

9A, 650V N-CHANNEL POWER MOSFET

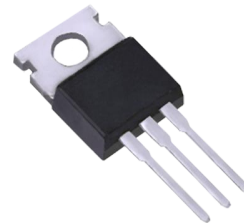
■ DESCRIPTION

The UTC **9N65** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

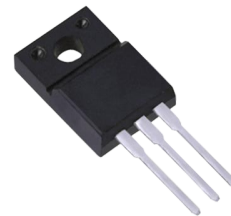
The UTC **9N65** is generally applied in high efficiency switch mode power supplies and uninterruptible power supplies.

■ FEATURES

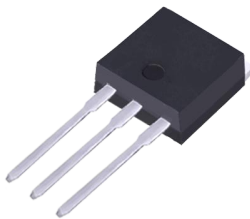
- * $R_{DS(ON)}=1.1\Omega @ V_{GS}=10V$
- * High Switching Speed
- * Improved dv/dt Capability
- * 100% Avalanche Tested



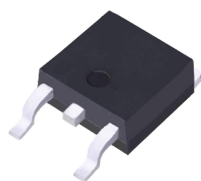
TO-220



TO-220F



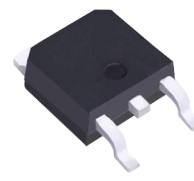
TO-262



TO-263



TO-251



TO-252

■ ABSOLUTE MAXIMUM RATINGS ($T_J=25^\circ\text{C}$, unless otherwise specified)

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V_{DSS}	650	V
Gate-Source Voltage			V_{GSS}	± 30	V
Drain Current	Continuous, $V_{GSS}@10\text{V}$	@ $T_C=25^\circ\text{C}$	I_D	9	A
		@ $T_C=100^\circ\text{C}$		5.4	A
	Pulsed (Note 2)		I_{DM}	36	A
Avalanche Current (Note 2)			I_{AR}	5.2	A
Avalanche Energy	Single Pulsed (Note 2)		E_{AR}	16	mJ
	Repetitive (Note 3)		E_{AS}	375	mJ
Peak Diode Recovery dv/dt (Note 3)			dv/dt	2.8	V/ns
Power Dissipation(@ $T_C=25^\circ\text{C}$)	TO-220		P_D	167	W
	TO-220F			44	
Linear Derating Factor	TO-220			1.3	W/ $^\circ\text{C}$
	TO-220F			0.35	
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. Repetitive rating; pulse width limited by max. junction temperature.

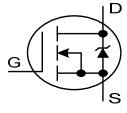
3. Starting $T_J=25^\circ\text{C}$, $L=9.25\text{mH}$, $R_G=25\Omega$, $I_{AS}=9\text{A}$.

4. $I_{SD}\leq 5.2\text{A}$, $di/dt\leq 90\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, $T_J\leq 150^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	θ_{JA}	62	$^\circ\text{C}/\text{W}$
	TO-220F		62.5	
Junction to Case	TO-220	θ_{JC}	0.75	$^\circ\text{C}/\text{W}$
	TO-220F		2.86	

■ 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}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	650			V	
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_J$	Reference to 25°C , $I_D=1\text{mA}$ (Note 3)		0.67		$\text{V}/^\circ\text{C}$	
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=650\text{V}$, $V_{GS}=0\text{V}$			25	μA	
		$V_{DS}=520\text{V}$, $V_{GS}=0\text{V}$, $T_J=125^\circ\text{C}$			250		
Gate- Source Leakage Current	Forward	I_{GSS}			+100	nA	
	Reverse				-100		
ON CHARACTERISTICS							
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	2.0		4.0	V	
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=5.1\text{A}$		0.85	1.1	Ω	
DYNAMIC PARAMETERS							
Input Capacitance	C_{ISS}	$V_{DS}=25\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$		1417		pF	
Output Capacitance	C_{OSS}				177		pF
Reverse Transfer Capacitance	C_{RSS}				7		pF
SWITCHING PARAMETERS							
Total Gate Charge	Q_G	$V_{DS}=520\text{V}$, $V_{GS}=10\text{V}$, $I_D=9\text{A}$ (Note 2)			48	nC	
Gate to Source Charge	Q_{GS}				12	nC	
Gate to Drain ("Miller") Charge	Q_{GD}				19	nC	
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=325\text{V}$, $I_D=9\text{A}$, $R_G=9.1\Omega$, $R_D=62\Omega$ (Note 2)		14		ns	
Rise Time	t_R			20		ns	
Turn-OFF Delay Time	$t_{D(OFF)}$			34		ns	
Fall-Time	t_F			18		ns	
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current	I_S	MOSFET symbol showing the integral reverse p-n junction diode. 			9	A	
Maximum Body-Diode Pulsed Current (Note 1)	I_{SM}				36	A	
Drain-Source Diode Forward Voltage	V_{SD}		$T_J=25^\circ\text{C}$, $I_S=9\text{A}$, $V_{GS}=0\text{V}$ (Note 2)			1.5	V

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

2. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

3. Uses IRFIB5N65A data and test conditions