



**22N65**

Preliminary

*Power MOSFET*

**22A, 650V N-CHANNEL  
POWER MOSFET**

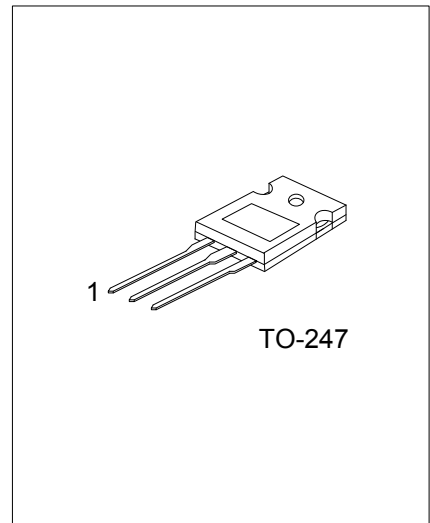
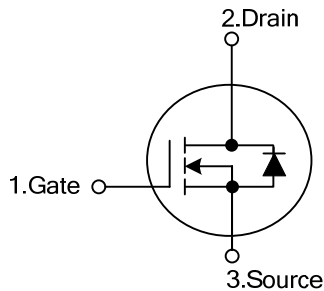
■ DESCRIPTION

As the SMPS MOSFET, the UTC **22N65** uses UTC's advanced technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

■ FEATURES

- \*  $R_{DS(ON)} = 0.35\Omega$
- \* Ultra low gate charge ( Typical 150 nC )
- \* Low reverse transfer capacitance (  $C_{RSS} =$  typical 36 pF )
- \* Fast switching capability
- \* Avalanche energy specified
- \* Improved dv/dt capability, high ruggedness

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
22N65L-T47-T	22N65G-T47-T	TO-247	G	D	S	Tube

<p>22N65L-T47-T</p> <ul style="list-style-type: none"> <li>(1)Packing Type</li> <li>(2)Package Type</li> <li>(3)Lead Free</li> </ul>	<ul style="list-style-type: none"> <li>(1) T: Tube</li> <li>(2) T47: TO-247</li> <li>(3) G: Halogen Free, L: Lead Free</li> </ul>
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■ ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> =25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	V <sub>DSS</sub>	650	V
Gate-Source Voltage	V <sub>GSS</sub>	±30	V
Avalanche Current	I <sub>AR</sub>	22	A
Continuous Drain Current	I <sub>D</sub>	22	A
Pulsed Drain Current (Note 1)	I <sub>DM</sub>	88	A
Avalanche Energy	Single Pulsed	E <sub>AS</sub>	380
	Repetitive	E <sub>AR</sub>	37
Peak Diode Recovery dv/dt (Note 2)	dv/dt	18	V/ns
Power Dissipation	P <sub>D</sub>	370	W
Junction Temperature	T <sub>J</sub>	150	°C
Operating Temperature	T <sub>OPR</sub>	-55 ~ +150	°C
Storage Temperature	T <sub>STG</sub>	-55 ~ +150	°C

Note: 1. Repetitive rating; pulse width limited by max. junction temperature.

2. I<sub>SD</sub> ≤ 22A, di/dt ≤ 540 A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤ 150°C.

3. 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	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ <sub>JA</sub>	40	°C /W
Junction to Case	θ <sub>JC</sub>	0.34	°C /W

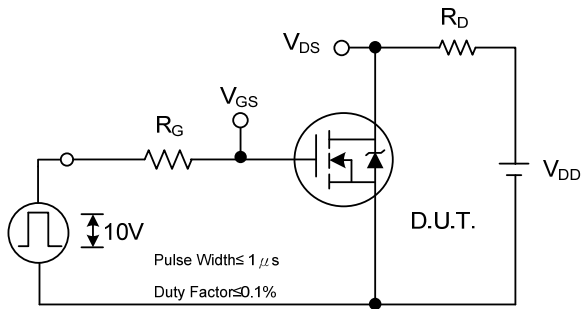
■ ELECTRICAL CHARACTERISTICS(T<sub>J</sub>=25°C, L=1.5mH,R<sub>G</sub>=25Ω,I<sub>AS</sub> =22A,Unless otherwise specified)

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
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V			50	μA
Gate- Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±30V			±100	nA
Breakdown Voltage Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> =1mA, Referenced to 25°C		0.30		V/°C
<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
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =13A (Note 2)		0.3	0.35	Ω
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz		3570		pF
Output Capacitance	C <sub>OSS</sub>			350		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			36		pF
<b>SWITCHING PARAMETERS</b>						
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =300V, I <sub>D</sub> =22A, R <sub>G</sub> =6.2Ω, V <sub>GS</sub> =10V (Note 2)		26		ns
Turn-ON Rise Time	t <sub>R</sub>			99		ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			48		ns
Turn-OFF Fall-Time	t <sub>F</sub>			37		ns
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> =480V, V <sub>GS</sub> =10V, I <sub>D</sub> =22A (Note 2)			150	nC
Gate Source Charge	Q <sub>GS</sub>				45	nC
Gate Drain Charge	Q <sub>GD</sub>				76	nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b>						
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =22A			1.5	V
Continuous Source Current (Body Diode)	I <sub>S</sub>	(Note 1)			22	A
Pulsed Source Current (Body Diode)	I <sub>SM</sub>				88	A
Reverse Recovery Time	t <sub>RR</sub>	I <sub>S</sub> =22A,		590	890	ns
Reverse Recovery Charge	Q <sub>RR</sub>	di/dt=100A/μs (Note 2)		7.2	11	μC

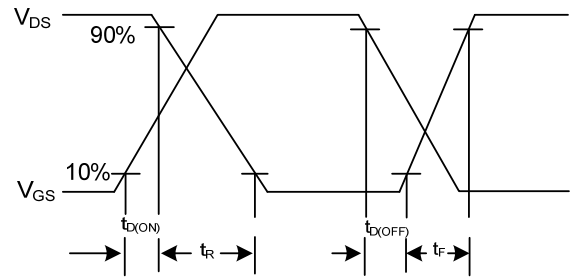
Note: 1. Repetitive rating; pulse width limited by max. junction temperature.

2. Pulse Width ≤ 300 s, Duty Cycle ≤ 2%.

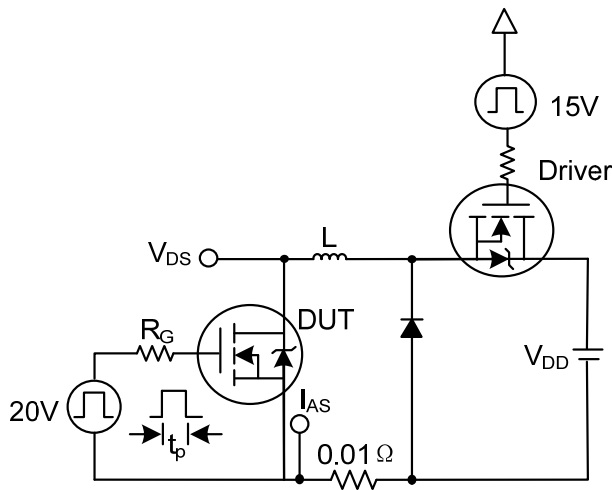
■ TEST CIRCUITS



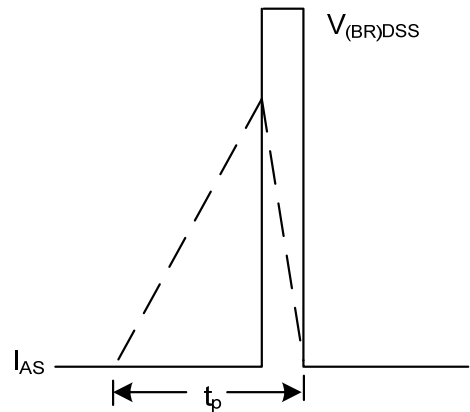
Switching Test Circuit



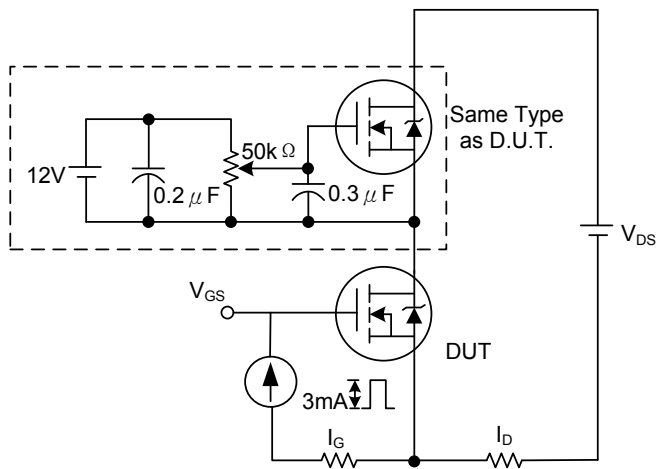
Switching Waveforms



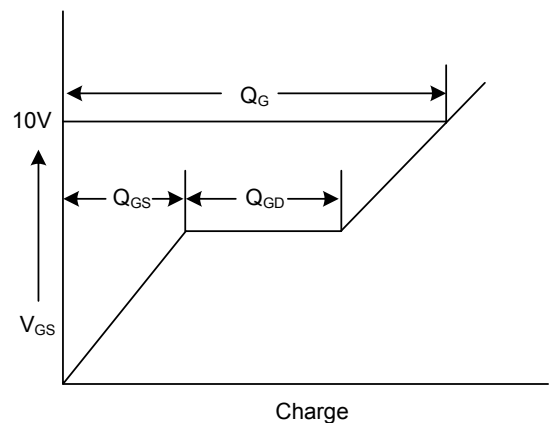
Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



Gate Charge Test Circuit



Gate Charge Waveform

■ TEST CIRCUITS(Cont.)

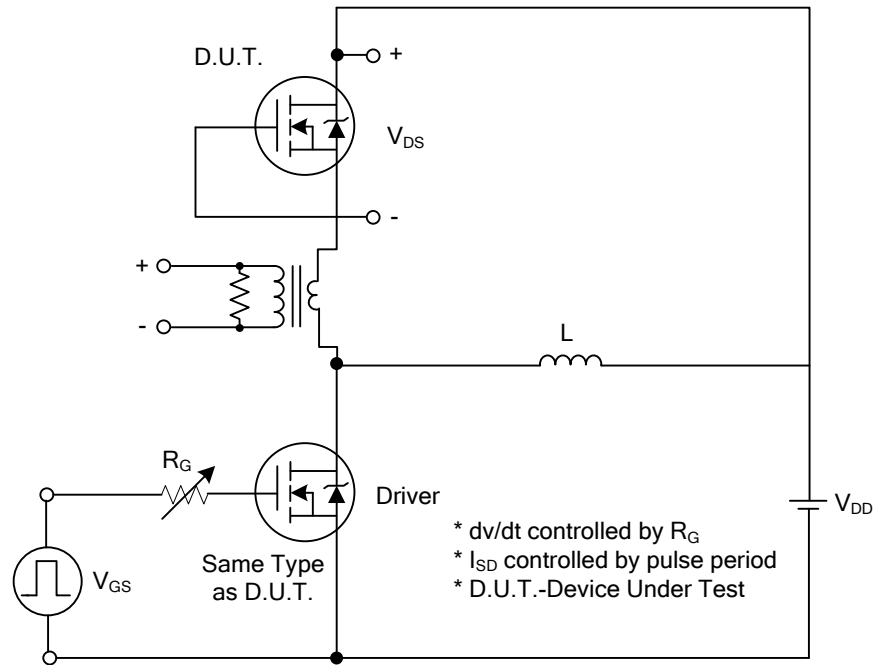
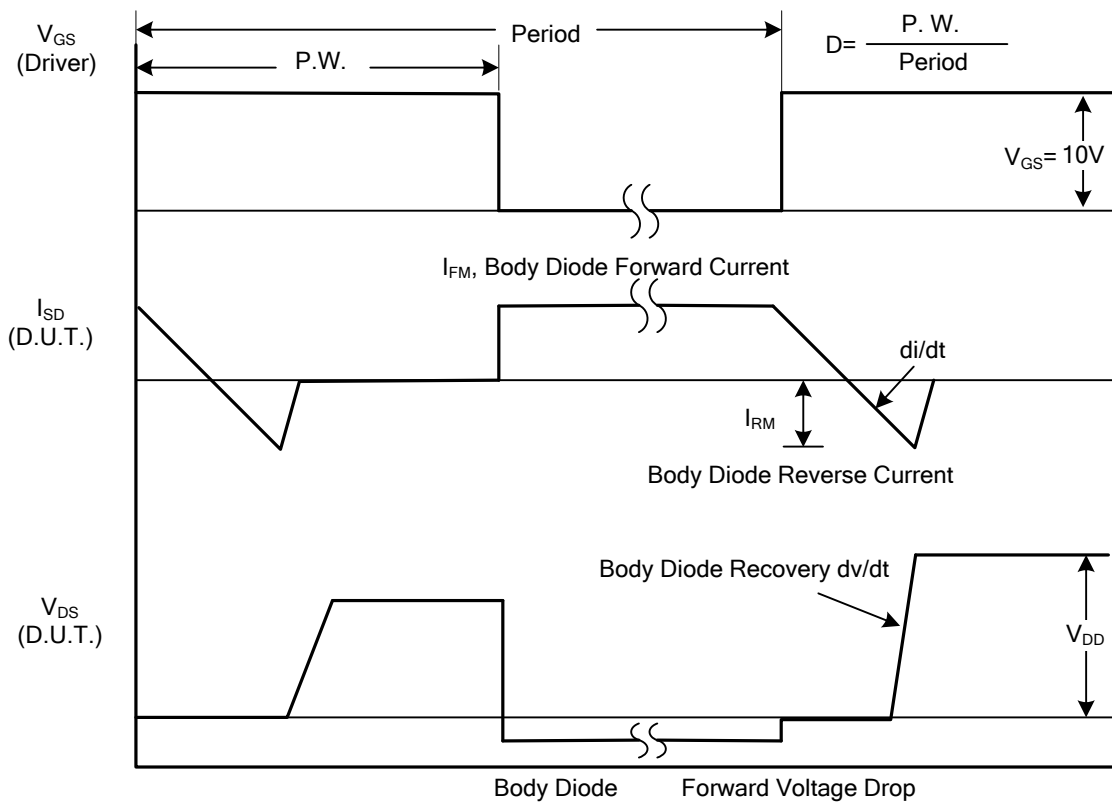


Fig. 1A Peak Diode Recovery dv/dt Test Circuit



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