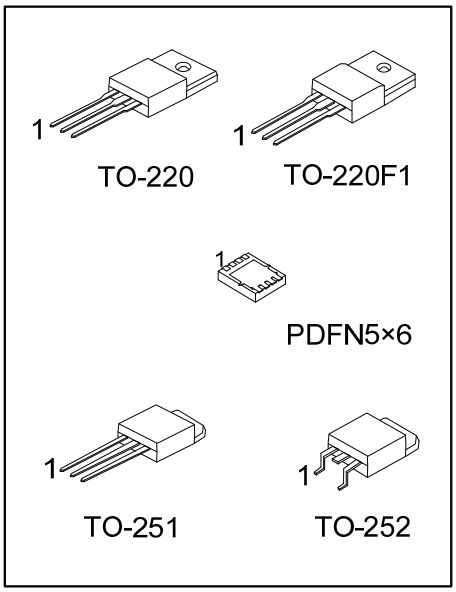
UTT50N06M

POWER MOSFET

50A, 60V N-CHANNEL ENHANCEMENT MODE TRENCH POWER MOSFET



■ DESCRIPTION

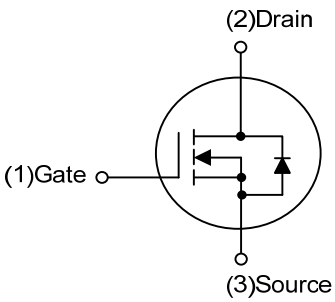
The UTC **UTT50N06M** is a N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with low $R_{DS(ON)}$ characteristic by high cell density trench technology.

The UTC **UTT50N06M** is suitable for high efficiency synchronous rectification in SMPS, UPS, hard switched and high frequency circuits.

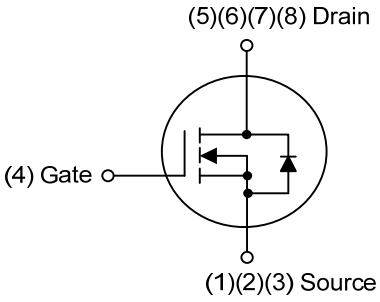
■ FEATURES

* $R_{DS(ON)}$ ≤ 12 mΩ @ V_{GS}=10V, I_D=25A
  $R_{DS(ON)}$ ≤ 15 mΩ @ V_{GS}=4.5V, I_D=20A
* High Cell Density Trench Technology
* High Power and Current Handling Capability

■ SYMBOL



TO-220/TO-220F1/TO-251/TO-252

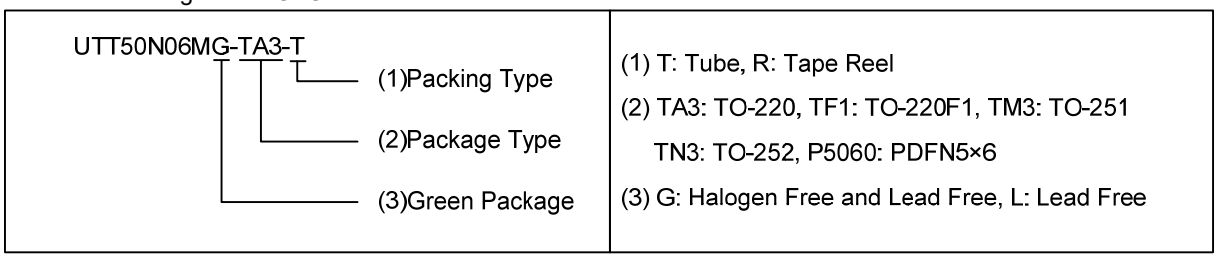


PDFN5×6

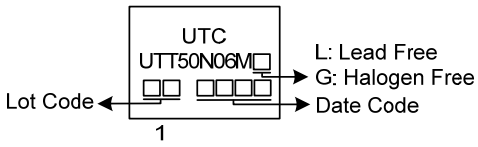
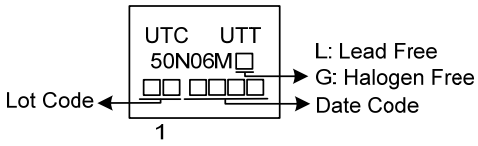
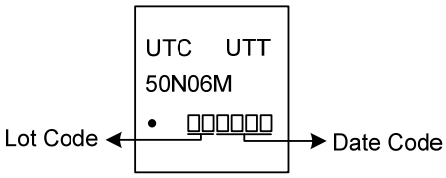
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTT50N06ML-TA3-T	UTT50N06MG-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UTT50N06ML-TF1-T	UTT50N06MG-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
UTT50N06ML-TM3-T	UTT50N06MG-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
UTT50N06ML-TN3-R	UTT50N06MG-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UTT50N06ML-P5060-R	UTT50N06MG-P5060-R	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

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



■ MARKING

PACKAGE	MARKING
TO-220 / TO-220F1	
TO-251 / TO-252	
PDFN5×6	

■ ABSOLUTE MAXIMUM RATING (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
Drain Current	Continuous	I_D	50	A
	Pulsed (Note 2)	I_{DM}	100	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	105	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.9	V/ns
Power Dissipation	TO-220	P_D	140	W
	TO-220F1		36	W
	TO-251/TO-252		52	W
	PDFN5×6		28	W
Junction Temperature		T_J	+150	°C
Storage Temperature Range		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 = 0.1 mH, I_{AS} = 46A, V_{DD} = 25V, R_G = 25Ω, Starting T_J = 25°C.
4. I_{SD} ≤ 30A, di/dt ≤ 200A/μs, V_{DD} ≤ $V_{(BR)DSS}$, T_J = 25°C.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F1	$θ_{JA}$	62.5	°C/W
	TO-251/TO-252		100	°C/W
	PDFN5×6		65 (Note)	°C/W
Junction to Case	TO-220	$θ_{JC}$	0.89	°C/W
	TO-220F1		3.47	°C/W
	TO-251/TO-252		2.4 (Note)	°C/W
	PDFN5×6		4.46 (Note)	°C/W

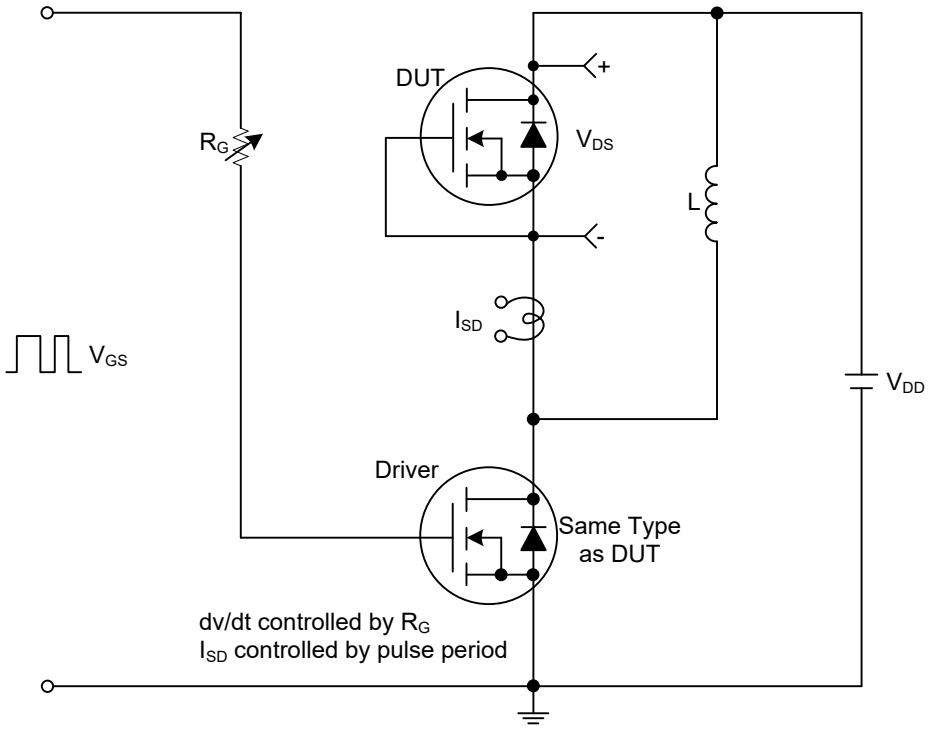
Note: The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.

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

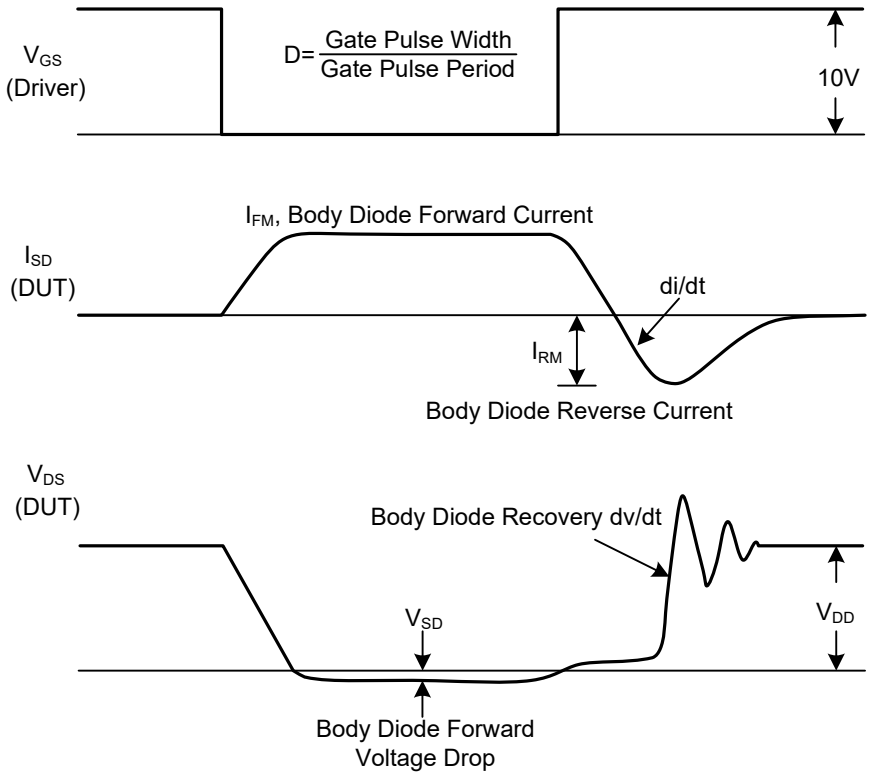
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	60			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=60V, V_{GS}=0V			1.0	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		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			12	mΩ
			V_{GS}=4.5V, I_D=20A			15	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		2700		pF
Output Capacitance		C_{OSS}			220		pF
Reverse Transfer Capacitance		C_{RSS}			160		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=48V, V_{GS}=10V, I_D=50A, (Note 1, 2)		62		nC
Gate to Source Charge		Q_{GS}			10		nC
Gate to Drain Charge		Q_{GD}			15		nC
Turn-on Delay Time (Note 1)		$t_{D(ON)}$	V_{DS}=30V, V_{GS}=10V, I_D=50A, R_G=3Ω (Note 1, 2)		11		ns
Rise Time		t_R			18		ns
Turn-off Delay Time		$t_{D(OFF)}$			44		ns
Fall-Time		t_F			22		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				50	A
Maximum Body-Diode Pulsed Current		I_{SM}				100	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=50A, V_{GS}=0V			1.3	V
Reverse Recovery Time (Note 1)		t_{rr}	I_S=30A, V_{GS}=0V, dI_F/dt =100A/μs		58		nS

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

■ TEST CIRCUITS AND WAVEFORMS



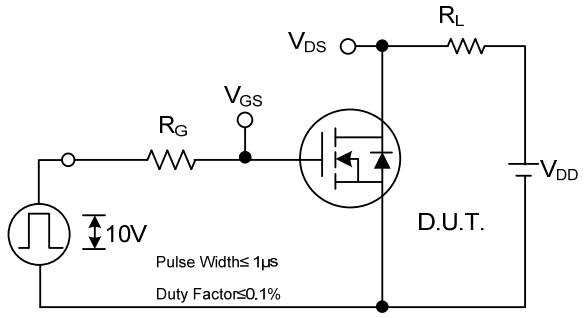
Peak Diode Recovery dv/dt Test Circuit



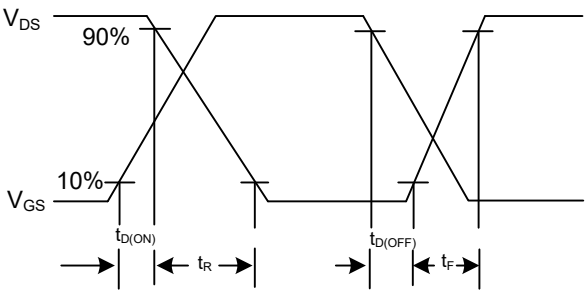
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

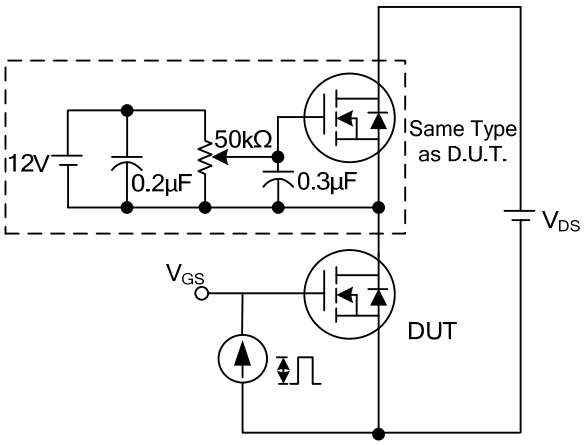
■ TEST CIRCUITS AND WAVEFORMS



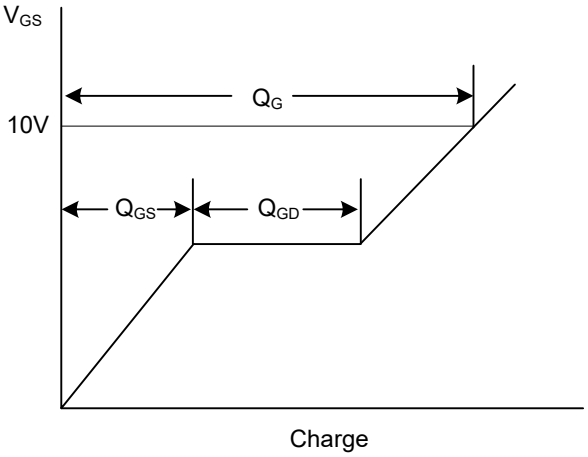
Switching Test Circuit



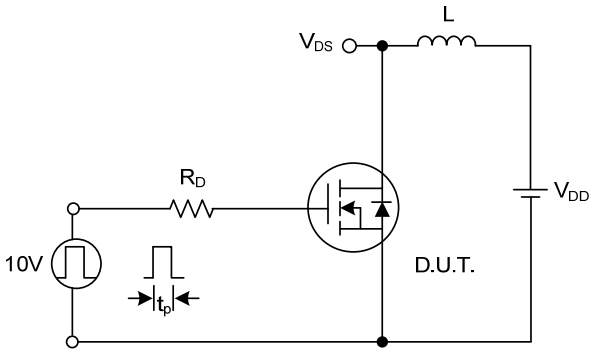
Switching Waveforms



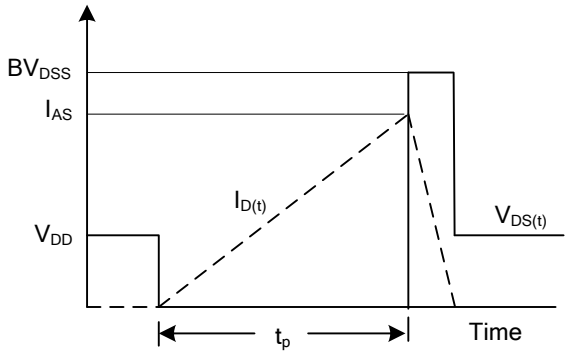
Gate Charge Test Circuit



Gate Charge Waveform

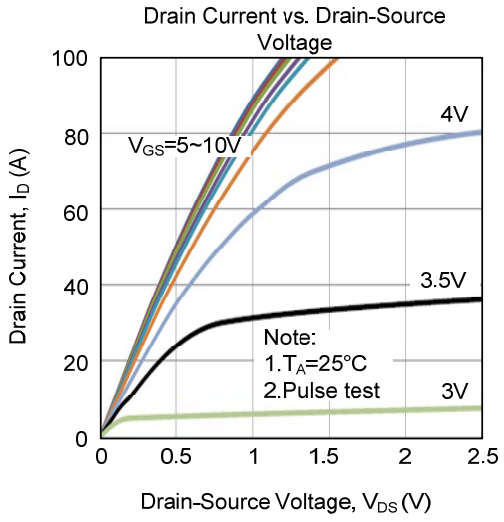


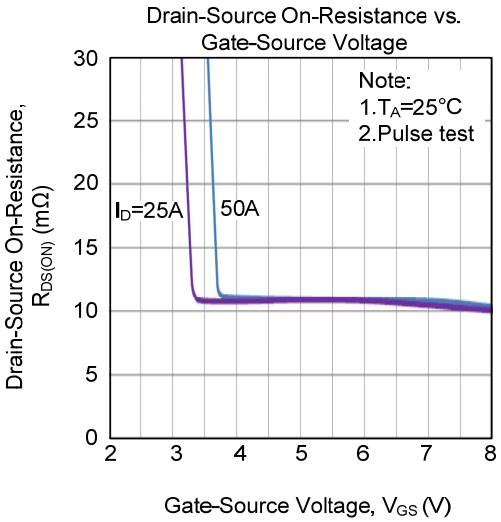
Unclamped Inductive Switching Test Circuit

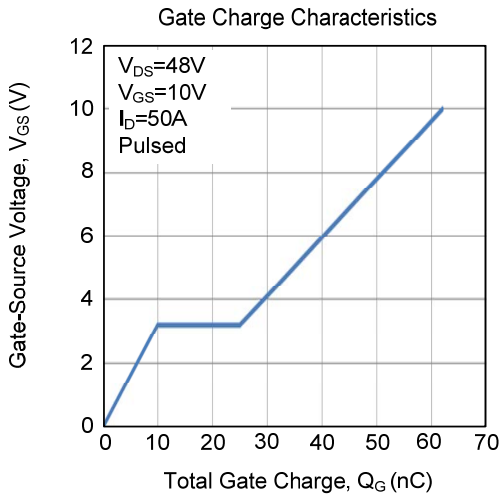


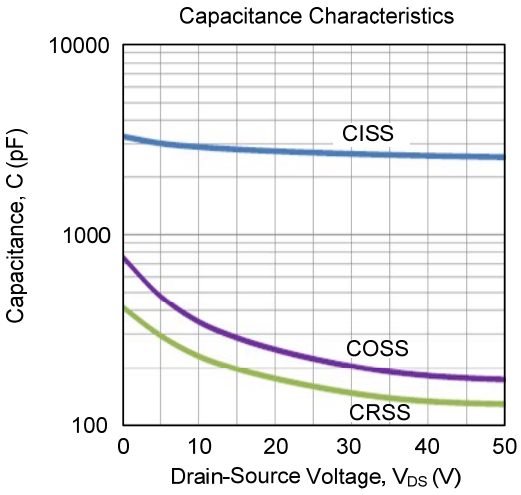
Unclamped Inductive Switching Waveforms

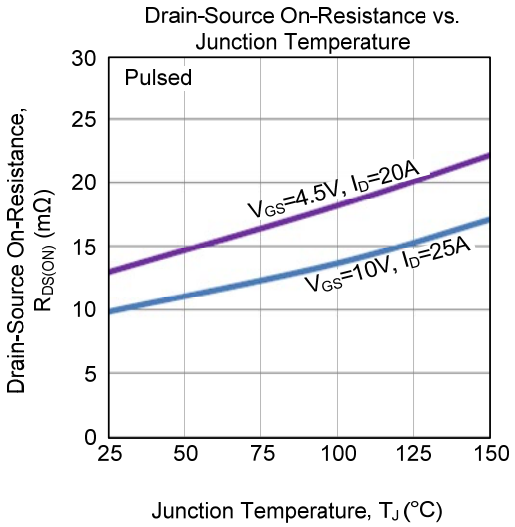
■ TYPICAL CHARACTERISTICS

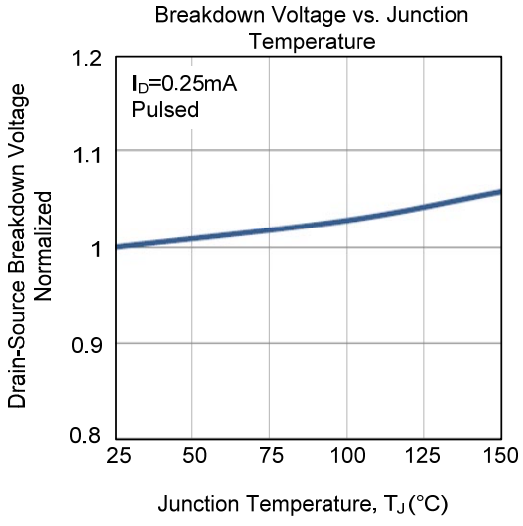






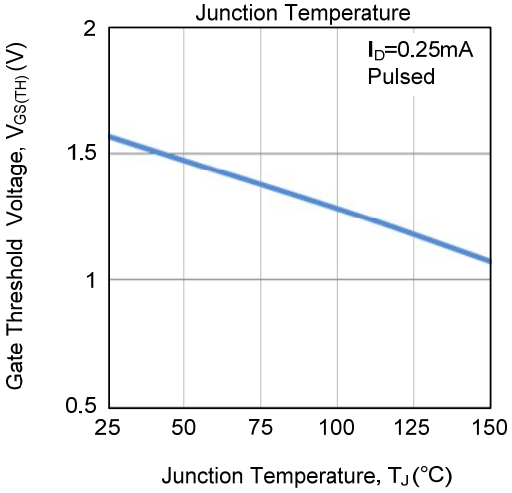




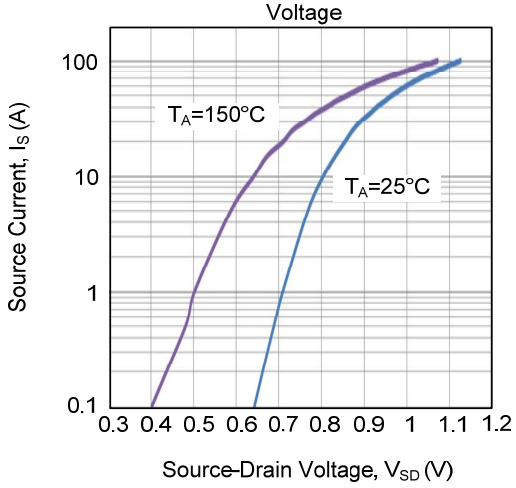


■ TYPICAL CHARACTERISTICS (Cont.)

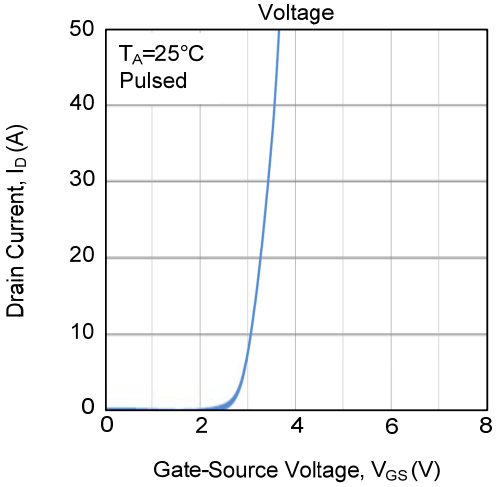
Gate Threshold Voltage vs. Junction Temperature



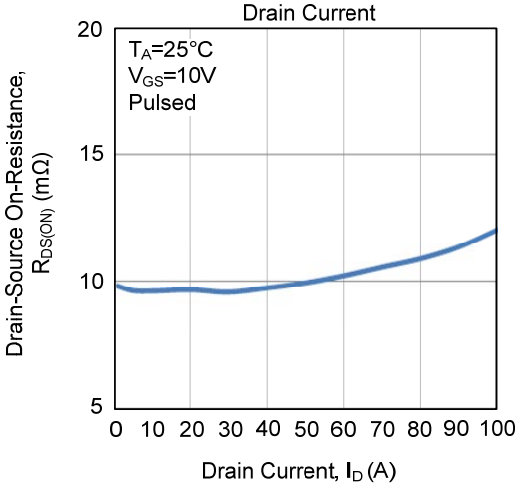
Source Current vs. Source-Drain Voltage



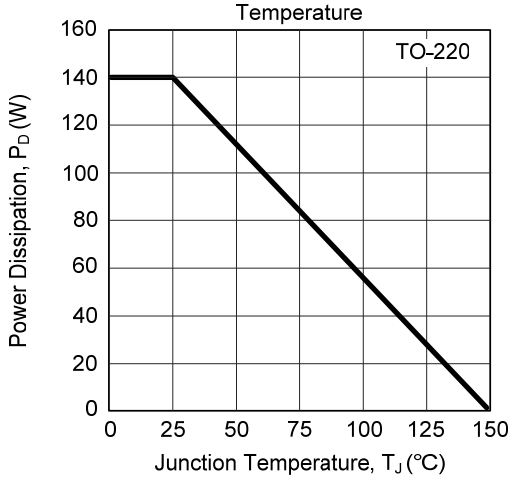
Drain Current vs. Gate-Source Voltage



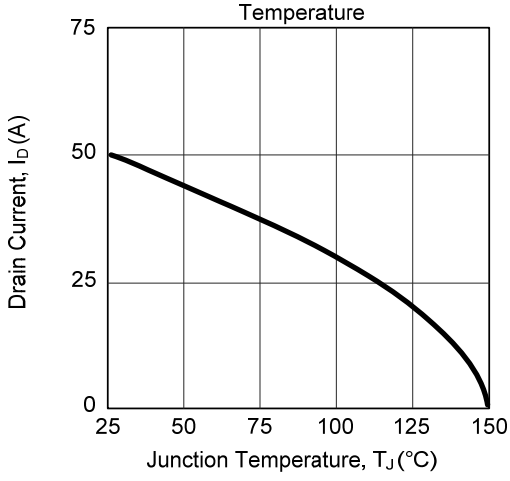
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS