



# 7NM65

**Power MOSFET**

## 7.0A, 650V N-CHANNEL SUPER-JUNCTION MOSFET

■ DESCRIPTION

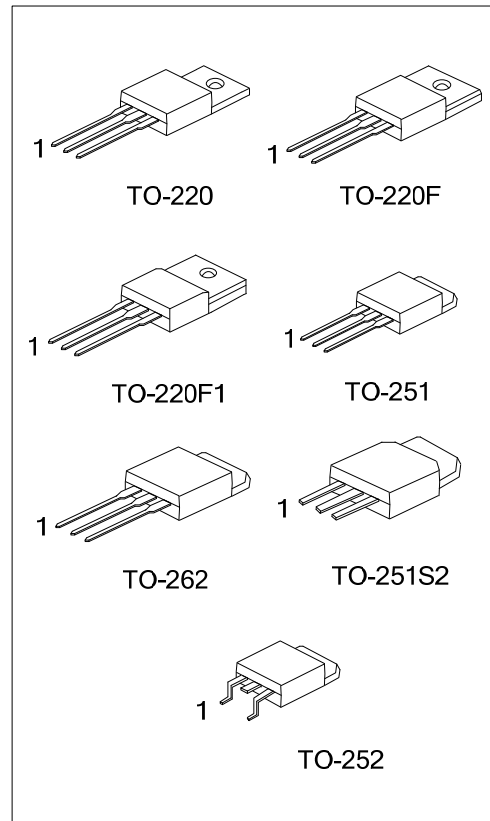
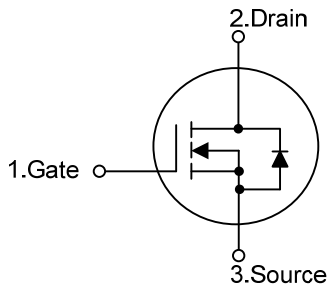
The UTC **7NM65** is a Super Junction MOSFET Structure. It uses UTC advanced planar stripe, DMOS technology to provide customers perfect switching performance, minimal on-state resistance.

The UTC **7NM65** is universally applied in electronic lamp ballasts based on half bridge topology, high efficiency switched mode power supplies, active power factor correction, etc.

■ FEATURES

- \*  $R_{DS(ON)} < 0.9\Omega @ V_{GS} = 10V, I_D = 3.5A$
- \* Fast switching capability
- \* Avalanche energy tested
- \* Improved dv/dt capability, high ruggedness

■ SYMBOL



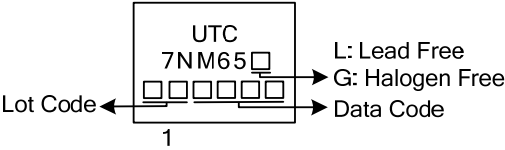
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7NM65L-TA3-T	7NM65G-TA3-T	TO-220	G	D	S	Tube
7NM65L-TF3-T	7NM65G-TF3-T	TO-220F	G	D	S	Tube
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-TMS2-T	7NM65G-TMS2-T	TO-251S2	G	D	S	Tube
7NM65L-TN3-R	7NM65G-TN3-R	TO-252	G	D	S	Tape Reel
7NM65L-T2Q-T	7NM65G-T2Q-T	TO-262	G	D	S	Tube

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

<p>7NM65L-TA3-T</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF3: TO-220F TM3: TO-251, TMS2: TO-251S2, TN3: TO-252 TQ2: TO-262 (3) L: Lead Free, G: Halogen Free and Lead Free</p>
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MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	650	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Drain Current	Continuous	$I_D$	7	A
	Pulsed (Note 2)	$I_{DM}$	28	A
Avalanche Current (Note 2)		$I_{AR}$	1.7	A
Avalanche Energy		$E_{AS}$	208	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.0	V/ns
Power Dissipation	TO-220/TO-262	$P_D$	142	W
	TO-220F/TO-220F1		48	W
	TO-251/ TO-251S2		60	W
	TO-252			
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.  $L = 144 \text{ mH}$ ,  $I_{AS} = 1.7\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25 \Omega$ , 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-220/TO-220F TO-220F1/TO-262	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
	TO-251/ TO-251S2 TO-252		110	
	TO-220/TO-262		0.88	
Junction to Case	TO-220F/TO-220F1	$\theta_{JC}$	2.6	$^\circ\text{C}/\text{W}$
	TO-251/ TO-251S2 TO-252		2.08	

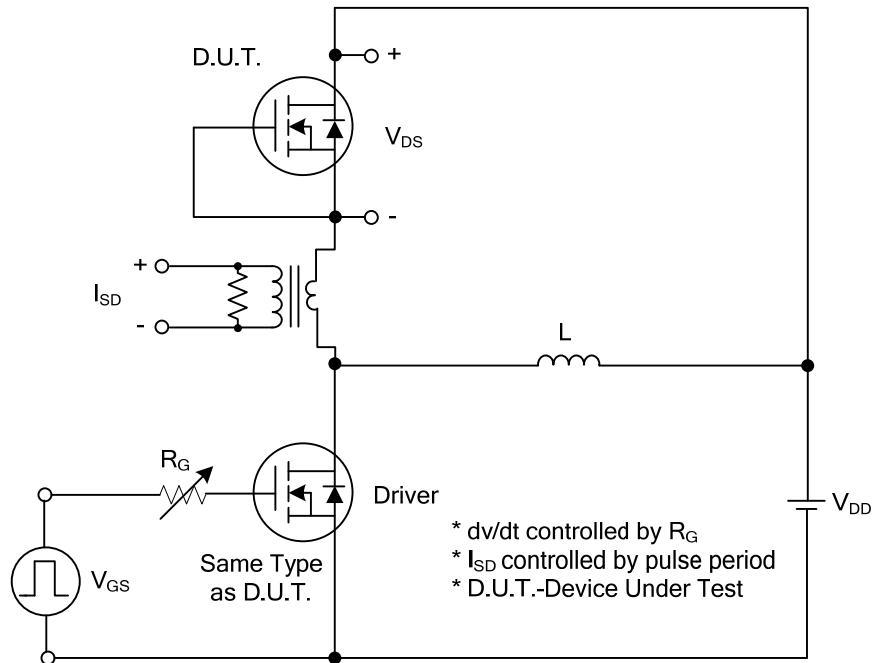
■ ELECTRICAL CHARACTERISTICS ( $T_J=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	650			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS} = 650V, V_{GS} = 0V$			1	$\mu A$
Gate- Source Leakage Current	Forward	$I_{GSS}$			100	nA
	Reverse				-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.5		4.5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 3.5A$			0.9	$\Omega$
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0V, V_{DS}=25V, f=1.0\text{ MHz}$		375		pF
Output Capacitance	$C_{OSS}$			238		pF
Reverse Transfer Capacitance	$C_{RSS}$			26		pF
<b>SWITCHING CHARACTERISTICS</b>						
Total Gate Charge (Note 1)	$Q_G$	$V_{DS}=50V, I_D=1.3A, I_G=100\mu A$ $V_{GS}=10V$ (Note 1, 2)		21		nC
Gate-Source Charge	$Q_{GS}$			5		nC
Gate-Drain Charge	$Q_{GD}$			5.8		nC
Turn-On Delay Time (Note 1)	$t_{D(ON)}$	$V_{DD}=30V, I_D=0.5A,$ $R_G=25\Omega$ (Note 1, 2)		50		ns
Turn-On Rise Time	$t_R$			95		ns
Turn-Off Delay Time	$t_{D(OFF)}$			160		ns
Turn-Off Fall Time	$t_F$			85		ns
<b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b>						
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				7	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				28	A
Drain-Source Diode Forward Voltage (Note 1)	$V_{SD}$	$V_{GS}=0V, I_S=7.0A$			1.4	V
Body Diode Reverse Recovery Time (Note 1)	$t_{rr}$	$V_{GS}=0V, I_S=7.0A,$ $dI_F/dt=100A/\mu s$		300		nS
Body Diode Reverse Recovery Charge	$Q_{rr}$			3		$\mu C$

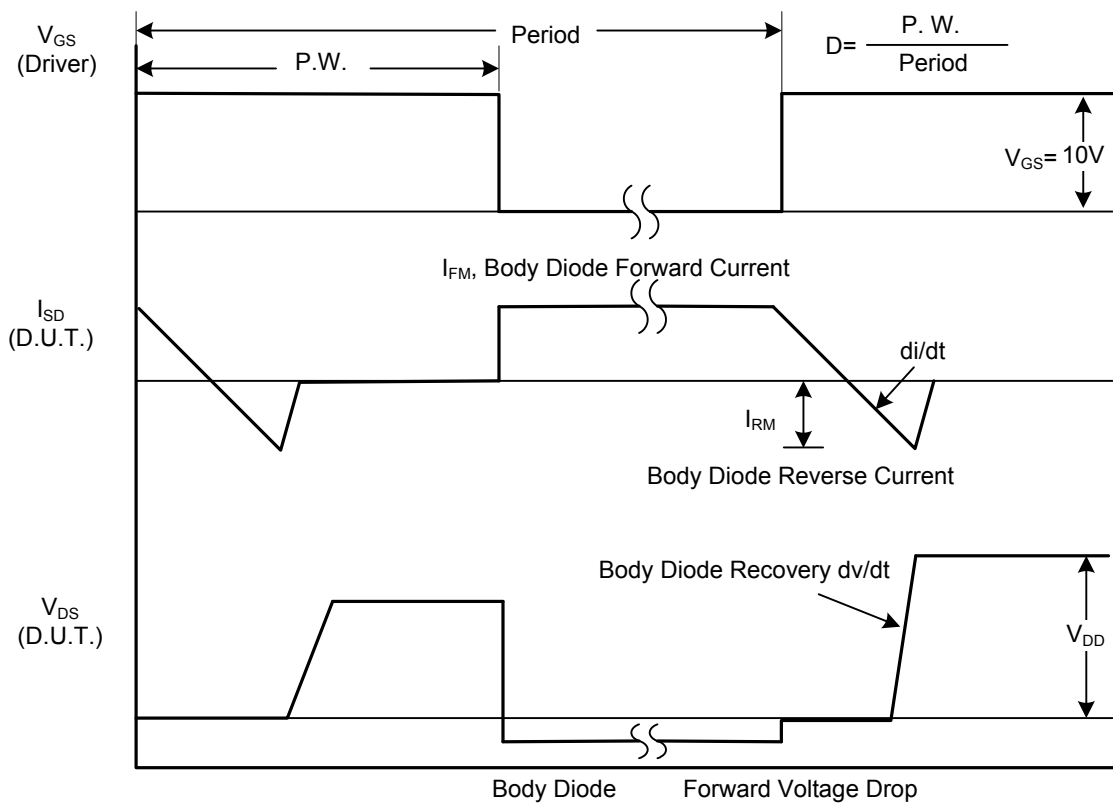
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$ , Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

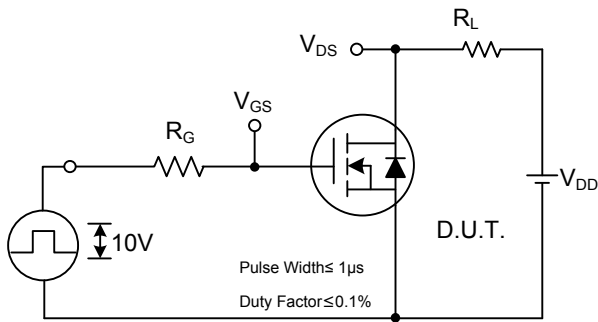


Peak Diode Recovery dv/dt Test Circuit

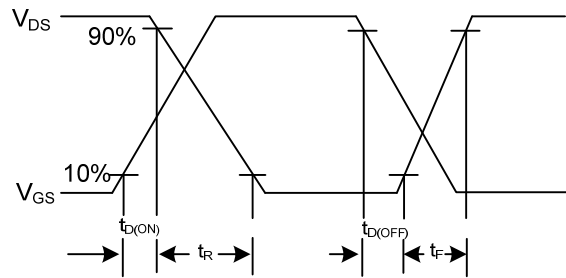


Peak Diode Recovery dv/dt Waveforms

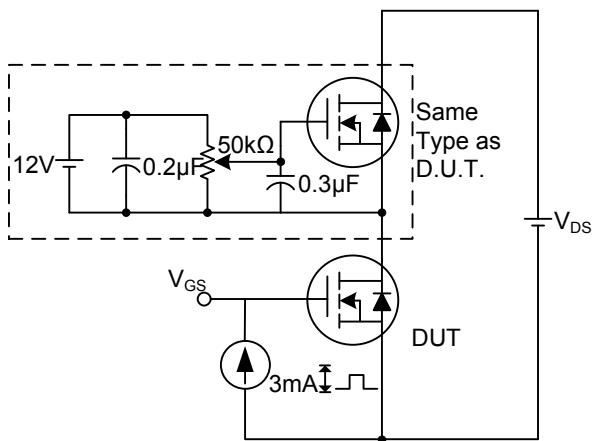
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



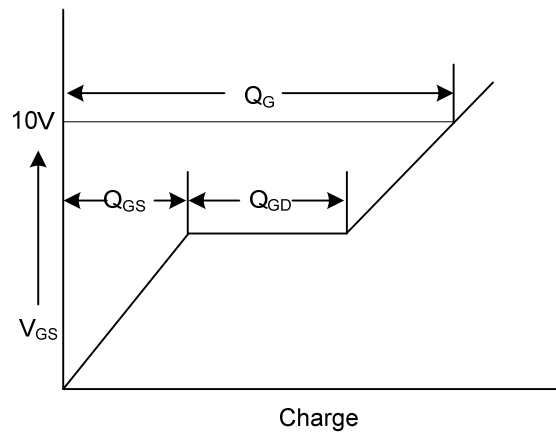
Switching Test Circuit



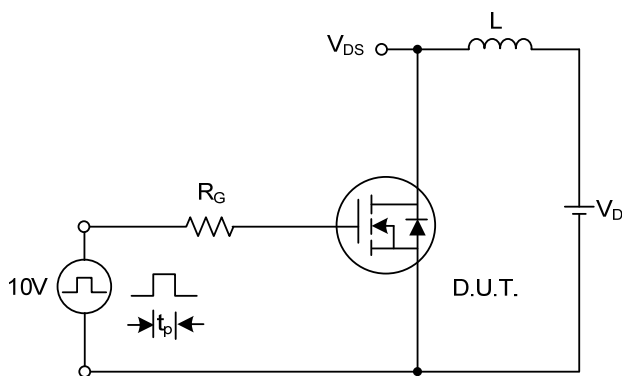
Switching Waveforms



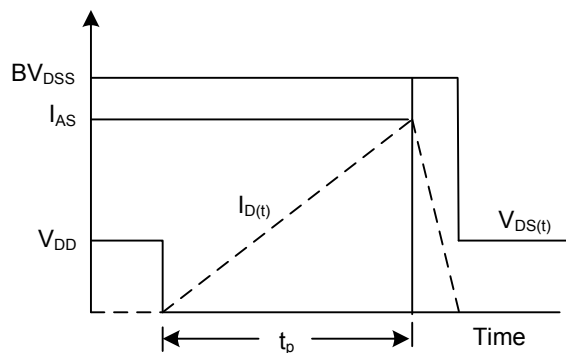
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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