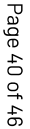


4D Systems



19. Specifications

Absolute Maximum Ratings	
Operating ambient temperature	-20°C to +65°C (see note 1 and 2)
Storage temperature	-30°C to +80°C
Voltage on any digital input pin (ESP32) with respect to GND	-0.3V to 3.6V
Voltage on any digital input pin (IO Expander) with respect to GND	-0.3V to 6.0V
Voltage on VCC with respect to GND	-0.3V to 6.5V

Note

1. Quote Espressif

"Ambient temperature specifies the recommended temperature range of the environment immediately outside an Espressif chip. For ESP32-S3R8 if the PSRAM ECC function is enabled, the maximum ambient temperature can be improved to 85°C, while the usable size of PSRAM will be reduced by 1/16".

2. Temperature range for Ambient and Storage, are determined by a combination of components used on these modules. While some components may be capable of exceeding these temperatures, some are not, so the minimums/maximums are determined by the weakest device on the modules. Based on the 65°C/85°C note above, if the ESP32-S3R8 is increased to 85°C capability, the next 'weakest' component on the module is the TFT LCD, which is capable of -20°C to 70°C Operating Temp.

3. Stresses above those listed here may cause permanent damage to the device. This is for stress rating only and functional operation of the device at those or any other conditions above those indicated in the recommended operation listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

Recommended Operating Conditions					
Parameter	Conditions	Min	Typ	Max	Units
Supply Voltage (VCC)	Stable external supply required	4.0	5.0	6.0	V
Processor voltage (VP)		—	3.3	—	V
Input Low Voltage (VIL)	all pins	0	—	0.25VP	V
Input High Voltage (VIH)	non 5V tolerant pins	0.75VP	—	VP+0.3	V
Input High Voltage (VIH)	5V tolerant pins	0.8VP	—	5.5	V

Global Characteristics Based on Operating Conditions

Parameter	Conditions	Min	Typ	Max	Units
Supply Current (ICC) ***	gen4-ESP32-43 (Contrast = 15)	—	208	—	mA
	gen4-ESP32-43T (Contrast = 15)	—	210	—	mA
	gen4-ESP32-43CT (Contrast = 15)	—	216	—	mA
	gen4-ESP32-43CT-CLB (Contrast = 15)	—	216	—	mA
	gen4-ESP32-50 (Contrast = 15)	—	318	—	mA
	gen4-ESP32-50T (Contrast = 15)	—	320	—	mA
	gen4-ESP32-50CT (Contrast = 15)	—	326	—	mA
	gen4-ESP32-50CT-CLB (Contrast = 15)	—	326	—	mA
	gen4-ESP32-70 (Contrast = 15)	—	598	—	mA
	gen4-ESP32-70T (Contrast = 15)	—	600	—	mA
	gen4-ESP32-70CT (Contrast = 15)	—	607	—	mA
	gen4-ESP32-70CT-CLB (Contrast = 15)	—	607	—	mA
	gen4-ESP32-70-WVA (Contrast = 15)	—	598	—	mA
	gen4-ESP32-70T-WVA (Contrast = 15)	—	600	—	mA
	gen4-ESP32-70CT-WVA (Contrast = 15)	—	607	—	mA
	gen4-ESP32-70CT-CLB-WVA (Contrast = 15)	—	607	—	mA
Display Endurance	Hours of operation, measured to when display is 50% original brightness	30000	—	—	H
Touch Screen Endurance (Resistive Touch)	Number of touches/hits with a 12.5mm tip at a rate of 2x per second with 250gf force	—	1M	—	Touches
	Slide stylus on screen, 100gf force, 60mm/s speed with a 0.8mm polyacetal tip stylus pen	—	100K	—	Slides
Touch Screen Transparency	Resistive Touch	82	—	—	%
	Capacitive Touch	90	—	—	%
Touch Screen Operational Force (Resistive Touch)	Only use Finger or Stylus, do not use anything sharp or metal	20	—	100	Gf
CLB Hardness	Cover Lens Bezel Glass Hardness	—	6	—	H

Note

Typical Supply Current (ICC) figures are without WiFi enabled, without microSD card inserted, and using simple display operations only. Any additional load such as GPIO sourcing, WiFi etc, will increase this figure. This is a Typical figure only, not a Maximum.

LCD DISPLAY INFORMATION (TN DISPLAY)

Parameter	Conditions	Specification
Display Type		TN - TFT Transmissive LCD
Display Size		7.0" Diagonal
Display Resolution		800 x 480 (Landscape/Wide Viewing)
Display Brightness	gen4-ESP32-70 (Contrast = 15)	500 cd/m2
	gen4-ESP32-70T (Contrast = 15)	400 cd/m2
	gen4-ESP32-70CT (Contrast = 15)	475 cd/m2
	gen4-ESP32-70CT-CLB (Contrast = 15)	475 cd/m2
	gen4-ESP32-70-WVA (Contrast = 15)	470 cd/m2
	gen4-ESP32-70T-WVA (Contrast = 15)	376 cd/m2
	gen4-ESP32-70CT-WVA (Contrast = 15)	446 cd/m2
	gen4-ESP32-70CT-CLB-WVA (Contrast = 15)	446 cd/m2
Display Contrast Ratio	Typical	500:1
Display Viewing Angles	Above Centre (non WVA models)	70 Degrees
	Below Centre (non WVA models)	60 Degrees
	Left of Centre (non WVA models)	70 Degrees
	Right of Centre (non WVA models)	70 Degrees
	Above Centre (WVA only)	85 Degrees
	Below Centre (WVA only)	80 Degrees
	Left of Centre (WVA only)	85 Degrees
	Right of Centre (WVA only)	85 Degrees
Display Viewing Direction		12 O'clock Display (Optimal viewing is from above when in Landscape/Wide mode)
Display Backlighting	All 7.0" models	9x3 Parallel LED's
Pixel Pitch	Width x Height – Landscape	0.1925 x 0.179 mm (non-Square pixels)
Pixel Density	Number of pixels in 1 row in 25.4mm, 7.0"	132 DPI/PPI (Horizontal)
		142 DPI/PPI (Vertical)

LCD DISPLAY INFORMATION (IPS DISPLAY)		
Parameter	Conditions	Specification
Display Type		IPS - TFT Transmissive LCD
Display Size	4.3" Models	4.3" Diagonal
	5.0" Models	5.0" Diagonal
Display Resolution		800 x 480 (Landscape/Wide Viewing)
Display Brightness	gen4-ESP32-43 (Contrast = 15)	600 cd/m2
	gen4-ESP32-43T (Contrast = 15)	510 cd/m2
	gen4-ESP32-43CT (Contrast = 15)	540 cd/m2
	gen4-ESP32-43CT-CLB (Contrast = 15)	540 cd/m2
	gen4-ESP32-50 (Contrast = 15)	600 cd/m2
	gen4-ESP32-50T (Contrast = 15)	510 cd/m2
	gen4-ESP32-50CT (Contrast = 15)	540 cd/m2
	gen4-ESP32-50CT-CLB (Contrast = 15)	540 cd/m2
Display Contrast Ratio	Typical (4.3")	800:1
	Typical (5.0")	1000:1
Display Viewing Angles	Above Centre	80 Degrees
	Below Centre	80 Degrees
	Left of Centre	80 Degrees
	Right of Centre	80 Degrees
Display Viewing Direction		ALL (wide viewing IPS Display)
Display Backlighting	4.3" Models	2x5 Parallel LED's
	5.0" Models	3x6 Parallel LED's
Pixel Pitch	4.3" Models	0.1188 x 0.1122 mm (Almost Square pixels)
	5.0" Models	0.135 x 0.135 mm (Square pixels)
Pixel Density	4.3" Number of pixels in 1 row in 25.4mm	213 DPI/PPI (Horizontal) 226 DPI/PPI (Vertical)
	5.0" Number of pixels in 1 row in 25.4mm	183 DPI/PPI

 **Note**

Relevant for all TN and IPS displays, the Displays used are of the highest rated 'Grade A', which allows for 0-4 defective pixels. A defective pixel could be solid Black (Dead), White, Red, Green or Blue.

20. Revision History

Datasheet Revision		
Revision Number	Date	Description
0.1	09/05/2023	Internal Use Only
1.0	12/09/2023	Initial Public Release Version
1.1	30/01/2024	Added note regarding Arduino ESP32 Core v3.0.0
1.2	10/06/2024	Removed information regarding v3.0 alpha release since this version has been officially released
1.3	21/07/2025	Clarify that RTC battery is not included with the module
1.4	29/08/2025	Added information regarding Workshop5 support and ESP-IDF setup

Hardware Revision		
Revision Number	Date	Description
1.0	20/04/2023	Initial Internal Version
1.1	30/06/2023	Initial Public Release Version

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FCC Warning:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.