

6NM65-Q

Power MOSFET

6A, 650V N-CHANNEL
SUPER-JUNCTION MOSFET

■ DESCRIPTION

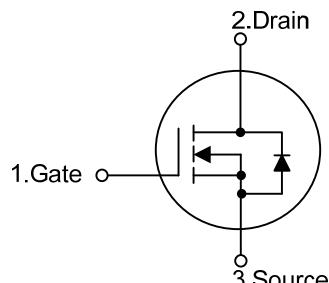
The UTC **6NM65-Q** is a Super Junction MOSFET Structure. It uses UTC advanced planar stripe, DMOS technology to provide customers perfect switching performance, minimal on-state resistance.

The UTC **6NM65-Q** is universally applied in electronic lamp ballasts based on half bridge topology, high efficiency switched mode power supplies, active power factor correction, etc.

■ FEATURES

- * $R_{DS(on)} < 1.2 \Omega$ @ $V_{GS}=10V$, $I_D=3.0A$
- * Improved dv/dt capability
- * Fast switching
- * 100% avalanche tested

■ SYMBOL



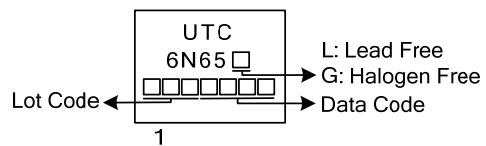
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6NM65L-TA3-T	6NM65G-TA3-T	TO-220	G	D	S	Tube
6NM65L-TF1-T	6NM65G-TF1-T	TO-220F1	G	D	S	Tube
6NM65L-TF2-T	6NM65G-TF2-T	TO-220F2	G	D	S	Tube
6NM65L-TF3-T	6NM65G-TF3-T	TO-220F	G	D	S	Tube
6NM65L-TM3-T	6NM65G-TM3-T	TO-251	G	D	S	Tube
6NM65L-TN3-R	6NM65G-TN3-R	TO-252	G	D	S	Tape Reel

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

 (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TM3: TO-251, TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free	

■ MARKING



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■ 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}	± 30	V
Drain Current	Continuous	I_D	6	A
	Pulsed (Note 2)	I_{DM}	24	A
Avalanche Current (Note 2)		I_{AR}	1.6	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	87	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.7	V/ns
Power Dissipation	TO-220	P_D	125	W
	TO-220F/TO-220F1		40	W
	TO-220F2		55	W
	TO-251/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. $L=144\text{mH}$, $I_{AS}=1.6\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 6.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C/W}$
	TO-220F1/TO-220F2		110	$^\circ\text{C/W}$
	TO-251/TO-252			
Junction to Case	TO-220	θ_{JC}	1.0	$^\circ\text{C/W}$
	TO-220F/TO-220F1		3.13	$^\circ\text{C/W}$
	TO-220F2		2.27	$^\circ\text{C/W}$
	TO-251/TO-252			

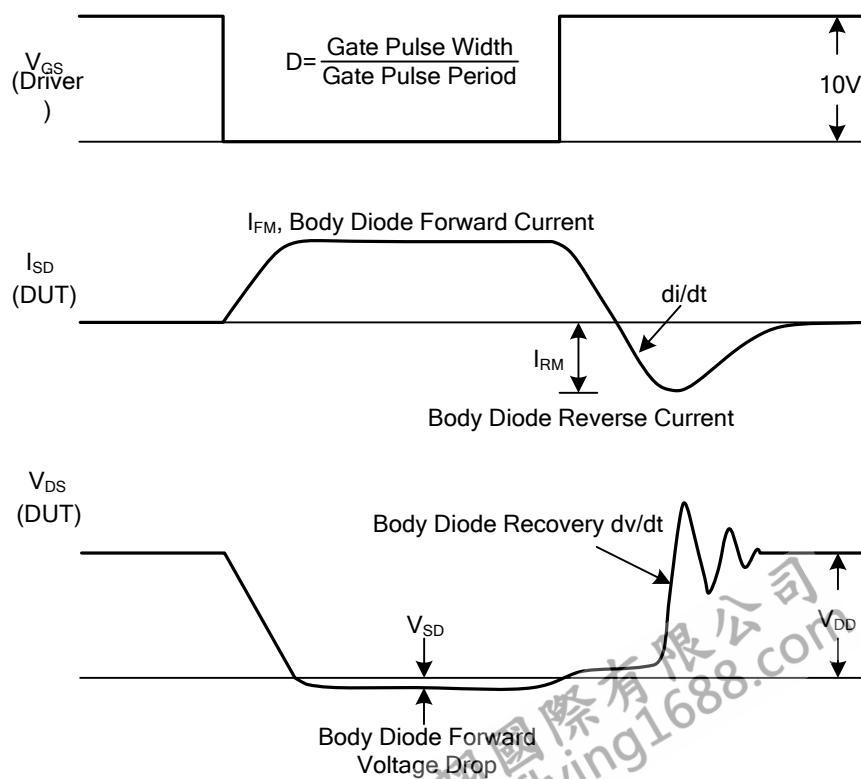
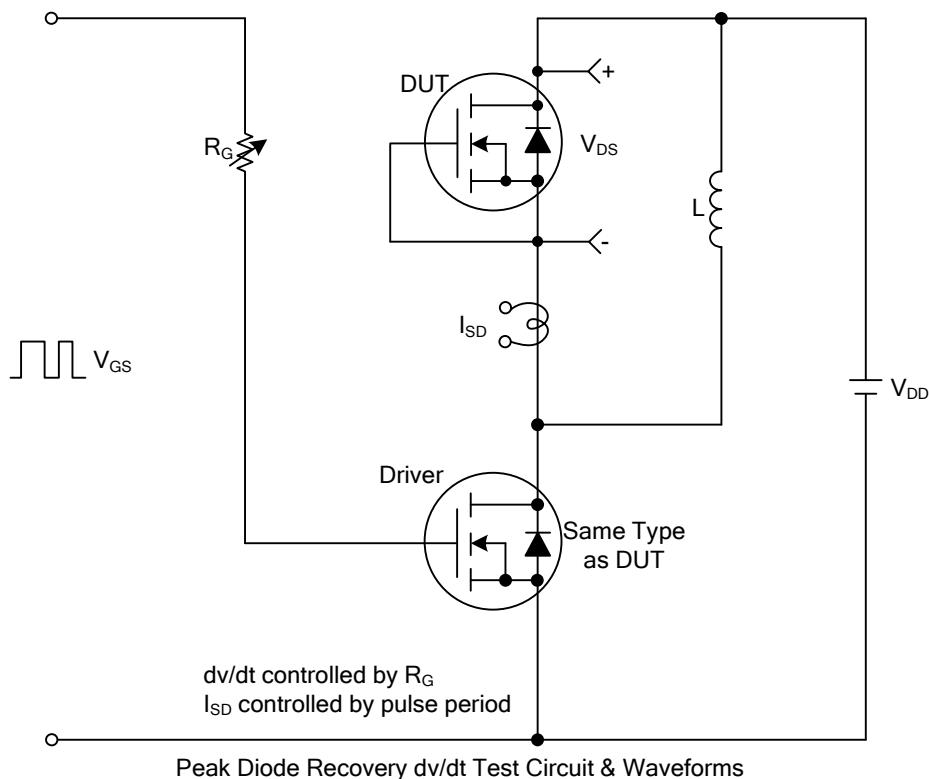
■ ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{\text{GS}} = 0\text{V}, I_{\text{D}} = 250\mu\text{A}$	650			V
Drain-Source Leakage Current	I_{DSS}	$V_{\text{DS}} = 650\text{V}, V_{\text{GS}} = 0\text{V}$		10		μA
Gate-Source Leakage Current	Forward	$V_{\text{GS}} = 30\text{V}, V_{\text{DS}} = 0\text{V}$		100		nA
	Reverse	$V_{\text{GS}} = -30\text{V}, V_{\text{DS}} = 0\text{V}$		-100		nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{\text{GS(TH)}}$	$V_{\text{DS}} = V_{\text{GS}}, I_{\text{D}} = 250\mu\text{A}$	2.5		4.5	V
Static Drain-Source On-State Resistance	$R_{\text{DS(ON)}}$	$V_{\text{GS}} = 10\text{V}, I_{\text{D}} = 3.0\text{A}$			1.2	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{\text{GS}}=0\text{V}, V_{\text{DS}}=25\text{V}, f=1.0\text{MHz}$		330		pF
Output Capacitance	C_{OSS}			190		pF
Reverse Transfer Capacitance	C_{RSS}			20		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q_G	$V_{\text{DS}}=50\text{V}, V_{\text{GS}}=10\text{V}$ $I_{\text{D}}=1.3\text{A}, I_{\text{G}}=100\mu\text{A}$ (Note 1, 2)		42		nC
Gate to Source Charge	Q_{GS}			4.0		nC
Gate to Drain Charge	Q_{GD}			12		nC
Turn-ON Delay Time (Note 1)	$t_{\text{D(ON)}}$			50		nS
Rise Time	t_R			130		nS
Turn-OFF Delay Time	$t_{\text{D(OFF)}}$			270		nS
Fall-Time	t_F			90		nS
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Maximum Body-Diode Continuous Current	I_S				6	A
Maximum Body-Diode Pulsed Current	I_{SM}				24	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_S=6.0\text{A}, V_{\text{GS}}=0\text{V}$			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t_{rr}	$I_S=6.0\text{A}, V_{\text{GS}}=0\text{V},$ $dI_F/dt=100\text{A}/\mu\text{s}$		430		nS
Body Diode Reverse Recovery Charge	Q_{rr}			3.91		μC

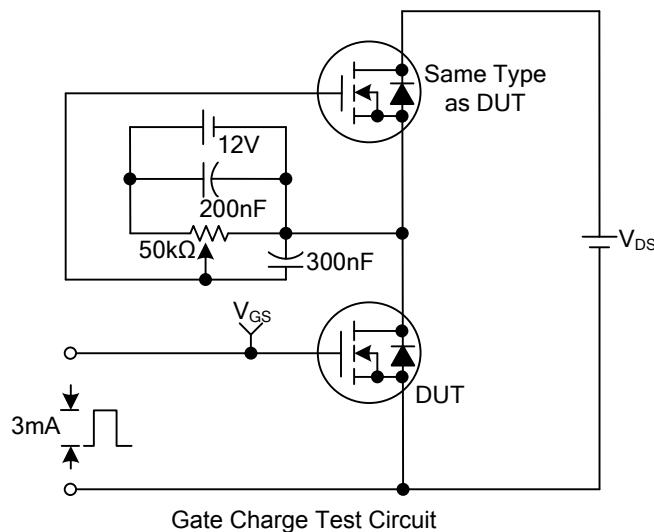
Notes: 1. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

2. Essentially independent of operating ambient temperature

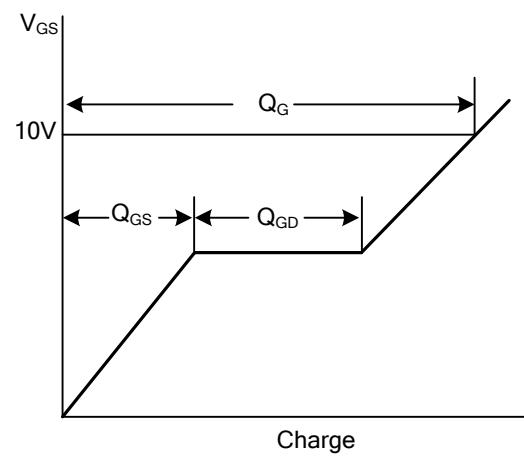
■ TEST CIRCUITS AND WAVEFORMS



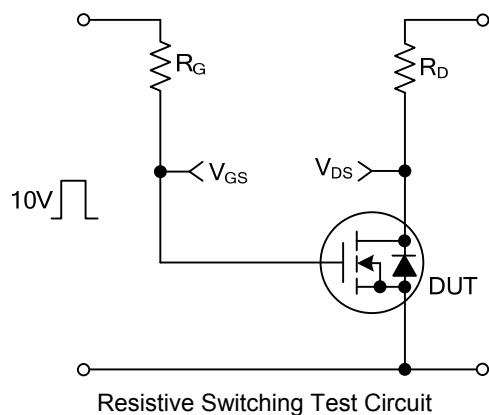
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



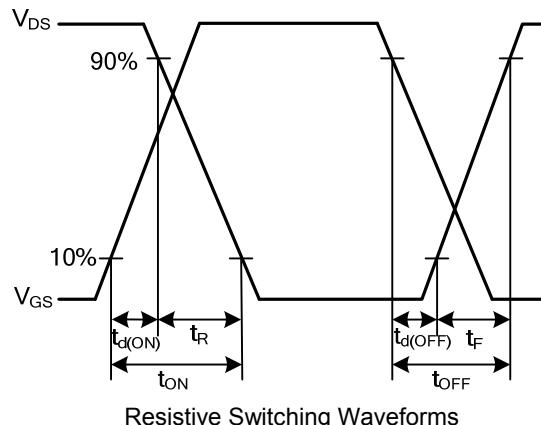
Gate Charge Test Circuit



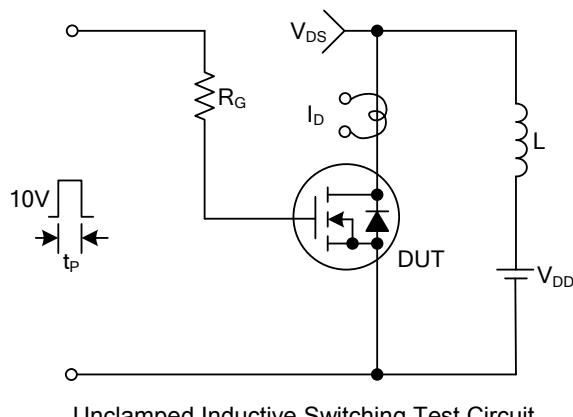
Gate Charge Waveforms



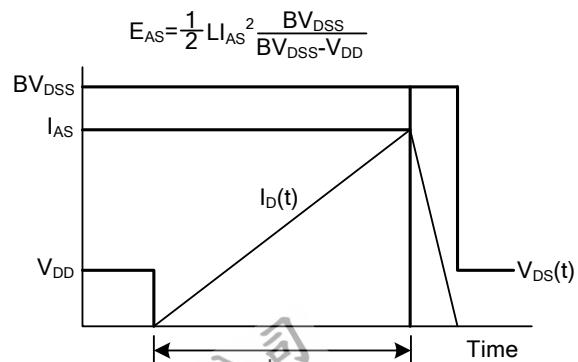
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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