# HYC◇N 紘康科技

# HY12P65 ENOB Test Tool User Manual



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# 1. HY12P65 ENOB Test

#### **1.1 Software Introduction**

The main function of HY12P65 ENOB Kit is to test ADC performance of HY12P65 and to test basic DMM ranges on its software.

#### **1.2 Software Installation**

#### 1.2.1 Installation

System Requirements of operating HY12P65 ENOB Test kit:

- PC Hardware Request
   Compatible PC with PENTIUM® CPU
   128 MB Memory (256MB is recommended)
   10 GB Hard Disk Space
- OS

Windows 98SE/Windows 2000/Windows XP/Windows Vista/Windows 7 Supporting x86, 32bit system; 64bit system is not supported.

- Applicable Interface
   USB Port
- Supporting Software Version DMMENOBTEST V1.1
- Model number in support: -HY12P65
- Function items:

-ENOB Test

-Testing basic ranges of DMM

Note: For some Windows OS, it may require to have administrator identity to install the Hex Loader to the computer.

- Insert the HYCON-IDE CD into the CD ROM drive and find the file in the CD ROM or file to execute Setup.exe.
- Following the instruction window dialogs step by step to continue setup procedures. As shown in Figure 1-1.

# HY12P65 ENOB Test Tool User Manual



🛃 HY12P Series ENOB Test	Tool ¥1.1 - InstallShield Wizard	HY12P Series ENOB Test Tool ¥1.1 - InstallShield Wizard
2711	Welcome to the InstallShield Wizard for HY12P Series ENOB Test Tool V1.1	Custom Setup Select the program features you want installed
	The InstallShield(D) Waard will install HV12D Series FNOR Test	Click on an icon in the list below to change how a feature is installed.
	Tool V1.1 on your computer. To continue, click Next.	Feature Description
	WARNING: This program is protected by copyright law and international treaties.	InstallShield
	< Back Next > Cancel	Help Space Rack Next > Cancel
JU HY12P Series ENOB Test	Tool ¥1.1 - In tallShield Wizard	IV12P Series ENOB Test Tool V1.1 - InstallShield Wizard         Installing HY12P Series ENOB Test Tool V1.1         The program features you selected are being installed.         Image: Series ENOP Test while the InstallShield Wizard Installed.
HY12P Series ENOB Test Toolf 鉱康科技股份有限公司(以下8 轸用戶使用條款(以下16桶本6) 簡構「本站」)提供「HY12P S 務。	武最終用戶使用條款 崩稱「本公司」) 所依據HY12P Series ENOB Test Tool程式最 使用條款加於HYCON網始(http://www.hycontek.com/,以下 erries ENOB Test Tool」(以下簡稱「軟體」)之下載服	Tool V1.1. This may take several minutes. Status:
壹、軟體內容 「軟體」係指鉱康科技所開發 片。	之整合開發環境,適用於本公司所開發之HV12P系列品	
I I go not accept the terms in the licer I go not accept the terms in the I potential shield	ise agreement	InstallShield
	<pre>&lt; Back Next &gt; Cancel</pre>	<back next=""> Cancel</back>
HY12P Series ENOB Test Customer Information Please enter your information User Name: [Tabo.Chang Organization:	Tool ¥1.1 - Ir tallShield Wizard	Image: Series ENOB Test Tool VI.1 - InstallShield Wizard         Image: Series ENOB Test Tool VI.1 - InstallShield Wizard Completed         Image: Series ENOB Test Tool VI.1. Click Finish to exit the wizard.
IV 12P Series ENOB Test         Customer Information         Please enter your information         User Name:         Tabo.Chang         Organization:         Install this application for: <ul> <li>Anyone who u</li> <li>Only for me (1)</li> </ul>	Tool ¥1.1 - Ir HallShield ¥izard	Image: Series ENOB Test Tool V1.1 - InstallShield Wizard         Image: Series ENOB Test Tool V1.1 - InstallShield Wizard Completed         Image: Series ENOB Test Tool V1.1 - InstallShield Wizard Completed         Image: Series ENOB Test Tool V1.1. Click Finish to exit the wizard.         Image: Series ENOB Test Tool V1.1. Click Finish to exit the wizard.         Image: Series ENOB Test Tool V1.1. Click Finish to exit the wizard.
IV 12P Series ENOB Test         Customer Information         Please enter your information         User Name:         Tabo.Chang         Organization:         Install this application for:         Only for me (1)         Instal/Shield	Tool VI.1 - In HallShield Wizard	Image: Series ENOB Test Tool V1.1 - InstallShield Wizard         InstallShield Wizard Completed         The InstallShield Wizard has successfully installed HY12P Series         ENOB Test Tool V1.1. Click Finish to exit the wizard.         Image: Complete Completed         Image: Complete Completed         Image: Complete Complete Completed         Image: Complete Completed
If Y12P Series ENOB Test         Customer Information         Please enter your information         User Name:         [Tabo.Chang         Organization:         [WCON]         Install this application for:         © Anyone who u         © Only for me (1)         InstallShield         Destination Folder         Click Next to install to this fol         Install HY12P Series ENOB Test         Destination Folder         Click Next to install to this fol         Install HY12P Series	Tool Y1.1 - In PallShield Wizard         x.         uses this computer (all users)         rabo.Chang)         Back       Bext >         Cancel         Tool Y1.1 - InstallShield Wizard         der, or clck Change to install to a different folder.         s ENOB Test Tool V1.1 to:         yEnobTest(HY12Px ENOBTest)	Image: Series and Seri

Figure 1-1



#### 1.2.2 Uninstall

Please remove the file of "HY12P Series ENOB Test Tool V1.1" in "Add/Remove Program" under Control Panel.

# **1.3 ENOB and Noise Free Description**

$$ENOB = Log_{2}\left(\frac{FSR}{RMS \text{ Noise}}\right) = \frac{In\left(\frac{FSR}{RMS \text{ Noise}}\right)}{In(2)} \qquad Equation \ 1$$
  
Noise Free Bits =  $Log_{2}\left(\frac{FSR}{Peak - to - Peak \text{ Noise}}\right) = \frac{In\left(\frac{FSR}{Peak - to - Peak \text{ Noise}}\right)}{In(2)} \qquad Equation \ 2$ 

RMS Noise that generated from Sigma Delta ADC is the minimum voltage value of distinguishable sampling signal. Hence, ENOB (Effective Number of Bits) is calculated by RMS Noise and Full Scale Range ratio. However, RMS Noise must be calculated by many average times. Insufficient sampling times can only represent RMS Noise for a specific period of time instead of the RMS Noise of the entire ADC operation. Therefore, RMS Noise operation times cannot be less than 1024 times.

However, Noise Free Bit represents that ADC output value count is not rolling. Noise Free Bits are stable ADC output performance. Bit operation is defined as Peak-to-Peak Noise and Full Scale Range ratio.

RMS Noise Calculation:

Average Counts 
$$\Rightarrow$$
 Average  $= \frac{\sum_{k=1}^{n} ADC[k]}{n}$  Equation 3  
 $n = Total ADC sampling times.$   
 $RMS Noise = \frac{V_{REF} \times \sqrt{\frac{\sum_{k=1}^{n} (ADC[k] - Average)^{2}}{2^{Scale}}}}{2^{Scale}}$  Equation  
Scale = Total ADC Output Bits  
Peak-to-Peak Noise Calculation:

Peak - to - Peak Noise =  $\frac{V_{REF} \times (ADC_{Max} - ADC_{Min})}{2^{Scale}}$ 

Equation 5

4

ADCMax = Maximum ADC value of total sample ADCMin = Minimum ADC value of total sample



# **1.4 Window Interface**

DMMENOBTEST V1.1 Now	Chip is 12P65 (6K)	
Option USB Scan Read RAM ENOB Setup USB Read all Scan registers	ENOB & Test Noise Free Test	
USB Connect Status		

When the software is opened, the window in below will pop up, as Figure 1-2:

Figure 1-2

# 1.4.1 Option



Choose Option, the window will display as shown in Figure 1-3.

Figure 1-3



#### 1.4.1.1 Setup

128 選項			
Select Chip 12P( Communication Interfafce SPI COM COM	35 (6K)	LPT Address	
Baud 300 Parity Non		洗耦合	Communication • Interfafce SPI
	<u></u> 開閉	Optical coupler Communication select	CO SPI Bau Special Parallel Par UART

When selecting Option $\rightarrow$ Setup, a window will show as Figure 1- 4:

Figure 1-4

Function	Description
Select Chip	Select OTP IC, OTP IC program needs to burn SPI or Special
	communication procedures.
Communication	Only SPI or Special can be selected, other interfaces are not
	supportive.
Optical Coupler	When communication interface selects optical coupler to isolate
	channels.

#### 1.4.1.2 RAM Panel

When selecting Option $\rightarrow$ RAM Panel, a window will show as Figure 1- 5:



	值	2														×
	0	1	2	3	4	5	6	7	8	9	A	в	С	D	E	F
000	00	00	00	00	00	00	00	00	00	00	-	-	-	-	-	00
010	00	00	00	-	-	-	00	00	00	-	00	00	-	00	00	00
020	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
030	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
040	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
050	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
060	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
070	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
080	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
090	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
OAO	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
OBO	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
oco	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
ODO	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
OEO	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
OFO	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
в	ank	0		Bar	ık1											

#### Figure 1-5

Please refer to Chapter 3.2, RAM window operation of HY12P-IDE software user manual.

#### 1.4.1.2 REG Panel

When selecting Option $\rightarrow$ REG Panel, a window will show Figure 1- 6:

👫 12P65Register 📃 🗖 🔀												
IND0: M[00	0]=00  P	rogram Count	er: O									
IND1: M[ 00	00]=00 7	Vork: 00	Cycle: A3000	000								
				Barte								
BUER POINCE POECE PENCE POINCE POECE POINCE												
INDFO	POINCO	PODECO	PRINCU	PLUSWU	INDEL	POINCI	PODECI	PRINCI				
DI HOUR	UDPC	Depen	00	00	00	DURID	LCDO	1.001				
PLUSWI	WREG	DSRCN	AAMI	PRC	INCR	PWMR	LCDU	LCDI				
1.000	1 (700	00	00	00	00	CODDUE	00	Dappa				
LCD2	LCD3	LCD4	LCDS	LCD6	LCD7	SSPBUE	TAREG	RUREG				
DU D	DISCOUTING	DISCOUTING	DISCOUTE	DISCOUTING	100	100	100	00				
KMSDATA4	RMSDATAS	RMSDATA2	RMSDATAT	RESDATAU	ADIDATAO	ADIDATAN	ADIDATAL	CIAU				
00	00	CTUDY	00	00	00	omore	omor	00				
CIAH	CIAL	CIBU	CIBH	CIBL	CICU	CICH	CICL	PERMAN	5			
00	00	00	00	00	00	00	00	00	~			
10000000	The distance of	The distant			1116134-1-611	THE SAME A	T History of					
				Word								
FSRO	FSR1	TOS	PCLAT	TBLPT	R TBL	D PRC	D BR	GR				
0000	0000	0000	0000	0000	000	000 000	0 00	00				
PAGE1	PAG	E2 PA	AGE3									
STKPTR	STKFL	STKUN	STKOV	-	-	STKP	FR2 STKF	TRI ST	KPTRO			
INTE1	GIE	-	TMCIE	-	TMA	ie wdt	'IE El	IE	EOIE			
INTE2	TXIE	RCIE	RMSIE	LPFIE	AD11	E SSPI	E CT	IE	-			
INTE3	E27IE	E26IE	E25IE	E24IE	E23I	E E22	IE E23	IE I	520IE			
INTF1		ADCIF	TMCIF	TMBI	F TMA	IF WDT	IF El	IF	EOIF			
INTF2	TXIF	RCIF	RMSF	LPFF	AD1	F SSPI	F CI	F				
INTF3	E27IF	E26IF	E25IF	E24IF	E23I	F E22	IF E2	IF I	E20IF			
STATUS	-	-	-	С	DC	N	0	V	Z			
PSTATUS	PD	TO	IDLEB	BOR	-	SKEI	RR -		-			
LVDCN1	ENLVD	LVD	¥11	VJ2	VLDX	C3 VLD	X2 VLI	XI V	LDX0			
LVDCN2	VSL	SVIN3	SVIN2	SVIN1	SVIN	0 SVIF	2 SVI	P1 5	VIPO			
SBMSET1	SKRST	-	HAOTR	S HAOTE	4 HAOT	R3 HAOT	TR2 HAO	TRI Ha	AOTRO			
MCKCN1	HS_SEL	CPUCK1	CPUCK	D HSS1	HSS	D HSC	K EN	XT E	NHAO			
MCKCN2	LCDS2	LCDS1	LCDS0	ADCCI	K PERC	K BZS	2 BZ	S1 .	BZS0			
TMACN	ENTMA	TMACK	TMASI	TMAS	D ENWI	DT WDI	'S2 WD	TS1 V	DTS0			
TMCCN	ENTMC	TMCCK1	TMCCK	0 TMCS1	2 TMCS	11 TMC	510 TMC	CS01 T.	MCS00			
PWMCN	ENPWM	ENPFD	PWMRL	1 PWMRJ	- 01							
LCDCN1	ENLCD	LCDPR	VLCDXI	VLCDX	0 LCDE	F LCDI	BII LCD	BIO	-			
LCDCN2	LCDBL	LCDMX1	LCDMX	0 -	-	-	-		-			

Figure 1-6

Please refer to Chapter 3.3, REG window operation of HY12P-IDE software user manual.

#### 1.4.1.3 ADC Panel

When selecting Option $\rightarrow$ ADC Panel, a window will show Figure 1-7:





Figure 1-7

Please refer to Chapter 3.6, ADC window operation of HY12P-IDE software user manual.

# 1.4.1.4 MPN Panel

When selecting Option $\rightarrow$ MPN Panel, a window will show Figure 1-8:





Please refer to Chapter 3.8, ADC window operation of HY12P-IDE software user manual.



#### 1.4.1.5 Power Panel



When selecting Option→Power Panel, a window will show Figure 1-9:

Figure 1-9

Please refer to Chapter 3.7, ADC window operation of HY12P-IDE software user manual.

# 1.4.1.6 ProCounter Panel

When selecting Option→ProCounter Panel, a window will show Figure 1- 10:





Function	Description
CTA	CTA value display
СТВ	CTB value display
СТС	CTC value display
CTA Initial	CTA Initial value setup
System Clock	Main frequency of System
ENCNTI Network	Signal input network; OFF=CMPO , ON=CNTI
ENCNTI Network Status Display	Display input source in accordance with "ENCNTI" setup
Parameters of Freq. Reciprocal	Reciprocal of input frequency
Start/End	Start/End measurement
Frequency	Display freq. result
Cycle results (Cap.)	Display cycle result for capacitor range measurement
Duty	Display duty cycle result

#### 1.4.2 USB Scan

 Image: Descent Plan ---- Now Chip is 12P65 (6K)

 Option
 USB Scent Read RAM ENOB Test SETDMMA INTF

USB scan function help to detect whether USB scan communication port is connected to HY12P65 ENOB Test Tool. If it is connected, the status, USB On Line, will be shown in left corner, as Figure 1- 11 displayed.





If not connected, "USB not Connect!!!" will show up as Figure 1- 12:

USB not Connect !!!	

Figure 1-12

**%Note** ∶

- 1. If using USB to supply power, connecting USB Line to USB ENOB Test Board (T09011 V02) can click USB Scan on the interface.
- If using external power supply, please connect the external power to HY12P65 ENOB Test Tool first then connecting USB Line to USB ENOB Test Board (T09011 V02) and click USB Scan on the interface.
- When using external power supply, please open USB ENOB Test Board (T09011 V02) J5 & J8 Jump to avoid power collide.



#### 1.4.3 Read Ram

M DMMENOBTEST V1.1 Now Chip is 12P65 (6K)							
Option <u>U</u> SB Scan	<u>R</u> ead RAM	ENOB Test	<u>S</u> ETDMMA	INTF			

When USB port connects to HY12P65 ENOB Test Tool and "USB On Line" is confirmed, please select Read Ram on the interface. This function will read the current RAM and register of HY12P65 to PC buffer, influencing RMS Noise & Vp-p Noise operation of ENOB Test.

# 1.4.4 ENOB Test

🕅 DMI	MENOBTE	ST ¥1.1	Now Chip	is 12P65	(6K)		
Option	<u>U</u> SB Scan	<u>R</u> ead RAM	<u>E</u> NOB Test	<u>S</u> ETDMMA	INTF-Reading		

After clicking ENOB Test, ENOB Test Panel will show up as Figure 1-13:

M Analys	🌃 Analyse ADC																	×
Sample Po	int 1024	▼ ENC	IB N	loise Free	Average	Vp-p Noise	RMS Noise	Catch AD	C Chang	to Chart	Ref Vo	lt Av	r. Times H	 EY Address	Key Data	Filter 9	_	
Scale	19	•						Save to CS	6V Chang	ge FFT	1.2	<b>V</b> 1	-	0000	00	Polling		
	00	01	02	03	04	05	06	07	08	09	0A	0	)B	OC	0D	0E	0F	^
0000																		
0001																		
0002																		
0003																		
0004																		
0005																		
0006																		
0007																		
0008																		
0009																		
000A																		
000B																		
000C																		
000D																		
000E																		
000F																		~

Figure 1-13

Function	Description
Comple Daint	"Catch ADC" of ADC sample number, min. 32, max. 131072. It is suggested
	to keep as 1024.
Scale	Captured bit of every ADC output. Min. 8Bits, Max.19Bits
	Display ENOB(Effective Number of Bits), please refer to equation 1 for
ENOB	calculation, unit is Bit.
Noise Free	Display Noise Free Bits, please refer to equation 2 for calculation, unit is Bit.
Avorago	Display average of ADC sample, please refer to equation 3 for calculation,
Average	unit is Count.
Vp-p Noise	Display Peak-to-Peak Noise, please refer to equation 5 for calculation, unit
	is nV.
RMS Noise	Display RMS Noise, please refer to equation 4 for calculation, unit is nV.

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Catch ADC	Real time capture and sequencing display ADC value to display zone.	
Save to CSV	Store the value in display zone to HyADC.CSV file, including ENOB, Noise	
	Free, Average & RMS Noise.	
Change to	Switch the value in display zone to chart	
Chart		
Change FFT	Switch chart to display "frequency domain/time domain".	
Ref Volt	Input Reference Voltage value, unit is V.	
Avr. Time	Select software average, value of the display zone will be averaged	
	according to the time set, then display to the zone again.	

# 1.4.5 SETDMMA



Figure 1-14

Function	Description
Setup file route Select the save route of setup file	
Range selection After the setup is done, different ranges can be tested by this fu	
Name	Pure character format, the input character will be the range name of "range select"
Calibration Unit	Pure character format
ADC1 Scale	Max value (full scale) after calibration



Calibration Ref.	Calibrate current ADC1 or RMS value as the input value (calibration
	point)
Select ADC	Select ADC1or RMS Output as output
Cal Cain	After pressing Cal. Gain, the current ADC1 or RMS output value will
Cal. Galli	be calibrated as "Calibration Ref." setup
Cal Offect	After pressing Cal. Offset, the current ADC1or RMS output value will
Cal. Oliset	be deemed as Offset
Average Times	Average ADC1 or RMS output value according to the input times
ADC1 Offset	Display ADC1 Offset value
RMS Offset	Display RMS Offset value
Sava Dogistor	Store all register status. If "NO FILE" is selected and store is clicked,
Save Register	a new record will be added to this menu, utmost 10 setup files.
Cancol Offect	When ticking "Cancel Offset", ADC1 will deduct Offset value and multiple
Cancel Oliset	Gain. RMS will deduct Offset first, then root and multiple Gain
Result Display Zone	Display results after calculation
Close	Close the window

# **1.5 SETDMMA Operation Procedures**

This function can simulate all basic ranges of DMM, excluding frequency that must be measured by ProCounter. Below SETDMMA software operation procedures demonstrate the measurement of DC 600mV

**Step 1:** Click USB Scan on the interface of HY12P65 ENOB Test Tool. "USB On line" will show up when the connection is successful, as Figure 1- 15. If not, please make sure the hardware connection or power supply is correct.



Figure 1-15

**%Note**:

- 1. If using USB to supply power, connecting USB Line to USB ENOB Test Board (T09011 V02) can click USB Scan on the interface.
- If using external power supply, please connect the external power to HY12P65 ENOB Test Tool first then connecting USB Line to USB ENOB Test Board (T09011 V02) and click USB Scan on the interface.
- When using external power supply, please open USB ENOB Test Board (T09011 V02) J5 & J8 Jump to avoid power collide.

**Step 2:** Click Read Ram on the interface when "USB On Line" was shown, loading all registers of HY12P65 to PC buffer.

Step 3: Click SETDMMA on the interface, a window as like Figure 1- 16 will pop up.



Calibration Segment -	D		
ADC1 Scale	Name ~KV		
Colibration Dof	Collibration Unit	NO FILE	
40000	mV	NO FILE	
		NO FILE	
Select ADC	ADCI	NU FILE	
Col. Coin	Cal Offect	NO FILE	
	Cal. Oliset	NO FILE	
Average Times	5	NO FILE	
ADC1 Offset	RMS Offset	NO FILE	
		NO FILE	
	Cancol Offect	NO FILE	
Save Register	Calicer Oliset		
ADC1	🖃 c: []		<u> </u>
	C:\		<u>^</u>
	HvEnobTe	nes est	
HY12Px ENOBTest			
Configuration			~
Cluse			
Destination Folders : C:\Program Files\HyEnobTest\HY12Px ENOBTest\Configuration			

Figure 1-16

**Step 4:** Select setup file reserve route. This program provides demo configurations for users, the default route is: <u>C:\Program Files\HyEnobTest\HY12Px ENOBTest\Configuration</u> **Step 5:** The route of DC 600mV is C:\Program Files\HyEnobTest\HY12Px ENOBTest\Configuration\mV, clicking 600mV of the range select tag will make the information marked in blue, as shown in Figure 1- 17. At this time, the registers of HY12P65 ENOB Test Tool will be set as the configurations of DC 600mV range. And the assumed full scale of DC 600mV (ADC1 Scale) is 6600 Count, calibration Ref. is 5000 Count.

🎇 Calibration Segment - 0			
ADC1 Scale	Name		
0000		600mV	
Calibration Ref.	Calibration Unit	60mV	
5000	mν	AC 600 mV	
Select ADC	ADC1 -	AC 60 mV	
		NO FILE	
Cal. Gain	Cal. Offset	NO FILE	
Average Times	1	NO FILE	
ADC1 Offset	RMS Offset	NO FILE	
0	0	NO FILE	
Reve Desister	Z Cancel Offset	NO FILE	
Save Register			
ADC1	🖃 c: 🛛		<b>•</b>
	🗁 Program F	iles	~
ſ	T 🗁 HyEnobTe	est	
	HY12Px E	NUBlest	=
Close	Close		
Destination File : C:\Program Files\HyEnob Test\HY12Px ENOBTest\Configuration\vnV\HYCONFIG-0.txt			

Figure 1-17



**Step 6:** Calibration started. Input 0mV first, then click Cal. Offset and tick Cancel Offset. This time, the result zone should display 0. After input DC 500mV, click Cal. Gain. This time, the result zone should display 5000, as shown in Figure 1- 18 to finish calibration.

🕅 Calibration Segment - 0			
ADC1 Scale 6600	Name 600m∀	600mV	
Calibration Ref. 5000	Calibration Unit	60mV	
Select ADC	ADC1 -	AC 60 mV	
Cal. Gain	Cal. Offset	NO FILE NO FILE	
Average Times	5	NO FILE	
ADC1 Offset	RMS Offset	NO FILE	
Save Register	Cancel Offset	NO FILE	
ADC1		•	
5000	HyĒnobTe HY12Px E Configure	est NOBTest ation	
Close ₩			
Destination File : C.\Program Files\HyEnobTest\HY12Px ENOBTest\Configuration\mV\HYCONFIG-0.txt			

Figure 1-18

**Step 7:** Save Configuration. Clicking Save Register after selecting the route, to store the register data as Configuration file, as shown in Figure 1- 19.

🌃 Calibration Segment - 0				
ADC1 Scale 6600	Name 600mV(Nev			
Calibartian Dat	C-libertine Heit	600m∀(New)		
Calibration Ref.	Calibration Unit	NO FILE		
5000		NO FILE		
Select ADC	ADC1 -	NO FILE		
[		NO FILE		
Cal. Gain	Cal. Offset	NO FILE		
Average Times	5	NO FILE		
ADC1 Offset	RMS Offset	NO FILE		
0	0	NO FILE		
	Cancel Offect	NO FILE		
Save Register	Caller Oliset			
ADC1	🖃 c: []		<u> </u>	
	🗁 Program Fi	les	<u>&gt;</u>	
		est NOBTest		
	Configure	ation		
🗁 Test			~	
Llose	Close			
Destination File : C.\Program Files\HyEnobTest\HY12Px ENOBTest\Configuration\Test\HYCONFIG-0.txt				

Figure 1-19

Step 8: Revise Configuration. Clicking Save Register after selecting the file to-be-covered.



Then click Yes to cover the origin file, as shown in Figure 1-20.



Figure 1-20

Configure Jump on HY12P65 Target Board based on different measurement functions:

Function	J4	J6 & J9	J7	J3
ACV	Short	Onon	Opop	Opon
DCV	Short	Open	Open	Open
AC mV				
DC mV	Open	Short	Open	Open
Thermocouple				
AC Current				A(Open)
DC Current	Open	Open	Open	mA(1-2)
De current				uA(2-3)
Resistor				
Continuity	Opop	Short	Opop	Opon
Diode	Open	Short	Open	Open
Capacitor				
Frequency(CNT Input)	Open	Short	Short	Open



2. Hardware Description

# 2.1 Communication Structure



PC sent Command or Data to USB ENOB Test Board and USB ENOB Test Board read/write SRAM Data of HYCON OTP or read/write Flash Memory.

# 2.2 USB ENOB Test Board



Figure 2-1

- 1. J2, J3: SPI communication Port
  - J2 Description:

PIN 1  $\rightarrow$  VDDIN supply power to U1. If OTP external power supplies to J3, then J3 is open. If the power was supplied by USB ENOB Test Board, then J3 short.

PIN 2  $\rightarrow$  ICESDI\_Q , DI signal line of SPI

PIN 3  $\rightarrow$  ICESCK\_Q , CK signal line of SPI



PIN 4 → ICESDO\_Q, DO signal line of SPI PIN 5 → ICECS\_Q, CS signal line of CS PIN 6 → VSS PIN 7 → ICEIRQ\_Q, signal line of detecting whether the write of HYCON OTP to Flash Memory is finished.

2. J4, J5, J8 : Optical coupler communication port

J4 description

PIN 1  $\rightarrow$  VP, supply power to Optical coupler IC(U9~U13). To isolate the power completely, then J5 & J8 must be opened; for common power, J5 & J8 must be short circuit.

PIN 2  $\rightarrow$  SPIDI\_Q, DI signal line of optical coupler.

PIN 3  $\rightarrow$  SPICK\_Q, CK signal line of optical coupler.

PIN 4  $\rightarrow$  SPIDO\_Q, DO signal line of optical coupler.

PIN 5  $\rightarrow$  SPICS\_Q, CS signal line of optical coupler.

PIN 6  $\rightarrow$  VSSP, Ground of optical coupler.

PIN 7  $\rightarrow$  SPIIRQ\_Q, signal line (optical coupler) of detecting whether the write of HYCON OTP to Flash Memory is finished.

3. J9, J10, J11 & U8

U8 is 512K byte Flash Memory

J10 & J11 is power source of Flash Memory. Using optical coupler to isolate power, then PIN1-2 of J10 & J11 must be short circuit; If no need to isolate power, then PIN2-3 of J10 & J11 must be short circuit.

J9 description :

PIN 1  $\rightarrow$  VDD\_X, supply power to U8.

PIN 2  $\rightarrow$  FLDI, control DI signal line of U8.

PIN 3  $\rightarrow$  FLCK, control CK signal line of U8.

PIN 4  $\rightarrow$  FLDO, control DO signal line of U8.

PIN 5  $\rightarrow$  FLCS, control CS signal line of U8.

PIN 6  $\rightarrow$  VSS\_X, Ground of U8.

4. JP1, JP2, J6 & U3

JP1 & JP2 are external input power of U3, to generate VDD power. If using USB power then J6 is short circuit. Using external Power (5V), then JP1 & JP2 is input and J6 is open. U3, R1, R2 & R3 consist of a Regulator, to generate VDD power. To change output voltage, R1, R2 & R3 can be changed, its relation is given:

$$VDD = 1.240V \times (1 + \frac{R1 + R2}{R3})$$



# 2.3 HY12P65 ENOB Board Circuitry





# 3. Revision History

Version	Page	Summary
V01	ALL	First Edition
V02	17	Add in the Table of Target Board Jump of different
		measurement functions.