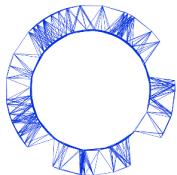


Experiment



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A1-1
English (Official)

Write down the numbers 0 to 9 in the following table:

0	1	2	3	4	5	6	7	8	9

Part A: Circuit Dimensioning (2.5 points)

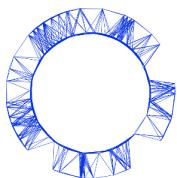
A.1 (0.2 pt)

$$V_{\text{out}} =$$

A.2 (0.5 pt)

#	R_{T1}	R_{T2}	R_{T3}
\bar{R}			
σ_R			

Experiment



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A1-2
English (Official)

A.3 (0.3 pt)

Demonstration:

A.4 (0.4 pt)

$$R_{\square} = \quad \pm$$

$$\rho_{\text{Carbon film}} = \quad \pm$$

A.5 (0.5 pt)

Demonstration:

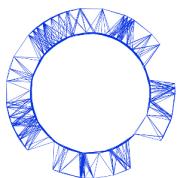
Measured values:

$$R_1 =$$

$$R_2 =$$

$$\kappa =$$

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A1-3
English (Official)

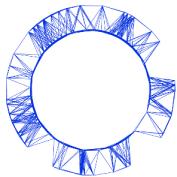
A.6 (0.3 pt)

R_1 Points	R_x	R_y	R_2 Points	R_x	R_y
Z			Z		
A			H		
B			I		
C			J		
D			K		
E			L		
F			M		
G			N		
V			W		

A.7 (0.3 pt)

Points	V_{out}	Points	V_{out}
A		H	
B		I	
C		J	
D		K	
E		L	
F		M	
G		N	
V		W	

Experiment



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A1-4
English (Official)

Part B: Characteristic Curves of the JFET transistor (4.5 points)

B.1 (0.2 pt)

$$I_{DS} =$$

B.2 (0.8 pt)

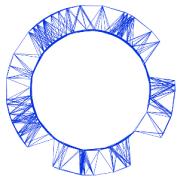
I_{DS} current values:

Gate/Drain	Z	H	I	J	K	L	M	N	W
Z									
A									
B									
C									
D									
E									
F									
G									
V									

B.3 (0.2 pt)

$$f =$$

Experiment



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A1-5

English (Official)

B.4 (1.2 pt)

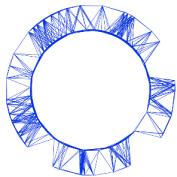
Use the empty columns to enter corrections factors you deem necessary.

Gate A: $V_{GS} =$ **DS:** $R_{DS} =$

Gate B: $V_{GS} =$

$$R_{\text{DS}} =$$

Experiment



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A1-6

English (Official)

B.4 (cont.)

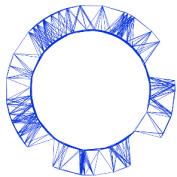
Gate C: $V_{GS} =$

$$R_{\text{DS}} =$$

Gate D: $V_{GS} =$

$$R_{\mathrm{DS}} =$$

Experiment



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Lisbon, Portugal

A1-7
English (Official)

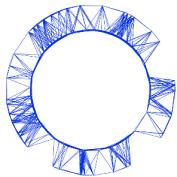
English (Official)

B.4 (cont.)

Gate E: $V_{GS} =$ $R_{DS} =$

Gate F: $V_{GS} =$ $R_{DS} =$

Experiment



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A1-8

English (Official)

B.4 (cont.)

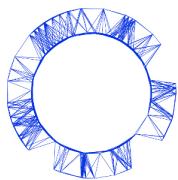
Gate G: $V_{GS} =$

$$R_{\text{DS}} =$$

Gate V: $V_{GS} =$

$$R_{\text{DS}} =$$

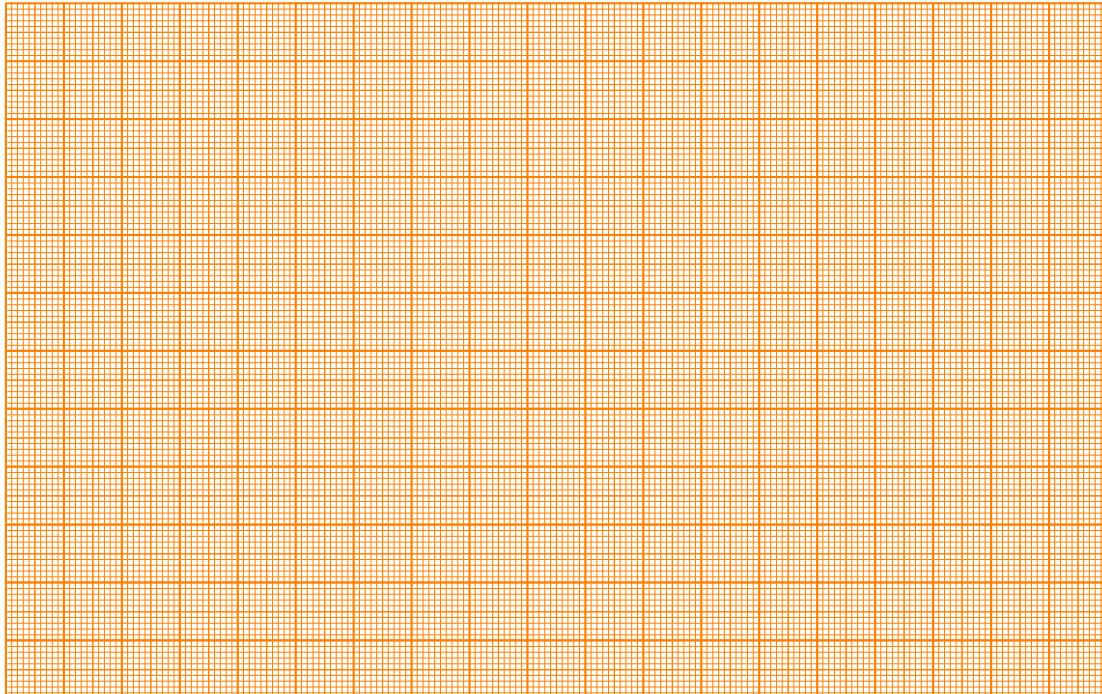
Experiment



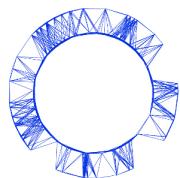
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A1-9
English (Official)

B.5 (0.5 pt)
Output curves:



Experiment



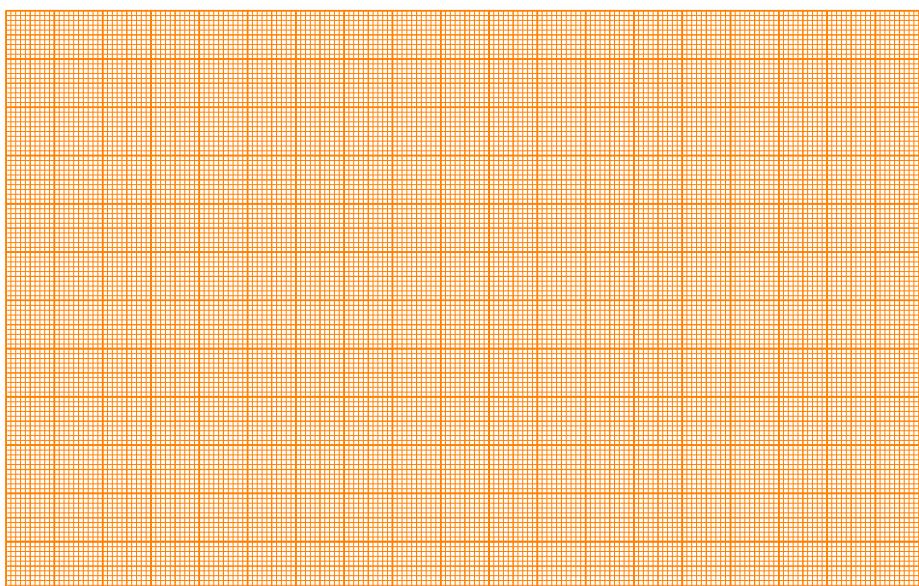
IPhO 2018
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A1-10
English (Official)

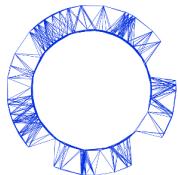
B.6 (0.5 pt)

V_{GS}	R_{DS}

Graph: $R_{DS}(V_{GS})$



Experiment



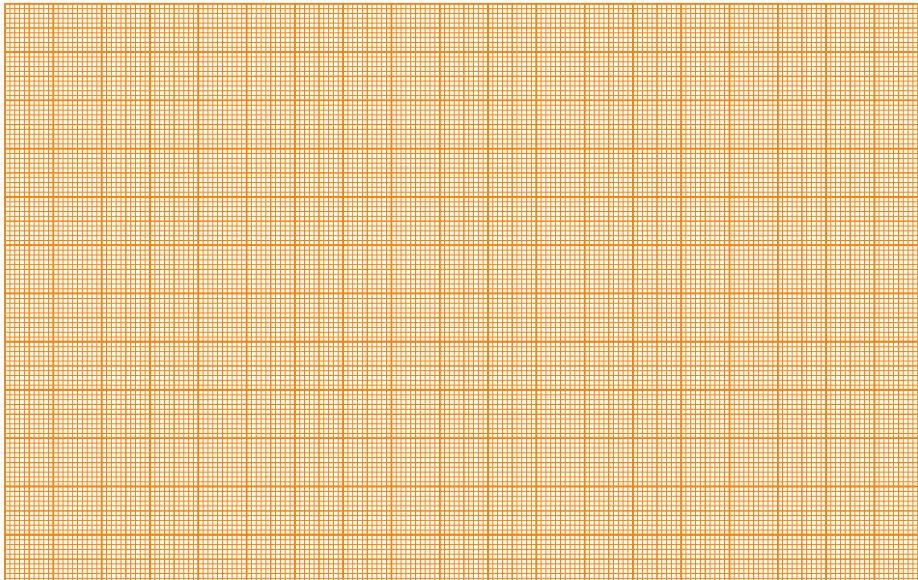
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A1-11

English (Official)

B.7 (0.3 pt)

Transfer curve:



B.8 (0.4 pt)

$$I_{\text{DSS}} =$$

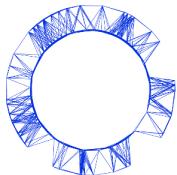
$$V_P =$$

B.9 (0.4 pt)

Measured transconductance: $g =$

Calculated transconductance from JFET model: $g =$

Experiment



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A1-12

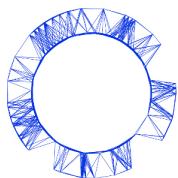
English (Official)

Part C: The Paper Thin Film Transistor (2.0 points)

C.1 (0.8 pt)

$$I_{\text{closed}} =$$

Experiment



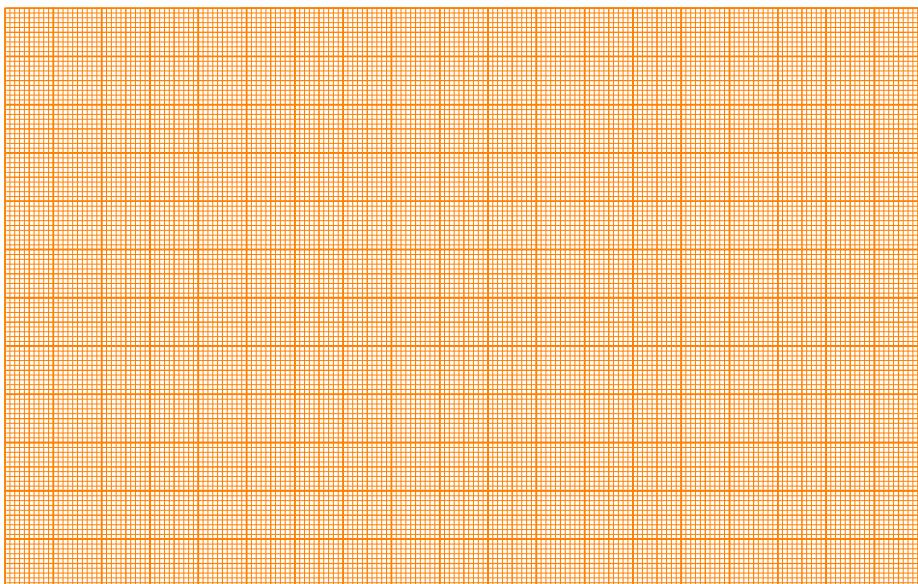
IPhO 2018
Lisbon, Portugal

A1-13

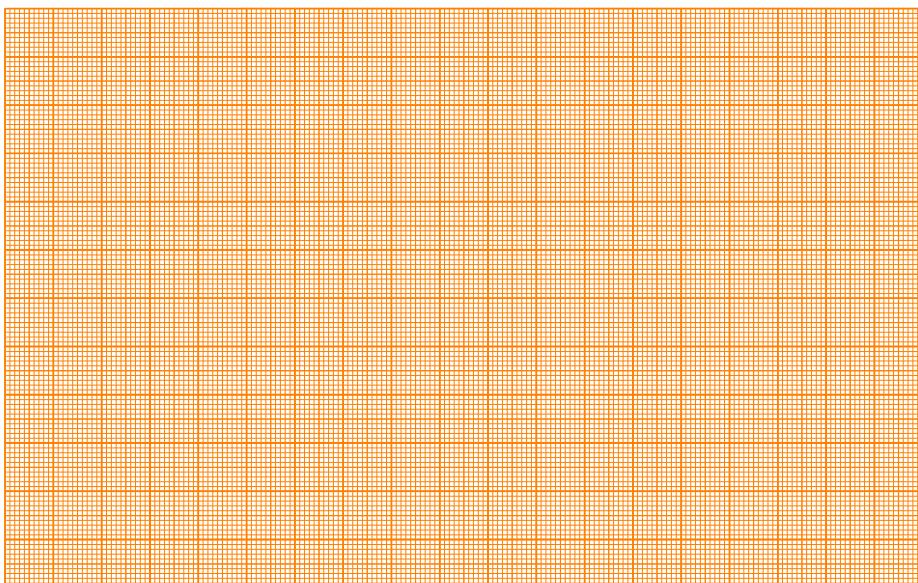
English (Official)

C.2 (1.2 pt)

Graph: $I_{DS}(t)$

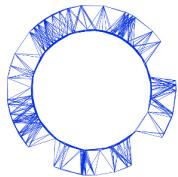


Auxiliary graph to determine τ_1 :



$$\tau_1 =$$

Experiment



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Lisbon, Portugal

A1-14

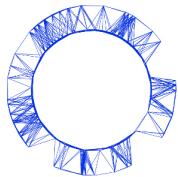
English (Official)

Part D: Inverter circuit (1.0 points)

D.1 (0.5 pt)

$$R_L =$$

Experiment



IPhO 2018
Lisbon, Portugal

A1-15

English (Official)

D.2 (0.5 pt)
Graph: $V_{\text{out}}(V_{\text{in}})$

