220/TO-263	θ_{JC}	1.04	°C/W
	TO-220F/TO-220F1		3.28	°C/W
	TO-252		2.4 (Note)	°C/W

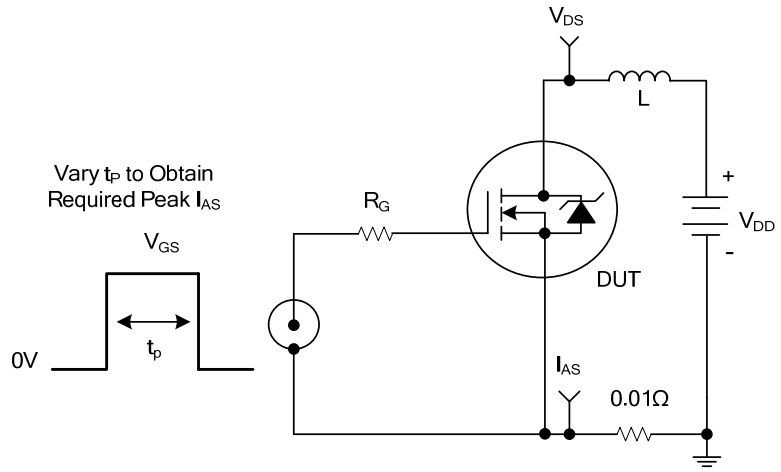
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

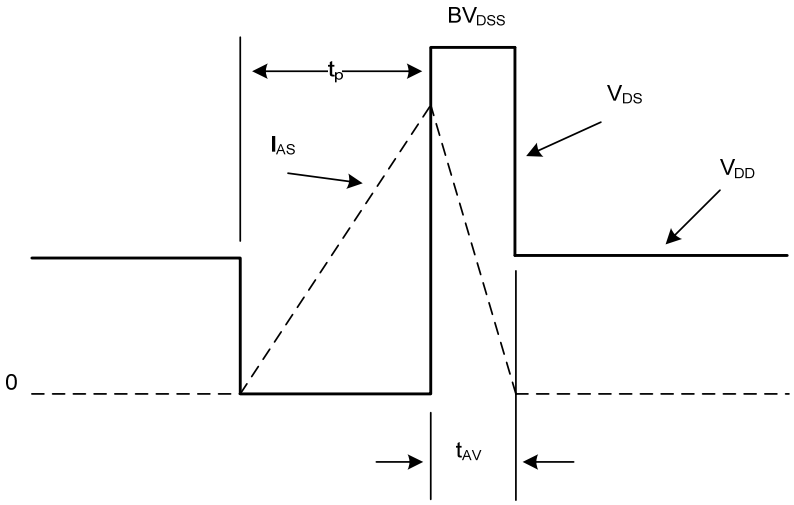
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	500			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=500V, V_{GS}=0V			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+30V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-30V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{GS}=V_{DS}, I_D=250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V. I_D=4.4A			0.87	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		1073		pF
Output Capacitance		C_{OSS}			104		pF
Reverse Transfer Capacitance		C_{RSS}			6		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=400V, V_{GS}=10V, I_D=8.0A (Note 1, 2)		28		nC
Gate to Source Charge		Q_{GS}			8		nC
Gate to Drain Charge		Q_{GD}			8		nC
Turn-on Delay Time (Note 1)		$t_{D(ON)}$	V_{DS}=250V, V_{GS}=10V, I_D=8.0A, R_G=25Ω (Note 1, 2)		13		ns
Rise Time		t_R			20		ns
Turn-off Delay Time		$t_{D(OFF)}$			62		ns
Fall-Time		t_F			26		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				8	A
Maximum Body-Diode Pulsed Current		I_{SM}				32	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=8.0A, V_{GS}=0V			1.4	V
Reverse Recovery Time (Note 1)		t_{rr}	I_S=8.0A, V_{GS}=0V, dI_F/dt=100A/μs		272		nS
Reverse Recovery Charge		Q_{rr}			2.6		μC

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

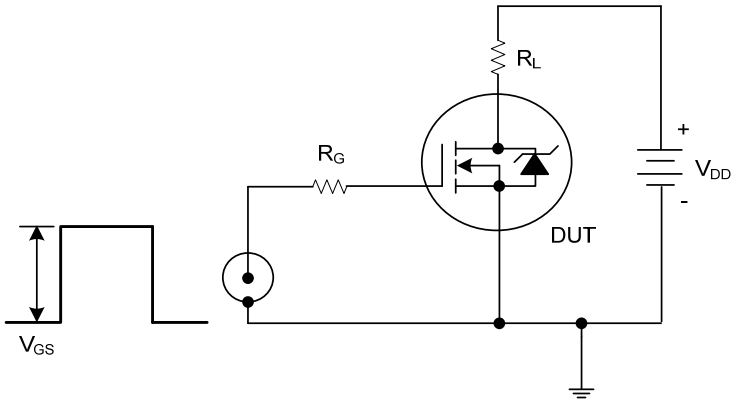
■ TEST CIRCUITS AND WAVEFORMS



Unclamped Energy Test Circuit

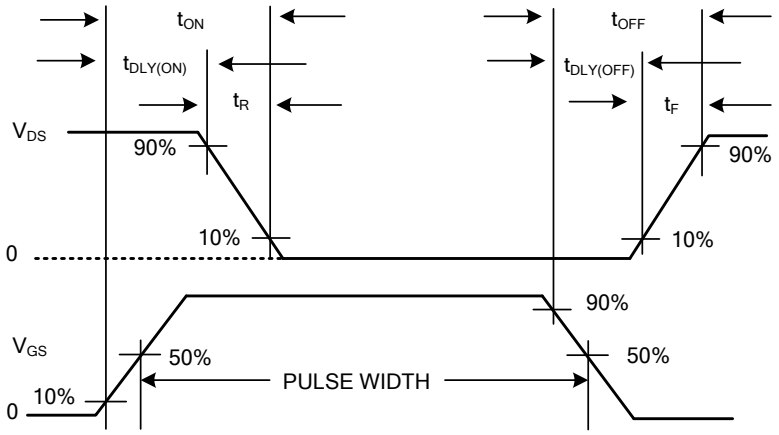


Unclamped Energy Waveforms

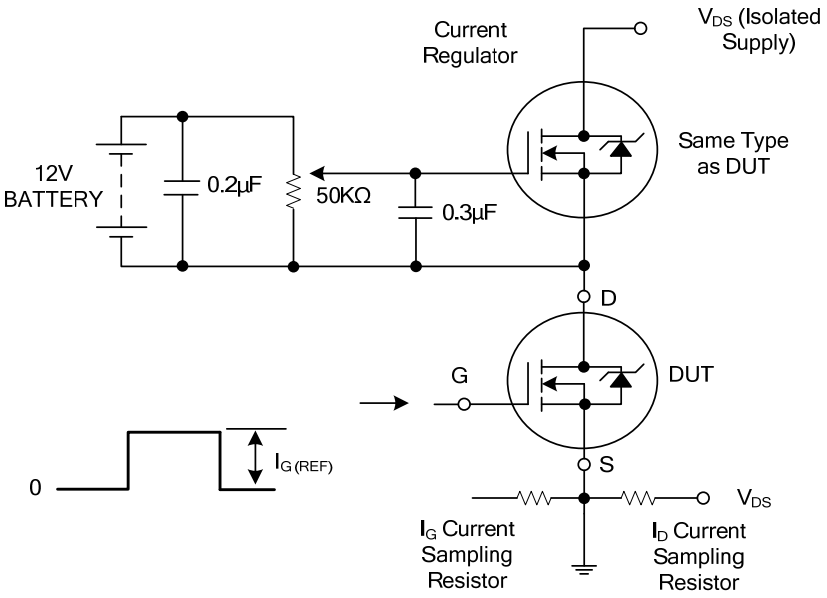


Switching Time Test Circuit

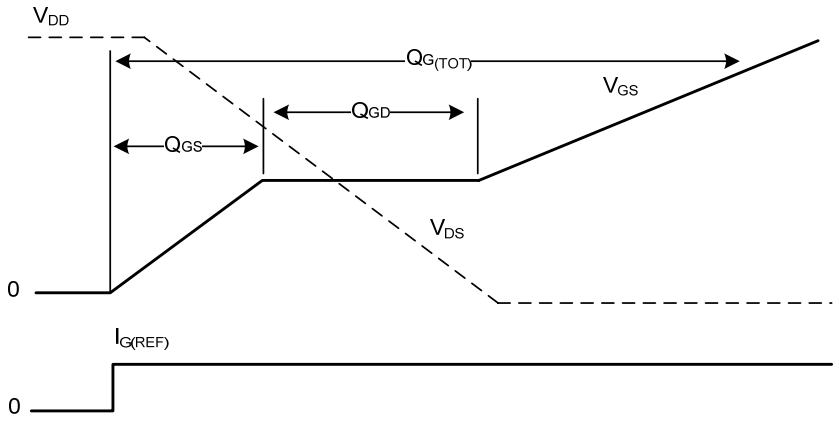
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



Resistive Switching Waveforms



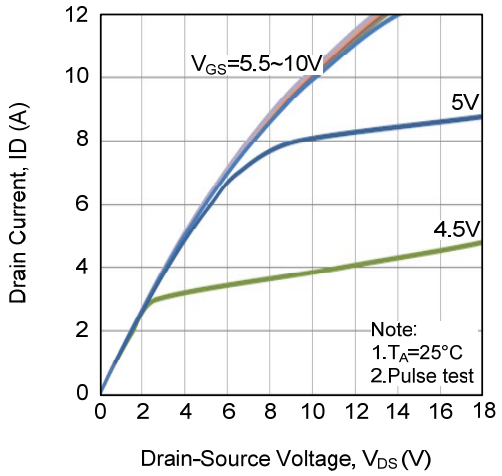
Gate Charge Test Circuit



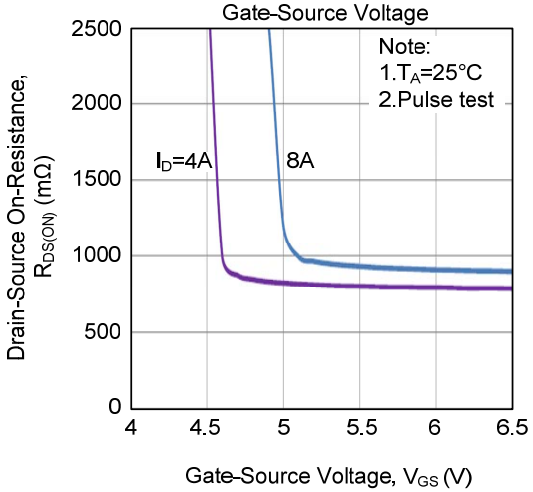
Gate Charge Waveforms

■ TYPICAL CHARACTERISTICS

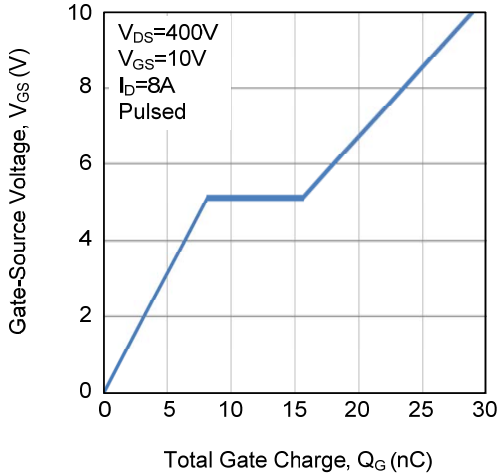
Drain Current vs. Drain-Source Voltage



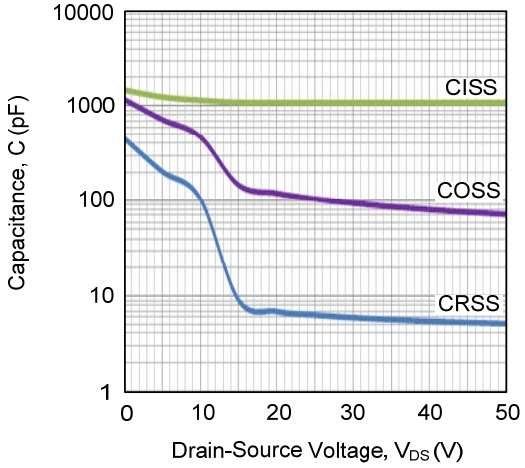
Drain-Source On-Resistance vs. Gate-Source Voltage



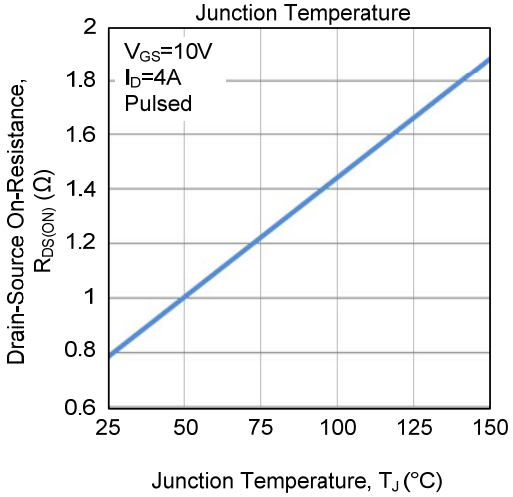
Gate Charge Characteristics



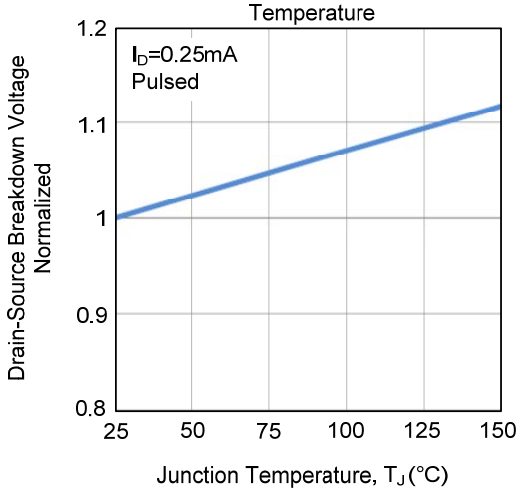
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

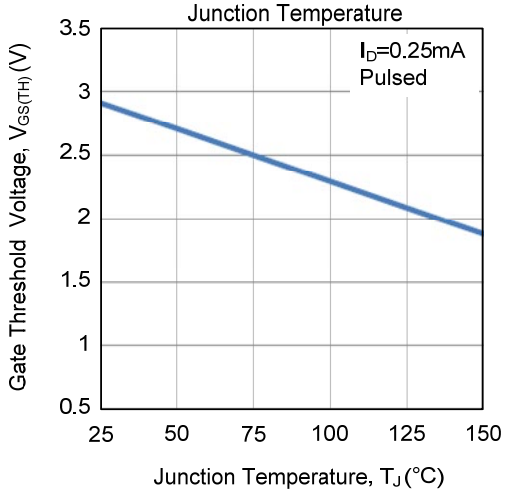


Breakdown Voltage vs. Junction Temperature

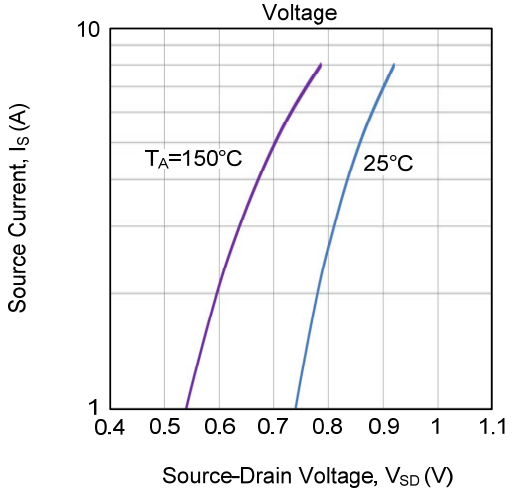


■ TYPICAL CHARACTERISTICS (Cont.)

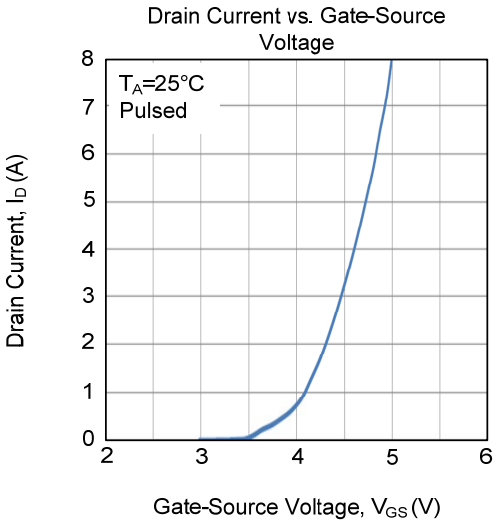
Gate Threshold Voltage vs. Junction Temperature



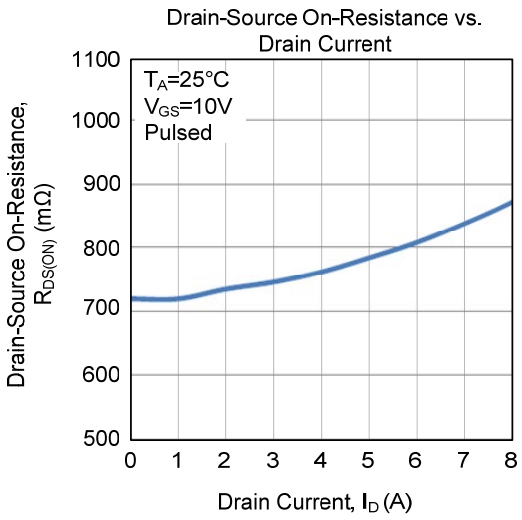
Source Current vs. Source-Drain Voltage



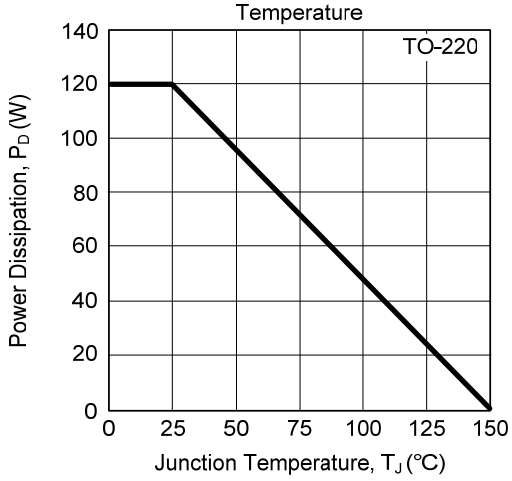
Drain Current vs. Gate-Source Voltage



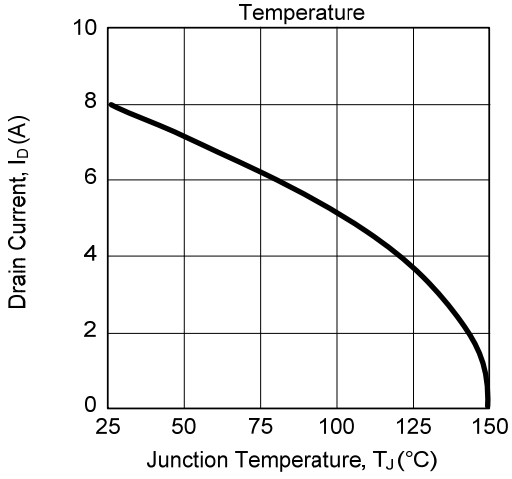
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)