

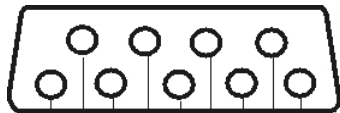
1. Communication Protocol

Transmit Method: Asynchronous Interface Half Duplex Serial Communication.

- Transmit Speed: 9600bps
- Start bit: 1Bit
- Parity Check: NA
- Data Bit: 8Bit
- Stop Bit: 1Bit

2. The wire diagram

The RS232 wire diagram between presenter and remote controller as below



Female

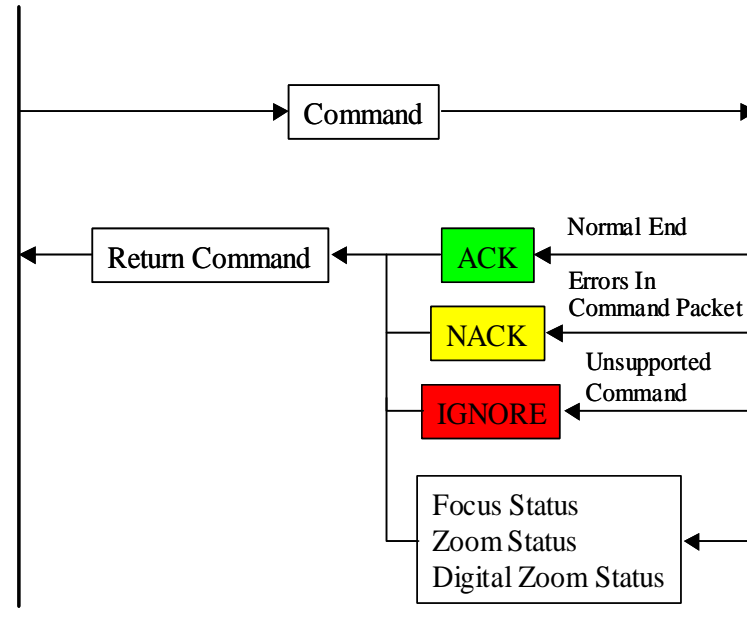
1 2 3 4 5 6 7 8 9

CONNECTIONS		
DB 9F	COLOUR	DB 9F
2	-	3
3	-	2
5	-	5
SHELL	DRAIN	SHELL

3. Communication Program

Host Controller

Camera Module



4. Command Format

4.1 Command Packet Format

1Byte	STX	Start Of Command	: A0h
2Byte	Command	Command	: 00~FFh
3Byte	Parameter1	Data	: 00~FFh
4Byte	Parameter2	Data	: 00~FFh
5Byte	Parameter3	Data	: 00~FFh
6Byte	ETX	End Of Command	: AFh

4.2 Return Packet Format

1Byte	STX	Start Of Command	: A0h	
2Byte	Command	Command	: 00~ FFh	
3Byte	Parameter1	Data	: 00~FFh	
4Byte	Parameter2	Data	: 00~FFh	
5Byte	Status	<Bit>	<Contents>	
		7	(0)	
		6	Iris Moving Status (1)/(0)Stop Status	
		5	Zoom Moving Status (1)/(0)Stop Status	
		4	Focus Moving Status (1)/(0)Stop Status	
		3	(0)	
		2	(0)	
		1	Communication Response 0=ACK/1=NAK/2=IGNORE/3=Not Used	
0	Communication Response			
6Byte	ETX	End Of Command	: AFh	
Communication		Bit1	Bit0	Status

Response			
ACK	0	0	Capable Of Normal End Or Normal Operation
NAK	0	1	Detecting Errors In Command Packet(STX, ETX Byte)
			Parity Error ,Framing Error, Overrun Error
			Data in out of specified range
IGNORE	1	0	Cannot execute the transmitted command for other operations
			Unsupported command
Not Used	1	1	

5. Command Packet

Item	Function	PC AP to DC145 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
1	Preset/Factory Reset	A0h	03h	P1	P2	00h	AFh	P1=0, P2=00/01:Preset Load/Save P1=1:Factory Reset
2	Slide show On/Off	A0h	04h	P1	00h	00h	AFh	P1=00/01:Off/On
3	Slide show Delay	A0h	06h	P1	00h	00h	AFh	P1=0~5:0.5sec/1sec/3sec/5sec/10sec/Manual
4	Image/Record Quality	A0h	07h	P1	00h	00h	AFh	P1=00/01/02:High/Medium/Low
5	Copy From Nand to SD	A0h	08h	00h	00h	00h	AFh	
6	Zoom Stop	A0h	10h	00h	00h	00h	AFh	
7	Zoom Start (No AF)	A0h	11h	P1	P2	00h	AFh	P1=00/01:Tele/Wide
8	Auto Erase	A0h	14h	P1	00h	00h	AFh	P1=00/01:Auto Erase off/on
9	Digital Zoom Direct	A0h	18h	P1	00h	00h	AFh	XGA :P1=0~63(dec) SXGA :P1=0~63(dec) WXGA :P1=0~63(dec) 1080P :P1=0~63(dec) NTSC :P1=0~63(dec) PAL :P1=0~63(dec)
10	Focus Stop	A0h	19h	00h	00h	00h	AFh	
11	Focus Start	A0h	1Ah	P1	P2	00h	AFh	P1=00/01:Near/Far P2=00~06:Speed
12	Focus Direct	A0h	1Bh	P1	P2	P3	AFh	P1(LowByte)P2(HighByte)=0~160(Dec), P3=00~06:Speed
13	Zoom Start (with AF)	A0h	1Dh	P1	P2	00h	AFh	P1=00/01:Tele/Wide
14	White Balance (AWB, Auto Tune)	A0h	22h	P1	00h	00h	AFh	P1=00/01:Auto Tune/AWB
15	Set Pan Mode	A0h	26h	P1	00h	00h	AFh	P1=00/01 : off/on

Item	Function	PC AP to DC145 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
16	Mask Mode	A0h	27h	P1	00h	00h	AFh	p1=0:Disable 1:Mask 2:Spolight
17	Freeze	A0h	2Ch	P1	00h	00h	AFh	P1=00/01:Off/On
18	Brightness Contorl	A0h	30h	P1	00h	00h	AFh	P1=00/01:Auto/Manua P2=60/50Hz: 00~105
19	LogoDelay	A0h	34h	P1	00h	00h	AFh	P1=4~30 (sec)
20	Language Select	A0h	38h	P1	00h	00h	AFh	P1=0~18(Dec): 0: English 1: Traditional Chinese 2: Simplified Chinese 3: German 4: French 5: Spanish 6: Russian 7: Dutch 8: Finnish 9: Polish 10: Italian 11: Portuguese 12: Swedish 13: Danish 14: Czech 15: Arabic 16: Japanese 17: Korean

Item	Function	PC AP to DC145 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
								18: Greek 19: Reserve (English) 20: Reserve(English) 21: Latvia
21	Brightness Step	A0h	39h	P1	00h	00h	AFh	P1=00/01:-1/+1
22	Source live/PC	A0h	3Ah	P1	00h	00h	AFh	00 : Camera 01 : PC 02 : Source OFF
23	Disable Digital Zoom After Optical Zoom	A0h	40h	P1	00h	00h	AFh	P1=00/01:Disable/Enable
24	Call Master Version	A0h	45h	00h	00h	00h	AFh	Code version : P1 P2 P3(ASCII)
25	Call AE Status	A0h	46h	00h	00h	00h	AFh	P1=00/01:Off/On
26	Enable/Disable LOGO Image	A0h	47h	P1	00h	00h	AFh	p1=00/01:default logo/user logo
27	Playback Image Index Change Page	A0h	4Ah	P1	00h	00h	AFh	P1=00/01:Page Up/Page Down
28	All OSD On/Off	A0h	4Bh	P1	00h	00h	AFh	P1=00/01:Off/On
29	Call Slave Version	A0h	4Dh	00h	00h	00h	AFh	Code version : P1 P2 P3(ASCII)
30	Frame Average	A0h	4Eh	P1	00h	00h	AFh	P1=00/01:LCD/DLP
31	Call lamp Status	A0h	50h	00h	00h	00h	AFh	00 : LED OFF 01 : LED ON
32	Call Text/Photo Status	A0h	51h	00h	00h	00h	AFh	P1=00/01/02:Photo/Text/Gray
33	reg1	A0h	52h	P1	P2	00h	AFh	P1=00/01:Read/Write P2=0x00~0xff
34	reg2	A0h	53h	P1	P2	00h	AFh	
34	reg3	A0h	54h	P1	P2	00h	AFh	
36	Error Code	A0h	55h	P1	00h	00h	AFh	p1=00/01:Show Error Code/Clear Error Code

Item	Function	PC AP to DC145 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
37	AWB Correction	A0h	56h	00h	00h	00h	AFh	AWB Correction
38	Call AC 50/60 Hzpower state	A0h	58h	00h	00h	00h	AFh	Call AC 50/60 Hz power State. 0: 50Hz, 1: 60Hz, 77: 0Hz, 99: Others
39	Keypad Detect	A0h	59h	P1	00h	00h	AFh	p1:00/01 :Kypad Detect Stop/Start. (Enable the Debug message at this time, the detection message will be sent via RS232.)
40	Call Zoom Position	A0h	60h	00h	00h	00h	AFh	XGA :P1=0~13(dec) SXGA :P1=0~10(dec) WXGA :P1=0~10(dec) 1080P :P1=0~3(dec) NTSC :P1=0~18(dec) PAL :P1=0~18(dec)
41	Call Digital Zoom Position	A0h	62h	00h	00h	00h	AFh	XGA :P1=0~50(dec) SXGA :P1=0~53(dec) WXGA :P1=0~53(dec) 1080P :P1=0~60(dec) NTSC :P1=0~45(dec) PAL :P1=0~45(dec)
42	Call Focus Position	A0h	64h	00h	00h	00h	AFh	P1(LowByte)P2(HighByte)=0~160(Dec)
43	Call Freeze Status	A0h	78h	00h	00h	00h	AFh	P1=00/01:Off/On
44	Call Brightness Position	A0h	89h	00h	00h	00h	AFh	P1=60/50Hz: 00~105(dec)
45	Call Mix Zoom Position	A0h	8Ah	00h	00h	00h	AFh	XGA :P1=0~63(dec) SXGA :P1=0~63(dec) WXGA :P1=0~63(dec) 1080P :P1=0~63(dec)

Item	Function	PC AP to DC145 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
								NTSC :P1=0~63(dec) PAL :P1=0~63(dec)
46	Call Menu Status	A0h	8Bh	00h	00h	00h	AFh	P1=00/01:Off/On
47	Capture Action	A0h	96h	P1	00h	00h	AFh	00 : Single Capture 01 : Time Lapse 02 : Record 03 : Disabled
48	Capture time	A0h	97h	P1	00h	00h	AFh	P1=00/01/02/03/04/05/06:1hr/ 2hr/ 4hr/ 8hr/ 24hr/48hr/72hr
49	Capture interval	A0h	98h	P1	00h	00h	AFh	00 : 3 sec. 01 : 5 sec. 02 : 10 sec. 03 : 30 sec. 04 : 1 min. 05 : 2 min. 06 : 5 min.
50	Key Function	A0h	A0h	P1	00h	00h	AFh	P1=01/02/03/04/05/06=Enter/Up/Down/Left/Right/ Menu
51	Set R/B Gain	A0h	A1h	P1	P2	P3	AFh	P1=01/02:Red Gain/Blue Gain P2(LowByte)P3(HighByte)=0x100~0xFFFF(hex):Gain
52	Call R/B Gain	A0h	A2h	P1	00h	00h	AFh	Send : P1=01/02:Red Gain/Blue Gain Return : P1(LowByte)P2(HighByte)=0x100~0xFFFF(Dec):Gain
53	AF One Push Trigger	A0h	A3h	01h	00h	00h	AFh	
54	Set Sharpness (Gamma)	A0h	A7h	P1	00h	00h	AFh	P1=00/01/02:Photo/Text/Gray

Item	Function	PC AP to DC145 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
55	Set Image Mode	A0h	A9h	P1	00h	00h	AFh	P1=00/01/02/03:Normal/Slide/Film/Microscope
56	System ON/OFF	A0h	B0h	P1	00h	00h	AFh	P1=00/01:Off/On
57	Power	A0h	B1h	P1	00h	00h	AFh	P1=00/01:Off/On
58	Capture	A0h	B2h	P1	00h	00h	AFh	P1=00/01:Capture/Record
59	Playback thumbnail	A0h	B3h	P1	00h	00h	AFh	P1=00:Thumbnail
60	Preview rotation	A0h	B4h	P1	00h	00h	AFh	P1=00/01/02/03:Rotate 0/180/Flip/Mirror
61	Delete	A0h	B6h	P1	00h	00h	AFh	P1=00/01/02: Delete one/Delete all/Format
62	call system status	A0h	B7h	00h	00h	00h	AFh	P1(system status)=00/01: not ready/ Read to receive the command P2(Power Status)=00/01:Off/On
63	LED On/Off	A0h	C1h	P1	00h	00h	AFh	00 : LED OFF 01 : LED ON
64	Firmware Upgrade	A0h	CBh	P1	00h	00h	AFh	P1=00/01:osd/no osd
65	Set Audio Volume	A0h	D6h	P1	00h	00h	AFh	P1=0~31(Dec):Volume
66	Call Audio Volume	A0h	D7h	00h	00h	00h	AFh	P1=0~31(Dec):Volume
67	PE Storage Test Data(Save)	A0h	E8h	P1	P2	P3	AFh	P1=1~7:Address P2=0x00~0xff:DATA
68	PE Storage Test Data(Load)	A0h	E9h	P1	P2	P3	AFh	P1=1~7:Address P2=0x00~0xff:DATA

6. Return Packet

Item	Function	PC AP to DC145 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
1	Preset/Factory Reset	A0h	03h	P1	P2	St.	AFh	P1=0, P2=00/01:Preset Load/Save P1=1:Factory Reset
2	Slide show On/Off	A0h	04h	P1	00h	St.	AFh	P1=00/01:Off/On
3	Slide show Delay	A0h	06h	P1	00h	St.	AFh	P1=0~5:0.5sec/1sec/3sec/5sec/10sec/Manual
4	Image/Record Quality	A0h	07h	P1	00h	St.	AFh	P1=00/01/02:High/Medium/Low
5	Copy From Nand to SD	A0h	08h	00h	00h	St.	AFh	
6	Zoom Stop	A0h	10h	00h	00h	St.	AFh	
7	Zoom Start (No AF)	A0h	11h	P1	P2	St.	AFh	P1=00/01:Tele/Wide
8	Auto Erase	A0h	13h	P1	00h	St.	AFh	P1=00/01:Auto Erase off/on
9	Digital Zoom Direct	A0h	18h	P1	00h	St.	AFh	XGA :P1=0~63(dec) SXGA :P1=0~63(dec) WXGA :P1=0~63(dec) 1080P :P1=0~63(dec) NTSC :P1=0~63(dec) PAL :P1=0~63(dec)
10	Focus Stop	A0h	19h	00h	00h	St.	AFh	
11	Focus Start	A0h	1Ah	P1	P2	St.	AFh	P1=00/01:Near/Far P2=00~06:Speed
12	Focus Direct	A0h	1Bh	P1	P2	St.	AFh	P1(LowByte)P2(HighByte)=0~160(Dec), P3=00~06:Speed
13	Zoom Start (with AF)	A0h	1Dh	P1	P2	St.	AFh	P1=00/01:Tele/Wide
14	White Balance (AWB, Auto Tune)	A0h	22h	P1	00h	St.	AFh	P1=00/01:Auto Tune/AWB
15	Set Pan Mode	A0h	26h	P1	00h	St.	AFh	P1=00/01 : off/on
16	Mask Mode	A0h	27h	P1	00h	St.	AFh	p1=0:Disable 1:Mask 2:Spotlight

Item	Function	PC AP to DC145 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
17	Freeze	A0h	2Ch	P1	00h	St.	AFh	P1=00/01:Off/On
18	Brightness Contorl	A0h	30h	P1	00h	St.	AFh	P1=00/01:Auto/Manua P2=60/50Hz: 00~105
19	LogoDelay	A0h	32h	P1	00h	St.	AFh	P1=4~30 (sec)
20	Language Select	A0h	38h	P1	00h	St.	AFh	P1=0~18(Dec): 0: English 1: Traditional Chinese 2: Simplified Chinese 3: German 4: French 5: Spanish 6: Russian 7: Dutch 8: Finnish 9: Polish 10: Italian 11: Portuguese 12: Swedish 13: Danish 14: Czech 15: Arabic 16: Japanese 17: Korean 18: Greek

Item	Function	PC AP to DC145 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
								19: Reserve (English) 20: Reserve(English) 21: Latvia
21	Brightness Step	A0h	39h	P1	00h	St.	AFh	P1=00/01:-1/+1
22	Source live/PC	A0h	3Ah	P1	00h	St.	AFh	00 : Camera 01 : PC 02 : Source OFF
23	Disable Digital Zoom After Optical Zoom	A0h	40h	P1	00h	St.	AFh	P1=00/01:Disable/Enable
24	Call Master Version	A0h	45h	P1	P2	P3	AFh	Code version : P1 P2 P3(ASCII)
25	Call AE Status	A0h	46h	P1	00h	St.	AFh	P1=00/01:Off/On
26	Enable/Disable LOGO Image	A0h	47h	P1	00h	St.	AFh	p1=00/01:default logo/user logo
27	Playback Image Index Change Page	A0h	4Ah	P1	00h	St.	AFh	P1=00/01:Page Up/Page Down
28	All OSD On/Off	A0h	4Bh	P1	00h	St.	AFh	P1=00/01:Off/On
29	Call Slave Version	A0h	4Dh	P1	P2	P3	AFh	Code version : P1 P2 P3(ASCII)
30	Frame Average	A0h	4Eh	P1	00h	St.	AFh	P1=00/01:LCD/DLP
31	Call lamp Status	A0h	50h	P1	00h	St.	AFh	00 : LED OFF 01 : LED ON
32	Call Text/Photo Status	A0h	51h	P1	00h	St.	AFh	P1=00/01/02:Photo/Text/Gray
33	reg1	A0h	52h	P1	P2	St.	AFh	P1=00/01:Read/Write P2=0x00~0xff
34	reg2	A0h	53h	P1	P2	St.	AFh	
34	reg3	A0h	54h	P1	P2	St.	AFh	
36	Error Code	A0h	55h	00h	00h	St.	AFh	p1=00/01:Show Error Code/Clear Error Code
37	AWB Correction	A0h	56h	00h	00h	St.	AFh	AWB Correction

Item	Function	PC AP to DC145 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
38	Call AC 50/60 Hzpower state	A0h	58h	00h	00h	St.	AFh	Call AC 50/60 Hz power State.
39	Keypad Detect	A0h	59h	00h	00h	St.	AFh	0: 50Hz, 1: 60Hz, 77: 0Hz, 99: Others p1:00/01 :Kypad Detect Stop/Start. (Enable the Debug message at this time, the detection message will be sent via RS232.)
40	Call Zoom Position	A0h	60h	P1	P2	St.	AFh	XGA :P1=0~13(dec) SXGA :P1=0~10(dec) WXGA :P1=0~10(dec) 1080P :P1=0~3(dec) NTSC :P1=0~18(dec) PAL :P1=0~18(dec)
41	Call Digital Zoom Position	A0h	62h	P1	00h	St.	AFh	XGA :P1=0~50(dec) SXGA :P1=0~53(dec) WXGA :P1=0~53(dec) 1080P :P1=0~60(dec) NTSC :P1=0~45(dec) PAL :P1=0~45(dec)
42	Call Focus Position	A0h	64h	P1	P2	St.	AFh	P1(LowByte)P2(HighByte)=0~160(Dec)
43	Call Freeze Status	A0h	78h	P1	00h	St.	AFh	P1=00/01:Off/On
44	Call Brightness Position	A0h	89h	P1	00h	St.	AFh	P1=60/50Hz: 00~105(dec)
45	Call Mix Zoom Position	A0h	8Ah	P1	P2	St.	AFh	XGA :P1=0~63(dec) SXGA :P1=0~63(dec) WXGA :P1=0~63(dec) 1080P :P1=0~63(dec) NTSC :P1=0~63(dec)

Item	Function	PC AP to DC145 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
								PAL :P1=0~63(dec)
46	Call Menu Status	A0h	8Bh	P1	00h	St.	AFh	P1=00/01:Off/On
47	Capture Action	A0h	96h	P1	00h	St.	AFh	00 : Single Capture 01 : Time Lapse 02 : Record 03 : Disabled
48	Capture time	A0h	97h	P1	00h	St.	AFh	P1=00/01/02/03/04/05/06:1hr/ 2hr/ 4hr/ 8hr/ 24hr/48hr/72hr
49	Capture interval	A0h	98h	P1	00h	St.	AFh	00 : 3 sec. 01 : 5 sec. 02 : 10 sec. 03 : 30 sec. 04 : 1 min. 05 : 2 min. 06 : 5 min.
50	Key Function	A0h	A0h	P1	00h	St.	AFh	P1=01/02/03/04/05/06=Enter/Up/Down/Left/Right/ Menu
51	Set R/B Gain	A0h	A1h	P1	P2	St.	AFh	P1=01/02:Red Gain/Blue Gain P2(LowByte)P3(HighByte)=0x100~0xFFFF(hex):Gain
52	Call R/B Gain	A0h	A2h	P1	P2	St.	AFh	Send : P1=01/02:Red Gain/Blue Gain Return : P1(LowByte)P2(HighByte)=0x100~0xFFFF(Dec):Gain
53	AF One Push Trigger	A0h	A3h	01h	00h	St.	AFh	
54	Set Sharpness (Gamma)	A0h	A7h	P1	00h	St.	AFh	P1=00/01/02:Photo/Text/Gray
55	Set Image Mode	A0h	A9h	P1	00h	St.	AFh	P1=00/01/02/03:Normal/Slide/Film/Microscope

Item	Function	PC AP to DC145 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
56	System ON/OFF	A0h	B0h	P1	00h	St.	AFh	P1=00/01:Off/On
57	Power	A0h	B1h	P1	00h	St.	AFh	P1=00/01:Off/On
58	Capture	A0h	B2h	P1	00h	St.	AFh	P1=00/01:Capture/Record
59	Playback thumbnail	A0h	B3h	P1	00h	St.	AFh	P1=00:Thumbnail
60	Preview rotation	A0h	B4h	P1	00h	St.	AFh	P1=00/01/02/03:Rotate 0/180/Flip/Mirror
61	Delete	A0h	B6h	P1	00h	St.	AFh	P1=00/01/02: Delete one/Delete all/Format
62	call system status	A0h	B7h	P1	P2	St.	AFh	P1(system status)=00/01: not ready/ Read to receive the command P2(Power Status)=00/01:Off/On
63	LED On/Off	A0h	C1h	P1	00h	St.	AFh	00 : LED OFF 01 : LED ON
64	Firmware Upgrade	A0h	CBh	P1	00h	St.	AFh	P1=00/01:osd/no osd
65	Set Audio Volume	A0h	D6h	P1	00h	St.	AFh	P1=0~31(Dec):Volume
66	Call Audio Volume	A0h	D7h	P1	P2	St.	AFh	P1=0~31(Dec):Volume
67	PE Storage Test Data(Save)	A0h	E8h	P1	P2	St.	AFh	P1=1~7:Address P2=0x00~0xff:DATA
68	PE Storage Test Data(Load)	A0h	E9h	P1	P2	St.	AFh	P1=1~7:Address P2=0x00~0xff:DATA