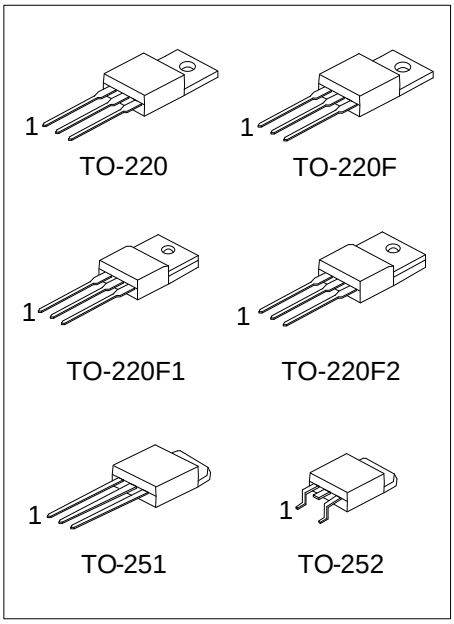
4N100

Power MOSFET

4A, 1000V N-CHANNEL POWER MOSFET



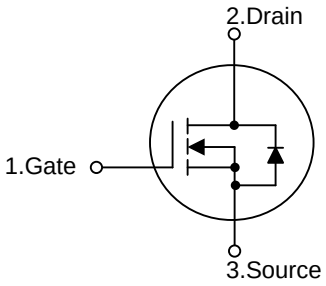
■ DESCRIPTION

The UTC **4N100** is an N-channel MOSFET, it uses UTC's advanced technology to provide the customers with high switching speed and high breakdown voltage.

■ FEATURES

* $R_{DS(ON)} \leq 3.5\ \Omega$ @ V_{GS}=10V, I_D=2.0A
* High switching speed
* High breakdown voltage

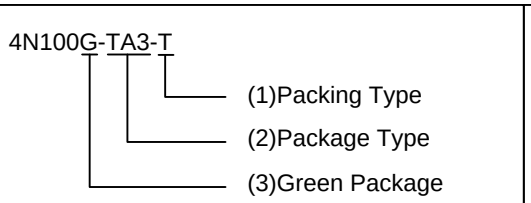
■ SYMBOL



■ ORDERING INFORMATION

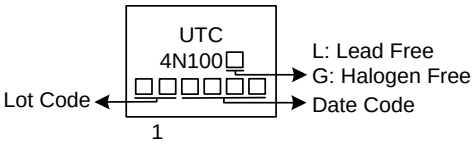
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
4N100L-TA3-T	4N100G-TA3-T	TO-220	G	D	S	Tube
4N100L-TF1-T	4N100G-TF1-T	TO-220F1	G	D	S	Tube
4N100L-TF2-T	4N100G-TF2-T	TO-220F2	G	D	S	Tube
4N100L-TF3-T	4N100G-TF3-T	TO-220F	G	D	S	Tube
4N100L-TM3-T	4N100G-TM3-T	TO-251	G	D	S	Tube
4N100L-TN3-R	4N100G-TN3-R	TO-252	G	D	S	Tape Reel

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



(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2
TF3: TO-220F, TM3: TO-251, TN3: TO-252
(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}	1000	V
Drain-Gate Voltage (R_{GS}=2kΩ)		V_{DGR}	1000	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	Continuous	I_D	4	A
	Pulsed	I_{DM}	8	A
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	88.2	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.84	V/ns
Power Dissipation	TO-220	P_D	140	W
	TO-220F/TO-220F1		38	W
	TO-220F2		40	W
	TO-251/TO-252		58	W
Junction Temperature		T_J	-55 ~ +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=10mH, I_{AS}=4.2A, V_{DD}=50V, R_G=25 Ω, Starting T_J = 25°C
4. I_{SD}≤ 4.0A, di/dt≤200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2	$θ_{JA}$	62.5	°C/W
	TO-251/TO-252		50	
Junction to Case	TO-220	$θ_{JC}$	0.89	°C/W
	TO-220F/TO-220F1		3.25	
	TO-220F2		3.1	
	TO-251/TO-252		2.15 (Note)	

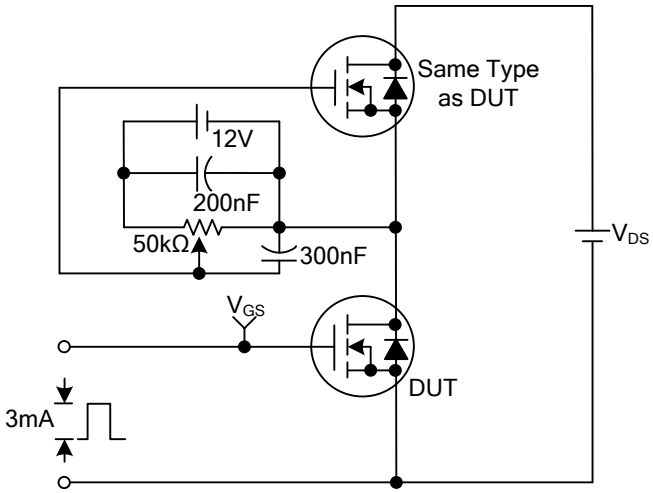
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

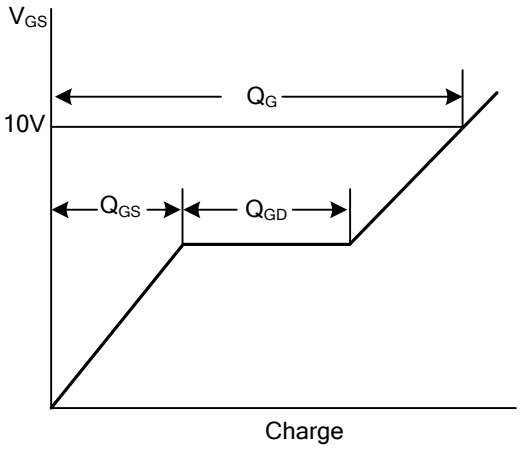
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=0.25mA, V_{GS}=0V, T_J=25°C	1000			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=1000V, V_{GS}=0V, T_J=25°C			10	μA
			V_{DS}=1000V, V_{GS}=0V, T_C=125°C			100	μA
Gate-Source Leakage 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	3.0		5.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=2.0A			3.5	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		849		pF
Output Capacitance		C_{OSS}			91		pF
Reverse Transfer Capacitance		C_{RSS}			8.7		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=800V, V_{GS}=10V, I_D=4.0A I_G=1mA (Note 1, 2)		21		nC
Gate-Source Charge		Q_{GS}			4.4		nC
Gate-Drain Charge		Q_{GD}			5.8		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=100V, V_{GS}=10V, I_D=4.0A, R_{GS}=25Ω		18		ns
Rise Time		t_R			20		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			100		ns
Fall-Time		t_F			45		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S	T_C=25°C			4	A
Maximum Body-Diode Pulsed Current		I_{SM}	T_C=25°C			8	A
Drain-Source Diode Forward Voltage		V_{SD}	I_F=4.0A, V_{GS}=0V			1.4	V
Reverse Recovery Time (Note 1)		t_{rr}	I_S=4.0A, V_{GS}=0V, di/dt=100A/μs		880		ns
Reverse Recovery Charge		Q_{rr}			5.08		μC

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

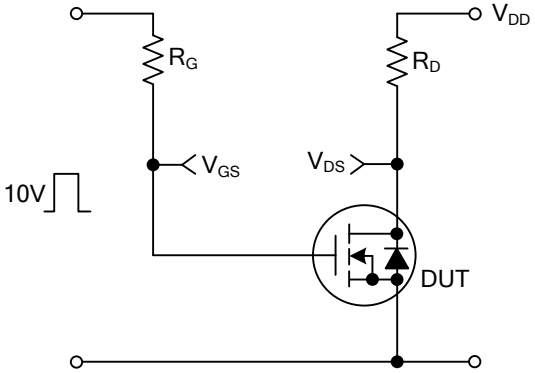
■ TEST CIRCUITS AND WAVEFORMS



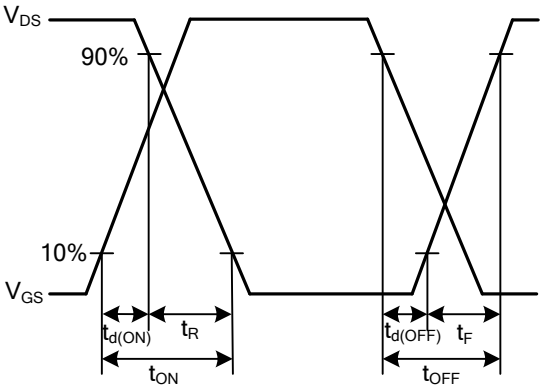
Gate Charge Test Circuit



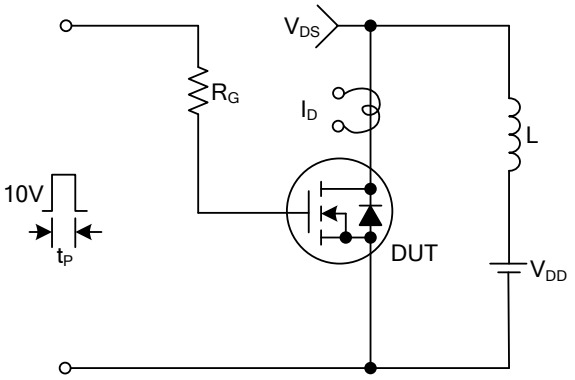
Gate Charge Waveforms



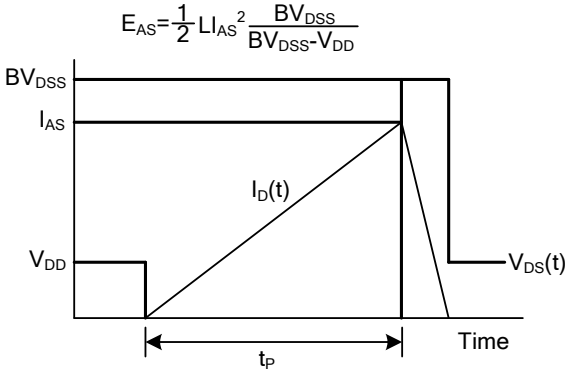
Resistive Switching Test Circuit



Resistive Switching Waveforms

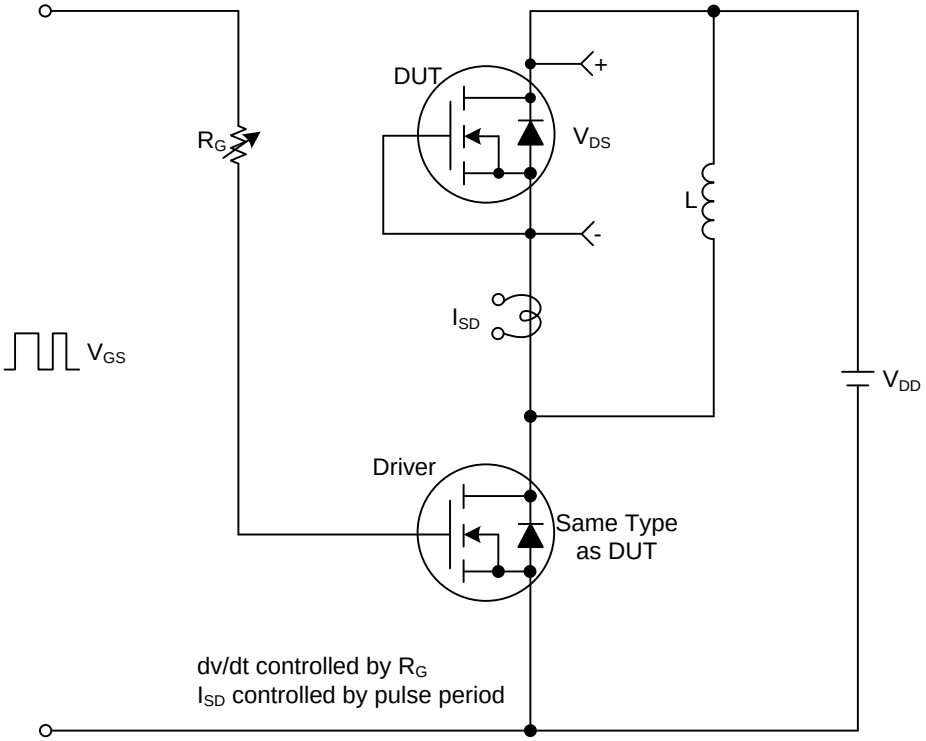


Unclamped Inductive Switching Test Circuit

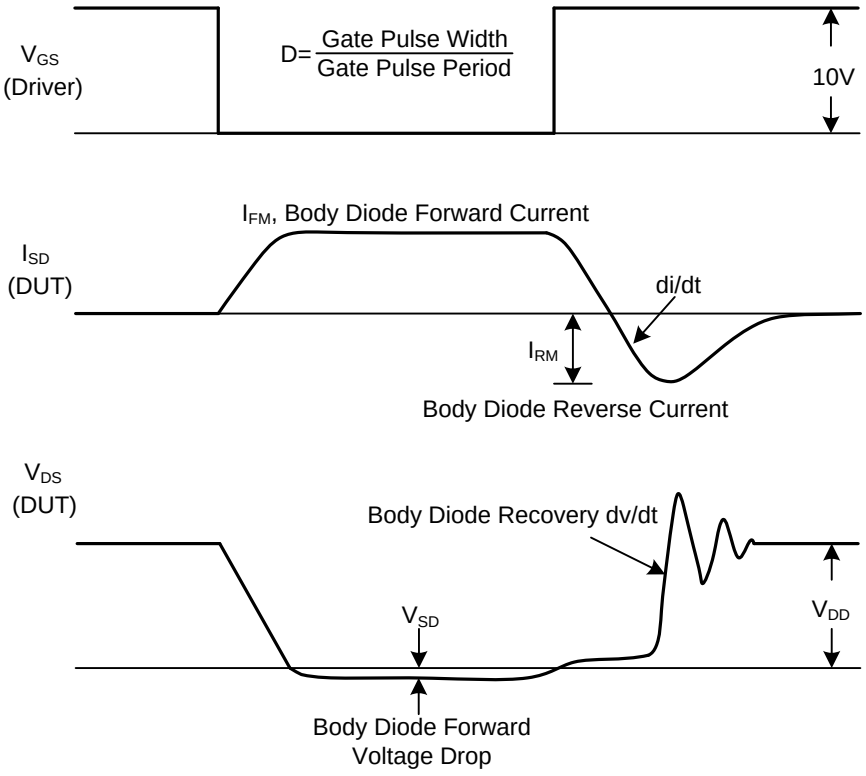


Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS

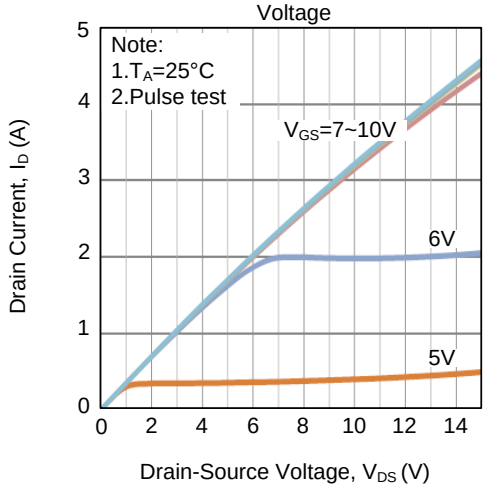


Peak Diode Recovery dv/dt Test Circuit & Waveforms

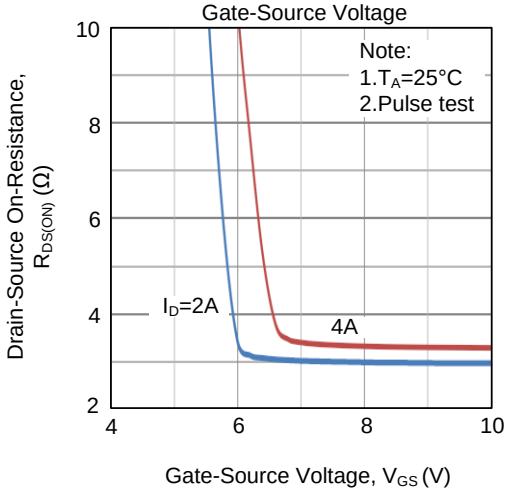


■ TYPICAL CHARACTERISTICS

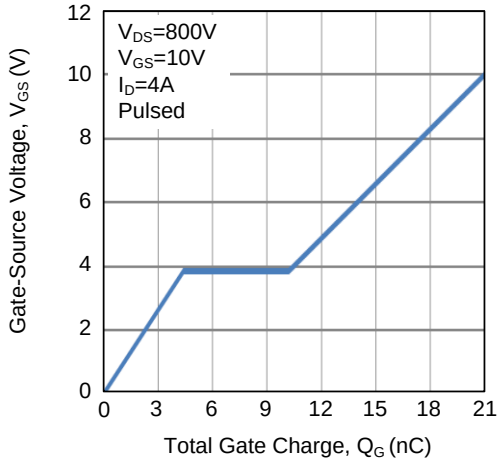
Drain Current vs. Drain-Source Voltage



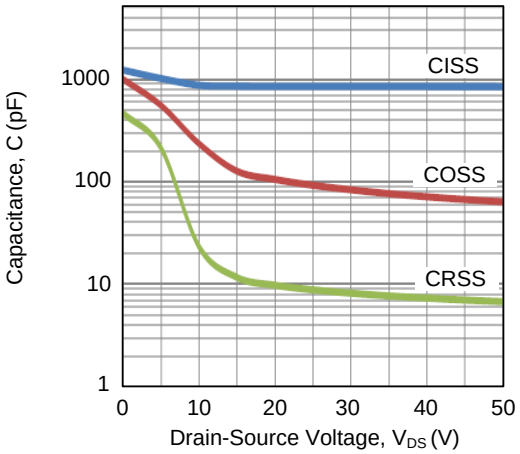
Drain-Source On-Resistance vs. Gate-Source Voltage



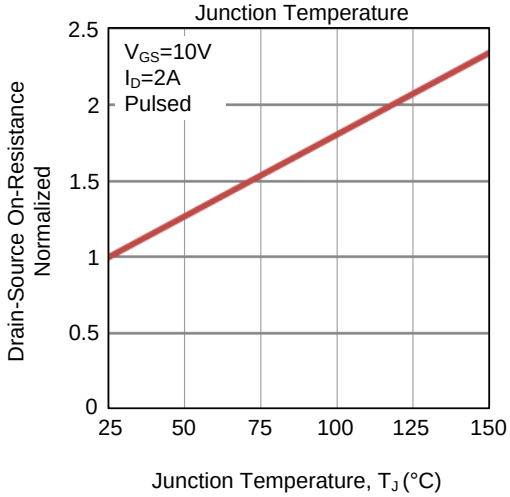
Gate Charge Characteristics



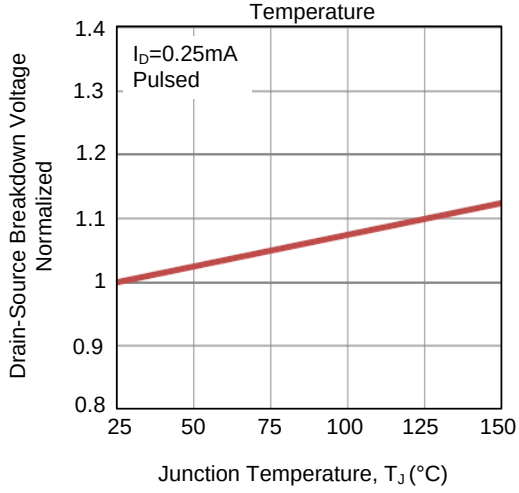
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

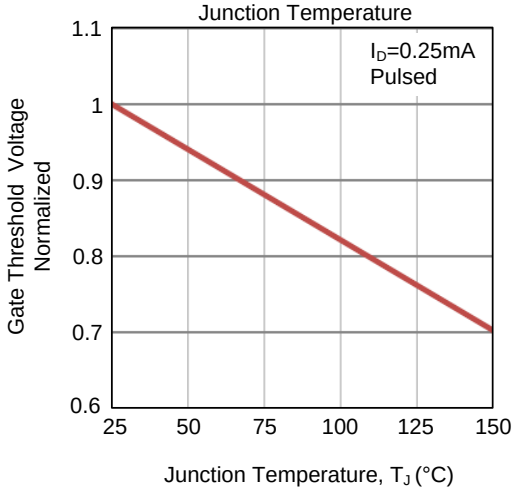


Breakdown Voltage vs. Junction Temperature

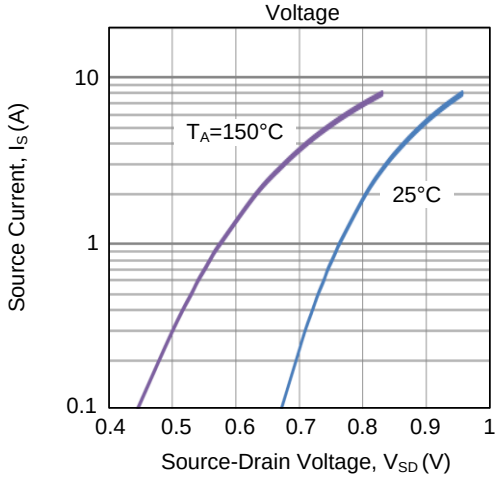


■ TYPICAL CHARACTERISTICS (Cont.)

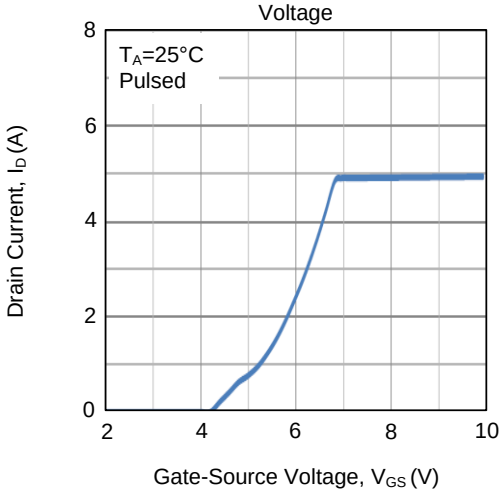
Gate Threshold Voltage vs. Junction Temperature



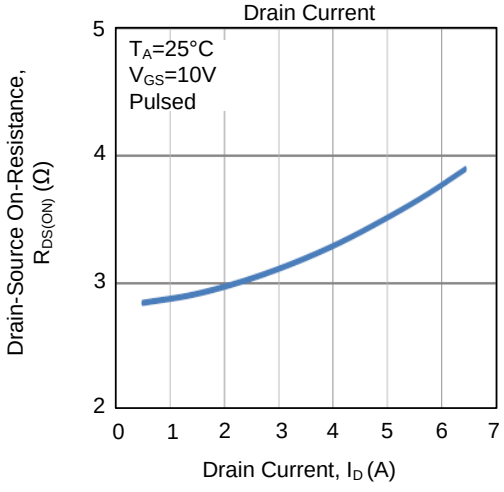
Source Current vs. Source-Drain Voltage



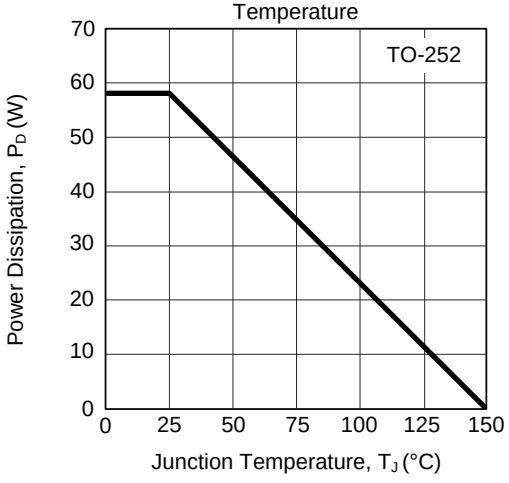
Drain Current vs. Gate-Source Voltage



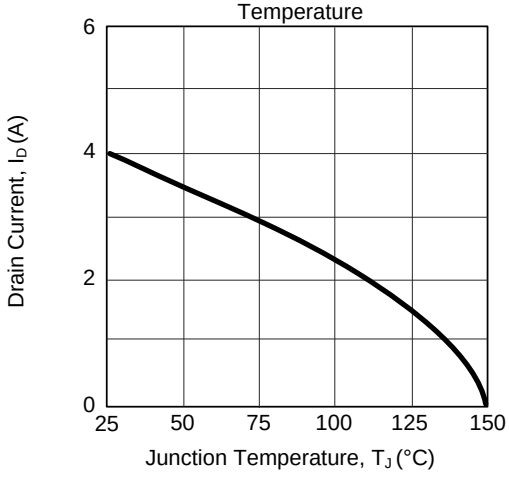
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)