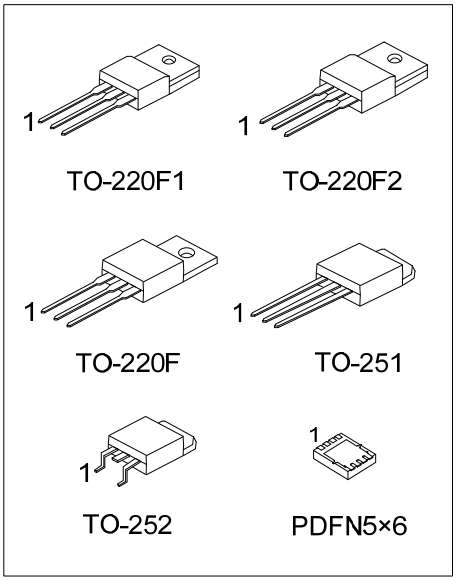
FUF830-ML

Power MOSFET

4.5A, 500V N-CHANNEL POWER MOSFET



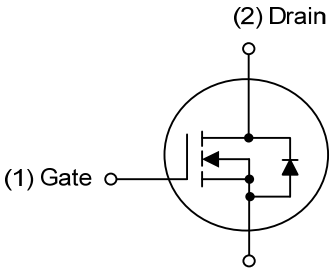
■ DESCRIPTION

The UTC **FUF830-ML** is a N-Channel enhancement mode silicon gate power MOSFET with Fast Body Diode. is designed high voltage, high speed power switching applications such. such as fast switching time, low gate charge, low on-state resistance and high rugged avalanche characteristics.

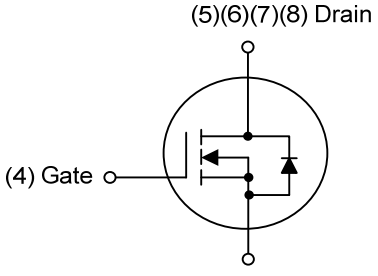
■ FEATURES

* $R_{DS(ON)} \leq 1.9\ \Omega$ @ V_{GS}=10V, I_D=2.5A
* 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



TO-220F / TO-220F1
TO-220F2 / TO-251 / TO-252



PDFN5×6

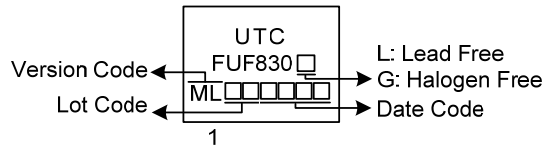
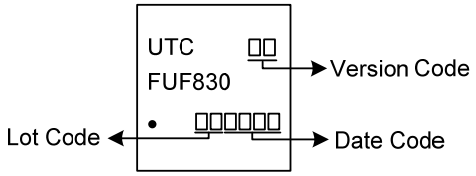
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
FUF830L-TF1-T	FUF830G-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
FUF830L-TF2-T	FUF830G-TF2-T	TO-220F2	G	D	S	-	-	-	-	-	Tube
FUF830L-TF3-T	FUF830G-TF3-T	TO-220F	G	D	S	-	-	-	-	-	Tube
FUF830L-TM3-T	FUF830G-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
FUF830L-TN3-R	FUF830G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
FUF830L-P5060-R	FUF830G-P5060-R	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

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

FUF830G-TF1-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube, R: Tape Reel (2) TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F TM3: TO-251, TN3: TO-252, P5060: PDFN5×6 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

TO-220F / TO-220F1 TO-220F2 / TO-251 / TO-252	PDFN5×6
	

■ 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
Continuous Drain Current		I_D	4.5	A
Pulsed Drain Current (Note 2)		I_{DM}	9	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	165.5	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	9.2	V/ns
Power Dissipation	TO-220F/TO-220F1 TO-220F2	P_D	32	W
	TO-251/TO-252		50	W
	PDFN5×6		34	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 = 30mH, I_{AS} = 3.3A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
4. I_{SD} ≤ 4.5A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F/TO-220F1 TO-220F2	θ_{JA}	62.5	°C/W
	TO-251/TO-252		110	°C/W
	PDFN5×6		65	°C/W
Junction to Case	TO-220F/TO-220F1 TO-220F2	θ_{JC}	3.9	°C/W
	TO-251/TO-252		2.5 (Note)	°C/W
	PDFN5×6		3.68 (Note)	°C/W

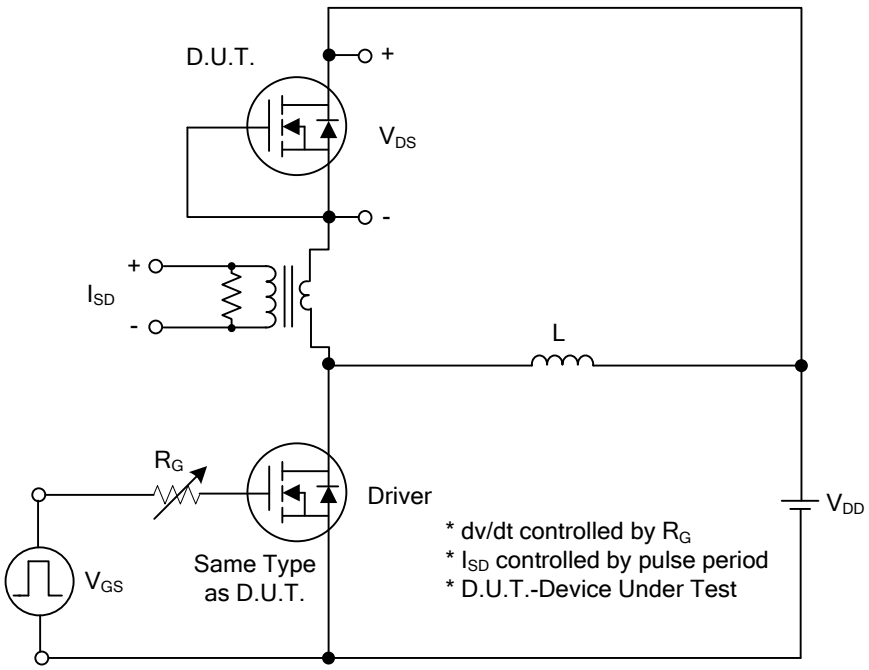
Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

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

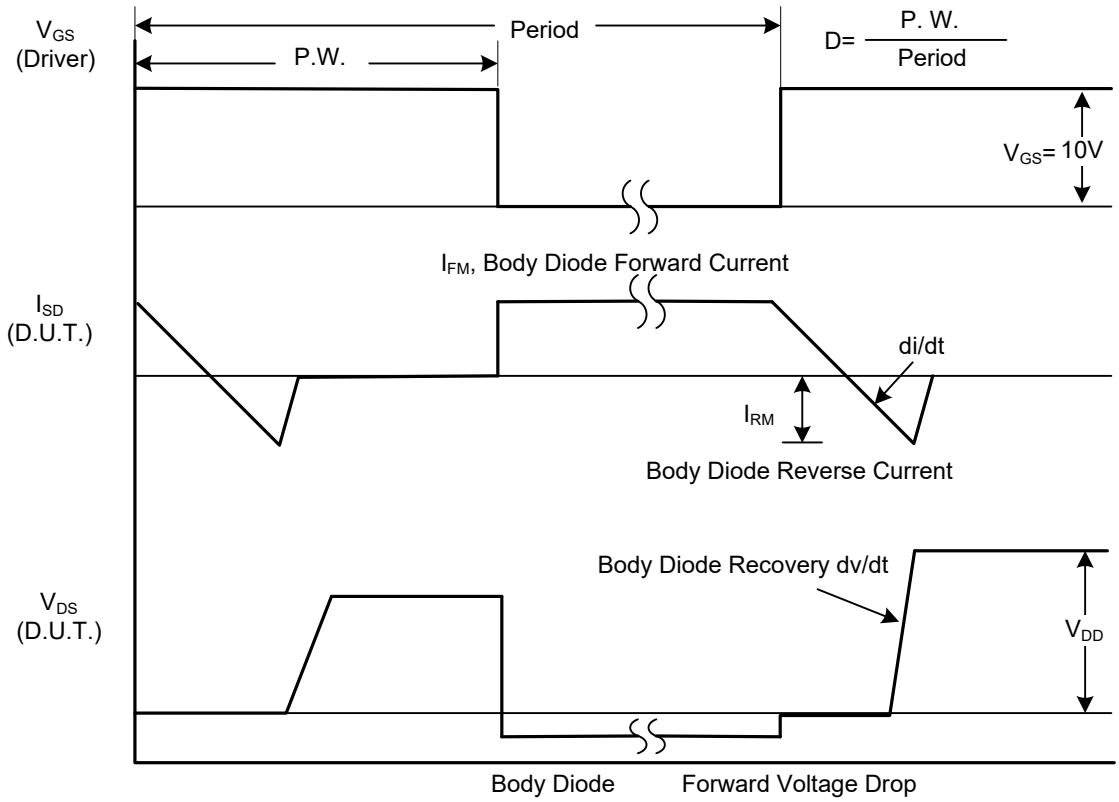
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	500			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}= 500V, V_{GS}=0V			25	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±30V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS}=V_{DS}, I_D=250μA	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	I_D=2.5A, V_{GS}=10V			1.9	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		582		pF
Output Capacitance	C_{OSS}			60		pF
Reverse Transfer Capacitance	C_{RSS}			5		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q_G	V_{DS}=400V, V_{GS}=10V, I_D=4.5A I_G= 1mA (Note1, 2)		16		nC
Gate-Source Charge	Q_{GS}			6		nC
Gate-Drain Charge	Q_{GD}			3		nC
Turn-On Delay Time (Note 1)	$t_{D(ON)}$	V_{DS}=100V, V_{GS}=10V, I_D=4.5A, R_G=25Ω (Note1, 2)		8		ns
Turn-On Rise Time	t_R			15		ns
Turn-Off Delay Time	$t_{D(OFF)}$			32		ns
Turn-Off Fall Time	t_F			24		ns
SOURCE TO DRAIN DIODE SPECIFICATIONS						
Continuous Source to Drain Current	I_S				4.5	A
Pulse Source to Drain Current	I_{SD}				9.0	A
Source to Drain Diode Voltage (Note 1)	V_{SD}	I_{SD}=4.5A, V_{GS}=0V			1.6	V
Reverse Recovery Time (Note 1)	t_{rr}	I_{SD}=4.5A, V_{GS}=0V, dI_F/dt =100A/μs		58		nS
Reverse Recovery Charge	Q_{rr}			177		nC

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

■ TEST CIRCUITS AND WAVEFORMS

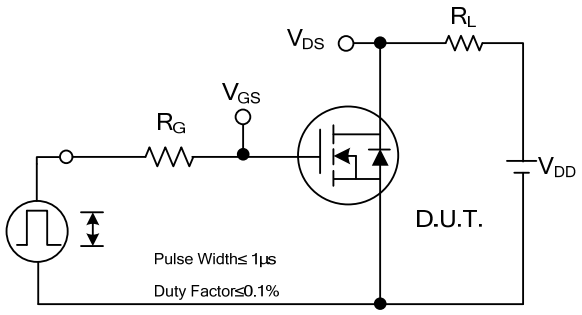


Peak Diode Recovery dv/dt Test Circuit

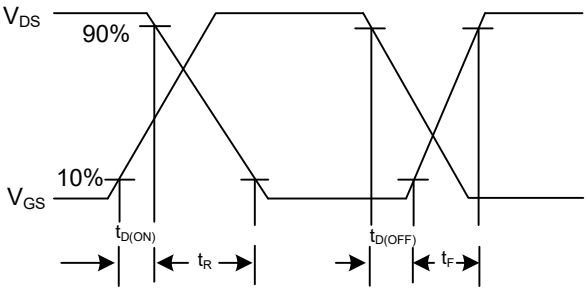


Peak Diode Recovery dv/dt Waveforms

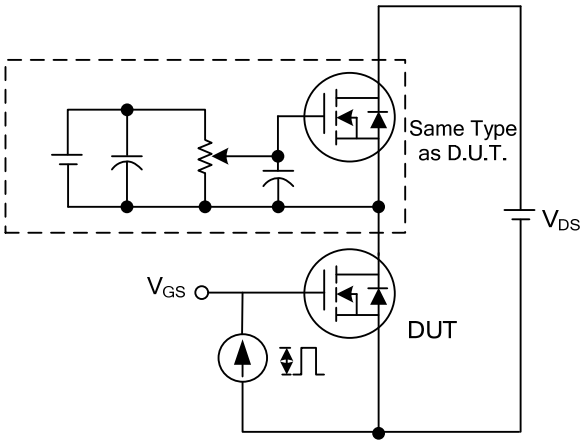
■ TEST CIRCUITS AND WAVEFORMS



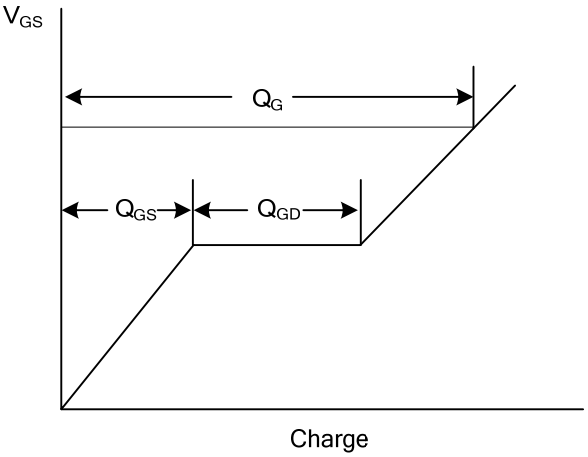
Switching Test Circuit



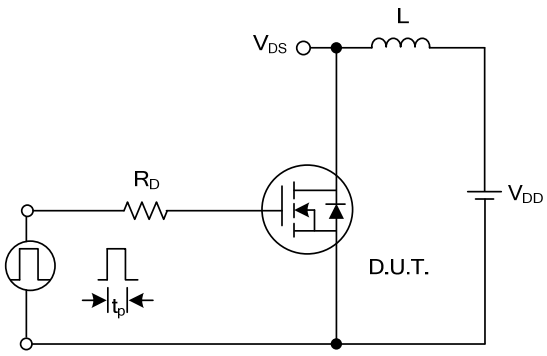
Switching Waveforms



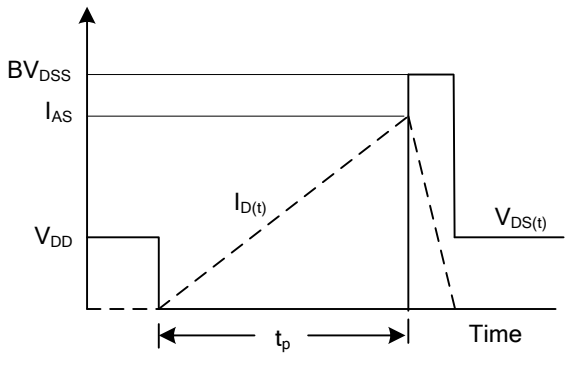
Gate Charge Test Circuit



Gate Charge Waveform



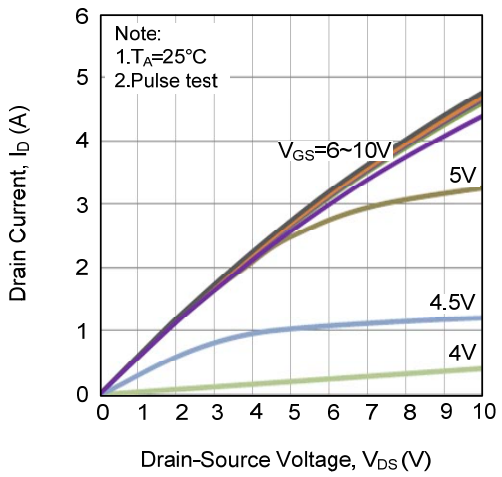
Unclamped Inductive Switching Test Circuit



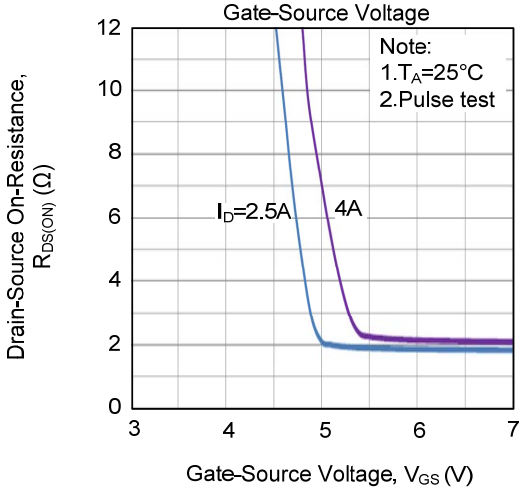
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

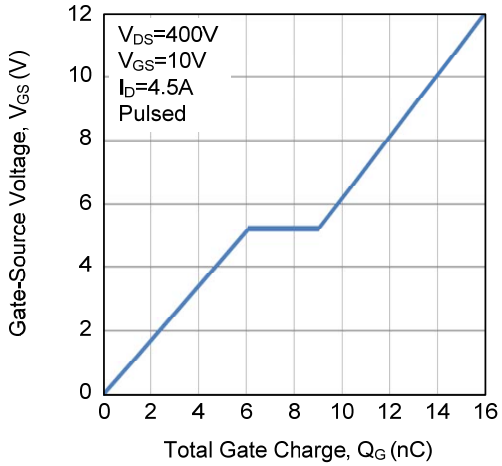
Drain Current vs. Drain-Source Voltage



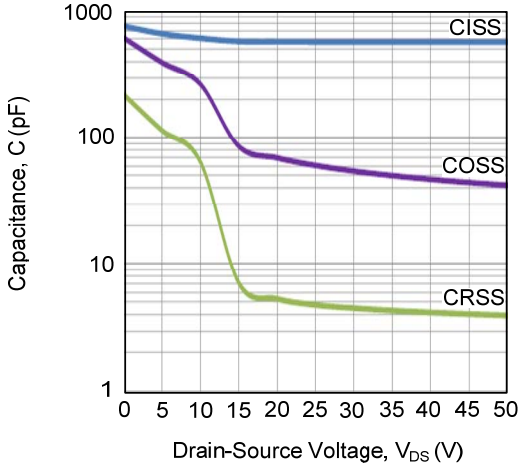
Drain-Source On-Resistance vs. Gate-Source Voltage



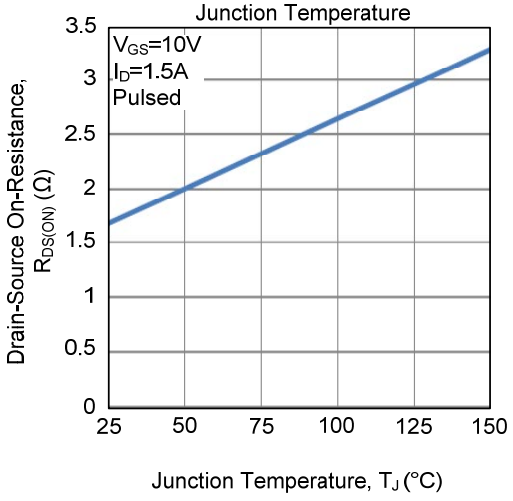
Gate Charge Characteristics



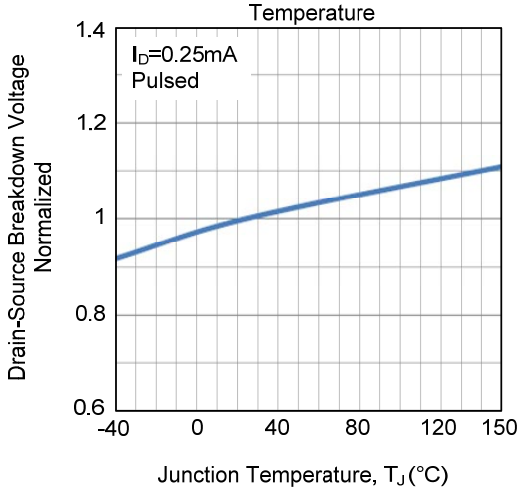
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

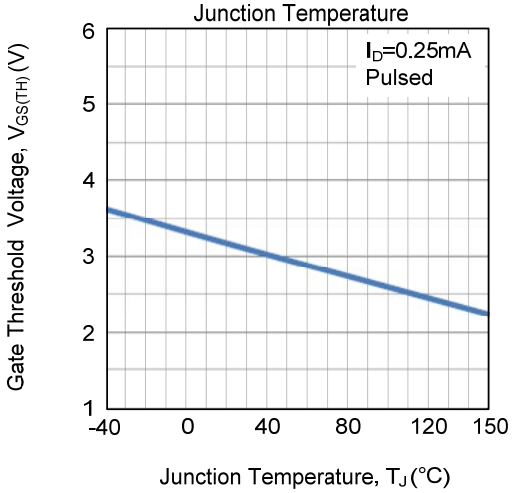


Breakdown Voltage vs. Junction Temperature

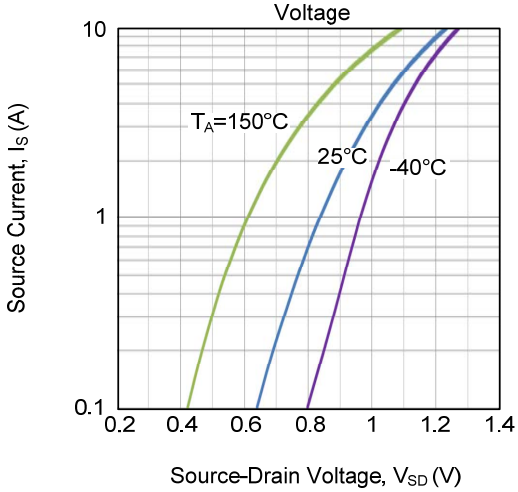


■ TYPICAL CHARACTERISTICS (Cont.)

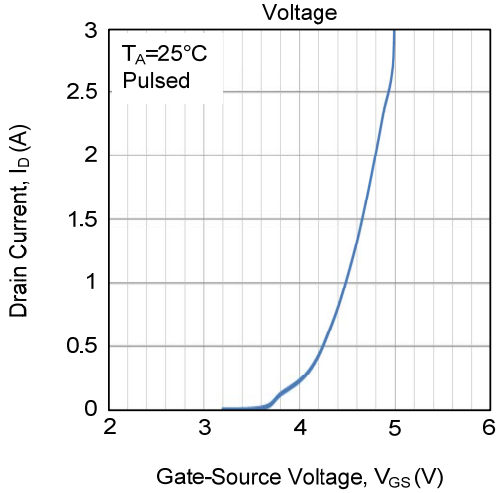
Gate Threshold Voltage vs. Junction Temperature



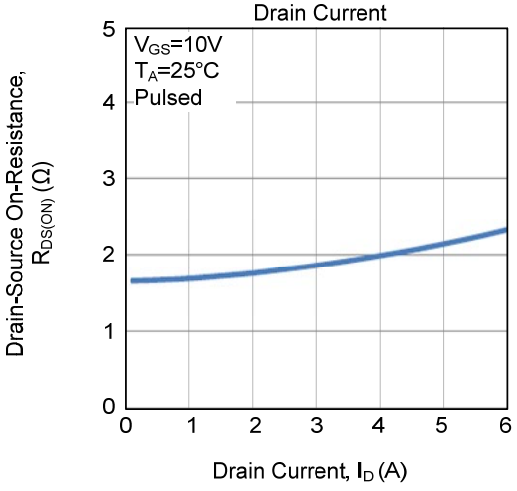
Source Current vs. Source-Drain Voltage



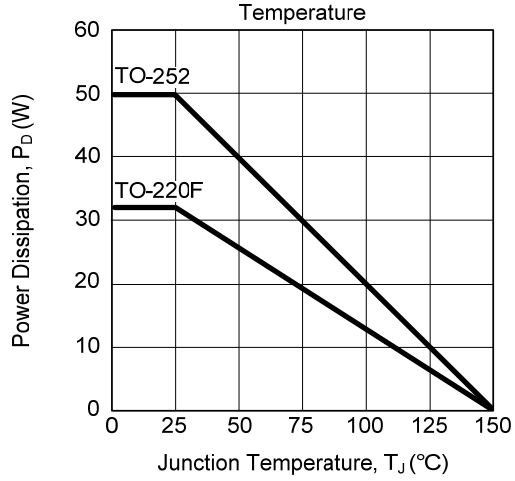
Drain Current vs. Gate-Source Voltage



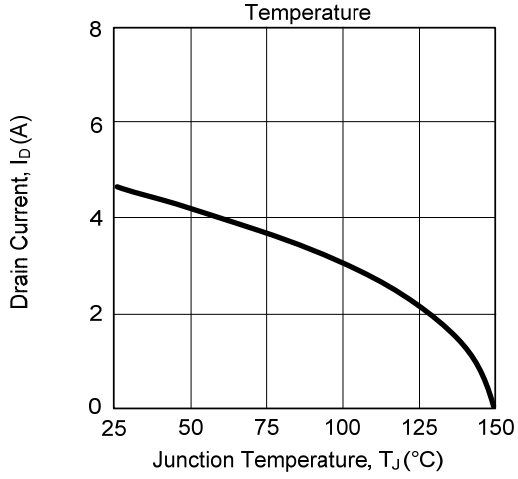
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)