

# DT321X190020Z240104H

## 产品特点:

- (1) 基于 T5L2 ASIC CPU，运行 DGUS II 人机交互软件平台，商业级应用的智能屏。
- (2) 15.6 英寸，1920\*1080 分辨率，16.7M 种颜色真彩显示，IPS 液晶显示屏，2K 高清智能屏。
- (3) 板载 R11 视频解码模块，实现 WIFI/4G 联网和音视频播放功能。
- (4) GFF 结构电容触摸屏。

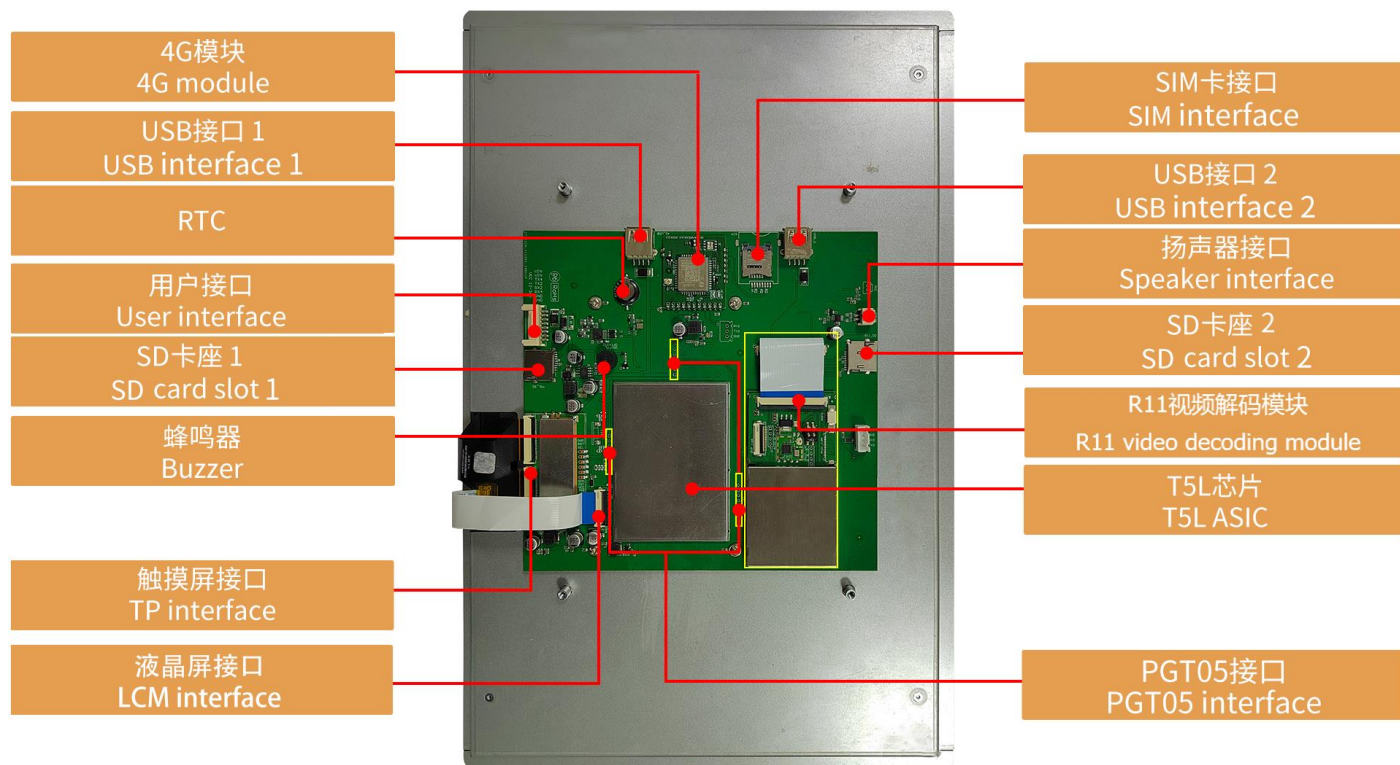
## Features:

- (1) Based on the T5L2 ASIC CPU, running the DGUS II human-machine interaction software platform, smart LCM for commercial-grade applications.
- (2) 15.6-inch, 1920\*1080 pixels, 16.7 M colors true-color display, IPS LCD screen, 2K HD smart screen.
- (3) Onboard R11 module for video decoding, enabling WIFI/4G connectivity and audio/video playback functionality.
- (4) Capacitive touch screen with GFF structure.



## 1、硬件及接口 Hardware and interface

### 1.1 硬件接口图 Hardware interface



硬件接口图  
Hardware interface

## 1.2 硬件及接口说明 Hardware and interface description

序号 No.	名称 Name	说明 Description
1	T5L2 芯片*3 T5L2 ASIC*3	迪文自主研发，2019 年量产；专利加密技术，确保代码和数据安全；功耗低，抗干扰能力强，双面 PCB 设计上轻松通过 EMC/EMI 测试。 DWIN independently developed, mass production in 2019; patented encryption technology ensures code and data security; low power consumption, strong anti-interference capability, easily passes EMC/EMI tests with dual-sided PCB design.
2	用户接口 User interface	用于供电和串口通讯，8Pin_2.0mm 座子。串口下载速率（典型值）：12KByte/s。 8Pin_2.0mm socket for power supply and serial communication. Download rate(typical value): 12KByte/s.
3	Flash	48MBytes + 512MBytes(3 颗 16MBytes NOR Flash + 512Mbytes Nand Flash)，可用于存放字库、图片、音乐等用户 UI 文件，擦写次数>100,000 次。 48MBytes + 512MBytes (3*16MBytes NOR Flash + 512MBytes Nand Flash), can be used to store user UI files such as fonts, images, music, etc., with erase/write cycles >100,000 times.
4	RTC	法拉电容供电，精度：±20ppm @25℃。掉电后可维持 7 天正常工作。预留电池供电兼容电路。 Super-capacitor supplies power to RTC, accuracy: ±20ppm @25℃. Can maintain normal operation for 7 days after power-off. Reserved button cell power supply compatible circuit.
5	蜂鸣器 Buzzer	3V 无源蜂鸣器。 3V passive buzzer.
6	扬声器接口 Speaker interface	2Pin_2.0mm 座子，外接扬声器。 2Pin_2.0mm socket, speaker interface.
7	SD 卡座 SD card slot	SD 卡座 1 供 T5L2 使用，支持所有文件（用户 UI 文件、CFG 硬件配置文件、底层内核固件）下载，屏幕显示下载统计信息，下载速率：4Mb/s。下载文件时，SD 卡需格式化为 FAT32 格式，推荐块大小为 4096。 SD 卡座 2 供 R11 视频解码模块使用，可用于存放 MP4 视频文件等。 SD card slot 1 is for use with T5L2 and supports downloading all files (user UI files, CFG files, underlying kernel firmware). The screen displays download statistics, with a download speed of 4Mb/s. When downloading files, the SD card needs to be formatted in FAT32 format, with a recommended block size of 4096. SD card slot 2 is for use with the R11 video decoding module and can be used to store MP4 video files, among others.
8	USB 接口 USB interface	供 R11 视频解码模块使用，可用于存放 MP4 视频文件或连接 USB 外设（如 USB 摄像头等） For use with the R11 video decoding module, it can be used to store MP4 video files or connect USB peripherals (such as USB cameras, etc.)
9	4G 模块 4G module	实现 4G 联网功能。 Enable 4G connectivity.
10	R11 视频解码模块 R11 video decoding module	型号：DG-T20-10B，内置 WIFI 模块，支持 2.4GHz/5GHz 频段。 Model:DG-T20-10B,Built-in WIFI module, supports 2.4GHz/5GHz frequency bands.

12	PGT05 接口 PGT05 interface	用于重新烧录 DGUS 底层程序。 Used for reprogramming the underlying DGUS firmware.
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## 2、规格参数 Specification parameters

### 2.1 显示参数 Display parameters

显示屏类型 LCD Type	IPS 工艺 TFT 显示屏。 IPS process TFT display screen.
视角 Viewing Angle	视角宽（典型值是 85°/85°/85°/85°），对比度高、色彩还原好。 Wide viewing angle (typical values are 85°/85°/85°/85°), high contrast, and good color reproduction.
分辨率 Resolution	1920×1080（支持 0°/90°/180°/270° 显示模式） 1920×1080 pixels (0°/90°/180°/270°)
色彩 Color	16.7M 色（24 位 8R8G8B） 16.7M color (24-bit 8R8G8B)
AA 区 Active Area (A.A.)	344.16mm (W)×193.59mm (H)
VA 区 View Area (V.A.)	343.16mm (W)×192.59mm (H)
接口 Interface	eDP
背光模式 Backlight Mode	LED
背光寿命 Backlight Service Life	>20000 小时（以最高亮度连续工作，亮度减半时间） >20000 hours (Time of the brightness decaying to 50% on the condition of continuous working with the maximum brightness)
背光亮度 Brightness	250nit
背光调节 Brightness Control	100 级亮度调节（当亮度调节至最高亮度的 1%~30% 时，可能出现闪烁现象，不建议在此范围使用） 0~100 grade (When the brightness is adjusted to 1%~30% of the maximum brightness, flickering may occur and is not recommended to use in this range)
注：长时间固定画面显示可能导致屏幕残影，可以用动态图片切换做屏保解决。 Note: You can use dynamic screen saver wallpapers to avoid afterimages caused by fixed page display for a long time.	

### 2.2 触摸参数 Touch parameters

触摸屏类型 Type	电容式触摸面板。 Capacitive touch panel.
接口 Interface	I <sup>2</sup> C
触摸屏结构 Structure	G+FF 结构，表面盖板为钢化玻璃。 G+FF structure with surface cover of tempered glass.
触摸方式 Touch Mode	单点触摸，支持连续滑动触摸。 Support point touch and drag.
表面硬度 Surface Hardness	6H
透光率 Light Transmittance	>85%
触控寿命 Life	>20,000 小时。 Over 20,000 hours touch.

## 2.3 串口参数 Serial interface parameters

串口模式 Mode	UART2: ON=TTL/CMOS; OFF=RS232 UART4: ON=TTL/CMOS; OFF=RS232 (OS 配置后才能使用 Only available after OS configuration)				
串口电平 Voltage Level	测试条件 Test Condition	最小值 Min	典型值 Typ	最大值 Max	单位 Unit
	Output 1, Iout = -4mA	4.78	5.0	-	V
	Output 0, Iout = 4mA	-	-	0.4	V
	Input 1	2.5	5.0	-	V
	Input 0	-	-	1.0	V
串口波特率 Baud Rate	3150~3225600bps, 典型值: 115200bps。 3150~3225600bps, typical value of 115200bps.				
数据格式 Data Format	UART2: N81 UART4: N81/E81/O81/N82 四种模式可选 (OS 配置) 4 modes (OS configuration)				
接口排线 Interface Cable	8Pin_2.0mm				

## 2.4 电气规格 Electrical specifications

额定功率 Rated Power	<12W	
工作电压 Operating Voltage	12~36V, 典型值 12V。 12~36V, typical value of 12V.	
工作电流 Operating Current	650mA	VCC=12V, 背光亮度最大。 VCC=12V, max backlight.
	170mA	VCC=12V, 背光关闭。 VCC=12V, backlight off.
推荐工作电源: 12V 1A 的直流稳压电源。 Recommended power supply: 12V 1A DC.		

## 2.5 工作环境 Operating environment

工作温度 Operating Temperature	-10°C~60°C (12V @ 60% RH)
存储温度 Storage Temperature	-20°C~60°C
三防漆工艺 Conformal coating	无 None
工作湿度 Operating Humidity	10%~90%RH, 典型值 60%RH。 10%~90%RH, typical value of 60% RH.

### 3、可靠性测试 Reliability test

#### 3.1 静电放电测试 Electrostatic discharge test

测试环境温度：25°C，测试环境湿度：50%RH。

Test temperature: 25°C. Test humidity: 50%RH.

试验过程：将产品放置在测试台面的测试工装上（测试工装高度约 15cm），针对智能屏进行接触放电和空气放电测试，实验过程观察屏幕有无死机、黑屏、白屏、花屏、重启等异常现象。性能符合判据 GB/T 17626.2 B 级及以上。

Test process: Place the product on the testing fixture of the test bench (fixture height approximately 15cm), and conduct contact discharge and air discharge tests on the smart screen, during the experimental process, it was observed whether the screen is dead, black, white, splash, or reboot. According to the experiment results, the performance is in line with the criteria GB/T 17626.2 B level and above.

Test standard :  EN 61000-4-2:2009     IEC 61000-4-2:2008     GB/T 17626.2-2018  
 Other:

Table 1: Electrostatic Discharge Immunity (Air Discharge)

Test Points Locations	Test Levels							
	-2kV	+2kV	-4kV	+4kV	-8kV	+8kV	-15kV	+15kV
屏幕					A	A		
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

Table 2: Electrostatic Discharge Immunity (Direct Contact)

Test Points Locations	Test Levels							
	-2kV	+2kV	-4kV	+4kV	-6kV	+6kV	-8kV	+8kV
边框 B	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

#### 性能标准:

- A. 在制造商、委托方或购买方规定的限值内性能正常;
- B. 功能或性能暂时丧失或降低，但在骚扰停止后能自行恢复，不需要操作者干预;
- C. 功能或性能暂时丧失或降低，但需操作者干预才能恢复;
- D. 因设备硬件或软件损坏，或数据丢失而造成不能恢复的功能丧失或性能降低。

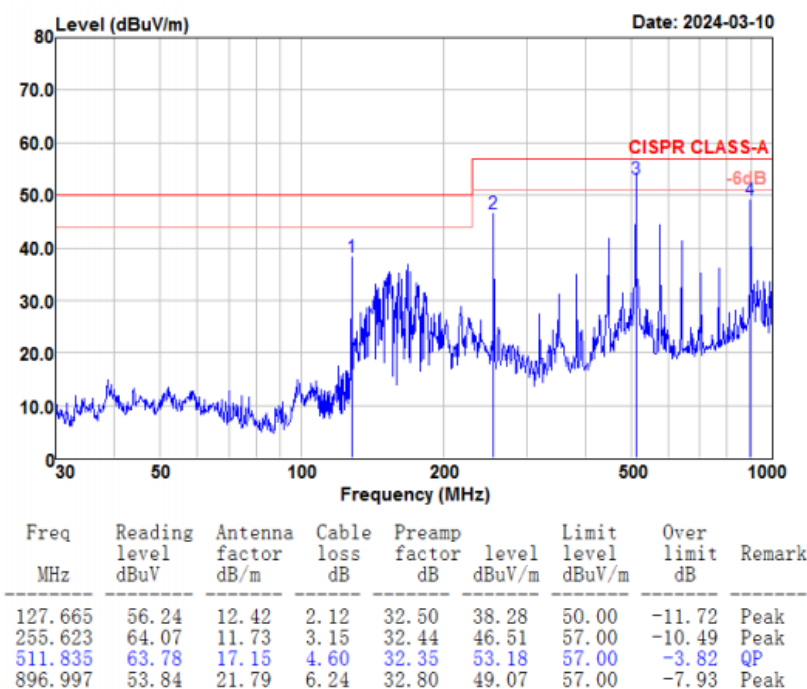
#### Performance Criterion:

- A. Normal performance within limits specified by the manufacturer, requestor or purchaser;
- B. Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention;
- C. Temporary loss of function or degradation of performance, the correction of which requires operator intervention;
- D. Loss of function or degradation of performance which is not recoverable, due to damage to hardware or software, or loss of data.

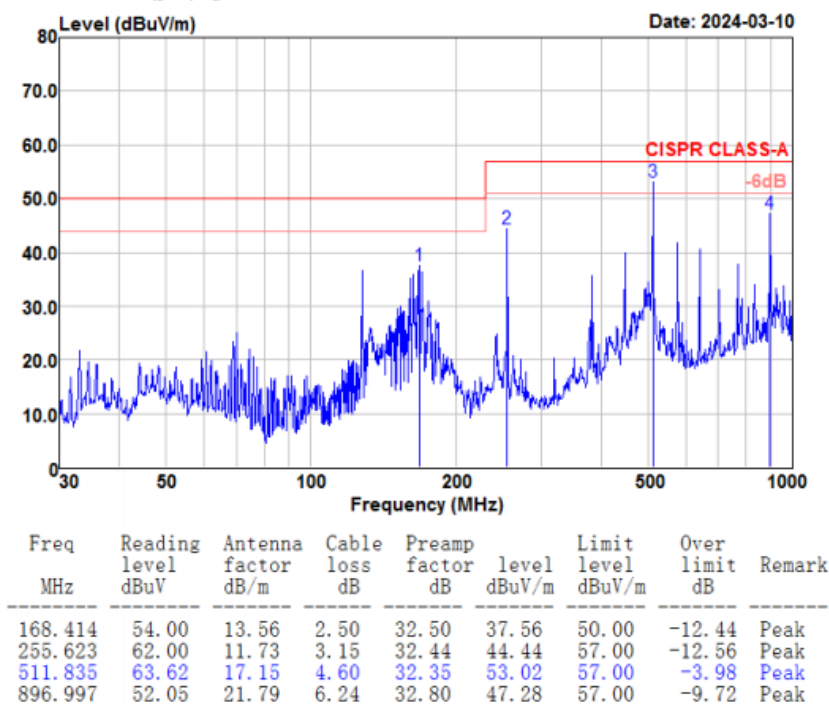
### 3.2 辐射干扰测试 RE test

测试项目 Test Item	测试标准 Test Standard	结果 Result
辐射干扰 RE	Class A	正常工作 Normal operation

#### HORIZONTAL



#### VERTICAL

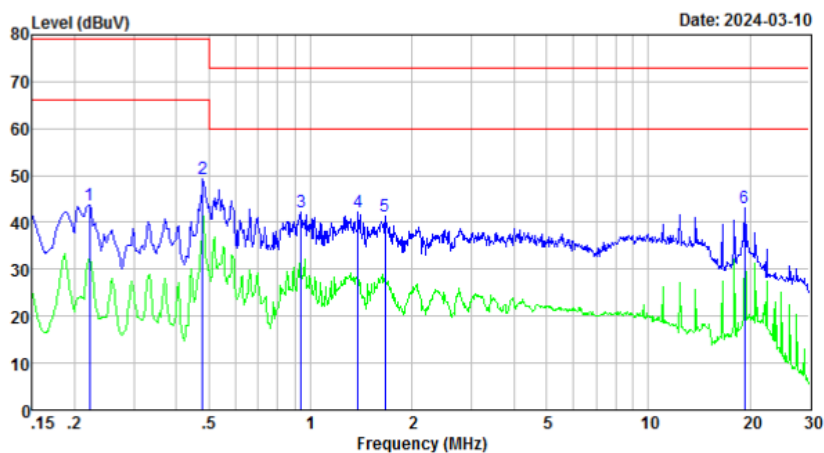




### 3.3 传导干扰测试 CE test

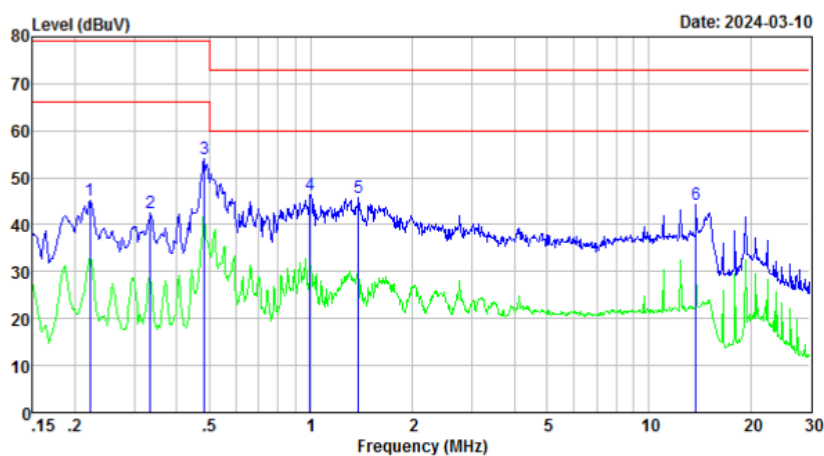
测试项目 Test Item	测试标准 Test Standard	结果 Result
传导干扰 CE	Class A	正常工作 Normal operation

#### LINE



Freq MHz	Reading level dBuV	LISN/ISN factor dB	Cable loss dB	Result level dBuV	Limit level dBuV	Over limit dB	Remark
0.222	34.23	9.58	0.01	43.82	79.00	-35.18	Peak
0.479	39.79	9.60	0.02	49.41	79.00	-29.59	Peak
0.938	32.51	9.61	0.02	42.14	73.00	-30.86	Peak
1.381	32.48	9.60	0.03	42.11	73.00	-30.89	Peak
1.662	31.73	9.60	0.03	41.36	73.00	-31.64	Peak
19.326	33.17	9.92	0.11	43.20	73.00	-29.80	Peak

#### NEUTRAL

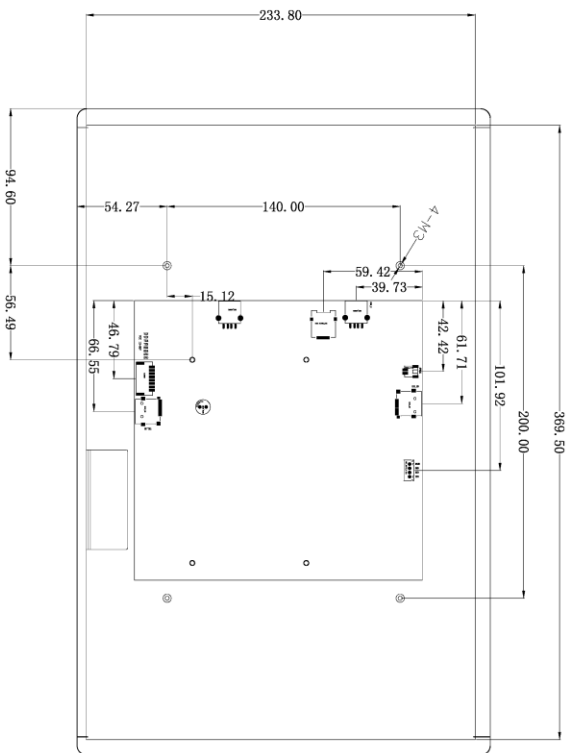
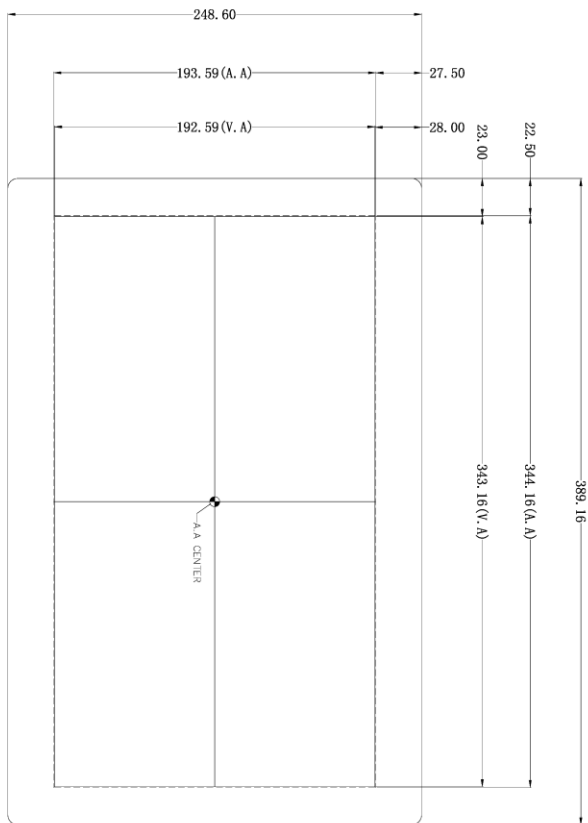
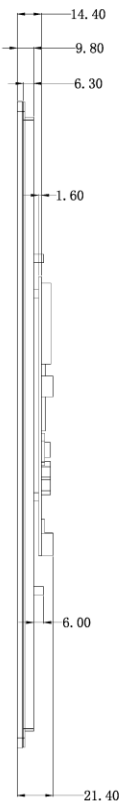


Freq MHz	Reading level dBuV	LISN/ISN factor dB	Cable loss dB	Result level dBuV	Limit level dBuV	Over limit dB	Remark
0.222	35.70	9.58	0.01	45.29	79.00	-33.71	Peak
0.334	32.83	9.60	0.02	42.45	79.00	-36.55	Peak
0.484	44.53	9.60	0.02	54.15	79.00	-24.85	Peak
0.994	36.66	9.61	0.02	46.29	73.00	-26.71	Peak
1.381	36.06	9.61	0.03	45.70	73.00	-27.30	Peak
13.768	34.41	9.90	0.09	44.40	73.00	-28.60	Peak

#### 4、包装和物理尺寸 Packaging & dimensions

<b>外形尺寸 Form Factor</b>	389.16mm (W)×248.60mm (H)×21.40mm (T)			
<b>安装尺寸 Installation Dimensions</b>	开孔尺寸: 369.50 (+0.3mm) ×233.80 (+0.3mm) Positioning hole: 369.50(+0.3mm)×233.80(+0.3mm)			
<b>净重量 Net Weight</b>	1800g			
包装标准 Packaging Standards				
<b>包装箱型号 Model</b>	<b>包装箱尺寸 Dimensions</b>	<b>层数 (层) Layer</b>	<b>数量/层 (片) Quantity/Layer</b>	<b>总数量 (片) Quantity(Pcs)</b>
1 号箱 Carton1:	220mm(L)×160mm(W)×47mm (H)	-	-	-
2 号箱 Carton2:	250mm(L)×200mm(W)×80mm (H)	-	-	-
3 号箱 Carton3:	320mm(L)×270mm(W)×80mm (H)	-	-	-
4 号箱 Carton4:	435mm(L)×335mm(W)×290mm(H)	-	-	-
5 号箱 Carton5:	600mm(L)×430mm(W)×290mm(H)	1	5	5

定义 Definition	序号 Pin#	类型 Type	说明 Description
VIN	1, 2	P	电源输入 Power Input
TX4	3	0	串口4输出 Output
TX2	4	0	串口2输出 Output
RX2	5	I	串口2输入 Input
RX4	6	I	串口4输入 Input
GND	7, 8	P	公共接地 GND



1. 尺寸定位基准为定位孔  
Location hole is used as position reference.  
2. 未标注公差为 $\pm 0.3\text{mm}$   
Unmarked Tolerance is  $\pm 0.3\text{mm}$   
注: 虚线标注为有效显示区域  
Active area is marked in Dash lines

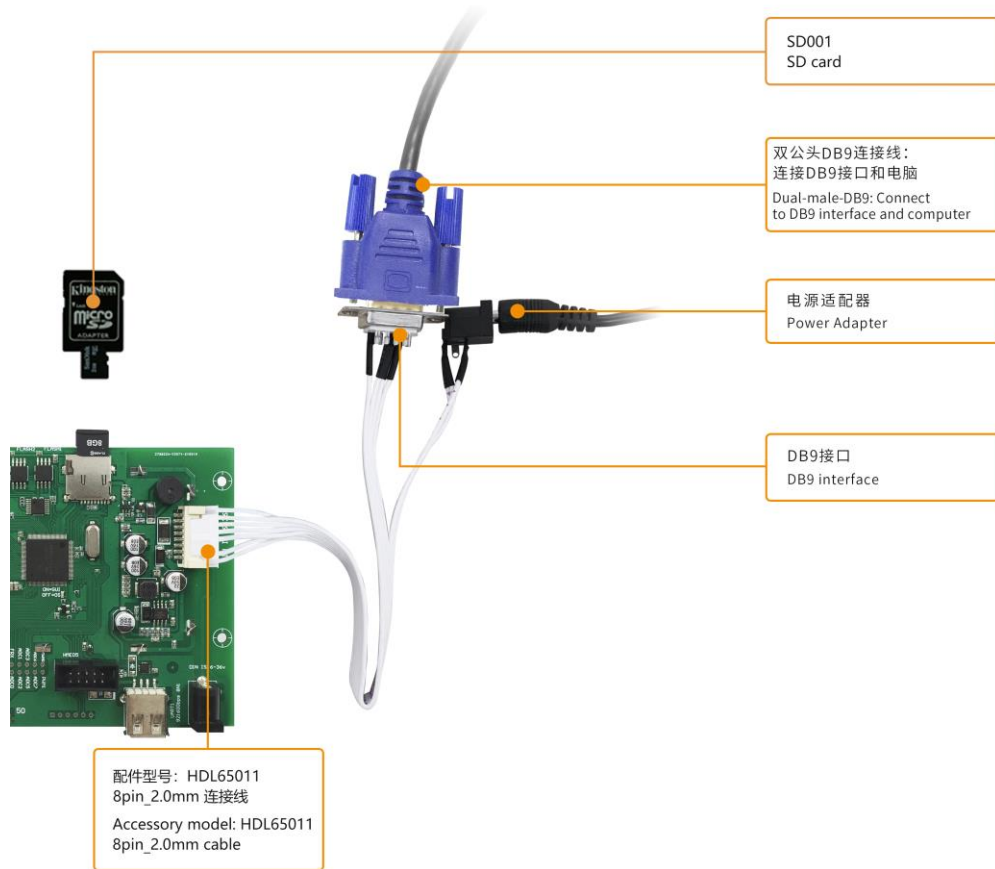
型号 Model	DT321X190020Z240104H		
图纸 Drawing	A 4	绘制 Drawn	DWIN
比例 Scale	1:1	审核 Review	
单位 Unit	MM	批准 Approval	
日期 Date	2024.2.29	日期 Date	

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## 5、调试工具 Debugging tools

建议首次使用迪文智能屏的用户购买标准配件。详细信息可联系客服人员。

It is recommended for new users of DWIN smart LCMs to purchase official accessories. For more details, please refer to customer service center.



## 6、T5L 系列芯片特点 T5L series IC features

(1) 采用应用最广泛、成熟和稳定的 8051 核，1T（单指令周期）高速工作，最高主频 250MHz。

Mature and stable 8051 core which is the most widely used with the maximum operating frequency of T5L is up to 250MHz, 1T(single instruction cycle)high speed operation.

(2) 单独 CPU 核（GUI CPU）运行 DGUS II 系统：

Separate GUI CPU Core running DGUS II System:

- 内置高速显存，2.4GB/S 带宽。

High-speed display memory, 2.4GB/S bandwidth.

- 2D 硬件加速，JPEG 解压缩速度高达 200fps@1280\*800，UI 极其流畅。

2D hardware acceleration, the decompression speed of JPEG is up to 200fps@1280\*800 and the UI with animation and icons as its main feature is extremely cool and smooth.

- JPEG 压缩模式存储图片、图标，大幅度缩小外置存储器到低成本的 16Mbytes SPI Flash。

Images and icons stored in JPEG format. Adopt Low-cost 16Mbytes SPI Flash.

- 支持电阻或电容触摸屏，灵敏度可以调节，最快 400Hz 触控打点速度。

Support CTP or RTP with adjustable sensitivity and maximum 400 Hz touch frequency.

- 1 路 15bit 32Ksps PWM 数字功放驱动扬声器，实现高品质语音压缩存储和播放。

1-way 15bit 32Ksps PWM digital power amplifier driver loudspeaker, save power amplifier cost and achieve high signal-to-noise ratio and sound quality restoration.

- 128Kbytes 变量存储器空间，存储器接口和 OS CPU 核交换数据，应用及其简单。

128Kbytes variable storage space for exchanging data with OS CPU Core and memory.

- 支持 PC 端组态开发和仿真，支持后台远程升级。

Support DGUS development and simulation on PC. Support background remote upgrade.

(3) 单独 CPU 核（OS CPU）运行用户 8051 代码，应用中省掉用户 CPU：

Separate CPU (OS CPU) core runs user 8051 code or DWIN OS system and user CPU is omitted in practical application:

- 标准 8051 架构和指令集，64Kbytes 代码空间，32Kbytes 片内 RAM。

Standard 8051 architecture and instruction set, 64Kbytes code space, 32Kbytes on-chip RAM.

- 64bit 整数型数学运算单元（MDU），包括 64bit MAC 和 64bit 除法器。

64 bit integer mathematical operation unit (MDU), including 64 bit MAC and 64 bit divider.

- 28 个 IO，4 路 UARTs，1 路 CAN 接口，最多 8 路 12bit A/D，2 路 16bit 分辨率可调的 PWM。

28 IOs, 4-channel UARTs, 1-channel CAN, up to 8-channel 12-bit A/Ds and 2-channle 16-bit PWM of adjustable resolution.

- 支持 IAP 在线仿真和调试，断点数量无限制。

Support IAP on-line simulation and debugging with unlimited number of breakpoints.

- 可以透过 DGUS 系统在线升级代码。

Upgrade code online through DGUS system.

- (4) 1Mbytes 片内 Flash, 迪文专利加密技术, 确保代码和数据安全, 杜绝山寨和克隆。

1Mbytes on-chip Flash with DWIN patent encryption technology ensure code and data security.

- (5) -40°C~+85°C工作温度范围 (可定制 -55°C~105°C工作温度范围 IC)。

Operating temperature ranges from -40°C to +85°C(IC operating temperature customizable from -55°C to 105°C).

迪文欢迎广大用户基于 T5L 自主设计客制化产品。

**DWIN encourages users to design your own customized product based on T5L.**

## 7、修订记录 Revision records

版本 Rev	日期 Revise Date	描述 Content	编辑人 Editor
01	2024-06-12	首次发布 First Edition	孟可

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迪文开发者论坛 DWIN Developer Forum: <http://inforum.dwin.com.cn:20080/forum.php>

感谢大家一直以来对迪文的支持，您的支持是我们进步的动力！

谢谢大家！

Thank you all for continuous support of DWIN, and your approval is the driving force of our progress!

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对于客户在其产品中采用迪文产品可能引发的任何后果，迪文不承担连带责任。特别地，对于可能导致的重大财产损失、环境危害、人身伤害甚至死亡等风险，尤其是在军事、易燃易爆、生命医疗设备等高风险应用领域，客户应自行评估风险，并采取相应的预防和保护措施，迪文不承担相关责任。

DWIN reserves the right to make any changes to product designs without prior notice.

Customers should ensure strictly adhering to all the relevant standards and requirements during the product application process, including but not limited to functional safety, information security, and regulatory provisions.

DWIN shall not bear any joint and several liability for any consequences that may arise from customers' adoption of DWIN products. In particular, for risks that may lead to significant property losses, environmental hazards, personal injury, or even death, especially in high-risk application areas such as military applications, flammable and explosive places, and life-saving medical equipment, customers should independently assess the risks and take corresponding preventive and protective measures. DWIN shall not bear any relevant responsibility.