

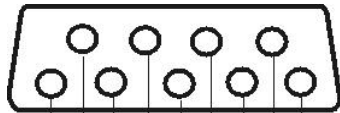
1. Communication Protocol

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



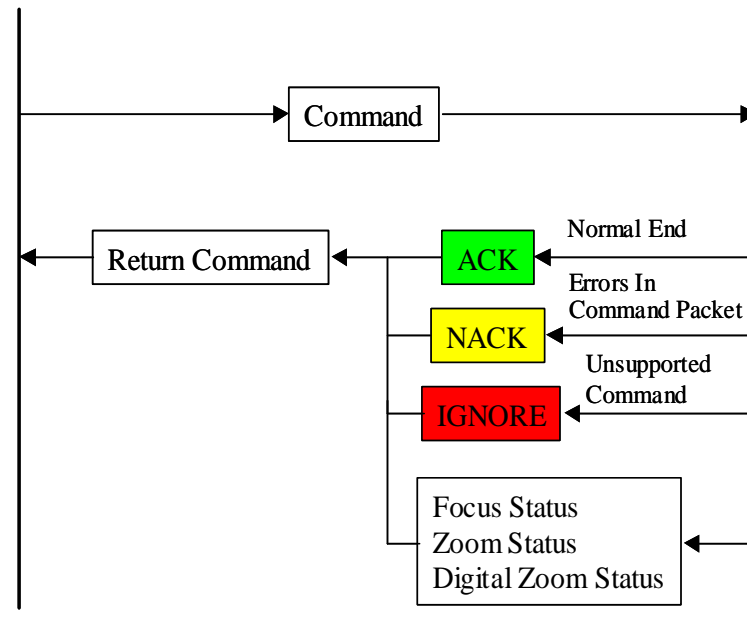
Female

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 DC190 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=0~5:0.5/sec/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 USB	A0h	08h	00h	00h	00h	AFh	
6	Zoom Stop	A0h	10h	00h	00h	00h	AFh	
7	Zoom Start (No AF)	A0h	11h	P1	00h	00h	AFh	P1=00/01:Tele/Wide
8	Zoom Direct (Straight, No AF)	A0h	13h	P1	P2	00h	AFh	P1(LowByte) · P2(HighByte)=0~615(Dec):Zoom Position
9	Auto Erase	A0h	14h	P1	00h	00h	AFh	P1=00/01:Auto Erase off/on
10	Digital Zoom Limit	A0h	15h	P1	00h	00h	AFh	P1=0x01~0x0A:1x~10x
11	Digital Zoom Direct	A0h	18h	P1	00h	00h	AFh	P1=0~60
12	Focus Stop	A0h	19h	00h	00h	00h	AFh	
13	Focus Start	A0h	1Ah	P1	P2	00h	AFh	P1=00/01:Near/Far P2=00~05:Speed
14	Focus Direct	A0h	1Bh	P1	P2	P3	AFh	P1(LowByte)P2(HighByte)=0~324(Dec),P3=00~05:Speed
15	Zoom Start (with AF)	A0h	1Dh	P1	00h	00h	AFh	P1=00/01:Tele/Wide
16	Zoom Direct (Straight) (with AF)	A0h	1Fh	P1	P2	P3	AFh	P1(LowByte) · P2(HighByte)=0~615(Dec):Zoom Position
17	White Balance (AWB, Auto Tune)	A0h	22h	P1	00h	00h	AFh	P1=00/01:Auto Tune/AWB
18	Set Pan Mode	A0h	26h	P1	00h	00h	AFh	P1= 00 off 、 P1 = 01 on
19	Mask Mode	A0h	27h	P1	00h	00h	AFh	p1=0:Disable 1:Mask 2:Highlight
20	Freeze	A0h	2Ch	P1	00h	00h	AFh	P1=00/01:Off/On

Item	Function	PC AP to DC190 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
21	Iris	A0h	30h	P1	P2	00h	AFh	P1=01:Manual (Normal 60Hz)P2=00~200(Dec) (Microscope 60Hz)P2=00~117(Dec)(NightVision 60Hz)P2=00~32(Dec):Brightness (Normal 50Hz)P2=00~199(Dec) (Microscope 50Hz)P2=00~143(Dec)(NightVision 60Hz)P2=00~32(Dec):Brightness
22	Negative (film)	A0h	36h	P1	00h	00h	AFh	P1=00/01:Off/On
23	Color (gray)	A0h	37h	P1	00h	00h	AFh	P1=00/01:Photo/Gray
24	Language Select	A0h	38h	P1	00h	00h	AFh	P1=0~12(Dec): English/ Traditional Chinese/German/French/Spanish/Russian/Dutch/Finnish/P olish/Italian/Portuguese/Swedish/Czech
25	Brightness Control	A0h	39h	P1	00h	00h	AFh	P1=00/01:-1/+1
26	Source live/PC	A0h	3Ah	P1	00h	00h	AFh	P1=00/01:Source 1=>camera/pc
27	Disable Digital Zoom After Optical Zoom	A0h	40h	P1	00h	00h	AFh	P1=00/01:Disable/Enable
28	Call Master Version	A0h	45h	00h	00h	00h	AFh	DHMxxx = DHM P1 P2 P3(ASCII)
29	Call AE Status	A0h	46h	00h	00h	00h	AFh	P1=00/01:Off/On
30	Enable/Disable LOGO Image	A0h	47h	P1	00h	00h	AFh	p1=00/01:power on setting /power off setting P2=00/01:Default logo/Customer logo
31	Playback Image Index Change Page	A0h	4Ah	P1	00h	00h	AFh	P1=00/01:Page Up/Page Down
32	All OSD On/Off	A0h	4Bh	P1	00h	00h	AFh	P1=00/01:Off/On
33	Call Slave Version	A0h	4Dh	00h	00h	00h	AFh	DHOxxx = DHO P1 P2 P3(ASCII)

Item	Function	PC AP to DC190 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
34	Call lamp Status	A0h	50h	00h	00h	00h	AFh	P1=00/01/02/03:Off/Lamp/Both/Top
34	Call Text/Photo Status	A0h	51h	00h	00h	00h	AFh	P1=00/01/02:Photo/Text/Gray
36	reg1	A0h	52h	P1	P2	00h	AFh	P1=00/01:Read/Write P2=0x00~0xff
37	reg2	A0h	53h	P1	P2	00h	AFh	
38	reg3	A0h	54h	P1	P2	00h	AFh	
39	Call AC 50/60 Hzpower state	A0h	58h	00h	00h	00h	AFh	Call AC 50/60 Hz power State.
40	Call Zoom Position	A0h	60h	00h	00h	00h	AFh	P1(LowByte) , P2(HighByte)=0~615(Dec):Zoom Position
41	Call Digital Zoom Position	A0h	62h	00h	00h	00h	AFh	P1=:0~60(Dec):Digital Zoom Position
42	Call Focus Position	A0h	64h	00h	00h	00h	AFh	P1(LowByte)P2(HighByte)=0~324(Dec),P3=00~05:Speed
43	Call Freeze Status	A0h	78h	00h	00h	00h	AFh	P1=00/01:Off/On
44	Call Iris Status	A0h	7Ah	00h	00h	00h	AFh	P1=00/01/02:Auto/Manual · Stop (Normal 60Hz)P2=00~200(Dec) (Microscope 60Hz)P2=00~117(Dec)(NightVision 60Hz)P2=00~32(Dec):Brightness (Normal 50Hz)P2=00~199(Dec) (Microscope 50Hz)P2=00~143(Dec)(NightVision 60Hz)P2=00~32(Dec):Brightness
45	Call Negative	A0h	87h	00h	00h	00h	AFh	P1=00/01:Off/On
46	Call Color	A0h	88h	00h	00h	00h	AFh	P1=00/01:Photo/Gray
47	Call Brightness Position	A0h	89h	00h	00h	00h	AFh	P1=0~254(Dec):Brightnes
48	Call Mix Zoom Position	A0h	8Ah	00h	00h	00h	AFh	P1(LowByte)P2(HighByte)=0~675(Dec):Mix Zoom Position
49	Call Menu Status	A0h	8Bh	00h	00h	00h	AFh	P1=00/01:Off/On
50	Capture type	A0h	96h	P1	00h	00h	AFh	P1=00/01/02:Single/Continuous/Disable
51	Capture time	A0h	97h	P1	00h	00h	AFh	P1=00/01/02/03/04/05/06:1hr/ 2hr/ 4hr/ 8hr/ 24hr/48hr/72hr

Item	Function	PC AP to DC190 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
52	Capture interval	A0h	98h	P1	00h	00h	AFh	P1=00/01/02/03/04/05:5sec /10sec /30sec /1min/ 2min /5min
53	Key Function	A0h	A0h	P1	00h	00h	AFh	P1=01/02/03/04/05/06=Enter/Up/Down/Left/Right/Menu
54	AF One Push Trigger	A0h	A3h	01h	00h	00h	AFh	
55	Set Sharpness (Gamma)	A0h	A7h	P1	00h	00h	AFh	P1=00/01/02:Photo/Text/Gray
56	Set Image Mode	A0h	A9h	P1	00h	00h	AFh	P1=00/01/02/03:Normal/Slide/Film/Microscope
57	Night Vision	A0h	ABh	P1	00h	00h	AFh	P1=00/01:Off/On
58	System ON/OFF (All lamp on)	A0h	B0h	P1	00h	00h	AFh	P1=00/01:Off/On
59	Power	A0h	B1h	P1	00h	00h	AFh	P1=00/01:Off/On
60	Capture	A0h	B2h	P1	00h	00h	AFh	P1=00/01:Capture/Record
61	Playback thumbnail	A0h	B3h	P1	00h	00h	AFh	P1=00/01:Thumbnail/PBP Thumbnail
62	Preview rotation	A0h	B4h	P1	00h	00h	AFh	P1=00/01/02/03:Rotate 0/90/180/270
63	Delete	A0h	B6h	P1	00h	00h	AFh	P1=00/01/02: Delete one/Delete all/Format
64	call system status	A0h	B7h	00h	00h	00h	AFh	P1(system status)=0/01:not ready/Ready to receive the command P2(Power Status)=00/01:Off/On
65	Lamp On/Off	A0h	C1h	P1	00h	00h	AFh	P1=00/01/02/03:Off/Lamp/Both/Top
66	Set Audio Volume	A0h	D6h	P1	00h	00h	AFh	P1=0~16(Dec):Volume
67	Call Audio Volume	A0h	D7h	00h	00h	00h	AFh	P1(LowByte)P2(HighByte) val=(0~16)

6. Return Packet

Item	Function	PC AP to DC190 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=0~5:0.5/sec/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 USB	A0h	08h	00h	00h	St.	AFh	
6	Zoom Stop	A0h	10h	00h	00h	St.	AFh	
7	Zoom Start (No AF)	A0h	11h	P1	00h	St.	AFh	P1=00/01:Tele/Wide
8	Zoom Direct (Straight, No AF)	A0h	13h	P1	P2	St.	AFh	P1(LowByte) , P2(HighByte)=0~615(Dec):Zoom Position
9	Auto Erase	A0h	13h	P1	00h	St.	AFh	P1=00/01:Auto Erase off/on
10	Digital Zoom Limit	A0h	15h	P1	00h	St.	AFh	P1=0x01~0x0A:1x~10x
11	Digital Zoom Direct	A0h	18h	P1	00h	St.	AFh	P1=0~60
12	Focus Stop	A0h	19h	00h	00h	St.	AFh	
13	Focus Start	A0h	1Ah	P1	P2	St.	AFh	P1=00/01:Near/Far P2=00~05:Speed
14	Focus Direct	A0h	1Bh	P1	P2	St.	AFh	P1(LowByte)P2(HighByte)=0~324(Dec),P3=00~05:Speed
15	Zoom Start (with AF)	A0h	1Dh	P1	00h	St.	AFh	P1=00/01:Tele/Wide
16	Zoom Direct (Straight) (with AF)	A0h	1Fh	P1	P2	St.	AFh	P1(LowByte) , P2(HighByte)=0~615(Dec):Zoom Position
17	White Balance (AWB, Auto Tune)	A0h	22h	P1	00h	St.	AFh	P1=00/01:Auto Tune/AWB
18	Set Pan Mode	A0h	26h	P1	00h	St.	AFh	P1= 00 off 、 P1 = 01 on
19	Mask Mode	A0h	27h	P1	00h	St.	AFh	p1=0:Disable 1:Mask 2:Highlight
20	Freeze	A0h	2Ch	P1	00h	St.	AFh	P1=00/01:Off/On
21	Iris	A0h	30h	P1	P2	St.	AFh	P1=01:Manual

Item	Function	PC AP to DC190 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
								(Normal 60Hz)P2=00~200(Dec) (Microscope 60Hz)P2=00~117(Dec)(NightVision 60Hz)P2=00~32(Dec):Brightness (Normal 50Hz)P2=00~199(Dec) (Microscope 50Hz)P2=00~143(Dec)(NightVision 60Hz)P2=00~32(Dec):Brightness
22	Negative (film)	A0h	36h	P1	00h	St.	AFh	P1=00/01:Off/On
23	Color (gray)	A0h	37h	P1	00h	St.	AFh	P1=00/01:Photo/Gray
24	Language Select	A0h	38h	P1	00h	St.	AFh	P1=0~12(Dec): English/ Traditional Chinese/German/French/Spanish/Russian/Dutch/Finnish/P olish/Italian/Portuguese/Swedish/Czech
25	Brightness Control	A0h	39h	P1	00h	St.	AFh	P1=00/01:-1/+1
26	Source live/PC	A0h	3Ah	P1	00h	St.	AFh	P1=00/01:Source 1=>camera/pc
27	Disable Digital Zoom After Optical Zoom	A0h	40h	P1	00h	St.	AFh	P1=00/01:Disable/Enable
28	Call Master Version	A0h	45h	P1	P2	P3	AFh	DHMxxx = DHM P1 P2 P3(ASCII)
29	Call AE Status	A0h	46h	P1	00h	St.	AFh	P1=00/01:Off/On
30	Enable/Disable LOGO Image	A0h	47h	P1	00h	St.	AFh	p1=00/01:power on setting /power off setting P2=00/01:Default logo/Customer logo
31	Playback Image Index Change Page	A0h	4Ah	P1	00h	St.	AFh	P1=00/01:Page Up/Page Down
32	All OSD On/Off	A0h	4Bh	P1	00h	St.	AFh	P1=00/01:Off/On
33	Call Slave Version	A0h	4Dh	P1	P2	P3	AFh	DHOxxx = DHO P1 P2 P3(ASCII)
34	Call lamp Status	A0h	50h	P1	00h	St.	AFh	P1=00/01/02/03:Off/Lamp/Both/Top

Item	Function	PC AP to DC190 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
34	Call Text/Photo Status	A0h	51h	P1	00h	St.	AFh	P1=00/01/02:Photo/Text/Gray
36	reg1	A0h	52h	P1	P2	St.	AFh	P1=00/01:Read/Write P2=0x00~0xff
37	reg2	A0h	53h	P1	P2	St.	AFh	
38	reg3	A0h	54h	P1	P2	St.	AFh	
39	Call AC 50/60 Hzpower state	A0h	58h	00h	00h	St.	AFh	Call AC 50/60 Hz power State.
40	Call Zoom Position	A0h	60h	P1	P2	St.	AFh	P1(LowByte) , P2(HighByte)=0~615(Dec):Zoom Position
41	Call Digital Zoom Position	A0h	62h	P1	00h	St.	AFh	P1=:0~60(Dec):Digital Zoom Position
42	Call Focus Position	A0h	64h	P1	P2	St.	AFh	P1(LowByte)P2(HighByte)=0~324(Dec),P3=00~05:Speed
43	Call Freeze Status	A0h	78h	P1	00h	St.	AFh	P1=00/01:Off/On
44	Call Iris Status	A0h	7Ah	P1	P2	St.	AFh	P1=00/01/02:Auto/Manual 、 Stop (Normal 60Hz)P2=00~200(Dec) (Microscope 60Hz)P2=00~117(Dec)(NightVision 60Hz)P2=00~32(Dec):Brightness (Normal 50Hz)P2=00~199(Dec) (Microscope 50Hz)P2=00~143(Dec)(NightVision 60Hz)P2=00~32(Dec):Brightness
45	Call Negative	A0h	87h	P1	00h	St.	AFh	P1=00/01:Off/On
46	Call Color	A0h	88h	P1	00h	St.	AFh	P1=00/01:Photo/Gray
47	Call Brightness Position	A0h	89h	P1	00h	St.	AFh	P1=0~254(Dec):Brightnes
48	Call Mix Zoom Position	A0h	8Ah	P1	P2	St.	AFh	P1(LowByte)P2(HighByte)=0~675(Dec):Mix Zoom Position
49	Call Menu Status	A0h	8Bh	P1	00h	St.	AFh	P1=00/01:Off/On
50	Capture type	A0h	96h	P1	00h	St.	AFh	P1=00/01/02:Single/Continuous/Disable
51	Capture time	A0h	97h	P1	00h	St.	AFh	P1=00/01/02/03/04/05/06:1hr/ 2hr/ 4hr/ 8hr/ 24hr/48hr/72hr
52	Capture interval	A0h	98h	P1	00h	St.	AFh	P1=00/01/02/03/04/05:5sec /10sec /30sec /1min/ 2min

Item	Function	PC AP to DC190 Master command format						Comment
		1B	2B	3B	4B	5B	6B	
								/5min
53	Key Function	A0h	A0h	P1	00h	St.	AFh	P1=01/02/03/04/05/06=Enter/Up/Down/Left/Right/Menu
54	AF One Push Trigger	A0h	A3h	01h	00h	St.	AFh	
55	Set Sharpness (Gamma)	A0h	A7h	P1	00h	St.	AFh	P1=00/01/02:Photo/Text/Gray
56	Set Image Mode	A0h	A9h	P1	00h	St.	AFh	P1=00/01/02/03:Normal/Slide/Film/Microscope
57	Night Vision	A0h	ABh	P1	00h	St.	AFh	P1=00/01:Off/On
58	System ON/OFF (All lamp on)	A0h	B0h	P1	00h	St.	AFh	P1=00/01:Off/On
59	Power	A0h	B1h	P1	00h	St.	AFh	P1=00/01:Off/On
60	Capture	A0h	B2h	P1	00h	St.	AFh	P1=00/01:Capture/Record
61	Playback thumbnail	A0h	B3h	P1	00h	St.	AFh	P1=00/01:Thumbnail/PBP Thumbnail
62	Preview rotation	A0h	B4h	P1	00h	St.	AFh	P1=00/01/02/03:Rotate 0/90/180/270
63	Delete	A0h	B6h	P1	00h	St.	AFh	P1=00/01/02: Delete one/Delete all/Format
64	call system status	A0h	B7h	P1	P2	St.	AFh	P1(system status)=0/01:not ready/Ready to receive the command P2(Power Status)=00/01:Off/On
65	Lamp On/Off	A0h	C1h	P1	00h	St.	AFh	P1=00/01/02/03:Off/Lamp/Both/Top
66	Set Audio Volume	A0h	D6h	P1	00h	St.	AFh	P1=0~16(Dec):Volume
67	Call Audio Volume	A0h	D7h	P1	P2	St.	AFh	P1(LowByte)P2(HighByte) val=(0~16)

** St : 0 =Action Succeed, 1= NAK (No Action), 2 = Ignore (Command is not in the command list.)