AM6200 Palm Monitor Communication Protocol（V1.0）

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一、Transmission media

BLE 5.0

二、Communication Protocol

Package Head	Package Length	Package Content	CheckSum
0x55 0xAA	N	A1，A2，...，An	SUM

1、Package Head: 0x55 0xAA, 2 fixed bytes；

2、Package Length: Total bytes exclude “Package Head”, “Package Length” and “CheckSum”, N = n + 2, (n is the subscript of An), range:3~255（Package Content length is more than or equal to 1）, 1 byte;

3、Package Content: composed by REAL data, more information is decrypted below，n bytes;

4、CheckSum: SUM = ~（N+A1+A2+...+An）， “~” means NOT (Negation operator)，1 byte;

三、Package Content

1、 PC Host→Module（Down-stream Command）

TYPE	A1（Command ID）	A2（Command Param）

ECG Test	0x01	Param
NIBP Test	0x02	Param
SPO2 Test	0x03	Param
TEMP Test	0x04	Param
ECG Wave Gain	0x07	Param
ECG Filter Mode	0x08	Param
NIBP Patient Mode	0x09	Param
NIBP Preset Cuff Pressure	0x0A	Param
NIBP Static Pressure Calibrate	0x0B	Param
NIBP Static Pressure Bias Setup	0x0C	Param
TEMP1 Bias Setup	0x0D	Param
RESP Wave Gain	0x0F	Param
NIBP Leakage Test	0x10	Param
ECG Wave Output Enable	0xFB	Param
Software Version Inquiry	0xFC	Param
Hardware Version Inquiry	0xFD	Param
SPO2 Wave Output Enable	0xFE	Param
RESP Wave Output Enable	0xFF	Param

ECG Test（0x01）： Enable/Disable ECG params output;

A2（Command Param）：

0x00 Disable ECG Params Output (0x55 0xAA 0x04 0x01 0x00 0xFA)
0x01 Enable ECG Params Output (0x55 0xAA 0x04 0x01 0x01 0xF9)

NIBP Test（0x02）： Enable/Disable NIBP params output;

A2（Command Param）:
0x00 Disable NIBP Params Output (0x55 0xAA 0x04 0x02 0x00 0xF9)
0x01 Enable NIBP Params Output (0x55 0xAA 0x04 0x02 0x01 0xF8)

SPO2 Test（0x03）： Enable/Disable SPO2 params output;

A2（Command Param）:
0x00 Disable SPO2 Params Output (0x55 0xAA 0x04 0x03 0x00 0xF8)
0x01 Enable SPO2 Params Output (0x55 0xAA 0x04 0x03 0x01 0xF7)

TEMP Test（0x04）： Enable/Disable TEMP(Temperature) params output;

A2（Command Param）:
0x00 Disable TEMP Params Output (0x55 0xAA 0x04 0x04 0x00 0xF7)
0x01 Enable TEMP Params Output (0x55 0xAA 0x04 0x04 0x01 0xF6)

ECG Wave Gain（0x07）： Switch ECG wave gains;

A2（Command Param）:
0x01 x0.25 gain
0x02 x0.5 gain
0x03 x1 gain
0x04 x2 gain

e.g. 0x55 0xAA 0x04 0x07 0x03 0xF1 （0x03 x1 gain）

ECG Filter Mode（0x08）： Switch ECG filter mode;

A2（Command Param）：

0x01 operation mode，1 ~ 25Hz (3dB)

0x02 monitor mode，0.5 ~ 75Hz (3dB)

0x03 diagnose mode，0.05 ~ 100Hz (3dB)

e.g. 0x55 0xAA 0x04 0x08 0x02 0xF1 （0x02 monitor mode）

NIBP Patient Mode（0x09）： Switch NIBP patient mode;

A2（Command Param）：

0x01 adult mode（default settings）

0x02 child mode

0x03 neonate mode

e.g. 0x55 0xAA 0x04 0x09 0x01 0xF1 （0x01 adult mode）

NIBP Preset Cuff Pressure（0x0A）： Setup NIBP preset cuff pressure before new test

A2（Command Param）：

Patient mode	Preset cuff pressure range（mmHg）
Adult mode	40~300 mmHg（default is 150）
Child mode	40~210 mmHg（default is 100）
Neonate mode	40~140 mmHg（default is 70）

Notice：

1）、Due to the Preset cuff pressure value may be more than 255（1 byte Maximum value）, so A2 value = Preset cuff pressure / 2，unit：mmHg

For example: If Preset cuff pressure is 280mmHg(adult mode), then the A2 value is 140mmHg(280mmHg/2)

2）、This command should be always send before a new test begin, if not, the module will use the last received value（During Power on use the default value）。

3）、The Preset cuff pressure should be always limit to the rang, if the value out of range, the default value will be used instead.

e.g. 0x55 0xAA 0x04 0x0A 0x4B 0xA6（Preset cuff pressure = 75（0x4B）x 2 = 150 mmHg）

NIBP Static Pressure Calibrate (0x0B)：This command should be Only used by Manufactory!

A2（Command Param）：

0x00	Stop calibrating operation
0x01	Execute NIBP static pressure calibrate

NIBP Static Pressure Bias Setup (0x0C)：This command should be Only used by Manufactory!

A2（Command Param）：

Bias value（Decimal numeric）：-50～+50，is equal to -50mmHg～+50mmHg

Bias value = Module show value – calibrating value

For example: If the calibrating value is 180mmHg, and the module show value is 183mmHg, then the Bias value is +3mmHg.

TEMP1 Bias Setup (0x0D)：This command should be Only used by Manufactory!

A2（Command Param）：

Bias value（Decimal numeric）：-20～+20，is equal to -2.0℃～+2.0℃, precision is 0.1℃

Bias value = Module show value – calibrating value

For example: If the calibrating value is 37.0℃, and the module show value is 36.8℃, then the Bias value is -2.

RESP Wave Gain (0x0F)：Switch RESP(respirate) wave gains;

A2（Command Param）：

0x01	x0.25 gain
0x02	x0.5 gain
0x03	x1 gain
0x04	x2 gain

NIBP Leakage Test (0x10) : This command should be Only used by Manufactory!

A2 (Command Param) :

0x00	Stop NIBP leakage test
Pressure	Execute NIBP leakage test and the Pressure value = Leakage Pressure / 2, unit: mmHg

ECG Wave Output Enable (**0xFB**) : Enable/Disable ECG wave output;

A2 (Command Param) :

0x00	Disable ECG wave output	(0x55 0xAA 0x04 0xFB 0x00 0x00)
0x01	Enable ECG wave output	(0x55 0xAA 0x04 0xFB 0x01 0xFF)

Software Version Inquiry (**0xFC**) : Inquire the software version information;

A2 (Command Param) : reserved (0x55 0xAA 0x04 0xFC 0x00 0xFF)

Hardware Version Inquiry (**0xFD**) : Inquire the hardware version information;

A2 (Command Param) : reserved (0x55 0xAA 0x04 0xFD 0x00 0xFE)

SPO2 Wave Output Enable (**0xFE**) : Enable/Disable SPO2 wave output;

A2 (Command Param) :

0x00	Disable SPO2 wave output	(0x55 0xAA 0x04 0xFE 0x00 0xFD)
0x01	Enable SPO2 wave output	(0x55 0xAA 0x04 0xFE 0x01 0xFC)

RESP Wave Output Enable (**0xFF**) : Enable/Disable RESP wave output;

A2 (Command Param) :

0x00	Disable RESP wave output	(0x55 0xAA 0x04 0xFF 0x00 0xFC)
0x01	Enable RESP wave output	(0x55 0xAA 0x04 0xFF 0x01 0xFB)

2、 Module → PC Host（Up-stream Command）

TYPE	A1	A2	A3	A4	A5	A6	A7	Freq (Pkg/sec)
ECG Wave	0x01	I						250
ECG Param	0x02	ECG Status	HeartRate(H)	RespRate	ST Level	ARR code	HeartRate(L)	1
NIBP Param	0x03	NIBP Status	Cuff Pressure	Sys Pressure	Mean Pressure	Dia Pressure		2
SPO2 Param	0x04	SPO2 Status	Spo2Sat	PulseRate				1
TEMP Param	0x05	TEMP Status	TEMP1 Integral	TEMP1 Decimal				1
Software Version	0xFC	ASCII byte 1	ASCII byte 2	ASCII byte 3	…	ASCII byte n	…	N/A
Hardware Version	0xFD	ASCII byte 1	ASCII byte 2	ASCII byte 3	…	ASCII byte n	…	N/A
SPO2 Wave	0xFE	Wave amplitude						50
RESP Wave	0xFF	Wave amplitude						50

ECG Wave（0x01）：

A2：I is the wave amplitude equal to Lead I, range is 0~250，send Frequency is 250 packages/second

ECG Param（0x02）：

A2: ECG Status：BIT0 is the LSB(least significant bit) and BIT7 is the MSB((most significant bit))

BIT0：	ECG signal intensity	
	0	normal；
	1	weak；
BIT1：	lead status	
	0	normal；
	1	lead off；
BIT3~BIT2：	ECG wave gain	
	00：	x0.25 gain；
	01：	x0.5 gain；
	10：	x1 gain；
	11：	x2 gain；
BIT5~BIT4：	ECG filter mode	
	00：	operation mode；
	01：	monitor mode；
	10：	diagnose mode；
BIT7~BIT6：	reserved	

A3: HeartRate：range is 0~1000，unit：beat/second [**Heart Rate = A3 + (A7 << 8)**]

A4: RespRate：range is 0~250，unit：beat/second

A5: ST Level：signed char，range is -100~+100, equal to –1mV~+1mV，eg：-75 means -0.75mV，+55 means +0.55mV

A6: ARR code (Arrythmia code)：0x00(default) not support for this product.

NIBP Param（0x03）：

A2: NIBP Status：

BIT1~BIT0：NIBP Patient mode

00： adult mode；

01： child mode；

10： neonate mode；

BIT5~BIT2：NIBP Test Result；

0000 Test Finished（normal test）

0001 During test

0010 Test Stopped

0011 Over pressure protected

0100 cuff is too loose or unattached

0101 Test time out

0110 Test error occured

0111 Disturb found during test

1000 test result is out of range

1001 module is initializing

1010 module initiallized

BIT7~BIT6： reserved bits；

A3: Cuff Pressure： real cuff pressure = A3 x 2，unit：mmHg

A4: Sys Pressure：range is 0~250，unit：mmHg

A5: Mean Pressure：range is 0~250，unit：mmHg

A6: Dia Pressure：range is 0~250，unit：mmHg

Notice：

(1)、When module status is initializing, any operation command about NIBP will be ignored by module。

(2)、The Sys/Mean/Dia pressure is meaningful only if NIBP test result is 0000 Test Finished（normal test）.

SPO2 Param（0x04）：

A2: SPO2 Status：

0x00	normal
0x01	sensor is off
0x02	no finger insert
0x03	searching pulse signal
0x04	searching pulse signal is time out

A3: Spo2Sat： SPO2 saturation value, range is 0~100， If SPO2 Status is not 0x00(normal), the value is invalid and always be 127(0x7F)

A4: PulseRate：range is 0~250，If SPO2 Status is not 0x00(normal), the value is invalid and always be 255(0xFF)

TEMP Param（0x05）：

A2: TEMP Status：

0x00	normal
0x01	TEMP1 sensor is off

A3: TEMP1 Integral：TEMP1 Integral part, range is 0~45

A4: TEMP1 Decimal：TEMP1 Decimal part, range is 0~9

Real temperature = TEMP Integral + （TEMP Decimal / 10）

eg：if TEMP Integral = 37，and TEMP Decimal = 5，then the real temperatue = 37.5，unit：℃（centidegree）

Notice：

If TEMP Status is not 0x00(normal)，then the TEMP Integral and TEMP Decimal are both equal to 0 (invalid value)

Software Version（0xFC）：

A2~A8 are displayable ASCII bytes represent for software version

Hardware Version（0xFD）：

A2~A8 are displayable ASCII bytes represent for hardware version

SPO2 Wave（0xFE）：

A2: SPO2 Wave amplitude, that is SPO2 Plethymography value，range is 0~100

RESP Wave（0xFF）：

A2: RESP Wave amplitude，that is RESP Plethymography value，range is 0~250