EWM103-WF7621A User Manual

MT7621A Gigabit-level routing gateway module



Chengdu Ebyte Electronic Technology Co.,Ltd.

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1 Product Overview

1.1 Product Introduction

a Gigabit routing gateway module developed by Chengdu Ebyte Electronic Technology Co., Ltd. with MediaTek MT76 21A chip as the core. The module integrates dual-core MIPS-1004Kc (880MHz), HNAT/HQoS/Samba/VPN accelerator and 5-port GbE switch, supports OpenWrt operating system and custom development, has rich interfaces and powerful processors, can be widely used in smart devices or cloud service applications, and can be freely developed for secondary development.

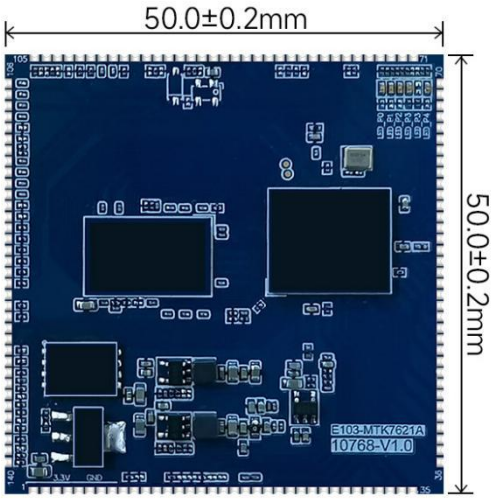


Figure 1: EWM103-WF7621A

1.2 Features

- Embedded MIPS1004Kc (880 MHz, dual-core)
  - 32 KB I-Cache and 32 KB D- Cache per core
  - 256kb L2 cache (shared by two cores)
  - SMP Function
  - Configurable single processor operation
- Gigabit Switch
  - 5 ports, running at full line speed
  - 5-port 10/100/1000Mbps MDI transceiver
- Support RGMII/MII interface
- 16-bit DDR2/3 , capacity up to 256/512 Mbytes
- SPI(2 chip select), NAND Flash(SLC), SDXC, eMMC(4 bits)
- USB3.0 interface × 1 + USB2.0 interface × 1 or USB2.0 interface × 2 (both are host interfaces)
- PCIe host interface × 3
- I2C , UART Lite × 3 , JTAG , MDC , MDIO , GPIO
- Support Internet voice calls (I2S, PCM)
- Audio interface (SPDIF-Tx, I2S, PCM)

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- Provides excellent Samba performance via USB2.0/USB 3.0/SD-XC
- HW Storage Accelerator
- HW NAT
  - Wired transmission rate up to 2Gbps
  - L2 Bridge
  - IPv4 routing , NAT, NAPT
  - IPv6 routing , DS-Lite, 6RD, 6to4
- HW QoS
  - 16 hardware queues to guarantee the minimum/maximum bandwidth for each flow .
  - Can work seamlessly with HW NAT engine .
  - Wired transmission rate can reach 2Gbps.
- HW Encryption
- IPSec throughput can reach 400~500mbps
- Green
  - Smart clock adjustment (dedicated)
  - DDR2/3: ODT off, self-refresh mode
- Firmware: OpenWRT
- RGMII iNIC Driver: Linux 2.4/2.6

1.3 Application Scenarios

- Wifi video transmission;
- WiFi audio transmission;
- router;
- Wifi repeater;
- Serial port forwarding and other general-purpose modules for smart homes;
- Cloud Service Application
- IoT Gateway ;

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2 Specifications

2.1 Basic parameters

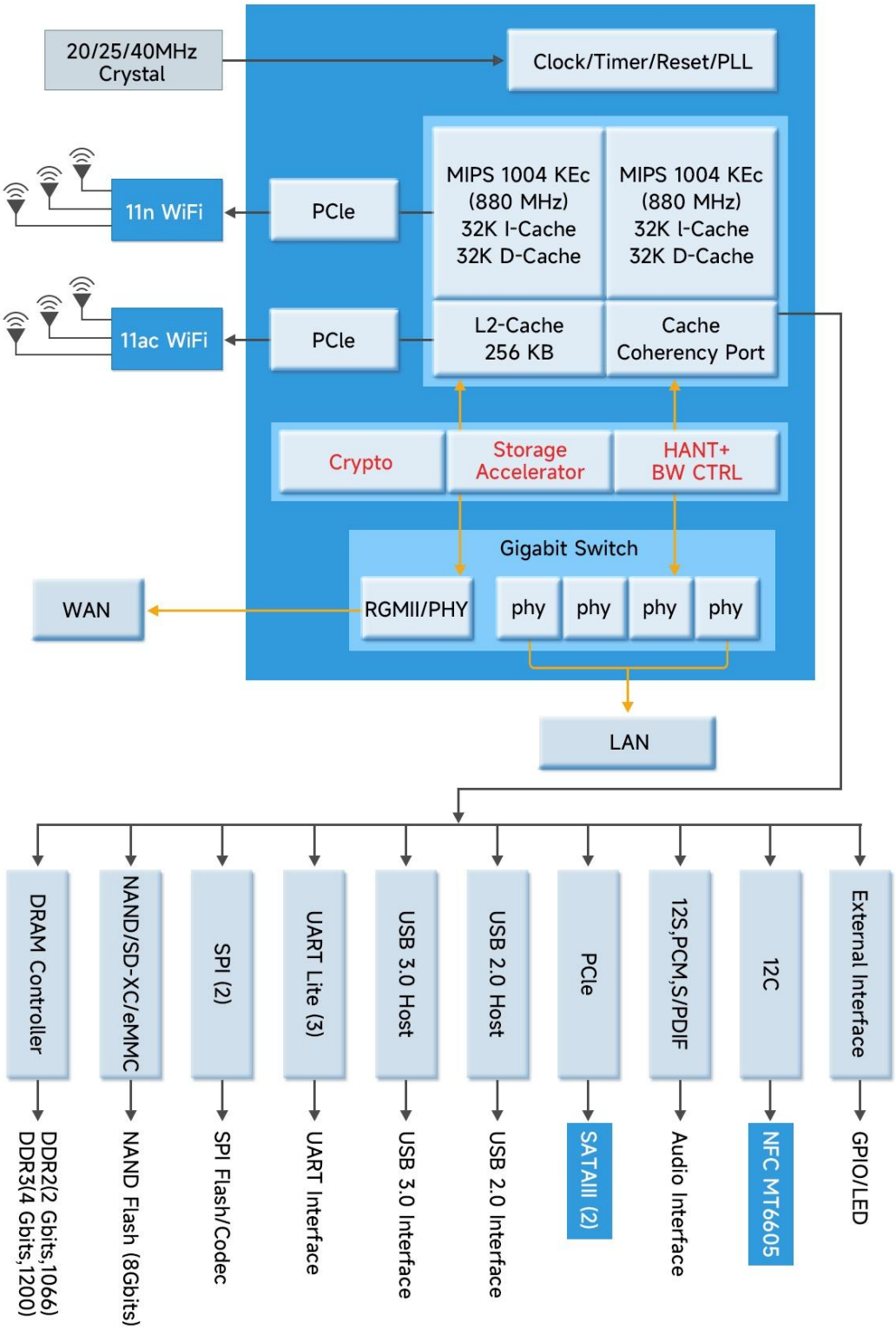
Electrical parameters		unit	Parameter Details	Remark
Operating voltage		V	3.3V	Exceeding 3.5 V may permanently burn the module
Communication level		V	3.3	Using 5V TTL may burn out
Supply current requirement		mA	5 00	-
temperature	Operating temperature	℃	-20 ～ + 60	-
	Storage temperature		-40 ～ + 8 5	-
humidity	use	%RH	10 ～ 95（non-condensing）	-
	storage		5～ 95 (no condensation)	-

2.2 Hardware Parameters

Hardware Parameters	model	Remark
chip	MT7621A	
Flash	32MB	Customizable 16MB/8MB
Memory	DDR3 256MB	Customizable DDR 3 128M/64M/32MB
Kernel	MIPS1004Kc	880 MHz, dual core
Packaging	Patches	-
Ethernet interface	5 10M/100 /1000M adaptive	The factory default firmware supports 1 WAN and 4 LAN interfaces .
UART Lite	3-Way	-
PCIe	3 -Way	-
USB	USB3.0×1+USB2.0×1 or USB2.0×2	Both are host interfaces
size	50*50*3mm	The error size is ±0.2mm
weight	11.1g	The error is ±0.2g

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2.3 Functional Block Diagram



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3 Mechanical Dimensions and Pin Definition

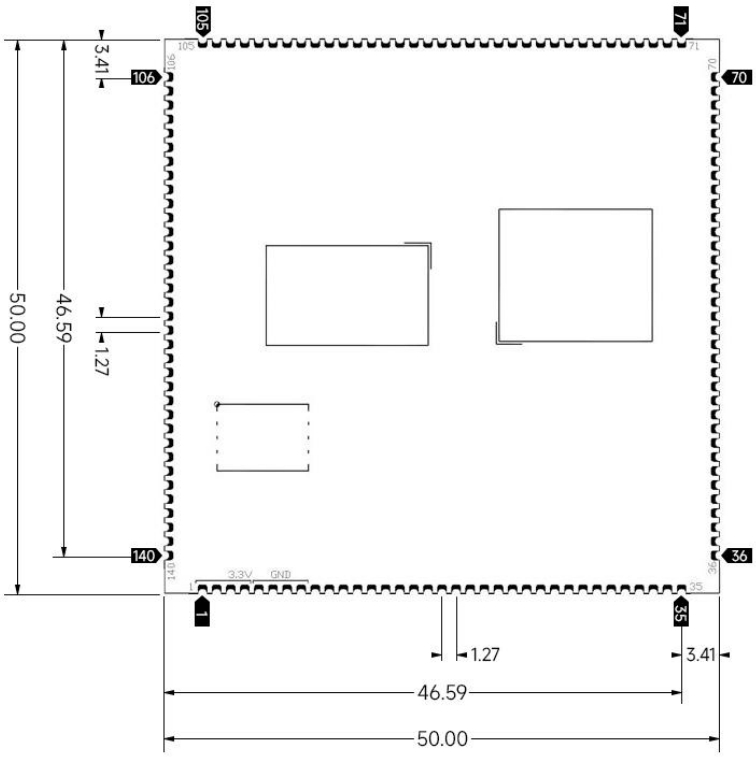


Figure 2 EWM103-WF7621A

Pin definition:

Serial number	Pin Name	Pin Function Description	Default functionality
1	3.3VD	power supply	-
2	3.3VD	power supply	-
3	3.3VD	power supply	-
4	3.3VD	power supply	-
5	GND	land	-
6	GND	land	-
7	GND	land	-
8	GND	land	-
9	CTS3_N	UART Clear To Send	-
10	TXD2	UART TX Data	-
11	RXD2	UART RX Data	-
12	TXD3	UART TX Data	-
13	RXD3	UART RX Data	-
14	RTS2_N	UART Request To Send	-
15	CTS2_N	UART Clear To Send	-
16	RTS3_N	UART Request To Send	-

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17	USB_DP_1P	USB Port1 data pin Data+ (USB2.0)	-
18	USB_DM_1P	USB Port1 data pin Data- (USB2.0)	-
19	GND	land	-
20	SSUSB_TXP	USB Port0 SS data pin TX+ (USB3.0)	-
twenty one	SSUSB_TXN	USB Port0 SS data pin TX- (USB3.0)	-
twenty two	SSUSB_RXP	USB Port0 SS data pin RX+ (USB3.0)	-
twenty three	SSUSB_RXN	USB Port0 SS data pin RX+-(USB3.0)	-
twenty four	GND	land	-
25	USB_DP_P0	SB Port0 HS/FS/LS data pin Data+ (USB3.0)	-
26	USB_DM_P0	USB Port0 HS/FS/LS data pin Data- (USB3.0)	-
27	GND	land	-
28	ESW_TXVP_A_P0	Port #0 MDI Transceivers	-
29	ESW_TXVN_A_P0	Port #0 MDI Transceivers	-
30	ESW_TXVP_B_P0	Port #0 MDI Transceivers	-
31	ESW_TXVN_B_P0	Port #0 MDI Transceivers	-
32	ESW_TXVP_C_P0	Port #0 MDI Transceivers	-
33	ESW_TXVN_C_P0	Port #0 MDI Transceivers	-
34	ESW_TXVP_D_P0	Port #0 MDI Transceivers	-
35	ESW_TXVN_D_P0	Port #0 MDI Transceivers	-
36	ESW_TXVP_A_P1	Port #1 MDI Transceivers	-
37	ESW_TXVN_A_P1	Port #1 MDI Transceivers	-
38	ESW_TXVP_B_P1	Port #1 MDI Transceivers	-
39	ESW_TXVN_B_P1	Port #1 MDI Transceivers	-
40	ESW_TXVP_C_P1	Port #1 MDI Transceivers	-
41	ESW_TXVN_C_P1	Port #1 MDI Transceivers	-
42	ESW_TXVP_D_P1	Port #1 MDI Transceivers	-
43	ESW_TXVN_D_P1	Port #1 MDI Transceivers	-
44	GND	land	-
45	ESW_TXVP_A_P2	Port #2 MDI Transceivers	-
46	ESW_TXVN_A_P2	Port #2 MDI Transceivers	-
47	ESW_TXVP_B_P2	Port #2 MDI Transceivers	-
48	ESW_TXVN_B_P2	Port #2 MDI Transceivers	-
49	ESW_TXVP_C_P2	Port #2 MDI Transceivers	-
50	ESW_TXVN_C_P2	Port #2 MDI Transceivers	-
51	ESW_TXVP_D_P2	Port #2 MDI Transceivers	-
52	ESW_TXVN_D_P2	Port #2 MDI Transceivers	-
53	GND	land	-

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54	ESW_TXVP_A_P3	Port #3 MDI Transceivers	-
55	ESW_TXVN_A_P3	Port #3 MDI Transceivers	-
56	ESW_TXVP_B_P3	Port #3 MDI Transceivers	-
57	ESW_TXVN_B_P3	Port #3 MDI Transceivers	-
58	ESW_TXVP_C_P3	Port #3 MDI Transceivers	-
59	ESW_TXVN_C_P3	Port #3 MDI Transceivers	-
60	ESW_TXVP_D_P3	Port #3 MDI Transceivers	-
61	ESW_TXVN_D_P3	Port #3 MDI Transceivers	-
62	GND	land	-
63	ESW_TXVP_A_P4	Port #4 MDI Transceivers	-
64	ESW_TXVN_A_P4	Port #4 MDI Transceivers	-
65	ESW_TXVP_B_P4	Port #4 MDI Transceivers	-
66	ESW_TXVN_B_P4	Port #4 MDI Transceivers	-
67	ESW_TXVP_C_P4	Port #4 MDI Transceivers	-
68	ESW_TXVN_C_P4	Port #4 MDI Transceivers	-
69	ESW_TXVP_D_P4	Port #4 MDI Transceivers	-
70	ESW_TXVN_D_P4	Port #4 MDI Transceivers	-
71	ESW_P4_LED_0	Port #4 PHY LED indicators	-
72	ESW_P3_LED_0	Port #3 PHY LED indicators	-
73	ESW_P2_LED_0	Port #2 PHY LED indicators	-
74	ESW_P1_LED_0	Port #1PHY LED indicators	-
75	ESW_P0_LED_0	Port #0 PHY LED indicators	-
76	ESW_DTEST	Digital test	-
77	GE2_TXD3	RGMII2 Tx Data bit #0	-
78	GE2_TXD2	RGMII2 Tx Data bit #2	-
79	GE2_TXD1	RGMII2 Tx Data bit #1	-
80	GE2_TXD0	RGMII2 Tx Data bit #0	-
81	ESW_DBG_B	-	-
82	MDIO	PHY Data Management	Note: When RGMII/MII is connected to external PHY, this pin is MDIO. Otherwise it is NC.
83	MDC	PHY Clock Management	Note: When RGMII/MII is connected to external PHY, this pin is MDC. Otherwise it is NC.
84	GE2_TXEN	RGMII2 Tx Data Valid	-
85	GE2_TXCLK	RGMII2 Tx Clock	-
86	GE2_RXD3	RGMII2 Rx Data bit #3	-
87	GE2_RXD2	RGMII2 Rx Data bit #2	-
88	GE2_RXD1	RGMII2 Rx Data bit #1	-
89	GE2_RXD0	RGMII2 Rx Data bit #0	-
90	GE2_RXDV	RGMII2 Rx Data Valid	-

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91	GE2_RXCLK	RGMII2 Rx Clock	-
92	GND	land	-
93	RXD1	UART TX Data	-
94	TXD1	UART RX Data	-
95	PORST_N	Power-On Reset	-
96	I2C_SCLK	I2C Clock	-
97	I2C_SD	I2C Data	-
98	PCIE_TXN2	PCIE2_TX -	-
99	PCIE_TXP2	PCIE2_TX+	-
100	PCIE_RXN2	PCIE2_RX -	-
101	PCIE_RXP2	PCIE2_RX+	-
102	PCIE_CKN2	PCIE2_CLK -	-
103	PCIE_CKP2	PCIE2_CLK+	-
104	GPIO0	-	-
105	PERST_N	PCIE	-
106	PCIE_TXP1	PCIE1_TX+	-
107	PCIE_TXN1	PCIE1_TX -	-
108	PCIE_RXP1	PCIE1_RX+	-
109	PCIE_RXN1	PCIE1_RX -	-
110	PCIE_CKN1	PCIE1_CLK -	-
111	PCIE_CKP1	PCIE1_CLK+	-
112	WDT_RST_N	NC	-
113	PCIE_RXP0	PCIE0_RX+	-
114	PCIE_RXN0	PCIE0_RX -	-
115	PCIE_TXN0	PCIE0_TX -	-
116	PCIE_TXP0	PCIE0_TX+	-
117	PCIE_CKP0	PCIE0_CLK+	-
118	PCIE_CKN0	PCIE0_CLK -	-
119	GND	land	-
120	JTMS	JTAG Mode Select	-
121	JTDO	JTAG Data Output	-
122	JTDI	JTAG Data Input	-
123	JTRST_N	JTAG Target Reset	-
124	JTCLK	JTAG Clock	-
125	GND	land	-
126	ND_D7	NAND Flash Data7	-
127	ND_D6	NAND Flash Data6	-
128	ND_D5	NAND Flash Data5	-
129	ND_D4	NAND Flash Data4	-
130	ND_D3	NAND Flash Data3	-
131	ND_D2	NAND Flash Data2	-
132	ND_D1	NAND Flash Data1	-
133	ND_D0	NAND Flash Data0	-

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134	ND_RB_N	NAND Flash Ready/Busy	-
135	ND_RE_N	NAND Flash Read Enable	-
136	ND_CS_N	NAND Flash Chip Select	-
137	ND_CLE	NAND Flash Command Latch Enable	-
138	ND_ALE	NAND Flash ALE Latch Enable	-
139	ND_WE_N	NAND Flash Write Enable	-
140	ND_WP	NAND Flash Write Protect	-

5 Frequently Asked Questions

5.1 The transmission distance is not ideal

- When there is a straight-line communication obstacle, the communication distance will be attenuated accordingly ;
- Temperature, humidity, and co-channel interference can increase the communication packet loss rate ;
- The ground absorbs and reflects radio waves, so the test results are poor when close to the ground ;
- Seawater has a strong ability to absorb radio waves, so the test effect at the seaside is poor ;
- If there are metal objects near the antenna, or the antenna is placed in a metal shell, the signal attenuation will be very serious ;
- The power register is set incorrectly, or the air rate is set too high (the higher the air rate, the closer the distance) ;
- The power supply voltage is lower than the recommended value at room temperature. The lower the voltage, the lower the power output .
- This causes poor matching between the antenna and the module or quality issues with the antenna itself.

5.2 Modules are vulnerable to damage

- Please check the power supply to ensure that it is within the recommended power supply voltage. If it exceeds the maximum value, the module will be permanently damaged .
- Please check the stability of the power supply. The voltage should not fluctuate greatly or frequently .
- Please ensure anti-static operation during installation and use, as high-frequency components are sensitive to static electricity ;
- Please ensure that the humidity is not too high during installation and use, as some components are humidity sensitive devices ;
- If there is no special requirement, it is not recommended to use it at too high or too low temperature.

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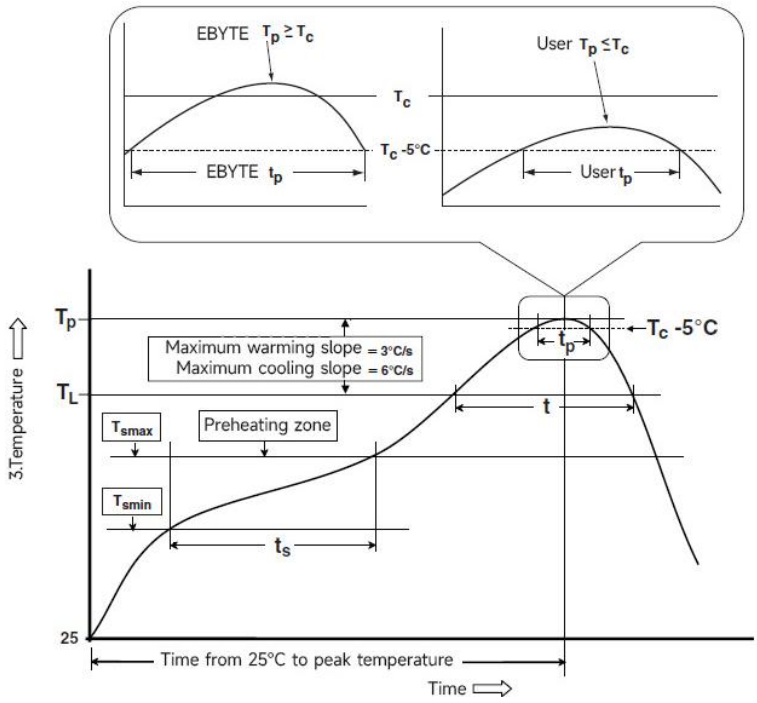
6 Welding Operation Instructions

6.1 Reflow temperature

Reflow profile characteristics		Leaded process assembly	Lead-free assembly
Preheating /keeping	Minimum temperature (Tsmin)	100℃	150℃
	Maximum temperature (T smax)	150℃	200℃
	Time (T smin ~T smin)	60-120 seconds	60-120 seconds
Heating slope (T L ~T p)		3℃/sec, max.	3℃/sec, max.
Liquidus temperature (TL)		183℃	217℃
T L above the holding time		60~ 90 seconds	60~ 90 seconds
Package peak temperature Tp		Users must not exceed the temperature stated on the product's "Moisture Sensitivity" label.	Users must not exceed the temperature stated on the product's "Moisture Sensitivity" label.
p) within 5°C of the specified classification temperature (Tc) is shown in the figure below.		20 seconds	30 seconds
Cooling slope (T p ~T L)		6℃/sec, max.	6℃/sec, max.
Time from room temperature to peak temperature		6 minutes, longest	8 minutes, longest
※The peak temperature (Tp) tolerance of the temperature curve is defined as the upper limit of the user			

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6.2 Reflow Oven Curve



Revision History

Version	Revision Date	Revision Notes	Maintainer
1.0	2024-12-18	Initial release	Hao
1.1	2026-4-20	Content Correction	Hao
1.2	2026-5-9	Content Correction	Hao

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