



10NM65

Power MOSFET

10A, 650V N-CHANNEL SUPER-JUNCTION MOSFET

■ DESCRIPTION

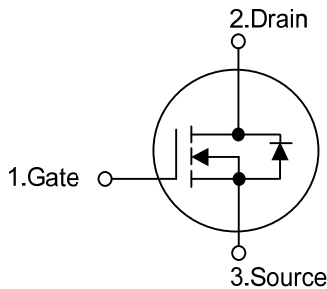
The UTC **10NM65** is a Super Junction MOSFET Structure. It uses UTC advanced planar stripe, DMOS technology to provide customers perfect switching performance, minimal on-state resistance.

The UTC **10NM65** is universally applied in electronic lamp ballasts based on half bridge topology, high efficiency switched mode power supplies, active power factor correction, etc.

■ FEATURES

- * $R_{DS(ON)} < 0.55\Omega @ V_{GS}=10V, I_D = 5.0 A$
- * High Switching Speed
- * Improved dv/dt capability

■ SYMBOL

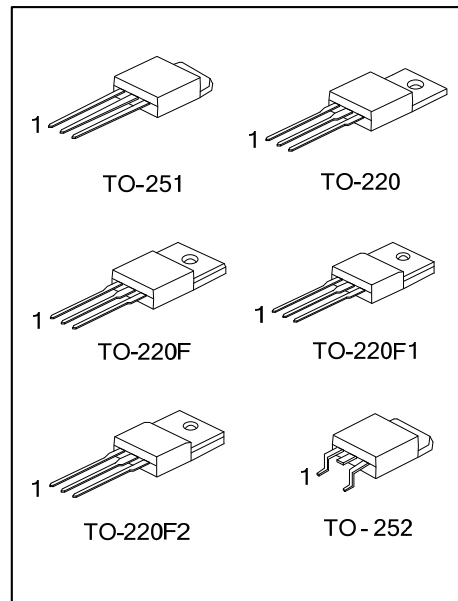


■ ORDERING INFORMATION

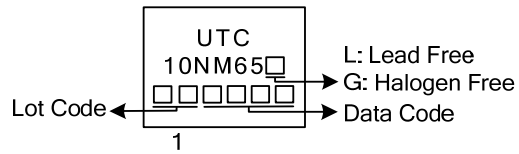
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
10NM65L-TA3-T	10NM65G-TA3-T	TO-220	G	D	S	Tube
10NM65L-TF3-T	10NM65G-TF3-T	TO-220F	G	D	S	Tube
10NM65L-TF1-T	10NM65G-TF1-T	TO-220F1	G	D	S	Tube
10NM65L-TF2-T	10NM65G-TF2-T	TO-220F2	G	D	S	Tube
10NM65L-TM3-T	10NM65G-TM3-T	TO-251	G	D	S	Tube
10NM65L-TN3-R	10NM65G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>10NM65G-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TM3: TO-251, TN3: TO-252</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free,</p>
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■ MARKING



■ ABSOLUTE MAXIMUM RATING ($T_C=25^{\circ}\text{C}$, 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	10	A
	Pulsed (Note 2)	I_{DM}	40	A
Avalanche Current (Note 2)		I_{AR}	3.0	A
Avalanche Energy (Note 3)	Single Pulsed (Note 3)	E_{AS}	45	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220	P_D	156	W
	TO-220F/TO-220F1		51	W
	TO-220F2		52	W
	TO-251/TO-252		70	W
Junction Temperature		T_J	150	$^{\circ}\text{C}$
Storage Temperature Range		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. $L=10\text{mH}$, $I_{AS}=3.0\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD} \leq 10\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ THERMAL DATA

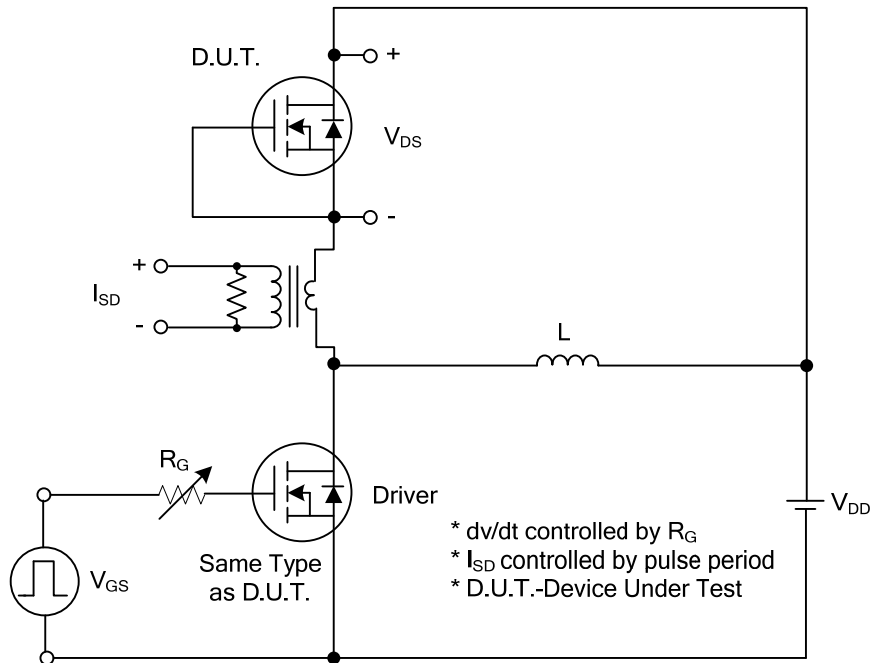
PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	TO-220F1/TO-220F2			
	TO-251/TO-252			
Junction to Case	TO-220	θ_{JC}	0.8	$^{\circ}\text{C}/\text{W}$
	TO-220F/TO-220F1		2.45	
	TO-220F2		2.4	
	TO-251/TO-252		1.78	

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

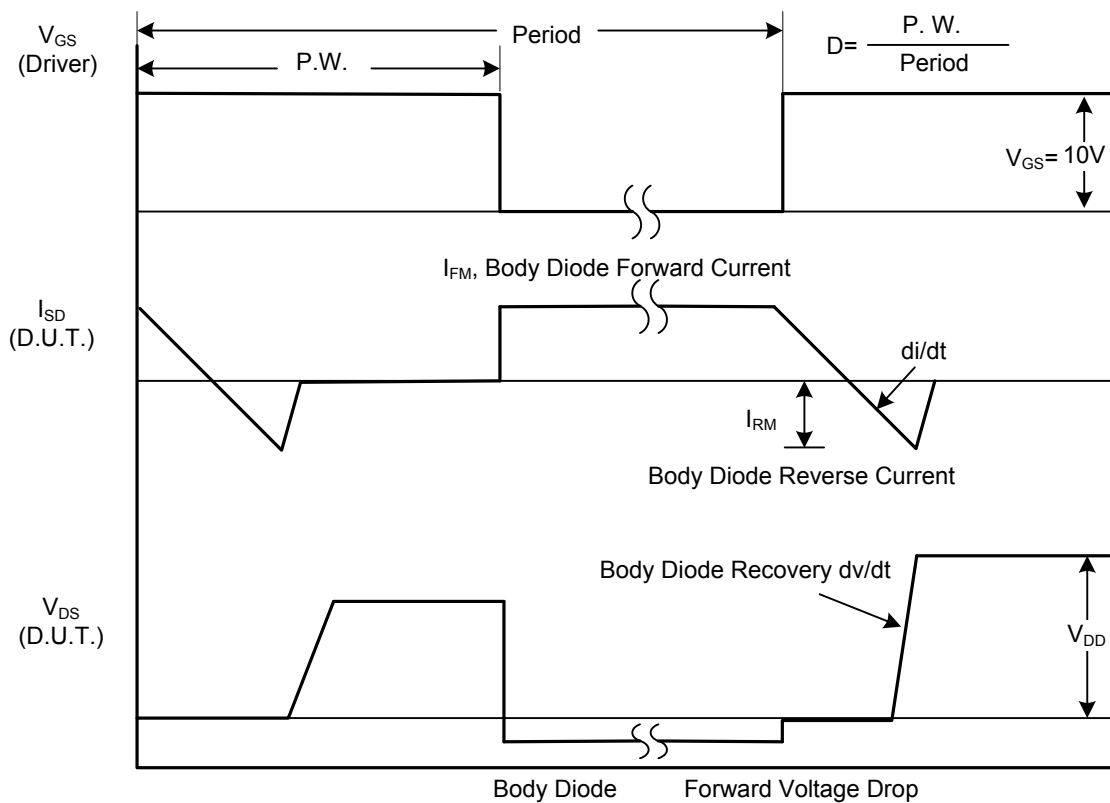
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	650			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 650V, V_{GS} = 0V$			1	μA
Gate-Source Leakage Current	Forward	$V_{GS} = 30V, V_{DS} = 0V$			100	nA
	Reverse		$V_{GS} = -30V, V_{DS} = 0V$			-100
ON CHARACTERISTICS						
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	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 5.0A$			0.55	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1.0\text{ MHz}$		610		pF
Output Capacitance	C_{OSS}			400		pF
Reverse Transfer Capacitance	C_{RSS}			35		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)		125		nC
Gate to Source Charge	Q_{GS}			7		nC
Gate to Drain Charge	Q_{GD}			20		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)		56		ns
Rise Time	t_R			135		ns
Turn-off Delay Time	$t_{D(OFF)}$			250		ns
Fall-Time	t_F			115		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				10	A
Maximum Body-Diode Pulsed Current	I_{SM}				40	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_S = 10A, V_{GS} = 0V$			1.4	V
Reverse Recovery Time (Note 1)	t_{rr}	$I_S = 10A, V_{GS} = 0V, dI_F/dt = 100A/\mu s$		350		ns
Reverse Recovery Charge	Q_{rr}				4.6	

Note: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
 2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

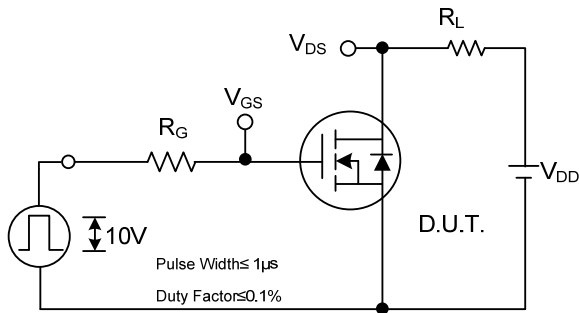


Peak Diode Recovery dv/dt Test Circuit

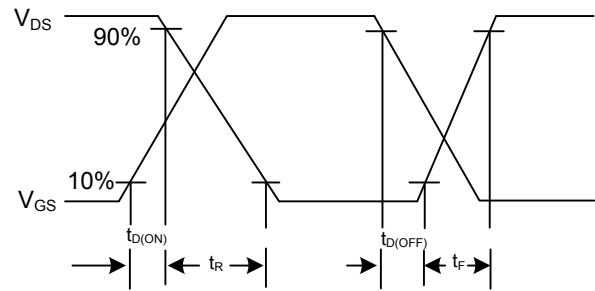


Peak Diode Recovery dv/dt Waveforms

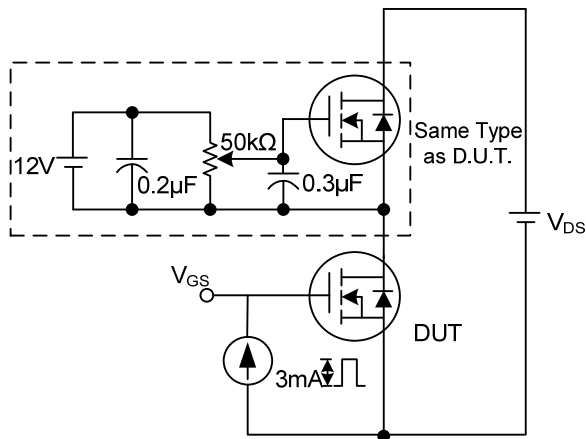
TEST CIRCUITS AND WAVEFORMS (Cont.)



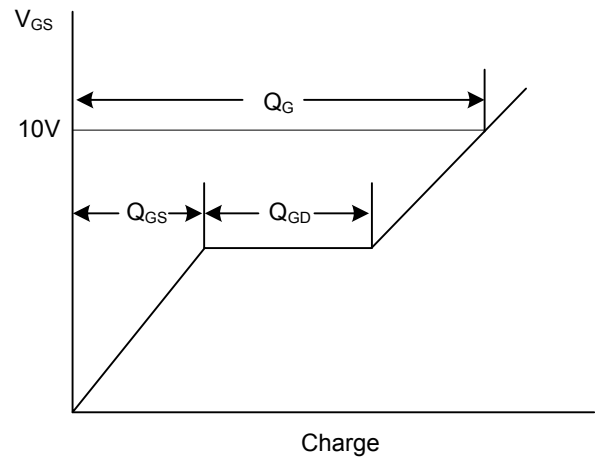
Switching Test Circuit



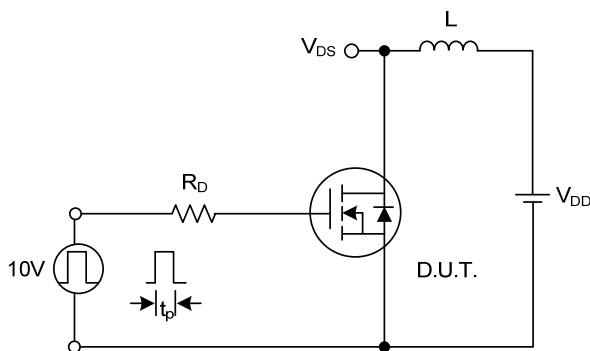
Switching Waveforms



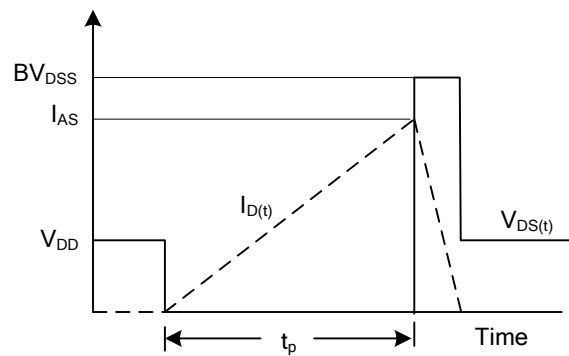
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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