



20NP03

Power MOSFET

N AND P-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

DESCRIPTION

The UTC **20NP03** is an N and P-channel enhancement mode field effect 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:

25A, 30V, $R_{DS(on)} \leq 18 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=7.0\text{A}$

25A, 30V, $R_{DS(on)} \leq 28 \text{ m}\Omega$ @ $V_{GS}=4.5\text{V}$, $I_D=6.0\text{A}$

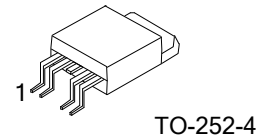
* P-channel:

-19A, -30V, $R_{DS(on)} \leq 38 \text{ m}\Omega$ @ $V_{GS}=-10\text{V}$, $I_D=-6.0\text{A}$

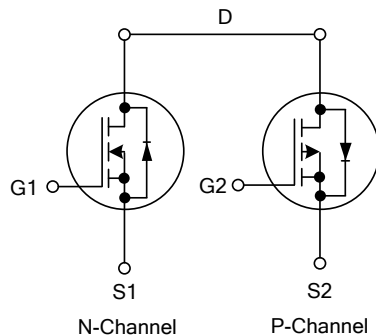
-19A, -30V, $R_{DS(on)} \leq 64 \text{ m}\Omega$ @ $V_{GS}=-4.5\text{V}$, $I_D=-5.0\text{A}$

* High switching speed

* Low gate charge



SYMBOL



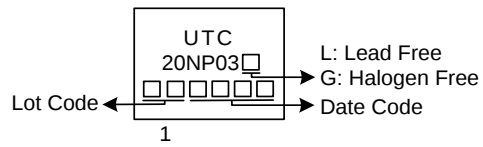
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment					Packing
Lead Free	Halogen Free		1	2	3	4	5	
20NP03L-TN4-R	20NP03G-TN4-R	TO-252-4	S1	G1	D	S2	G2	Tape Reel

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

20NP03G-TN4-R	(1)Packing Type (2)Package Type (3)Green Package	(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-channe	
Drain-Source Voltage			V _{DSS}	30	-30	V
Gate-Source Voltage			V _{GSS}	±20	±20	V
Drain Current	Continuous	T _C =25°C	I _D	25	-19	A
		T _C =70		20	-15	A
		T _A =25°C		9	-7	A
		T _A =70		7	-5.7	A
	Pulsed (Note 2)		I _{DM}	65	-45	A
Avalanche Current			I _{AS}	19	-18	A
Avalanche Energy		L=0.1mH	E _{AS}	18	17	mJ
Power Dissipation	T _C =25°C		P _D	21		W
	T _C =70			13		W
	T _A =25°C			3		W
	T _A =70			2		W
Junction Temperature			T _J	-55 ~ +150		°C
Storage Temperature			T _{STG}	-55 ~ +150		°C
Lead Temperature (1/16" from case for 10 sec.)			T _L	275		°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 CHARACTERISTICS

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Case	θ_{JC}	6	$^{\circ}\text{C/W}$
Junction to Ambient	θ_{JA}	42	$^{\circ}\text{C/W}$

Note: Pulse width limited by maximum junction temperature.

■ ELECTRICAL CHARACTERISTICS (Cont.)

N-channel

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250uA, V _{GS} =0V	30			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =24V, V _{GS} =0V			1	μA
			V _{DS} =20V, V _{GS} =0V, T _J =55°C			10	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	1.7	2.5	V
Static Drain-Source On-State Resistance (Note 1)		R _{DS(ON)}	V _{GS} =10V, I _D =7.0A			18	mΩ
			V _{GS} =4.5V, I _D =6.0A			28	mΩ
Forward Transconductance (Note 1)		g _{FS}	V _{DS} =10V, I _D =7.0A		29		S
On-State Drain Current (Note 1)		I _{D(ON)}	V _{GS} =10V, V _{DS} =5.0V	65			A
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		670		pF
Output Capacitance		C _{OSS}			160		pF
Reverse Transfer Capacitance		C _{RSS}			155		pF
Gate Resistance		R _G	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		2		Ω
SWITCHING PARAMETERS							
Total Gate Charge (Note 2)		Q _G	V _{GS} =10V, V _{DS} =30V(BR)DSS, I _D =1A, I _G =100uA		106		nC
Gate to Source Charge Note 2)		Q _{GS}			5		nC
Gate to Drain Charge Note 2)		Q _{GD}			10.5		nC
Turn-ON Delay Time (Note 2)		t _{D(ON)}	V _{DS} =30V, V _{GS} =10V, I _D =0.5A, R _G =25Ω		40		ns
Rise Time (Note 2)		t _R			75		ns
Turn-OFF Delay Time (Note 2)		t _{D(OFF)}			365		ns
Fall-Time (Note 2)		t _F			205		ns
SOURCE TO DRAIN DIODE SPECIFICATIONS							
Continuous Current		I _S				9	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =I _F , V _{GS} =0V			1	V

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

P-channel

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =-250uA, V _{GS} =0V	-30			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =-24V, V _{GS} =0V			-1	μA
			V _{DS} =-20V, V _{GS} =0V, T _J =55°C			-10	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	-1.6	-2.5	V
Static Drain-Source On-State Resistance (Note 1)		R _{DS(ON)}	V _{GS} =-10V, I _D =-6.0A		35	38	mΩ
			V _{GS} =-4.5V, I _D =-5.0A			64	mΩ
Forward Transconductance		g _{FS}	V _{DS} =-10V, I _D =-6.0A		15		S
On-State Drain Current (Note 1)		I _{D(ON)}	V _{GS} =-5V, V _{DS} =-10V	-45			A
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =-25V, f=1.0MHz		605		pF
Output Capacitance		C _{OSS}			110		pF
Reverse Transfer Capacitance		C _{RSS}			75		pF
Gate Resistance		R _G	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		6.27		Ω
SWITCHING PARAMETERS							
Total Gate Charge (Note 2)		Q _G	V _{GS} =-10V, V _{DS} =-30V _{(BR)DSS} , I _D =-1A, I _G =100uA		60		nC
Gate to Source Charge Note 2)		Q _{GS}			2.5		nC
Gate to Drain Charge Note 2)		Q _{GD}			6		nC
Turn-ON Delay Time (Note 2)		t _{D(ON)}	V _{DS} =-30V, V _{GS} =-10V, I _D =-0.5A, R _G =25Ω		60		ns
Rise Time (Note 2)		t _R			84		ns
Turn-OFF Delay Time (Note 2)		t _{D(OFF)}			560		ns
Fall-Time (Note 2)		t _F			305		ns
SOURCE TO DRAIN DIODE SPECIFICATIONS							
Continuous Current		I _S				-7	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =I _F , V _{GS} =0V			-1	V

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

2. Independent of operating temperature.

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