# BEGA220A USER MANUAL

#### Features:

- ARM 9 CPU
- 7" 800X480 TFT with Touch Panel
- Wi-Fi
- 10/100Mbps Ethernet
- RS-232/485/422
- Audio
- SD/MMC
- WINCE OS



### History of Version

Version	Contents	Date	Note
01	NEW VERSION	2010/05/17	SPEC.
02	Revision – evc4sp4 , driver download URL,etc.	2010/10/18	SPEC

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# **1** General Information

This chapter provides basic information about Bolymin's BEGA220A module and it consists of :

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1.1 Introduction

- 1.2 Specifications
- 1.3 Mechanical Specifications



### **1.1 Introduction**

BEGA220A module is a general purpose embedded system and is suitable for versatile applications such as medical probing devices, in-car automation, human machine interface (HMI), etc. And here is the order information for the BEGA220A family :

### Order Information Part No RS-485 F

Part No.	RS-485	RS-422	WLAN	20 PIN EXT BUS(I0x12,ADCx6)
BEGA220A				
BEGA220A1			X	
BEGA220A2				∑,
BEGA220A3			$\mathcal{K}$	∑,
BEGA220A4				
BEGA220A5			47	
BEGA220A6		$\overrightarrow{\mathbf{x}}$		X
BEGA220A7		\$	4	X

### 1.1.1 Packing Content

A complete package should contain all of the following:

- BEGA220A module
- Female USB to mini USB cable with 20cm length (CB04P201LC01\$)
- 220 communication cable with 3M 40 pin connector and length100cm(CB40P1000LC01\$)( only on sample stage)
- CD for user manual and utility software

# 1.1.2 Module Layout



No.	Name	Description
1	Touch screen	To support touch screen operation on BEGA220A



No.	Name	Description
2	Power socket	Use 12V/3A power with a spec. of DC Plug_in $\phi$ 2.5 socket
3	ADC_GPIO Bus	GPIOx12, ADCx6 °
4	Communication Bus	SPI x1 · Device USB 2.0 · RS-232x3 · RS485/422x1(Optional) ·
5	Host-USB 1.1	Connect to USB 1.1 peripheral (keyboard, mouse,etc)
6	RJ-45	Connect to Ethernet network



No.	Name	Description
7	Wi-Fi Antenna socket	Connect Wi-Fi antenna
8	SD Card socket	Connect SD and MMC Card (4GB max.)

# 1.2 Specifications

### **1.2.1 System Functional Blocks**



# 1.2.2 Module Specifications

Parameter	Specification
СРU	<ul> <li>Samsung S3C2416X 400MHz</li> <li>32 bit RISC architecture ARM926EJ CPU core</li> </ul>
System Memory	<ul> <li>16-bit 64MB/133MHz DDR2 memory</li> </ul>
Storage Device	2GB NAND Flash
Series Port	<ul> <li>2 wire RS-232 x 3</li> <li>Isolated RS485/422 x1(Option)</li> <li>SPI x1(Option)</li> </ul>
USB	<ul> <li>1x USB device (USB2.0) for Active Sync only</li> <li>1XUSB host (USB1.1)</li> </ul>
GPIO	Support programmable 12 x IO sharing with Key board interface
ADC	Support 6 x channel 12 bit high speed A/D converter
LAN	High performance 16-bit 10/100 Ethernet controller
Audio	Dual channels 2 watts speaker output
Wi-Fi	IEEE 802.11b/g,Wi-Fi compliant
OS	WinCE 5.0(default)
LCD Size	7" TFT LCD
LCD Resolution	800x480
LCD Brightness	400 cd/m <sup>2</sup>
Power Supply	DC9V~DC28V
Operating Temperature	-20°C ~ +70°C

# **1.3 Mechanical Specifications**

# 1.3.1 Module Specifications





# 2 BEGA220A Installation & Testing

This chapter provides installation information for BEGA220A module and it consists of :

2.1 Connect power
2.2 Connect SD/MMC Card
2.3 Connect Host USB
2.4 Connect LAN
2.5 Connect Wi-Fi
2.6 Connect Communication Bus
2.7 Connect ADC\_GPIO Bus



# 2.1 Connect Power

User may prepare a power adaptor with an output of DC12V/3A and a 2.5 $\phi$  as illustrated.



DC Plug\_in  $\phi$  2.5





# 2.2 Connect a SD/MMC Card

Insert SD/MMC card as illustrated and eject card only when it's not at reading mode. Note that there is write-protection toggle switch on the card and make sure it's not write-protected so data can be written into the card.



WinCE will then detect the SD/MMC Card and appears a storage card icon as follows:

<u>File Edit View G</u> o						? ×
00		• 🗣			B	P
Application My Data Documents	Network Pocket	Mory Pocke <mark>r</mark> Mory1	Program Files <mark>Storage</mark>	Card Temp	Windows (	Control Panel
Printer						
🐉 🔋 My Device					S- 3-	12:05 PM 🏓 🖶



# 2.3 Connect Host USB

Users may connect host USB to any USB1.0 device, for example mouse, keyboard, USB storage, through a mini-USB cable as illustrated.





### **Connect to LAN**



STEP1: Connect to LAN port as illustrated.

STEP2: Click on "Start-Setting-Networking and Dial-up connections" to set up a network



**STEP3:** Select "DM9ISA1" to set up a LAN parameters.





<u>File</u> <u>E</u> dit	<u>V</u> iew Adv	vanced 🗙 😭 🖭			? ×
1	<b>3</b> 7	<u>\$</u>			
Make New Connection	SDI086861	DM9ISA1			
		DM9000 Fast Ethernet Adap	ter' Settings	ок ×	
		IP Address Name Servers			
		An IP address can be	Obtain an IP address via DHCP		
		automatically assigned to this computer. If your network	O Specify an IP address		
		does not automatically assign IP addresses, ask your network	IP Address:		
		administrator for an address, and then type it in the space	Sybnet Mask:		
		provided.	Default <u>G</u> ateway:		
1					
🛃 👟 Netwo	ork Connectio	ns			🎭 🥪 6:53 AM 🏴 🗟

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**STEP5:** Select Internet Explorer.



STEP6: Enter URL at the Address box

	? ×
Address \\windows\default	-
Welcome to Microsoft Pocket Internet Explorer	
Microsoft Windows CE	
© 2004 Microsoft Corporation. All rights reserved. <u>Terms of use.</u>	
🐉 Windows CE	9 PM 🏓 🔁



### STEP7: Enter URL at the Address box





**STEP1:** Screw up the Antenna on BEGA220A as illustrated.



STEP2: Click on the network icon as highlighted to enter the wireless setup.





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SD1086861
IP Information IPv6 Information Wireless Information
Internet Protocol (TCP/IP)
Address Type: DHCP
IP Address: 192.168.1.36
Subnet Mask: 255.255.0
Default Gateway: 192.168.1.1
Details
Renew

STEP4: Click on "Add New..." to add a new wireless connection



**STEP5:** Set up SSID, WEP, IEEE802.1X Authentications parameters as appropriate on BEGA220A, then click OK.

My Device	Wireless Network Properties	
🤕 Recycle Bin	SDI This is a computer-to-computer (ad hoc) network; wireless access points are not used	
Internet Explorer	SI This network requires a key for: Encryption: AES Authentication: WPA2	
Player State	Network key:       Key index:       ⊥       ✓ The key is provided automatically	
	S  IEEE 802.1X Authentication  Enable 802.1X authentication on this network  EAP type: TLS	
	Properties OK Cancel	
<b>SDIO86861</b>	4 🤐 🕹 7126 PM 🎜 🤋	10



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My Device		
	SDI086861 OK ×	
	IP Information IPv6 Information Wireless Information Select a network and press connect or right-click for more options. To add a new network, double-click 'Add New',	
Internet Explorer Sep Media Flayer	Y Add New       Q corega (preferred)       I savesafe       WiFi_Test	
	Status: Connecter Signal Strength: Very Low ✓ Notify me when new wireless networks are available	
	Connect Advanced View Log	
SD1086861	• بالم الم الم الم الم الم الم الم الم الم	31 PM 🗭 🔁

STEP7: Select "IP Information" tab and click on "renew" to refresh IP address.

IP Informat	ion Pv6 Infi	ormation   Wirele	ss Information		
Interne	t Protocol (	(TCP/IP) ——		-	
Address	Type: D	HCP			
IP Addr	ess: 1	.92.168.1.33			
Subnet	Mask: 2	55.255.255.0			
Default	Gateway: 1	.92.168.1.254			
			<u>D</u> etails		



My Device My Device Recycle Bin Internet Explorer	Windows CE	
Meula Player		
<b>3</b> 7		4 🤐 🔔 7:23 PM 🏓 📑



STEP9: Enter URL address in the "Address" box



**STEP10:** then the browser will surf to the URL as specified.



# 2.5 Connect Communication Bus

	1	NC	Yellow/Red	21	GND	Green/White
	2	NC	Yellow/Blue	22	GND	Blue/White
	3	DSPC1	Black	23	DSPC2	White/Red
	4	DSPC3	Brown	24	DSPC4	Brown/Black
$\bigcirc$	5	NC	Brown/White	25	NC	Orange/Green
	6	USBDP	Red	26	USBDN	Red/Black
	7	NC	Brown/Green	27	GND	Orange/White
1 21	8	TXD1T	Orange	28	RXD1T	Orange/Black
	9	RTS1T	Yellow	29	CTS1T	Yellow/Black
	10	VBUS	Green	30	GND	Green/Black
	11	TXD2T	Blue	31	RXD2T	Blue/Black
200 40	12	NC	Х	32	GND	Red/White Red/Green
	13	TXD3T	Purple	33	RXD3T	Purple/Black
	14	VDD2	Grey	34	GND2	Orange/Blue
	15	A-422R+	White	35	A-422R-	White/Black
	16	A-422T+ A-485D+	Pink	36	A-422T- A-485D-	Pink/Black
	17	VDD2	Grey/Black	37	GND2	Red/Blue
	18	NC	Х	38	GND	Purple/White Purple/Red
	19	SS	Light green	39	SPIMOSI	Light green/Black
	20	SPIMISO	Light blue	40	SPICLK	Light blue/Black

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### 2.5.1 Pin Assignment of Communication Bus



### 2.5.2 Serial Port Test

BEGA220A provides 3 sets of RS-232 for serial connection. There is also optional RS-485 or RS-422 interface available as options.

#### 2.5.2.1 Connect Serial Port

### 1<sup>st</sup> set of RS-232 (Debug Port)(for update only)

Connect 1<sup>st</sup> set of RS-232 on BEGA220A to DB9-female on PC's COM port. This RS-232 port is used as debug port ONLY with a signal level of +/-12v.



Pin Assignment of RS-232					
RS-232 DB9 Female BEGA220A					
Pin No	Pin Name	Pin No	Pin Name		
1	DCD		—		
2	TD	8	TXD1T		
3	RD	28	RXD1T		
4	DTR		—		
5	GND	27	GND		
6	DSR		—		
7	CTS	29	CTS1T		
8	RTS	9	RTS1T		
9	RI	—	—		



## 2<sup>nd</sup> set of RS-232 (COM3)

Connect  $2^{nd}$  set of RS-232 to PC's COM port. BEGA220A reserves COM3 port for the  $2^{nd}$  set of RS-232 and its signal level is at +/-12 v.



Pin Assignment of RS-232					
RS-232 DB9 Female BEGA220A					
Pin No	Pin Name	Pin No	Pin Name		
1	DCD				
2	TD	13	TXD3T		
3	RD	33	RXD3T		
4	DTR	—			
5	GND	32	GND		
6	DSR	—	—		
7	CTS	—	—		
8	RTS				
9	RI				



### 3<sup>rd</sup> set of RS-232(COM4)

Connect  $3^{rd}$  set of RS-232, which is defaulted to COM4 on BEGA220A, to DB-9 COM port of PC. The signal level runs at +/-12v.



Pin assignment of RS-232				
RS-232	DB9 Female	BEG	GA220A	
Pin No	Pin Name	Pin No	Pin Name	
1	DCD	_		
2	TD	11	TXD2T	
3	RD	31	RXD2T	
4	DTR	_		
5	GND	30	GND	
6	DSR	_	—	
7	CTS	_	—	
8	RTS		—	
9	RI			



### RS-422 (Option)(COM1)

BEGA220A supports 1 set of RS-422 serial interface and defaulted to COM1 port. It is supported to use a RS-232 to RS-422/485 converter board to connect to PC's COM port for connectivity test.

Pin Assignment of RS-422			
Pin No	Pin Name		
35	A-422R-		
15	A-422R+		
16	A-422T+		
36	A-422T-		
34	GND2		

\*Note that either RS-422 or RS-485 can be used at a time.

\*If no isolation is required, please connect Pin14 to Pin 12 and Pin 34 to Pin 32; otherwise, connect Pin 14 and 34 to a voltage of 5 +/- 10% voltage (4.75-5.25v).

### RS-485 (Option)(COM1)

BEGA220A support one set of RS-485 serial interface and defaulted to COM1 port. During connectivity test, it is applicable to use a RS-232 to RS-422/485 converter board to connect to PC's COM port.

Pin assignment of RS-485		
Pin No	Pin Name	
37	GND2	
16	A-485D+	
36	A-485D-	

\*Note that either RS-422 or RS-485 can be used at a time.

\*If no isolation is required, please connect Pin14 to Pin 12 and Pin 34 to Pin 32; otherwise, connect Pin 14 to a voltage of 5 +/- 10% voltage (4.75-5.25v), and pin 34 to ground.



#### 2.5.2.2 Serial Port test procedure

To test serial connectivity, first connect the RS-232 cable as appropriate, and run the hyper-terminal program to test if receiving and sending function normally. Here is the step guide:

### PC set up:

**STEP1**: Run "hyper-terminal" program under start-program-accessories-communication", then enter a name for this session and click ok.

<ul> <li>New Connection - HyperTerminal</li> <li>File Edk View Call Transfer Help</li> <li>         一</li></ul>	Connection Description	
Disconnected Auto detect Auto		

STEP2: 在 Select PC's COM port in "Connect using" box to connect to serial port on BEGA220A. Then click OK.

TEST - HyperTer File Edit View Call	minal Transfer Help ) 꿈 답		
-		Connect To TEST Enter details for the phone number that you want to dial: Country/region: Area code: Phone number: Connect using: OK Cancel	
Disconnected	Auto detect Auto detec	t SCROLL CAPS NUM Capture Print echo	



**STEP3:** Pull down "Bits per second" to set up communication speed (usu. Ranges from 9600 to 115200). Make sure the baud rate value is identical to that on BEGA220A. Select None for "Flow control", then click ""Apply", and click "OK".



# BEGA220A set up procedure:

STEP1: Select "My Device" on BEGA220A



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STEP2: Select "Windows" folder

<u>File Edit View Go</u>	? ×
Application My Network PocketMory PocketMory1 Program Files Temp Windows Control Panel	
	line (in

STEP3: Run"SerialPortTest"

Eile E	dit 1	<u>V</u> iew <u>G</u> o									? ×
	E	×r	<b>₩</b> •								
B		Ø	Ø	Ø	Ø	Ø	D			$\odot$	
Deskto	q	Favorites	Fonts	Help	Programs	Recent	StartUp	ADCTest	ceconfig	GarField	
	5	16	*	Ř	RE	*					
GpioTest	<u>-</u>	LCDTest	netmui	regedit	SerialPortTes t	PFCCapture					
<b>8</b> 🕞 w	Vindow	15							3	🥹 ▶ 9:17 PM	7 2



**STEP4:** "Here is the initial screen of SerialPortTest"

<u>Eile</u> <u>E</u> dit	⊻iew <u>G</u>	0									? ×
4 🔶 [	1	<b>*</b>									
D	D	C	3	Ø	D	D	D	1 🗁			
AppMgr	Desktop	Fai	Serial Port	Test(BEGA	220A) \	/er:1.05			<b>ок</b> × <sup>ур</sup>	ADCTest	
ceconfig	GarField	Gpio	Set Serial: Serial: BaudRate Open F TX TX	al port [COM1 ] a: [2600 ] port [Closent [Clear	Dat     Sto     Se Port	a bit: 8 p 1 RX	Clear Rx	Parity: Non			
					_						
😽 🕂 Seria	l Port Test(B	EGA220	A) Ver:1.05							2 2 + 2:50 PF	a 📝 🛱

**STEP5:** Select COM port as appropriate. Pull down at Baud Rate ranged between 9600 to 115200 and use the same value at both BEGA220A and PC end. Then click on "Open port" to activate a serial connection.

File Edit View Go	? X
Serial port select Desktop Falserial Port Test(BEGA220A) Ver:1.05	ADCTest
BaudRate select Gro Serial: COM1 Close Port Stop 1 Close Port	
Open port	
Send Tx Clear Tx Clear Rx	
Serial Port Test(BEGA220A) Ver:1.05	🤧 > 2:50 PM 🎾 🖷

**STEP6:** If everything goes right, you will see the pop-up window as follows. Click on OK to proceed.





**STEP7:** Enter "text" at Tx" window and click on"Send Tx" button.

<u>Eile E</u> dit	⊻iew <u>G</u>	0							? ×
4 🔶 🚺	1 🛛 🖆	<b>*</b>							
$\bigcirc$	D	D	DE	3 0	B			수는	
AppMgr	Desktop	<sup>Fa'</sup> Serial Po	rt Test(BEGA22	20A) Ver:1.05			<b>ок × <sup>ур</sup></b>	ADCTest	
ceconfig	<b>GarField</b>	Gpio Set Si BaudR	ate: 9600 Close	Data bit: 8 Stop 1 Port	•	Parity: None	N		
		test	Ty Char T	RX	Clear By		*		
		Jenu		<u>*</u> ]	Clear KX	Inpu	t Panel		
						Esc 1 Tab CAP Shift Ctl 2	2345 qwertt asdf zxcv ü`\\	6 7 8 9 0 : y u i o g h j k I b n m , ↓	- = ◆ [ [ ] ] [ / ] ↓ ] / ] ↓ ↑ [ ← ] →

STEP8: At PC end, you will see the same text entered echoed back.

🍓 TEST - HyperTermina	a				
File Edit View Call Trans	sfer Help				
0 📽 💿 🕉 😐 🗗	ſ				
					A
test					
Connected 0:00:02 A	uto detect Auto detect	SCROLL CAPS	NUM Capture	Print echo	

**STEP9:** Enter some text at PC end and note an echo of those text will appear at RX window at BEGA220A end.

Eile	<u>E</u> dit	⊻iew <u>G</u> o	)									? ×
	* 🖻		<b>*</b>							A		
E	3	$\bigcirc$	6	3	Ø	D	Ø	Ø	E	7 6	<u>ን ት</u>	
App	Mgr	Desktop	Fai	Gerial Por	t Test(BE	GA220A)	Ver:1.05			OK ×	Up ADCTest	
cecc	<b>A</b> Infig	GarField	<b>g</b> pio	Set Serial: BaudR: Open TX	rial port — COM1 ate: 9600 Port	▼ Da ▼ St Close Port	ata bit: 8 op 1 	<b>•</b>	Parity: N			
				Send 1	x Cle	ar Tx		ilear Rx	I	nput Panel		
									E		56789	
										abjų wiej APiaisio hiftizixic ctiaui`i\	fghjk Vbnm,	· [ · [ · ] · ] [ · ] / ] ← [ · ] / ] ←] →
🐮 🕄	Serial	Port Test(BE	GA220	A) Ver:1.0	)5						🥪 🛃 🕨 2:59 I	M 🚔 🖶



# 2.5.3 Device USB installation

BEGA220A supports one set of Device USB to communicate with a PC through ActiveSync software for data sync. Here illustrates the connection of Device USB. Please refer to chapter 3.1.1 for ActiveSync operation.



Pin assignment of Device USB									
l	JSB	BEG	BEGA220A						
Pin No	Pin Name	Pin No	Pin Name						
1	VBUS	10	VBUS						
2	D-	26	USBDN						
3	D+	6	USBDP						
4	GND	30	GND						

# 2.5.4 Speaker installation

BEGA220A offers 2 sets of speaker circuits to connect to  $8\Omega/2W$  speaker. Connect speakers as illustrated to support audio playback.





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1<sup>st</sup> set of Speaker

Pin Assignment of Speaker									
Speaker BEGA220A									
Pin No	Pin Name	Pin No	Pin Name						
1	+	3	DSPC1						
2	-	23	DSPC2						

2<sup>nd</sup> set of peaker

Pin Assignment of Speaker									
Speaker BEGA220A									
Pin No	Pin Name	Pin No	Pin Name						
1	+	4	DSPC3						
2	-	24	DSPC4						



		1	ADCT0	Brown	11	ADCT3	Blue
	$\bigcirc$	2	ADCT1	Orange	12	ADCT4	Blue/Black
		3	ADCT2	Brown/Black	13	ADCT5	Purple
	1 - 11	4	GND	Orange/Blac k	14	GND	White
		5	KEY1	Red	15	KEY6	Purple/Black
	10 20	6	KEY2	Yellow	16	KEY7	White/Black
		7	KEY3	Red/Black	17	KEY8	Grey
		8	KEY4	Yellow/Black	18	KEY9	Light Blue
	$\bigcirc$	9	KEY5	Green	19	KEY10	Grey/Black
I		10	KEY11	Green/Block	20	KEY12	Light blue/Black

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## 2.6.1 Pin Assignments of ADC\_GPIO Bus



### 2.6.2 GPIO Test

BEGA220A offers 12 general purpose programmable I/O ports (GPIO). Please refer to sample code at chapter 4.4.The typical signal length is around 10 to 15 cm and the rated voltage is as follows

Item	Symbol	Min	Тур	Max	Unit
High Level Input Voltage	VIH	2.3		3.6	V
Low Level Input Voltage	VIL	-0.3	_	09	V
High Level Output Voltage	VOH	3.1		3.3	V
Low Level Output Voltage	VOL			0.2	V

#### **Test Procedure:**





STEP2: Select "Windows" folder.

<u>F</u> ile <u>E</u> dit	<u>V</u> iew <u>G</u> o								? ×
<b>(</b>		<b>₩</b> •							
$\bigcirc$	D		9	9	Ø	B			
Application Data	My Documents	Network	PocketMory	PocketMory1 F	Program Files	Temp	Windows	Control Panel	
🌄 🔓 My I	Device							1500	2:44 PM 🎾 🖶

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STEP3: Run "GpioTest\_220A"

<u>File</u> Edit	<u>V</u> iew <u>G</u> o									? ×
4 🔶 🖻		<b>#</b> •								
	D	B	Ø	Ø	D	Ø			$\odot$	
Desktop	Favorites	Fonts	Help	Programs	Recent	StartUp	ADCTest	ceconfig	GarField	
GpioTest_22 OA	LCDTest	netmui	regedit	SerialPortT	PPCCapture					
🛃 问 Winda	200								3 > 9:16 PM	

STEP4: Here is the initial screen of "GpioTest\_220A" and defaulted to test all KEYs as inputs.

	ਁ ਗ਼ੵੑਗ਼ਜ਼੶			<u>? ×</u>
Desktop Favorite	Imm         ▼           GPIOTest for         KEY1           KEY2         KEY2           KEY3         KEY3           KEY5         KEY6           KEY6         KEY7           KEY8         KEY8           KEY10         KEY10           KEY11         KEY11	220A ¥1.01	Output Backlight Enable LCD power Enable Amplifier switch	GarField
	<ul> <li>KEY7</li> <li>KEY8</li> <li>KEY9</li> <li>KEY10</li> <li>KEY11</li> <li>KEY12</li> </ul>	Input  Input		

STEP5: A green light at KEY stands for a high input signal

Eile Edit	View G				? ×
CopioTest	Fawirites Fice LCDTest	GPIOTest for           kEY:           kEY:	220A v1.01 Input v Input v Input v Input v Input v Input v Input v Input v Input v Input v	Output Backlight Enable LCD power Enable Amplifier switch	GarField
🐉 🔩 GPIO	Test for 220	A v1.01			🍌 12:13 PM 🏓 🖥



STEP6: To test output, pull down the Input and change the KEY to output.

<u>File E</u> dit	<u>V</u> iew <u>G</u>	0			 		 	? ×
Desktop	Favorites		Fest fer KEY: KEY3 KEY4 KEY5 KEY6 KEY7 KEY8 KEY9 KEY10 KEY11 KEY12	220A v1 Input Output Input Input Input Input Input Input Input Input Input		Coutput ✓ Backlight Enable LCD power Enable Amplifier switch	GarField	
🐉 👍 GP10	Fest for 220	A ¥1.01					🥪 占 12:16 PI	м 🗭 🕾

**STEP7:** While KEY is defined as OUTPUT as step6, check on red circle to the left of KEYto generate a high output voltage.

<u>Eile E</u> dit	<u>V</u> iew <u>G</u> o	<u>)</u>			 		 	? ×
GpioTest	Favorites COTest	GP10 CP10	KEY1           KEY2           KEY3           KEY4           KEY5           KEY6           KEY7           KEY8           KEY10           KEY11           KEY12	220A v1. Dutput Input Input Input Input Input Input Input Input Input		Output Backlight Enable LCD power Enable Amplifier switch	X GarFi	eld
🐉 👍 GP10	Test for 220A	×1.01						17 PM 🗭 🖶

### 2.6.3 ADC test



#### 2.6.3.1 ADC test set-up

Prior to ADC port testing, connect ADCT0 port as illustrated. Use a Vdd of 3.3 volt and voltage divider to limit maximum ADCT0 to be 1.6 volt (ADC readout as 4095, 12-bit unsigned). Then run the ADC test by using test program as BEGA220A provided. Note that the maximum voltage of ADCTO should not exceed 1.6 volt.



### 2.6.3.2 ADC test procedure

**STEP1:** Select"My Device"on BEGA220A

M Re Me	Device ivernet plorer a Player A Player	
2		🦦 🕪 2:43 PM 🎾 🖶

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STEP2: select "Windows" folder

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O	$\bigcirc$		$\langle \rangle$		$\bigcirc$		P	
Applicatio	n My Documents	Network	PocketMory	PocketMory1 Program Files	Temp	Windows	Control	
Data	Documents						Pariel	
<b>91</b>	Deciles						2.01	2.44 PM

**STEP3:** Run "ADCTest" program by double-clicking the icon.





STEP4: "ADCTest" initial screen is as follows:

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$\bigcirc$		D	$\bigcirc$	Ø	D	D			$\odot$	
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GpioTest	LCDTest	netmui								
				DC1	<u></u>	Ťř	-			
			🔽 AI	DC2						
			🗹 AI	рсз						
			🔽 AI	DC4						
			🔽 A(	DC5		S	tart			
👸 🛧 ADCT	est ver1.01							3	🤧 ► 9:12 PM	P 🔁

### **STEP5:** Click "Start" button to start testing ADC.

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apio rest	LCDTESC	nethal	<b>A</b>	DCO		21	BOLYMIN			
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			<b>A</b>	DC2						
			🔽 A	DC3						
			<b>A</b>	DC4						
						S	tart			
<mark>∛</mark> ADCT	est ver1.01								9:12 PF	1 1 1

**STEP6:** Adjust variable resistor (VR) and observe the changes in read-out of ADC Port value. Click on "Stop" to finish the ADC test.

<u>File</u> <u>E</u> dit	<u>V</u> iew <u>G</u> o									? ×
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			🔽 A.	осз 🕅	271					
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	est ver1.01							3	🛃 🕨 9:13 PM	<b>7</b>

# 3 BEGA220A Programming Guide

This chapter demonstrates connection from BEGA20A to PC and how to use software to control serial port, GPIO , ADC, Backlight, and SPI. Chapter 3 consists of the following:

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3.1 Transfer File Between BEGA220A and PC

- 3.2 Programming for BEGA220A
- 3.3 Serial Port Function
- 3.4 GPIO Control

3.5 A/D Converter and Backlight Adjustment

# 3.1 Transfer File Between BEGA220A and PC

### 3.1.1 Connect PC and BEGA220A

User may setup the connection between desktop PC and BEGA220A by following steps:

**STEP 1.** Install Microsoft ActiveSync 4.5 on desktop PC. You may download ActiveSync from: http://www.microsoft.com/downloads/details.aspx?familyid=9e641c34-6f7f-404d-a04b-dc09f814 1141&displaylang=en&tm

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After installation, you need to restart PC.

**STEP 2.** Connect desktop PC and BEGA220A by USB cable. Below picture shows the hardware connection between desktop PC and BEGA220A for file transfer.



Please note that **the USB cable should plug into the connector of device USB wiring from the 40 pin communication bus**. Below table shows the pin assignment of device USB on the 40 pin external bus.

USB	connector	40 pin communication bus of BEGA220A			
Pin No	Pin Name	Pin No	Pin Name		
1	VBUS	10	VBUS		
2	D-	26	USBDN		
3	D+	6	USBDP		
4	GND	30	GND		



**STEP 3.** Power on BEGA220A and connect BEGA220A and PC by USB cable. For the first connection, windows system on PC will request the USB device driver of BEGA220A. Please install USB driver by following procedures.

(1). Select the advance item on below dialog and click "Next" button.

Found New Hardware Wiza	ar d
	This wizard helps you install software for: SEC S3C2443X Test B/D If your hardware came with an installation CD or floppy disk, insert it now. What do you want the wizard to do? Unstall the software automatically (Recommended) install from a list or specific location (Advanced) Click Next to continue.
	< <u>B</u> ack Next > Cancel

(2). Click "Browse" button and then select the directory which includes USB device driver file of BEGA220A. Click "Next" button.

Please choose your search and installation options.	Directory which inclu device driver file of B	ides USB BEGA220/
<ul> <li>Search for the best driver in these locations.</li> <li>Use the check boxes below to limit or expand the defaul paths and removable media. The best driver found will be Search removable media (floppy, CD-ROM)</li> <li>Include this location in the search:</li> <li>C:\Program Files\Microsoft ActiveSync\Drivers</li> </ul>	t search e insta	
Choose this option to select the device driver from a list. the driver you choose will be the best match for your have <u>K</u> ack	Windows does not guarantee that dware. <u>N</u> ext > Cancel	

\*The following download URL contain all needed driver for 220A Active Sync/Samgsung drivers: <u>http://www.bolymin.com.tw/manual/dnw.rar</u>

### (3). Click "Continue" button



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(4). Click "Finish" button. Now BEGA220A may connect to PC by ActiveSync.



(5). Select "No" and click "Next" button to cancel the synchronization.





### 3.1.2 Transfer Files

After connecting PC and BEGA220A, below screen will display. The green cycle means the connection between PC and BEGA220A has been built.

🔞 Microsoft Activ	eSync	
<u>File V</u> iew <u>T</u> ools	Help	
🚫 Sync 🕒 Sch	edule 🔯 Explore	
Guest		
Connected		V
		Hide Details 🗙
Information Type	Status	
Information Type	Status	

Execute "Explore" program and move into the folder of BEGA220A, you can transfer files between PC and BEGA220A.



# 3.2 Programming for BEGA220A

### 3.2.1 Setup Development environment

By following steps, we can setup the development environment for WinCE 5.0:

 Install Microsoft eMbedded Visuall C++ 4.0(eVC 4.0) into desktop PC : eVC 4.0 can be downloaded from <u>http://www.microsoft.com/downloads/details.aspx?FamilyID=1DACDB3D-50D1-41B2-A107-FA75AE960856&displayLang=en.</u> Use free serial number : TRT7H-KD36T-FRH8D-6QH8P-VFJHQ

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- 2. Install service pack 4 for eVC 4.0 and here is the download URL: <u>http://download.microsoft.com/download/a/7/3/a735c7fb-dcbd-429f-9090-d09b3b15d3fa/evc4sp4.exe</u> After the patch, the eVC version is 4.00.1610.0.
- 3. Connect BEGA220A and Desktop PC by procedures in section 3.1.2
- 4. Install SDK of BEGA220A provided by Bolymin. The installation file may be found in the product CD. Here is the download URL: http://www.bolymin.com.tw/manual/BEGA220A\_INX\_SDK\_100804\_093.msi
- 5. The platform setting of embedded Visual C++:

Following pictures show the required setting of eVC 4.0::





### 3.2.2 Create New Project

In this section, we will describe how to create a new project in eVC 4.0. An experienced programmer may jump to next section directly. You may create a new project for your application by following steps:

STEP 1: Execute eVC 4.0.

STEP 2: Select "File"-"New...: function



**STEP 3:** Select your application type, setup the location and name of your project and. Please select "WCE MFC AppWizard(exe)" as application type.

New Files Projects Workspaces	? 🗙	Project name
■WCE Application	Project name: TestAP1 Location: D:\PHENIX\PROJECT\BETA903A1	Project location
Application type	Create new workspace     Add to current workspace     Dependency of:     Y	
	CPUs: Win32 (WCE ARMV4) Win32 (WCE ARMV4I) Win32 (WCE ARMV4I) Win32 (WCE MIPS16) Win32 (WCE MIPSII) Win32 (WCE MIPSII_FP)	Only select "ARMV4I" as CPU type
	OK Cancel	

**STEP 4:** Select "Dialog based" and language setting. Click "Next" button.

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STEP 5: Click "Next" button.

WCE MFC AppWiza	rd (exe) -	Step 2 of 4		? 🗙
Application ()		What feature ☐ <u>Window</u> ☐ Window ☐ Active <u>X</u>	es would you like to rs Sockets rs H <u>e</u> lp Controls	include?
		Please ente TestAP1 Help conte	n a <u>title for your dial</u>	og: htp
	< <u>B</u> ack	<u>N</u> ext >	<u>F</u> inish	Cancel

### **STEP 6:** Click "Next" button.

WCE MFC AppWizard (exe) -	Step 3 of 4		? 🗙
File Edit Yicer Jasert Build Jielp         Project         Project	Would you l © Yes, p © No, that How would y © As a sl @ As a <u>s</u> t	ike to generate sou lease ink you you like to use the l hared <u>D</u> LL tatically linked libra	irce file comments MFC library? iry
< <u>B</u> ack	<u>N</u> ext >	<u>F</u> inish	Cancel

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#### **STEP 7:** Click "Finish" button.

WCE MFC AppWiza	rd (exe) -	Step 4 of 4		? 🗙
		AppWizard cre you: CTestAP1App CTestAP1Dlg CIass name: CTestAP1Dlg Base class: CDialog	eates the followin Heade TestA	g <u>c</u> lasses for er file: P1Dlg.h mentation file: P1Dlg.cpp
]	< <u>B</u> ack	<u>N</u> ext >	<u>F</u> inish	Cancel

STEP 8: Now you can add your codes into this new project.

You can get more development information from below MSDN website. http://msdn.microsoft.com/en-us/library/bb847963.aspx

# 3.3 Serial Port Function

# 3.3.1 Overview

There are 4 serial ports in BEGA220A. Below table lists the function of each serial port:

Name	Function	Comment
COM1:	RS-422 or RS485 port	Option
COM3:	Used by application program.	2 wire RS-232
COM4:	Used by application program.	2 wire RS-232
Debug port	Internal used.	May not open by application program.



### 3.3.2 Serial Port Control-CSerialPort class

Bolymin provided a class, CSerialPort, which implements basic control logic for serial port. Application may use this class by adding "**CSerialPort.cpp**" and "**CSerialPort**.h" into project. Customer may modify the source code of class CSerialPort to expand the serial port functions.

### 3.3.2.1 Basic concept of class CSerialPort

The object of class CSerialPort will handle all data transfer and receive of opened serial port. Once there is any data is received by the opened serial port, CSerialPort object will send a user defined message to user defined window which should be main window of application program. Below picture shows the flow:





#### Member function of class CSerialPort 3.3.2.2

CSerialPort Function: Constructor function of calss CSerialPort.		
Syntax	CSerialPort();	
Parameters	None	
Return value	None	

### **Open Function:** Open a serial port.

Syntax	BOOL Open	(	
	LPO	CTSTR	port,
	int		baud_rate,
	int		data_bit
	int		stop_bit
	int		parity
	);		
Parameters	port	Name of s	serial port listed in the table of section 3.3.1.
	baud_rate	Baud rate	, ex: 9600.
	data_bit	Data_bit,	7 ~ 8
	stop_bit	Stop bit, 0	ONESTOPBIT, ONE5STOPBITS or TWOSTOPBITS.
	parity	Parity, NO	OPARITY, ODDPARITY, EVENPARITY.
Return value	TRUE: Oper	n serial port	successfully
	FALSE: .Open serial port fail.		

#### **Send Function:** Send specified data by this serial port.

Syntax	BOOL Send(		
	LPCVOID buf_ptr,		
	DWORD data_len		
	);		
Parameters	buf_ptr Memory pointer of data will be sent.		
	data_len Length of data will be sent. (UNIT: byte)		
Return value	TRUE: Send data successful.		
	FALSE: Send data fail.		

SetCommMsg Function: CSerialPort object will send a receive message to specified window. User need to call this function to set the receive message value and the window that will receive message.

Syntax	void SetCommMsg(		
	HWND win_handle,		
	UINT receive_msg		
	);		
Parameters	win_handle Handle of the window that will receive message.		
	receive_msg User defined message value.		
Return value	None		

#### **Close Function:** Close current serial port.

Syntax	BOOL Close (
	);
Parameters	None
Return value	TRUE: Close serial port successfully.
	FALSE: Cloas serial port fail.



### 3.3.2.3 How to catch the receive message

Please follow below steps to catch the receive message.

**STEP 2:** Declare a message processing function in the window that will process receive message.



STEP 3: Create message mapping.

```
BEGIN_MESSAGE_MAP(CSerialPortDlg, CDialog)
    //{{AFX_MSG_MAP(CSerialPortDlg)
    ON_BN_CLICKED(IDC_OPEN_COM, OnOpenCom)
    ON_BN_CLICKED(IDC_CLOSE_COM, OnCloseCom)
    ON_BN_CLICKED(IDC_SEND, OnSend)
    ON_BN_CLICKED(IDC_CLEAR_SEND, OnClearSend)
    ON_BN_CLICKED(IDC_CLEAR_REC, OnClearRec)
    ON_BN_CLICKED(IDC_CMD_TEST, OnCmdTest)
    ON_WM_DESTROY()
    //]]AEX_MSG_MAP
    ON_MESSAGE(WM_CMD_OK, OnCommRecv)
END_MESSAGE_MAP()
```

**STEP 4:** Implement the receive message processing function.



# 3.3.3 Example Code

Bolymin provide a test application and its source code for example. Below picture is the screen shot of the serial port test program:



Below are the major source codes of the test program:

### File: SerialPortDlg.cpp

// CSerialPortDlg dialog

#### const UINT WM\_CMD\_OK = WM\_USER+1;

BEGIN\_MESSAGE\_MAP(CSerialPortDlg, CDialog)

//{{AFX\_MSG\_MAP(CSerialPortDlg)

ON\_BN\_CLICKED(IDC\_OPEN\_COM, OnOpenCom)

ON\_BN\_CLICKED(IDC\_CLOSE\_COM, OnCloseCom)

ON\_BN\_CLICKED(IDC\_SEND, OnSend)

ON\_BN\_CLICKED(IDC\_CLEAR\_SEND, OnClearSend)

ON\_BN\_CLICKED(IDC\_CLEAR\_REC, OnClearRec)

ON\_WM\_DESTROY()

//}}AFX\_MSG\_MAP

ON\_MESSAGE(WM\_CMD\_OK, OnCommRecv)

Map the receive message processing function to user defined message.

Define a receive message

#### END\_MESSAGE\_MAP()

#### // CSerialPortDlg message handlers

BOOL CSerialPortDlg::OnInitDialog() { CDialog::OnInitDialog(); // Set the icon for this dialog. The framework does this automatically // when the application's main window is not a dialog SetIcon(m\_hIcon, TRUE); // Set big icon SetIcon(m\_hIcon, FALSE); // Set small icon CenterWindow(GetDesktopWindow()); // center to the hpc screen /\* Define BaudRate: 115200 \*/ m\_ComboBaud.SetCurSel(5); /\* Define data bit: 8 bit \*/ m\_ComboData.SetCurSel(1); m\_ComboParity.SetCurSel(0); /\* Define parity: none \*/ m\_ComboPort.SetCurSel(0); /\* Define searial port: COM1 \*/ /\* Define stop bit: 1bit \*/ m\_ComboStop.SetCurSel(0); m\_ButClose.EnableWindow(FALSE); /\* "Close"Button is disable\*/ m\_strRecDisp = \_T(""); Create a CSerialPort object and set m\_cSendBuffer = new char[60]; current window as the window UpdateData(FALSE); which will process received data. m\_pSerialPort = new CSerialPort(); m\_pSerialPort->SetCommMsg(m\_hWnd, WM\_CMD\_OK); return TRUE: } Implement function used to process receive data from serial port LRESULT CSerialPortDIg::OnCommRecv(WPARAM wParam, LPARAM IParam) { CString tmp; char \*buf; DWORD buflen; buf = (char \*)wParam; // memory pointer of received data buflen = (DWORD)IParam; // received data length CEdit \*pRecvStrEdit = (CEdit\*)GetDlgItem(IDC\_REC\_DISP); for (int i = 0; i < buflen; i++, buf++)

```
{
         tmp.Format(_T("%c"), *buf);
         m_strRecDisp += tmp;
    }
    pRecvStrEdit->SetWindowText(m_strRecDisp);
                                                     /* Show */
    return 0;
}
// Initial user interface
const CString PorTbl[4] = {_T("COM1:"),_T("COM3:"),_T("COM4:"),_T("COM6:")};
const DWORD BaudTbl[6] = {4800, 9600, 19200, 38400, 57600, 115200};
const DWORD DataBitTbl[2] = {7, 8};
const BYTE StopBitTbl[3] = {ONESTOPBIT, ONE5STOPBITS, TWOSTOPBITS};
const BYTE ParityTbl[4] = {NOPARITY, ODDPARITY, EVENPARITY, MARKPARITY};
Function for "OPEN" button used to open selected serial port.
    ****
                                                     *******************************
void CSerialPortDlg::OnOpenCom()
{
    UpdateData(TRUE);
                                                                    Open selected serial port
                                                                    by specified parameter
    CString strPort = PorTbl[m_ComboPort.GetCurSel()];
                                                                    values.
    DWORD baud = BaudTbl[m_ComboBaud.GetCurSel()];
    DWORD databit = DataBitTbl[m_ComboData.GetCurSel()];
                 = StopBitTbl[m_ComboStop.GetCurSel()];
    BYTE stopbit
    BYTE parity
                   = ParityTbl[m_ComboParity.GetCurSel()];
    BOOL ret = m_pSerialPort->Open(strPort, baud, databit, stopbit, parity);
    if (ret == FALSE)
    {
         MessageBox(_T("Open ") + strPort + _T(" Fail!"));
         return;
    }
    m_ButOpen.EnableWindow(FALSE);
                                           /* Disable "open" button */
    m_ButClose.EnableWindow(TRUE);
                                           /* Enable "close" button */
    MessageBox(_T("Open ") + strPort + _T(" is OK!"));
}
```



# 3.4 GPIO Control

# 3.4.1 How to Control GPIO for BEGA220A

Bolymin provides a DLL file "**pGPIO\_220A.dll**", which is already included in your WinCE OS as a hidden file, to control the General Purpose Input and Ouput(GPIO) signal. In BEGA220A, there are 12 user defined GPIO. User may read current value of all GPIO of BEGA220A, change values of GP output signal and set the attribute of GPIO by functions in "**pGPIO\_220A.dll**".

User may use GPIO control functions by following procedures: **STEP 1.** Add "**pGPIO\_220A.h**" into project.

STEP 2. Load "pGPIO\_220A.dll" by "Loadlibrary()" function.

**STEP 3.** Get the address of control functions by "**GetProcAddress**()" function.

**STEP 4.** Execute GPIO control functions by the address got at STEP3.

Below is a simple example code to use the GPIO control functions:





# 3.4.2 GPIO Control Function for BEGA220A

GetGPInput Function: Get current status of specified GPIO.

Syntax	BOOL GetGPInput (	
	int gpio_index	
	);	
Parameters	gpio_index	The index of specified GPIO. Refer to section 3.4.3 for
		the value definition.
Return value	TRUE: Current status of specified GPIO is HIGH.	
	FALSE: Current status of specified GPIO is LOW.	

**SetGPOutput Function:** Set value of specified GP Output.

Syntax	void SetGPOutput (	
	int gpio_index,	
	BOOL value	
	);	
Parameters	gpio_index	The index of specified GP output. Refer to section 3.4.3
		for the value definition.
	value	New value of specified GP output.
		TRUE: Set specified GP output to HIGH.
		FALSE: Set specified GP output to LOW.
Return value	None	

**IsOutput Function:** Check if the specified GPIO is output or not..

Syntax	BOOL IsOutput (	
	int gpio_index	
	);	
Parameters	gpio_index The ind	ex of specified GPIO. Refer to section 3.4.3 for
	the value	le definition.
Return value	TRUE: The specified GPIO is output.	
	FALSE: The specified GPIO is input.	

SetIOAttribute Function: Set the attribute of the specified GPIO.

Syntax	void SetIOAttribute (	
	int gpio_index,	
	BOOL value	
	);	
Parameters	gpio_index	The index of specified GPIO. GIO_KEY1~GIO_KEY12.
	value	New attribute of the specified GPIO.
		GA_OUTPUT: Set the specified GPIO as output.
		GA_INPUT: Set the specified GPIO as input.
Return value	None	

# 3.4.3 Definition of GPIO Index

Class CGPIO\_220A support following index values:

GPIO index	Description
GIO_KEY1	User defined general purpose input/output. (KEY1)
GIO_KEY2	User defined general purpose input/output. (KEY2)
GIO_KEY3	User defined general purpose input/output. (KEY3)
GIO_KEY4	User defined general purpose input/output. (KEY4)
GIO_KEY5	User defined general purpose input/output. (KEY5)
GIO_KEY6	User defined general purpose input/output. (KEY6)
GIO_KEY7	User defined general purpose input/output. (KEY7)
GIO_KEY8	User defined general purpose input/output. (KEY8)
GIO_KEY9	User defined general purpose input/output. (KEY9)
GIO_KEY10	User defined general purpose input/output. (KEY10)
GIO_KEY11	User defined general purpose input/output. (KEY11)
GIO_KEY12	User defined general purpose input/output. (KEY12)
GO_BLIGHT_ENABLE	Backlight control. Default value : HIGH.
GO_LCD_POWER_ENABLE	LCD power control. Default value : LOW.
GO_AMP_SWITCH	Amplifier switch. Default vale: LOW.
GO_EN485	Reserved for internal use.



Load "CtrlFunc 220A.dll" and get

the address of control functions.

# 3.5 ADC Converter and Backlight Adjustment 3.5.1 Overview

Bolymin provides a dynamic link library "**CtrlFunc\_220A.dll**" which includes all control functions of A/D converter and backlight adjustment.

- For A/D converter, there are 6-ch A/D converters with 12-bit resolution in BEGA220A. User may read the value from selected A/D converter channel by functions provided by Bolymin. Suggested hardware wiring about A/D converter may be found in user manual. Detail description of control functions of A/D converter may be found in section 3.5.2.
- For backlight adjustment, user may get current brightness value or change the brightness of backlight by control functions. The description of control functions of backlight adjustment may be found in section 3.5.3.

User may use control functions about A/D converter and backlight adjustment by following procedures:

STEP 1. Add "CtrlFunc\_220A.h" into project.

- STEP 2. Load "CtrlFunc\_220A.dll" by "Loadlibrary()" function.
- STEP 3. Get the address of control functions by "GetProcAddress()" function.
- **STEP 4.** Execute control functions about A/D converter by the address got at STEP3.
- STEP 5. Call "FreeLibrary()" function to free the reference of "CtrlFunc\_220A.dll" while ending the application program.

Below is a simple example code to use the control functions about A/D converter and backlight adjustment:

// variable declaration

HINSTANCE m\_hModule;

BOOL (\*m\_pInitADC)(void);

int (\*m\_pReadADC)(int);

m\_hModule=::LoadLibrary(\_T("CtrlFunc\_220A.dll"));

m\_pInitADC = (BOOL (\*)(void))::GetProcAddress(m\_hModule,\_T("InitADC"));

m\_pReadADC = (int (\*)(int))::GetProcAddress(m\_hModule,\_T("ReadADC"));

m\_pInitBacklightCtrl = (BOOL (\*)(void))::GetProcAddress(m\_hModule,\_T("InitBacklightCtrl"));

m\_pGetBrightness = (int (\*)(void))::GetProcAddress(m\_hModule,\_T("GetBrightness"));

m\_pSetBrightness = (int (\*)(int))::GetProcAddress(m\_hModule,\_T("SetBrightness"));

m_pInitADC(); value = m_pReadADC(ADC_CHANNEL0);	Execute control functions of A/D converter.
m_pInitBacklightCtrl(); brightness = m_pGetBrightness(); m_pSetBrightness(brightness+5);_// Increase the	Execute control functions of backlight adjustment.
m_pSetBrightness(0); // OFF the bac	klight

FreeLibrary(m\_hModule);

*//* free the reference of "**CtrlFunc\_220A.dll**"



# **3.5.2 Control Function of A/D Converter**

initADC Function: A/D converter initialization. User need to call this function before using A/D converter.

Syntax	BOOL initADC ();
Parameters	None
Return value	TRUE: Initial A/D converter successfully.
	FALSE: Fail to initial A/D converter.

**ReadADC Function:** Read A/D converted data from specified A/D converter channel.

Syntax	Int ReadADC(	
	int adc_channel	
	);	
Parameters	adc_channel The index of specified A/D converter channel.	
	ADC_CHANNEL0~ADC_CHANNEL5	
Return value	A/D converted data from specified A/D converter channel.	



# 3.5.3 Function about Backlight Adjustment

InitBacklightCtrl Function: Initial backlight controller. User need to call this function before adjusting backlight brightness.

Syntax	BOOL InitBacklightCtrl ();	
Parameters	None	
Return value	TRUE: Initial backlight controller successfully.	
	FALSE: Fail to initial backlight controller.	

GetBrightness Function: Get current brightness value of backlight.

Syntax	int GetBrightness ();
Parameters	None
Return value	Current brightness value of backlight. (0~100)

#### SetBrightness Function: Set brightness value of backlight.

Syntax	Int SetBrightness	
	int new_value	
	);	
Parameters	new_value	New brightness value of backlight. (0~100)
		0: Turn OFF the backlight
Return value	Original brightnes	s value of backlight.



# <End of BEGA220A User Manual >