

**UT22NP04**

Preliminary

Power MOSFET

**N AND P-CHANNEL
ENHANCEMENT MODE FIELD
DFFECT TRANSISTOR****DESCRIPTION**

The UTC **UT22NP04** is an N and P-channel enhancement mode field dffect transistor, it uses UTC's advanced technology to provide the customers with a minimum on-state resistance, high switching speed and low gate charge.

FEATURES

* N-channel

$$R_{DS(on)} \leq 24 \text{ m}\Omega @ V_{GS}=10\text{V}, I_D=11\text{A}$$

$$R_{DS(on)} \leq 32 \text{ m}\Omega @ V_{GS}=4.5\text{V}, I_D=11\text{A}$$

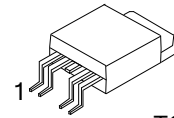
* P-channel

$$R_{DS(on)} \leq 28 \text{ m}\Omega @ V_{GS}= -10\text{V}, I_D= -11\text{A}$$

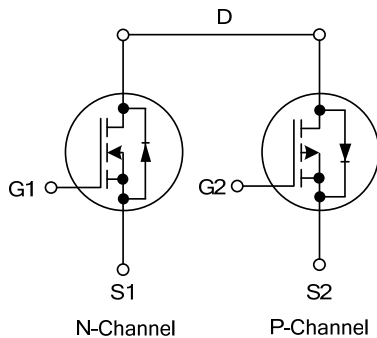
$$R_{DS(on)} \leq 36 \text{ m}\Omega @ V_{GS}= -4.5\text{V}, I_D= -11\text{A}$$

* High switching speed

* Low gate charge



TO-252-4

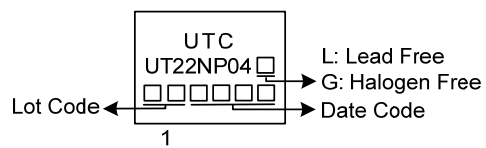
SYMBOL**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment					Packing
Lead Free	Halogen Free		1	2	3	4	5	
UT22NP04L-TN4-R	UT22NP04G-TN4-R	TO-252-4	S1	G1	D	S2	G2	Tape Reel

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

	(1) R: Tape Reel (2) TN4: TO-252-4 (3) G: Halogen Free and Lead Free, L: Lead Free
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■ MARKING



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

PARAMETER		SYMBOL	RATINGS		UNIT
			N-Channel	P-Channel	
Drain-Source Voltage		V_{DSS}	40	-40	V
Gate-Source Voltage		V_{GSS}	± 20	± 20	V
Drain Current	Continuous	I_D	22	-22	A
	Pulsed (Note 2)	I_{DM}	44	-44	A
Avalanche Energy, Single Pulse (Note 3, 4)		E_{AS}	11	33	mJ
Power Dissipation		P_D	50		W
Junction Temperature		T_J	$-55 \sim +150$		$^{\circ}\text{C}$
Storage Temperature		T_{STG}	$-55 \sim +150$		$^{\circ}\text{C}$

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 maximum junction temperature.

3. N-Channel: $L = 0.1\text{mH}$, $I_{AS} = 15\text{A}$, $V_{DD} = 30\text{V}$, $R_G = 25\ \Omega$ Starting $T_J = 25^{\circ}\text{C}$

P-Channel: $L = 0.1\text{mH}$, $I_{AS} = -26\text{A}$, $V_{DD} = -30\text{V}$, $R_G = 25\ \Omega$ Starting $T_J = 25^{\circ}\text{C}$

■ **THERMAL DATA**

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Case	θ_{JC}	110	$^{\circ}\text{C/W}$
Junction to Ambient	θ_{JA}	2.5	$^{\circ}\text{C/W}$

Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

N-channel

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250uA, V _{GS} =0V	40			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =32V, V _{GS} =0V			1	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} =+20V, V _{DS} =0V			+100	nA
	Reverse		V _{GS} =-20V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250uA	1.0		3.0	V
Static Drain-Source On-State Resistance (Note 1)		R _{DS(ON)}	V _{GS} =10V, I _D =11A			24	mΩ
			V _{GS} =4.5V, I _D =11A			32	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{DS} =-25V, V _{GS} =0V, f=1.0MHz		680		pF
Output Capacitance		C _{OSS}			85		pF
Reverse Transfer Capacitance		C _{RSS}			73		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 2)		Q _G	V _{DS} =32V, V _{GS} =10V, I _D =22A		36		nC
Gate to Source Charge Note 2)		Q _{GS}			4.5		nC
Gate to Drain Charge Note 2)		Q _{GD}			9.2		nC
Turn-ON Delay Time (Note 2)		t _{D(ON)}	V _{DS} =20V, V _{GS} =10V, I _D =22A, R _G =3Ω		4		ns
Rise Time (Note 2)		t _R			16		ns
Turn-OFF Delay Time (Note 2)		t _{D(OFF)}			20		ns
Fall-Time (Note 2)		t _F			19		ns
SOURCE TO DRAIN DIODE SPECIFICATIONS							
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _F =22A, V _{GS} =0V			1.4	V

■ ELECTRICAL CHARACTERISTICS (Cont.)

P-channel

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =-250uA, V _{GS} =0V	-40			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =-32V, V _{GS} =0V			-1	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} =+20V, V _{DS} =0V			+100	nA
	Reverse		V _{GS} =-20V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =-250uA	-1.0		-3.0	V
Static Drain-Source On-State Resistance (Note 1)		R _{DS(ON)}	V _{GS} =-10V, I _D =-11A			28	mΩ
			V _{GS} =-4.5V, I _D =-11A			36	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{DS} =-25V, V _{GS} =0V, f=1.0MHz		1880		pF
Output Capacitance		C _{OSS}			212		pF
Reverse Transfer Capacitance		C _{RSS}			162		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 2)		Q _G	V _{DS} =-32V, V _{GS} =-10V, I _D =-22A		37		nC
Gate to Source Charge Note 2)		Q _{GS}			5		nC
Gate to Drain Charge Note 2)		Q _{GD}			8		nC
Turn-ON Delay Time (Note 2)		t _{D(ON)}	V _{DS} =-20V, V _{GS} =-10V, I _D =-22A, R _G =3Ω		6		ns
Rise Time (Note 2)		t _R			18		ns
Turn-OFF Delay Time (Note 2)		t _{D(OFF)}			76		ns
Fall-Time (Note 2)		t _F			40		ns
SOURCE TO DRAIN DIODE SPECIFICATIONS							
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _F =-22A, V _{GS} =0V			-1.4	V

Notes: 1. Pulse test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.

2. Independent of operating temperature.

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