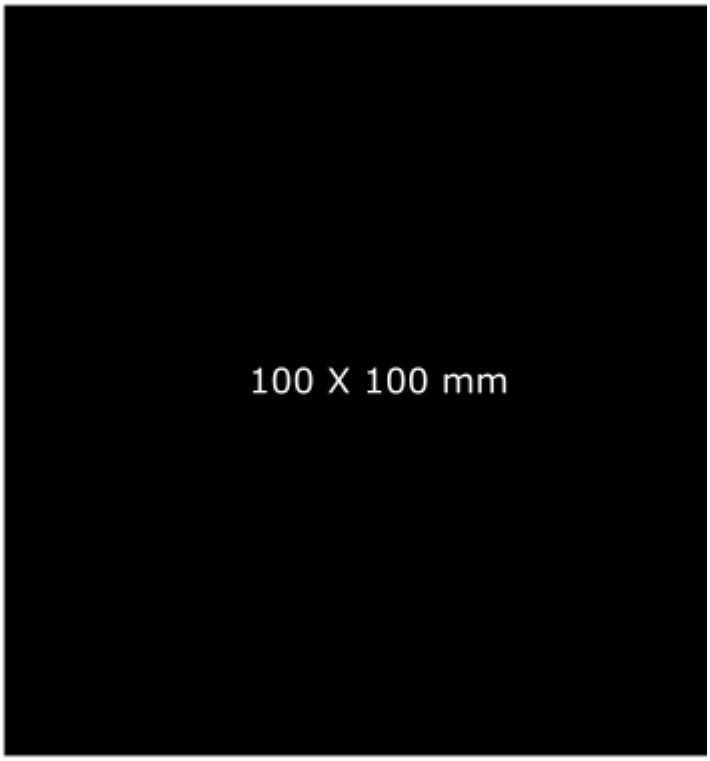
Opamp Instrumentation Amplifier

PART NUMBER	04A-020
GROUP NAME	Opamp Amplifiers (04A)
CIRCUIT NAME	Instrumentation Amplifier
VARIANT DESCRIPTION	Single Supply, THD, Gain Trimmer, DC Bias Trimmer, Testpoints
BOARD DESIGN	PCB50/100-A-07
PRODUCT DESCRIPTION	Panel of #04A-020 miniPCBs, v-scored (1 Panel = 2 Pieces)

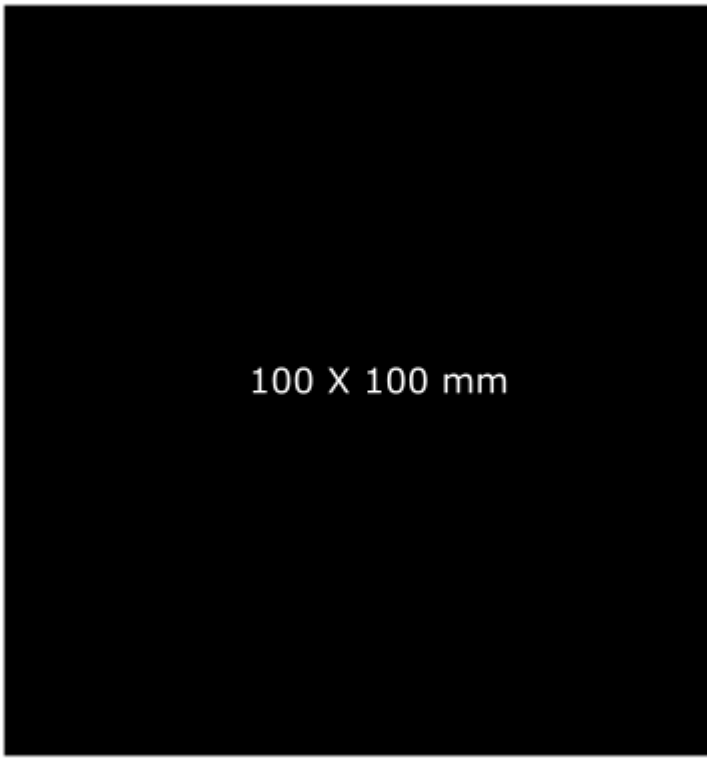
Circuit Description

This circuit amplifies a small voltage signal.

Panel Board



TOP VIEW



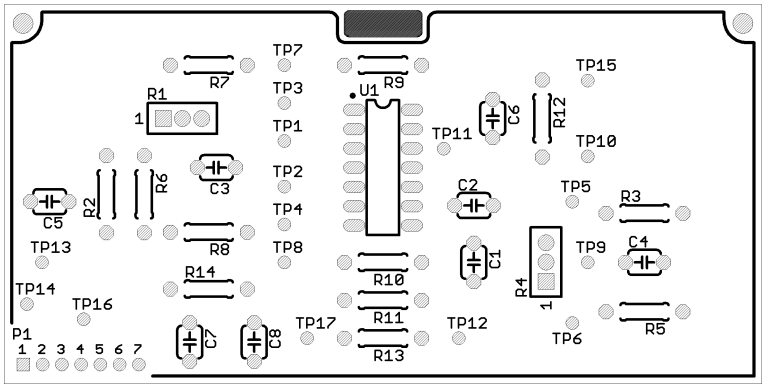
BOTTOM VIEW

Single Board

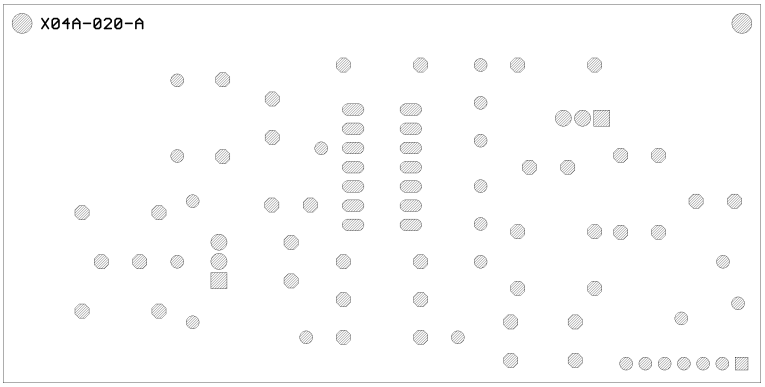
TOP VIEW

BOTTOM VIEW

Part Locations



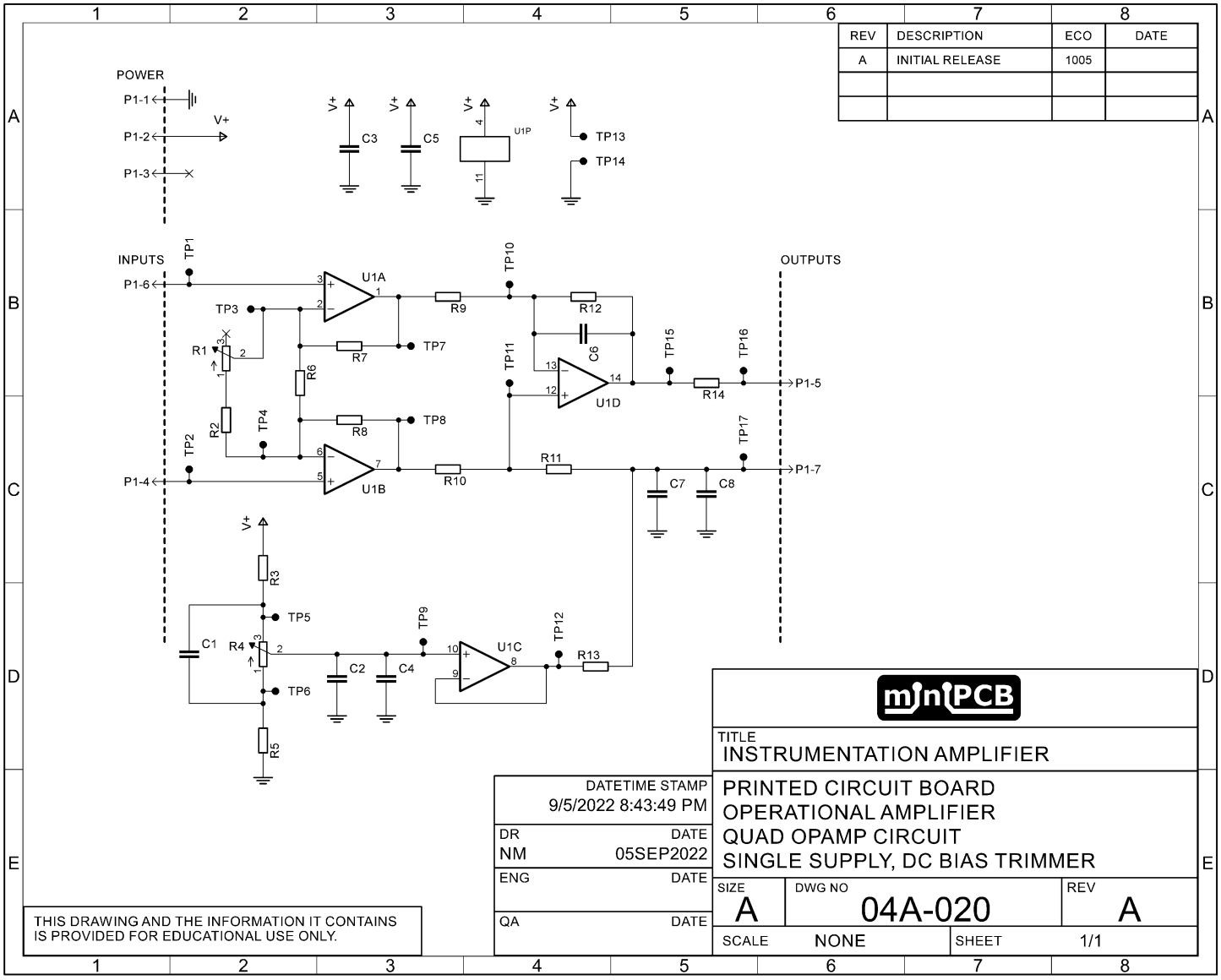
TOP VIEW



BOTTOM VIEW

Schematic

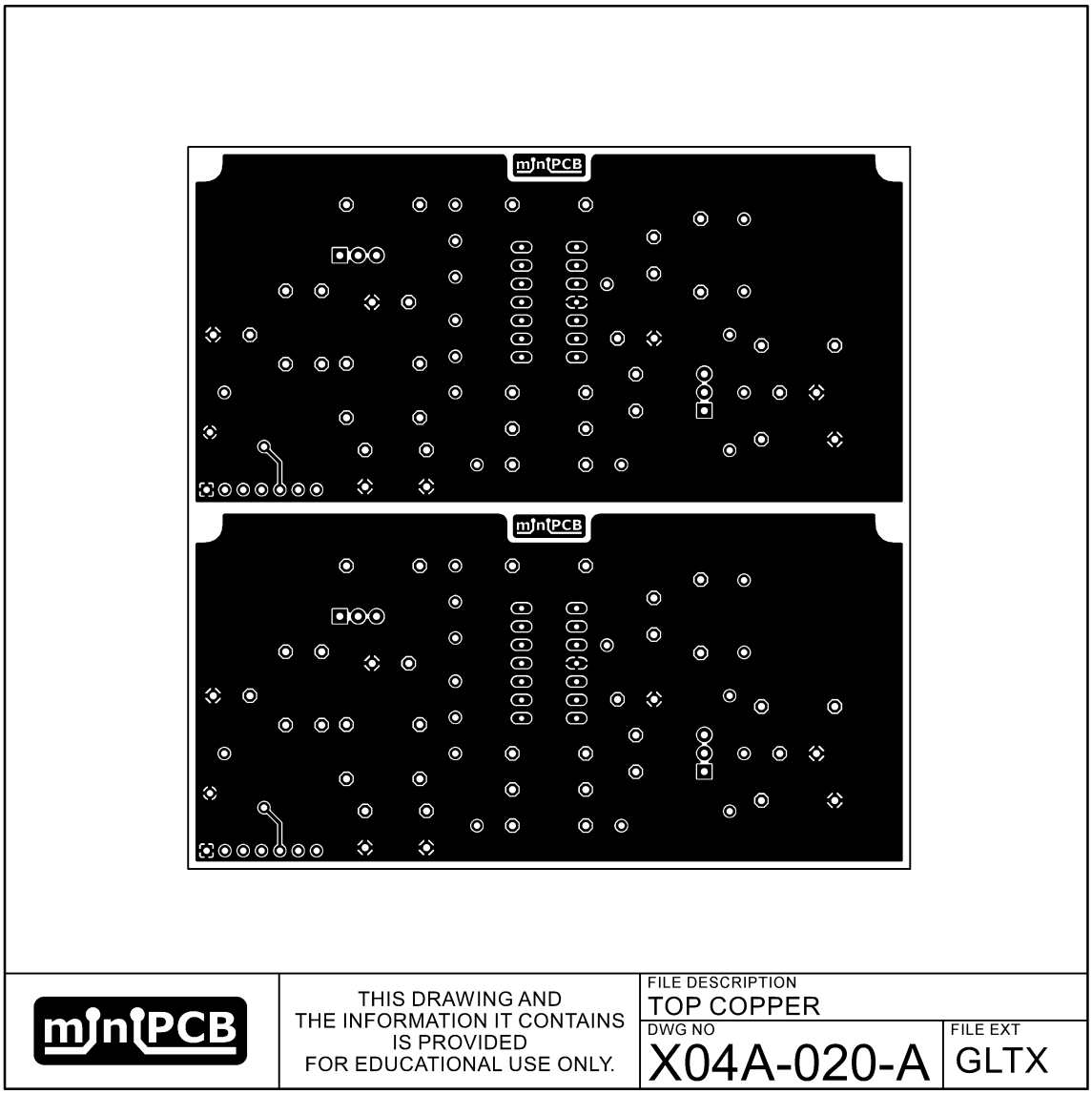
REV	DESCRIPTION	ECO	DATE
A	INITIAL RELEASE	1005	



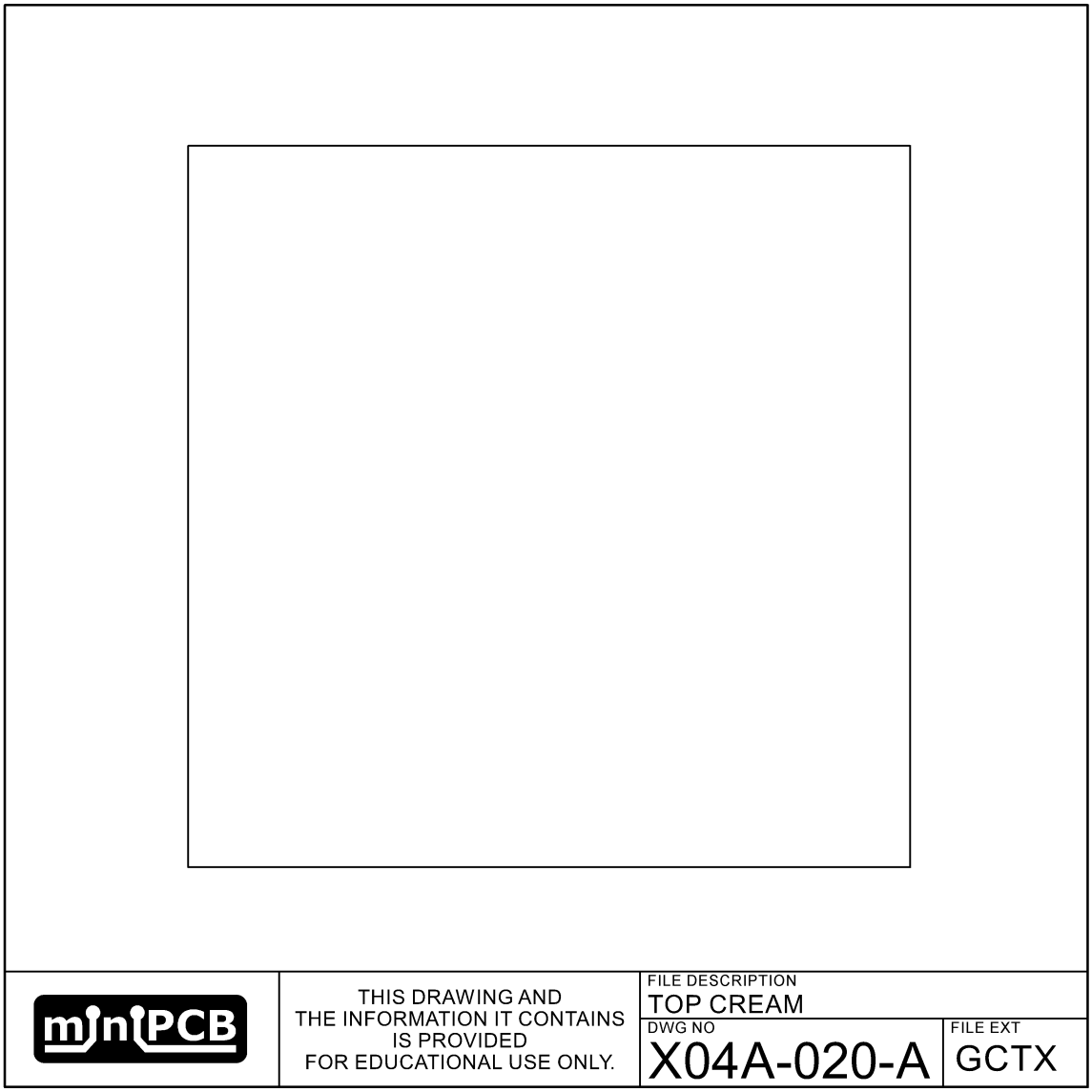
Gerber Files

This section contains images of the layers included in each Gerber file.

TOP COPPER (GLTX)



TOP CREAM (GCTX)



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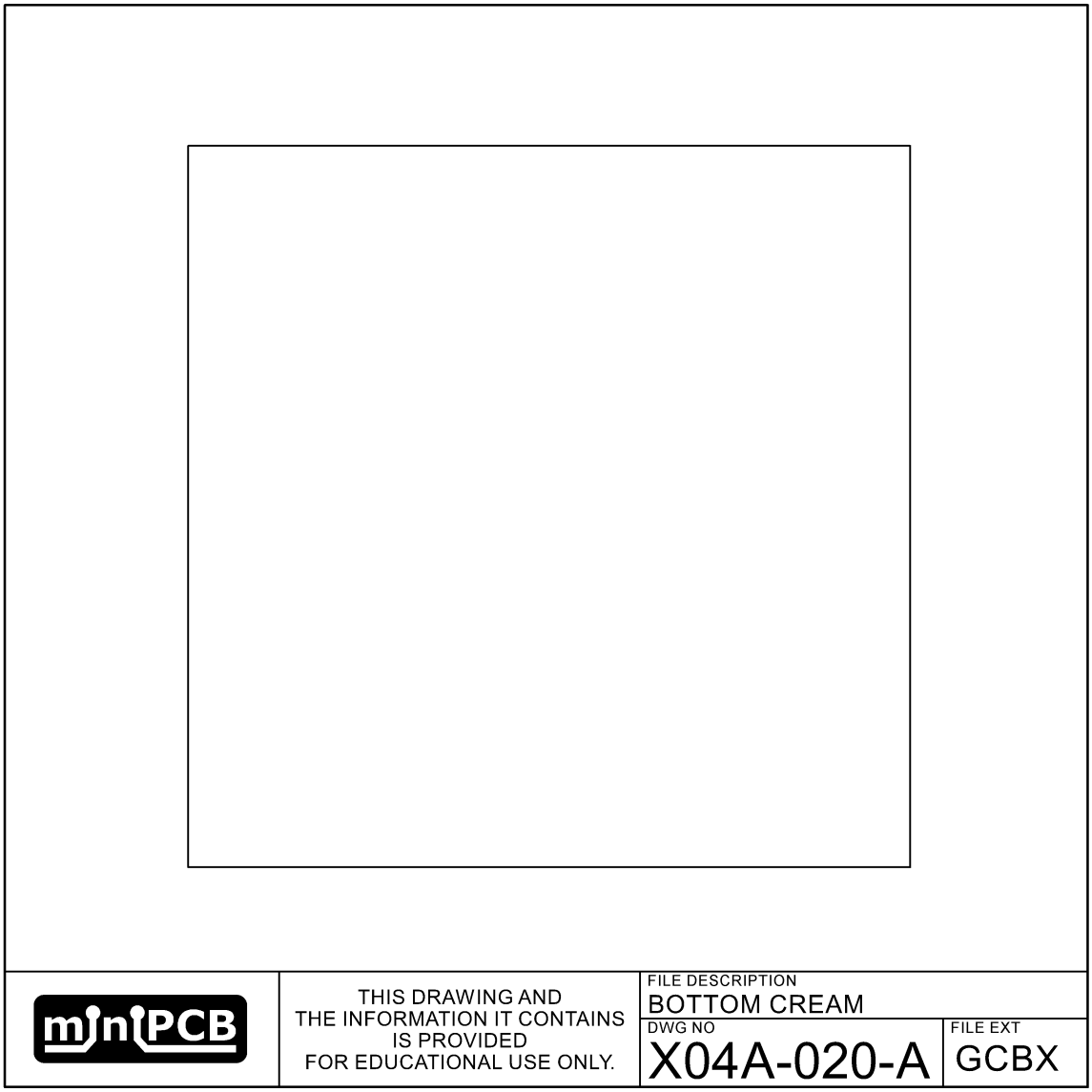

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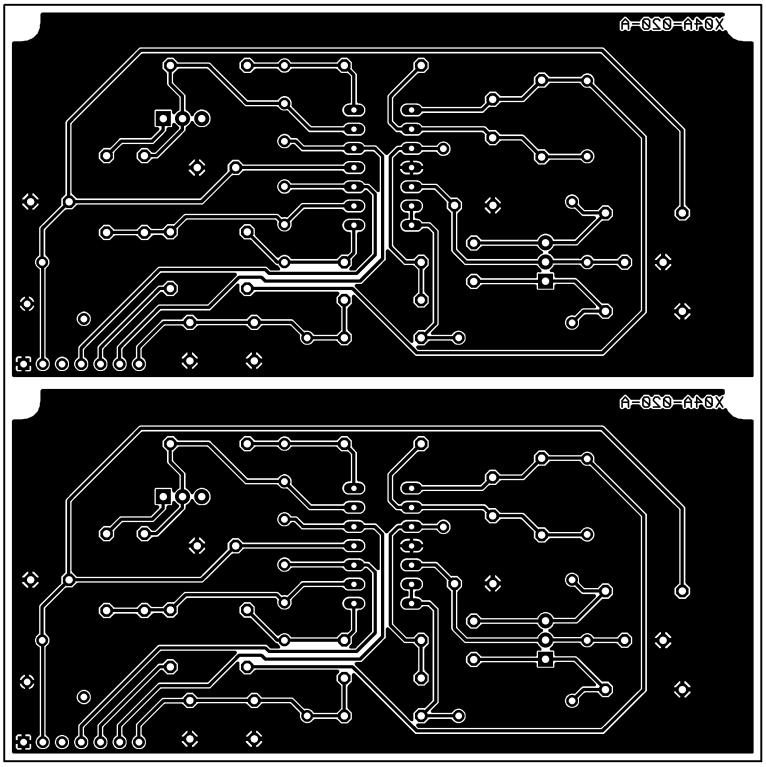

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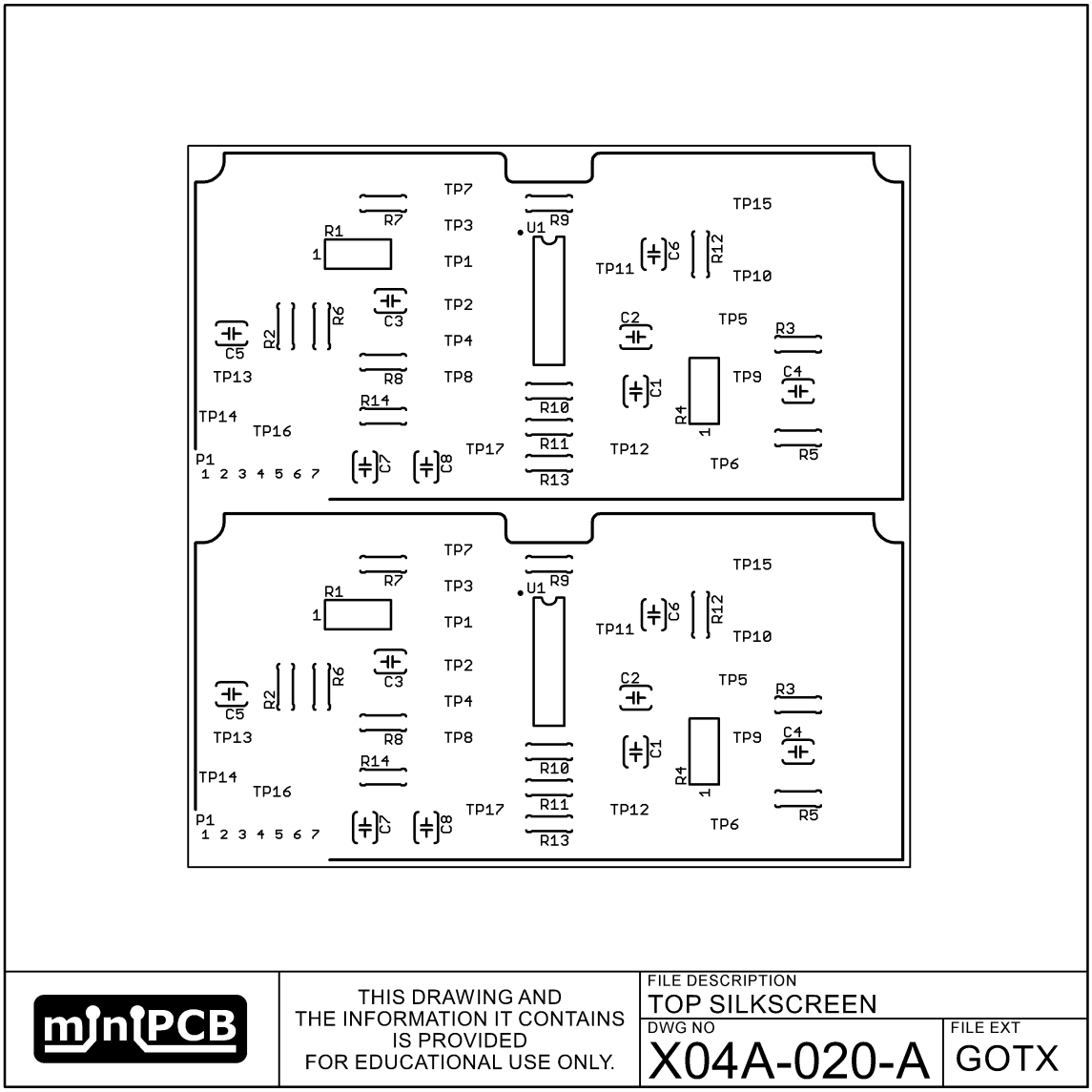
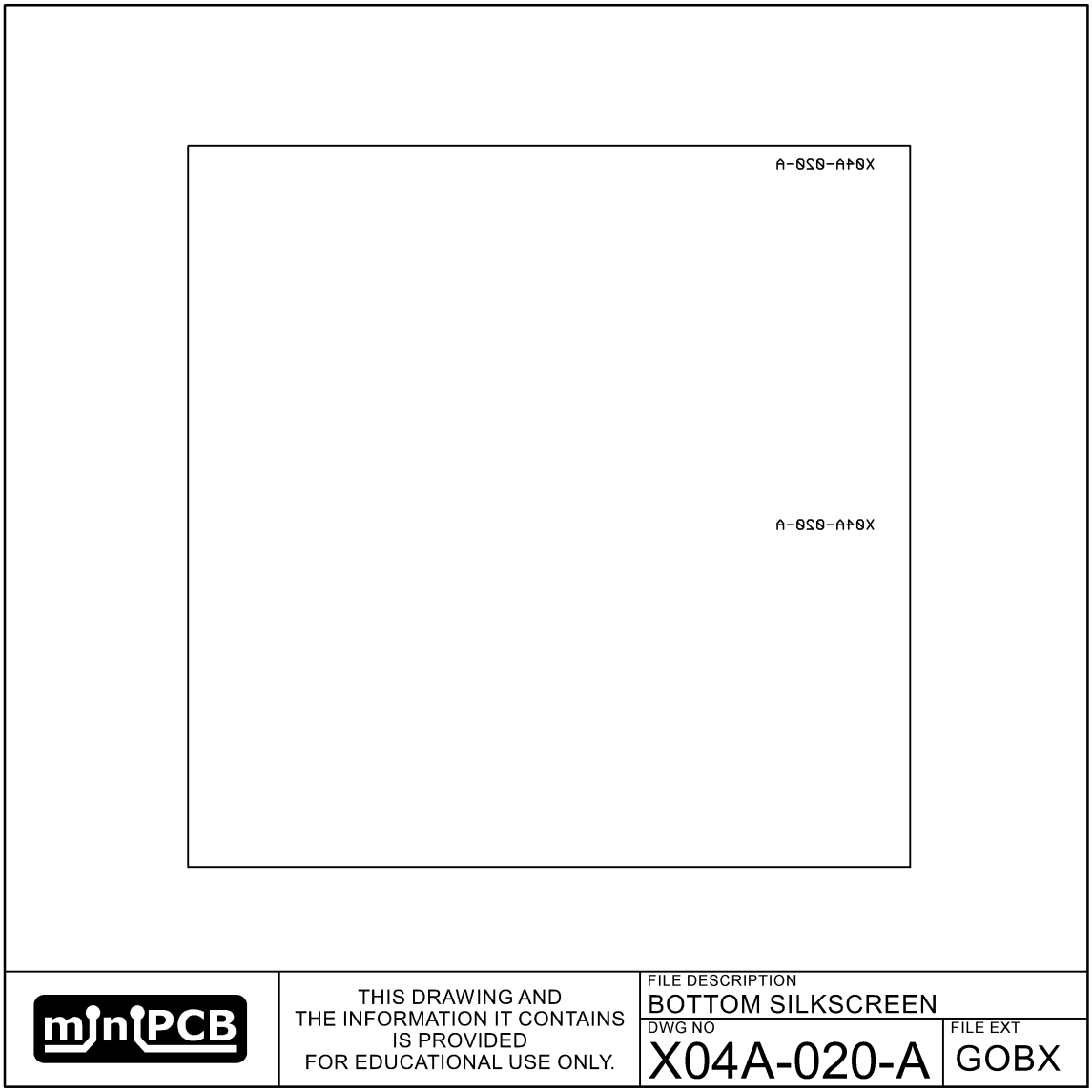
		DWG NO: X04A-020-A	FILE EXT: GLBX

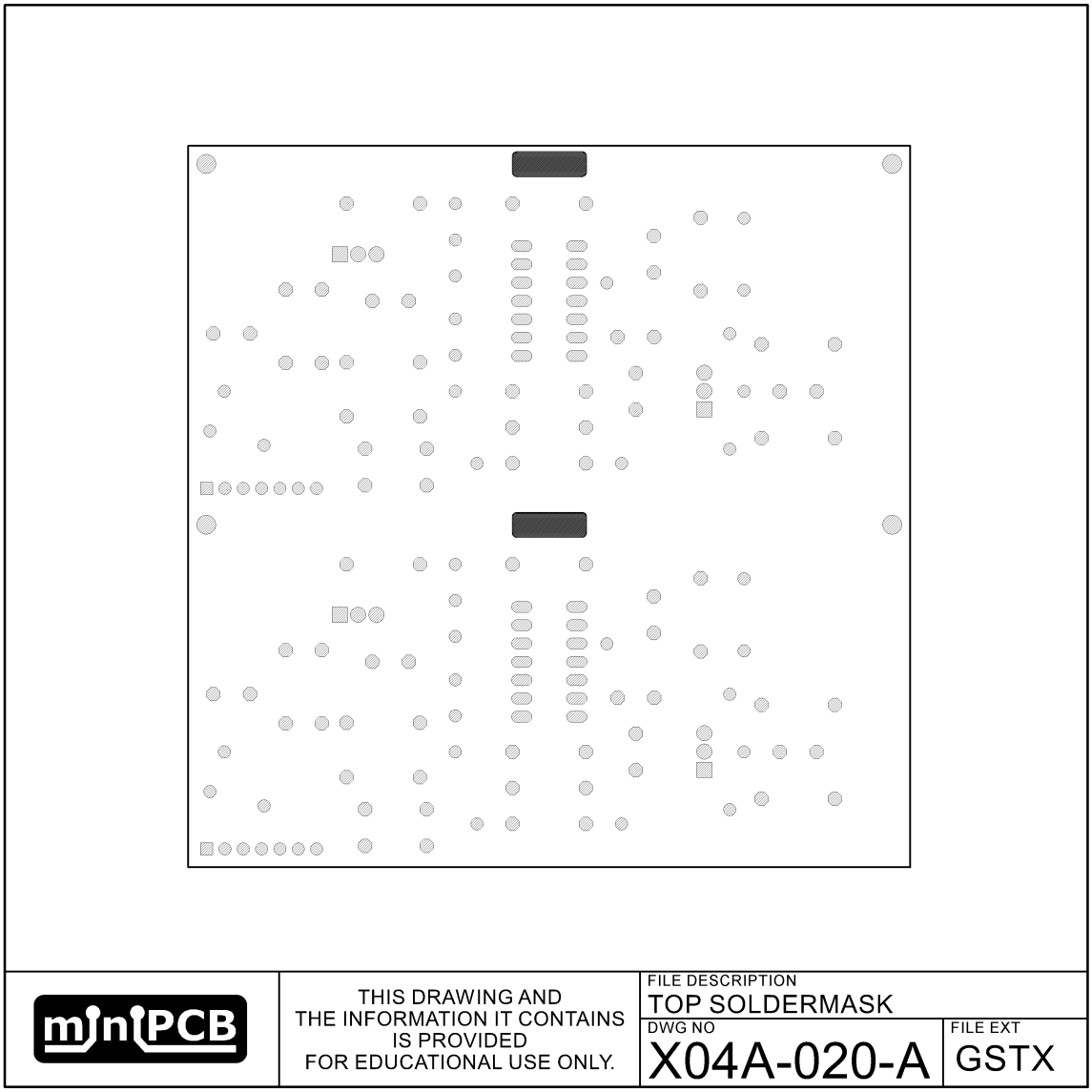
TOP SILKSCREEN (GOTX)



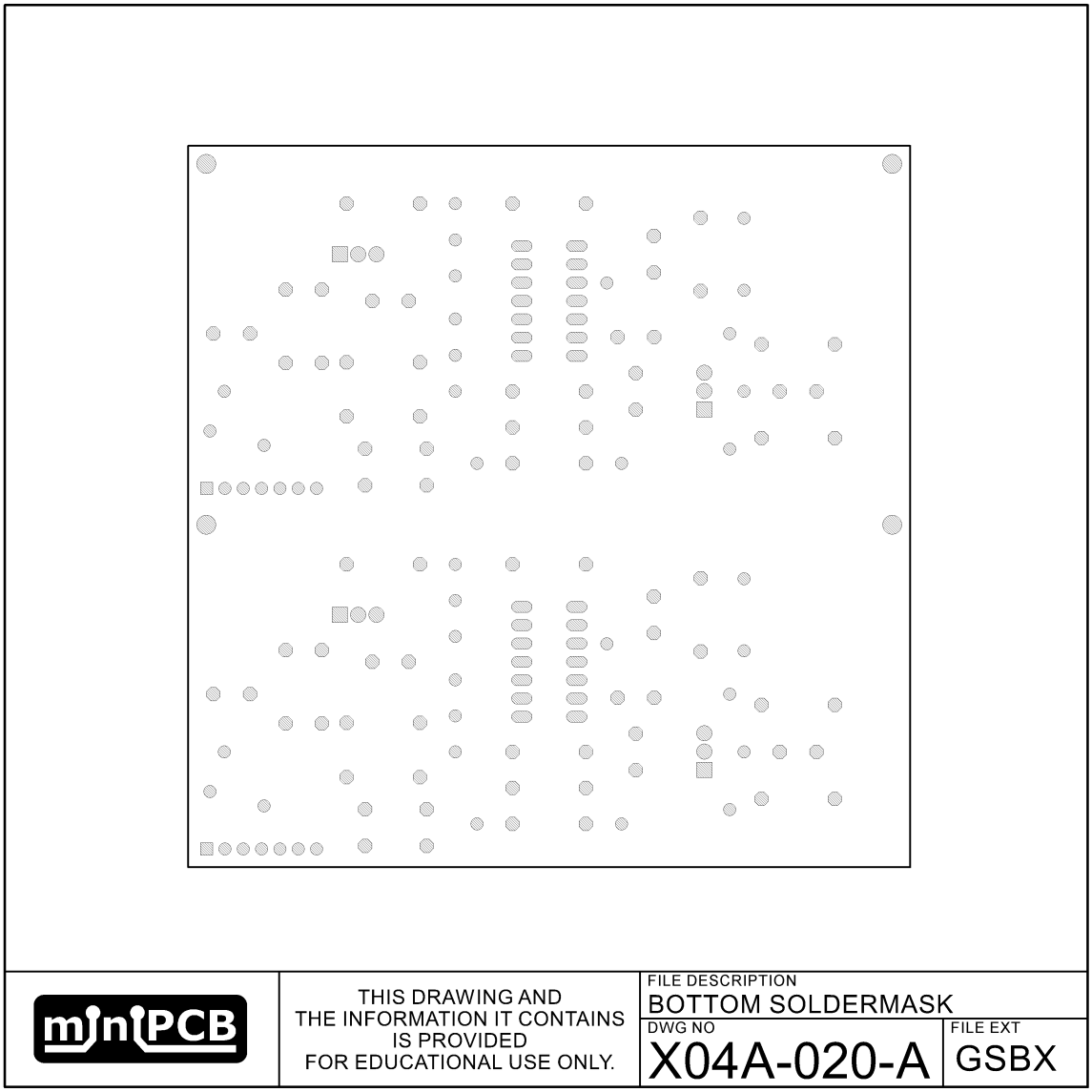
BOTTOM SILKSCREEN (GOBX)



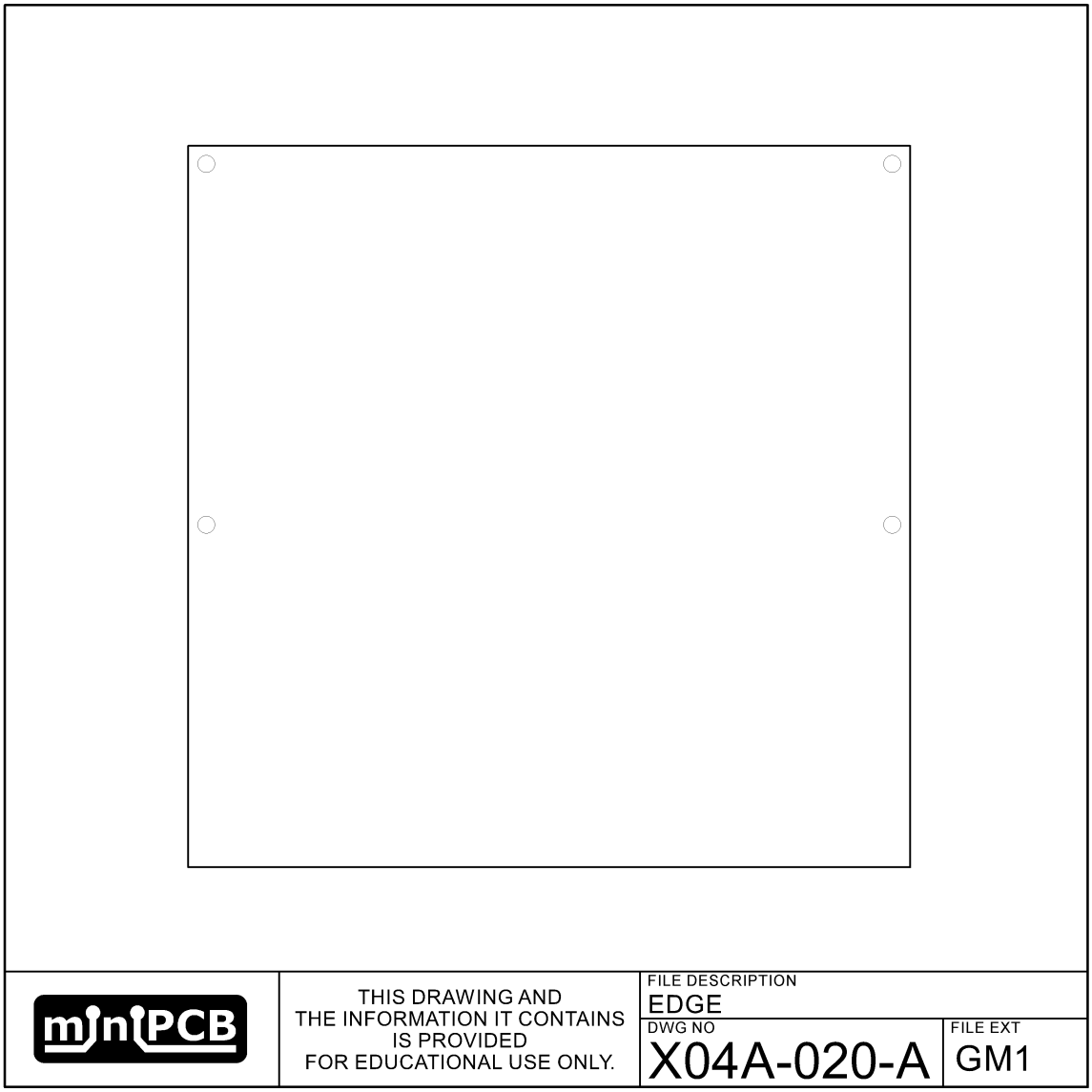
TOP SOLDERMASK (GSTX)



BOTTOM SOLDER MASK (GSBX)



EDGE (GM1)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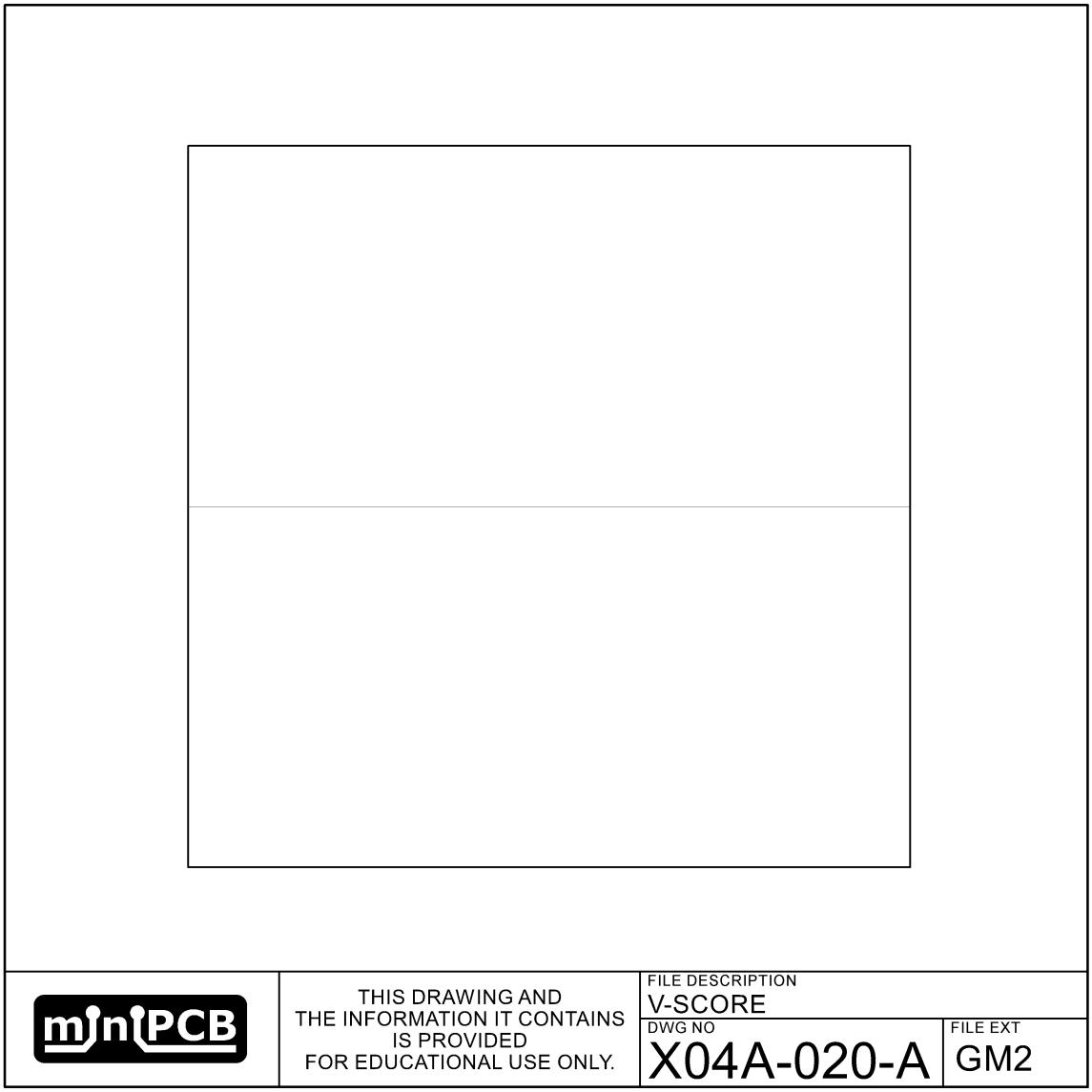
DWG NO
X04A-020-A
FILE EXT
GM1

VSCORE (GM2)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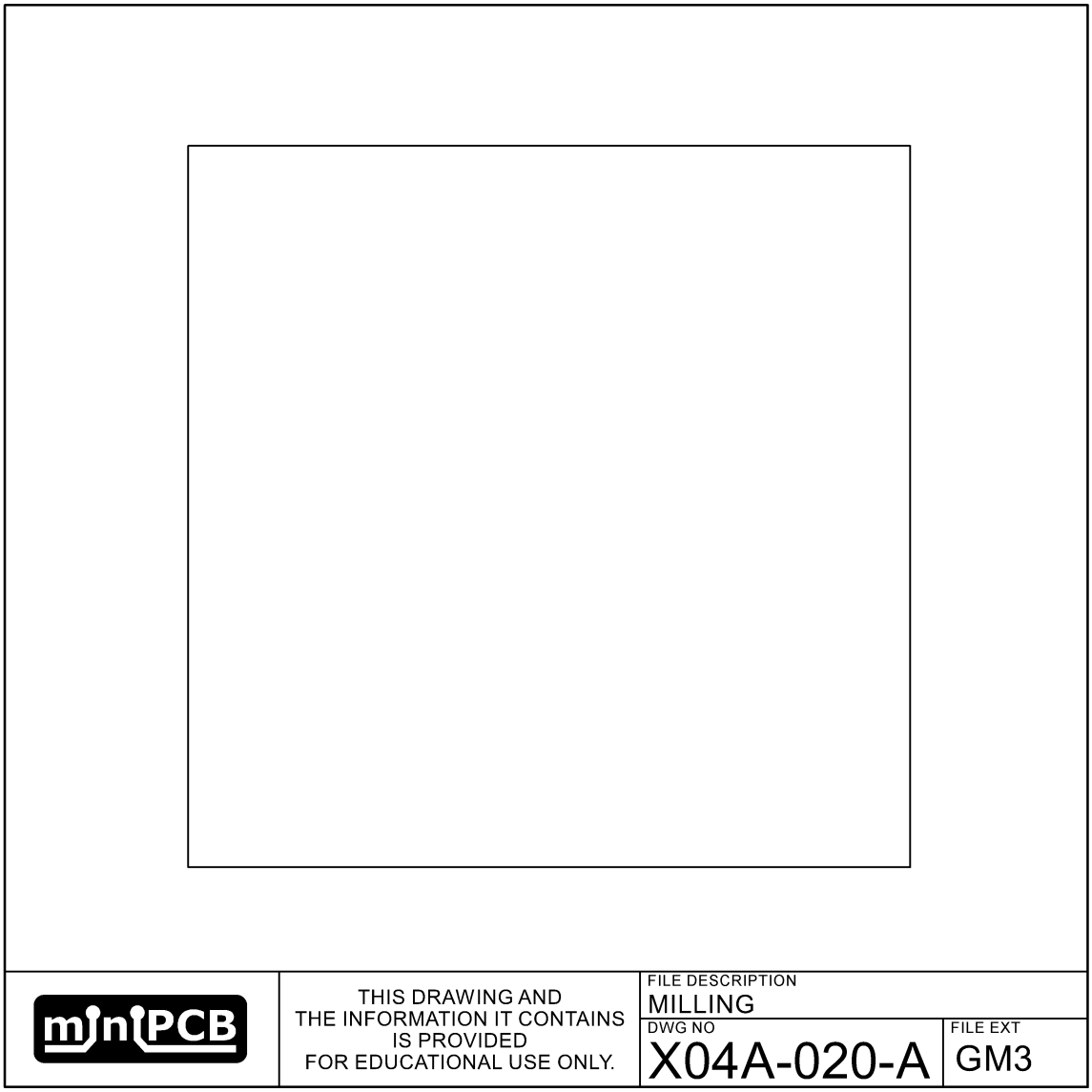
DWG NO
X04A-020-A
FILE EXT
GM2

MILLING (GM3)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MILLING
DWG NO
X04A-020-A
FILE EXT
GM3

Theory of Operation

The purpose of this circuit is to…

This circuit is supplied with a positive DC voltage…

The input stimuli is DC coupled…

The output signal is DC coupled…

Design Inputs

Design Requirements Form

POWER REQUIREMENTS

PARAMETER NAME	SYMBOL	UNITS	LOWER LIMIT	TARGET VALUE	UPPER LIMIT
Postive DC Supply	+V	V			
Negative DC Supply	-V	V			

STIMULI REQUIREMENTS

PARAMETER NAME	SYMBOL	UNITS	LOWER LIMIT	TARGET VALUE	UPPER LIMIT
Signal Voltage, Peak to Peak	V_s	V			
Signal Frequency	f_s	Hz			
Common Mode	V_{cm}	V			
Source Impedance	R_s	Ω			

PERFORMANCE CHARACTERISTICS

PARAMETER NAME	SYMBOL	UNITS	LOWER LIMIT	TARGET VALUE	UPPER LIMIT
Quiescient Current	I_q	A			
Voltage Gain	A_v	V/V			
Current Gain	A_i	A/A			
Power Gain	A_p	P/P			
Input Impedance	R_i	Ω			
Output Impedance	R_i	Ω			

Design Outputs

Parts List Form

REF DES	PART TYPE	MFG PART NUMBER	PART DESCRIPTION	FIND
				1
				2
				3
				4
				5
				6
				7
				8
				9
				10
				11

Testing Plans

Developmental Testing

1. Plan each calibration and service test.
2. Predict expected values for each test measurement.
3. Determine if expected values satisfy design requirements.
4. Assemble a prototype that is representative of what might be the final design.
5. Perform the calibration and service testing plans.
6. Determine if the design outputs satisfy design requirements.

Calibration and Service Testing

1. With power off, measure resistances between each pin.
2. If measured resistances are not as expected, end testing fail, components need to be replaced.
3. With power on, measure voltages at each pin.
4. If measured voltages are not as expected, end testing fail, components need to be replaced.
5. With power on, adjust potentiometer PX such that the voltage at test point TPX is ##.
6. If measured voltages cannot be adjusted to an expected value, end testing fail, components need to be replaced.
7. With power on, apply stimuli and measure outputs.
8. If measured output signals are not as expected, end testing fail, components need to be replaced.
9. If measured output signals are as expected, end testing pass.-

Design Example

Design Inputs

POWER REQUIREMENTS

PARAMETER NAME	SYMBOL	UNITS	LOWER LIMIT	TARGET VALUE	UPPER LIMIT
Postive DC Supply	+V	V	4.9	5	5.1
Negative DC Supply	-V	V			

STIMULI REQUIREMENTS

PARAMETER NAME	SYMBOL	UNITS	LOWER LIMIT	TARGET VALUE	UPPER LIMIT
Signal Voltage, Peak to Peak	V_s	V	0.015	0.02	0.025
Signal Frequency	f_s	Hz			
Common Mode	V_{cm}	V			
Source Impedance	R_s	Ω			

PERFORMANCE CHARACTERISTICS

PARAMETER NAME	SYMBOL	UNITS	LOWER LIMIT	TARGET VALUE	UPPER LIMIT
Quiescient Current	I_q	A			
Voltage Gain	A_v	V/V			
Current Gain	A_i	A/A			
Power Gain	A_p	P/P			
Input Impedance	R_i	Ω			
Output Impedance	R_i	Ω			

Design Outputs

PARTS LIST

QTY REQ	REFERENCE DESIGNATORS	MFG PART NUMBER	PART DESCRIPTION	FIND
3	R1, R2, R5		RESISTOR, 1.5K, 1/4W, 1%	1
2	R3, R4		100	2
1	Q1		2N2222	3
1	C1		10u	4
1	C2		1u	5
1	C3		0.1u	6

Developmental Tests per Example

Test Report per Example

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Revision History

REV	DESCRIPTION	ECO	DATE
A	Initial Release		