



## 15N65

Preliminary

Power MOSFET

### 15 Amps, 650 Volts N-CHANNEL MOSFET

#### DESCRIPTION

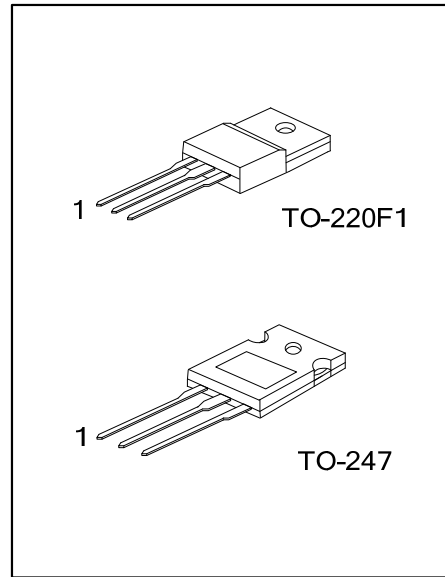
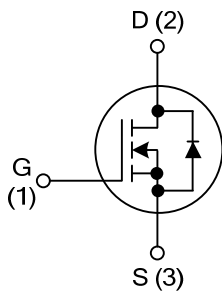
The UTC **15N65** is an N-channel mode Power FET using UTC's advanced technology to provide costumers with planar stripe and DMOS technology. This technology is specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **15N65** is universally applied in active power factor correction and high efficient switched mode power supplies.

#### FEATURES

- \* 15A, 650V,  $R_{DS(ON)}=0.44\Omega @ V_{GS}=10V$
- \* Typically 23.6pF low  $C_{RSS}$
- \* High switching speed
- \* Improved dv/dt capability

#### SYMBOL



#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
15N65L-TF1-T	15N65G-TF1-T	TO-220F1	G	D	S	Tube
15N65L-T47-T	15N65G-T47-T	TO-247	G	D	S	Tube

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

<p>15N65L - TF1 - T</p>	<p>(1) T: Tube (2) TF1: TO-220F1, T47: TO-247 (3) G: Halogen Free, L: Lead Free</p>
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■ 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
Avalanche Current (Note 1)		$I_{AR}$	15	A
Continuous Drain Current	Continuous	$I_D$	15	A
	Pulsed (Note 1)	$I_{DM}$	60	A
Avalanche Energy	Single Pulsed (Note 2)	$E_{AS}$	637	mJ
	Repetitive (Note 1)	$E_{AR}$	25.0	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5	V/ns
Power Dissipation	TO-220F1	$P_D$	37	W
	TO-247		312	W
Junction Temperature		$T_J$	+150	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

Note : 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.

■ THERMAL DATA

PARAMETER	PACKAGE	SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F1	$\theta_{JA}$	62.5	$^\circ\text{C/W}$
	TO-247		40	$^\circ\text{C/W}$
Junction to Case	TO-220F1	$\theta_{JC}$	3.3	$^\circ\text{C/W}$
	TO-247		0.4	$^\circ\text{C/W}$

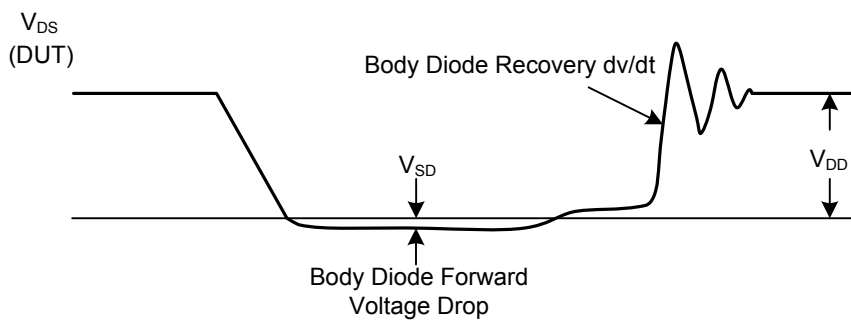
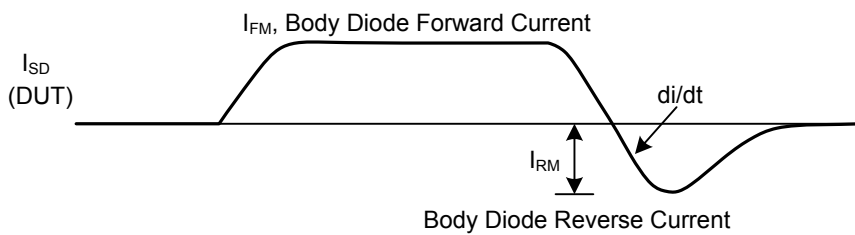
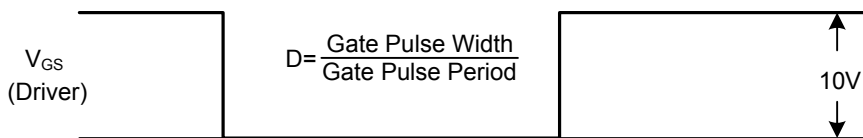
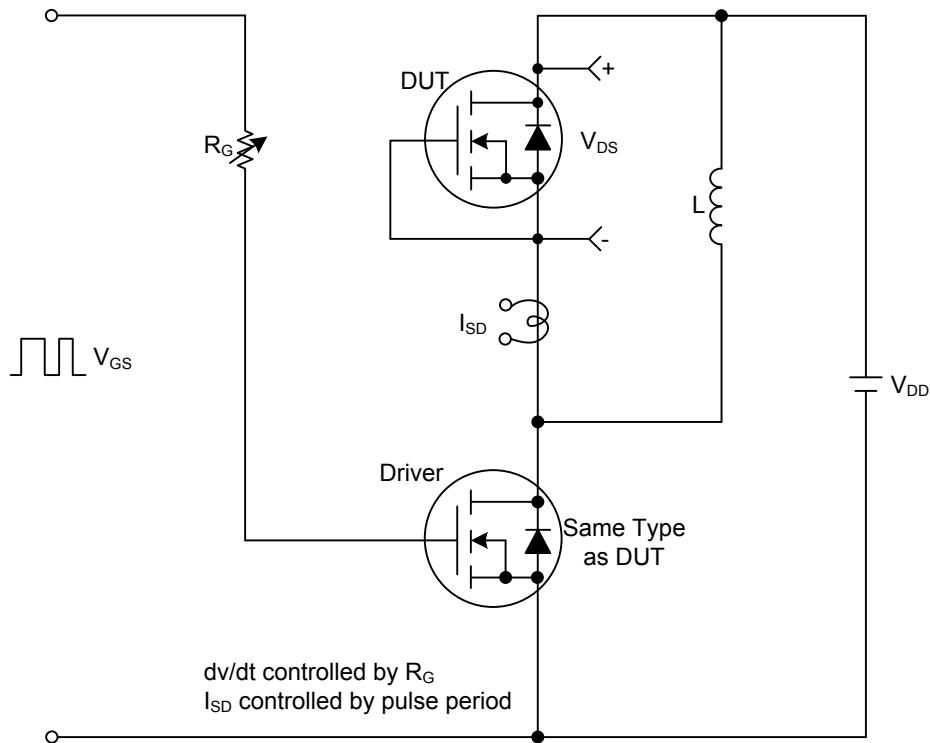
■ ELECTRICAL CHARACTERISTICS (T<sub>c</sub>=25°C, unless otherwise specified)

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, T <sub>J</sub> =25°C	650			V
Breakdown Voltage Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> =250μA, Referenced to 25°C		0.65		V/°C
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V			1	μA
		V <sub>DS</sub> =520V, T <sub>C</sub> =125°C			10	μA
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>			+100	nA
	Reverse					
		V <sub>GS</sub> =-30V, V <sub>DS</sub> =0V			-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	3.0		5.0	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =7.5A		0.36	0.44	Ω
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =40V, I <sub>D</sub> =7.5A (Note 4)		19.2		S
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz		2380	3095	pF
Output Capacitance	C <sub>OSS</sub>			295	385	pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			23.6	35.5	pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> =520V, V <sub>GS</sub> =10V, I <sub>D</sub> =15A (Note 4,5)		48.5	63.0	nC
Gate-Source Charge	Q <sub>GS</sub>			14.0		nC
Gate-Drain Charge	Q <sub>GD</sub>			21.2		nC
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =325V, I <sub>D</sub> =15A, R <sub>G</sub> =21.7Ω (Note 4,5)		65	140	ns
Turn-ON Rise Time	t <sub>R</sub>			125	260	ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			105	220	ns
Turn-OFF Fall Time	t <sub>F</sub>			65	140	ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>				15	A
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>				60	A
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =15A, 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> =15A,		496		ns
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	di <sub>F</sub> /dt=100A/μs (Note 4)		5.69		μC

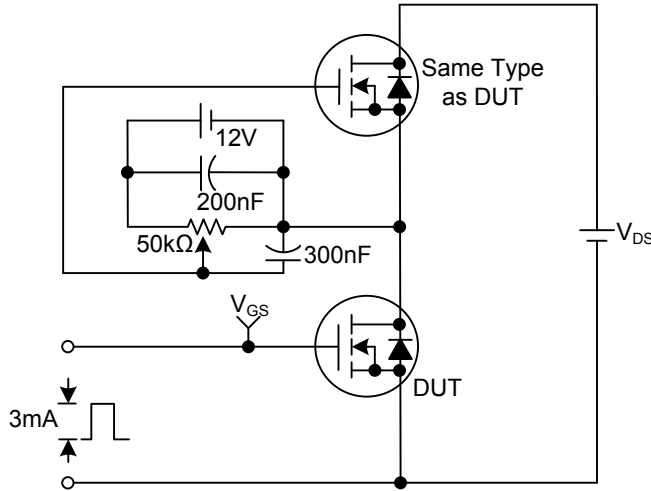
- Notes : 1. Repetitive Rating : Pulse width limited by maximum junction temperature  
 2. L=5.23mH, I<sub>AS</sub>=15A, V<sub>DD</sub>= 50V, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C  
 3. I<sub>SD</sub> ≤15A, di/dt ≤200A/μs, V<sub>DD</sub> ≤BV<sub>DSS</sub>, Starting T<sub>J</sub>=25°C  
 4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%  
 5. Essentially independent of operating temperature  
 6. Drain current limited by maximum junction temperature

- TEST CIRCUITS AND WAVEFORMS

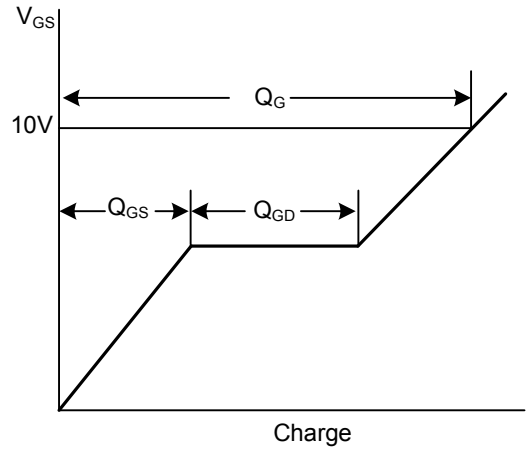
Peak Diode Recovery dv/dt Test Circuit & Waveforms



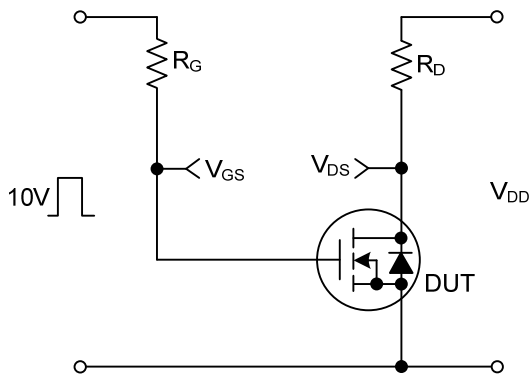
Gate Charge Test Circuit



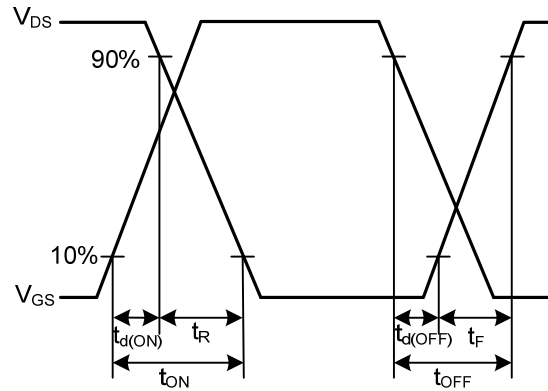
Gate Charge Waveforms



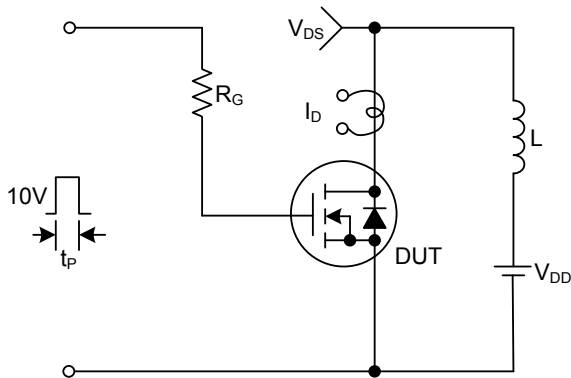
Resistive Switching Test Circuit



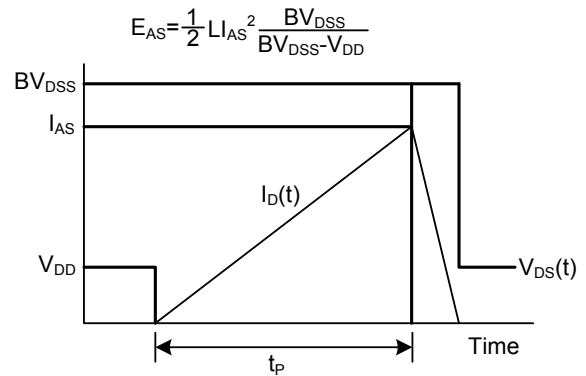
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



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