

ET-PGMPIC USB

ET-PGMPIC USB is a PIC Microcontroller Programmer that is Microcontroller from Microchip Co., Ltd. Its specifications are equivalent to PicKit 2 Programmer of Microchip because it can program many numbers of PIC Microcontroller that is FLASH Memory (Can see numbers of PIC Microcontroller at ET-PGMPIC USB in file README of Software Program PicKit 2).

specification of ET-PGMPIC The remarkable USB Programmer is USB Interface that is more convenient to apply and high speed to program, so it takes a short time to program. Moreover, it can upgrade new Firmware (www.microchip.com). versions from Microchip The specifications that are mentioned above, ETT designs additional Module suite for Emulator Programming because it can program data into Target Board directly, so it is more convenient to develop program because we do not take off any IC Pin and it can protect IC Pin from broken or bending efficiently.

• Specifications of ET-PGMPIC USB

- Support applications of PIC Microcontroller
- Connecting with computer through USB Port
- Use Power Supply from USB Port (Only Board ET-PGMPIC USB)
- Can program through Text Tool 40PIN or 20PIN
- Port ICSP for In-Circuit Serial Programming
- LED to display state operation
- Can program by pressing Switch PROGRAM on programmer
- Can program through Emulator Modules



Meaning of vocabularies in the User's Manual

Vocabulary	Meaning
Target Board	Board Microcontroller connects with ET-PGMPIC
	USB through Connector ICD2 or ICSP.
Emulator Module	Module replaces Microcontroller on Target
	Board for programming.
PIC Micro	IC PIC Microcontroller
ICD2	Programmer and Debugger of Microchip Co., Ltd.
ICSP	The method to program by directly interfacing
	signal programs; VPP, VDD, GND, PGD and PGC
	with signal Pin of Microcontroller for
	programming
TEXT TOOL	Socket to insert IC for programming

• Structure of Board ET-PGMPIC USB





Details

1.USB Port Connection
 It is a Port to connect signal from Board ET-PGMPIC
 USB with computer.



2. LED to display state operations; POWER, TARGET, and BUSY



BUSY: It is a red LED to display state operation of programmer. It will be ON when Program is running such as reading/writing Flash Memory of PIC microcontroller.

• **TARGET:** It is a yellow LED to display Power Supply status of Target Board.

POWER: It is a green LED to display Power Supply status of Board.

3. TEXT TOOL 40PIN



4. TEXT TOOL 20PIN



- Support IC PIC Microcontroller 28PIN up to 40PIN DIP TYPE
- Put IC top-justification as shown in the picture Always tightly lock IC

- Support IC PIC Microcontroller 8PIN up to 20PIN DIP TYPE
- Put IC top-justification as shown in the picture Always tightly lock IC

5. JUMPER T/B to select to supply power to Port ICD2 and ICSP

ET-PGMPIC USB can program by putting IC into TEXT TOOL; normally, there are Port ICSP and ICD2 that can be interfaced with components external board or on board Microcontroller (TARGET Board) as required for programming. So, it is necessary to have circuit to verify and control voltage that is supplied to Port ICSP and ICD2 for ET-PGMPIC USB because it protects Power Supply between Board ET-PGMPIC USB and TARGET Board from crashing.



- In case of programming IC on TEXT TOOL, we must set Jumper on T side to verify voltage that comes from USB.
- In case of programming IC by interfacing signal from Port ICSP or ICD2, we must set Jumper on B side. In this case, circuit will verify voltage of TARGET Board. If there's voltage at TARGET Board, it will control circuit not supply power from Board ET-PGMPIC USB; on the other hand, if there's no any voltage at TARGET Board, circuit will supply power to TARGET Board.
- 6. Socket for interfacing signal ICD2 is a port of signal programming that is arranged under standard of ICD2 (programmer suit and debugger of Microchip Co., Ltd.). It can interface with Board Microcontrollers that have the same port arrangement of ICD2. Moreover, it can interface with ETT Emulator Modules as shown in the picture below.



7. Port ICSP is a port of signal programming as same as Port ICD2 but its signal arrangement differs from Port ICSP because it uses Connector 6PIN for interfacing signal programming. If Board Microcontroller has not Connector ICD2, we recommend user to directly connect signal from this port.



- VPP (Programming Voltage): It is signal voltage for programming.
- VDD (Power Supply Positive Voltage): It is voltage for supplying IC.
- GND: It is Ground Pin.
- **PGD (Programming Data):** It is signal Data Pin for programming.
- PGC (Programming Clock): It is signal Clock
 Pin for programming.
 AUX: It is reserved.
- 8. Switch PROGRAM



It can program by pressing Switch and its specifications are equivalent to pressing Button "Write" on Software PICKit 2.

We can use this function by setting specifications of Program PICkit 2 Programmer in Menu **Programmer -> Write on PICkit Button** and then tick sign $[\sqrt{}]$ as shown in the picture below.



PICkit 2 Pro	gramme	7						3
File Device Fa	amily Pro	ogrammer To	ools Help					
Midrange Config Device: F User IDs: F	guratio PIC16F FF FF F	Read Device Write Device Verify Erase	e Ctrl+R e Ctrl+W Ctrl+Y	on: 21E	В			
Programming	g Suc 🗸	Blank Check Verify on Wr Hold Device	ite in Reset		5		ROCH	۱P
Read	Anite II	Write on PIC Verify E	i <mark>kit Button</mark>	nd check		D PICkit 2] On] /MCLR	5.0	*
Program Mem	nory							
🗹 Enabled 🛛	Hex Only	Sour	ce: C:\ET_BA	SE16F628A	PICCexa	m\LCD.hex		
000 3	3000 ()08 A 290)	D 0000	100A	108A	110A	0782	^
008 3	3428 3	340C 340.	1 3406	100A	108A	110A	0782	

• Software for using with ET-PGMPIC USB Programmer

In the part of Software Board ET-PGMPIC USB, it uses Software "PICkit 2 Programmer" from Microchip Co., Ltd. First of all, we must install program .NET Framework (dotnetfx) and then follow by Program PICkit2Setup as follow;







Application of Software Program PICkit 2 Programmer

PICE	PICkit 2 Pi	rogrami	ner				_					j i
	<u>-</u> jle <u>D</u> evice	Family	Programme	er <u>T</u> ools	<u>H</u> elp		_	Т	ool Bar			
ſ	PIC18F Config	guration										
(Device:	PIC18F4	458		Config	uration:	2200	0E0F	0000	0080) -	<u> </u>
	User IDs:	FF FF F	F FF FF FF F	F FF			C00F	EOOF	400F		Н	Configuration
	Checksum:	1B50			OSCC.	AL:		Ba	andGap:		٦ ٦	
								-				
	Reading de Program M	evice:		oorlDo	Config	Dono		\mathbf{X}	MIC	ROC	HIP	
6	Frogramm	emory.	LL 0	sends	coning	. Done.	- (PICkit 2-			
1							-		On	5.0	-	VDD Target
l	Read	Write	Verify	Eras		ank Chec	k		/MCLR			
	Program Me	emory										
	🗹 Enabled	Hex Or	ıly 🔽	Source:	Read from	n PIC18F4	458					
	0000	EFAD	F000	6AF7	0F14	6EF6	OEC)0	22 F 7	0009	^	
	0010	50F5	0012	OAOC	500D	4F52	524	17	4D41	5420	_	
	0020	5345	2054	4F49	4220	414F	445	52	4520	2D54		
	0030	4142	4553	5020	4349	3738	303	32	ODOA	0000		
	0040	6AF7	0F50	6EF6	0E00	22F7	000)9	50F5	0012		
	0050	6F43	6E6E	PROCI	2AM Me	mory	204	14	6F74	6120		
	0060	796E	4920	TROO		intor y	205	54	6F79	2075		
	0070	6977	6060	7320	6565	4C20	444	15	6220	696C		
	0080	6B6E	0A20	000D	6AF7	0F96	6EF	°6	0E00	22F7		
	0090	0009	50F5	0012	ODOA	5220	354	12	6920	2073		
	0A00	6572	6573	7672	6465	6620	726	δF	5020	4D47		
	00B0	2820	7250	676F	6172	6D6D	6E6	59	2067	6F4D	×	
	EEPROM D	ata								to Immert	Hou	
	🗹 Enabled	Hex Or	ıly 🔽						40 +1	Write Dev	vice	
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	10 FF FI	F FF FF				FF F	FFFF	FF 🥏	E)	port Hex	File	
	20 FF FI	F FF FF	EE]	PROM D	ATA	FF F	FFFF	F	D	Ck:+"	2	
	30 FF FI	F FF FF	FF FF I	F FF FF	FF FF 1	FF FF F	FFFF	FF 🔽	PI	CKI	6	
												1

Menu Command for managing File

File		
	Import Hex	Ctrl+I
	Export Hex	Ctrl+E
	Exit	Ctrl+Q

- **Import Hex** To load the appropriate hex file into Program PICkit2 for programming.
- **Export Hex** To Export hex file that is read from Microcontroller for saving as file.



- Exit- To exit from program

Menu	Command	to	select	family	of	Microcontroller	(DEVICE
FAMII	GY)						

Dev	vice Family	Program					
	Baseline						
	Midrange						
	PIC18F						
	PIC18F_J	-					
	PIC18F_K	_					
	PIC24						
	dsPIC33						

- **Baseline (12-bit Core)-** To program with 12-bit Core Flash devices Microcontroller
- Mid-range (14-bit Core) To program with 14-bit Core Flash devices Microcontroller
- **PIC18F-** To program with PIC18F Flash devices Microcontroller
- **PIC18F_J-** To program with PIC18FXXJXX Flash devices Microcontroller
- **PIC18F_K-** To program with PIC18FXXKXX Flash devices Microcontroller
- **PIC24-** To program with PIC24 Flash device Microcontroller
- **dsPIC33-** To program with dsPIC33 Flash devices Microcontroller

Menu Command for function programming (PROGRAMMER)

Pro	grammer						
	Read Device Ctrl+R						
	Write Device Ctrl+W						
	Verify Ctrl+Y						
	Erase						
	Blank Check						
	Verify on Write						
	Hold Device in Reset						
	Write on PICkit Button						





	 Control voltage at VDD of Target Tick sign [√], it means that it supplies voltage to Target Board. Not tick any sign [√], it means that it does not supply voltage to Target Board.
VDD Target Check 5.0	Adjust voltage VDD Target from 2.5 to 5 Volt.
	<pre>Control state of MCLR _ Tick sign [√], it means that it supplies Logic "0" to MCLR Not tick any sign [√], it means that it does not supply any Logic "0" to MCLR.</pre>

- Auto Import Hex + Write Device- Function of this Button Command can be both Import Hex File and Write data.



- Read Device + Export Hex File- Function of this Button Command can be both Read data from memory of Microcontroller and Export data to be Hex File.



Menu Command of TOOL for programming



- Enable Code Protect (Ctrl+P): It is a function to protect code program memory.
- Enable Data Protect (Ctrl+D): It is a function to protect data EEPROM.



- Set OSCCAL: It uses value from Register OSCCAL to modify frequency OSC internal PIC.
- **Target VDD Source:** Should be set at <u>Auto-Detect</u> position.
 - Auto-Detect: To check voltage of destination components automatically.
 - Force PICkit2: To configure voltage VDD that is supplied to Target come from Board PICkit2.
 - Force Target: To configure voltage VDD that is supplied to Target come from voltage of its Target.
- Fast programming: To program quickly.
- Check Communication: To check the connection between ET-PGMPIC and Computer.
- **Troubleshoot...:** It is a function Help and give some advice or solution when problem has occurred.
- Download PICkit 2 Firmware: It is a function to download new Firmware version of PICkit2 into Board ET-PGMPIC USB; it is used to Update Firmware.

Menu Command of Help



- PICkit 2 User's Guide: It is User's Manual of PicKit2 that is PDF File.
- LPC Demo Board Guide: It is User's Manual of Board Low Pin Count Demo Board of MICROCHIP.
- PICkit 2 on the web: It is data of PICkit2 on website of MICROCHIP.
- ReadMe: It is File ReadMe of Program PICkit 2 to shown details and numbers of PIC MCU that are supported by PICkit 2.
- About: It is details of Software PICkit 2.

EEPROM Data

Program PICkit 2 can modify data in EEPROM of PIC Micro because there's window to modify data, so we just click



mouse at the data position that we want to modify. When we write data, EEPROM of PIC Micro will be changed follow the modified data as shown in the picture below.

r I	EEPF	ROM	Da	ta														
Ŀ	🗹 En	able	d	Hex	: Onlj	y	Y											
Γ	00	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	^
	10	FF	FF	FF	01	02	03	04	05	FF	FF	FF	FF	FF	FF	FF	FF	
	20	FF	FF	FF	FF	FF	FF	FF	FF	FΜ	रहर	FF	FF	FF	FF	FF	FF	
	30	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	~

- The method to program
 - 1. Connect USB Cable between Board ET-PGMPIC USB and Computer.
 - 2. Put the preferable IC PIC MCU into TEXT TOOL or Emulator Modules for programming.
 - If programming on TEXT TOOL



***NOTE:** If programming on TEXT TOOL, we must set Jumper T/B on T position.



• If programming on Target Board by Emulator Module



If programming through Emulator Module, we should interface Power Supply for TARGET Board to protect power supply from USB not enough and should shift Switch on Module to PRG position for connecting signal programming.

***NOTE:** If programming on Emulator Module, we must set Jumper T/B on B position.

3. Open Program PICkit 2 by double click Icon PICkit2.



4. Program PICkit 2 checks IC on TEXT TOOL; if it is number that is supported by PICkit 2 and its connections are correct, it will display the found number of PIC Micro in the blank **Device** as shown in the picture below.



🕎 PICkit 2 Pr	ogramm	er							
File Device F	Family P	Programmer	Tools	Help					
PIC18F Config	juration								
Device:	PIC18F45	58		Config	uration: 2	2700 OFO	IF 0000	0085	
User IDs:	FF FF FF	FF FF FF FF	FF		(COOF EOC)F 400F		
Charlesson	000.7			0000	ы.,		D		
Checksum:	82D7			USLU	AL:		Bandulap:		
PIC18F dev	ice four	nd.							
							NAUC	RUCH	
							D PICkit 2-		
Bead	Write	Verifu	Erase	ПВ	ank Check	5 4] On	5.0	-
	WINC	V Cilly							
Program Me	mory		c	N. (T		D			
	Hex Unly	/ 🗡	Source:	None (Err	ipty/Erase	aj			
0000	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	^
0010	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	-11
0020	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	
0030	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	
0040	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	
0050	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	
0060	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	
0070	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	
0080	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	
0090	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	
00A00	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	
00B0	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	*
	ata								_
	Hex Only	· ·					Au	ito Import He Write Device	×
	They emp								
00 FF FF	FF FF	FF FF FI	F FF FF	FF FF H	FF FF FF	FFFFF	A B	ead Device - voort Hey File	+
10 FF FF	FF FF	FF FF F]	7'1''1''	FF FF F	"F" FF FF	· 17 17 · 17 ·			
20 FF FF	רד דד ידי ידי י	ויז יוי יוי יים יוים יוים	11 11 3 77 77 7 77 77 7	ר דד דד ד דד דד ד	11 11 1 1 47 77	ייי יי ייי ייי י	PI	Ckit [™]	2
50 FF FF	rr rf	rr rr fl	rr rr	rr rr I	r rr fl	rr rr			

- 5. First of all, we must erase the old data in PIC Micro, click button command **Erase** and we will see data in the blank of **Program Memory** and **EPPROM data** that will be FF value.
- 6.Import Hex File as required, click menu command File->
 Import Hex.
- 7. We will see data in the blank **Program Memory** and **EEPROM Data** are changed follow the loaded Hex File data.
- 8. Click Button Command **Write** to start writing program Hex File into memory of PIC Micro.

Programming Successful.	
Read Write Verify Erase	Blank Check

9. We can click Button **Verify** if we want to check and determine whether the written data into PIC Micro is correct or not.

Verification Successful.
(**************************************
Read Write Verify Erase Blank Check

If we select **"Enable Code Protect",** it makes Verify processing failed because reading Code program is protected, so we can not verify it.

PIC18F Confi	guration				
Device:	PIC18F458	Configuration: 2200	0E0F	0000	0080
User IDs:	FF FF FF FF FF FF FF FF	Code Protect 8000	EOOF	400F	
Checksum:	1850	OSCCAL:	Ba	ndGap:	
Verification	of Program Memory faile	d at address		Mic	ROCHIP
Read	Write Verify Erase	Blank Check		PICkit 2-)n 'MCLR	5.0 🛟

• Emulation Module Suite

It is additional accessories of ET-PGMPIC USB Programmer that can support programming on Board Microcontroller (TARGET Board) without taking off any IC Pin. It is more convenient to develop program and protects IC Pin from broken and bending.

There are 6 Emulator Modules; 14-PIN, 18-PIN, 20-PIN, 28PIN (narrow pin), 28PIN (wide pin), and 40-PIN. So, it can support many sizes of PIC Microcontroller from MICROCHIP as shown in the picture below.



Sizes of Emulator Module



14-PIN



18-PIN



20-PIN



28-PIN (narrow pin)



28-PIN (wide pin)

Each module has Switch to select modes; PROGRAM Mode (PRG) and RUN Mode (RUN). If we want to program, we must shift Switch to PRG position; on the other hand, if we want to run, we must shift Switch to RUN position as shown in the picture below.



Sa Line R

40-PIN

Programming Mode

Running Mode

Some Module has Jumper 18F/16F to select number of PIC Microcontroller; we must set Jumper corresponding with the used number as shown in the picture below.



If we programming through these modules, we must set Jumper T/B to B position as shown in the picture below.



Pin arrangement of Port ICD2



The feature of programming through Emulator Modules







Problems and Solutions

Problem

The error connection between computer and Board PICkit2, it will display error message as shown in the picture below.

PIC	PIC	kit 2 Pr	ogrami	mer					
	File				Tools	Help			
	Dev	ice Confi <u>o</u>	guration						
	Dev	ice:	Not Pre	sent		Configuratio	on:		
	Use	r ID s:	00 00 0	0 00					
	Che	cksum:	0000			OSCCAL:	0000	BandGap:	0000
	PICk use	kit 2 not Tools-X	: found >Check	. Check US Communica	B conne ation to	ections an retry.	d	<u>∭</u> Mic	ROCHIP
(Re	ad	Write	Verify	Erase	Blank	Check	VDD PICkit 2-	2.5 🗘

Solution

- Check the connection of USB Cable between computer and Board ET-PGMPIC USB.



- Click **Tools** -> Check Communication to verify the connection again.

Problem

The error of voltage verification at Target Board, it will display Error Message as shown in the picture below.

PICkit 2 Error	×
PICkit 2 VDD voltage level erro	or.
Check target & retry operation	n.

Solution

- If programming through Text Tool, we must check Jumper T/B that must be set at T position only.
- If using through Emulator Module, we must check Jumper T/B that must be set at B position only and then check Power Supply of Target Board. If there's no any power supply at Target Board, we must supply power to it.

Problem

It can not find any Microcontroller.

🕎 PICkit 2 P	rogrammer						
File Device	Family Prog	rammer T	ools I	Help			
Midrange Co	nfiguration						
Device:	No Device Fo	und		Configuration:	21FF		
User IDs:	FF FF FF FF						
Checksum:	19FF			OSCCAL:		BandGap:	
No device	detected.						ROCHIP
Read	Write N	/erify	Erase	Blank Che	ck	VDD PICkit 2 On /MCLR	5.0 🗘

Solution

- Check IC in Text Tool whether it is correct or not and Pin 1 of IC is in the correct position or not.



- If programming by Emulator Module, we must check connection of Cable and then check voltage at Target Board that must be supplied power.

Problem

The mistake of Hex File that is Import has not Configuration, this problem occurs in the step of design and compile program.

🕎 PICkit 2 P	rogram	mer						
File Device	Family	Programmer	Tools	Help				
- Midrange Co	nfiguratio	n						
Device:	PIC16F	877		Configuration:	3BFF			
User IDs:	FF FF F	FF FF						
Checksum:	AAB9			OSCCAL:		BandGap:		
Warning: No configuration words in hex file. In MPLAB use File-Export to save hex with config.								
Read	Write	Verify	Erase	Blank Cheo	= .k	VDD PICkit 2 0n /MCLR	5.0 拿	

Solution

- Must set Configuration value in the step of design and compile program successfully.