

# **AR1100 Resistive Touch Screen Controller Guide**

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## **Guide Contents**

Guide Contents	2
Overview	3
Calibrating the AR1100	6
Download and Install AR1100 Configuration Software	6
Secondary Monitor calibration	6
Manual Setup	7
Advanced Configuration	10
Verifying Communication	10
Adjusting Filters and Threshholds	11
Downloads	13
Software	13
Breakout Version Schematic & Fabrication Print	13
TFT Adapter With Touch Version Schematic & Fab Print	14
HELP!	16
My touch screen isn't showing up as a mouse / isn't responding!	16
I'd like to use this touchscreen with Kodi but its not calibrated right	17
How can I calibrate in Linux?	17

### Overview



Getting touchy performance with your screen's touch screen? Resistive touch screens are incredibly popular as overlays to TFT and LCD displays. If you want to connect one to a computer you need something to handle the analog to digital conversion. Most converters we've found are not very easy to use, and are 'fixed' - making them difficult to calibrate.

The AR1100 is a nice chip that solves this problem by acting as a touch->USB converter and also comes with calibration software. The calibration software is Windows only, but once you've calibrated you can use the screen on any OS. The AR1100 shows up as a regular Mouse or Digitizer HID device so no drivers are required and it works on any operating system that supports a USB mouse (that is, every single one we've ever seen) There is also a red LED that lights up to indicate when a touch has been detected.



We have a breakout that features the AR1100, which has both USB and UART interfaces available. 99% of the time, you'll want to use the USB interface but there is some functionality for getting TTL UART data out (see the datasheet for details)



For the screens that have 1mm pitch FPC cables, you can plug the cable right into the connector. The majority of medium/large touchscreens have that kind of connector. If you have another kind of touch screen, the four X/Y

contacts are available on 0.1" pitch breakouts so you can hand-solder or wire them. We set this breakout up for 4-wire sensing only



We also use this same chip in our TFT Touch screen designs, so that the screen can act like a display+mouse for any kind of computer.

You can pretty much just plug and play to get started, for more details including calibration software, check out the AR1100 page (https://adafru.it/e6g). If you're using the breakout, plug any 1mm-pitch 4-wire resistive touchscreen to the on-board FPC connector. Otherwise, it should already be wired up internally.

When you plug into a computer's USB port you should see a new device and touching the screen will cause the mouse cursor to move around.

## Calibrating the AR1100

If you bought a display that has the AR1100 built into it, we already did a calibration procedure for you here in the factory, so you should be able to use it out of the box.

However, you may want to recalibrate it, say you don't think it's set up well for you, or you want to change modes. Or you're using the breakout board and want to change resolutions or layouts.

To calibrate the AR1100 chip, you must use a Windows computer. We know, that sucks, but that's the only software Microchip wrote! The good news is you only have to calibrate once, and then the calibration is stored permanently in the chip, so you do not have to re-calibrate every time you turn it on.,

### Download and Install AR1100 Configuration Software

Start by downloading the AR1100 Calibration/Config software here (https://adafru.it/e6h)

and install like any other software. Now start up the AR1100 Calibration Utility software

If and only if you are using the display as a SECONDARY monitor (not your main monitor) perform the steps below

### Secondary Monitor calibration

If you have two monitors (one main one and a second with touch) you'll need to tell the software to use the secondary monitor! To do this start up and select Exit Screen to get out of the config screen

	10000000	Microchip AR Configuration Utilit	у		
AR 1000 Configuration	1				0
	Wel	Come To The AR Cor How Do You Wish Configuration Wizard Launch the configuration wizard which w you set up your touch controller step by s	n <mark>figuration</mark> Γο Begin? <sup>Il help</sup>	Utility	
Use	These Settings	Manual Setup Configure the controller using these settings.	Communication Sensor Type Calibration	AR1100 USB Mouse 4 Wire 9-Point	
Ext	This Screen	Expert I know what I'm doing - take me to the ho screen using the last communication meth	me iod.		
		<ul> <li>Snow this screen on standard</li> </ul>	nh	P	KSA 💿 Ver: 2.20 ,;;

#### Click Options

Microchip AR Configuration Utility							
AR 1000 C	AR 1000 Configuration Scribble Demo Equalizer Demo P.O.S. Demo						
A PKSA	fx Scripts	0 ‡	0 🛟	1 🗘	Calibration Inset 0	No Touch Report 🔹	Up Delay 0 🗘
EEPROM	💐 Wizard	0 🗘	1 *	1 🗘	Enable Calibrated Coord	No Touch Report *	State Rprt Delay 0
Trans Window	7 Options	0 🗘	1 *	0 🗘		No Touch Report 🔹	
Tools		Threshold	s, Delay	Filtering	Calibration	Pe	n Options
View	Options						
O Basic	Opens the	Options wir	ndow.				
Oiagnostic	Т	ransaction	5				_ = X
Commands	F	ile - Edit	- × Cle	ar 🛞 Rep	port Dashboard		
Read Registers							
Enable Touch	3	:07:54 P	M Welco	ome to t	he Microchip AR Confi	guration Utility	version 2.20
Disable Touch	3	:07:54 P	M Found	d PICkit	S.dll - Ver: 3.1.0.2		
	3:07:54 PM PICkit Serial Analyzer could not be found.						
Save To EE	P	Please check your connections.					
Register Start Address	3	:07:54 P	M Welco	ome to t	he Microchip AR Confi	guration Utility	version 2.20
Operations							

Then in the options window, select the secondary type of monitor

Options		_ ×
Restore Defaults Enter Demo Mode	Startup Monitor ○ Primary ● Secondary ♥ Show welcome screen	Communication Mode AR1000
Ribbon Layout	Touch Reports	Select Mode then press Verify "Verify Communication" Communication
Tools	10 Cuch Report Buffer Size Mouse Mode  Default Timer Based Show cursor movement on Configuration page	Layout Preferences Help Dock Left I Right Roat
Filtering     Image: Collibration       Calibration     Image: Collibration       Pen Options     Image: Collibration       AR1100     Image: Collibration	Configuration Cal Pts (AR1100 only) 4 4 Full Interpretation 9 25	Serial Port (AR1100 only)  Test this port for AR1100 first Port COM1

Then quit and restart the software, next time you run it - the program will be in the secondary monitor

## Manual Setup

Select USB Mouse as the type of AR1100 interface you want (this is the most universal!)

	Microchip AR Configuration Uti	lity		
AR 1000 Configuration				0
w	elcome To The AR Co	onfiguration	Utility	
	How Do You Wish	To Begin?		
	Configuration Wizard			
	Launch the configuration wizard which	will help		
Start Wizard	you set up your touch controller step by	step.		
	Manual Setup	Communication	AR1000 I2C	3
9	Configure the controller using these	Sensor Type	4 Wire	-
Use These Settings	seus igs.	Calibration	4-Point	-
	Expert			
	I know what I'm doing - take me to the I screen using the last communication me	home sthod.		
Exit This Screen				
	V Show this screen on st	artup		
				PKSA 🔵 Ver: 2.20 💥

And 4-wire for the type of resistive screen

	Microchip AR Configuration Utility	
AR 1000 Configuration		0
We Start Wizard	Come To The AR Configuration How Do You Wish To Begin Configuration Wizard Launch the configuration wizard which will help you set up your touch controller step by step.	n Utility ?
Use These Settings	Manual Setup Communication Configure the controller using these Sensor Type settings. Calibration	AR1100 USB Mouse
Ext This Screen	Expert I know what I'm doing - take me to the home screen using the last communication method.	8 Wire
	V Show this screen on startup	
		PKSA 🔵 Ver: 2.20 🛒

And 9-point Calibration as the type of calibration (or skip calibration if you don't want to re-calibrate)

	Microchip AR Configuration Utility	
AR 1000 Configuration		۷
We	lcome To The AR Configurati How Do You Wish To Begi	on Utility in?
	Configuration Wizard	
Start Wizard	Launch the configuration wizard which will help you set up your touch controller step by step.	
	Manual Setup Communica	tion AR1100 USB Mouse -
Y	Configure the controller using these Sensor Typ settings.	e 4 Wire •
Use These Settings	Calibration	4-Point
		Skip Calibration
	Expert	9-Point
	I know what I'm doing - take me to the home screen using the last communication method	25-Point
Exit This Screen	and the second second second field.	
	V Show this screen on startup	
		PKSA 🔵 Ver: 2.20 🕫

You'll get some driver unloading and reloading and then the calibration screen will pop up. Use a stylus to hit each point. There are 9 points, so if you dont end up poking the screen 9 times, something went wrong, rerun the software to restart calibration



When done, you'll pop back to the 'control panel'. That's it! You can test out your calibration with the **Scribble Demo** if you are using the monitor as a main screen. If its a secondary monitor, it wont work right because the mouse shows up on the first screen.

© Adafruit Industries

Microchip AR Configuration Utility - [Transactions]						×		
AR1100	Configuration	Scribble Demo	Equalizer (	Demo P.O.S. Demo			0	X
EEPROM	K Wizard	128 0 0	8 🗘	Calibration Inset 64 🛟	P=0,P=1 *	Up Delay 2 🗘		
Trans Window	Options	3 🗘 8 👻	8 <del>î</del>	Enable Calibrated Coord	P=1 -	State Rprt Delay 4 🗘	AD 1100	
$f_{x}$ Scripts		0 🗘 32 👻	4		P=0 ~		ARTIO0	
Tool	s	Thresholds, Delay	Filtering	Calibration	Pe	n Options		
View	File - Edit -	K Clear 🛞 Rep	ort Dashbo	oard				
O Basic	3:14:03 PM	Cal: 55 02 00	14					^
Diagnostic	3:14:03 PM	Calibration t	ouch 4	received.				
Commande	3:14:04 PM	Cal: 55 02 00	14					
Read Register	3:14:04 PM	Calibration t	ouch 5	received.				
Tread Wegisters	3:14:05 PM	Cal: 55 02 00	14					
Enable Louch	3:14:05 PM	Calibration t	ouch 6	received.				
Disable Touch	3:14:07 PM	Cal: 55 02 00	14					
Save To EE	3:14:07 PM	Calibration t	ouch 7	received.				
Register Start	3:14:09 PM Cal: 55 02 00 14							
Address	3:14:09 PM Calibration touch 8 received.							
Operations	3:14:10 PM Cal: 55 02 00 14							
Restore Defaults	estore Defaults 3:14:10 PM Calibration touch 9 received.							
Tooole Power								111
						AR1100 (	Ver: 2.2	20

## Advanced Configuration

There's a lot of settings you can adjust if you like to the AR1100. For more details, check the datasheet but here's the stuff we find handy:

Note that if you're using a small screen, you may want to drag the window over to the main monitor with not calibrating since the software has a lot of buttons on the sides!

## Verifying Communication

This is kind of the fix-all button if you ever find you got the AR1100 in a weird mode. The chip can act like a mouse, digitizer or raw 'USB HID generic'. For many of the settings adjustments you'll need to switch to HID generic since that's how the software sends commands.



Yeah it would be handy if it did this for you but just bear with us and switch modes as necessary. When you're done, dont forget to set the mode back to Mouse (or digitizer if you wish) and Verify to set that mode

Transactions	_ = ×
File 🔻 Edit 👻	🗙 Clear 🔞 Report Dashboard
status debug	: 121 (0x79) : 0 (0x00)
3:20:00 PM	AR1100 responding and ready for operation
3:20:00 PM	Touch Disable cmd sent
3:20:00 PM	Sent: [55][01][13]
3:20:00 PM	Received: [55][02][00][13]
3:20:00 PM	Sent: [55][01][01]
3:20:00 PM	Received: [55][06][00][01][01][42][00]
3:20:00 PM	Touch Enable cmd sent
3:20:00 PM	Sent: [55][01][12]
3:20:00 PM	Received: [55][02][00][12]
3:20:00 PM	AR1100 - FW Ver: 1.1.66.0
3:20:12 PM	Found Tub.dll - Ver: 1.5.0.0
3:20:13 PM	USB AR1100 HID-Generic Removed
3:20:15 PM	USB AR1100 Mouse Detected
3:20:18 PM	Found Tub.dll - Ver: 1.5.0.0
3:20:18 PM	AR1100 Mouse found and operating normally

#### Adjusting Filters and Threshholds

Depending on your setup and screen, you may find that the touch is too sensitive, not sensitive enough, a little noisy, a little slow, etc. You can tweak just about all of the settings in the top panel. Note that you must be in HID generic mode to do this! Then set back to mouse when done

		Microchip AR Configuratio	on Utility			• ×
AR1100 Configuration	Scribble Demo Equalizer De	mo P.O.S. Demo				
Diagnostics & Scripts	128     Sleep Delay     0     1       3     Sampling Fast     8     *	Accuracy Filter Slow 8 Accuracy Filter Fast 8	Calibration Inset 64	P=0,P=1 *	Up Delay 2 C State Rprt Delay 4 C	AR 1100
Tools	0 Sampling Slow 32 * Thresholds, Delays, Sampling	Filtering	Calbration	P=0 *	n Options	-
New     Description       Basic     File       Obsolution     Period       Commands     Period       Bead Registers     Communication       Basic     Transactions       Startup     Communication       Bead Registers     Communication       Communication     Restore Defaults       Basic     Startup       Bead Registers     Communication       California     Period       Basic     Touch Reports       Communication     Digizer       Basic     Touch Reports       Communication     Communication       Basic     Touch Reports       Verfy Communication     Communication						

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## Downloads

#### Software

- If Microchip doesn't have the download configuration software available for some reason, we have a mirror here (https://adafru.it/e6i)
- AR1100 product page, with datasheets, software downloads and more! (https://adafru.it/e6g)
- Fritzing object in Adafruit Fritzing library (https://adafru.it/aP3)
- EagleCAD PCB files for Breakout Version on GitHub (https://adafru.it/qzc)
- EagleCAD PCB files for the TFT 50pin-to-40pin Adapter Version on GitHub (https://adafru.it/qNc)

### **Breakout Version Schematic & Fabrication Print**

Here's the schematic for the breakout board, we use nearly identical setup for each use of the AR1100





TFT Adapter With Touch Version Schematic & Fab Print





#### My touch screen isn't showing up as a mouse / isn't responding!

If your AR1100 touch screen isn't working first up

• Make sure you see the red LED blink faster when you touch the screen. If not, check that you have a good USB cable and power

If you get a reaction from the Red LED but its not moving the mouse cursor, its likely your AR1100 is in non-mouse mode. The AR1100 can get set into 'Digitizer' or 'raw HID' mode, its easy to fix, run the AR1100 software and don't calibrate just go into **Expert** mode if mode (or if you want to, go ahead and calibrate, doesn't matter)

ARI	000 Configuration	Microchip AR Configuration Ut	ility		
	We	Icome To The AR Co How Do You Wish Configuration Wizard Launch the configuration wizard which you set up your touch controller step by	onfiguration To Begin? will help step.	Utility	
	Use These Settings	Manual Setup Corfigure the controller using these settings.	Communication Sensor Type Calibration	AR1000 I2C 4 Wre 4-Point	
	Ext This Screen	Expert I know what I'm doing - take me to the screen using the last communication m	home ethod. artup		
				1	PKSA 🔵 Ver: 2.20 , ; j

Then select the **Options** button and when the window comes up, click on the **AR1100 Mouse** radio button and click **Verify Communications** - this will force the **AR1100** into mouse

		Microchip AR	Configuration Utility		
AR1100 Configuration	Sorbble Demo         Equalizer Demo           Touch Threshold         128 °, Sleep Dela           Speed Threshold         3 °, Sampling F           Touch Report Delay         0 °, Sampling S           Thresholds, Delays, Sampling S         Sampling S	P.O.S. Demo y 0 , Accuracy Filter 1 Accuracy Filter 1 Accuracy Filter Sensitivity Filter g Filte	Slow 8 C Calbration Inset 64 Fast 8 C Calbration Calbrated C r 4 C Calbrated C Calbration	C Down Mode P=0,P=1 Movement Mode P=1 Up Mode P=0 Pen Opb	Up Delay State Rprt Delay ons
Vere     Tons       Basic     Basic       © Daggette     3:155:       Commands     3:155:       Basic Basic     3:155:       Operations     3:155:       Operations     3:155:       Togle Dener     3:155:       Very     3:155:       Operations     3:155:       Togle Dener     3:157:       Very     3:177:       Attrans     3:177:	Ctions Edit - X Clear ③ Report Dashboy SD PM X: 35944, Y: 35016 SD PM X: 35942, Y: 34035 SD PM X: 35912, Y: 34035 SD	Cotions Pestore Defaults Effer Demo Mode Ribbon Layout Tools © Threshold © Fittering © Calibration © Pen Options © AR1100 © d operating normal ly:	L Carlup Montor O Primay O Secon ♥ Show welcome screen Touch Reports 10 Touch Report Buffer Size Mouse Mode O Default O Terrer Show coursor movement on Corlig Corliguration Cal Pis (AR1100 only) 4 4 Full Interpretation ③ 9 25	Num Wres Num Wr	Let Page COM1
1					AR1100 🔘 Ver. 2.20 д

#### I'd like to use this touchscreen with Kodi but its not calibrated right

Check out this fine tutorial for more details on how to use the AR1100 with XBMC Kodi

http://arendwierks.blogspot.nl/p/touchscreen-fix-raspberry-pi-xbmc-kodi.html

#### How can I calibrate in Linux?

Try this project!

https://github.com/tom-2015/rpi-AR1100