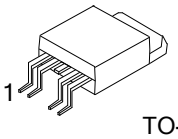
20NP03

Power MOSFET

N AND P-CHANNEL ENHANCEMENT MODE FIELD DFFECT TRANSISTOR



TO-252-4

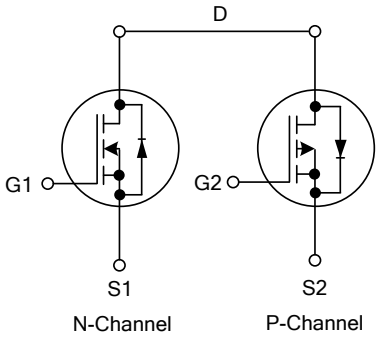
■ DESCRIPTION

The UTC **20NP03** 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:
  25A, 30V, $R_{DS(on)}$ ≤ 18 mΩ @ V_{GS}=10V, I_D=7.0A
  25A, 30V, $R_{DS(on)}$ ≤ 28 mΩ @ V_{GS}=4.5V, I_D=6.0A
* P-channel:
  -19A, -30V, $R_{DS(on)}$ ≤ 38 mΩ @ V_{GS}=-10V, I_D=-6.0A
  -19A, -30V, $R_{DS(on)}$ ≤ 64 mΩ @ V_{GS}=-4.5V, I_D=-5.0A
* High switching speed
* Low gate charge

■ SYMBOL



■ ORDERING INFORMATION

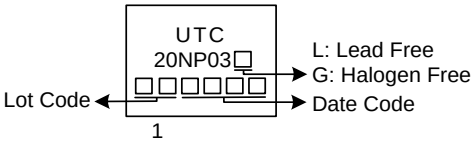
Ordering Number		Package	Pin Assignment					Packing
Lead Free	Halogen Free		1	2	3	4	5	
20NP03L-TN4-R	20NP03G-TN4-R	TO-252-4	S1	G1	D	S2	G2	Tape Reel

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

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_C=25°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	°C/W
Junction to Ambient	θ_{JA}	42	°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}=30$V_{(BR)DSS}$, 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°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}=-30$V_{(BR)DSS}$, 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 ≤ 300μs, Duty Cycle ≤ 2%.
2. Independent of operating temperature.