



7NM65-Q

Power MOSFET

7A, 650V N-CHANNEL SUPER-JUNCTION MOSFET

DESCRIPTION

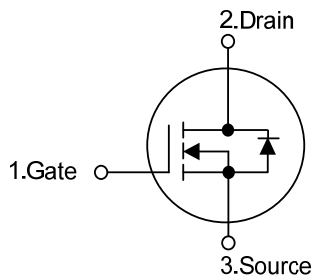
The **UTC 7NM65-Q** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics.

This power MOSFET is usually used at DC-DC, AC-DC converters for power applications.

FEATURES

- * $R_{DS(ON)} < 1.1\Omega$ @ $V_{GS} = 10V$, $I_D = 3.5A$
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

SYMBOL

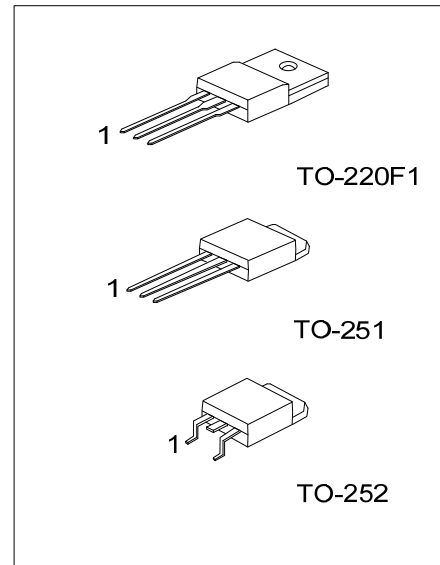


ORDERING INFORMATION

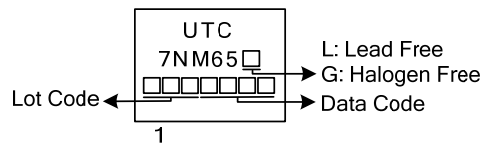
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7NM65L-TF1-T	7NM65G-TF1-T	TO-220F1	G	D	S	Tube
7NM65L-TM3-T	7NM65G-TM3-T	TO-251	G	D	S	Tube
7NM65L-TN3-R	7NM65G-TN3-R	TO-252	G	D	S	Tape Reel

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

7NM65L-TF1-T	(1)Packing Type	(1) T: Tube, R: Tape Reel
	(2)Package Type	(2) TF1: TO-220F1, TM3: TO-251, TN3: TO-252
	(3)Green Package	(3) L: Lead Free, G: Halogen Free and Lead Free



■ MARKING



■ ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	± 30	V
Drain Current	Continuous	I_D	7.0	A
	Pulsed (Note 2)	I_{DM}	28	A
Avalanche Current (Note 2)		I_{AR}	1.1	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	87	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.45	V/ns
Power Dissipation	TO-220F1	P_D	48	W
	TO-251/TO-252		59	W
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

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. $L=144\text{mH}$, $I_{AS}=1.1\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD}\leq 7.0\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F1	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		110	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220F1	θ_{JC}	2.6	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		2.12	$^\circ\text{C}/\text{W}$

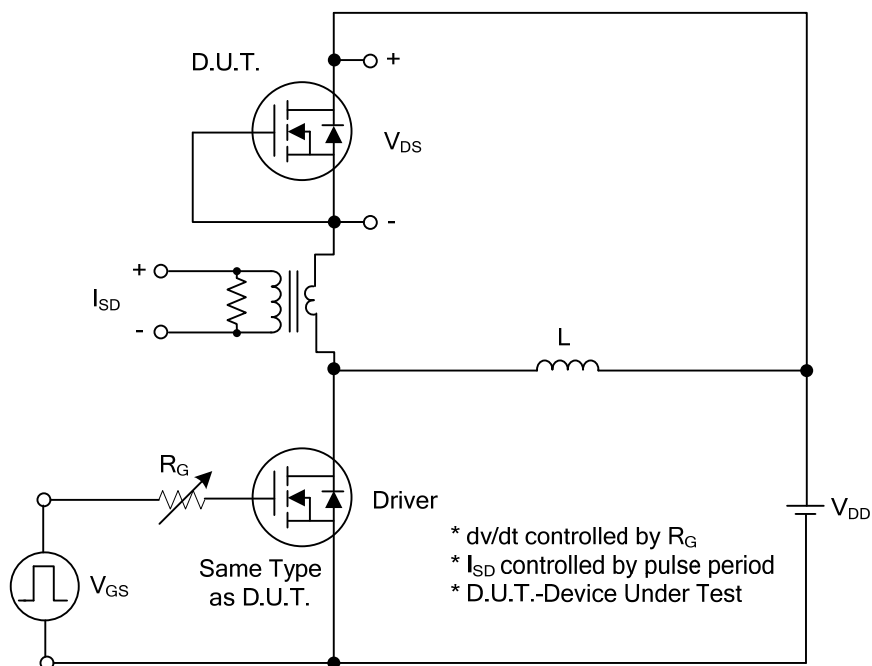
■ ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	650			V
Drain-Source Leakage Current		I_{DSS}	$V_{DS} = 650V, V_{GS} = 0V$			10	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 Threold Voltage		$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.5		4.5	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 3.5A$			1.1	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	$V_{GS} = 0V, V_{DS} = 25V, f = 1MHz$		330		pF
Output Capacitance		C_{OSS}			165		pF
Reverse Transfer Capacitance		C_{RSS}			20		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)		Q_G	$V_{DS} = 50V, V_{GS} = 10V, I_D = 1.3A$ $I_G = 100\mu A$ (Note 1, 2)		42		nC
Gate to Source Charge		Q_{GS}			4		nC
Gate to Drain Charge		Q_{GD}			12		nC
Turn-on Delay Time (Note 1)		$t_{D(ON)}$	$V_{DD} = 30V, V_{GS} = 10V, I_D = 0.5A,$ $R_G = 25\Omega$ (Note 1, 2)		40		ns
Rise Time		t_R			70		ns
Turn-off Delay Time		$t_{D(OFF)}$			140		ns
Fall-Time		t_F			38		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				7.0	A
Maximum Body-Diode Pulsed Current		I_{SM}				28	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	$I_S = 7.0A, V_{GS} = 0V$			1.4	V
Reverse Recovery Time (Note 1)		t_{rr}	$I_S = 7.0A, V_{GS} = 0V$		310		nS
Reverse Recovery Charge		Q_{rr}	$dI/dt = 100A/\mu s$		2.9		μC

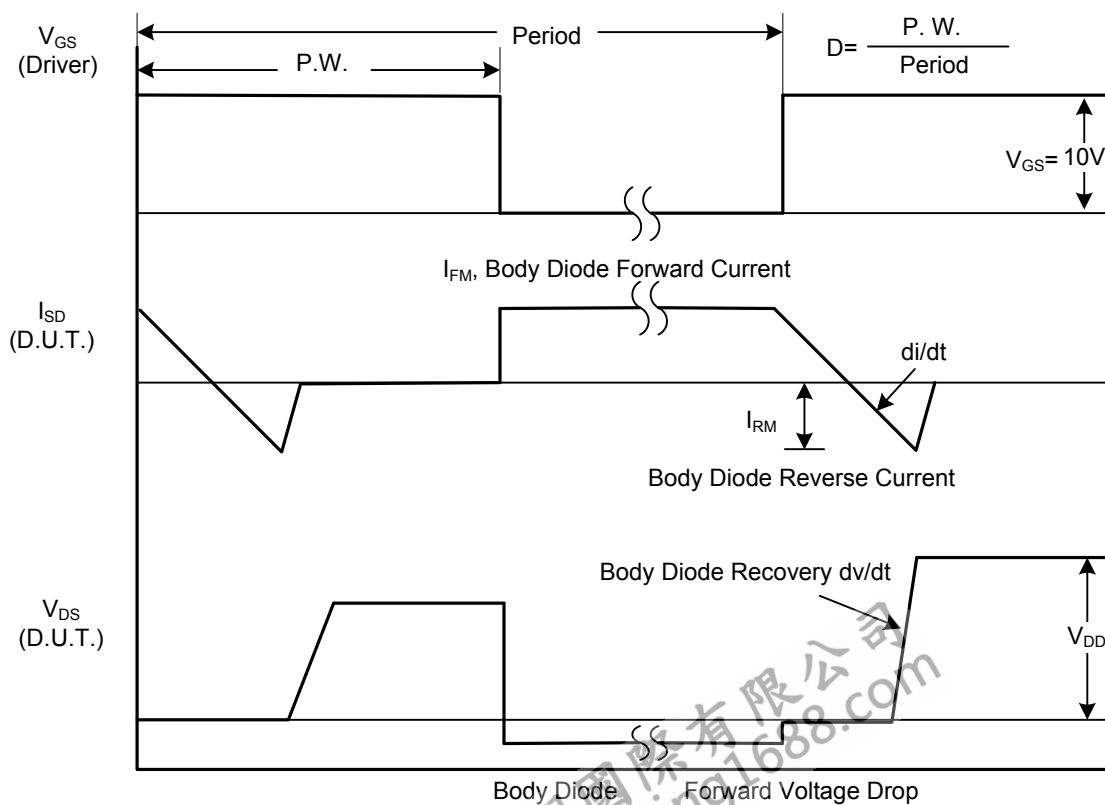
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

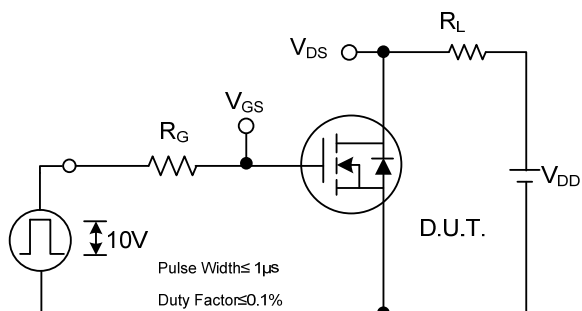


Peak Diode Recovery dv/dt Test Circuit

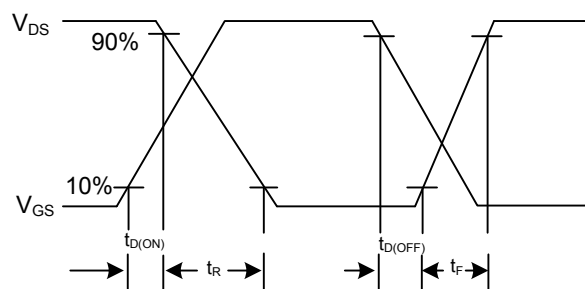


Peak Diode Recovery dv/dt Waveforms

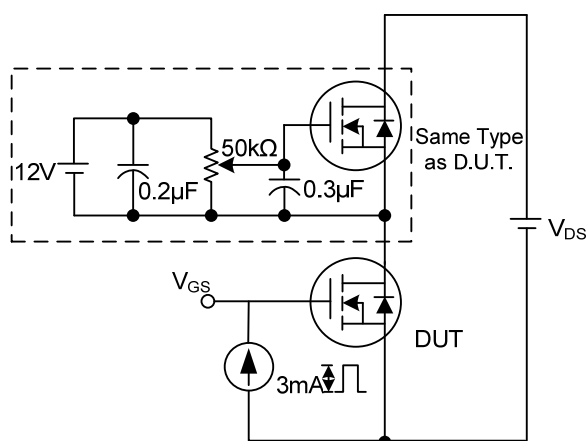
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



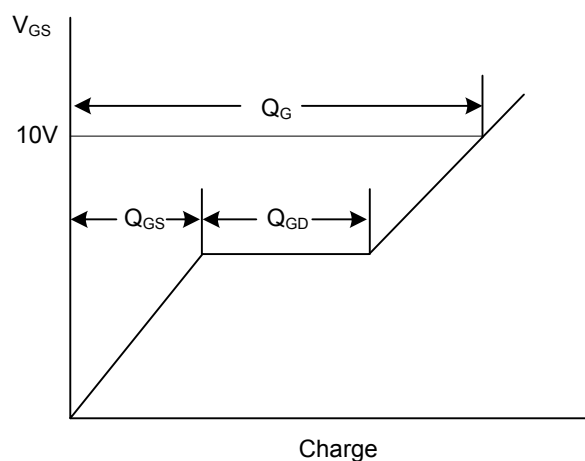
Switching Test Circuit



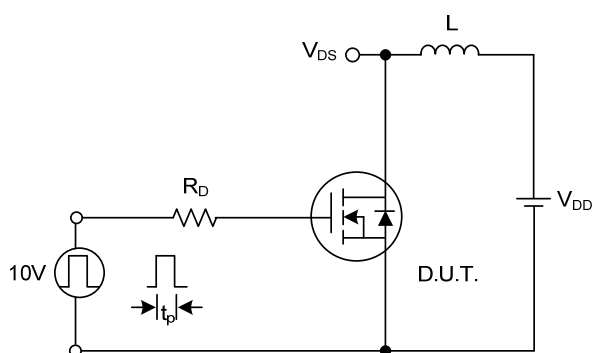
Switching Waveforms



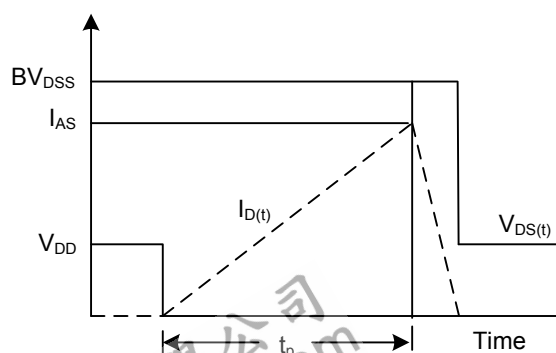
Gate Charge Test Circuit



Gate Charge Waveform

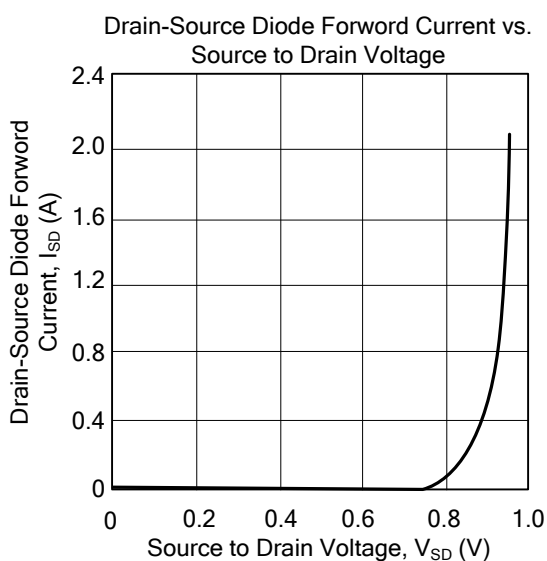
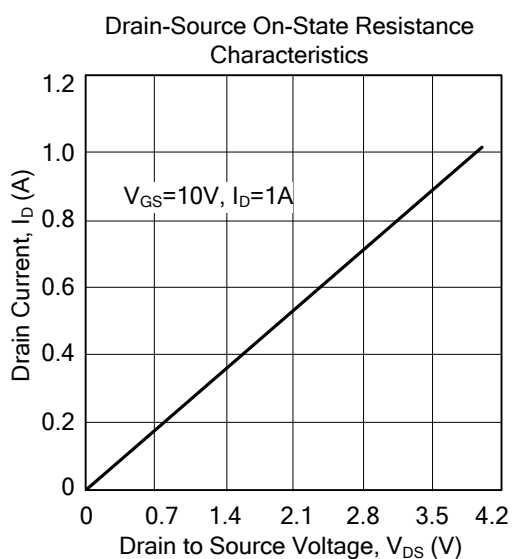
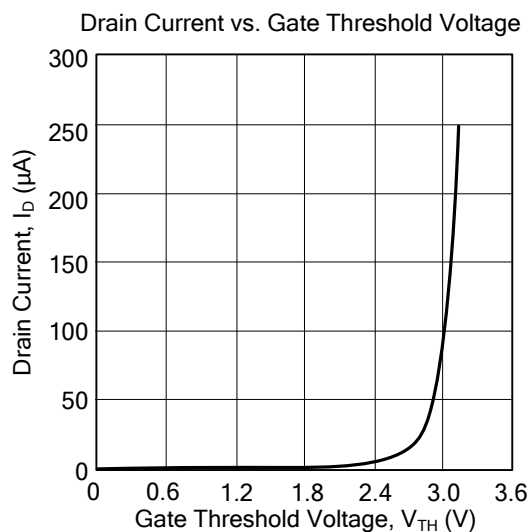
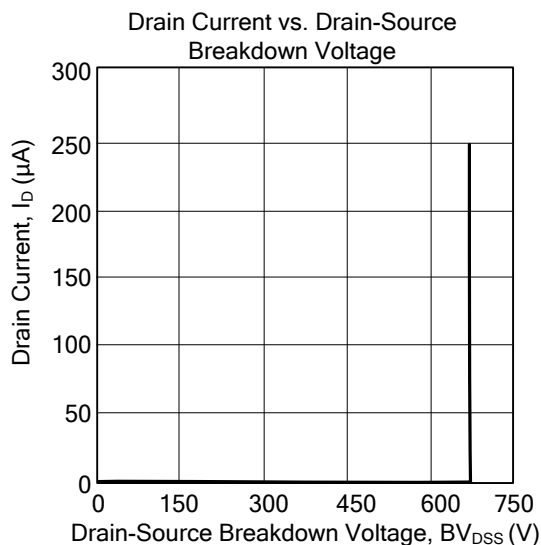


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.