

GK7206V10 Datasheet

Version 1.1

Goke Microelectronics Co., Ltd

Version History

Version	Note	Author	Date
V1.0	Initial version	Goke IPC Team	2025/5/24
V1.1	Update SDIO and FE PHY	Goke IPC Team	2025/10/13

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1. Introduction

The GK7206V10 chip is a next-generation IP Camera SoC launched by GOKE, targeting professional security, consumer markets, operator markets, and in-vehicle markets. The chip integrates GOKE's fully self-developed ISP pipeline, H.265/H.264 encoder, and a general-purpose NPU with 1.0T computing power, providing customers with high-quality, low-bitrate, low-memory, low-latency, and low-power solutions. It supports a wide range of products, including single-lens box cameras, dome cameras, dual-lens box and dome cameras, long and short-focus cameras, wide-angle stitching, and top-bottom stitching cameras. The GK7206V10 also features AI noise reduction and dual 3D noise reduction, significantly enhancing image quality in low-light scenarios and enabling customers to achieve low-cost black-light solutions.

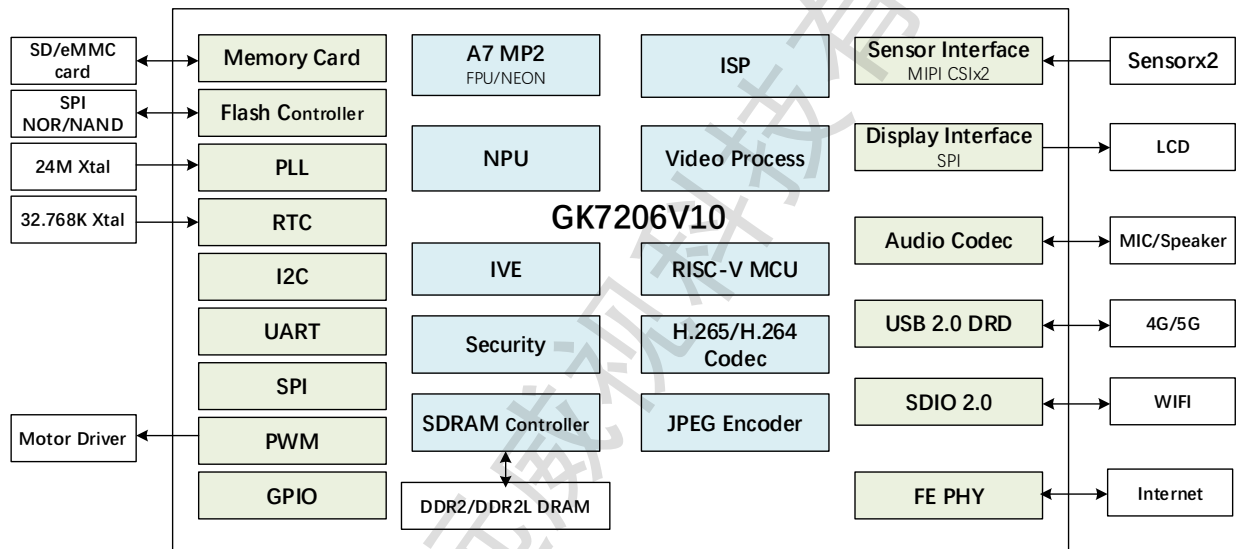


Figure1-1: GK7206V10 Functional Block Diagram

2. Specifications

Processor Core

- ARM Cortex-A7 MP2, up to 1.0GHz
- 32KB I-Cache, 32KB D-Cache, 128KB L2 Cache
- Supports Neon and FPU

MCU

- Integrated RISC-V coprocessor, up to 400MHz
- 8KB I-Cache, 8KB D-Cache

Intelligent Processing

- Integrated Neural Network Processing Unit (NPU), max computing power 1.0 Tops
 - Supports mainstream AI frameworks: ONNX, PyTorch, TensorFlow
 - Supports AIBNR model
 - Supports mainstream CNN models: YOLOv10, ResNet50 (for object detection and classification)
 - Supports INT16/INT8/INT4 mixed quantization
 - Supports per-channel and per-layer quantization
 - Built-in lightweight multimodal models: CLIP and YOLO-World
 - Built-in algorithms: Human/Vehicle/Object detection, Package detection, Pet detection, Fire/Smoke detection
- Supports IVE

- Common operators: Single/Dual source, Filtering, Sobel gradient, CCL, GMM, LK optical flow, ST corner detection

Video Input

- MIPI RX interface
 - 4 data lanes + 2 clock lanes
 - Supports MIPI D-PHY1.1/CSI-2, max 1.5Gbps/lane
 - Single sensor supports up to 2F-WDR 2592×1944@30fps input

Video Output

- Max display: 240p@30fps
- Supports 1 HD video layer
- Supports 1 HD graphics layer
- Supports video-graphics overlay
- Compatible with video display devices

Display Interfaces

- SPI screen (DBI-Type C), max 240p@30fps

ISP

- AI noise reduction
- 3DNR (Bayer domain)
- 3DNR (YUV domain)
- 2F-WDR fusion
- Built-in WDR
- 3A (AE/AWB/AF)
- Fixed Pattern Noise (FPN) removal
- Bad pixel correction (static/dynamic)
- Lens Shading Correction (LSC)

- Image dynamic contrast and edge enhancement
- Chromatic aberration correction (purple fringe removal)
- Defogging
- Lens Distortion Correction (LDC)
 - LDC_H: Online
 - LDC_V: Offline
- DRC
- Demosaic
- Mono sensor processing

Video Processing

- Scaling
- OSD overlay
- Drawing (lines/rectangles)
- 2D graphics acceleration
- Video format conversion

Video Codec

- H.265 (Main/Base Profile, Level 5): Max 2592×1944@30fps
- H.264 (High/Main Profile, Level 5.1):
 - Max 2592×1944@30fps + 1280×720@30fps + 480×360@30fps
 - Real-time upscaling:
 - 1920×1080 → 2560×1440
 - 1920×1080 → 3840×2160
 - 2560×1440 → 3840×2160
- MJPEG/JPEG Baseline encoding:
 - Max resolution: 8192×8192
 - Input format: SP420/400

- Output format: SP420/SP422/400
- Max performance: 3840×2160@30fps (SP420)

- I/P frames
- Rate control: CBR/VBR/AVBR/FIXQP/QPMAP
- GOP modes: SmartP, NormalP
- Max bitrate: 60Mbps
- 8 ROI encoding regions
- 8 OSD overlay regions
- 8 Mosaic regions
- 8 Cover regions

Audio Interfaces & Codec

- Integrated Audio Codec:
 - 2ch single-ended or 1ch differential input
 - 1ch line-out
- 4ch DMIC input
- I2S interface
- Software audio codecs: G.711, G.726, ADPCM, AAC, MP3
- Audio 3A (AEC/ANR/AGC)
- Wind noise reduction
- AI audio noise reduction

External Memory Interface

- SDRAM
 - Built-in 512Mb 16bit DDR2/DDR2L KGD
- SPI Nor Flash
 - 1/2/4-wire mode
 - Boot-adaptive page size/block size
 - Max capacity: 256MB, max speed:

99MHz

- SPI Nand Flash
 - 1/2/4-wire mode
 - Boot-adaptive page size/block size
 - Max capacity: 1GB, max speed: 99MHz
- eMMC 4.5
 - 1/4/8-bit mode
 - DDR52 mode: max 100MB/s (8-bit)
 - HS200 mode: max 100MB/s (8-bit)

Boot

- SPI NOR/NAND, eMMC boot
- SD card/USB device flashing
- Secure boot

Security

- Hardware AES/SHA/RSA encryption/decryption
- 4Kbit OTP
- TRNG (True Random Number Generator)

Peripheral Interfaces

- 1× USB 2.0 DRD (Dual Role Device) interface:
 - Host/Device static switching
 - Host/Device software switching
- 2× SDIO 2.0 interfaces:
 - Supports SD2.0 cards
 - DS/HS modes, max 25MB/s
 - Supports external WiFi modules
- Integrated FE PHY
 - Supports 10M/100Mbps
- Up to 1 independent 12-bit LSADC channel

(3 input pins)

- Multiple PWM interfaces
- 3× UART interfaces
- Up to 4× I2C interfaces
- Up to 3× SPI interfaces
- 4× EDMA channels
- Multiple GPIO interfaces
- Always-on RTC
- PMC
 - 2 external wake-up sources
 - 1 output power sequence control

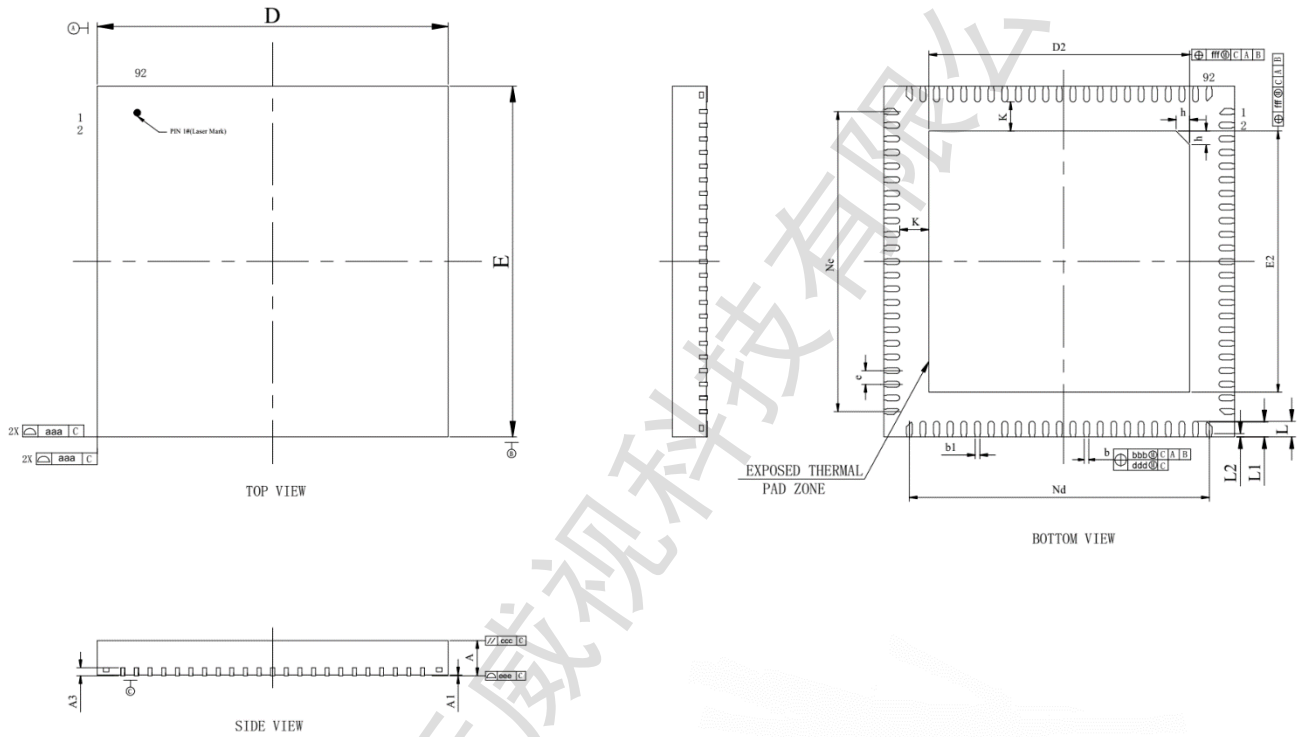
Physical Specifications

- Operating voltage:
 - Core: 0.9V (typical)
 - I/O: 3.3V/1.8V
 - DDR: 1.8V (DDR2)/1.5V (DDR2L)
- Package:
 - QFN 9mm×9mm, 92-pin

3. Package and Pinout

3.1. Package

GK7206V10 uses QFN package method, the package size is 9mm×9mm, the pin spacing is 0.35mm, there are totally 92 pins, the details is as bellow.



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.85	0.90	0.95
A1	0	0.02	0.05
b	0.10	0.15	0.20
b1	0.120REF		
A3	0.203REF		
D	8.90	9.00	9.10
D2	6.60	6.70	6.80
Nd	7.70BSC		
e	0.35BSC		
E	8.90	9.00	9.10
E2	6.60	6.70	6.80
Ne	7.70BSC		
L	0.30	0.40	0.50
L1	0.28	0.38	0.48
L2	0.10REF		
K	0.75REF		
h	0.30	0.35	0.40
aaa	0.10		
bbb	0.07		
ccc	0.10		
ddd	0.05		
eee	0.08		
fff	0.10		

Figure3-1 GK7206V10 package details

3.2. Pinout

		92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70		
Pin 1		AUDIO_MIC1P	AUDIO_MICBIAS	AUDIO_VREF	AUDIO_DECAP	AVDD33_AUDIO	FEPHY_TXP	FEPHY_TXN	FEPHY_RXP	FEPHY_RXN	AVDD33_FEPHY	VDD5	SENSOR1_RSTN	SENSOR1_CLK	SENSOR0_RSTN	SENSOR0_CLK	DVDD3318_SENSOR	I2C0_SDA	I2C0_SCL	GPIO5_0	DVDD3318	GPIO4_7	GPIO4_6	ETH_LINK_STA_LED		
1	AUDIO_MIC1N	GK7206V10																							ETH_LINK_ACT_LED	69
2	AUDIO_LINEOUT																								GPIO4_3	68
3	MIPIRX0_D0P																								GPIO4_2	67
4	MIPIRX0_D0N																								GPIO4_1	66
5	MIPIRX0_CKP																								UART1_CTSN	65
6	MIPIRX0_CKN																								UART1_RTSN	64
7	MIPIRX0_D1P																								UART1_RXD	63
8	MIPIRX0_D1N																								UART1_TXD	62
9	AVDD18_MIPIRX																								DDR_VDDQ3	61
10	MIPIRX1_D0P																								DDR_PLL	60
11	MIPIRX1_D0N																								DDR_VDD	59
12	MIPIRX1_CKP																								DDR_VDDQ2	58
13	MIPIRX1_CKN																								DDR_VDDQ1	57
14	MIPIRX1_D1P																								SDIO0_DETECT	56
15	MIPIRX1_D1N																								SDIO0_DATA2	55
16	VDD1																								SDIO0_DATA3	54
17	DVDD3318_PMC																								VDD4	53
18	PWR_BUTTON																								SDIO0_CMD	52
19	PWR_SEQ																								SDIO0_CLK	51
20	PWR_WAKEUP0																								SDIO0_DATA0	50
21	PWR_WAKEUP1																								SDIO0_DATA1	49
22	PWR_RSTN																								SDIO0_RWREN	48
23	AVDD_BAT																								SFC_MOSI_IO0	47
		RTC_XIN	RTC_XOUT	DVDD18	XTAL_XOUT	XTAL_XIN	AVDD18_PLL	LSADC0	LSADC1	LSADC2	DVDD33	USB2_DM	USB2_DP	VDD2	VDD3	SVB_PWM	UART0_TXD	UART0_RXD	DVDD3318_FLASH_SDIO0	SFC_WP_IO2	SFC_MISO_IO1	SFC_CSN	SFC_HOLD_IO3	SFC_CLK		
		24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46		

Figure3-2 GK7206V10 pinout

4. Hardware Specification

4.1. Soldering Suggestion

4.1.1. Requirements of Lead-free reflow soldering

The process curve of lead-free reflow soldering is as below:

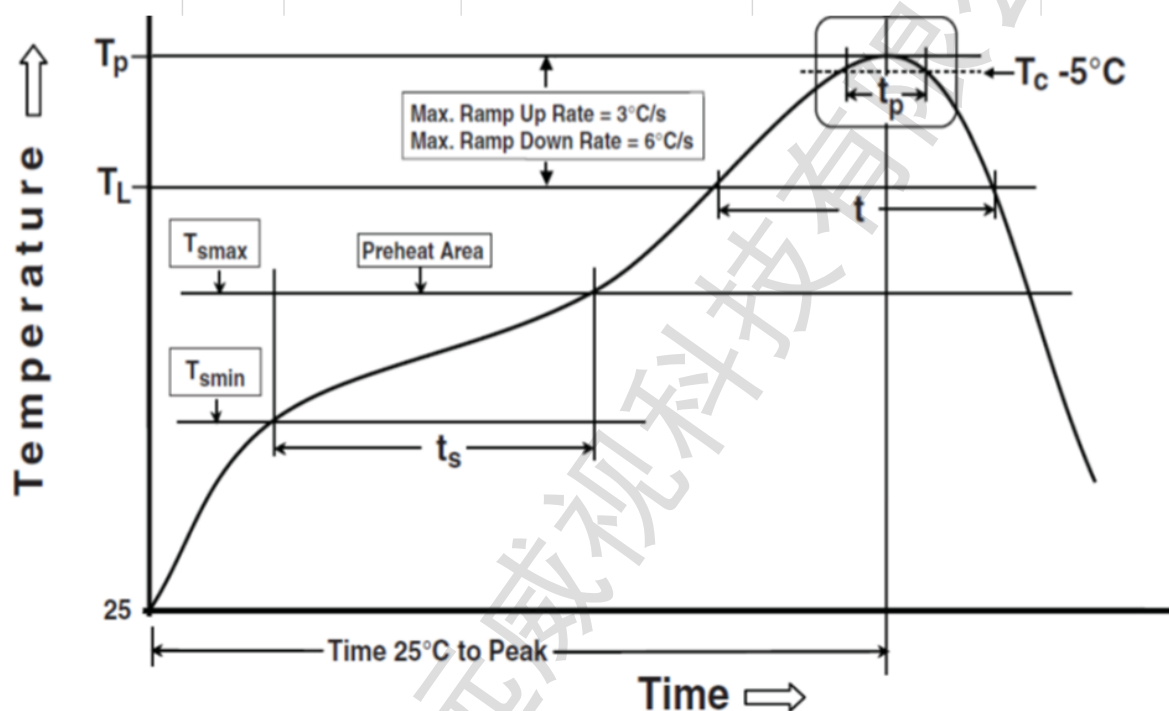


Figure4-1 Process curve of lead-free reflow soldering

The reflow soldering curve is only the recommended value, and you need to make corresponding adjustments according to the actual production situation.

The parameters and related temperature settings of lead-free reflow soldering are as below:

Feature Vector	Curve Setting Requirements
Temperature min (T _{smin})	150 °C
Temperature max (T _{smax})	200 °C
Time (T _{smin} to T _{smax}) (t _s)	60 seconds –120 seconds
Ramp-up Rate (T _L to T _p)	3 °C/second max
Liquidous Temperature (T _L)	217 °C

Time at Liquidous (tL)	60 seconds – 150 seconds
Peak Package Body Temperature (Tp)	Refer to Table4-2
Time (tp) within 5 °C of the Specified Classification Temperature (Tc)	30 seconds
Ramp-down Rate (Tp to TL)	6 °C /second max
Time 25 °C to Peak Temperature	8 minutes max.

Table4-1 Parameters of lead-free reflow soldering

Package Thickness	Volume (mm3) <350	Volume (mm3) 350~2000	Volume (mm3) ≥2000
<1.6mm	260°C	260°C	260°C
1.6mm~2.5mm	260°C	250°C	245°C
≥2.5mm	250°C	245°C	245°C

Table4-2 Requirements for setting the peak temperature of lead-free reflow soldering

4.2. Moisture sensitivity parameters

This chapter specifies the principle of IC (moisture sensitivity products).

【moisture sensitivity level】

The moisture sensitivity level of this product is level 3.

4.2.1. Moisture package

4.2.1.1. Package information

The dry vacuum packaging material contains:

- Humidity indicator card (HIC)
- Moisture barrier bag (MBB)
- Desiccant



Figure4-2 Diagram of dry vacuum packaging materials

4.2.1.2. Moisture sensitive product checking before use

Before use the chipset, please do the following check:

- If the color of HIC 10%RH dot changes, the product shall be rebaked according to Table 4-4.

4.2.2. Storage and use

【Storage Environment】

It is recommended that the product be stored in $<30^{\circ}\text{C}/60\% \text{ RH}$ by vacuum packaging.

【Shelf Life】

If the product is stored in $<30^{\circ}\text{C}/60\% \text{ RH}$ by vacuum packaging. The shelf life will not more than 12 months.

【Floor Life】

If the environment is $\leq 30^{\circ}\text{C}/60\%$, the floor life is as below:

MSL	Floor life(out of bag) at factory ambient $\leq 30^{\circ}\text{C}/60\% \text{ RH}$ or as stated
1	Unlimited at $\leq 30^{\circ}\text{C}/85\% \text{ RH}$
2	1 year
2a	4 weeks

MSL	Floor life(out of bag) at factory ambient $\leq 30^{\circ}\text{C}/60\% \text{ RH}$ or as stated
3	168 hours
4	72 hours
5	48 hours
5a	24 hours
6	Mandatory bake before use, must be reflowed within the time limit specified on the label

Table4-3 Floor life diagram

【moisture sensitive product usage】

If the product continuous or cumulative exposure under the $\leq 30^{\circ}\text{C}/60\% \text{ RH}$ environment more than 12 hours, it is recommended to rebake and then vacuum packing with moisture-proof agent.

If the product continuous or cumulative exposure under the $\leq 30^{\circ}\text{C}/60\% \text{ RH}$ environment less than 12 hours, it is unneeded to rebake but recommended to replace the moisture-proof agent.

Please also refer to **JEDEC J-STD-033A** for more rules.

4.2.3. Rebake

【Scope】

For the moisture sensitive products which need rebaked.

【Rebake reference table】

Moisture Sensitivity Level	Baking conditions
4	125°C/12 hours
3	125°C/8 hours
1	NA

Table4-4 Rebake reference table

5. Electrical Performance

5.1. Extreme working conditions

Permanent damage may occur when the chip operates at the maximum rating beyond the limit operating conditions. The operation shall be limited to the conditions given in the "recommended operating conditions" section. Working under extreme working conditions for a long time may affect the reliability of the equipment. The chip junction temperature exceeds the destructive junction temperature, which may cause physical damage to the chip.

Parameters	Symbols	Range	Unit
supply voltage	0V9	-0.2 to +1.17	V
	1V5	-0.2 to +1.8	
	1V8	-0.2 to +2.16	
	3V3	-0.2 to +3.63	
Destructive junction temperature	TJ	125	°C

Table5-1 Extreme working conditions (VSS=0V)

5.2. Recommended working conditions

Parameters	Symbols	Requirements			Unit
		Minimum Value	Typical Value	Maximum Value	
supply voltage	0V9	TBD	0.9	TBD	V
	1V5	1.425	1.5	1.575	
	1V8	1.71	1.8	1.89	
	3V3	3.135	3.3	3.465	
Environment temperature	TA	-20	-	70	°C
Destructive junction temperature	TJ	-	-	105	°C

Table5-2 Recommended working conditions

5.3. DC electrical parameters

The DC electrical parameters of GK7206V10 is as below:

Parameters	Symbols	Condition	Minimum Value	Typical Value	Maximum Value	Unit
3.3V mode Post-driver voltage	VDDPST3318	IO voltage =3.3V	3.135	3.3	3.465	V
High level output voltage	VOH		2.4	-	-	
Low level output voltage	VOL		-	-	0.4	
High level input voltage	VIH		2	-	3.465	
Low level input voltage	VIL		-0.3	-	0.8	
High level output voltage	VOH	IO voltage =1.8V	1.3	-	-	
Low level output voltage	VOL		-	-	0.45	
High level input voltage	VIH		1.2	-	1.89	
Low level input voltage	VIL		-0.3	-	0.6	

Table5-3 DC electrical parameters

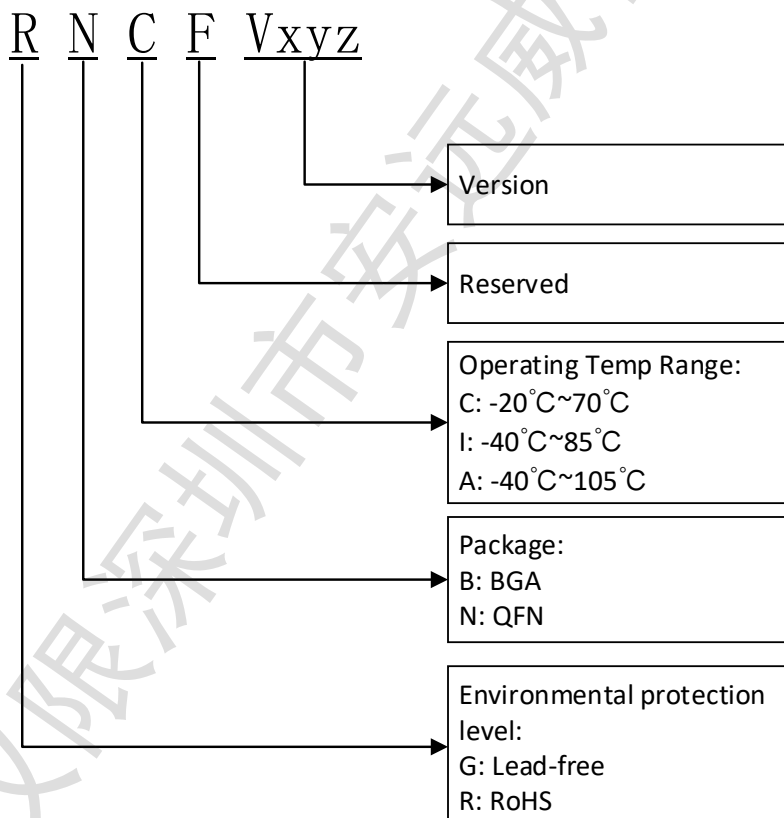
6. Ordering Information

6.1. Chipset mark & definition

Chipset mark



Extension code definition



7. RoHS Declare

All the GK7206V10 products are RoHS products.

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