Wuxi Unigroup Microelectronics CO.,LTD.

40V N-Channel Trench MOSFET(Preliminary)

General Description

- Trench Power technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- Optimized for fast-switching applications

Applications

- Synchronous Rectification in DC/DC and AC/DC Converters
- Isolated DC/DC Converters in Telecom and Industrial

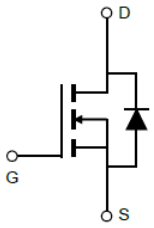
Product Summary

V_{DS}	40V
I_D (at V_{GS}=10V)	70A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 6.4mΩ
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 9.4mΩ

100% UIS Tested

RoHS

TO-220



Part Number	Package Type	Form	Marking
TTP70N04AT	TO-220	Tube	70N04AT

Absolute Maximum Ratings (T_A =25°C unless otherwise noted)

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [B]	T_C =25°C	I_D	70	A
	T_C =100°C		49	
Pulsed Drain Current [A]		I_{DM}	210	A
Avalanche Current [A]		I_{AS}	21	A
Single Pulse Avalanche Energy L =0.3mH [A]		E_{AS}	66.2	mJ
Power Dissipation [C]	T_C =25°C	P_D	108	W
	T_C =100°C		70	W
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

Thermal Characteristics

Parameter		Symbol	Maximum	Units
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	1.32	°C/W
Maximum Junction-to-Ambient	Steady-State	$R_{\theta JA}$	100	

Electrical Characteristics(T_J =25ºC unless otherwise noted)

Symbol	Parameter	Conditions		Value			Units
				Min	Typ	Max	
STATIC PARAMETERS							
BV_{DSS}	Drain-Source Breakdown Voltage	I_D =250μA,V_{GS} =0V		40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =40V, V_{GS} =0V	T_J =25ºC			1	μA
			T_J =100ºC			25	
I_{GSS}	Gate-Body Leakage Current	V_{DS} =0V, V_{GS} =±20V				±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} =V_{GS}, I_D =250μA		1	1.7	2.4	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} =10V, I_D =30A			4.7	6.4	mΩ
		V_{GS} =4.5V, I_D =30A			7	9.4	mΩ
g_{FS}	Forward Transconductance	V_{DS} =10V, I_D =20A			26.4		S
V_{SD}	Diode Forward Voltage	I_S =30A, V_{GS} =0V				1	V
I_S	Maximum Body-Diode Continuous Current [B]					70	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS} =0V, V_{DS} =20V, f =1MH_Z			3286		pF
C_{oss}	Output Capacitance				560		
C_{rss}	Reverse Transfer Capacitance				370		
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS} =10V,V_{DS} =20V, I_D =30A			57		nC
Q_{gs}	Gate Source Charge				10		
Q_{gd}	Gate Drain Charge				10		
$t_{D(on)}$	Turn-On Delay Time	V_{GS} =10V,V_{DS} =20V, I_D =30A, R_G =3Ω			7		ns
t_r	Turn-On Rise Time				4		
$T_{D(off)}$	Turn-Off Delay Time				25		
t_f	Turn-Off Fall Time				5		
t_{rr}	Body Diode Reverse Recovery Time	I_F =20A, di/dt =100A/μs			15.5		ns
Q_{rr}	Body Diode Reverse Recovery Charge				31		nC

A. Single pulse width limited by maximum junction temperature.

B. The maximum current rating is package limited.

C. The power dissipation P_D is based on $T_{J(MAX)}$ =175ºC, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

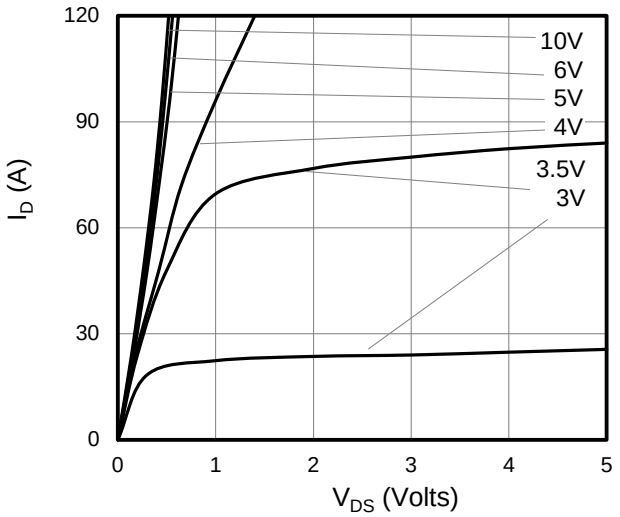


Figure 1: On-Region Characteristics

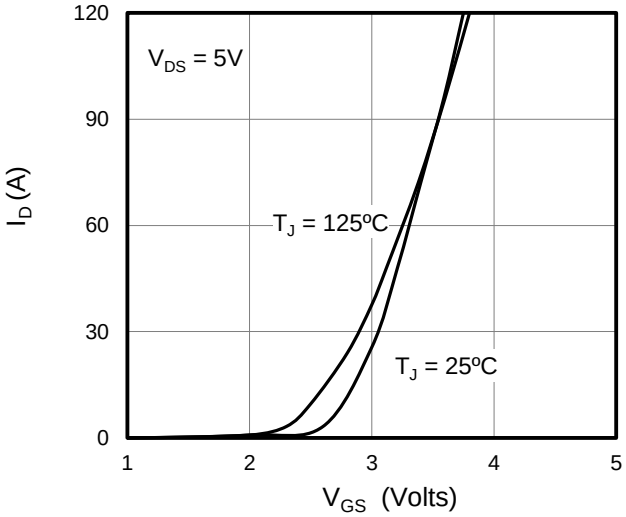


Figure 2: Transfer Characteristics

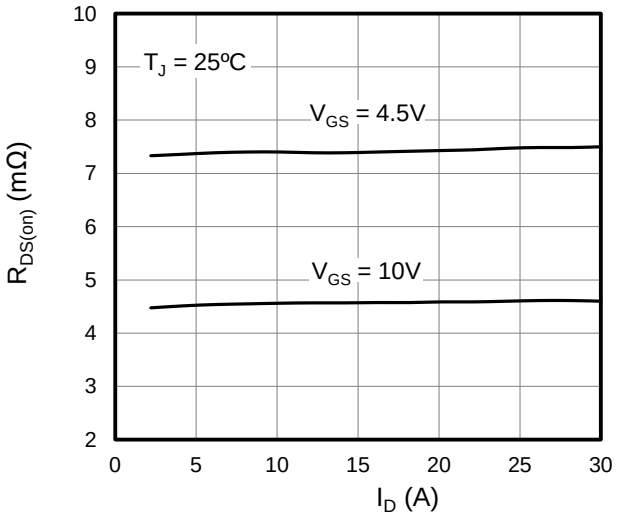


Figure 3: On-Resistance vs. Drain Current

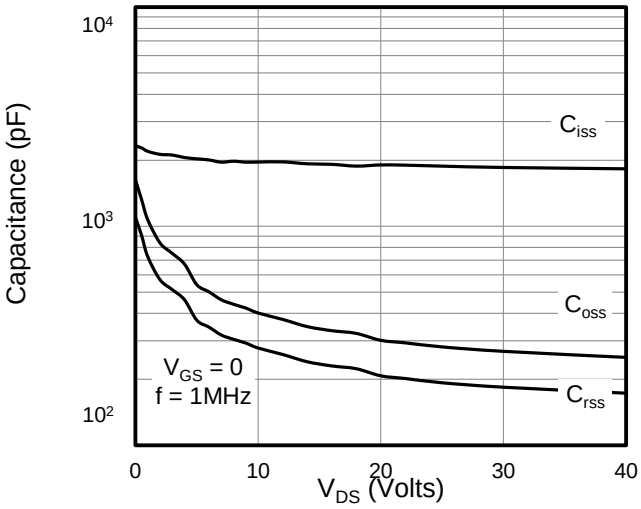


Figure 4: Capacitance Characteristics

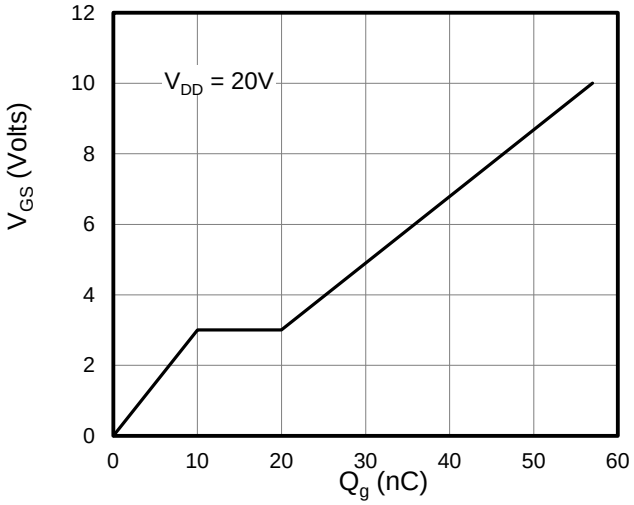


Figure 5: Gate Charge Characteristics

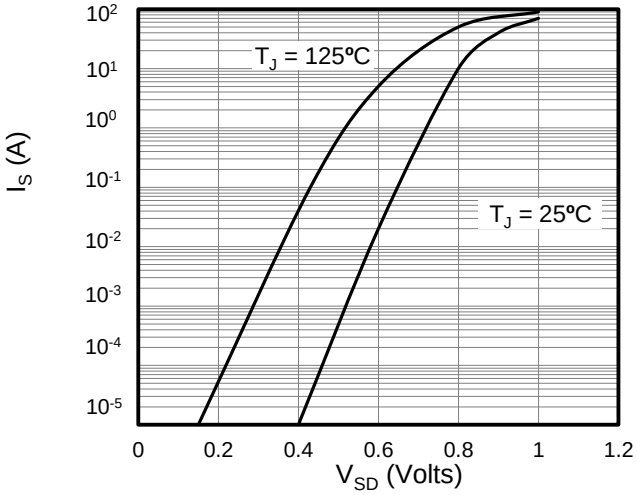


Figure 6: Body Diode Forward Voltage

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

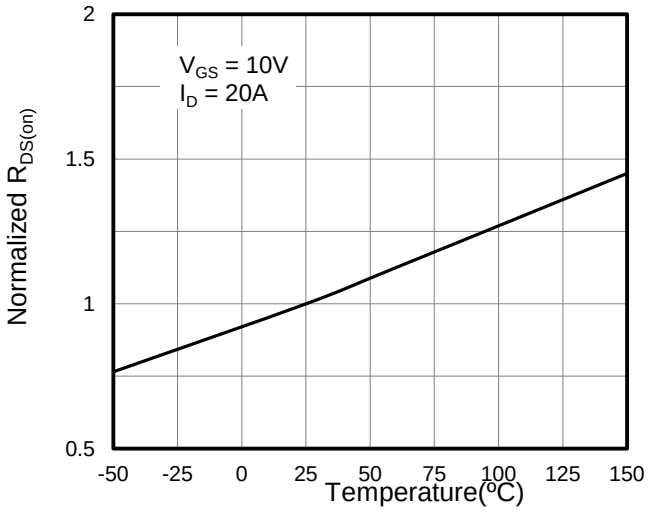


Figure 7: On-Resistance vs. Junction Temperature

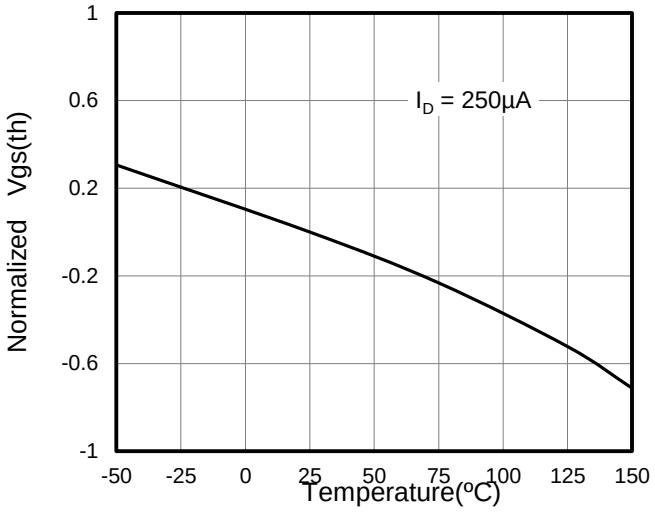


Figure 8: Vgs(th) vs. Junction Temperature

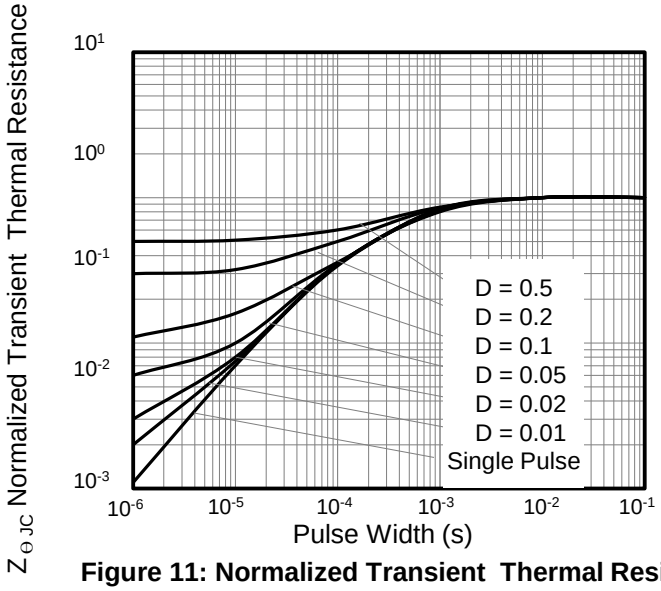


Figure 11: Normalized Transient Thermal Resistance

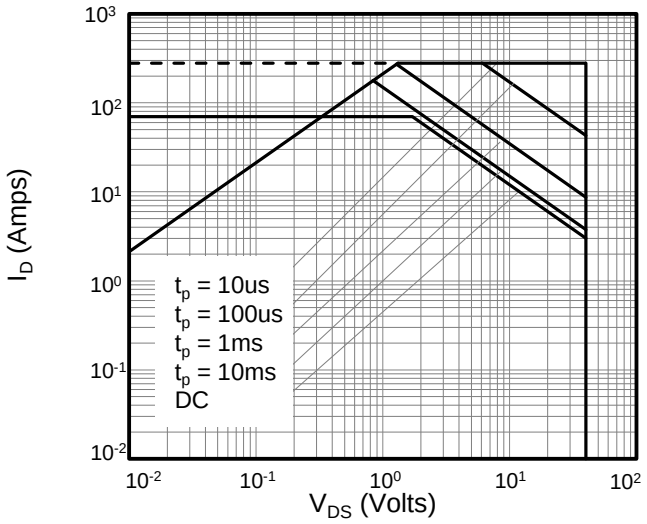


Figure 12: Safe Operating Area

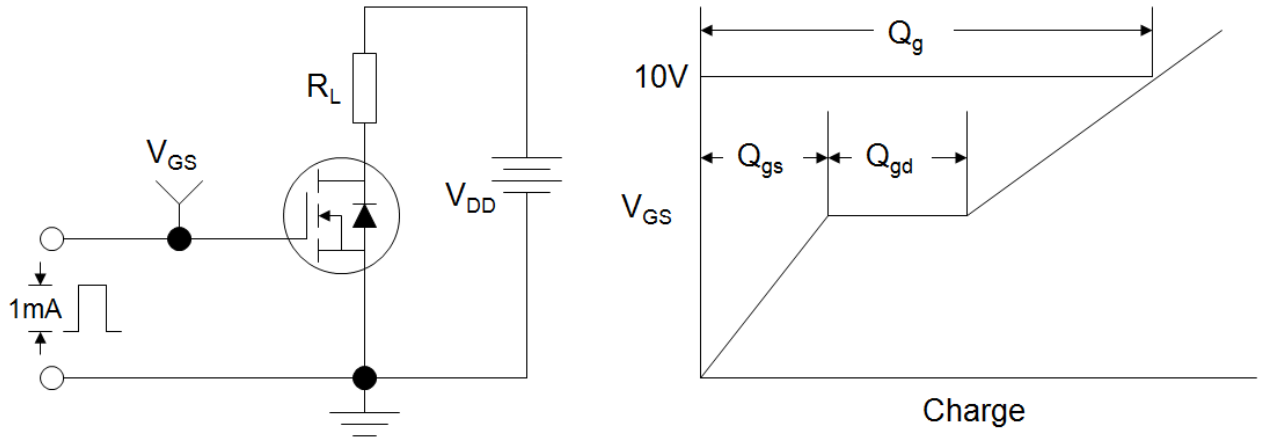


Figure A：Gate Charge Test Circuit and Waveforms

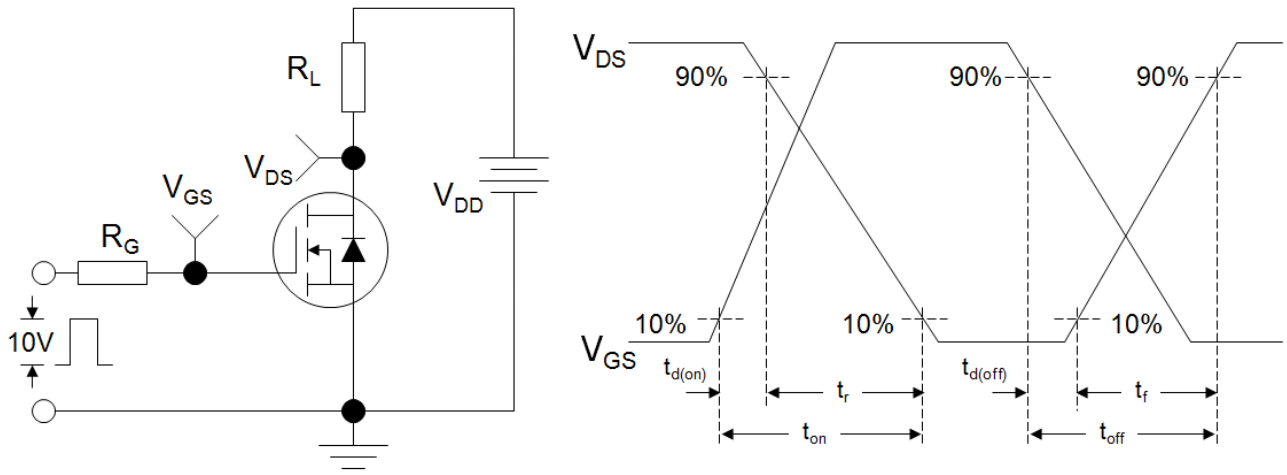


Figure B：Resistive Switching Test Circuit and Waveforms

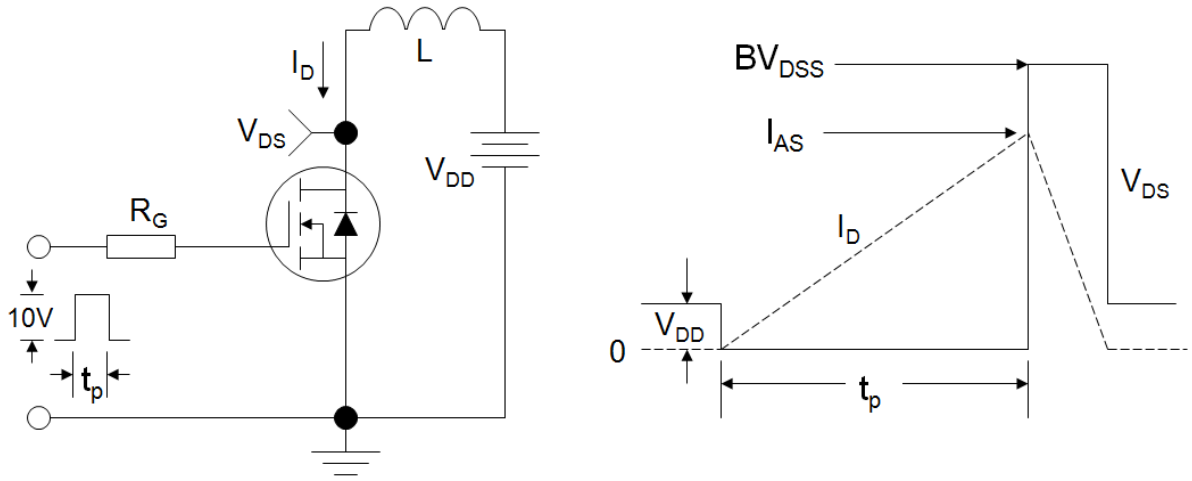
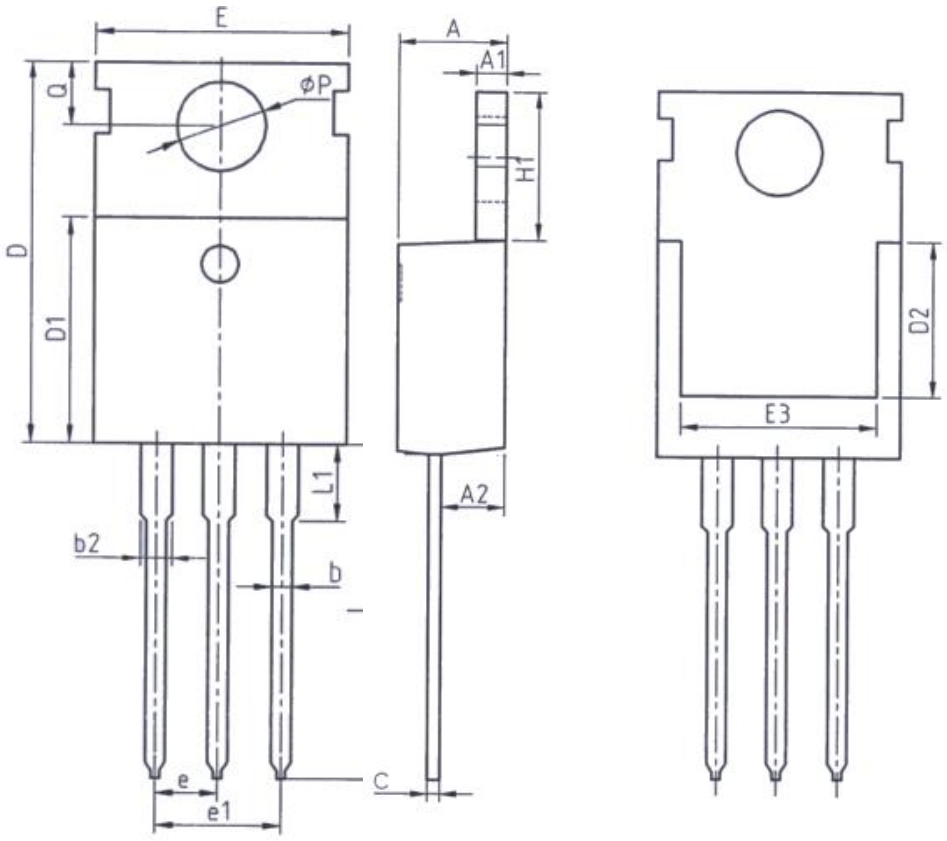


Figure C：Unclamped Inductive Switching (UIS) Test Circuit and Waveforms

TO-220(华天)



Unit: mm		
Symbol	Min.	Max.
A	4.37	4.77
A1	1.25	1.45
A2	2.20	2.60
b	0.70	0.95
b2	1.17	1.47
c	0.40	0.65
D	15.10	16.10
D1	8.80	9.40
D2	5.50	–

Unit: mm		
Symbol	Min.	Max.
E	9.70	10.30
E3	7.00	–
e	2.54BSC	
e1	5.08BSC	
H1	6.25	6.85
L	12.75	13.80
L1	–	3.40
P	3.40	3.80
Q	2.60	3.00

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