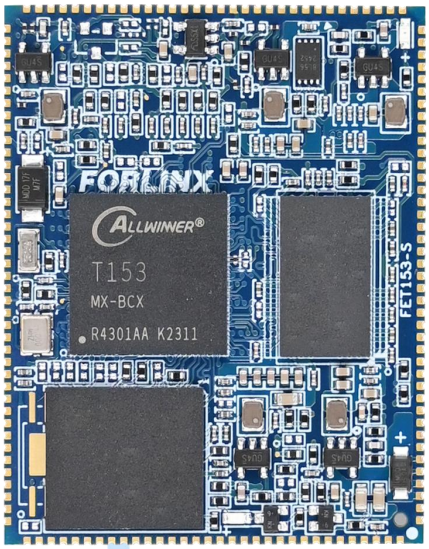
FET153-S SoM

The FET153-S System on Module (SoM) is developed using the Allwinner T153 processor, which is specifically designed for the industrial sector. It features 3 x Gigabit Ethernet, 2 x CAN-FD, and LocalBus, providing high-throughput network connections to support the needs of complex, data-driven applications. It also has 10 x UART, 24 x GPADC, 6 x TWI, and 30 x PWM, providing flexibility for diverse applications. Edge Connector providing a more secure connection.

It has undergone thorough testing in industrial environments by Forlinx Embedded Laboratory to ensure stability and reliability. 10 to 15 years longevity, ensuring a consistent supply over time.



SoM (with eMMc storage), the NAND version varies from the illustration.

4×A7 CPU	35 × 44mm Compact Size	2 × CAN-FD CAN
Upto1.6GHz Clock	3 × EtherNet Multiple Network Ports	

Product Features:

- All the functional pins of the processor are led out by using the edge connector;
- ARM + RISC-V, multi-core heterogeneous, suitable for various scenarios;
- Display interfaces: MIPIDSI, RGB, LVDS;
- Rich industrial bus interfaces: RMII, CAN-FD, LocalBus, etc;
- LocalBus can be used to extend PSRAM, FPGA communication;
- 3 x Gigabit network to meet the needs of industrial control scenarios.

SoM Parameters

Processor		**Allwinner T153**
	ARM：	4×Cortex-A7,up to 1.6GHz
	RISC-V	E907, up to 600MHz
	NPU：	**No**
	GPU：	G2D
	VPU：	**No**
RAM		256MB/512MB/1GBDDR3

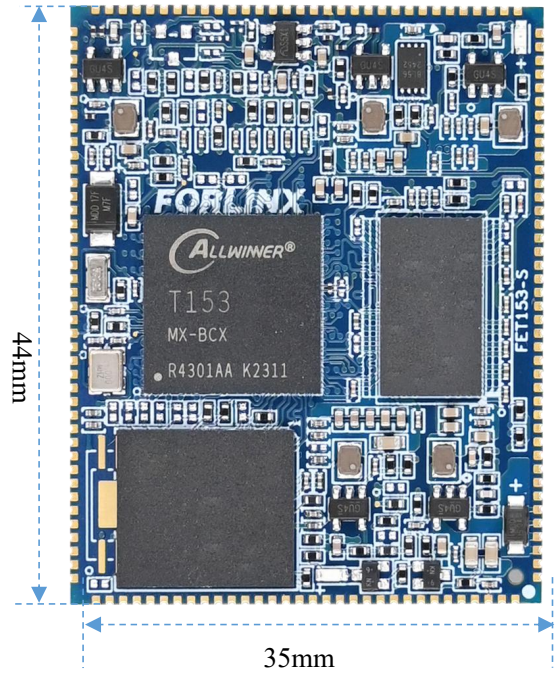
ROM	256MB/512MBNandFlash/8GBeMMC
Operating Temperature	-40℃~+85℃
Working Voltage	DC5V
Connection	Edge connector +LGA, with a total of 185 pins led out. The center - to - center spacing of the edging connecting pins is 0.4 mm. The pitch for LGA package is 0.47 mm.

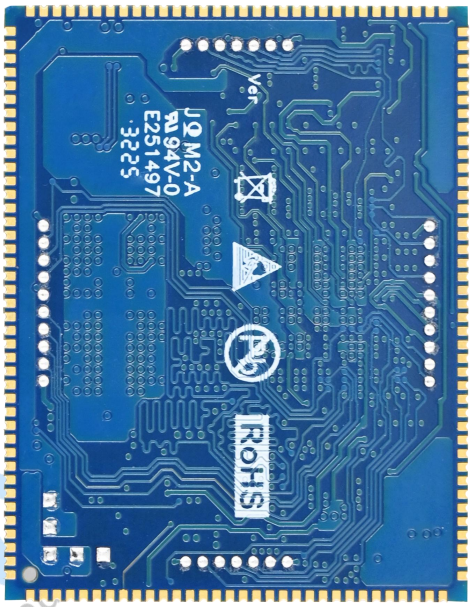
SoM Function Parameters:

Function	Quantity	Parameter
ParallelCSI	≤1	Supports 8/10/12/16 bit wideth and BT.656upto2-ch720P@30fpsandBT.1120upto2-ch1080P@30fps,RAWupto4-ch720P@30fps
MIPICSI	≤2	Supports 4-lane/2+2-lane,Upto1.0Gbit/sperlane
MIPIDSI(1)	≤1	Supports 4-laneMIPIDSI,Upto1920x1200@60fps,1.0Gbit/sperlane
RGBLCD(1)	≤1	DE/SYNC mode, up to1920x1080@60fps; RGB888,RGB666 and RGB565 pixel
LVDS(1)	≤2	Upto1920×1080@60fpsforduallink;Upto1366×768@60fpsforsingle-link
SDIO	≤2	SMHC0 for SD card; SMHC1 for SDIO interface, 3.3 V mode only
Audio	≤1	Built-in audio codec supports 1 x differential LINEOUT output
IIS	≤3	Supports master/slave mode, sampling rate 8kHz to 384kHz; I2S0/2 supports 4lane application; I2S1 supports 2lane application
DMIC	≤1	Supports master/slave mode with sampling rate from 8kHz to 48kHz
OWAIN/OUT	≤1	Single line audio
USB2.0DRD	1	Supports master and slave and High-Speed,480Mbps
USB2.0HOST	1	Only supports master mode, and High-Speed, 480Mbps
GMAC	≤3	Supports RMII/RGMII interface and rate 10/100/1000 Mbit/s
CAN-FD	≤2	Supports CAN-FD（upto64databytes) and CAN2.0A 与 CAN2.0B
LocalBus	≤1	Supports 8/16/32 bit width, up to 100MHz bus clock
SPI	≤4	Supports master/slave mode with up to 100MHz clock; SPI0, SPI2, SPI3 support SPI mode; SPI1 supports SPI mode and DBI mode
TWI	≤5	Compatible with I2C standard, standard mode 100kbit/s, fast mode 400kbit/s
UART(2)	≤10	Compatible with industry standard 16450/16550.
GPADC	≤24	12-bit sampling resolution, maximum sampling rate 1MHz; GPADC2 has 4 channels multiplexed as TPADC
TPADC	≤1	4-wire resistive touch, 12 bit SAR type AD conversion
PWM&PWMCS	≤30	PWM output frequency 0 ~ 24 MHz or 0 ~ 100MHz; PWMCS output frequency 0 ~ 4MHz, supporting maximum and minimum frequency limit
LEDC	≤1	Control LED light, programmable output high and low width, data up to 800kbit/s
IRTX	≤1	Infrared output
IRRX	≤4	Infrared receiving
GPIO	≤140	

Note: The parameters in the table are the theoretical values of hardware design or CPU; RGB, LVDS, MIPI-DSI have a pin multiplexing relationship, please read the chip data sheet or pin multiplexing table; among them, UART0 is used as the debugging serial port. It is recommended to keep this design.

Appearance & Dimension





Note: PCB thickness is 1.2mm; total height of PCBA is 2.3mm; dimensional tolerance is ± 0.2mm.

Software Support:

OS	Linux5.10.198+Qt5.15.8
Flashing	USB, OTG

Peripheral Support List:

Linux5.10.198	**Interface**	**Function**	**Plan**
Drive Support List	**IIS**	Audio	NAU88C22
	SDIO	WiFi	6221A-SRC
	UART	Bluetooth	
	I2C	RTC	RX8010SJ
	I2C	Touch	FT3427, ft5x06, tsc2007, GT928
	LVDS	10.1-inch capacitive touch screen	Resolution 1280 × 800, touch chip GT928
	LCD	7-inch capacitive touch screen	Resolution 1024 × 600, touch chip ft5x06
	MIPI-CSI	Camera	OV5645（No autofocus, 500 W pixels）
	RMII	Ethernet	YT8521SH
	USB	4G	EC20
	UART	General	
	CAN	General	
	PWM	General	LCDBacklight

Product Materials:

Linux5.10.198 Documentation List:	User's Manual, User's Compilation Manual, Factory Image, Kernel Source Code, Test Program Source Code, File System, Driver Tool, Download Tool, Burning Tool, Development Environment.
Hardware Documentation List	Hardware Manual, Pin Multiplexing Comparison Table, Pin Function Comparison Table, SoM STEP File, Carrier Board STEP File, SoM DXF File, Carrier Board DXF File, Carrier Board PDF Schematic, Carrier Board PCB Source File, Carrier Board Design Data.

Note: The documentation will be gradually provided and enriched after the product is released.

Order Model List:

Specification Model	Core	CPU Clock	RAM	ROM	Operating Temperature	Supply
FET153-S+16256SN256Ixx:xx	4×A7	Upto1.6GHz	256MB	256MBNandFlash	-40℃~+85℃	Mass Production
FET153-S+16512SE8GIxx:xx	4×A7	Upto1.6GHz	512MB	8GBeMMC	-40℃~+85℃	Mass Production
FET153-S+161GSE8GIxxx:xx	4×A7	Upto1.6GHz	1GB	8GBeMMC	-40℃~+85℃	Plan
FET153-S+16512SN512Ixx:xx	4×A7	Upto1.6GHz	512MB	512MBNandFlash	-40℃~+85℃	Plan

SoM Naming Rules:

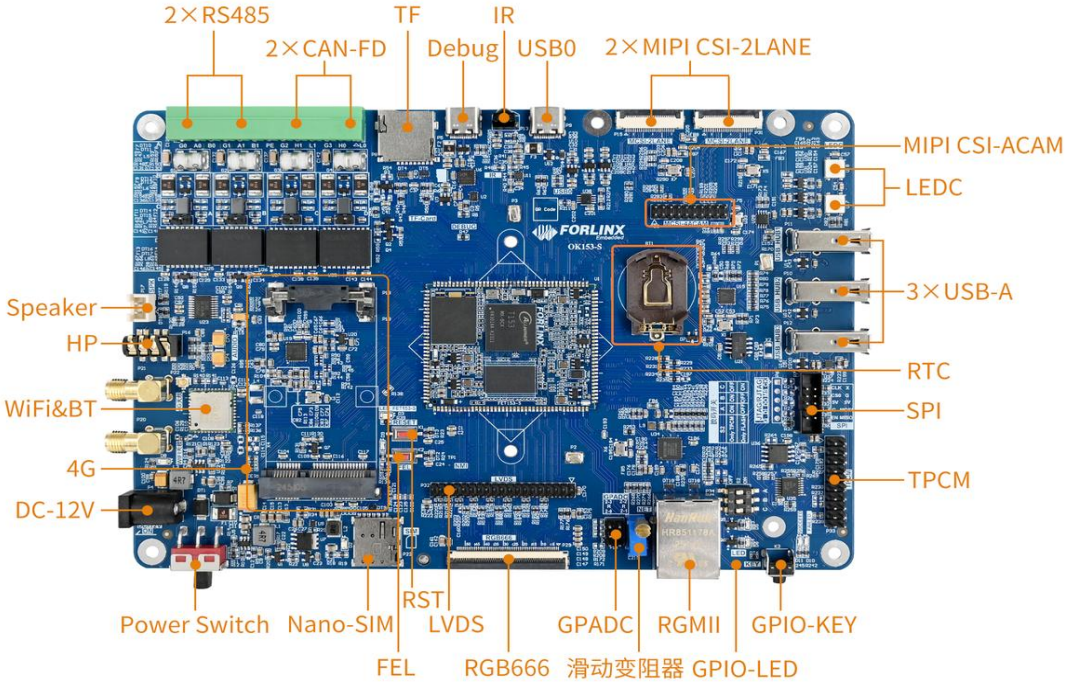
A	B	-	C	+	D	E	F	G	H	I	J	:	K	L

This table describes SoM number terms to define its characteristics (e.g., CPU, frequency, temperature grade, version).

Field	Field Description	Value	Description
A	Product Line Identification	FET	Forlinx Embedded SoM
		FL	Forlinx Embedded All in One Panel
B	CPU Name	T153	Allwinner T153
-	Segment Identification	-	
C	Connection	S	Edge Connector
+	Segment Identification	+	The configuration parameter section follows this identifier.
D	CPU Clock (Max.)	16	1.6GHz
E	RAM Capacity (Unite：Byte)	256	256MB
		512	512MB

		1G	1GB
F	Single ROM Type	SN	NandFlash
		SE	eMMC
G	Single ROM Capacity (Unite：Byte)	256	256MB
		512	512MB
		8G	8GB
H	Operating Temperature	C	0to70 ℃ Commercial grade
		E	-20 to 80℃ Wide temperature range
		I	- 40 to 85 ℃ Commercial grade
I	Configuration No.	A~Z	If the D ~ H field values of each product are the same, the field values are the same, in ascending order according to the configuration release time
J	PCB Version	10	V1.0
		11	V1.1
		xx	Vx.x
:	Separator	:	This symbol is followed by the internal identification of the manufacturer, which has no effect on the use.
KL	Internal Identification of the Manufacturer	xx	This is the internal identification of the manufacturer and has no impact on the use.

Development Board:



Development Board Function Parameters:

Function	Quantity	Parameter
LCD(1)	1	RGB 66618 bits, SoM can support up to RGB 88824 bits, up to 1080p @ 60fps
LVDS(1)	1	Dual Octal, up to 1080P@60fps
MIPIDSI(1)	1	Supports 4lane, up to 1080P @ 60fps, requires LVDS to MIPI adapter board
Ethernet	1	10/10/1000Mbps adaptive,RJ-45 interface
TYPE-C（DEBUG）	1	Convert the debug UART to USB export, debug CPUX and RISC-V respectively
TYPE-C（USB0）	1	Native USB0 interface, supporting OTG function
USBHost	3	USB2.0, supports up to 480Mbps, extended by hub
TF	1	Supports extended storage and system flashing
Camera	2	2 x 2Lane MIPICSI, supporting OV5645, in addition, AHD to MIPICSI can be realized through the adapter board
WiFi&Blue Tooth（2）	1	Onboard 6221A-SRC, 2.4G/5G dual-band Wi-Fi, BT5.0, and audio capabilities The Wi-Fi function occupies 1 x SDIO interface, the BT function occupies 1 x UART, and 1 x IIS is reserved for audio.
GPADC	4	1.8V, slide resistor on carrier board for easy testing.
RTC	1	On-board CR2032 battery, keep going when power is off
Audio（2）	2	It includes 1 x four - segment headphone jack with built - in HP (headphone) and MIC (microphone), and 1 x monophonic SPEAKER port.
KEY	3	It includes reset, programming and GPIO buttons.
CAN-FD	2	CAN-FD with protection circuit
RS485	2	It is equipped with automatic transmission and receiving control and protection circuit.
IR_RX	1	IR_RX, sample rate 1MHz, 64*8bits cache
4G	1	Led out via MiniPCIE, supporting EC20
LED	2	GPIO controls LED
LEDC	1	Used to control external smart LED lights
SPI	1	Multiplexed with RJTAG and JTAG signal
RJTAG	1	Led out via 2.54mm pin is led out, and multiplexed with SPI3 and JTAG signals
JTAG	1	Led out via 2.54mm pin is led out, and multiplexed with SPI3 and RJTAG signals

Note: The parameters in the table are the theoretical values of hardware design or CPU. LCD, MIPI-DSI and LVDS have interface multiplexing, and only one of the three can be used at a time; these two functions use the same IIS; currently, this IIS is used by AUDIO.

Power Consumption:

No.	Test Item	SoM Power (W)	Development Board Power (including SoM) (W)
1	No load	0.533	1.238
2	4G module	0.543	1.540
3	10.1-inch LVDS screen	0.545	4.89
4	7-inch MIPI screen	0.544	3.378
5	CPU full load + memory pressure + Nand read/write pressure	1.121	1.829

Test conditions: the SoM is configured with industrial 256MB + 256MB; the 4G module is Quectel EC20; the screen is the development board accessory screen.

