

User Manual PY-LINK User Manual

Introduction

PY-LINK emulator is a tool for online simulation programming and offline programming of Puya MCU. Provides a CMSIS-DAP debugger port with SWD interface, which can perform online emulation, programming and other related operations on the target chip in the MDK environment. Support Puya programmer host computer to download the program to the target board through SWD or ISP online, and support the host computer to burn the configuration to PY-LINK for offline programming.



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1 Features

- USB interface provides 5V power supply
- USB 2.0 full speed compatible interface
- 20 -pin 2.54mm pitch connector
- Firmware online upgrade function
- Operating temperature from 0°C to 50°C
 - Support online debugging function
 - Support running on MDK environment
- Support serial debug SWD (Serial Wire Debug) interface
 - Support Programming function
 - PY32F0xx in the MDK environment.
- Single file Programming in offline mode
- Supports power supply to PY32F0xx
 - 200mA supply current
 - 3.3V and 5V supply voltage
- any voltage programming in the range of external input 1.7V to 5.5V
- SWD rate up to 4MHz

2 Instructions

The definition of the hardware pin is shown in Figure 2-1 PY-LINK pin definition

Figure 2-1 PY-LINK pin schematic and physical map





Table 2-1 Pin definition

Pin	Name	Туре	Description
1	TVCC	Power	power supply
2	3.3V	Output	3.3V power output port
3	5V	Output	5V power output port
4	TVCC	Power	power supply
5	TDI	1	Reserved
6	RX	1	Reserved
7	TMS_SWDIO	Input /Output	data line
8	ТХ	/	Reserved
9	TCK_SWCLK	Output	clock line
10	GND	Power	power ground
11	MCU_MCO	/	Reserved
12	GND	Power	ground
13	TDO	/	Reserved
14	STANDBY	/	Reserved
15	RST	Output	reset signal
16	BUSY	1	Reserved
17	ОК	/	Reserved
18	NG	1	Reserved
19	START	/	Reserved
20	GND	Power	ground

Note: 1. If the target board has voltage, it needs to be connected to the TVC pin, and the voltage of the target board should be (between 1.7V-5V).

2. If the target board has no voltage, you can use PY-LINK to supply power to the target board (3.3V or 5V). At the same time, you need to use a jumper cap to short the selected voltage to the TVC Pin. PY-LINK can provide 200mA of current.

3 Device Connection

Online programming can realize real-time online programming of the target board on the PC side, and PY-LINK can realize MDK online programming and Puya Programmer host computer online programming.

3.1 MDK online programming

MDK online programming requires the user to have the MDK source program of the entire project, and then realize the programming of the target board through the following configuration. When using PY-link in the MDK environment, you need to configure the corresponding usage environment. The configuration process is as follows

Click "Project" -> "Options for Target ' Project name ' ... " -> " Debug ", then click setting to select CMSIS-DAP Debugger as shown in Figure 3-1 and Figure 3-2 DAP mode configuration. to configure DAP mode.

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File Edit	t View	Proj	ect Flash	Debug	Peripherals	Tools	SVCS	Window	Help									
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= 😜	MAIN		Export										21					
e	CMS		Manage										2					
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			Remove Item Options for T Clean Targets Build Target Rebuild all ta Batch Build Batch Setup Translate E:\V Stop build	f <mark>arget 'M</mark> s arget files NORK\PT(AIN" ; 061\CP3-test\	01 IO_Le	akage_ca	ase1_pp\U:	er\main.c	c		Alt+F F Ctrl+F	7]				

Figure 3.1-1 DAP Mode Configuration 1

Figure 3.1-2 DAP Mode Configuration 2

🖁 Options for Target 'Target 1'	×
Device Target Output Listing User C/C++ A	Asm Linker Debug Utilities
C Use <u>S</u> imulator <u>with restrictions</u> <u>Settings</u> ☐ Limit Speed to Real-Time	Image: Image
Load Application at Startup Initialization File:	CMSIS-DAP Debugger Initializated -CINK7 3-TRACE Contex Models Contex-M Debugger ST-Link Debugger ST-Link Debugger Edit
Restore Debug Session Settings Image: Breakpoints Image: Toolbox Image: Watch Windows & Performance Analyzer Image: Memory Display Image: System Viewer	Restore NULink Debugger Pemicro Debugger I Bra Stellaris ICDI SiLabs UDA Debugger Watch virinows I Memory Display System Viewer
CPU DLL: Parameter: SARMCM3.DLL -REMAP	Driver DLL: Parameter: SARMCM3.DLL
Dialog DLL: Parameter: DARMCM1.DLL pCM0+	Dialog DLL: Parameter: TARMCM1.DLL -pCM0+
Wam if outdated Executable is loaded Manage Component Vie	Wam if outdated Executable is loaded
OK	Defaults Help

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Click Settings and select SW, as shown in Figure 3.1-3 Communication Mode Selection

Figure 3.1-3 Communication mode selection

CMCIC DAD	LIBOODE	D	Move
CMSIS-DAP	SWDIO O 0 00011	Device Name	move
Serial No: 07000003346aba	SWDIO OXOBCTI	4// ARM CoreSight SW-DP	Up
Firmware Version: 1.10			Down
	Automatic Datas		
🔽 SWJ Port SW 🖵	Automatic Detect	alon Device Massar	
Max Clock: 1MHz 👻	• Manual Conliguia	Device Name:	
·	Add Delete	Update	AP: 0x00
Debug			
Connect & Reset Options		Cache Options D	ownload Options
	anti Alta da la cal	Cache Code	Verify Code Download
Connect: Normal 🗨 Res	set: Autodetect		venily code Download

Then click Flash Download to configure erase, verify, and program as needed, as shown in Figure 3.1-4 programming options:

Figure	3.1 - 4	Progra	mmina	Options

Debug Trace Flash Download Pack Download Function C Erase Full Chip Program C Do not Erase Reset and Run RAM for Algorithm Start: 0x20000000 Size: 0x00001000 Programming Algorithm	
Description Device Size Device Type Address Range	
Start: Size:	
Add Remove	
OK Cancel Help	

Click Add to load and download the algorithm file, the algorithm file of P32F030 is loaded in the figure, as shown in Figure 3.1-5 algorithm file:

Fiaure 3.1-5	Alaorithm	file
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CMSIS-DAP Cortex-M Target [Driver Setup					×
Debug Trace Flash Downlos	ad Pack					
Download Function C Erase Full Chip Erase Sectors C Do not Erase Programming Algorithm	 ✓ Program ✓ Verify ✓ Reset and F 	RAM for J	Algorithm	Size: 0x00001	000	
Description	Device Size	Device Type	Addr	ess Range		
		Start:		Size:		
	Add	Remove				
	OK	Cano	el		Help	

3.2 PUYA PROGRAMMER host computer online programming

When using the Puya Programmer host computer to program online, the user only needs to have the hex file of the project. The specific operation process is as follows.

Step 1: Configure Project configuration options

Configure the communication mode and communication speed in the project Windows column of the host computer. The SWD mode is configured in the figure, and the speed is 10Mhz as shown in Figure 3.2-1 Project configuration options. When the download is unstable, it is recommended to reduce the speed appropriately before proceeding with the following operations. The recommended speed is between 500Khz-10Mhz.

		i igui				areativ	011 0	puor						
R	PuyaProgramme	ər										C]	×
1	File(E) Edit(E) Ta	rget(T) Device(D) Vie	w(V) Help(<u>H</u>)											
÷	😂 🛃 DL EC ES	BL PR VR RD UF 💂												
Pre	perties	★ û X	TARGET ME		PROG	RAM ME	MORY	OPT	ION BYT	ES			۵ ۵	H
Pr	operties Windows	~	Address	0	1	2	3	4	5	6	7	8	9	1
8	2↓ 🗉 🗲		0x0800000	68	04	00	20	D5	00	00	08	2B	06	u l
	Device		0x08000010	00	00	00	00	00	00	00	00	00	00	
	Device Interface	SWD 🔹	0x08000020	00	00	00	00	00	00	00	00	00	00	
•	Firmware Version	1.10	0x08000030	00	00	00	00	00	00	00	00	2F	06	
	USB	USB-0	0x08000040	AD	08	00	08	2D	06	00	08	33	06	
	SWD Max Clock	10MH-	0x08000050	31	06	00	08	E7	00	00	08	E7	00	
	INIAX CIOCK	IUWINZ	0x0800060	00	00	00	00	99	01	00	08	9B	01	
	COM	COM0	0x08000070	41	01	00	08	53	06	00	08	55	06	
	Baud Rate	115200	0x08000080	57	06	00	08	59	06	00	08	00	00	
	MCU Info		0x08000090	00	00	00	00	4F	06	00	08	51	06	
	RAM Address	Unknown	0x08000A0	00	00	00	00	35	06	00	08	37	06	
	RAM Size	Unknown	0x080000B0	AB	08	00	08	29	06	00	08	E7	00	
	Flash Base Addr	Unknown	0x080000C0	03	48	85	46	00	FO	2A	F8	00	48	
	Flash Size	Unknown	0x080000D0	68	04	00	20	04	48	80	47	04	48	
			0x080000E0	FE	E7	FE	E7	FE	E7	FE	E7	3D	06	
			0x080000F0	30	B5	OB	46	01	46	00	20	20	22	
			0x08000100	D5	40	9D	42	05	D3	1D	46	95	40	
			-											

Figure 3.2-1 Project configuration options

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Step 2: Load the hex file

First click	" File(F) "	->	" Open(O) "	, as shown in Figure 3.2-2 to load the hex file (*	1)	:
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			Figure 3.2	-Z LU	au ne	S IIIC	;(])							
🖗 PuyaProgra	mmer											C	ו	×
File(F) Edit(E)	Target(T) De	vice(D) Viev	w(V) Help(H)											
📴 Open(O)	Ctrl+O	RD UF _												
p 🛃 Save(S)	Ctrl+S	→ 中 ×	TARGET MEI		PROGE	RAM ME	MORY	OPT	ION BYT	ES			4 Þ	H
p Save As(A).		~	Address	0	1	2	3	4	5	6	7	8	9	^
Exit(X)			0x08000000	68	04	00	20	D5	00	00	08	2B	06	
Device			0x08000010	00	00	00	00	00	00	00	00	00	00	
Device Interfa	ce SWD		0x08000020	00	00	00	00	00	00	00	00	00	00	
Firmware Vers	ion 1.10		0x08000030	00	00	00	00	00	00	00	00	2F	06	
USB	USB-0		0x08000040	AD	08	00	08	2D	06	00	08	33	06	
SWD			0x08000050	31	06	00	08	E7	00	00	08	E7	00	
Max Clock	10MHz	•	0x08000060	00	00	00	00	99	01	00	08	9B	01	
	60140		0x08000070	41	01	00	08	53	06	00	08	55	06	
COIVI Roud Pate	115200		0x08000080	57	06	00	08	59	06	00	08	00	00	
MCU Info	115200		0x08000090	00	00	00	00	4F	06	00	08	51	06	
RAM Address	0x2000000	D	0x080000A0	00	00	00	00	35	06	00	08	37	06	
RAM Size	0x0000200	D	0x080000B0	AB	08	00	08	29	06	00	08	E7	00	
Flash Base Ad	dr 0x0800000	D	0x080000C0	03	48	85	46	00	FO	2A	F8	00	48	
Flash Size	0x0001000	D	0x080000D0	68	04	00	20	04	48	80	47	04	48	
			0x080000E0	FE	E7	FE	E7	FE	E7	FE	E7	3D	06	
			0x080000F0	30	B5	OB	46	01	46	00	20	20	22	
			0x08000100	D5	40	9D	42	05	D3	1D	46	95	40	
			0x08000110	40	19	15	46	52	1E	00	2D	F1	DC	
Max Clock			0x08000120	06	4E	05	EO	E3	68	07	CC	2B	43	
			0x08000130	B4	42	F7	D3	FF	F7	C8	FF	60	0A	v
			<										3	>

Figure 3.2-2 I	Load hex file	(1)
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Then find the hex to be loaded, first click the hex file, and then click "Open", as shown in Figure 3.2-3 to load the hex file (2).

Figure 3.2-3 Load hex file (2)									
牛夹				?					
^	名称	^	修改日期	类型	大小				
	Project.hex		2021/9/1 11:00	HEX 文件	8 KB				
×									
文件名(N	j):				~ *.bin;	*.hex		\sim	
					打	开(0)	取消		

Step3: Configure programming options Click " Device " -> " Configuration ". and then configure erase, program and verify as required, as shown in Figure 3.2-4 programming options.

Figure 3.2-4 Programmir	ng Options
PY-Link Configuration	×
Download Function ● Erase Full Chip ✓ Program ○ Erase Sectors ✓ Verify ○ Erase Pages ○ Do not Erase	Program Limit
Product SN Write SN SN Addres Next SN: 0 SN Increm	ss:0x 00000000
OK	Cancel

Step4: Programming

Click " Target " -> " Download " to complete the programming of the target board, as shown in Figure 3.2-5 programming.

Ø	PuyaProgram	nme	r	Ŭ		Ŭ		0				_	C) >	×
8.1	File(F) Edit(E)	Targ	get(T) Device(D) Vie	w(V) Help(H)											
÷	😅 🛃 DL EC	DL	Download												
Pro	perties	EC	Erase Full Chip	TARGET ME	MORY	PROGE	RAM MEI	MORY	OPT	ION BYT	ES			۵ ۵	м
Pro	perties Window	ES	Erase Sectors	dress	0	1	2	3	4	5	6	7	8	9	^
8	2↓ 🗉 🗲	BL	Blank Check	0000008	68	04	00	20	D5	00	00	08	2B	06	
	Device	PR	Program	8000010	00	00	00	00	00	00	00	00	00	00	
	Device Interfac	VR	Verify	8000020	00	00	00	00	00	00	00	00	00	00	
	Firmware Versio	RD	Read Data	08000030	00	00	00	00	00	00	00	00	2F	06	
_	USB		Program OptionBites	8000040	AD	08	00	08	2D	06	00	08	33	06	
	SWD			8000050	31	06	00	08	E7	00	00	08	E7	00	
_			Run App	8000060	00	00	00	00	99	01	00	08	9B	01	
	COM		COM0	0x08000070	41	01	00	08	53	06	00	08	55	06	
	Baud Rate		115200	0x08000080	57	06	00	08	59	06	00	08	00	00	
	MCU Info			0x08000090	00	00	00	00	4F	06	00	08	51	06	
	RAM Address		0x20000000	0x080000A0	00	00	00	00	35	06	00	08	37	06	
	RAM Size		0x00002000	0x080000B0	AB	08	00	08	29	06	00	08	E7	00	
	Flash Base Add	r	0x0800000	0x080000C0	03	48	85	46	00	FO	2A	F8	00	48	
	Flash Size		0x00010000	0x080000D0	68	04	00	20	04	48	80	47	04	48	
(0x080000E0	FE	E7	FE	E7	FE	E7	FE	E7	3D	06	
				0x080000F0	30	B5	OB	46	01	46	00	20	20	22	
				0x08000100	D5	40	9D	42	05	D3	1D	46	95	40	
				0x08000110	40	19	15	46	52	1E	00	2D	F1	DC	
Ma	ax Clock			0-09000120	06	AE	05	EO	E2	69	07	00	20	42	

Figure 3.2-5 Programming

Target on the main interface, select the click operation as required. The meanings of the corresponding buttons are as follows

• Erase Full Chip: Erase the chip in the way of full erase

Check chip

- Erase Sectors: Erase chips by sector
- Blank check: blank check chip
- Program: Program the chip
- Verify:
- Read Data: Read chip data

 Download: Operate according to the configuration mode in " Device " -> " Configuration ", as shown in Figure 3.2-4 programming options, click to execute the selected configuration item.

4 Puya Programmer offline programming

Configure the communication method and communication speed in the project Windows column of the host computer, then click " Device " -> " Configuration ", and then configure the erasing, programming and verification methods according to your own needs (the operation is online with the Puya Programmer host computer). The programming options for programming are the same), and then click " Device " -> " Update File " to wait for the code burning to complete, as shown in Figure 4-1 Offline programming. Finally, after connecting the target board, you can click the button to perform offline programming.

🗑 PuyaProgrammer — 🗆 🗙											×	
File(F) Edit(E) Target(I) Device(D) View(V) Help(H)												
E C ES BL PR UR RD UF PY32F030x2												
Properties	•	ąχ	TARGET MEMO	DRY	PROGR	AM ME	MORY				4	▶ ₩
Properties Windows		~	Address	0	1	2	3	4	5	6	7	8 ^
8∎ 2↓ 🔳 🗲			0x08000000	18	04	00	20	01	01	00	08	DB
Device		^	0x08000010	D9	OB	00	08	6D	01	00	08	8D
Device Interface	SWD	-	0x08000020	00	00	00	00	00	00	00	00	00
Firmware Version	1.10		0x08000030	6F	01	00	08	00	00	00	00	DD
USB	USB-0		0x08000040	1B	01	00	08	1B	01	00	08	1B
SWD			0x08000050	18	01	00	08	1B	01	00	08	18
Max Clock	500kHz		0x08000060	1B	01	00	08	1B	01	00	08	18
⊟ ISP			0×08000070	18	01	00	08	18	01	00	08	18
СОМ	COM0	_	0x00000070	10	01	00	09	10	01	00	09	10
Baud Rate	1000000		0x08000000	10	01	00	00	10	01	00	00	10
MCU Info	0.10401477		0x08000090	10	01	00	08	10	01	00	08	10
Core ID	0x1BA01477		0x080000A0	IB	01	00	80	IB	01	00	08	IB
RAIVI Address	Unknown	~	0x080000B0	18	01	00	80	18	01	00	80	18
Device Interface			0x080000C0	1B	01	00	08	1B	01	00	08	1B
			0x080000D0	1B	01	00	08	1B	01	00	08	1B
			0v080000E0	1R	01	00	08	1R	01	00	08	18 ×
Outrut												_ n v
Discourse of Custom												• + ~
DeviceUpdateFile finished at 13:50:52 Start DeviceUpdateFile at 13:51:00 Connect Success. EraseChip Done. Verify OK. Disconnect Success. DeviceUpdateFile finished at 13:51:04 Start DeviceUpdateFile at 13:51:46 Connect Success. EraseChip Done.												
IA A > > Status	/					-						
Ready								Prog	gram: 00	022000H	1	

Figure 4-1 Offline programming

5 PY-LINK firmware upgrade

If PY-LINK needs to be upgraded, click " Device " -> " Update Firmware " to wait for the upgrade to complete, as shown in Figure 5-1 Firmware upgrade.

🖗 PuyaProgramm	er											×
File(F) Edit(E) Ta	rget(T) Device(E) Vi	ew(V) Help(<u>H</u>)									
: 💕 🛃 DL EC ES	S BL PR VR RD	UF	PY32F030x2			•	Ŧ					
Properties	•	ąх	TARGET MEM	ORY	PROGR	AM ME	MORY				4	Þ H
Properties Windows		~	Address	0	1	2	3	4	5	6	7	8 ^
8≣ ⊉↓ 🔳 🗲			0x0800000	18	04	00	20	01	01	00	08	DB
Device		^	0x08000010	D9	0B	00	08	6D	01	00	08	8D
Device Interface	SWD	-	0x08000020	00	00	00	00	00	00	00	00	00
Firmware Version	1.10		0x08000030	6F	01	00	08	00	00	00	00	DD
USB	USB-0		0x08000040	1B	01	00	08	1B	01	00	08	1B
SWD			0x08000050	18	01	00	08	1B	01	00	08	18
Max Clock	500kHz		0×08000060	18	01	00	08	18	01	00	08	18
ISP			0.08000000	10	01	00	00	10	01	00	00	10
COM	COM0		0x08000070	10	01	00	08	10	01	00	08	10
Baud Rate	1000000	_	0x08000080	IB	01	00	08	IB	01	00	80	IB
MCU Info			0x08000090	18	01	00	80	18	01	00	80	18
Core ID	0x1BA01477		0x080000A0	1B	01	00	08	1B	01	00	08	1B
RAM Address	Unknown		0x080000B0	1B	01	00	80	1B	01	00	08	1B
DAMAC:	11-1	-	0x080000C0	1B	01	00	08	1B	01	00	08	1B
Device Interface			0x080000D0	1B	01	00	08	1B	01	00	08	1B
			0x080000E0	1R	01	00	08	1R	01	00	08	18 [×]
			_ <									>
Output												▼ Ŧ ×
Disconnect Success. DeviceUpdateFile finis Start DeviceUpdateFile Connect Success. EraseChip Done. Programming Done. Verify OK. Disconnect Success. DeviceUpdateFile finis	hed at 13:51:04 e at 13:51:46 hed at 13:51:50									,		^
Start DeviceUpdatefirm	nware at 13:55:40											
EraseChip Done.												*
H + + H \Status	r											
Ready								Prog	jram: 00	008800	н	

Figure 5-1 Firmware upgrade

6 Version history

Version	Content	Date
Rev 0.1	Initial Release	2021-09-15
Rev 1.0	Update 5.	2021-08-31

Puya Semiconductor Co., Ltd.

IMPORTANT NOTICE

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