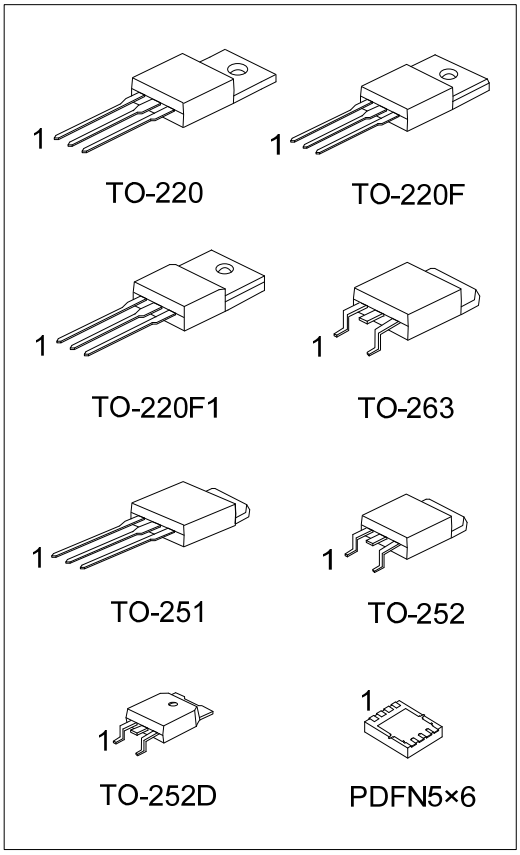
UTT50N06

Power MOSFET

50A, 60V N-CHANNEL POWER MOSFET



■ DESCRIPTION

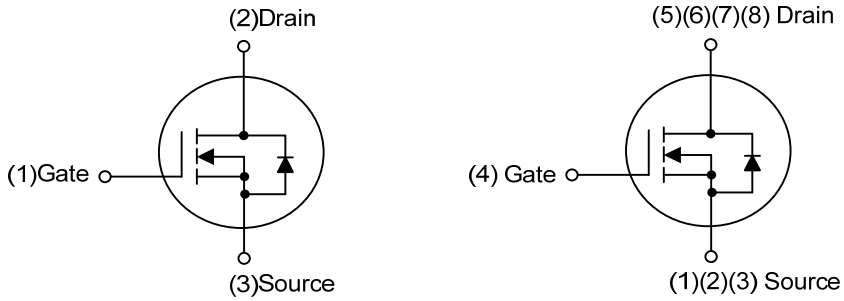
The UTC **UTT50N06** is an N-channel power MOSFET using UTC's advanced technology to provide customers with a minimum on-state resistance and superior switching performance.

The UTC **UTT50N06** is generally applied in low power switching mode power appliances and electronic ballast.

■ FEATURES

* $R_{DS(ON)} \leq 15\ m\Omega$ @ V_{GS}=10V, I_D=25A
  $R_{DS(ON)} \leq 20\ m\Omega$ @ V_{GS}=4.5V, I_D=25A
* High Switching Speed
* Improved dv/dt capability

■ SYMBOL



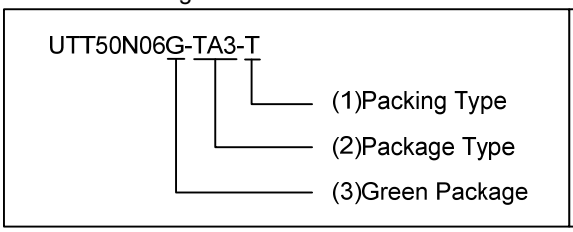
TO-220/TO-220F/TO-220F1
TO-251/TO-252/TO-252D/TO-263

PDFN5×6

■ ORDERING INFORMATION

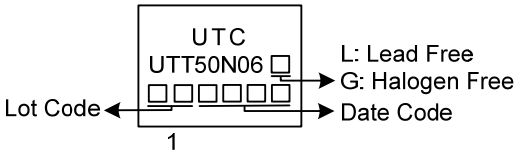
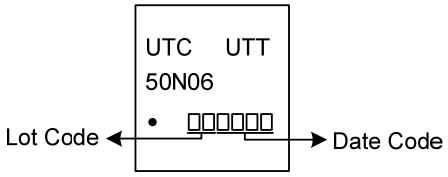
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTT50N06L-TA3-T	UTT50N06G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UTT50N06L-TF3-T	UTT50N06G-TF3-T	TO-220F	G	D	S	-	-	-	-	-	Tube
UTT50N06L-TF1-T	UTT50N06G-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
UTT50N06L-TM3-T	UTT50N06G-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
UTT50N06L-TN3-R	UTT50N06G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UTT50N06L-TND-R	UTT50N06G-TND-R	TO-252D	G	D	S	-	-	-	-	-	Tape Reel
UTT50N06L-TQ2-T	UTT50N06G-TQ2-T	TO-263	G	D	S	-	-	-	-	-	Tube
UTT50N06L-TQ2-R	UTT50N06G-TQ2-R	TO-263	G	D	S	-	-	-	-	-	Tape Reel
UTT50N06L-P5060-R	UTT50N06G-P5060-R	PDFN5×6	S	S	S	G	D	D	D	D	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
TM3: TO-251, TN3: TO-252, TND: TO-252D,
TQ2: TO-263, P5060: PDFN5×6
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

TO-220 / TO-220F / TO-220F1 / TO-251 TO-252 / TO-252D / TO-263	PDFN5×6
	

■ ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	60	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current		I_D	50	A
Pulsed Drain Current (Note 2)		I_{DM}	100	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	32	mJ
Peak Diode Recovery dv/dt		dv/dt	2.9	V/ns
Power Dissipation	TO-220/TO-263	P_D	120	W
	TO-220F/TO-220F1		36	W
	TO-251/TO-252 TO-252D		51	W
	PDFN5×6		25	W
Junction Temperature		T_J	+150	°C
Operation and 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=0.1mH, I_{AS}=25A, V_{DD}=30V, R_G=20Ω, Starting T_J=25°C
4. I_{SD} ≤ 30A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J=25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-263	θ_{JA}	62.5	°C/W
	TO-251/TO-252 TO-252D		110	°C/W
	PDFN5×6		65	°C/W
Junction to Case	TO-220/TO-263	θ_{JC}	1.04	°C/W
	TO-220F/TO-220F1		3.47	°C/W
	TO-251/TO-252 TO-252D		2.45 (Note)	°C/W
	PDFN5×6		5 (Note)	°C/W

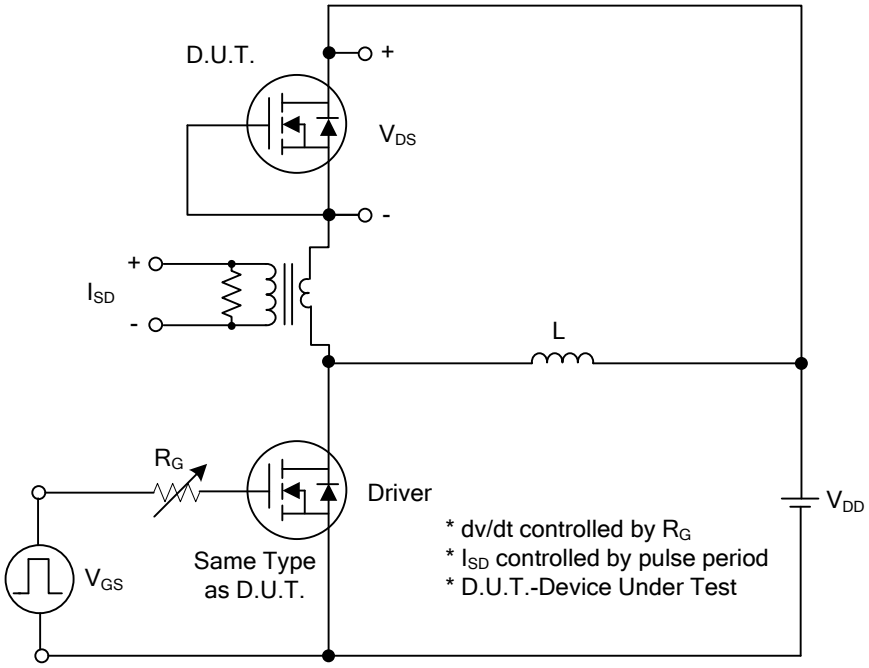
Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

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

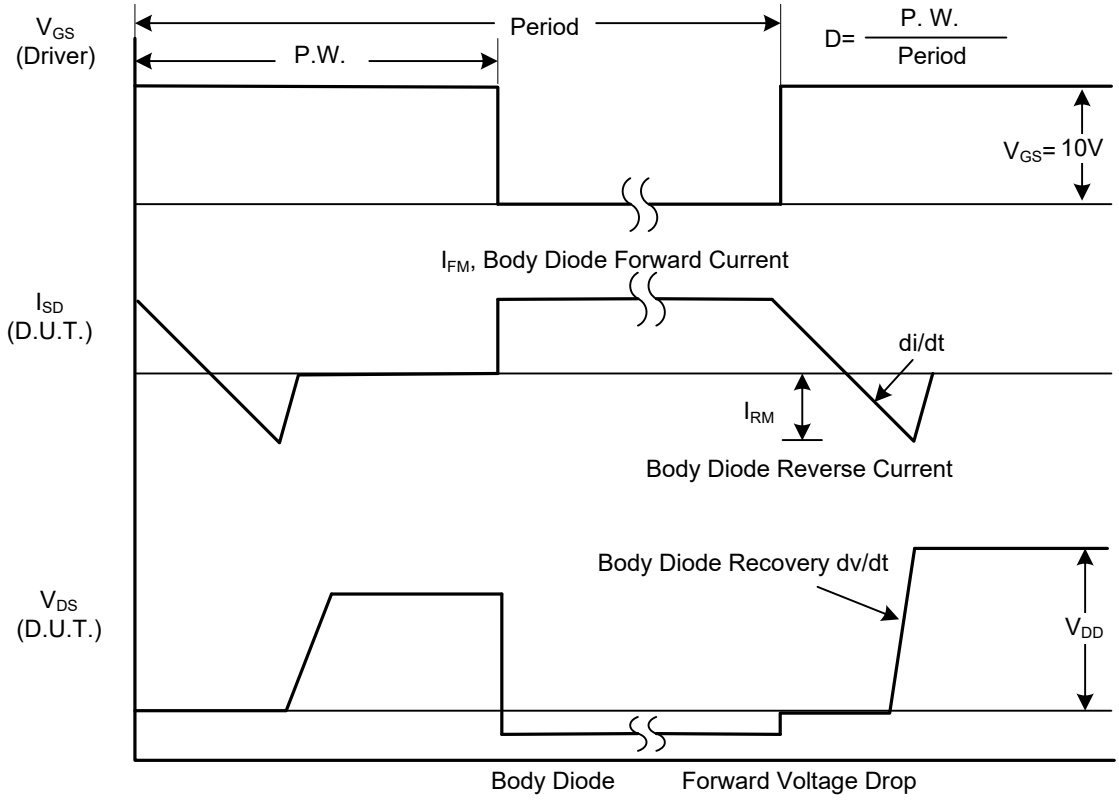
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	60			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=60V, V_{GS}=0V			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=20V, V_{DS}=0V			100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	1.0		3.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=25A			15	mΩ
			V_{GS}=4.5V, I_D=25A			20	mΩ
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1MHz		2315		pF
Output Capacitance		C_{OSS}			181		pF
Reverse Transfer Capacitance		C_{RSS}			144		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge		Q_G	V_{DS}=48V, V_{GS}=10V, I_D=50A (Note1,2)		56		nC
Gate-Source Charge		Q_{GS}			8.4		nC
Gate-Drain Charge		Q_{GD}			16		nC
Turn-On Delay Time		$t_{D(ON)}$	V_{DS}=30V, V_{GS}=10V, I_D=50A, R_G=6Ω (Note1,2)		9		ns
Turn-On Rise Time		t_R			18		ns
Turn-Off Delay Time		$t_{D(OFF)}$			54		ns
Turn-Off Fall Time		t_F			28		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Maximum Continuous Drain-Source Diode Forward Current		I_S				50	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				100	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=50A, V_{GS}=0V			1.5	V
Body Diode Reverse Recovery Time		t_{rr}	I_S=30A, V_{GS}=0V, dI_S/dt=100A/μs		60		ns
Body Diode Reverse Recovery Charge		Q_{rr}			30		nC

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

■ TEST CIRCUITS AND WAVEFORMS



Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS

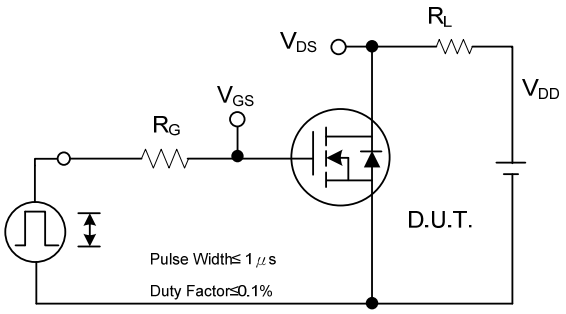


Fig. 2A Switching Test Circuit

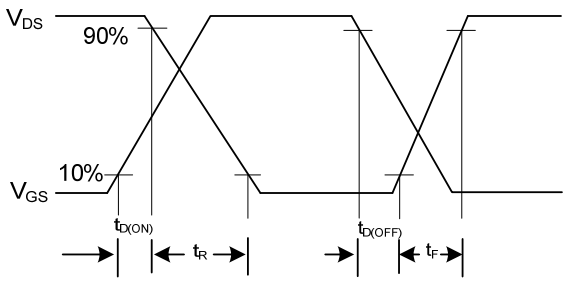


Fig. 2B Switching Waveforms

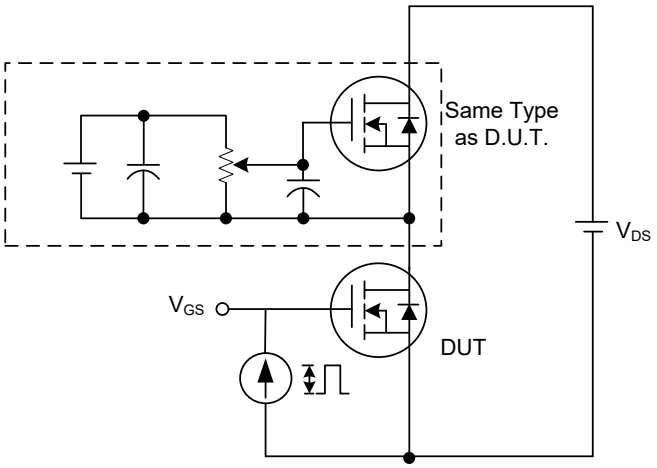


Fig. 3A Gate Charge Test Circuit

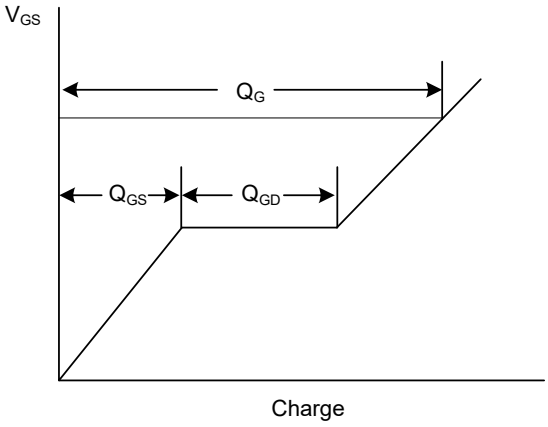


Fig. 3B Gate Charge Waveform

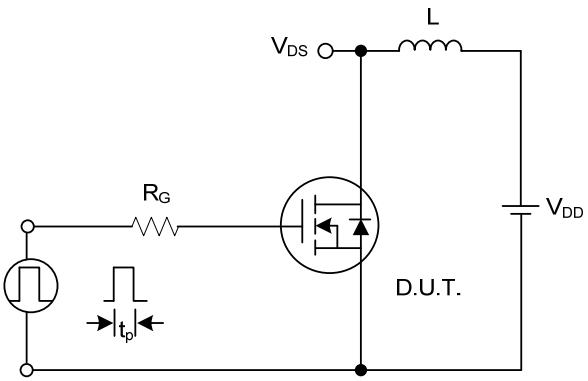


Fig. 4A Unclamped Inductive Switching Test Circuit

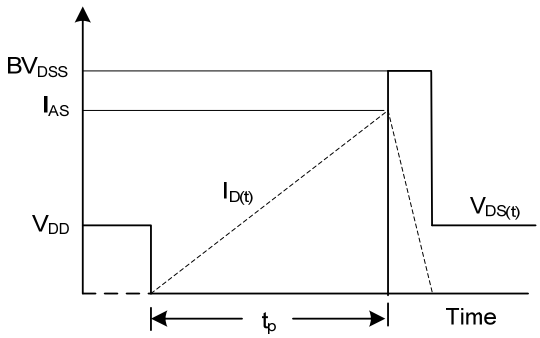
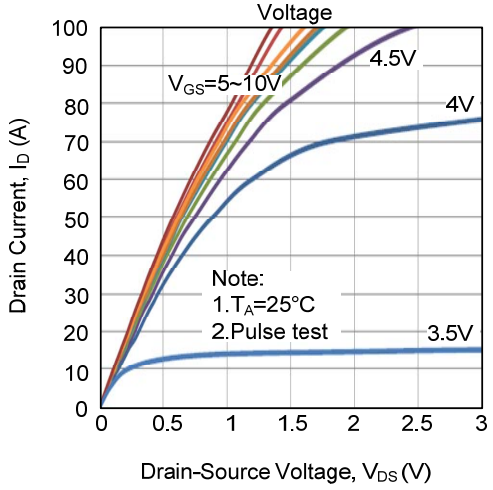


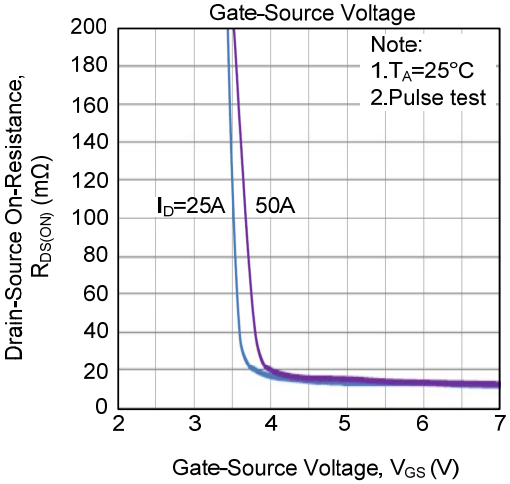
Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

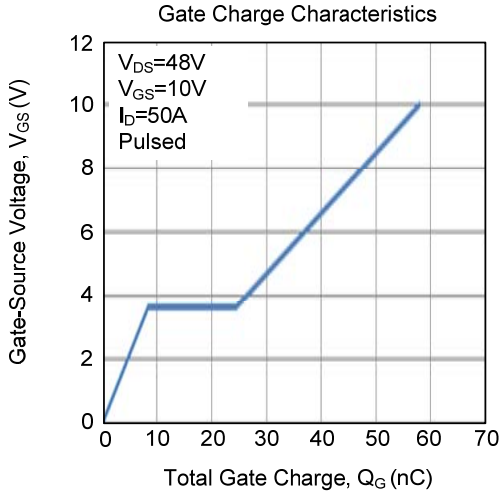
Drain Current vs. Drain-Source Voltage



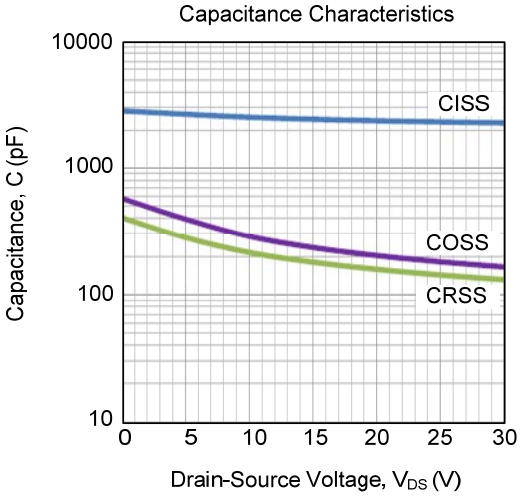
Drain-Source On-Resistance vs. Gate-Source Voltage



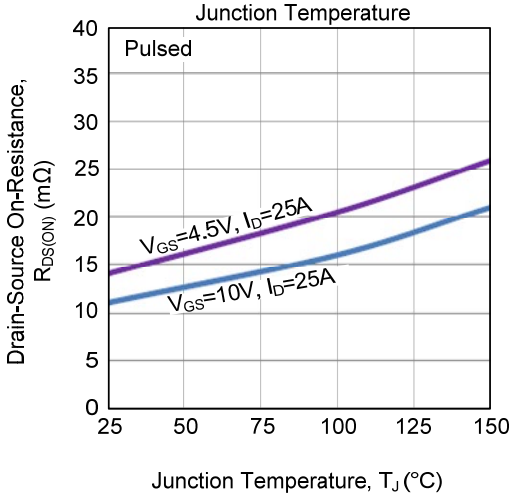
Gate Charge Characteristics



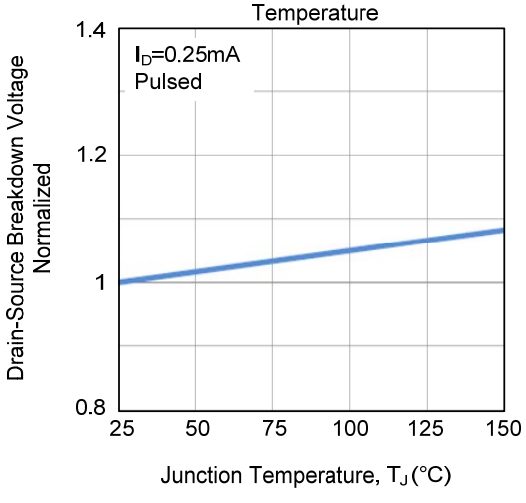
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

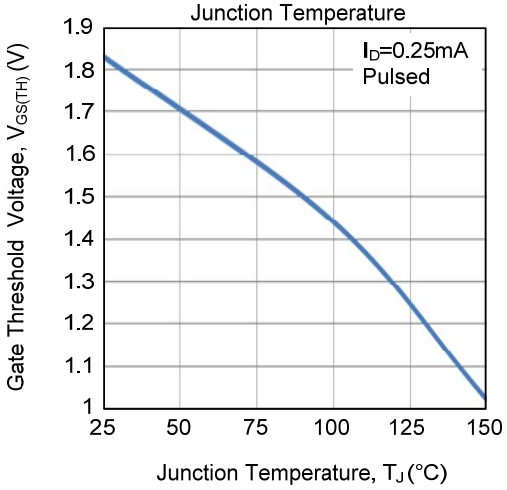


Breakdown Voltage vs. Junction Temperature

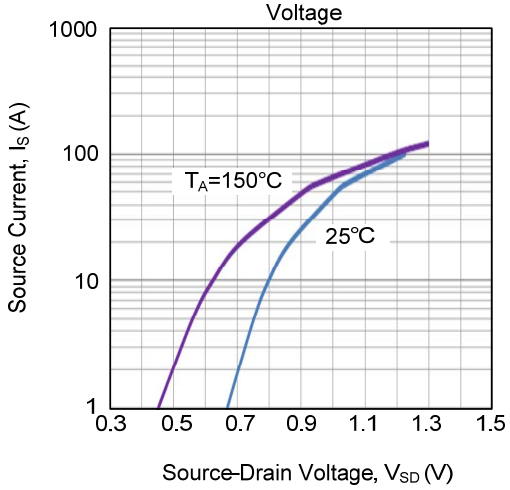


■ TYPICAL CHARACTERISTICS (Cont.)

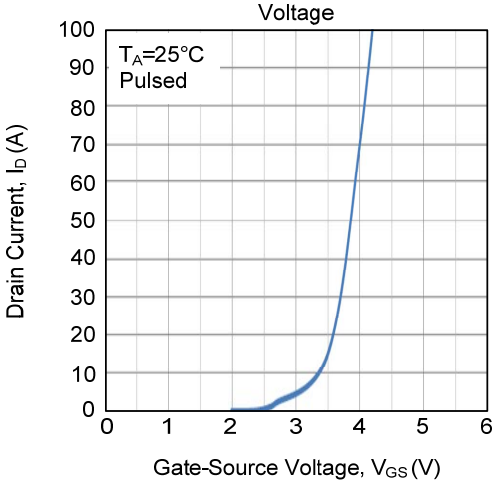
Gate Threshold Voltage vs. Junction Temperature



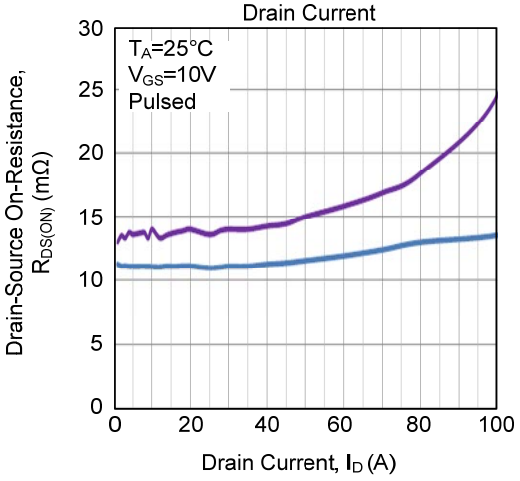
Source Current vs. Source-Drain Voltage



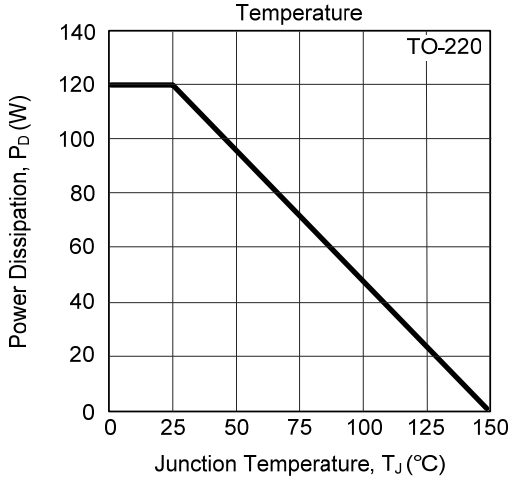
Drain Current vs. Gate-Source Voltage



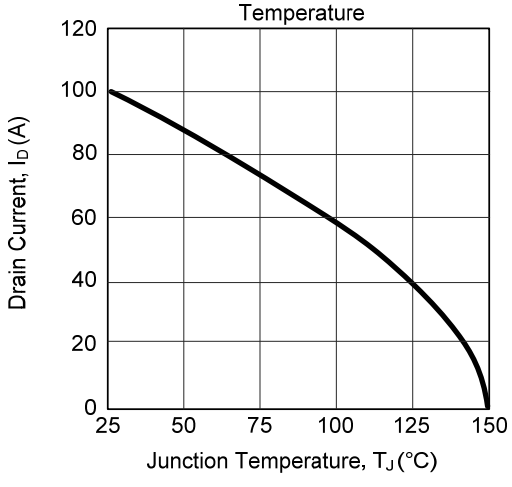
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)