

Revision History				
Revision	ECO #	Description	Initiator	Date of Approval
1.0		Initial revision	Michael Gu	Nov/30 2016
1.2		Update battery status word structure Remove HW/FW version commands	Michael Gu	Mar24/2017
1.3		Modify Mode2 to be send out "ECG raw data + RRI (or R-wave location)"	Michael Gu	May23/2017
1.4		1) modify Mode 1, add R-wave location field 2) add SDK write/read user information into FLASH command	Michael Gu	June 7, 2017

Communication Protocol between Firmware & SDK

1: PATCH→SDK Command.

1: Mode 0 (ECG raw data + ACC raw data sent to SDK by blue tooth)

A: ACC sampling frequency: 10HZ;

B: ACC data resolution is 8 bits;

C: there are 3 bytes in one ACC sampling, X direct 1 bytes, Y direct 1 bytes, Z direct 1 bytes;

D: ECG raw data resolution is 2 bytes

E: ECG raw data sample frequency is 250HZ

F: there are raw ECG & ACC data of 100ms in sampling buffer

Raw data sampling buffer data structure is as follow:

ACC raw data (3)		X – Y – Z				
ECG raw data (50)		Raw0	Raw1	Raw2	Raw3	Raw4
		Raw5	Raw6	Raw7	Raw8	Raw9
		Raw10	Raw11	Raw12	Raw13	Raw14
		Raw15	Raw16	Raw17	Raw18	Raw19
		Raw20	Raw21	Raw22	Raw23	Raw24

Change sampling buffer to blue tooth command:

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Serial number		command	data section															Check sum	
SN_H	SN_L	00	00	X	Y	Z	00	00	00	Raw0	Raw1	Raw2	Raw3					CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Serial number		command	data section															Check sum	
SN_H	SN_L	00	01	Raw4	Raw5	Raw6	Raw7	Raw8	Raw9	Raw10								CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Serial number		command	data section															Check sum	
SN_H	SN_L	00	02	Raw11	Raw12	Raw13	Raw14	Raw15	Raw16	Raw17								CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Serial number		command	data section															Check sum	
SN_H	SN_L	00	03	Raw18	Raw19	Raw20	Raw21	Raw22	Raw23	Raw24								CS1	CS2

Note:

(1): ECG raw data structure definition:

Byte11	Byte12
Raw0	
Raw_H	Raw_L

Raw_H is the high 8 bit of 16 bit ECG raw data, Raw_L is the low 8 bit of 16 bit ECG raw data;

Raw_H.7 =0/1 means: Raw0 is positive/negative

SDK should change Raw0 to signed data structure, the change method is:

If $0 \leq \text{Raw0} \leq 7FFF$, the Raw0 is positive, no need do any change;

If $8000H \leq \text{Raw0} \leq FFFF$, the Raw0 is negative, the data after change is: $(FFFF - \text{Raw0} + 1) * (-1)$

(2): CS1 is the high 8 bit of check sum, CS2 is the low 8 bit of check sum.

Check sum=byte1+byte2+byte3+.....+byte18

2: Mode 1 (RR interval + ACC raw data sent to SDK & storage to FLASH)

A: ACC sampling frequency: 10HZ.

B: ACC resolution: 8 BIT

C: there are 3 bytes in one ACC sampling, X direct 1 bytes, Y direct 1 bytes, Z direct 1 bytes;

D: R-R interval resolution is 2 bytes, count unit is ms

E: There are max 5 R-R intervals in one second, that mean PATCH can detect max 300 heart beat per minute;

F: if there are less than 5 R-R interval one second (most of cases are like this), invaluable bytes will be filled with "FF"

G: Sample buffer will storage 1 second data, include: time stamp, R-R interval, ACC

Data sampling buffer data structure defined as follow:

Time stamp & ECG lead status(6)	Year/month/date/hour/min/sec + ECG lead status				
R-R interval (10)	RR0	RR1	RR2	RR3	RR4
R-wave location (5)	RWL0	RWL1	RWL2	RWL3	RWL4
ACC raw data (30)	X0 – Y0 – Z0				
	X1 – Y1 – Z1				
	X2 – Y2 – Z2				
	X3 – Y3 – Z3				
	X4 – Y4 – Z4				
	X5 – Y5 – Z5				
	X6 – Y6 – Z6				
	X7 – Y7 – Z7				
	X8 – Y8 – Z8				
	X9 – Y9 – Z9				

Note:

ECG lead status used bit 7 of "second" field, the detailed definition is as below:

Second.7=0: lead off

Second.7=1: not lead off

If detect blue tooth is connected, then sampling buffer data will be sent to SDK by blue tooth.

Change sampling buffer to blue tooth command (sampling & sent)

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	01	00	year	month	date	hour	min	sec	lead	RR0		RR1		RR2		00	CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	01	01	RR3	X0	Y0	Z0	X1	Y1	Z1	X2	Y2	Z2	X3	Y3	Z3	CS1	CS2	

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	01	02	RR4	X4	Y4	Z4	X5	Y5	Z5	X6	Y6	Z6	X7	Y7	Z7		CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	01	03	00	00	X8	Y8	Z8	X9	Y9	Z9	RWL0	RWL1	RWL2	RWL3	RWL4	00	CS1	CS2

Note:

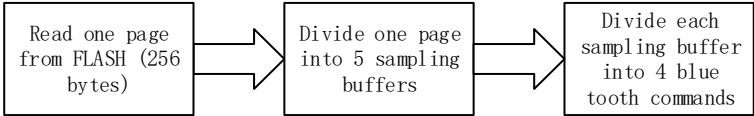
RR definition:	
Byte12	Btye13
RRO	
RRO_H	RRO_L

RRO_H is the high 8 bit of RRO, RRO_L is the low 8 bit of RRO;

If detect blue tooth is not connected, sampling buffer data will be storage into FLASH. One FLASH read/write page is 256 bytes, so one page can contain maximum 5 sampling buffer. The FLASH read/write page data structure is:

Byte address	0-50	51-101	102-152	153-203	204-254	255
Use defination	Sampling buffer 1	Sampling buffer 2	Sampling buffer 3	Sampling buffer 4	Sampling buffer 5	fill 00
						free

When need to upload FLASH data to SDK, the data flow is:



Change FLASH data to blue tooth command (read FLASH & upload)

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	02	00	year	month	date	hour	min	sec	lead	RR0	RR1	RR2		00			CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	02	01	RR3	X0	Y0	Z0	X1	Y1	Z1	X2	Y2	Z2	X3	Y3	Z3		CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	02	02	RR4	X4	Y4	Z4	X5	Y5	Z5	X6	Y6	Z6	X7	Y7	Z7		CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	02	03	00	00	X8	Y8	Z8	X9	Y9	Z9	RWL0	RWL1	RWL2	RWL3	RWL4	00	CS1	CS2

Note: except command field, all the other data structures are the same as “sampling & sent” .

3: Mode 2 (RR interval + ECG raw data, only send to SDK, NOT storage to Flash)

Time stamp & ECG lead status(7)	Year/month/date/hour/min/sec + ECG lead status				
R-wave location or RR interval (10)	RR0	RR1	RR2	RR3	RR4

ECG raw data (500)				Raw0	Raw1	Raw2	Raw3	Raw4											
																		
Raw245	Raw246	Raw247	Raw248	Raw249															
Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	03	00	year	month	date	hour	min	sec	lead	00	00	00	00	00	00	00	CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	03	01	RR0		RR1		RR2		RR3		RR4		00	00	00	00	CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	03	02	Raw0		Raw1		Raw2		Raw3		Raw4		Raw5		Raw6		CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	03	03	Raw7		Raw8		Raw9		Raw10		Raw11		Raw12		Raw13		CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	03	04	Raw14		Raw15		Raw16		Raw17		Raw18		Raw19		Raw20		CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	03	05	Raw21		Raw22		Raw23		Raw24		Raw25		Raw26		Raw27		CS1	CS2

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Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	03	36	Raw238		Raw239		Raw240		Raw2411		Raw242		Raw243		Raw244		CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	03	37	Raw245		Raw246		Raw247		Raw248		Raw249		00	00	00	00	CS1	CS2

4: Mode 3 (RR interval sent to SDK & storage to FLASH)

In some cases, ACC is not needed (such as during sleep), so we can stop ACC sampling and sent (storage), in this case, only RR interval is sampling & sent or sampling & storage.

A: R-R interval resolution is 2 bytes，count unit is ms

B: There are max 5 R-R intervals in one second, that mean PATCH can detect max 300 heart beat per minute;

F: if there are less than 5 R-R interval one second (most of cases are like this), invaluable bytes will be filled with “FF”

G: Sample buffer will storage 5 second data, include: time stamp, R-R interval

Data sampling buffer data structure defined as follow:

Time stamp & ECG lead status(7)	Year/month/date/hour/min/s ec + ECG lead status				
RR interval 5 seconds 50 bytes	RR0	RR1	RR2	RR3	RR4
	RR5	RR6	RR7	RR8	RR9
	RR10	RR11	RR12	RR13	RR14
	RR15	RR16	RR17	RR18	RR19
	RR20	RR21	RR22	RR23	RR24

If detect blue tooth is connected, then sampling buffer data will be sent to SDK by blue tooth.

Change sampling buffer to blue tooth command (sampling & sent)

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	05	00	year	month	date	hour	min	sec	lead	00	00	00	00	00	00	00	CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	05	01	RR0		RR1		RR2		RR3		RR4		RR5		RR6		CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	05	02	RR7		RR8		RR9		RR10		RR11		RR12		RR13		CS1	CS2

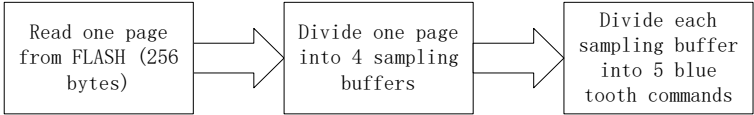
Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	05	03	RR14		RR15		RR16		RR17		RR18		RR19		RR20		CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	05	04	RR21		RR22		RR23		RR24		00	00	00	00	00	00	CS1	CS2

If detect blue tooth is not connected, sampling buffer data will be storage into FLASH. One FLASH read/write page is 256 bytes, so one page can contain maximum 4 sampling buffers. The FLASH read/write page data structure is:

Byte address	0-63					64-127					128-191					192-255												
Use defination	Sampling buffer 1					Sampling buffer 2					Sampling buffer 3					Sampling buffer 4												
	Time stamp & ECG lead status(7)- RR interval- 5 seconds- 50 bytes-		Year/month/date/hour/min/s ec + ECG lead status				Time stamp & ECG lead status(7)- RR interval- 5 seconds- 50 bytes-		Year/month/date/hour/min/s ec + ECG lead status				Time stamp & ECG lead status(7)- RR interval- 5 seconds- 50 bytes-		Year/month/date/hour/min/s ec + ECG lead status				Time stamp & ECG lead status(7)- RR interval- 5 seconds- 50 bytes-		Year/month/date/hour/min/s ec + ECG lead status							
			RR0	RR1	RR2	RR3			RR4	RR0	RR1	RR2			RR3	RR4	RR0	RR1			RR2	RR3	RR4	RR0	RR1	RR2	RR3	RR4
			RR5	RR6	RR7	RR8			RR9	RR5	RR6	RR7			RR8	RR9	RR5	RR6			RR7	RR8	RR9	RR5	RR6	RR7	RR8	RR9
			RR10	RR11	RR12	RR13			RR14	RR10	RR11	RR12			RR13	RR14	RR10	RR11			RR12	RR13	RR14	RR10	RR11	RR12	RR13	RR14
			RR15	RR16	RR17	RR18			RR19	RR15	RR16	RR17			RR18	RR19	RR15	RR16			RR17	RR18	RR19	RR15	RR16	RR17	RR18	RR19
RR20	RR21	RR22	RR23	RR24	RR20	RR21	RR22	RR23	RR24	RR20	RR21	RR22	RR23	RR24	RR20	RR21	RR22	RR23	RR24									

When need to upload FLASH data to SDK, the data flow is:



Change FLASH data to blue tooth command (read FLASH & upload)

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
-------	-------	-------	-------	-------	-------	-------	-------	-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------

Package head		command	data section														Check sum		
FF	FE	06	00	year	month	date	hour	min	sec	lead	00	00	00	00	00	00	00	CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	06	01	RR0	RR1	RR2	RR3	RR4	RR5	RR6								CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	06	02	RR7	RR8	RR9	RR10	RR11	RR12	RR13								CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	06	03	RR14	RR15	RR16	RR17	RR18	RR19	RR20								CS1	CS2

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	06	04	RR21	RR22	RR23	RR24	00	00	00	00	00	00	00	00	00	00	CS1	CS2

Note: except command field, all the other data structures are the same as “sampling & sent” .

5: send “battery status word” command

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10
Package head		command	Data section					Check sum	
FF	FE	07	STATUS	VL	Battery voltage		00H	CSH	CSL

note:

Battery voltage: is the battery voltage (mV), 16 bit HEX value

STATUS	VL	Description
0 In charger Not complete charging	1	$V3 \leq V$
	2	$V2 \leq V < V3$
	3	$V1 \leq V < V2$
	4	$V0 \leq V < V1$
	5	$V < V0$
1 In charger Complete charging	x	VL is N/A
2 Not in charger	1	$V3 \leq V$ Can OTA, can ADC/ACC sampling, can BLE transmission
	2	$V2 \leq V < V3$

		Cannot OTA, can ADC/ACC sampling, can BLE transmission, no low battery warning,
	3	$V1 \leq V < V2$ Cannot OTA, can ADC/ACC sampling, can BLE transmission, low battery warning,
	4	$V0 \leq V < V1$ Cannot OTA, cannot ADC/ACC sampling, can BLE transmission, low battery warning,

Note:

- (1): When battery voltage is $V < V0$ and Patch is not in charger, Cannot OTA, cannot ADC/ACC sampling, cannot BLE transmission, system shut down. This status cannot be sent because of BLE cannot work.
- (2): $V0 < V1 < V2 < V3$

6: send FLASH memorized data quantity command

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
Package head		command	data section		Check sum	
FF	FE	08	Number		CSH	CSL

note:

Number: quantity of memorized data in FLASH, unit is: bank (one bank is 256 bytes, storage 5 sec R-R interval & ACC data or 20 seconds RR interval data)

7: send self-test word command

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11
Package head		command	data section						Check sum	
FF	FE	09	T-word		Status	VL	Battery voltage		CSH	CSL

Note:

- (1): T-word: self-test word
- (2): status: battery status
- (3): VL: battery voltage level
- (4): battery voltage: the battery voltage value (mV)

8: send ACK of SDK command

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6
Package head		command	data section	Check sum	
FF	FE	0AH	ACK	CSH	CSL

ACK value	Description
01	ACK of erase FLASH data SDK command
02	ACK of set PATCH clock SDK command
03	ACK of switch patch to “Mode 0” SDK command
04	ACK of switch patch to “Mode 1” SDK command
05	ACK of switch patch to “Mode 2” SDK command
06	ACK of switch patch to “Mode 3” SDK command
07	ACK of start ECG/ACC sampling SDK command
08	ACK of stop ECG&ACC sampling SDK command
09	ACK of shut down PATCH SDK command
0A	ACK of set init parameters SDK command
0B	ACK of set consumer information

0C

ACK of set erase consumer information

9: send consumer information from Flash to SDK

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	0B	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	CS1	CS2

Note:

When Patch receive “read consumer information command”, patch will sent out this command read from FLASH to SDK.

2: SDK→PATCH command**1: send start sampling/shut down command**

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6
Package head		command	data section	Check sum	
FF	FE	00	ON_OFF	CSH	CSL

ON_OFF definition is as follow:

ON_OFF value	Description
0	Shut down command
1	Stop ECG & ACC sampling command
2	Start ECG/ACC sampling command

2: send set patch clock command

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12
Package head		command	data section							Check sum	
FF	FE	01	year	month	date	hour	min	sec	Self	CSH	CSL

Note:

Year/month/date/hour/minute/second are all BCD code format;

Self=0: Do not require PATCH do self-test & do not require PATCH send T-word/battery status word to SDK;

Self=1: Require PATCH do self-test & require PATCH send T-word/battery status word to SDK;

3: Switch patch work mode

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6
Package head		command	data section	Check sum	
FF	FE	02	Mode	CSH	CSL

note:

Mode Value	Mode Description	Bluetooth send	Memory storage
0	ECG raw data & ACC raw data	√	x
1	RR interval & ACC raw data	√	√
2	ECG raw data & RR interval	√	√
3	Only RR interval	√	√

(1): after reset, the default mode value is: 1;

(2): when PATCH receive this command, it will erase all FLASH data automatically first.

4: send FLASH operation command

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6
Package head		command	data section	Check sum	
FF	FE	03	operate	CSH	CSL

note:

Operate=1: upload FLASH data

Operate=2: cancel FLASH upload
Operate=3: erase all FLASH data

6: send init PATCH parameters command

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	05	Value1	Value2	Value3	Value4	Value5	Value6	Value7	Value8	Value9	ValueA	ValueB	ValueC	ValueD	ValueE	ValueF	CS1	CS2

Note:

Value1-VlueF are the init parameters, these parameters are memorized in FLASH, after PATCH reset, these parameters will be re-stored from FLASH to MCU. Now follow parameters can be finalized:

iterm	Description
Value1-ValueF	TBD

7: send OTA command

Byte1	Byte2	Byte3	Byte4	Byte5
Package head		command	Check sum	
FF	FE	06	CSH	CSL

8: set consumer information into flash command

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20
Package head		command	data section															Check sum	
FF	FE	07	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	CS1	CS2

Note:

When patch receive this command, patch will write all of the “data section” into flash as consumer’s information.

Data section definition is according to detailed consumer’s information. Email, phone number or other format.

9: read consumer information from flash

Byte1	Byte2	Byte3	Byte4	Byte5
Package head		command	Check sum	
FF	FE	08	CSH	CSL

Note:

When patch receive this command, patch will read flash and sent out the consumer’s information to SDK

10: erase consumer information from flash

Byte1	Byte2	Byte3	Byte4	Byte5
Package head		command	Check sum	
FF	FE	09	CSH	CSL

Note:

When patch receive this command, patch will wrist “00” to all of the consumer information into flash.