



Things Air<sup>®</sup>

TA3220R1E IoT Wi-Fi<sup>®</sup> Module

Created for the Internet of Things(IoT)

TA3220R1E Data Sheet V1.0.1

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## 1 Device Overview

### 1.1 Features

- Wi-Fi Microcontroller Module
  - CC3220x SimpleLink Wi-Fi Wireless Microcontroller Unit (MCU) System-on-Chip(SoC) is a Single-Chip with Two Separate Execution Environments: a User Application Dedicated ARM Cortex-M4 MCU and a Network Processor MCU to Run All Wi-Fi and Internet Logical Layers
- Applications Microcontroller Subsystem
  - ARM Cortex-M4 Core at 80 MHz
  - Embedded Memory
    - With Integrated 1MB of Flash and 256KB of RAM
    - 32Mbit-Onboard flash
  - McASP Supports Two I2S Channels
  - SD
  - SPI
  - I2C
  - UART
  - 8-Bit Parallel Camera
  - Four General-Purpose Timers With 16-Bit PWM Mode
  - Watchdog Timer
  - 4-Channel 12-Bit ADCs
  - Up to 27 GPIO Pins
  - Debug Interfaces: JTAG, cJTAG, SWD
- Wi-Fi Network Processor (NWP) Subsystem
  - Wi-Fi Internet-on-a-chip Dedicated ARM MCU Completely Offloads Wi-Fi and Internet Protocols from the Application MCU
  - Wi-Fi Modes:
    - 802.11b/g/n Station
    - 802.11b/g Access Point (AP) Supports up to Four Stations
    - Wi-Fi Direct Client and Group Owner
  - WPA2 Personal and Enterprise Security: WEP, WPA/WPA2 PSK, WPA2 Enterprise (802.1x)
  - IPv4 and IPv6 TCP/IP Stack
  - Industry-Standard BSD Socket Application Programming Interfaces (APIs)
    - 16 Simultaneous TCP or UDP Sockets
    - 6 Simultaneous TLS and SSL Sockets
  - IP Addressing: Static IP, LLA, DHCPv4, DHCPv6 With DAD
- SimpleLink Connection Manager for Autonomous and Fast Wi-Fi Connections
- Flexible Wi-Fi Provisioning With SmartConfig Technology, AP Mode, and WPS2 Options
- RESTful API Support Using the Internal HTTP Server
- Embedded Network Applications Running on Dedicated Network Processor
- Wide Set of Security Features:
  - Hardware Features:
    - Separate Execution Environments
    - Device Identity
    - Hardware Crypto Engine for Advanced Fast Security, Including: AES, DES, 3DES, SHA2, MD5, CRC, and Checksum
  - Initial Secure Programming:
    - Debug Security
    - JTAG and Debug Ports are Locked
  - Personal and Enterprise Wi-Fi Security
  - Secure Sockets (SSLv3, TLS1.0/1.1/TLS1.2)
- Networking Security
  - Personal and Enterprise Wi-Fi Security
  - Secure Sockets (SSLv3, TLS1.0, TLS1.1, TLS1.2)
  - HTTPS Server
  - Trusted Root-Certificate Catalog
  - TI Root-of- Trust Public key
- SW IP Protection
  - Secure Key Storage
  - File System Security
  - Software Tamper Detection
  - Cloning Protection
  - Secure Boot: Validate the Integrity and Authenticity of the Runtime Binary During Boot
- Embedded Network Applications Running on the Dedicated Network Processor
  - HTTP/HTTPS Web Server With Dynamic User Callbacks
  - mDNS, DNS-SD, DHCP Server
  - Ping

- Recovery Mechanism—Can Recover to Factory Defaults or to a Complete Factory Image
- Wi-Fi TX Power
  - 17.0dBm @ 1DSSS
  - 12.0dBm @54 OFDM
- Wi-Fi RX Sensitivity
  - -76dBm @ 1DSSS
  - -64dBm @ 54OFDM
- Application Throughput
  - UDP: 16Mbps
  - TCP: 13Mbps
- Power-Management Subsystem
  - Integrated DC-DC converters Support a Wide Range of Supply Voltage:
    - VBAT Wide-Voltage Mode: 2.3V to 3.6V
    - VIO is Always Tied With VBAT
- Package and Operating Conditions
  - 1.27-mm Pitch, 44-Terminal, 20-mm × 32.4 mm Stamp Package for Easy Assembly and Low-Cost PCB Design
- Operating Temperature Range: -40°C to +85°C

## 1.2 Applications

- Cloud Connectivity
- Internet Gateway
- Home and Building Automation
- Appliances
- Access Control
- Security Systems
- Smart Energy
- Industrial Control
- Smart Plug and Metering
- Wireless Audio
- IP Network Sensor Nodes
- Asset Tracking
- Medical Devices

## 1.3 Descriptions

TA3220R1E module is designed based on the CC3220 device which is a single-chip solution, integrating two physically separated, on-chip MCUs.

- An application processor- ARM Cortex-M4 MCU with a user-dedicated 256KB of RAM, and an optional 1MB of XIP flash.
- A network processor MCU to run all Wi-Fi and Internet logical layers. This ROM-based subsystem includes an 802.11b/g/n radio, baseband, and MAC with a powerful crypto engine for fast, secure internet connections with 256-bit encryption.

The CC3220 wireless MCU family is part of the second generation of TI's Internet-on-a-chip family of solutions. This generation introduces new features and capabilities that further simplify the connectivity of thing to the Internet. The new capabilities including the following:

IPv6

Enhanced Wi-Fi provisioning

Enhanced power consumption

Enhanced file system security (supported only by the CC3220S and CC3220SF devices)

Wi-Fi AP connection with up to four stations

More concurrently opened BSD sockets; up to 16 BSD sockets, of which 6 are secure

HTTPS support

RESTful API support

Asymmetric keys crypto library

The CC3220 wireless MCU family supports the following modes: station, AP, and Wi-Fi direct. The device also supports WPA2 personal and enterprise security. This subsystem includes embedded TCP/IP and TLS/SSL stacks, HTTP server, and multiple Internet protocols. The device supports a variety of Wi-Fi provisioning methods including HTTP based on AP mode, SmartConfig Technology, and WPS2.0.

The power-management subsystem includes integrated DC-DC converters that support a wide range of supply voltages. This subsystem enables low-power consumption modes for extended battery life, such as low-power deep sleep, hibernate with RTC (consuming only 4.5 uA), and shutdown mode (consuming only 1uA);

The device includes a wide variety of peripherals, including a fast parallel camera interface, I2S, SD, UART, SPI, I2C, and 4-channel ADC.

The CC3220SF device includes application-dedicated 1MB of XIP flash and 256KB of RAM for code and data, ROM with external serial flash bootloader, and peripheral drivers. The CC3220SF device options have additional security features, such as encrypted and authenticated file systems, user IP encryption and authentication, secured boot (authentication and integrity validation of the application image at flash and boot time), and more.

#### **1.4 Functional Block Diagram**

Figure 1-1 shows the functional block diagram of the TA3220R1E module.

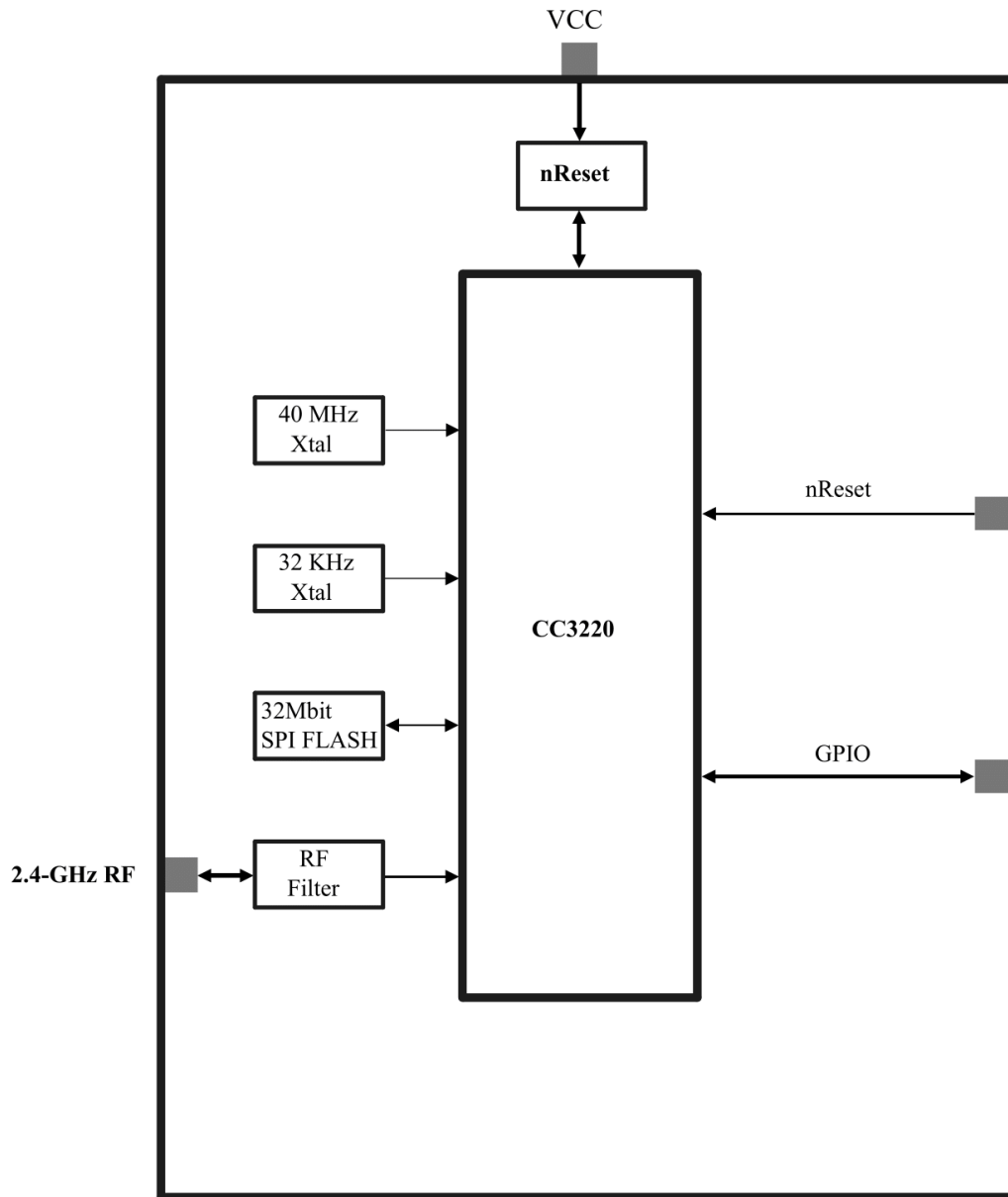


Figure 1-1. TA3220R1E Module Functional Block Diagram

## 2 TA3220R1E Terminal Overview

### 2.1 TA3220R1E Terminal Diagram

Figure 2-1 shows the Terminal diagram for the TA3220R1E

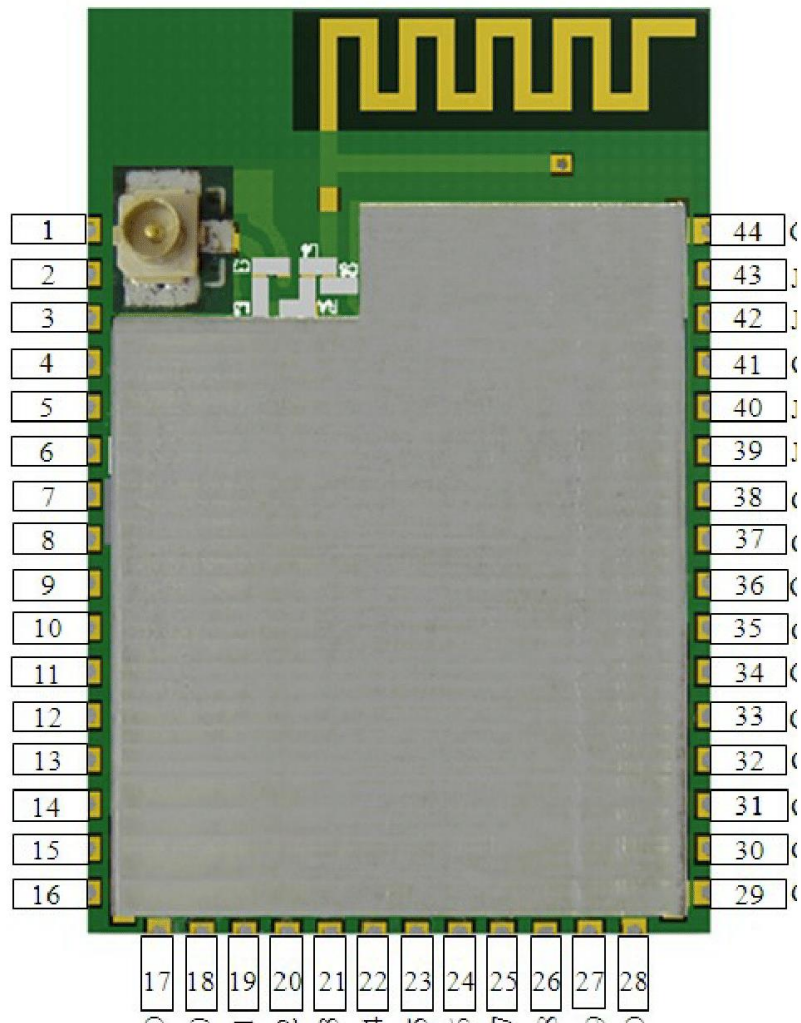


Figure 2-1 Terminal diagram for the TA3220R1E

## 2.2 TA3220R1E Terminal Descriptions

Table 2-1 lists the terminal descriptions of the TA3220R1D module.

Table 2-1. Terminal Descriptions

Pad Number	Pin Name	Description ①	CC3220 Pkg pin number
1	GND	Ground	65
2	ANTSEL1	Antenna Selection Control / Output only	29
3	ANTSEL2	Antenna Selection Control / Output only	30
4	nRESET	Master chip reset. Active low	32
5	SOP2	Sense On Power 2	21
6	SOP1	Sense On Power 1	34
7	SOP0	Sense On Power 0	35
8	GND	Ground	65
9	GND	Ground	65
10	VDD	Main Chip supply	10,37,39,44,47,54
11	VDD		
12	GPIO_30	General-Purpose I/O	53
13	DCDC_ANA2_SW_P	ANA2 DCDC converter	45
14	GPIO_0	General-purpose I/O	50
15	GPIO_01	General-Purpose I/O	55
16	GPIO_02	General-Purpose I/O	57
17	GPIO_03	General-Purpose I/O	58
18	GPIO_04	General-Purpose I/O	59
19	GPIO_05	General-Purpose I/O	60
20	GPIO_06	General-Purpose I/O	61
21	RTC_XTAL_P	Connect 32.768kHz XTAL or force external CMOS level clock	51
22	RTC_XTAL_N	Connect 32.768kHz XTAL or connect 100-kΩ resistor to VDD	52
23	GPIO_07	General-Purpose I/O	62
24	GPIO_08	General-Purpose I/O	63
25	GPIO_09	General-Purpose I/O	64
26	GPIO_10	General-Purpose I/O	1
27	GPIO_11	General-Purpose I/O	2
28	GPIO_12	General-Purpose I/O	3
29	GPIO_13	General-Purpose I/O	4
30	GPIO_14	General-Purpose I/O	5
31	GPIO_15	General-Purpose I/O	6
32	GPIO_16	General-Purpose I/O	7
33	GPIO_17	General-Purpose I/O	8
34	GPIO_22	General-Purpose I/O	15
35	NC		NC



Pad Number	Pin Name	Description	CC3220 Pkg pin number
36	NC		NC
37	NC		NC
38	NC		NC
39	JTAG_TDI	JTAG TDI. Reset Default Pinout.	16
40	JTAG_TDO	JTAG TDO. Reset Default Pinout	17
41	GPIO_28	General-Purpose I/O	18
42	TCK	JTAG TCK. Reset Default Pinout.	19
43	TMS	JTAG TMS. Reset Default Pinout	20
44	GND	Ground	GND

① please reference CC3220 datasheet for more details

### 3 Specifications

#### 3.1 Recommended Operating Conditions

Symbol	Condition	Min	Typ	Max	Unit
Operating temperature	-	-40	25	+85	°C
VBAT and VIO	Battery mode	2.3	3.3	3.6	V

#### 3.2 Current Consumption

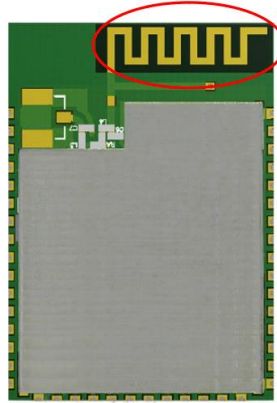
VBAT=3.6V

Mode	Parameters	Conditions	Min	Typ	Max	Unit
MCU ACTIVE	TX Current	1DSSS		286		mA
		6OFDM		255		
		54OFDM		232		
	RX Current	1DSSS		74		
54OFDM			74			
MCU SLEEP	TX Current	1DSSS		282		mA
		6OFDM		251		
		54OFDM		228		
	RX Current	1DSSS		70		
54OFDM			70			
MCU LPDS	TX Current	1DSSS		266		mA
		6OFDM		242		
		54OFDM		217		
	RX Current	1DSSS		53		
54OFDM			53			
Peak calibration current		VBAT=3.3V		450		mA
		VBAT=2.3V		670		

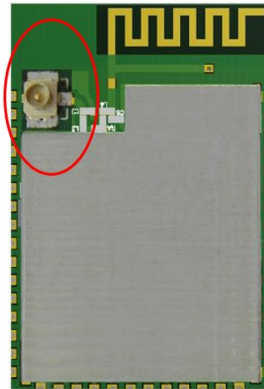
## 4 Antenna Style Selection

There are two antenna style for TA3220R1E Module

1. TA3220R1E-SA(PCB Strip Antenna)



2. TA3220R1E-UFL(UFL Connector)



## 5 Mechanical Drawing

Figure 5-1 shows the Mechanical of TA3220R1E module.

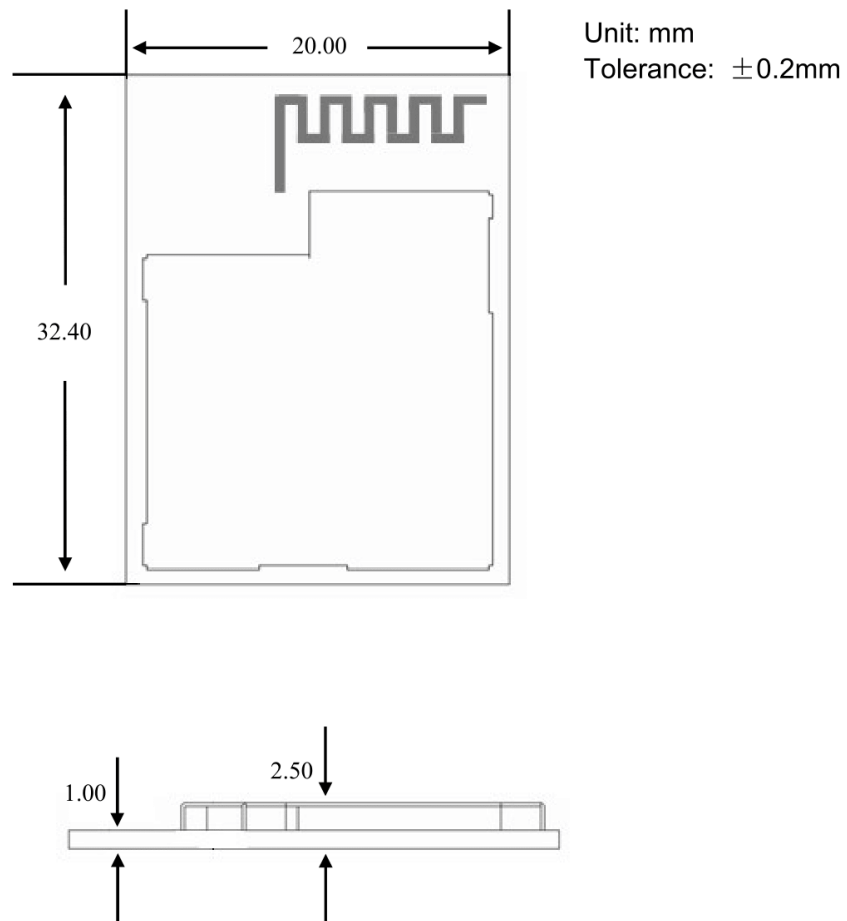


Figure 5-1. Mechanical of TA3220R1E

## 6 Recommended PCB Layout for Package

Figure 6-1 shows the Recommended PCB Layout of TA3220R1E module.

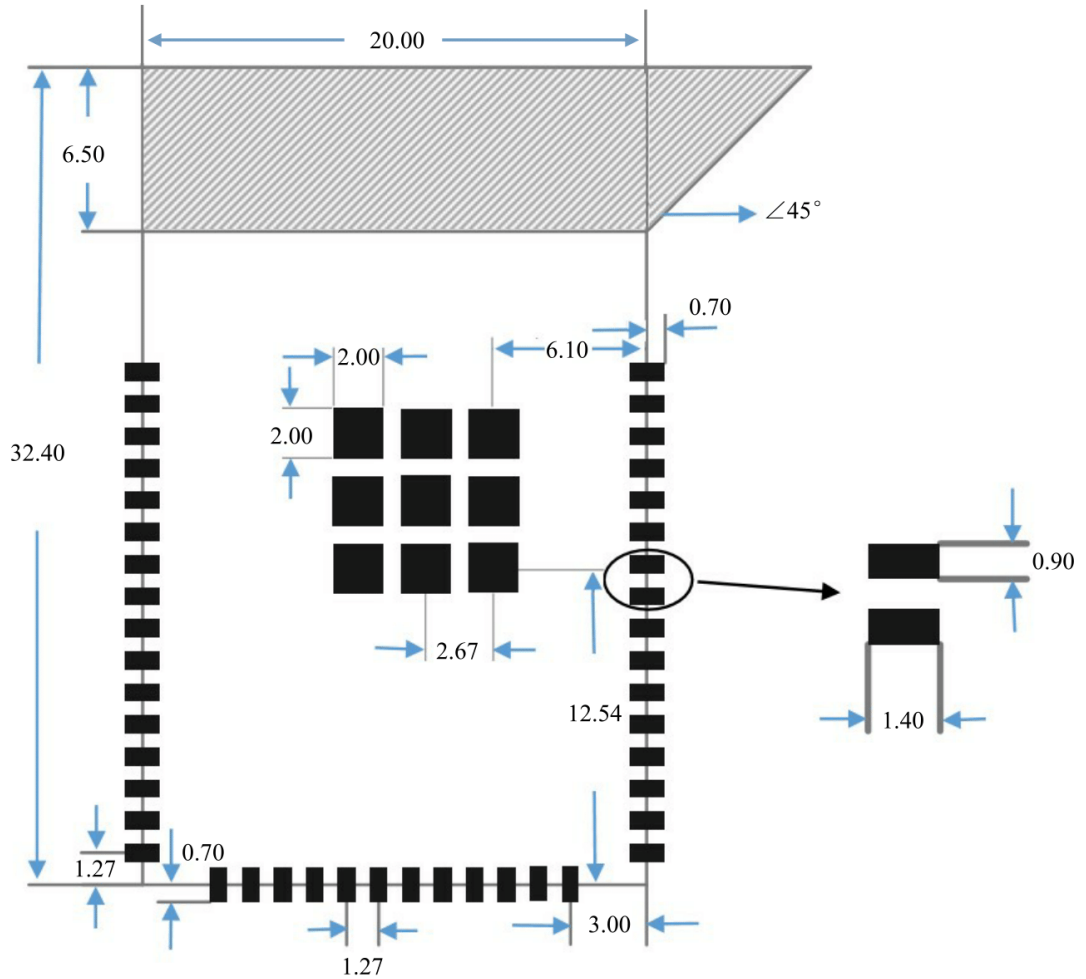


Figure 6-1 Recommended PCB Layout of TA3220R1E

Noted: If using the PCB antenna please make sure the shadow area shall be without any wiring or ground.

## 7 Soldering Recommendations

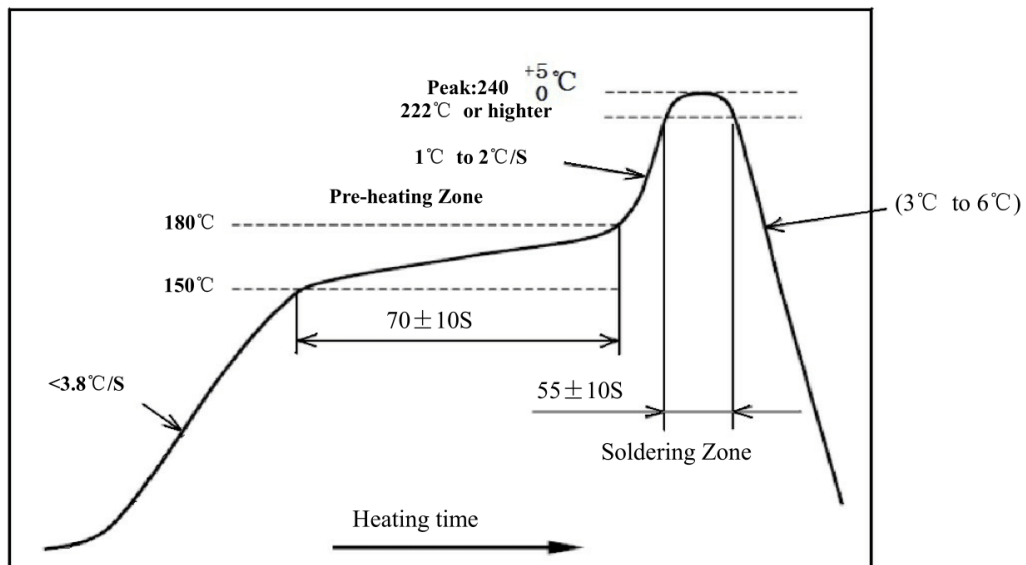


Figure 7-1. Temperature Profile for Evaluation of Solder Heat Resistance of a Component (at Solder Joint)

### Contact details

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