

承认书

FOR APPROVAL

客户名称: _____

Customer: _____

机种(Model): **LM-Q21-3031/3021**

客户料号(Part No.): _____

客户承认样品签字 (Customer Approval Signature)

日期(Date): _____

合格 PASSED		拒收 REJECTED	
备注 Remark			

Specification Version: _____

Hardware Version: _____

SW/FW Version: _____

备注(Remark): _____

承认 Prepared By	检验/审核 Checked By	审核/核准 Approved By

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1. Introduction

The LM-Q21-3031/3021 is a Bluetooth single-mode module with a built-in PCB antenna. This is a compact and cost effective module capable of embedding into wired/wireless mono/stereo speaker applications.

The LM-Q21-3031/3021 is built on top of the Qualcomm chip QCC3031/3021. The only difference between the two is that the QCC3031 supports Qualcomm® aptX™ audio (while the QCC3021 does not). QCC3031/3021 is based on high performance Programmable Bluetooth® stereo Audio SoC, fully qualified single-chip dual-mode Bluetooth v5.1 system, tri-core processor architecture, low power consumption, extended battery life.

Qualcomm® QCC302x/QCC303x/QCC304x/QCC305x SoC series, the series including specialized design options, in order to satisfy consumers' robust and functional demand increasingly rich real wireless speaker, can support used throughout the day.

2. Features

QCC3021/3031 includes high-performance, analog, and digital audio codecs, Class-AB speaker driver, advanced power management, Li-ion battery charger, light-emitting diode (LED) drivers, and flexible interfaces including I²S, I²C, UART), and GPIOs.

- A small and cost effective Bluetooth® System.
- Qualified to Bluetooth® Specification V5.1 .
- 120 MHz Qualcomm® Kalimba™ audio DSP, 32 MHz Developer Processor for applications.
- Flexible QSPI flash programmable platform, Firmware Processor for system
- High-performance 24-bit stereo audio interface, Digital and analog microphone interfaces.
- 1-mic Qualcomm® cVc™, speaker noise reduction and echo cancellation technology
- Flexible PIO controller and LED pins with PWM support
- Audio codecs support for SBC, AAC, QCC3031 additionally for aptX and aptX HD.
- Serial Interfaces: UART, Bit Serializer (I²C/SPI), USB 2.0.
- Integrated PMU: Dual SMPS for system/digital circuits, Integrated Li-ion battery charger.

3. Applications

An application-dedicated Developer Processor and a system Firmware Processor run code from an external quad serial peripheral interface (QSPI) flash. Both processors have tightly coupled memory (TCM) and an on-chip cache for performance while executing from external flash memory. The Audio subsystem contains a programmable Kalimba core running Qualcomm® Kymera™ system DSP architecture framework, with audio processing capabilities provided from ROM which are configurable.

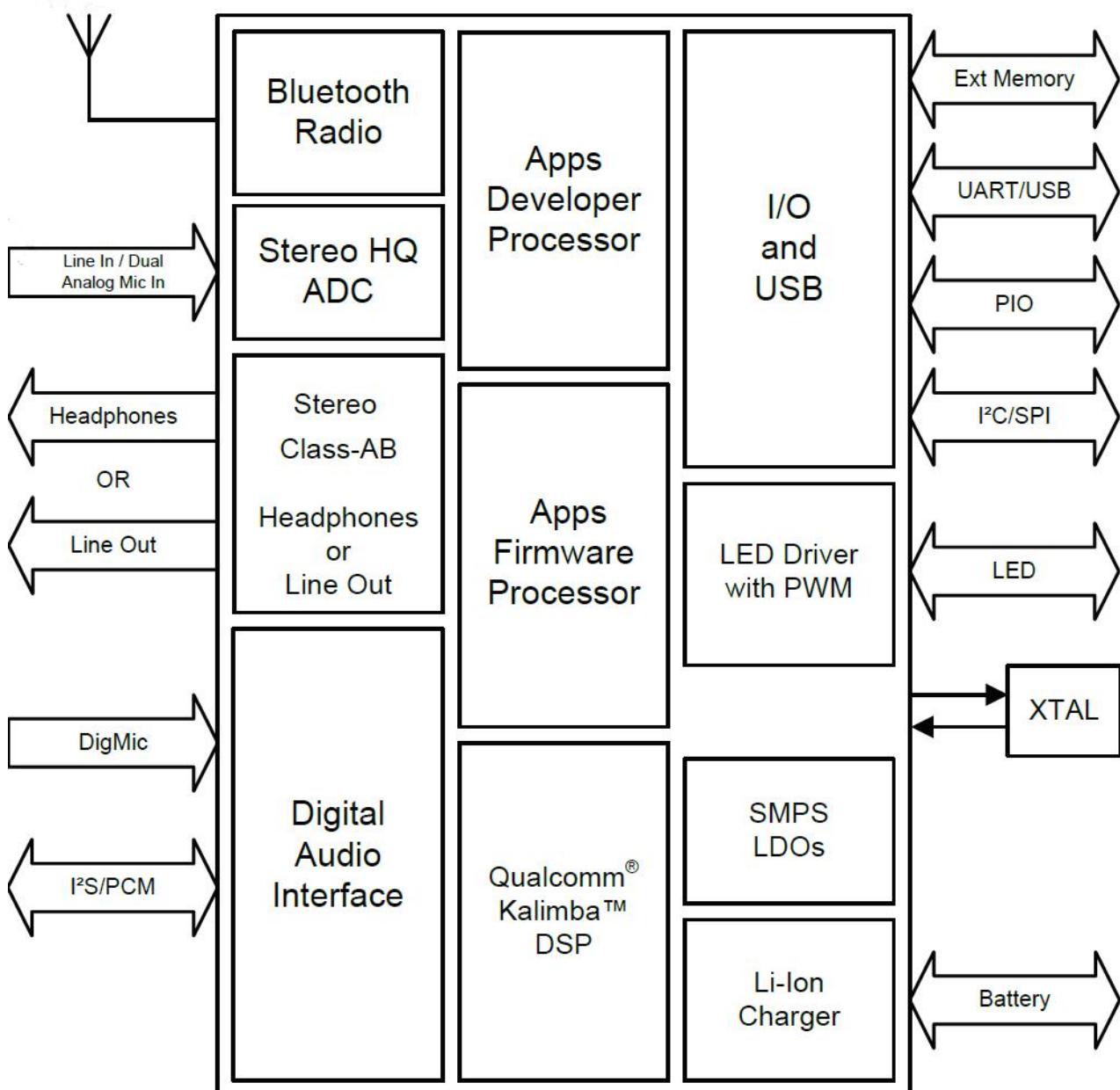
The typical applications supporting for Bluetooth profiles A2DP v1.3.1, AVRCP v1.6, AVCTP v1.4, HFP v1.7.1, HSP v1.2, SPP v1.2, DID v1.3 and Bluetooth low energy (LE) based on Bluetooth® Specification V5.1 enables rapid time-to-market for your audio products such as:

- Wired/wireless mono/stereo speakers
- Qualcomm TrueWireless™ stereo speakers
- Speaker phones

4. General Specifications

Operating Frequency Band	2.4GHz ~ 2.48GHz unlicensed ISM band
Bluetooth Specification	V5.1
Operating Voltage	3.0V to 6.0V (External Supply)
Host Interface	USB 2.0
Audio Interface	Analogue, I2S
Dimension	24.00mm x 17.8.00mm x 2.5mm

5. System Architecture



6. Electrical Characteristics

6.1. Absolute Maximum Ratings

Pin Name	Min	Max	Unit
VBAT	-0.4	4.8	V
VUSB	-0.4	7	V
LED(0:2)	-0.4	7	V
PIO	-0.4	3.8	V

6.2. Radio Performance

Frequency Range	2402~2480MHz
RF Transmit Power	9 dBm
Receive Sensitivity	-91 dBm
Modulation Type	GFSK,π/4DQPSK,8DPSK
Channel No.	79(Class) , 40(BLE)

6.3. Audio performance (Class-AB DAC audio output)

Input Sample Width	24 bits
Input Sample Rate	8 ~ 192 kHz
Output Power (0 dBFS, 32 Ω, -3 dBFS, 16 Ω load)	30 mW max
SNR (1 kHz~48 kHz)	101 dBA typical
THD + N	-90.5 dBA typical
Digital gain (resolution = 1/32)	21.5 dBA max

6.4. Recommended Operating Conditions

VBAT	/	4.2	V
VUSB	/	5	V
LED	/	4.2	V
PIO	/	1.8/3.3	V
Operating Temperature	-20	75	°C
Storage Temperature	-40	85	°C

7. Pin Configurations

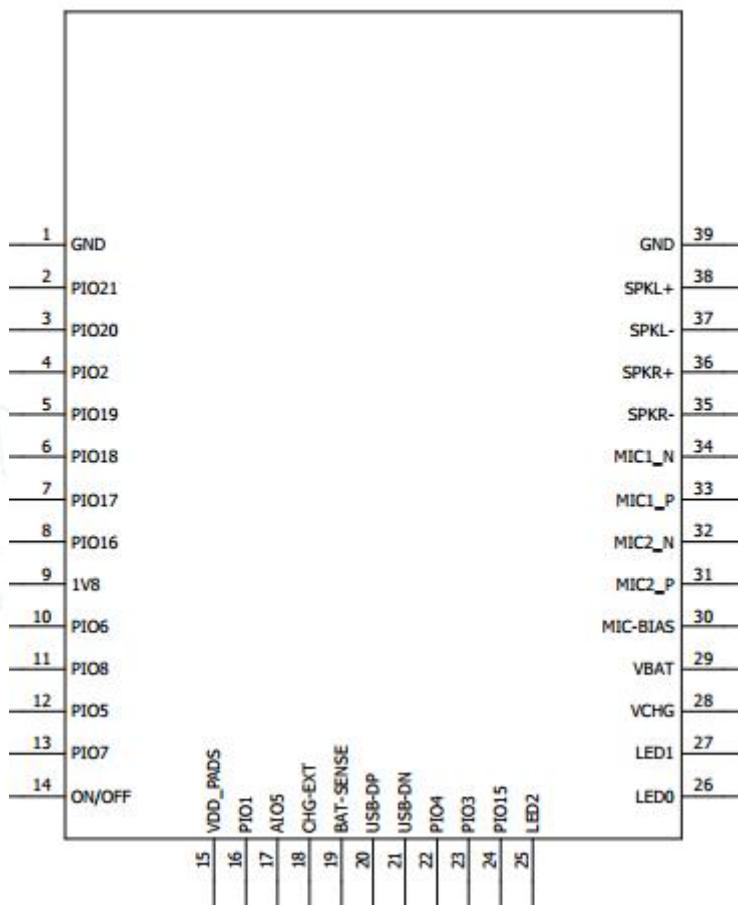


Figure 7-1 PIN configuration diagram

Pin No.	Name	I/O Type	Description	Alternative Function
1	GND	Ground	Ground connections	
2	PIO21	Digital: Bidirectional with programmable strength internal pullup/pull-down	Programmable I/O line 21	
3	PIO20	Digital: Bidirectional with programmable strength internal pullup/pull-down	Programmable I/O line 20	
4	PIO2	Digital: Bidirectional with programmable strength internal pullup/pull-down	Programmable I/O line 2	TBR_MISO[3]
5	PIO19	Digital: Bidirectional with programmable strength	Programmable I/O line 19	PCM_DIN[0]

6	PIO18	Digital: Bidirectional with programmable strength internal pullup/pull-down	Programmable I/O line 18	PCM_DOUT[0]
7	PIO17	Digital: Bidirectional with programmable strength internal pullup/pull-down	Programmable I/O line 17	PCM_SYNC
8	PIO16	Digital: Bidirectional with programmable strength internal pull up/pull-down	Programmable I/O line 16	PCM_CLK
9	1V8	Power output	1.8V Power output	
10	PIO6	Digital: Bidirectional with programmable strength internal pullup/pull-down	Programmable I/O line 6	TBR_MOSI[0]
11	PIO8	Digital: Bidirectional with programmable strength internal pullup/pull-down	Programmable I/O line 8	TBR_CLK
12	PIO5	Digital: Bidirectional with programmable strength internal pullup/pull-down	Programmable I/O line 5	TBR_MISO[1]
13	PIO7	Digital: Bidirectional with programmable strength internal pullup/pull-down	Programmable I/O line 7	TBR_MISO[0]
14	ON/OFF	Digital input	Typically connected to an ON/OFF push button. Boots device in response to a button press when power is still present from battery and/or charger but software has placed the device in the OFF or DORMANT state. Additionally useable as a digital input in normal operation. No pull.	PIO[0] input only
15	VDD_PAD_S	Supply	1.8V Power input.	
16	PIO1	Digital: Bidirectional with programmable strength internal pullup/pull-down	Programmable I/O line 1	
17	LED5/AIO5	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.	
18	CHG_EXT	Power	External battery charger control. External battery charger transistor base control when using external charger boost. Otherwise leave	
19	VBAT_SE_NSE	Analogue	Battery charger sense input. Connect directly to the battery positive pin.	
20	USB_DP	Digital	USB Full Speed device D+ I/O. IEC-61000-4-2 (device level) ESD Protection	
21	USB_DN	Digital	USB Full Speed device D- I/O.	

			IEC-61000-4-2 (device level) ESD Protection	
22	PIO4	Digital: Bidirectional with programmable strength internal pullup/pull-down h internal pullup/pull-down	Programmable I/O line 4	TBR_MOSI[1]
23	PIO3	Digital: Bidirectional with programmable strength internal pullup/pull-down	Programmable I/O line 3	TBR_MISO[2]
24	PIO15	Digital: Bidirectional with programmable strength internal pull up/pull-down	Programmable I/O line 15	MCLK_OUT
25	LED2/AIO2	Analog or digital input/open drain output	General-purpose analog/digital input or open drain LED output.	
26	LED0/AIO0	Analog or digital input/open drain output	General-purpose analog/digital input or open drain LED output.	
27	LED1/AIO1	Analog or digital input/open drain output	General-purpose analog/digital input or open drain LED output.	
28	VCHG	Supply	Charger input	
29	VBAT	Supply	Battery voltage input.	
30	MIC_BIAS	Analogue in	Mic bias output.	
31	MIC2_P	Analogue in	Microphone differential 2 input, positive	Differential audio line input right, positive
32	MIC2_N	Analogue in	Microphone differential 2input, negative	Differential audio line input left, negative
33	MIC1_P	Analogue in	Microphone differential 1 input, positive	Differential audio line input right, positive
34	MIC1_N	Analogue in	Microphone differential 1input, negative	Differential audio line input left, negative
35	SPKR+	Analogue out	Audio/speaker differential right output, negative	Differential right line output, negative
36	SPKR-	Analogue out	Audio/speaker differential right output, positive	Differential right line output, positive
37	SPKL+	Analogue out	Audio/speaker differential left output, negativeoutput, negative	Differential left line output, negativeline output, negative
38	SPKL-	Analogue out	Audio/speaker differential left output, positive	Differential left line output, positive
39	GND	Ground	Ground connections.	

8. Mechanical Drawing

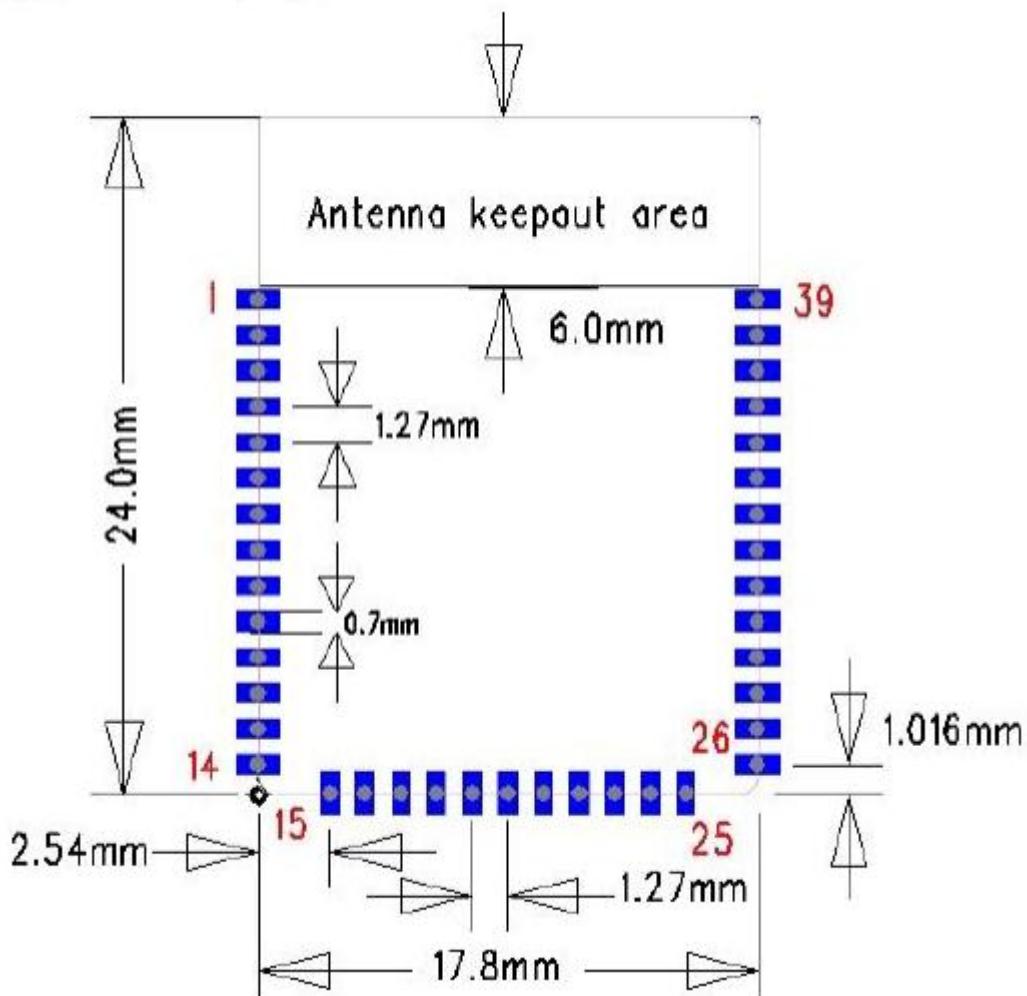


Figure 8-1 Module Package Dimension

9. Recommended Temperature Reflow Profile

Follow: IPC/JEDEC J-STD-020 C

Reference to conditions:

- Average ramp-up rate(217°C to peak):1~2°C/sec max.
- Preheat:150~200C,60~180 seconds
- Temperature maintained above 217°C:60~150 seconds
- Time within 5°C of actual peak temperature:20~40 sec.
- Peak temperature:250+0/-5°C or 260+0/-5°C
- Ramp-down rate:3°C/sec.max.
- Time 25°C to peak temperature:8 minutes max
- Cycle interval: 5 minus

The re-flow profiles are illustrated in Figure 9-1 and Figure 9-2 below.

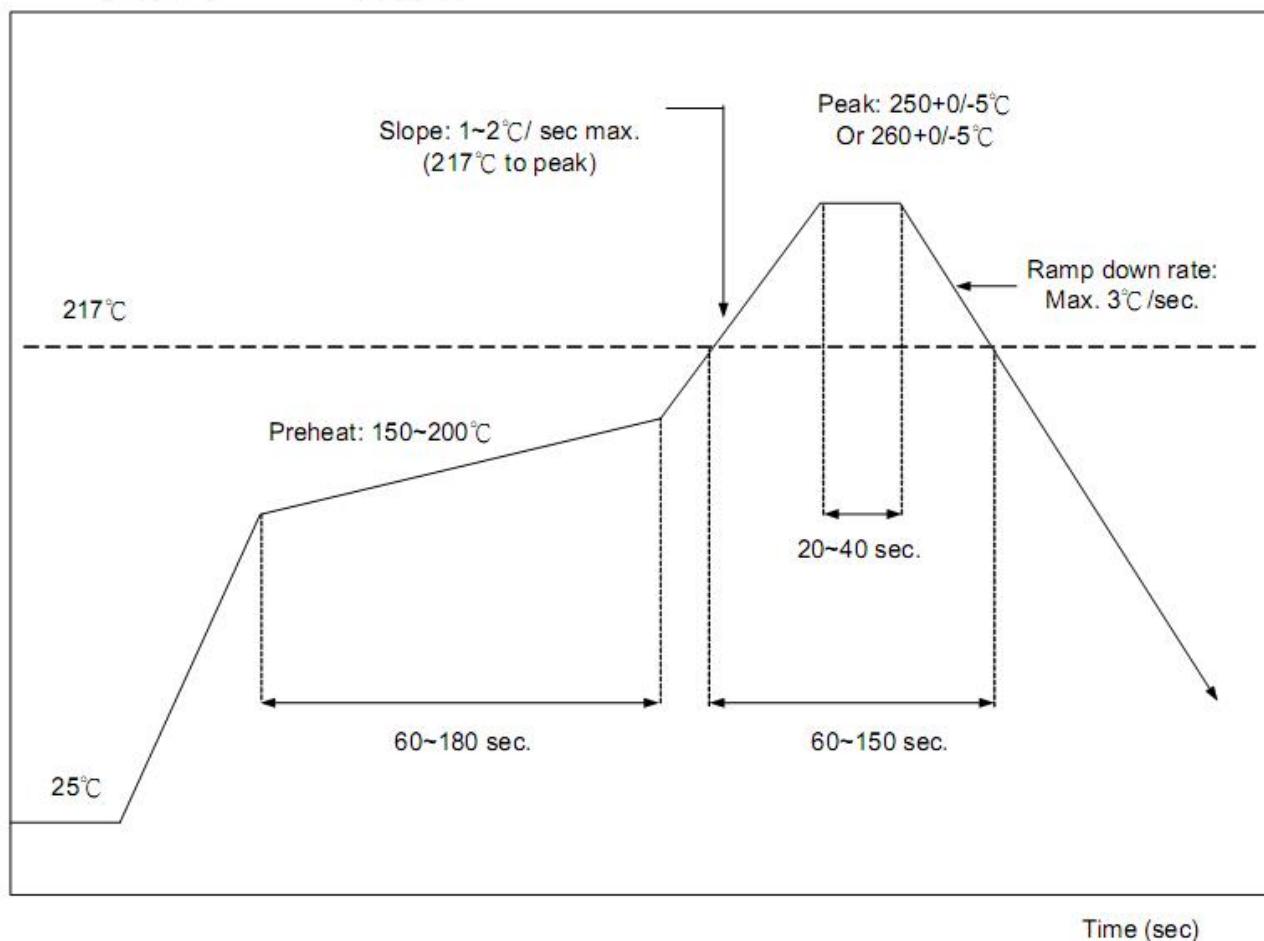


Figure 9-1. Typical Lead-free Re-flow Solder Profile

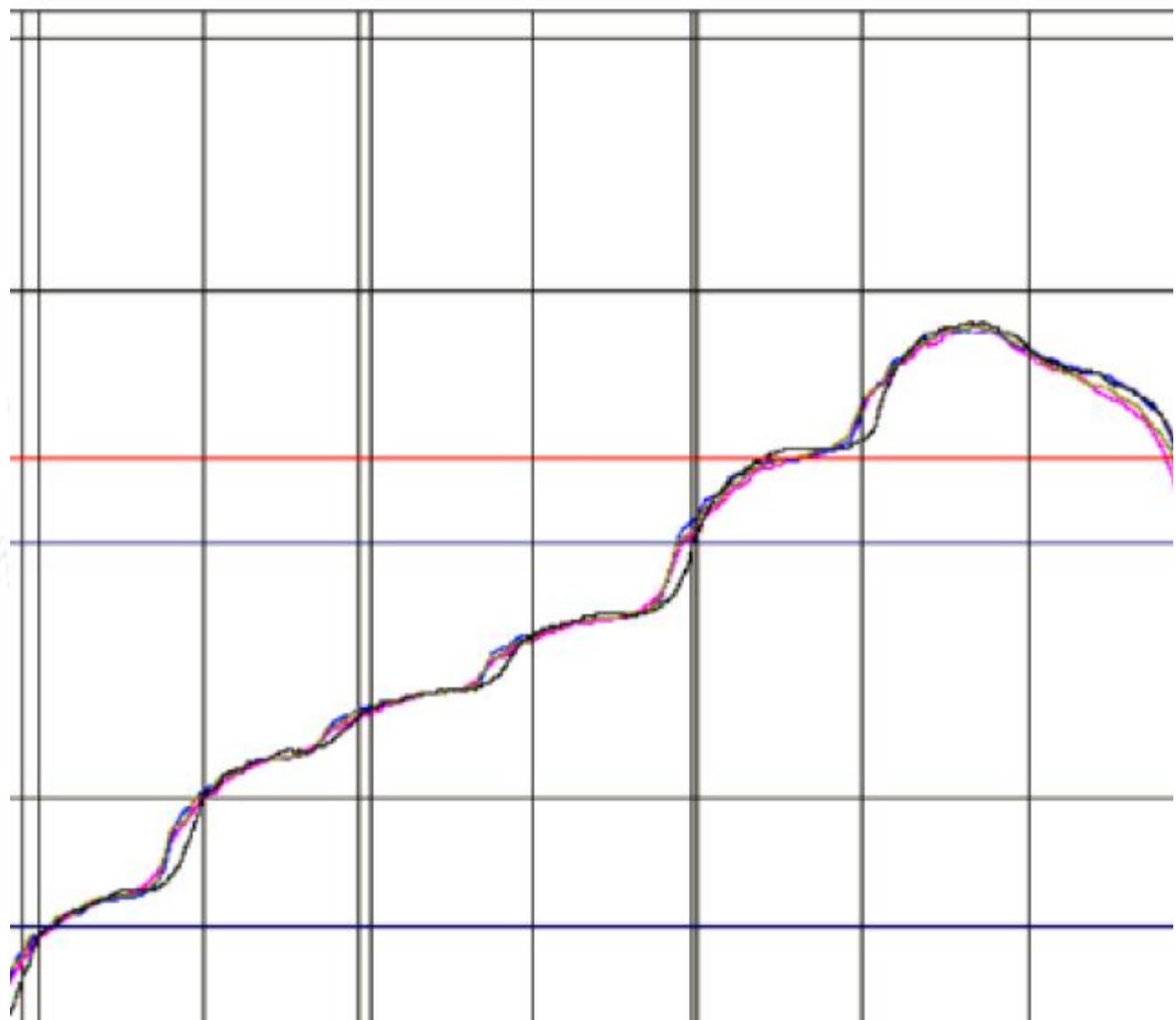


Figure 9-2. Typical Lead-free Re-flow

FCC Statement

FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247 Integral antenna with antenna gain 2 dBi

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy

and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2A8Q5-ALMQ21LB Or Contains FCC ID: 2A8Q5-ALMQ21LB"

When the module is installed inside another device, the user manual of the host must contain below warning statements;

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

This device may not cause harmful interference.

This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off

and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

Any company of the host device which install this modular with limit modular approval should perform the test of radiated & conducted emission and spurious emission,etc. according to FCC part 15C : 15.247 and 15.209 &

15.207 ,15B Class B requirement, Only if the test result comply with FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement, then the host can be sold legally.

IC STATEMENT

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes:

- (1) Cet appareil ne doit pas causer d'interférences.
- (2) Cet appareil doit accepter toutes les interférences, y compris celles susceptibles de provoquer un fonctionnement indésirable de l'appareil.

IC Radiation Exposure Statement

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device.

This modular complies with IC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body. Cette modulaire doit être installé et utilisé à une distance minimum de 20 cm entre le radiateur et le corps de l'utilisateur.

If the IC number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:

“Contains IC:29583-ALMQ21LB”

when the module is installed inside another device, the user manual of this device must contain below warning statements;

1. This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

2. Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes:

- (1) Cet appareil ne doit pas causer d'interférences.

(2) Cet appareil doit accepter toutes les interférences, y compris celles susceptibles de provoquer un fonctionnement indésirable de l'appareil.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

The End

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