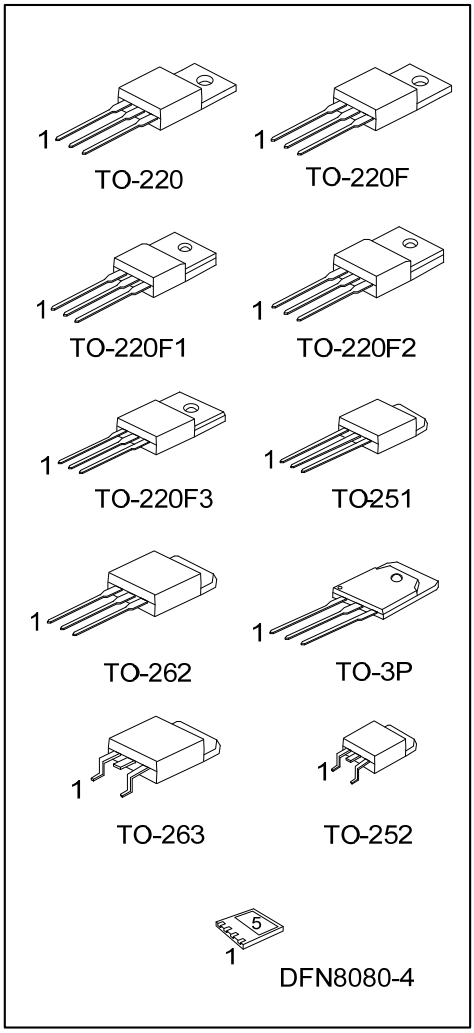
18NM65

Power MOSFET

18A, 650V N-CHANNEL SUPER-JUNCTION MOSFET



■ DESCRIPTION

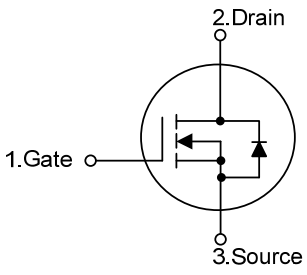
The UTC **18NM65** is a high voltage super junction MOSFET and is designed to have better characteristics.

The UTC **18NM65** Utilizing an advanced charge-balance technology, enhance system efficiency, improve EMI and reliability. such as low gate charge, low on-state resistance and have a high power density and high rugged avalanche characteristics. This super junction MOSFET usually used at AC/DC power conversion, and industrial power applications.

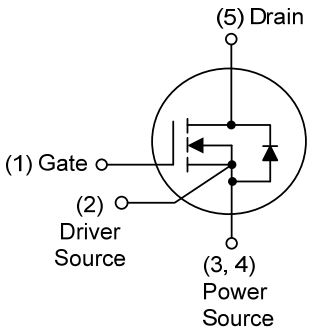
■ FEATURES

* $R_{DS(ON)} \leq 0.28\ \Omega$ @ V_{GS}=10V, I_D=9.0A
* Fast Switching Capability
* Avalanche Energy Specified
* Improved dv/dt Capability, High Ruggedness

■ SYMBOL



TO-220 / TO-220F / TO-220F1
TO-220F2 / TO-220F3 / TO-251
TO-252 / TO-262/TO-263 / TO-3P

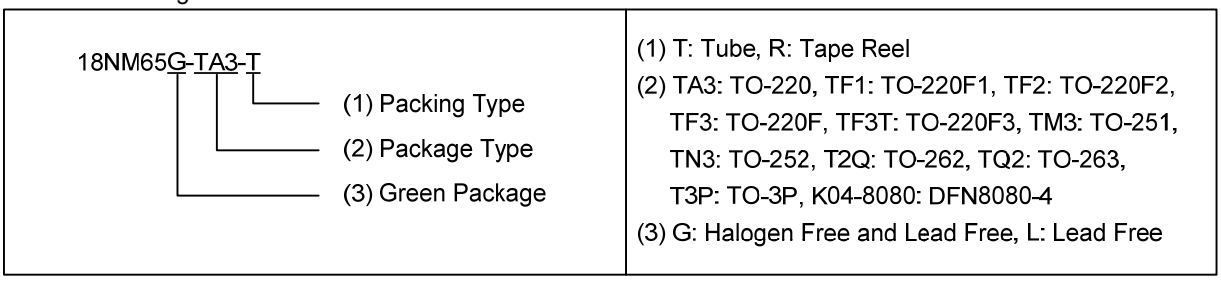


DFN8080-4

■ ORDERING INFORMATION

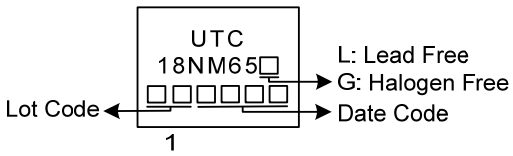
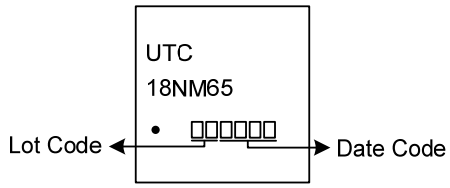
Ordering Number		Package	Pin Assignment					Packing
Lead Free	Halogen Free		1	2	3	4	5	
18NM65L-TA3-T	18NM65G-TA3-T	TO-220	G	D	S	-	-	Tube
18NM65L-TF1-T	18NM65G-TF1-T	TO-220F1	G	D	S	-	-	Tube
18NM65L-TF2-T	18NM65G-TF2-T	TO-220F2	G	D	S	-	-	Tube
18NM65L-TF3-T	18NM65G-TF3-T	TO-220F	G	D	S	-	-	Tube
18NM65L-TF3T-T	18NM65G-TF3T-T	TO-220F3	G	D	S	-	-	Tube
18NM65L-TM3-T	18NM65G-TM3-T	TO-251	G	D	S	-	-	Tube
18NM65L-TN3-R	18NM65G-TN3-R	TO-252	G	D	S	-	-	Tape Reel
18NM65L-T2Q-T	18NM65G-T2Q-T	TO-262	G	D	S	-	-	Tube
18NM65L-TQ2-T	18NM65G-TQ2-T	TO-263	G	D	S	-	-	Tube
18NM65L-TQ2-R	18NM65G-TQ2-R	TO-263	G	D	S	-	-	Tape Reel
18NM65L-T3P-T	18NM65G-T3P-T	TO-3P	G	D	S	-	-	Tube
18NM65L-K04-8080-R	18NM65G-K04-8080-R	DFN8080-4	G	S	S	S	D	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, TF3T: TO-220F3, TM3: TO-251, TN3: TO-252, T2Q: TO-262, TQ2: TO-263, T3P: TO-3P, K04-8080: DFN8080-4
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

TO-220 / TO-220F / TO-220F1 TO-220F2 / TO-220F3 / TO-251 TO-252 / TO-262/TO-263 / TO-3P	DFN8080-4
	

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	650	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	Continuous	I_D	18	A
	Pulsed (Note 2)	I_{DM}	36	A
Avalanche Current (Note 2)		I_{AR}	2.9	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	151	mJ
	Repetitive	E_{AR}	0.44	mJ
Drain Source Voltage Slope		dv/dt	12.9	V/ns
Peak Diode Recovery dv/dt (Note 4)			6.0	V/ns
Power Dissipation	TO-220/TO-262/TO-263	P_D	104	W
	TO-220F/TO-220F1 TO-220F2/TO-220F3		33	W
	TO-251/TO-252		83	W
	TO-3P		200	W
	DFN8080-4		62	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} = 5.5A, V_{DD} = 50V, R_G = 25 Ω, 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	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2 TO-220F3/TO-262 TO-263	θ_{JA}	62.5	°C/W
	TO-251/TO-252		110	°C/W
	TO-3P		40	°C/W
	DFN8080-4		35	°C/W
Junction to Case	TO-220/TO-262/TO-263	θ_{JC}	1.2	°C/W
	TO-220F/TO-220F1 TO-220F2/TO-220F3		3.78	°C/W
	TO-251/TO-252		1.5 (Note)	°C/W
	TO-3P		0.625	°C/W
	DFN8080-4		2	°C/W

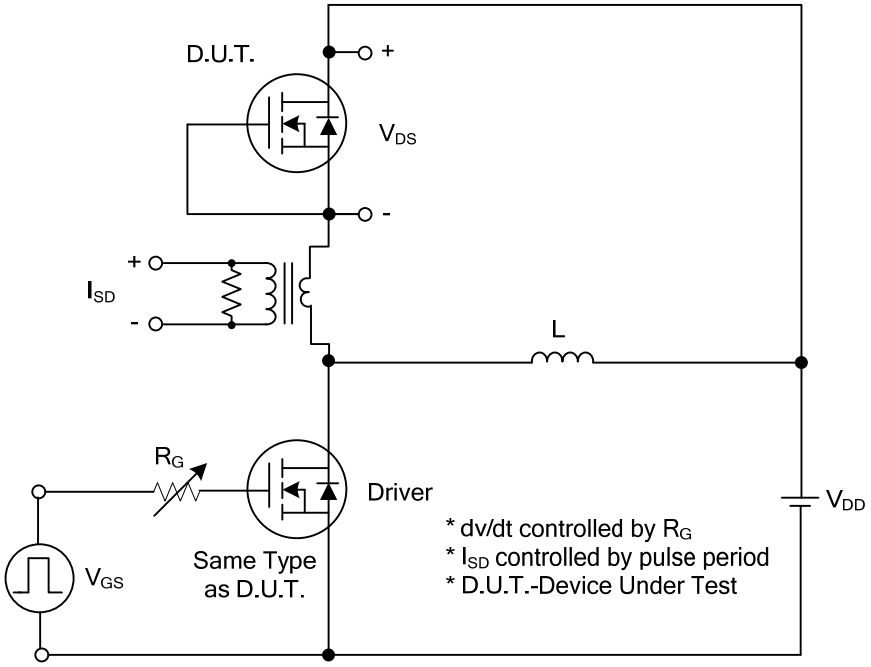
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

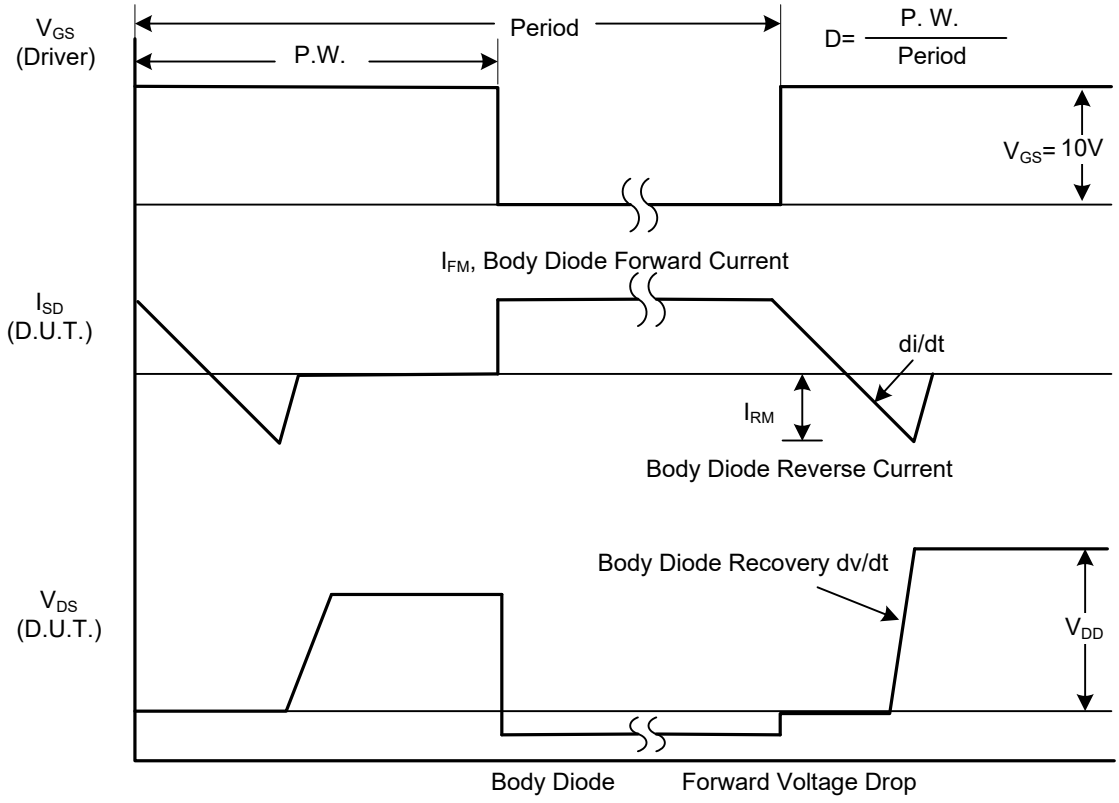
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	650			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V			10	μA
Gate-Body Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±30V			±100	nA
ON CHARACTERISTICS						
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		0.23	0.28	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=50V, f=1.0MHz		1115		pF
Output Capacitance	C_{OSS}			134		pF
Reverse Transfer Capacitance	C_{RSS}			4.9		pF
Gate Resistance	R_G	f =1MHz, Open Drain			5	Ω
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q_G	V_{DS}=520V, V_{GS}=10V, I_D=18A, I_G=1mA (Note 1, 2)		44		nC
Gate Source Charge	Q_{GS}			13		nC
Gate Drain Charge	Q_{GD}			17		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)		18		ns
Turn-ON Rise Time	t_R			25		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			50		ns
Turn-OFF Fall-Time	t_F			76		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				18	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				36	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	I_F=I_S ,V_{GS}=0V			1.5	V
Reverse Recovery Time (Note 1)	t_{rr}	I_S=18A, V_{GS}=0V, dI_F/dt=100A/μs		420		ns
Reverse Recovery Charge	Q_{rr}			7.0		μC

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

■ TEST CIRCUITS AND WAVEFORMS

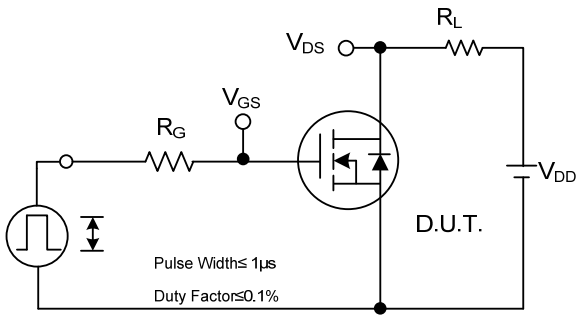


Peak Diode Recovery dv/dt Test Circuit

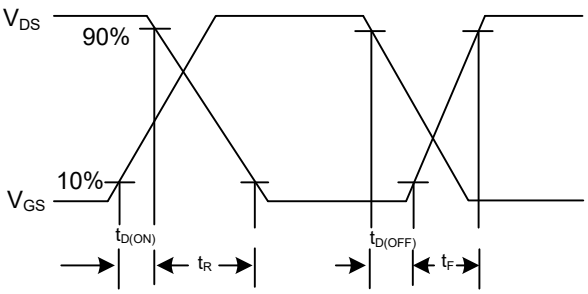


Peak Diode Recovery dv/dt Waveforms

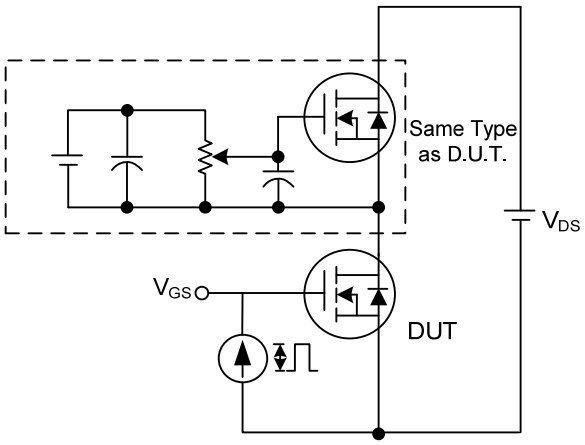
■ TEST CIRCUITS AND WAVEFORMS



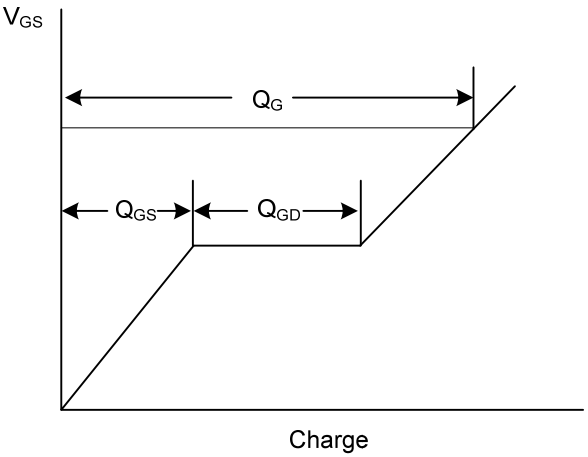
Switching Test Circuit



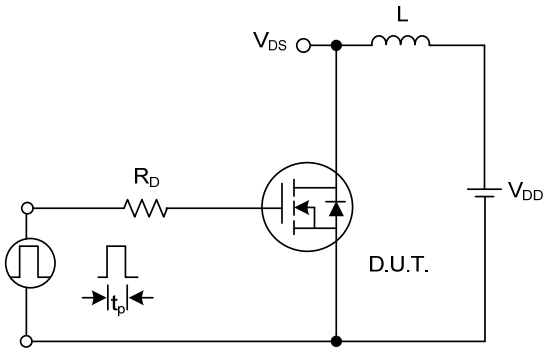
Switching Waveforms



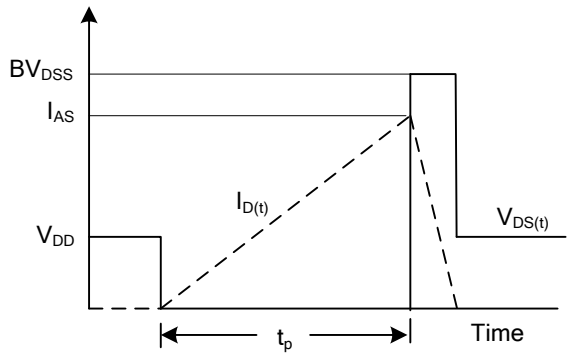
Gate Charge Test Circuit



Gate Charge Waveform



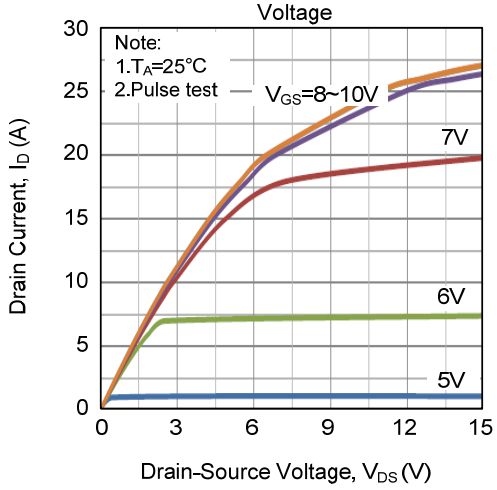
Unclamped Inductive Switching Test Circuit



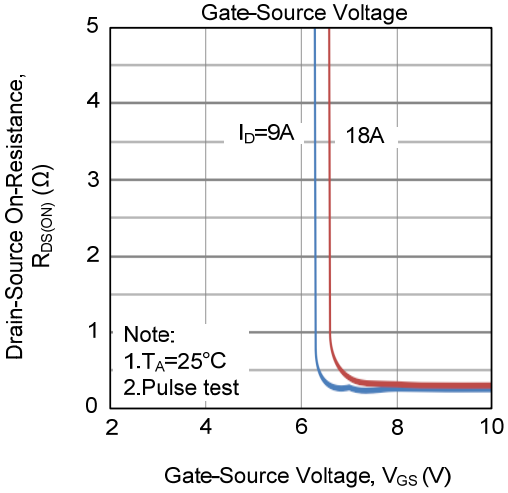
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

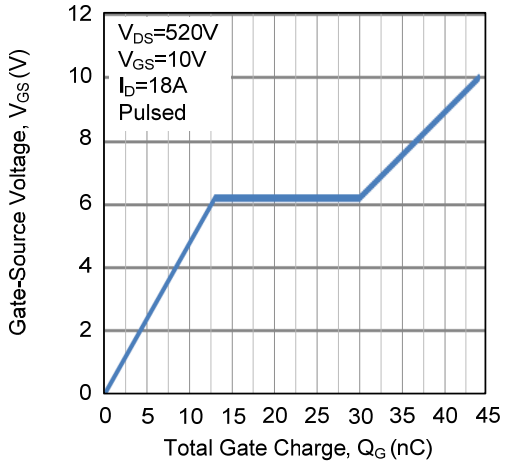
Drain Current vs. Drain-Source Voltage



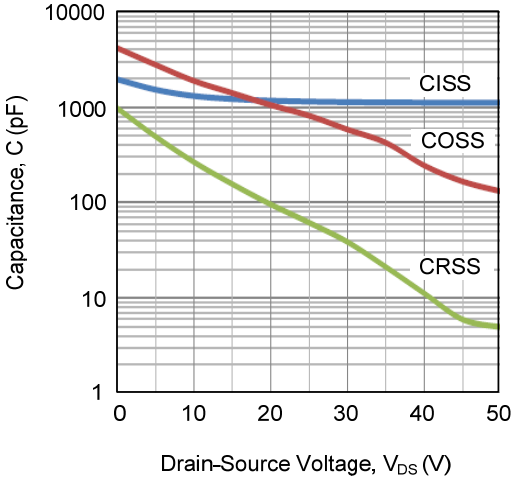
Drain-Source On-Resistance vs. Gate-Source Voltage



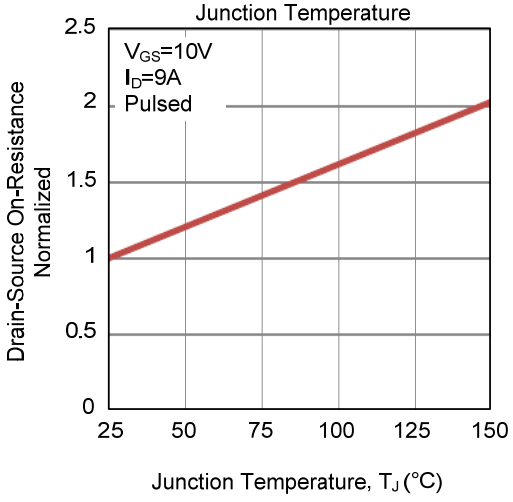
Gate Charge Characteristics



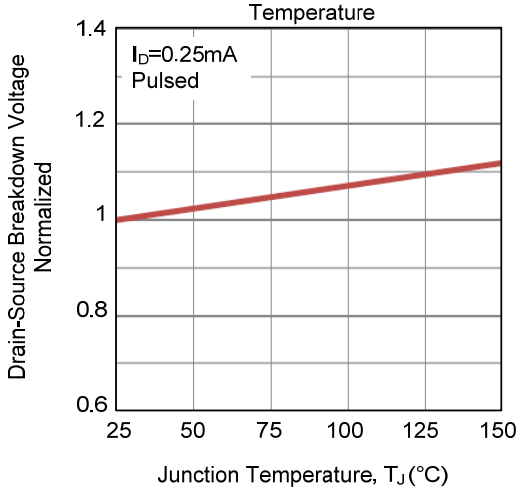
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

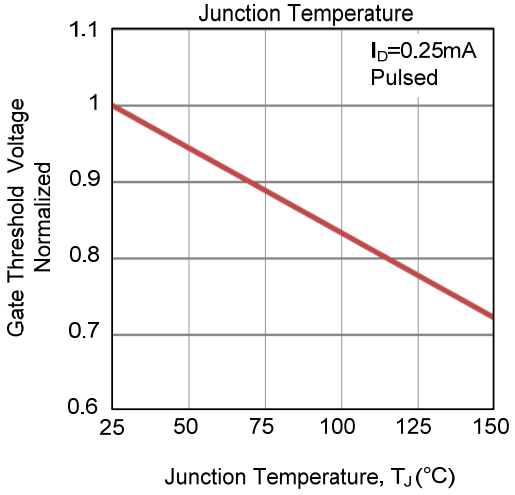


Breakdown Voltage vs. Junction Temperature

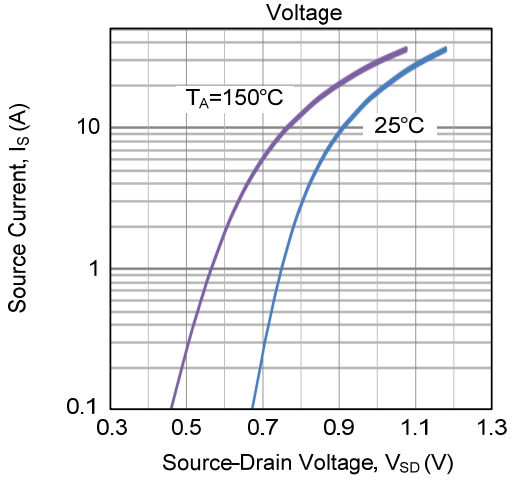


■ TYPICAL CHARACTERISTICS (Cont.)

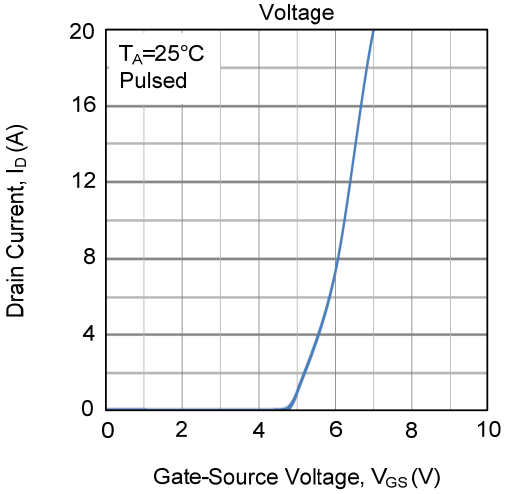
Gate Threshold Voltage vs. Junction Temperature



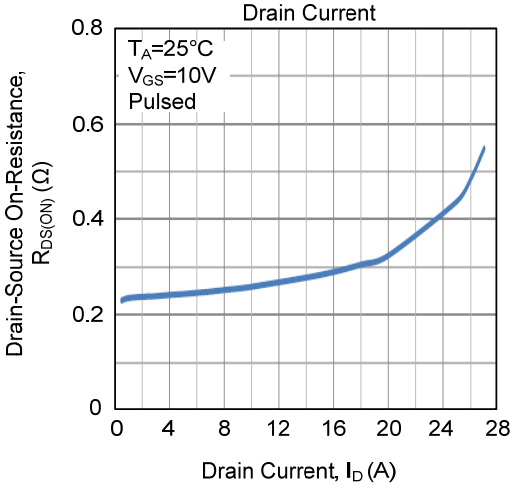
Source Current vs. Source-Drain Voltage



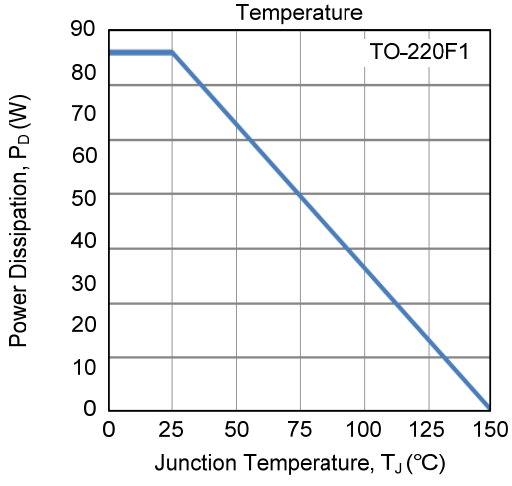
Drain Current vs. Gate-Source Voltage



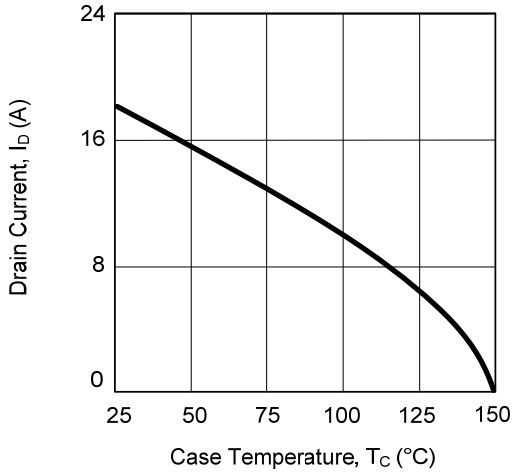
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Case Temperature



■ TYPICAL CHARACTERISTICS (Cont.)