

**6N65-C**

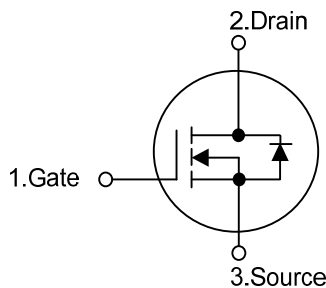
Preliminary

Power MOSFET**6A, 650V N-CHANNEL
POWER MOSFET****DESCRIPTION**

The UTC **6N65-C** is a high voltage power MOSFET designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and high rugged avalanche characteristics. This power MOSFET is usually used in high speed switching applications of switching power supplies and adaptors.

FEATURES

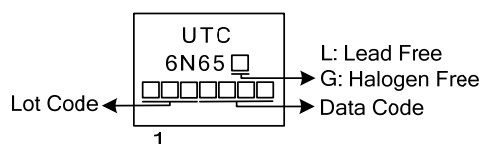
- * $R_{DS(ON)} < 1.7\Omega$ @ $V_{GS}=10V$, $I_D=3A$
- * Fast switching capability
- * Avalanche energy tested
- * Improved dv/dt capability, high ruggedness

SYMBOL**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6N65L-TA3-T	6N65G-TA3-T	TO-220	G	D	S	Tube
6N65L-TF1-T	6N65G-TF1-T	TO-220F1	G	D	S	Tube
6N65L-TF3-T	6N65G-TF3-T	TO-220F	G	D	S	Tube
6N65L-TN3-R	6N65G-TN3-R	TO-252	G	D	S	Tape Reel

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

		(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF3: TO-220F, TN3: TO-252 (3) L: Lead Free, G: Halogen Free and Lead Free
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MARKING

■ **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
Avalanche Current (Note 2)		I_{AR}	6	A
Continuous Drain Current		I_D	6	A
Pulsed Drain Current (Note 2)		I_{DM}	24	A
Avalanche Energy (Note 3)	Single Pulsed	E_{AS}	360	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3	ns
Power Dissipation	TO-220	P_D	120	W
	TO-220F/TO-220F1		40	W
	TO-252		125	W
Junction Temperature		T_J	+150	$^\circ\text{C}$
Operating Temperature		T_{OPR}	-55 ~ +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 T_J

3. $L = 20\text{mH}$, $I_{AS} = 6\text{A}$, $V_{DD} = 90\text{V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 6\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ **THERMAL RESISTANCES CHARACTERISTICS**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-220F1			
	TO-252		110	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	1.04	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		3.2	$^\circ\text{C}/\text{W}$
	TO-252		40	$^\circ\text{C}/\text{W}$

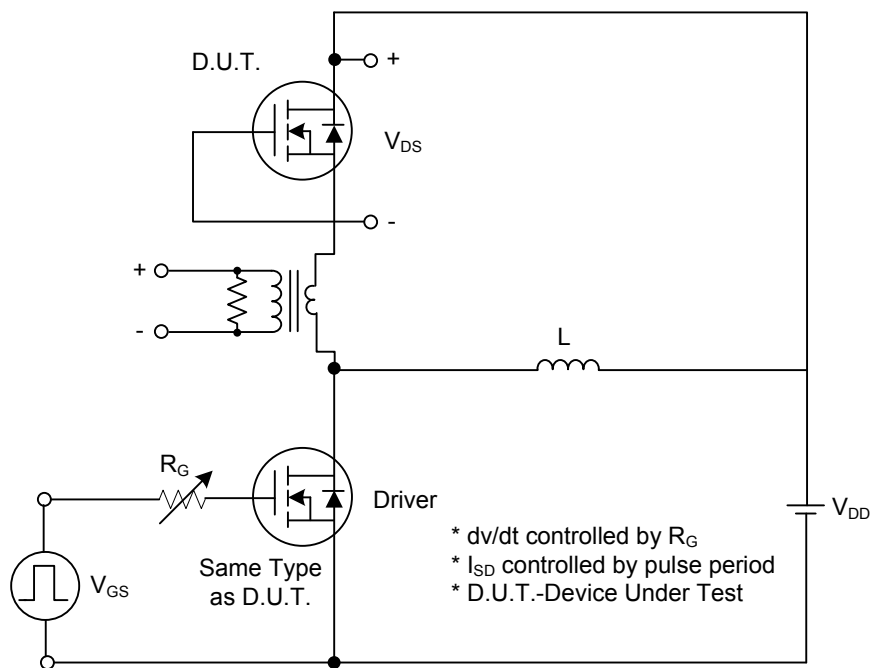
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	650			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =650V, V _{GS} =0V			10	μA
			V _{DS} =520V, V _{GS} =0V, T _J =125°C			100	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =30V, V _{DS} =0V			100	nA
	Reverse		V _{GS} =-30V, V _{DS} =0V			-100	nA
Breakdown Voltage Temperature Coefficient		ΔBV _{DSS} /ΔT _J	I _D =250μA, Referenced to 25°C		0.53		V/°C
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =3A			1.7	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0 MHz		350		pF
Output Capacitance		C _{OSS}			85		pF
Reverse Transfer Capacitance		C _{RSS}			7		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge		Q _G	V _{DS} =50V, I _D =1.3A, V _{GS} =10V, I _G =100μA (Note 1, 2)		100		nC
Gate-Source Charge		Q _{GS}			7		nC
Gate-Drain Charge		Q _{GD}			7		nC
Turn-On Delay Time		t _{D(ON)}	V _{DD} =30V, I _D =0.5A, R _G =25Ω (Note 1, 2)		55		ns
Turn-On Rise Time		t _R			40		ns
Turn-Off Delay Time		t _{D(OFF)}			215		ns
Turn-Off Fall Time		t _F			45		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} = 0 V, I _S = 6 A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I _S				6	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				24	A
Reverse Recovery Time		t _{RR}	V _{GS} = 0 V, I _S = 6 A,		340		ns
Reverse Recovery Charge		Q _{RR}	dl _F /dt = 100 A/μs (Note 1)		3.5		uC

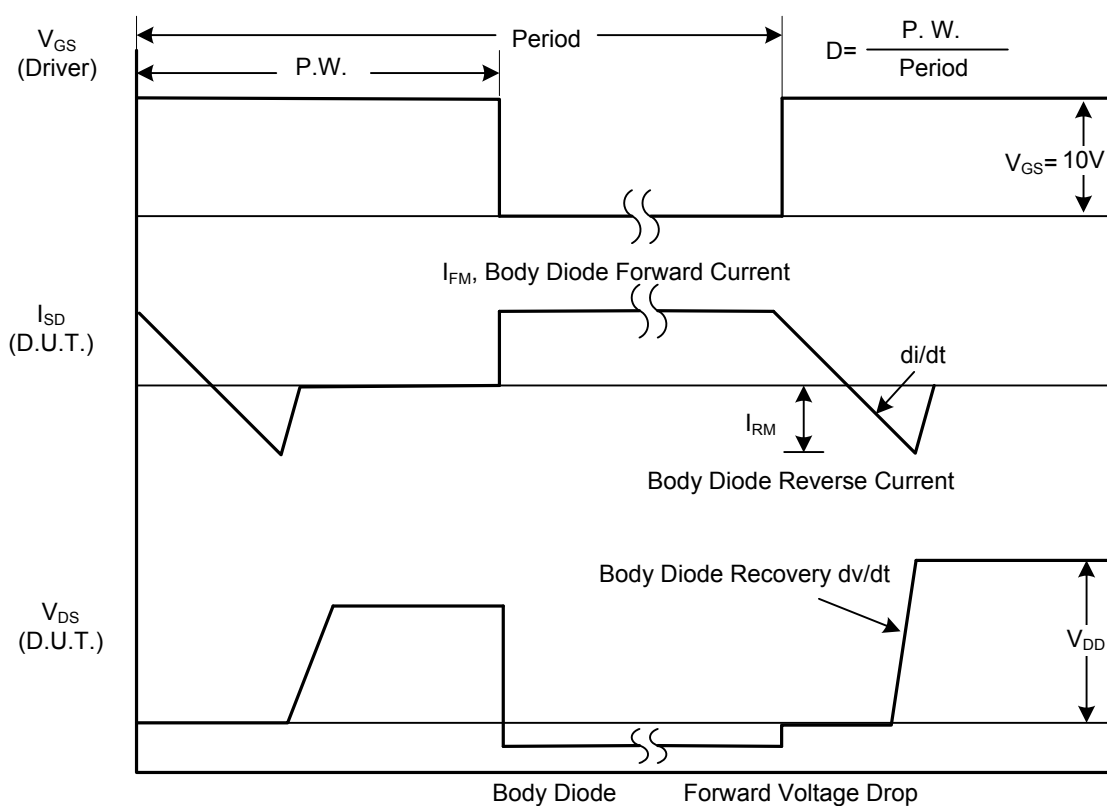
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

TEST CIRCUITS AND WAVEFORMS

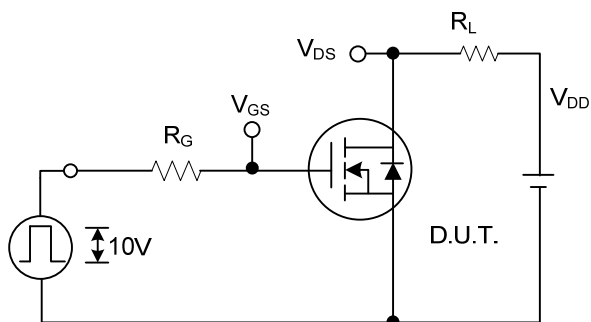


Peak Diode Recovery dv/dt Test Circuit

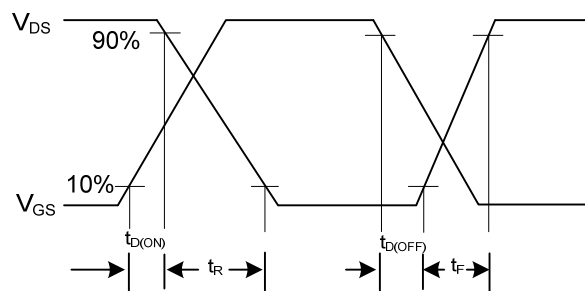


Peak Diode Recovery dv/dt Waveforms

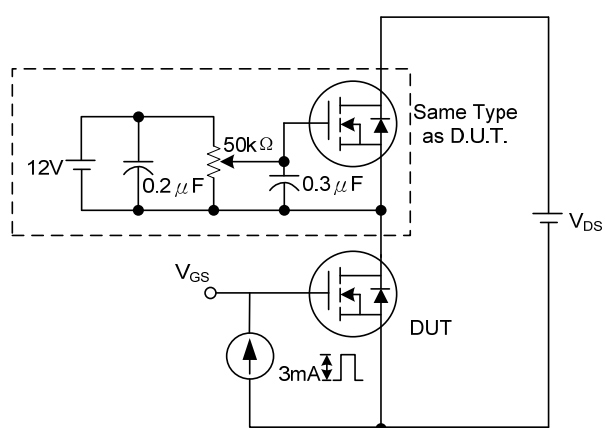
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



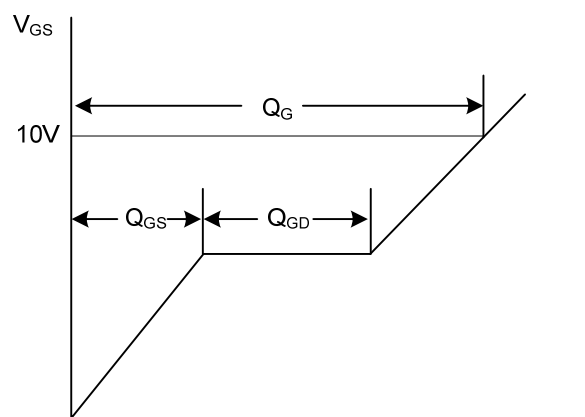
Switching Test Circuit



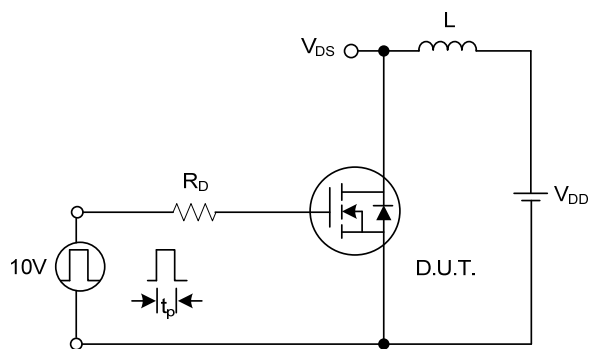
Switching Waveforms



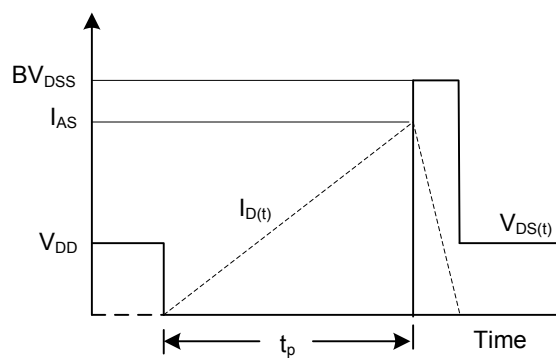
Gate Charge Test Circuit



Charge
Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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