



## 11N65K-MT

Preliminary

Power MOSFET

### 11A, 650V N-CHANNEL POWER MOSFET

#### DESCRIPTION

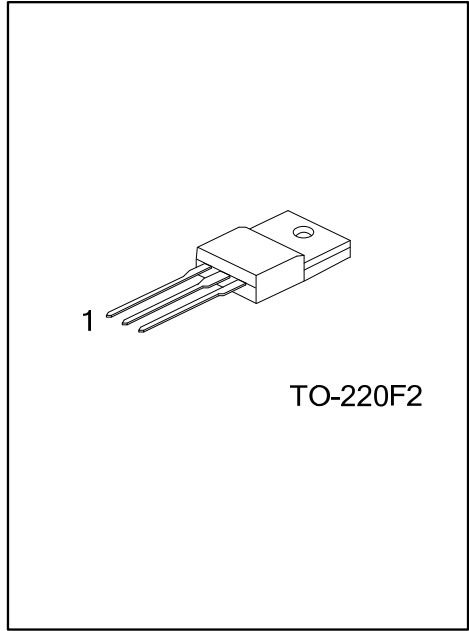
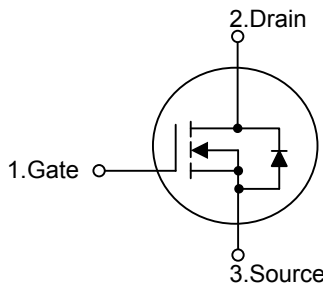
The **UTC 11N65K-MT** is an N-channel enhancement mode power MOSFET. It uses UTC advanced planar stripe, DMOS technology to provide customers perfect switching performance, minimal on-state resistance. It also can withstand high energy pulse in the avalanche and commutation mode.

The **UTC 11N65K-MT** is universally applied in electronic lamp ballasts based on half bridge topology, high efficiency switched mode power supplies, active power factor correction, etc.

#### FEATURES

- \*  $R_{DS(ON)} < 1.00\Omega @ V_{GS} = 10V, I_D = 5.5A$
- \* Fast Switching
- \* With 100% Avalanche Tested

#### SYMBOL



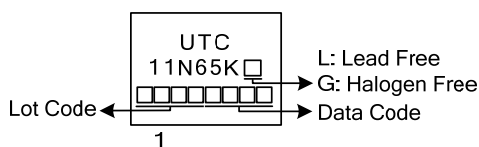
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
11N65KL-TF2-T	11N65KG-TF2-T	TO-220F2	G	D	S	Tube

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

<p>11N65KL-TF2-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube (2) TF2: TO-220F2 (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 to Source Voltage	$V_{DSS}$	650	V
Gate to Source Voltage	$V_{GSS}$	$\pm 30$	V
Continuous Drain Current	$I_D$	$T_C=25^\circ\text{C}$	11 (Note 2)
		$T_C=100^\circ\text{C}$	7 (Note 2)
Pulsed Drain Current (Note 3)	$I_{DM}$	44 (Note 2)	A
Single Pulsed Avalanche Energy(Note 4)	$E_{AS}$	440	mJ
Peak Diode Recovery dv/dt (Note 5)	dv/dt	4.5	V/ns
Power Dissipation	$P_D$	48	W
Derate above $25^\circ\text{C}$		0.38	W/ $^\circ\text{C}$
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. Drain current limited by maximum junction temperature
3. Repetitive Rating : Pulse width limited by maximum junction temperature
4.  $L=7.27\text{mH}$ ,  $I_{AS}=11\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$
5.  $I_{SD}\leq 11\text{A}$ ,  $di/dt\leq 200\text{A}/\mu\text{s}$ ,  $V_{DD}\leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	2.58	$^\circ\text{C}/\text{W}$

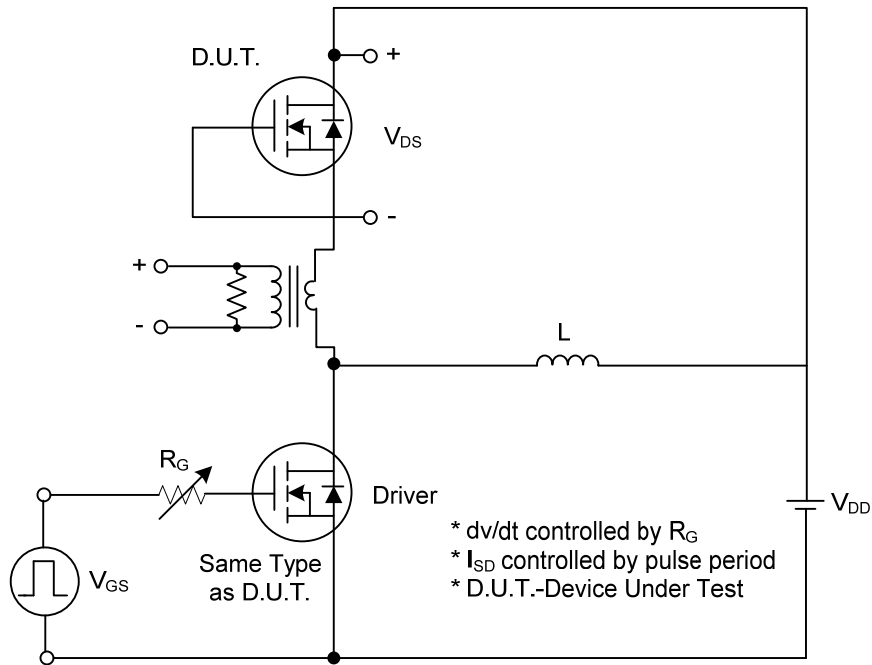
■ ELECTRICAL CHARACTERISTICS (T<sub>C</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	650			V
Breakdown Voltage Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> =250μA, Referenced to 25°C		0.5		V/°C
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V			10	μA
		V <sub>DS</sub> =650V, T <sub>J</sub> =125°C			100	μA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±30V			±100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0		4.0	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =5.5A			1.00	Ω
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz		850	1200	pF
Output Capacitance	C <sub>OSS</sub>			139	150	pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			10	20	pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, I <sub>D</sub> =0.5A (Note 1, 2)		35	55	nC
Gate-Source Charge	Q <sub>GS</sub>			10		nC
Gate-Drain Charge	Q <sub>GD</sub>			9		nC
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =1.3A, R <sub>G</sub> =3Ω (Note 1, 2)		74	90	ns
Turn-ON Rise Time	t <sub>R</sub>			95	120	ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			180	200	ns
Turn-OFF Fall Time	t <sub>F</sub>			96	120	ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>				11	A
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>				44	A
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =11A, V <sub>GS</sub> =0V			1.4	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =11A, dI <sub>F</sub> /dt=100A/μs (Note 1)		90		ns
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>				1.5	

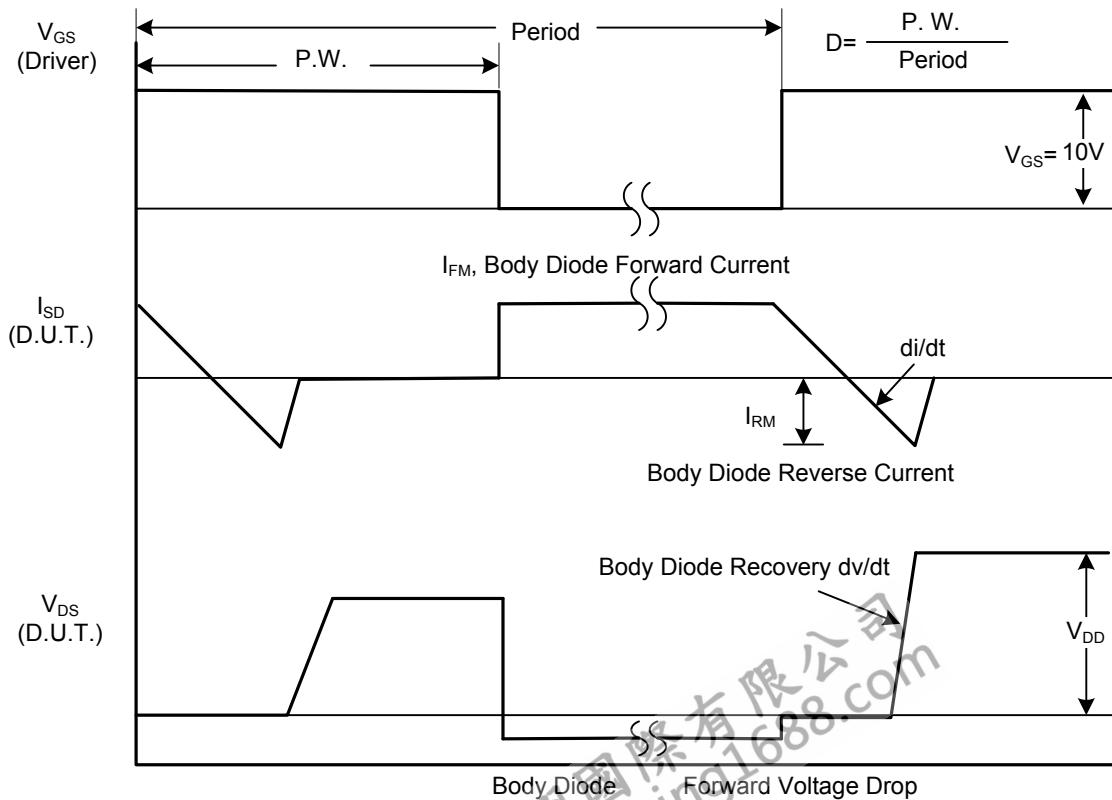
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

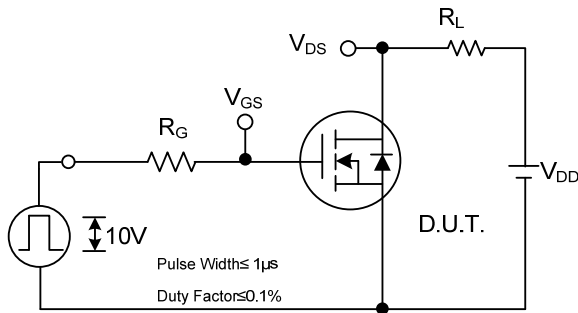


Peak Diode Recovery dv/dt Test Circuit

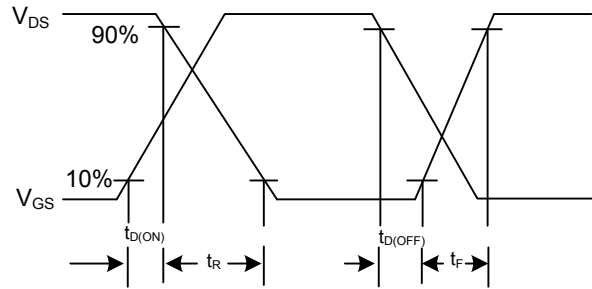


Peak Diode Recovery dv/dt Waveforms

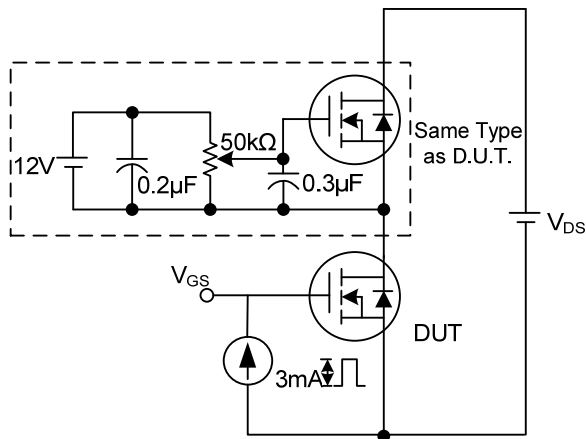
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



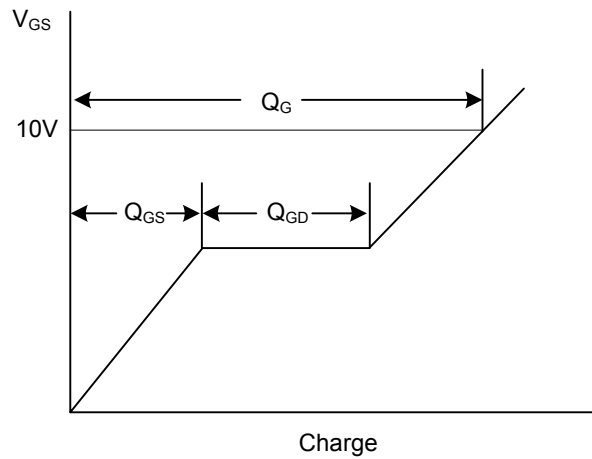
Switching Test Circuit



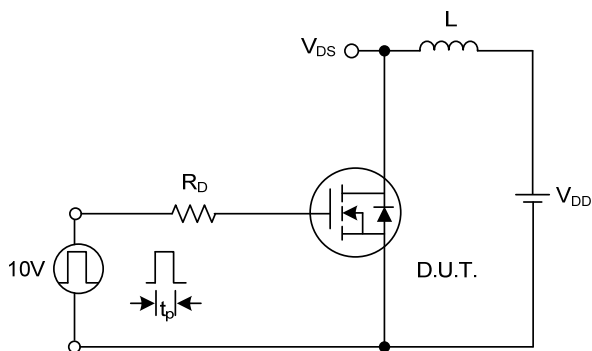
Switching Waveforms



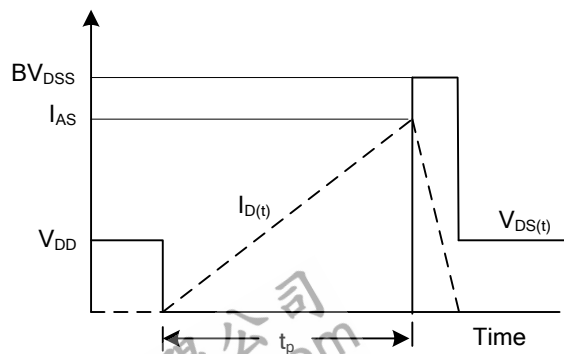
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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