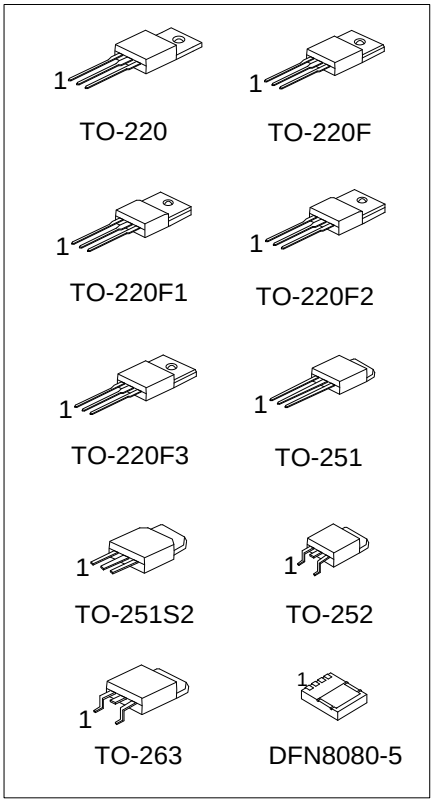
18NM70

Power MOSFET

18A, 700V N-CHANNEL SUPER-JUNCTION MOSFET



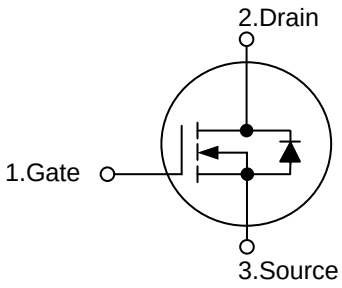
■ DESCRIPTION

The **UTC 18NM70** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

■ FEATURES

* $R_{DS(ON)} \leq 0.35\Omega$ @ V_{GS}=10V, I_D=9.0A
* Fast Switching Capability
* Avalanche Energy Specified
* Improved dv/dt Capability, High Ruggedness

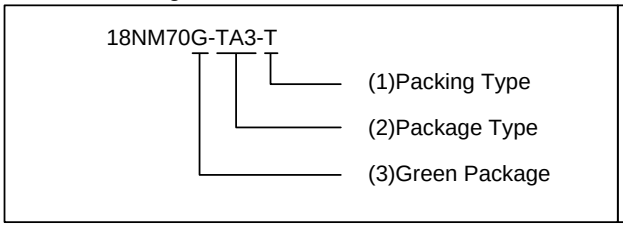
■ SYMBOL



■ ORDERING INFORMATION

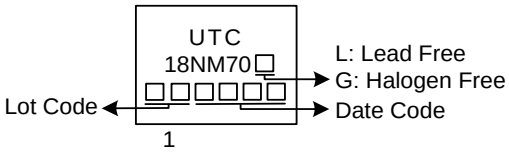
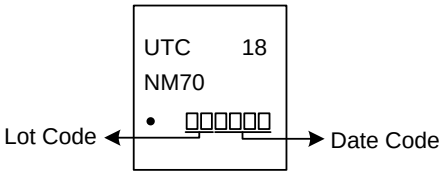
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
18NM70L-TA3-T	18NM70G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
18NM70L-TF3-T	18NM70G-TF3-T	TO-220F	G	D	S	-	-	-	-	-	Tube
18NM70L-TF1-T	18NM70G-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
18NM70L-TF2-T	18NM70G-TF2-T	TO-220F2	G	D	S	-	-	-	-	-	Tube
18NM70L-TF3T-T	18NM70G-TF3T-T	TO-220F3	G	D	S	-	-	-	-	-	Tube
18NM70L-TM3-T	18NM70G-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
18NM70L-TMS2-T	18NM70G-TMS2-T	TO-251S2	G	D	S	-	-	-	-	-	Tube
18NM70L-TN3-R	18NM70G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
18NM70L-TQ2-T	18NM70G-TQ2-T	TO-263	G	D	S	-	-	-	-	-	Tube
18NM70L-TQ2-R	18NM70G-TQ2-R	TO-263	G	D	S	-	-	-	-	-	Tape Reel
18NM70L-K05-8080-R	18NM70G-K05-8080-R	DFN8080-5	G	S1	S2	S2	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, TF2: TO-220F2, TF3T: TO-220F3, TM3: TO-251, TMS2: TO-251S2, TN3: TO-252, TQ2: TO-263 K05-8080: DFN8080-5
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

TO-220 / TO-220F / TO-220F1 / TO-220F2 TO-220F3 / TO-251 / TO-251S2 / TO-252 / TO-263	DFN8080-5
	

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain to Source Voltage		V_{DSS}	700	V
Gate to Source Voltage		V_{GSS}	±30	V
Continuous Drain Current	Continuous	I_D	18	A
Pulsed Drain Current	Pulsed (Note 2)	I_{DM}	45	A
Avalanche Current		I_{AR}	4.1	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	204.8	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.0	V/ns
Power Dissipation	TO-220/TO-263	P_D	104	W
	TO-220F/TO-220F1 TO-220F2/ TO-220F3		33	W
	TO-251/TO-251S TO-251S2/TO-252		83	W
	DFN8080-5		60	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}=6.3A, V_{DD}= 50V, R_G=25Ω, Starting T_J=25°C.
4. I_{SD} ≤18A, 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-220F2 TO-220F3/TO-263	θ_{JA}	62.5	°C/W
	TO-251/TO-251S TO-251S2		110	°C/W
	TO-252		110	°C/W
	DFN8080-5		30 (Note)	°C/W
Junction to Case	TO-220/TO-263	θ_{JC}	1.2	°C/W
	TO-220F/TO-220F1 TO-220F2/TO-220F3		3.78	°C/W
	TO-251/TO-251S TO-251S2/TO-252		1.5 (Note)	°C/W
	DFN8080-5		2	°C/W

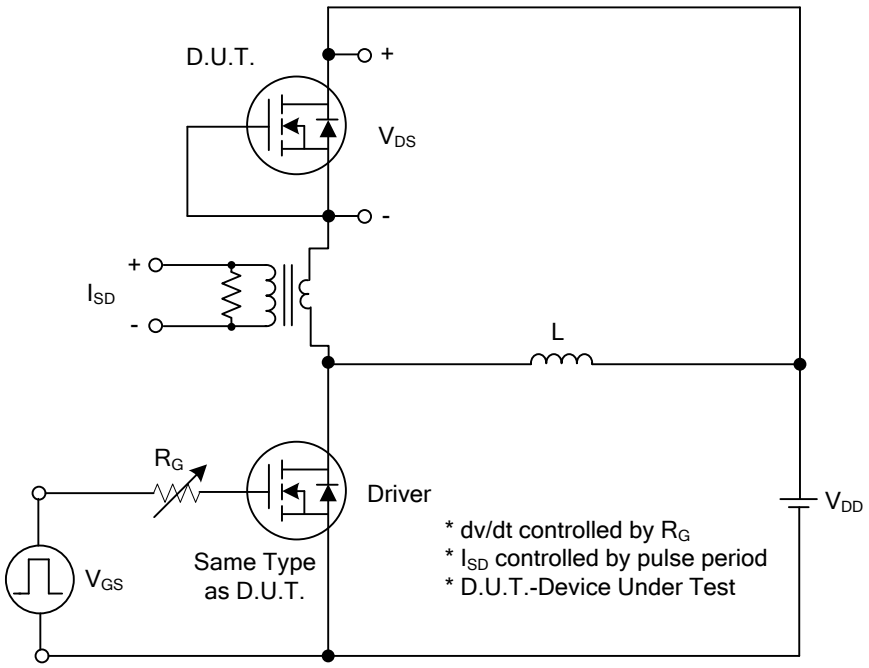
Note: The data tested by surface mounted on a 1 $inch^2$ FR-4 board with 2OZ copper.

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

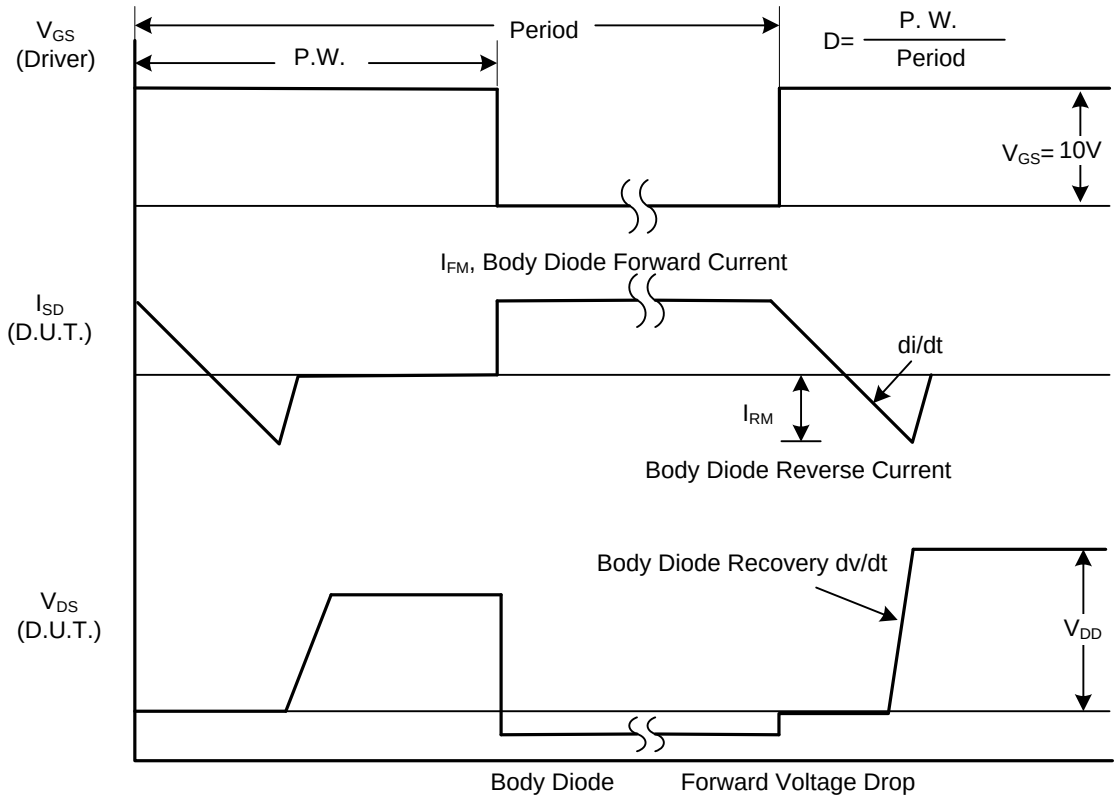
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	700			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=700V, V_{GS}=0V			10	μA
Gate-Body Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±30V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.5		4.5	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=9.0A			0.35	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1MHz		1127		pF
Output Capacitance	C_{OSS}			794		pF
Reverse Transfer Capacitance	C_{RSS}			71		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q_G	V_{DS}=100V, V_{GS}=10V, I_D=18A, I_G=1mA (Note 1, 2)		52		nC
Gate to Source Charge	Q_{GS}			10.4		nC
Gate to Drain Charge	Q_{GD}			12.4		nC
Turn-ON Delay Time (Note 1)	$t_{D(ON)}$	V_{DS}=100V, V_{GS}=10V, I_D=18A, R_G=25Ω (Note 1, 2)		24		ns
Rise Time	t_R			61		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			154		ns
Fall-Time	t_F			51		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				18	A
Maximum Body-Diode Pulsed Current	I_{SM}				54	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	I_S =18A, V_{GS}=0V			1.5	V
Body Diode Reverse Recovery Time (Note 1)	t_{rr}	I_S =18A, V_{GS}=0V, dI_F/dt=100A/μs		468		ns
Body Diode Reverse Recovery Charge	Q_{rr}			7.8		μC

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

■ TEST CIRCUITS AND WAVEFORMS

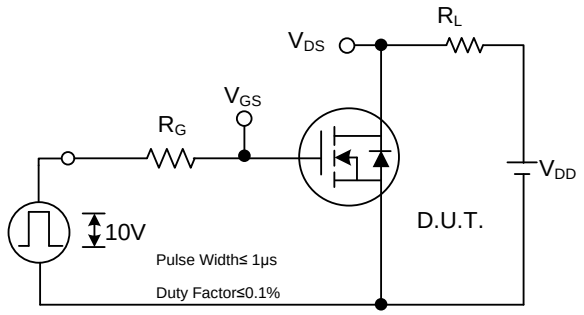


Peak Diode Recovery dv/dt Test Circuit

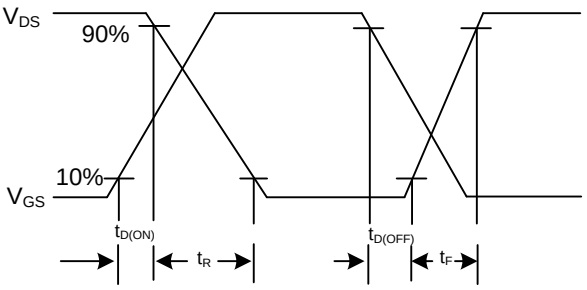


Peak Diode Recovery dv/dt Waveforms

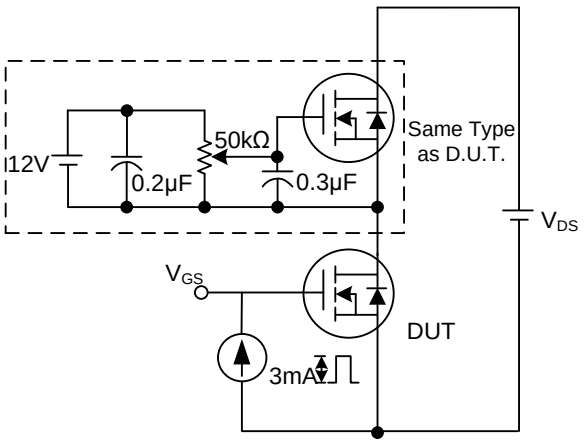
■ TEST CIRCUITS AND WAVEFORMS



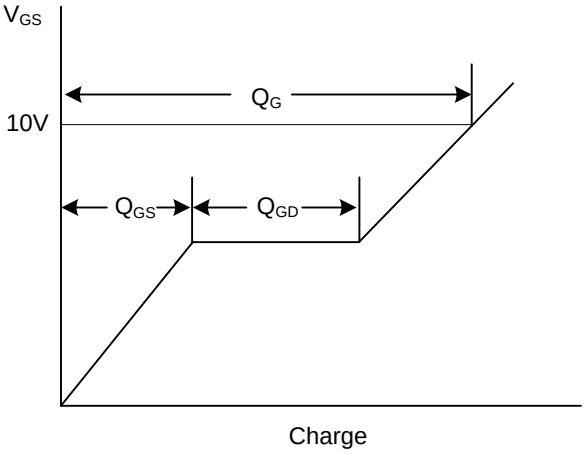
Switching Test Circuit



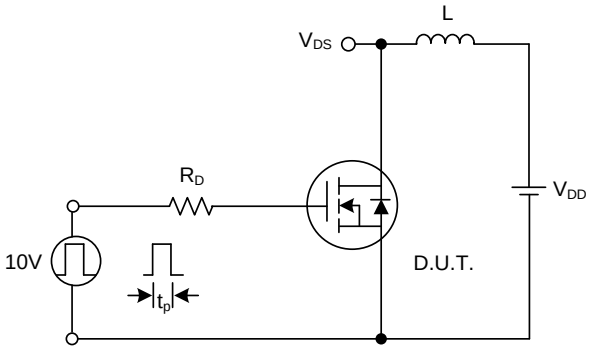
Switching Waveforms



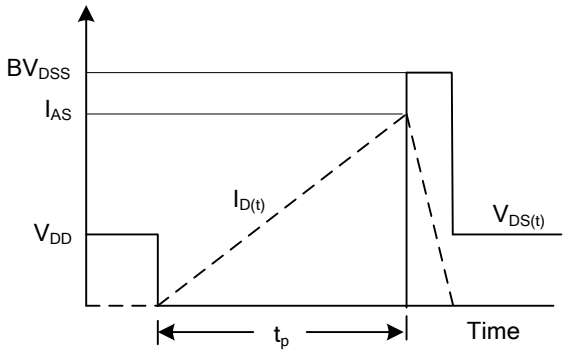
Gate Charge Test Circuit



Gate Charge Waveform



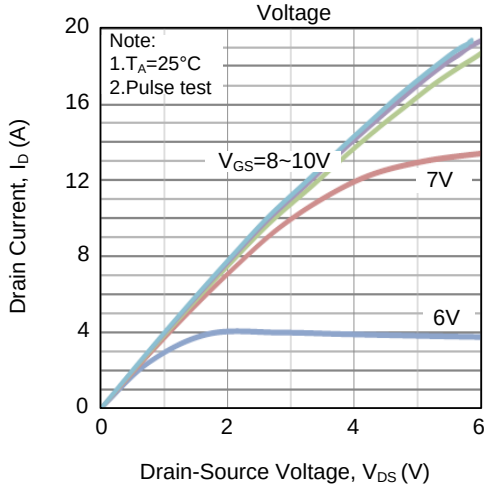
Unclamped Inductive Switching Test Circuit



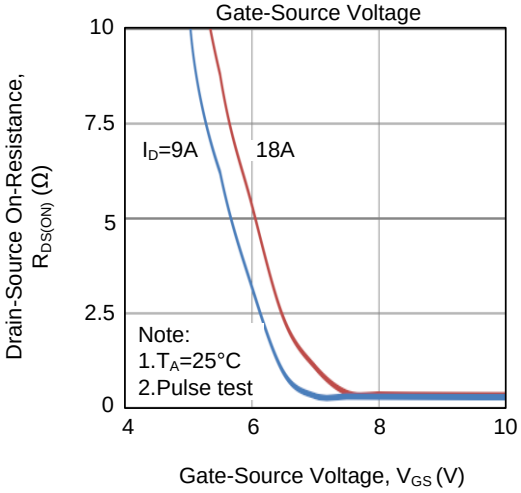
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

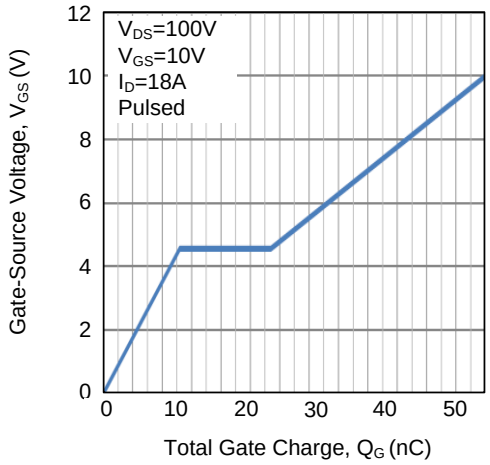
Drain Current vs. Drain-Source Voltage



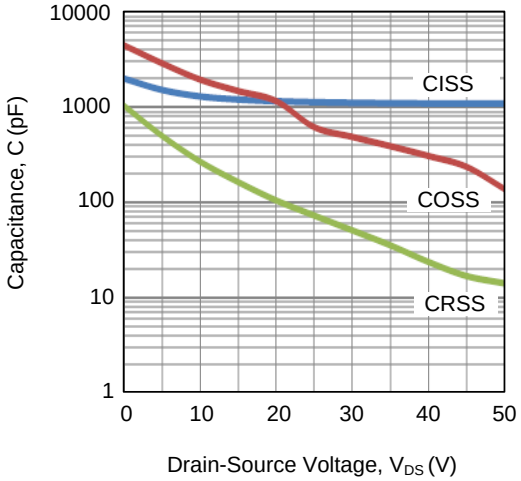
Drain-Source On-Resistance vs. Gate-Source Voltage



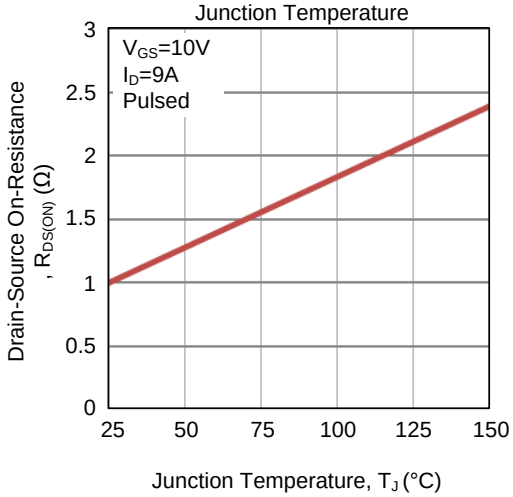
Gate Charge Characteristics



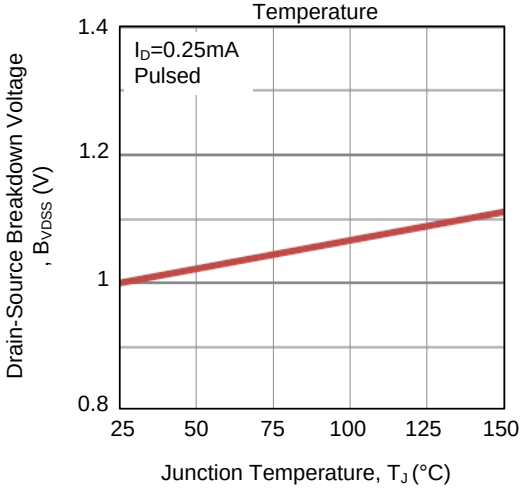
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

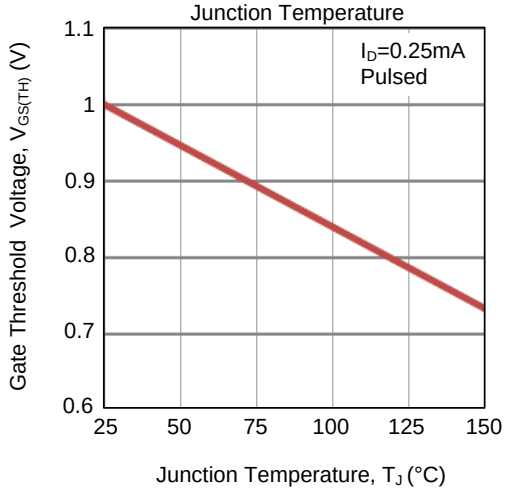


Breakdown Voltage vs. Junction Temperature

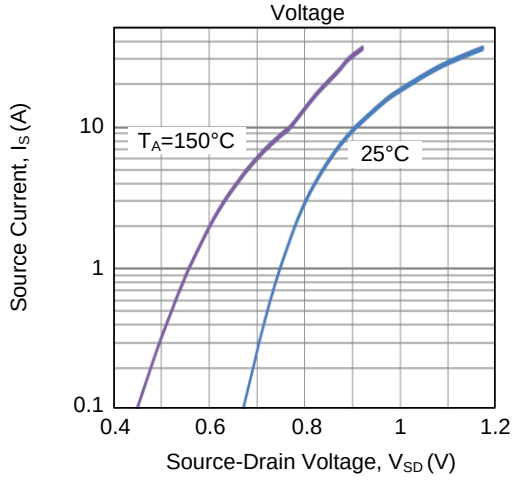


■ TYPICAL CHARACTERISTICS (Cont.)

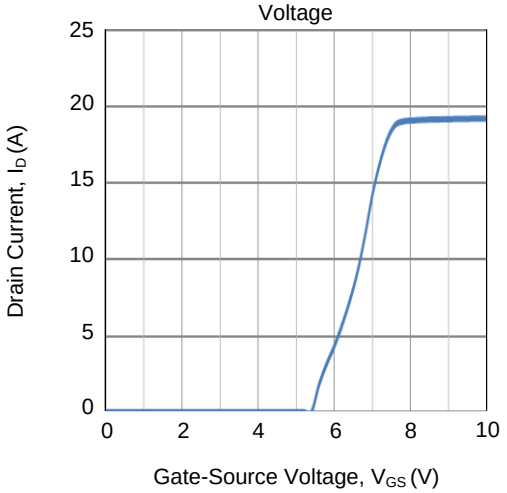
Gate Threshold Voltage vs. Junction Temperature



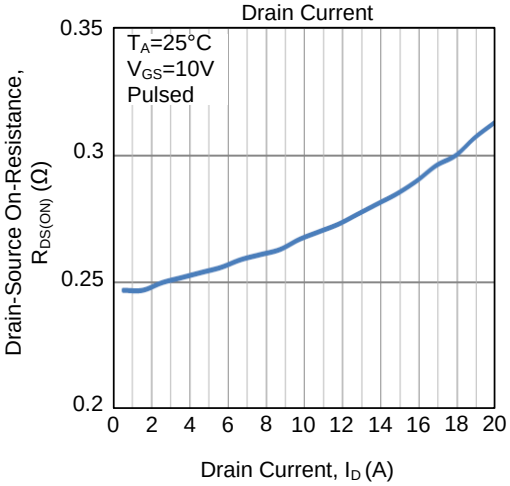
Source Current vs. Source-Drain Voltage



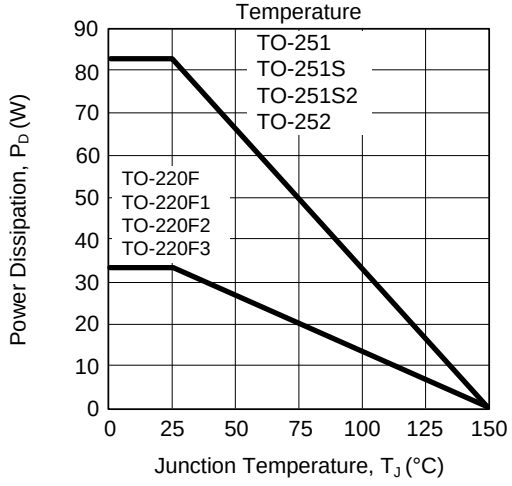
Drain Current vs. Gate-Source Voltage



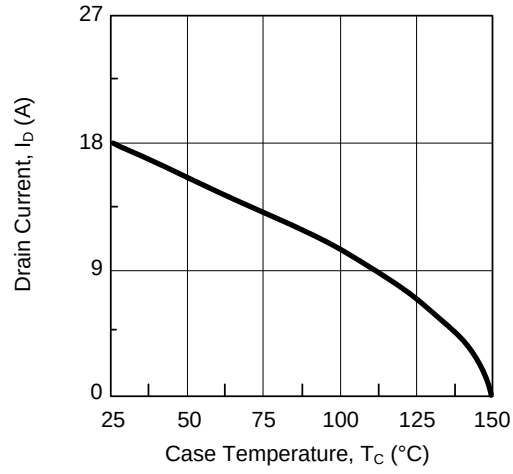
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Case Temperature



■ TYPICAL CHARACTERISTICS (Cont.)