MODEL NO：HelperBoard T113i

MODEL VERSION： V1.2

SPEC VERSION ： Ver 1.0

ISSUED DATE： 2024-05-28

MANUFACTURE：SZBAIJIE

☐ Preliminary Specification

☑ Final Product Specification

SZBAIJIE Confirmed：

Prepared by	Checked by	Approved by
		陈军

HelperBoard T113i 核心板规格

主要特性

- 主控芯片：全志 T113-i
- CPU：双核 ARM CortexTM-A7，32 KB 指令缓存 + 32 KB 数据缓存 + NEON SIMD + Thumb 2/FPU + 256 KB L2 缓存；RISC-V CPU，32KB 指令缓存 + 32KB 数据缓存
- DSP：HiFi4
- 内存：ddr3 512M
- 贮存：SD3.0/eMMC 5.0，SPI Nor/NAND Flash
- 视频：

  解码：H.265 MP，H.264 BP，H.263，MPEG-1/2/4，JPEG/Xvid/Sorenson Spark up to 1080p@60fps，MJPEG up to 1080p@30fps

  编码：JPEG/MJPEG，可达 1080p60
- 显示：双通道 LVDS 接口，可达 1920×1080 @ 60 Hz，4 通道 MIPI DSI 接口
- 以太网：10/100/1000M EMAC（千兆以太网），带 RMII 和 RGMII 接口
- USB：2 路高速 USB HOST，1 路高速 USB OTG
- 供电：3.3V 电压输入
- 系统：ubuntu+qt5，内核 5.4（linux 不带硬件编、解码，不支持硬件加速）
- 工作温度：-40-85 摄氏度
- 存贮温度：-40-125 摄氏度
- 提供源码(其中 LINUX 不带硬解码)，参考设计底板原理图和 PCB 图（orcad, pads 格式）
- 提供有偿软技术支持、硬件定制服务，不提供免费

主要应用

手持设备
二维码扫描设备
人机交互设备
广告机
医疗监护
医疗心电图机

引脚定义表

（请仔细看这个引脚定义，底板走线竟如此简单！3.3V，请一定注意电平匹配，如果 IO 的输入电压过高，会导致 PMU 保护而不开机）：

编号	引脚名称	引脚备注
1	GND	
2	TVOUT0	CVBS 输出
3	PB0/PWM3/IR-TX/TWI2-SCK/SPI1-WP/DBI-TE/UART0-TX/UART2-TX/SPDIF-OUT/PB-EINT0	GPIO
4	AGND	内部 ADC 相关 GND
5	AVCC	ADC 参考电源
6	FMINR	FM 输入
7	FMINL	
8	LINEINR	LINEIN 输入
9	LINEINL	
10	MIC-DET	麦克风接口
11	MICIN1N	
12	MICIN1P	
13	MICIN2N	
14	MICIN2P	
15	MBIAS	
16	HP-DET	耳机接口
17	HBIAS	
18	HPOUTR	
19	HPOUTL	
20	HPOUTFB	
21	LINEOUTLN	LINEOUT 接口
22	LINEOUTLP	
23	LINEOUTRN	
24	LINEOUTRP	
25	TVIN1	
26	TVIN0	
27	LRADC	
28	GPADC0	通过 ADC，12BIT
29	GPADC1	
30	TP-X1	电阻触摸接口
31	TP-X2	
32	TP-Y1	
33	TP-Y2	
34	USB0-DM	USB 接口
35	USB0-DP	
36	USB1-DM	
37	USB1-DP	

38	GND	
39	GND	
40	REFCLK-OUT	参考时钟输出
41	PF6/SPDIF-OUT/IR-RX/I2S2-MCLK/PWM5/PF-EINT6	SD 卡接口
42	PF0/SDC0-D1/JTAG-MS/R-JTAG-MS/I2S2-DOUT1/I2S2-DIN0/PF-EINT0	
43	PF1/SDC0-D0/JTAG-DI/R-JTAG-DI/I2S2-DOUT0/I2S2-DIN1/PF-EINT1	
44	PF2/SDC0-CLK/UART0-TX/TWI0-SCK/LEDC-DO/SPDIF-IN/PF-EINT2	
45	PF3/SDC0-CMD/JTAG-DO/R-JTAG-DO/I2S2-BCLK/PF-EINT3	
46	PF4/SDC0-D3/UART0-RX/TWI0-SDA/PWM6/IR-TX/PF-EINT4	
47	PF5/SDC0-D2/JTAG-CK/R-JTAG-CK/I2S2-LRCK/PF-EINT5	
48	PG11/I2S1-MCLK/TWI3-SDA/EPHY-25M/CLK-FANOUT1/TCON-TRIG/PG-EINT11	复用 GPIO
49	PG13/I2S1-BCLK/TWI0-SDA/RGMII-CLKIN/RMII-RXER/PWM2/LEDC-DO/UART1-RX/PG-EINT13	
50	PG10/PWM3/TWI3-SCK/RGMII-RXCK/CLK-FANOUT0/IR-RX/PG-EINT10	
51	PG0/SDC1-CLK/UART3-TX/RGMII-RXCTRL/RMII-CRS-DV/PWM7/PG-EINT0	
52	PG1/SDC1-CMD/UART3-RX/RGMII-RXD0/RMII-RXD0/PWM6/PG-EINT1	
53	PG2/SDC1-D0/UART3-RTS/RGMII-RXD1/RMII-RXD1/UART4-TX/PG-EINT2	
54	PG8/UART1-RTS/TWI1-SCK/RGMII-RXD2/UART3-TX/PG-EINT8	
55	PG9/UART1-CTS/TWI1-SDA/RGMII-RXD3/UART3-RX/PG-EINT9	
56	PG3/SDC1-D1/UART3-CTS/RGMII-TXCK/RMII-TXCK/UART4-RX/PG-EINT3	
57	PG12/I2S1-LRCK/TWI0-SCK/RGMII-TXCTRL/RMII-TXEN/CLK-FANOUT2/PWM0/UART1-TX/PG-EINT12	
58	PG4/SDC1-D2/UART5-TX/RGMII-TXD0/RMII-TXD0/PWM5/PG-EINT4	
59	PG5/SDC1-D3/UART5-RX/RGMII-TXD1/RMII-TXD1/PWM4/PG-EINT5	
60	PG6/UART1-TX/TWI2-SCK/RGMII-TXD2/PWM1/PG-EINT6	
61	PG7/UART1-RX/TWI2-SDA/RGMII-TXD3/SPDIF-IN/PG-EINT7	
62	PG15/I2S1-DOUT0/TWI2-SDA/MDIO/I2S1-DIN1/SPI0-HOLD/UART1-CTS/PG-EINT15	
63	PG14/I2S1-DIN0/TWI2-SCK/MDC/I2S1-DOUT1/SPI0-WP/UART1-RTS/PG-EINT14	电源地
64	PG16/IR-RX/TCON-TRIG/PWM5/CLK-FANOUT2/SPDIF-IN/LEDC-DO/PG-EINT16	休眠仍有效 GPIO(1.8V)
65	VCC-3V3	3.3V 电源输入，不小余 1A
66	VCC-3V3	
67	GND	
68	PG17/UART2-TX/TWI3-SCK/PWM7/CLK-FANOUT0/IR-TX/UART0-TX/PG-EINT17	
69	PG18/UART2-RX/TWI3-SDA/PWM6/CLK-FANOUT1/SPDIF-OUT/UART0-RX/PG-EINT18	GPIO
70	PE17/TWI3-SDA/D-JTAG-CK/IR-TX/I2S0-MCLK/DMIC-CLK/PE-EINT17	GPIO
71	PE16/TWI3-SCK/D-JTAG-DO/PWM7/I2S0-BCLK/DMIC-DATA0/PE-EINT16	
72	PE15/TWI1-SDA/D-JTAG-DI/PWM6/I2S0-LRCK/DMIC-DATA1/RGMII-RXCK/PE-EINT15	
73	PE14/TWI1-SCK/D-JTAG-MS/I2S0-DOUT1/I2S0-DIN0/DMIC-DATA2/RGMII-RXD3/PE-EINT14	
74	PE8/NCSI0-D4/UART1-RTS/PWM2/UART3-TX/JTAG-MS/MDC/PE-EINT8	
75	PE9/NCSI0-D5/UART1-CTS/PWM3/UART3-RX/JTAG-DI/MDIO/PE-EINT9	
76	PE6/NCSI0-D2/UART5-TX/TWI3-SCK/SPDIF-IN/D-JTAG-DO/R-JTAG-DO/RGMII-TXCTRL/RMII-TXEN/PE-EINT6	

77	PE7/NCSI0-D3/UART5-RX/TWI3-SDA/SPDIF-OUT/D-JTAG-CK/R-JTAG-CK/RGMII-CLKIN/RMII-RXER/PE-EINT7	
78	PE4/NCSI0-D0/UART4-TX/TWI2-SCK/CLK-FANOUT2/D-JTAG-MS/R-JTAG-MS/RGMII-TXD0/RMII-TXD0/PE-EINT4	
79	PE5/NCSI0-D1/UART4-RX/TWI2-SDA/LEDC-DO/D-JTAG-DI/R-JTAG-DI/RGMII-TXD1/RMII-TXD1/PE-EINT5	
80	PE2/NCSI0-PCLK/UART2-TX/TWI0-SCK/CLK-FANOUT0/UART0-TX/RGMII-RXD1/RMII-RXD1/PE-EINT2	
81	PE3/NCSI0-MCLK/UART2-RX/TWI0-SDA/CLK-FANOUT1/UART0-RX/RGMII-TXCK/RMII-TXCK/PE-EINT3	
82	PC0/UART2-TX/TWI2-SCK/LEDC-DO/PC-EINT0	
83	PC1/UART2-RX/TWI2-SDA/PC-EINT1	
84	VCC-RTC	RTC 供电，1.62-1.98V
85	FEL	烧写专用键
86	RESET	复位
87	PB8/DMIC-DATA3/PWM5/TWI2-SCK/SPI1-HOLD/DBI-DCX/DBI-WRX/UART0-TX/UART1-TX/PB-EINT8	GPIO
88	PB9/DMIC-DATA2/PWM6/TWI2-SDA/SPI1-MISO/DBI-SDI/DBI-TE/DBI-DCX/UART0-RX/UART1-RX/PB-EINT9	
89	PB10/DMIC-DATA1/PWM7/TWI0-SCK/SPI1-MOSI/DBI-SDO/CLK-FANOUT0/UART1-RTS/PB-EINT10	
90	PB11/DMIC-DATA0/PWM2/TWI0-SDA/SPI1-CLK/DBI-SCLK/CLK-FANOUT1/UART1-CTS/PB-EINT11	
91	PB12/DMIC-CLK/PWM0/SPDIF-IN/SPI1-CS/DBI-CSX/CLK-FANOUT2/IR-RX/PB-EINT12	
92	PE10/NCSI0-D6/UART1-TX/PWM4/IR-RX/JTAG-DO/EPHY-25M/PE-EINT10	
93	PE11/NCSI0-D7/UART1-RX/I2S0-DOUT3/I2S0-DIN3/JTAG-CK/RGMII-TXD2/PE-EINT11	
94	PE0/NCSI0-HSYNC/UART2-RTS/TWI1-SCK/LCD0-HSYNC/RGMII-RXCTRL/RMII-CRS-DV/PE-EINT0	
95	PE1/NCSI0-VSYNC/UART2-CTS/TWI1-SDA/LCD0-VSYNC/RGMII-RXD0/RMII-RXD0/PE-EINT1	
96	PE12/TWI2-SCK/NCSI0-FIELD/I2S0-DOUT2/I2S0-DIN2/RGMII-TXD3/PE-EINT12	
97	PE13/TWI2-SDA/PWM5/I2S0-DOUT0/I2S0-DIN1/DMIC-DATA3/RGMII-RXD2/PE-EINT13	
98	PD22/SPDIF-OUT/IR-RX/UART1-RX/PWM7/PD-EINT22	
99	PB2/LCD0-D0/I2S2-DOUT2/TWI0-SDA/I2S2-DIN2/LCD0-D18/UART4-TX/CAN0-TX0/PB-EINT2	
100	PB3/LCD0-D1/I2S2-DOUT1/TWI0-SCK/I2S2-DIN0/LCD0-D19/UART4-RX/CAN0-RX0/PB-EINT3	
101	PB4/LCD0-D8/I2S2-DOUT0/TWI1-SCK/I2S2-DIN1/LCD0-D20/UART5-TX/CAN1-TX0/PB-EINT4	
102	GND	
103	PB5/LCD0-D9/I2S2-BCLK/TWI1-SDA/PWM0/LCD0-D21/UART5-RX/CAN1-RX0/PB-EINT5	GPIO
104	PB6/LCD0-D16/I2S2-LRCK/TWI3-SCK/PWM1/LCD0-D22/UART3-TX/CPUBIST0/PB-EINT6	
105	PB7/LCD0-D17/I2S2-MCLK/TWI3-SDA/IR-RX/LCD0-D23/UART3-RX/CPUBIST1/PB-EINT7	
106	PD0/LCD0-D2/LVDS0-V0P/DSI-D0P/TWI0-SCK/PD-EINT0	LCD/GPIO

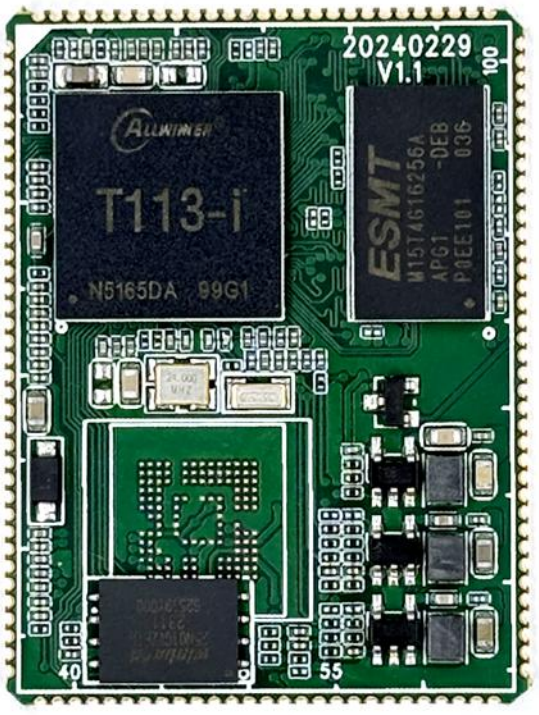
107	PD1/LCD0-D3/LVDS0-V0N/DSI-D0N/UART2-TX/PD-EINT1	
108	PD2/LCD0-D4/LVDS0-V1P/DSI-D1P/UART2-RX/PD-EINT2	
109	PD3/LCD0-D5/LVDS0-V1N/DSI-D1N/UART2-RTS/PD-EINT3	
110	PD4/LCD0-D6/LVDS0-V2P/DSI-CKP/UART2-CTS/PD-EINT4	
111	PD5/LCD0-D7/LVDS0-V2N/DSI-CKN/UART5-TX/PD-EINT5	
112	PD6/LCD0-D10/LVDS0-CKP/DSI-D2P/UART5-RX/PD-EINT6	
113	PD7/LCD0-D11/LVDS0-CKN/DSI-D2N/UART4-TX/PD-EINT7	
114	PD8/LCD0-D12/LVDS0-V3P/DSI-D3P/UART4-RX/PD-EINT8	
115	PD9/LCD0-D13/LVDS0-V3N/DSI-D3N/PWM6/PD-EINT9	
116	PD10/LCD0-D14/LVDS1-V0P/SPI1-CS/DBI-CSX/UART3-TX/PD-EINT10	
117	PD11/LCD0-D15/LVDS1-V0N/SPI1-CLK/DBI-SCLK/UART3-RX/PD-EINT11	
118	PD12/LCD0-D18/LVDS1-V1P/SPI1-MOSI/DBI-SDO/TWI0-SDA/PD-EINT12	
119	PD13/LCD0-D19/LVDS1-V1N/SPI1-MISO/DBI-SDI/DBI-TE/DBI-DCX/UART3-RTS/PD-EINT13	
120	PD14/LCD0-D20/LVDS1-V2P/SPI1-HOLD/DBI-DCX/DBI-WRX/UART3-CTS/PD-EINT14	
121	PD15/LCD0-D21/LVDS1-V2N/SPI1-WP/DBI-TE/IR-RX/PD-EINT15	
122	PD16/LCD0-D22/LVDS1-CKP/DMIC-DATA3/PWM0/PD-EINT16	
123	PD17/LCD0-D23/LVDS1-CKN/DMIC-DATA2/PWM1/PD-EINT17	
124	PD18/LCD0-CLK/LVDS1-V3P/DMIC-DATA1/PWM2/PD-EINT18	
125	PD19/LCD0-DE/LVDS1-V3N/DMIC-DATA0/PWM3/PD-EINT19	
126	PD20/LCD0-HSYNC/TWI2-SCK/DMIC-CLK/PWM4/PD-EINT20	
127	PD21/LCD0-VSYNC/TWI2-SDA/UART1-TX/PWM5/PD-EINT21	
128	PB1/PWM4/I2S2-DOUT3/TWI2-SDA/I2S2-DIN3/UART0-RX/UART2-RX/IR-RX/PB-EINT1	GPIO

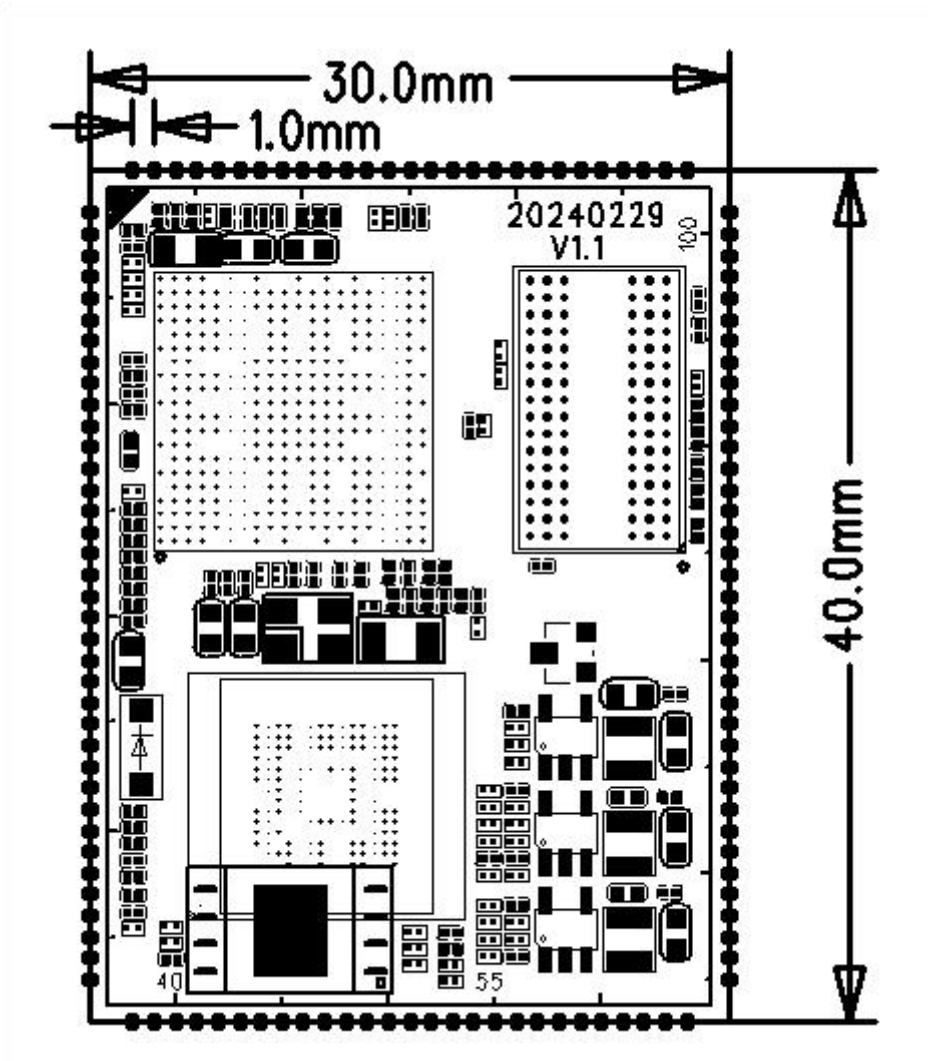
外观及尺寸及丝印说明

（30x40x2.7(+/-0.2mm)，128PIN，引脚间距 1.0mm,邮票孔结构，背面无器件）

512M+8G，EMMC 版本

512M+256M，NAND 版本





注：批量企业用户可免费定制底板。

底板设计建议

1、烧程序是通过 usb-otg，这个口一定要保留，另外还需要保留 FEL 键(上电时接地进入烧写)，最好加上 reset 键，这样烧写更方便；
2、所有差分信号要走差分线，尽量满足差分阻抗 90 欧姆，包括：usb、lvds、mipi、hdmi 等；
3、给核心板供电的走线宽度最好大于 1.5mm，核心板的接地线也要足够粗；
4、麦克风走线要包地；
5、为了保证焊接质量，核心板位置的焊盘，出钢网时，要比核心板焊盘大 20mil 左右，可以参考我们的开发板 PCB 的 paste 层；
6、核心板的 3.3V 输入电流不能低于 1000mA，同时在底板上，3.3V 这个网络靠近核心板的位置增加一个 100uF~220uF 的电容；
7、核心板过炉前建议按 120 度烘烤 4 小时，烘烤后，12 小时内贴片完成，如果没用完的，要真空、干燥保存。

核心板回流焊温度曲线

注：底板过炉时，建议比这个低 3 度左右

PROFILE CHECK

Customer Name: 百杰 Pcb Name: HelperA523C_V1.2

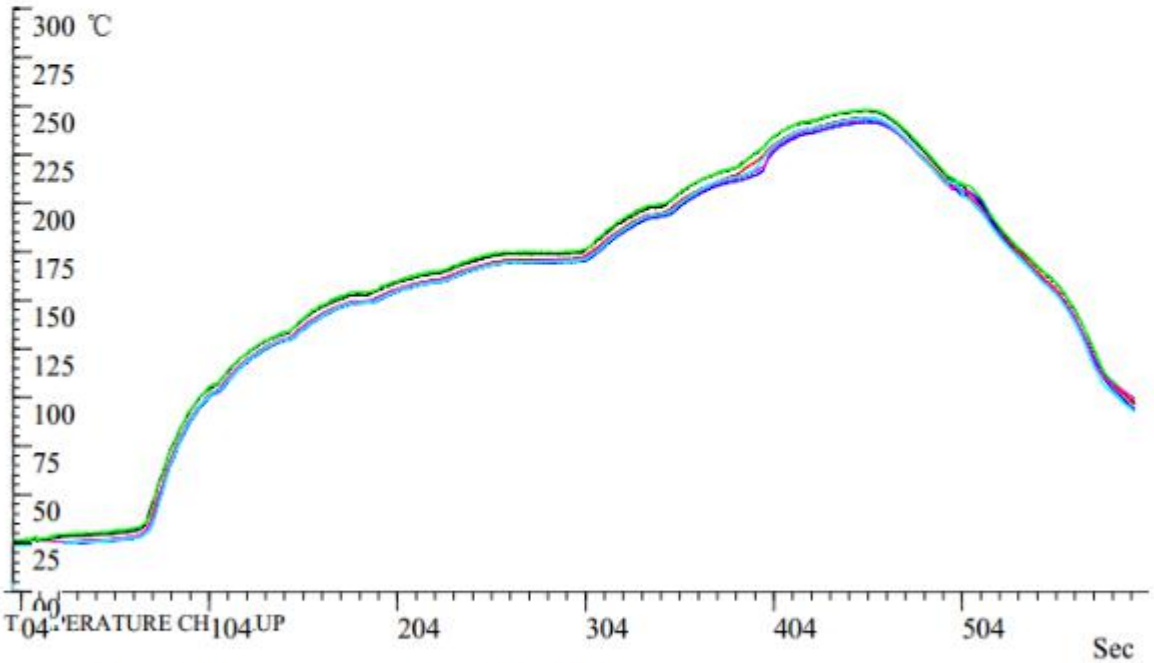
Oven Type: TEA-800 Speed: 55

Date Time: 2024.01.27

Zone Setting Temperature

	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Z10	Z11	Z12	Z13	Z14
UP:	130.0	150.0	170.0	195.0	210.0	235.0	260.0	260.0						
DOWN:	130.0	150.0	170.0	195.0	210.0	235.0	260.0	260.0						

Analysis	Between:45-150℃		Between:150-180℃		Between:150-200℃		Over 220℃	Between:220-60℃	
	Time(Sec)	Slope(℃ / Sec)	Time(Sec)	Slope(℃ / Sec)	Time(Sec)	Slope(℃ / Sec)	Time(Sec)	Time(Sec)	Slope(℃ / Sec)
#1:(BGA)	97.9	1.07	139.9	0.21	178.9	0.28	103.5	0.0	0.00
#2:(DDR)	106.3	0.99	133.0	0.23	173.0	0.29	94.7	0.0	0.00
#3:(FLASH)	94.5	1.11	141.2	0.21	179.2	0.28	104.1	0.0	0.00
#4:(FPC)	116.9	0.90	124.8	0.24	164.8	0.30	86.5	0.0	0.00
#5:(USB)	111.4	0.94	129.1	0.23	168.1	0.30	86.5	0.0	0.00
#6:(TF)	114.7	0.92	125.5	0.24	164.5	0.30	90.3	0.0	0.00



	Peak	At sec	Point1	Point2	SLOPE	OVER 183℃		
LINE1	247.7	456.2				214.434	T1 Time: 0	sec
LINE2	244	454.4				208.164		
LINE3	248.1	456.4				216.315	T2 Time: 0	sec
LINE4	241.8	459.				204.402		
LINE5	243	457.2				205.029	/T1-T2/:	sec
LINE6	243.9	458.5				203.775		