MS7200

HDMI Receiver to Digital Output

Datasheet

MacroSilicon Release For 深圳市视品数字技术有限公司 Internal Use Only

The information contained herein is the exclusive property of MacroSilicon. Distribution, duplication or disclosure of such information or portions of information is not permitted without the permission of MacroSilicon.

Tel:0551-65317870 Fax:0551-65314133 Web:www.macrosilicon.com Add: North 9F, Building B1, Innovation Industrial Park, NO.800 Wang Jiang Xi Road, Hi-Tech Zone, Heifei, Anhui, China

General Description

The MS7200 is an advanced HDMI receiver compliant with HDMI 1.4b and 1.4b 3D specification, supporting output video format up to 4K resolution and 30Hz, with a high speed TMDS core running up to 300MHz. The MS 7200 provides efficient color space conversion which can receive RGB or YCBCR video data and send video data in RGB or YCBCR format.

The MS7200 supports HD audio transmission through IIS or SPDIF interface. SPDIF interface can support the transmission of compressed audio compliant with IEC61937 and that of High-Bit-audio with sample frame rate up to 768K.

An integrated EDID can be programmed at the time of manufacture using IIC interface. IIC slave address is decided by the SA pin. When SA pin is pull-up or floating, the slave address is 0xB2; when connected to GND, the slave address is 0x56.

Features

HDMI Receiver

- HDMI 1.4b/DVI 1.0
- HDCP 1.4
- TMDS clock up to 300MHz
- HDMI 3D format
- High Bit Audio（HBR） format
- Internal HDCP engine
- Internal CEC engine
- Programmable EDID buffer

Digital Video Output

- 24-bit RGB/YUV444 format
- 8/16-bit YUV422 format
- DDR/SDR mode
- Channel swap and MSB/LSB swap
- Support BT.601,BT656,BT.1120,BTA-T1004 digital format
- Support separate SYNC and embedded SYNC

Video Process

- Color space conversion
- Up/down sampling betweenYUV444 and YUV422
- 10/12-bit to 8-bit deep color conversion

Digital Audio Output

- Two IIS interface output
- Channel swap
- IIS sample rate up to 192KHz
- IIS Sample size up to 24 bit
- SPDIF output with PCM and compressed audio format

System

- IIC interface
- External 27MHz crystal
- INT# pin
- Chip slave address selection

Power

- Widely voltage digital I/O from 1.8V to 3.3V
- 1.2V Core Power

MacroSilicon Release For 深圳市视品数字技术有限公司 Internal Use Only

Tel:0551-65317870 Fax:0551-65314133 Web:www.macrosilicon.com Add: North 9F, Building B1, Innovation Industrial Park, NO.800 Wang Jiang Xi Road, Hi-Tech Zone, Heifei, Anhui, China

Package

- MS7200 QFN76

Applications

- Video Converter/ Set-Top-Box
- Car Infotainment Device
- Portable/ Desktop Visualizer

MacroSilicon Release For
深圳市视品数字技术有限公司
Internal Use Only

Tel:0551-65317870 Fax:0551-65314133 Web:www.macrosilicon.com Add: North 9F, Building B1, Innovation Industrial Park, NO.800 Wang Jiang Xi Road, Hi-Tech Zone, Heifei, Anhui, China

Table of Contents

MacroSilicon Release For 深圳市视晶数字技术有限公司 Internal Use Only

Tel:0551-65317870 Fax:0551-65314133 Web:www.macrosilicon.com Add: North 9F, Building B1, Innovation Industrial Park, NO.800 Wang Jiang Xi Road, Hi-Tech Zone, Heifei, Anhui, China

Function Block Diagram

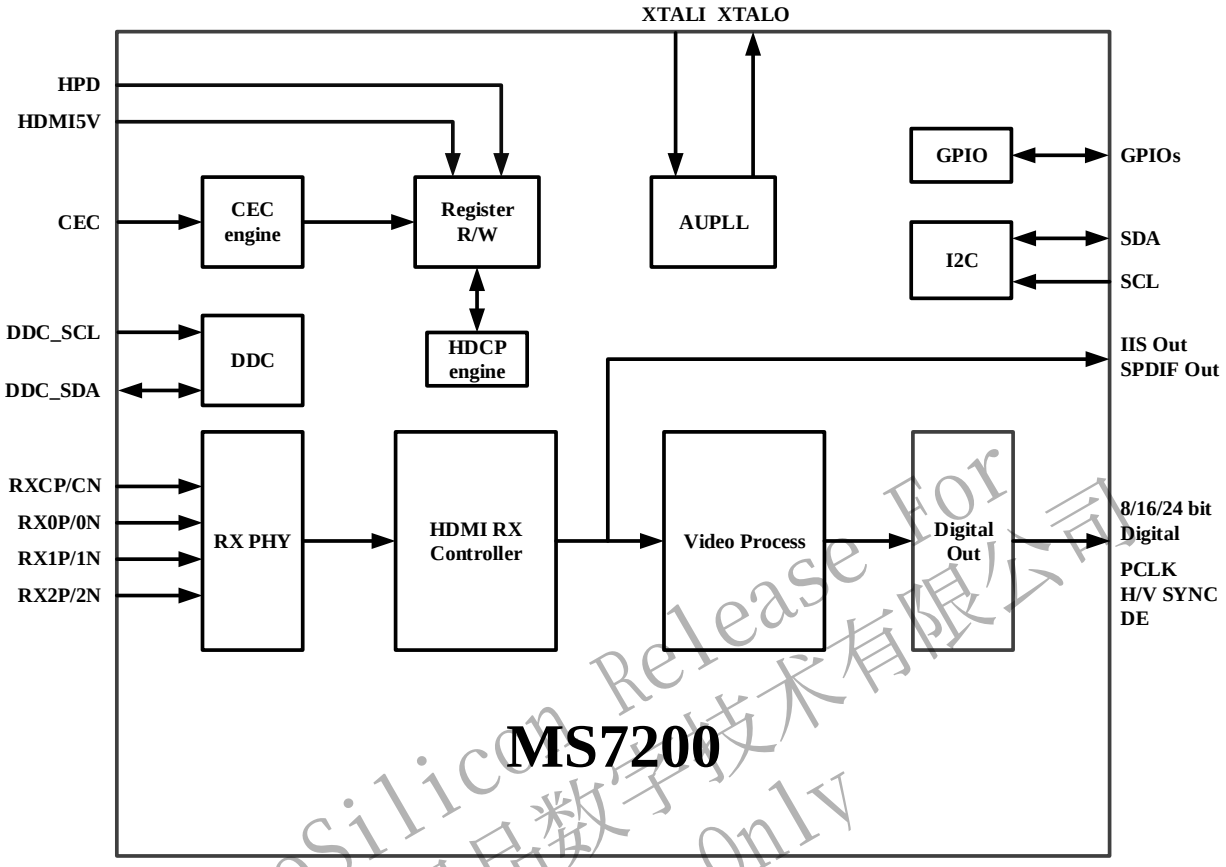


Figure 1. Function Block Diagram Format

MacroSilicon Release For 深圳市视晶数字技术有限公司 Internal Use Only

Tel:0551-65317870 Fax:0551-65314133 Web:www.macrosilicon.com Add: North 9F, Building B1, Innovation Industrial Park, NO.800 Wang Jiang Xi Road, Hi-Tech Zone, Heifei, Anhui, China

Function Description

Digital output module description

Table 1. Video digital output format

Color Space	Format	Bit	Sample Mode	H/V Mode	PCLK（MHz）			
					480P	720P	1080P	4K
RGB	4:4:4	24	SDR	H/V separate	27	74.25	148.5	297
		24	DDR	H/V separate	13.5	37.125	74.25	148.5
YUV	4:4:4	24	SDR	H/V separate	27	74.25	148.5	297
		24	DDR	H/V separate	13.5	37.125	74.25	148.5
	4:2:2	16	SDR	H/V separate	27	74.25	148.5	297
			DDR	H/V separate	13.5	37.125	74.25	148.5
			SDR	H/V embedded	27	74.25	148.5	297
			DDR	H/V embedded	13.5	37.125	74.25	148.5
		8	SDR	H/V separate	54	148.5		
			DDR	H/V separate	27	74.25	148.5	
			SDR	H/V embedded	54	148.5		
			DDR	H/V embedded	27	74.25	148.5	

MacroSilicon Release For 深圳市视品数字技术有限公司 Internal Use Only

Tel:0551-65317870 Fax:0551-65314133 Web:www.macrosilicon.com Add: North 9F, Building B1, Innovation Industrial Park, NO.800 Wang Jiang Xi Road, Hi-Tech Zone, Heifei, Anhui, China

Table 2. Video digital out interface

DOUT IO	RGB444	YUV444	16B-YUV422		8B-YUV422	
	24B-444	24B-444	1st edge	2st edge	1st edge	2st edge
D0	B0	CB0				
D1	B1	CB1				
D2	B2	CB2				
D3	B3	CB3				
D4	B4	CB4				
D5	B5	CB5				
D6	B6	CB6				
D7	B7	CB7				
D8	G0	Y0	Y0	Y0	C0	Y0
D9	G1	Y1	Y1	Y1	C1	Y1
D10	G2	Y2	Y2	Y2	C2	Y2
D11	G3	Y3	Y3	Y3	C3	Y3
D12	G4	Y4	Y4	Y4	C4	Y4
D13	G5	Y5	Y5	Y5	C5	Y5
D14	G6	Y6	Y6	Y6	C6	Y6
D15	G7	Y7	Y7	Y7	C7	Y7
D16	R0	CR0	CB0	CR0		
D17	R1	CR1	CB1	CR1		
D18	R2	CR2	CB2	CR2		
D19	R3	CR3	CB3	CR3		
D20	R4	CR4	CB4	CR4		
D21	R5	CR5	CB5	CR5		
D22	R6	CR6	CB6	CR6		
D23	R7	CR7	CB7	CR7		

MacroSilicon Release For 深圳市极品数字技术有限公司 Internal Use Only

Tel:0551-65317870 Fax:0551-65314133 Web:www.macrosilicon.com Add: North 9F, Building B1, Innovation Industrial Park, NO.800 Wang Jiang Xi Road, Hi-Tech Zone, Heifei, Anhui, China

PIN Map

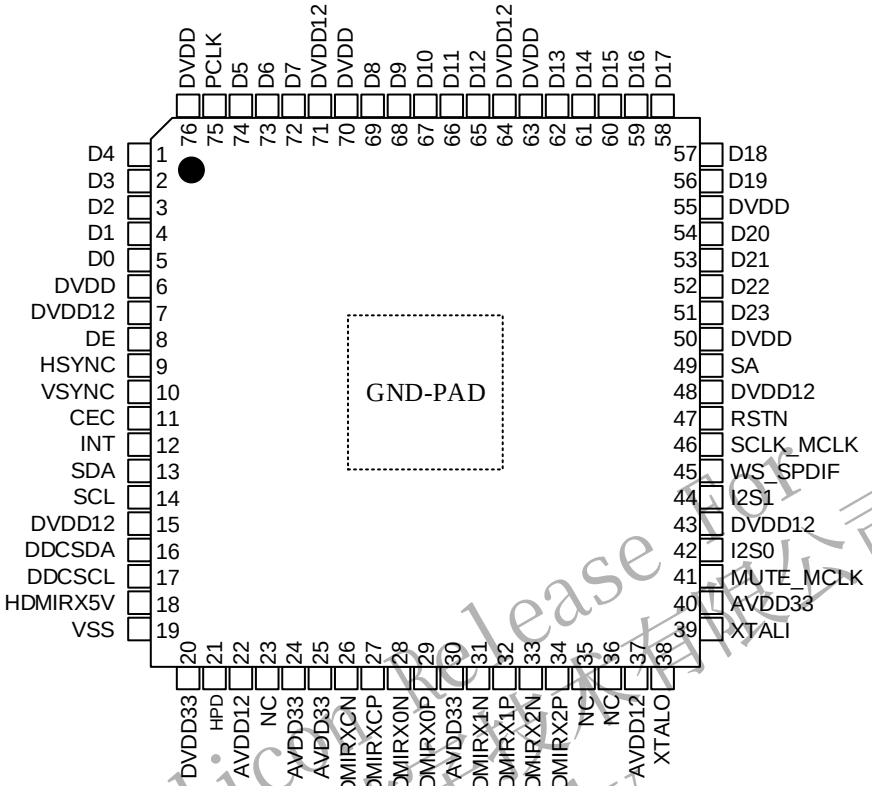


Figure 2. MS7200 Package Top View

MacroSilicon 深圳市视晶被授权使用 Internal Use Only release

Tel:0551-65317870 Fax:0551-65314133 Web:www.macrosilicon.com Add: North 9F, Building B1, Innovation Industrial Park,
NO.800 Wang Jiang Xi Road, Hi-Tech Zone, Heifei, Anhui, China

PIN Description

Table 3. PIN Description

Pin Name	Pin #	Type	Description
System			
RSTN	47	DI	External reset in, active low
SCL	14	DI	Serial bus clock
SDA	13	DIO	Serial bus data
INT	12	DO	Interrupt signal output
SA	49	DI	Slave address select
XTALI	39	AI	Crystal clock input
XTALO	38	AO	Crystal clock output
E-PAD	77		VSS
NC	23,35,36		Not connected
HDMI Input			
HDMIRXCN	26	AI	HDMI receiver negative clock
HDMIRXCP	27	AI	HDMI receiver positive clock
HDMIRX0N	28	AI	HDMI receiver negative data0
HDMIRX0P	29	AI	HDMI receiver positive data0
HDMIRX1N	31	AI	HDMI receiver negative data1
HDMIRX1P	32	AI	HDMI receiver positive data1
HDMIRX2N	33	AI	HDMI receiver negative data2
HDMIRX2P	34	AI	HDMI receiver positive data2
CEC	11	DIO	HDMI CEC channel
DDCSDA	16	DIO	HDMI DDC serial data
DDCSCL	17	DI	HDMI DDC serial clock
HDMIRX5V	18	DI	HDMI 5V signal input
HPD	21	DIO	HDMI hot plug detect
Digital Output			
D0	5	DO	Video parallel data0
D1	4	DO	Video parallel data1
D2	3	DO	Video parallel data2
D3	2	DO	Video parallel data3
D4	1	DO	Video parallel data4
D5	74	DO	Video parallel data5
D6	73	DO	Video parallel data6
D7	72	DO	Video parallel data7
D8	69	DO	Video parallel data8

MacroSilicon Release For Internal Use only 深圳市视晶数字技术有限公司

Tel:0551-65317870 Fax:0551-65314133 Web:www.macrosilicon.com Add: North 9F, Building B1, Innovation Industrial Park, NO.800 Wang Jiang Xi Road, Hi-Tech Zone, Heifei, Anhui, China

Pin Name	Pin #	Type	Description
D9	68	DO	Video parallel data9
D10	67	DO	Video parallel data10
D11	66	DO	Video parallel data11
D12	65	DO	Video parallel data12
D13	62	DO	Video parallel data13
D14	61	DO	Video parallel data14
D15	60	DO	Video parallel data15
D16	59	DO	Video parallel data16
D17	58	DO	Video parallel data17
D18	57	DO	Video parallel data18
D19	56	DO	Video parallel data19
D20	54	DO	Video parallel data20
D21	53	DO	Video parallel data21
D22	52	DO	Video parallel data22
D23	51	DO	Video parallel data23
DE	8	DO	Data enable signal
HSYNC	9	DO	Horizontal SYNC signal
VSYNC	10	DO	Vertical SYNC signal
PCLK	75	DO	Pixel clock
SCLK_MCLK	46	DO	IIS serial clock or master clock
WS_SPDIF	45	DO	IIS L/R clock or S/PDIF output
I2SDATA1	44	DO	IIS serial data1
I2SDATA0	42	DO	IIS serial data0
MUTE_MCLK	41	DIO	IIS master clock or Mute signal output
Power and Ground			
DVDD	6,50,55,63,70, 76	P	Digital I/O power
DVDD33	20	P	HDMI Digital I/O power
AVDD33	24,25,30,40	P	Analog power
DVDD12	7,15,43, 48,64,71	P	Core power
AVDD12	22,37	P	Analog power
VSS	19	G	Ground

Table 4. Abbreviation of Pin Description

Abbreviation	Description
AI	Analog Input
AO	Analog Output
DI	Digital Input

Macrosilicon Release For Internal Use Only
深圳市视晶数字技术有限公司

Tel:0551-65317870 Fax:0551-65314133 Web:www.macrosilicon.com Add: North 9F, Building B1, Innovation Industrial Park, NO.800 Wang Jiang Xi Road, Hi-Tech Zone, Heifei, Anhui, China

DIO	Digital Bi-direction
P	Power
G	Ground
NC	No Connect

Electrical Characteristics

Absolute Maximum Ratings

Table 5. Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Ambient Operating Temperature	TA	0 to 70	℃
Storage Temperature	Tsto	-65 to 150	℃
ESD Ratings	Vsed		
Human Body Model		2000	V
Machine Model		200	V

Note1：Stresses above those listed in Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and does not imply functional operation of the device. Exposure to Absolute Maximum Ratings for extended periods may affect device reliability.

ESD CAUTION: Electrostatic charges accumulate on the human body and test equipment and can discharge without detection. Although this product features has dedicated ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.

Macrosilicon Release For 深圳市视芯数字技术有限公司 Internal Use Only

DC Characteristics

Table 6. DC Characteristics

Parameter	Symbol	MIN	TYP	MAX	Unit
Analog 3.3V Power	AVDD33	2.97	3.3	3.63	V
Digital I/O Power	DVDD-3.3	2.97	3.3	3.63	V
	DVDD-2.5	2.25	2.5	2.75	V
	DVDD-1.8	1.7	1.8	1.9	V
HDMI I/O Power	DVDD33	2.97	3.3	3.63	V
Core Power	DVDD12	1.08	1.2	1.32	V
Analog 1.2V Power	AVDD12	1.08	1.2	1.32	V
Analog 3.3V Power	I_{AVDD33}	70.57	73.03	75.57	mA
Digital I/O Power	$I_{DVDD-3.3}$	22.5	26.01	30.45	mA

Tel:0551-65317870 Fax:0551-65314133 Web:www.macrosilicon.com Add: North 9F, Building B1, Innovation Industrial Park, NO.800 Wang Jiang Xi Road, Hi-Tech Zone, Heifei, Anhui, China

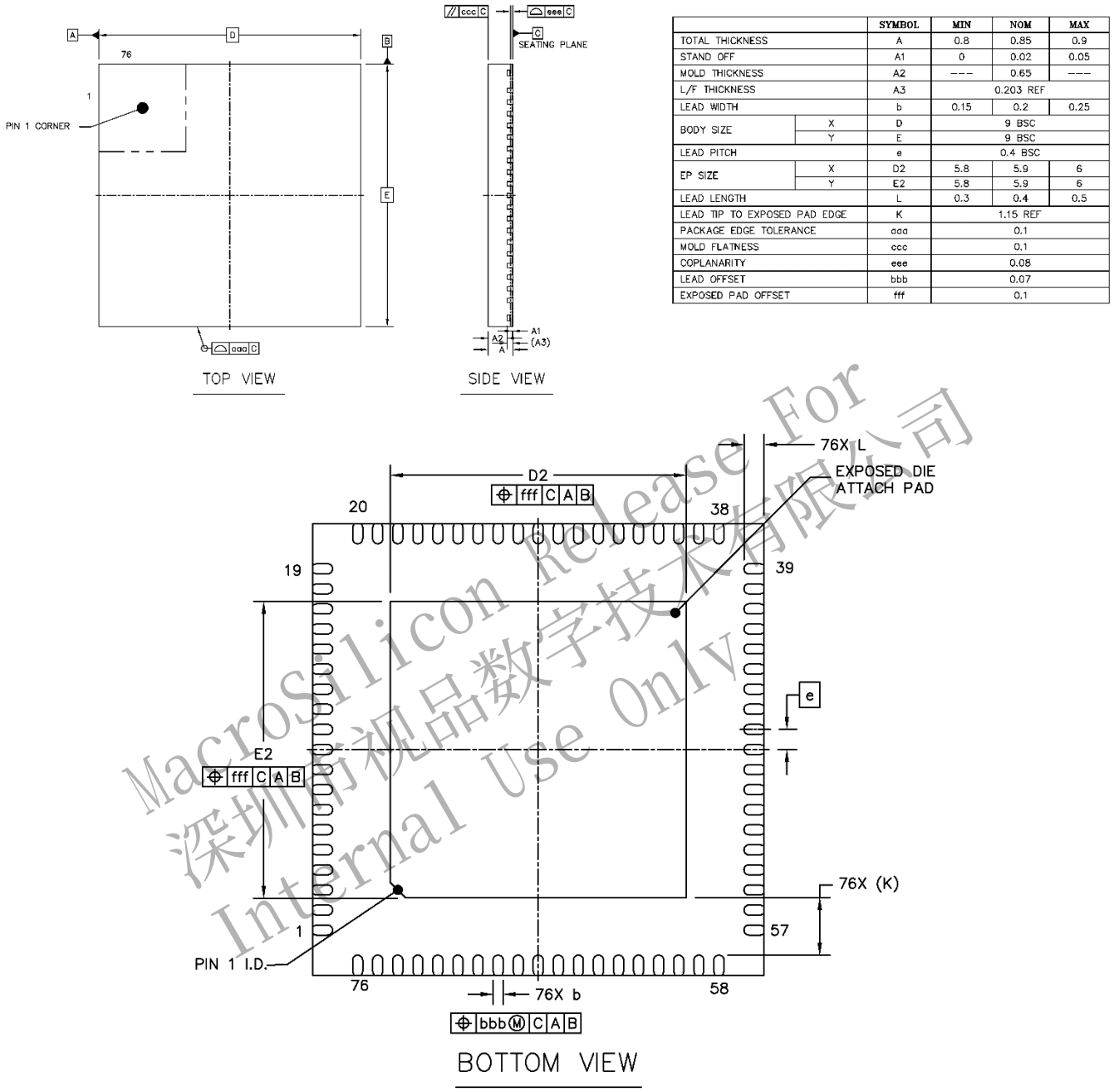
	$I_{DVDD-2.5}$	16.75	20.1	23.8	mA
	$I_{DVDD-1.8}$	11.13	14.02	17.64	mA
HDMI I/O Power	I_{DVDD33}	0.06	0.09	0.13	mA
Core Power	I_{DVDD12}	44.85	50.76	55.38	mA
Analog 1.2V Power	I_{AVDD12}	59.22	66.05	72.09	mA

Test condition: 1080P60Hz HDMI input.

MacroSilicon Release For
深圳市视品数字技术有限公司
Internal Use Only

Tel:0551-65317870 Fax:0551-65314133 Web:www.macrosilicon.com Add: North 9F, Building B1, Innovation Industrial Park,
NO.800 Wang Jiang Xi Road, Hi-Tech Zone, Heifei, Anhui, China

Package Outline



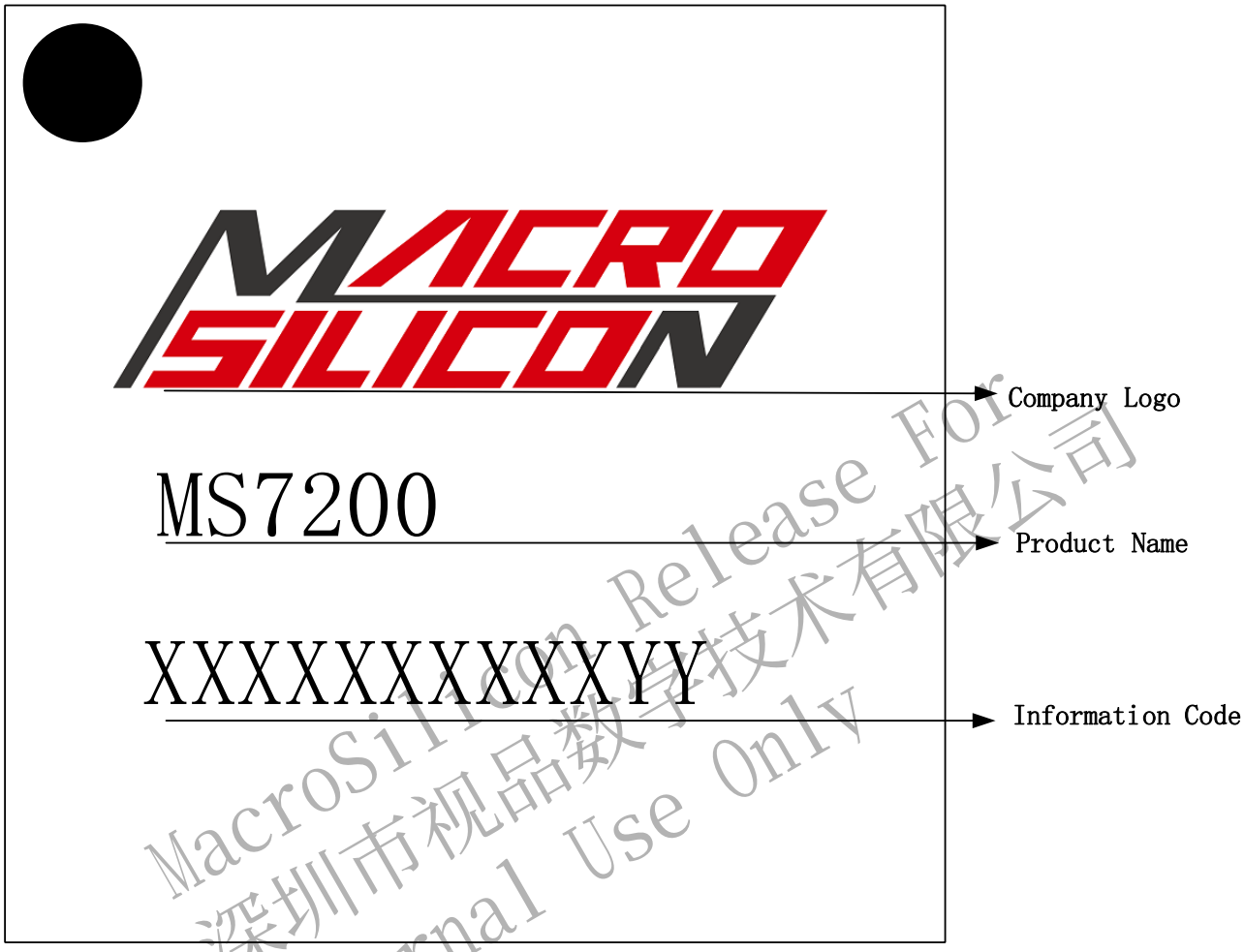
		SYMBOL	MIN	NOM	MAX
TOTAL THICKNESS		A	0.8	0.85	0.9
STAND OFF		A1	0	0.02	0.05
MOLD THICKNESS		A2	---	0.65	---
L/F THICKNESS		A3		0.203 REF	
LEAD WIDTH		b	0.15	0.2	0.25
BODY SIZE	X	D		9 BSC	
	Y	E		9 BSC	
LEAD PITCH		e		0.4 BSC	
EP SIZE	X	D2	5.8	5.9	6
	Y	E2	5.8	5.9	6
LEAD LENGTH		L	0.3	0.4	0.5
LEAD TIP TO EXPOSED PAD EDGE		K		1.15 REF	
PACKAGE EDGE TOLERANCE		aaa		0.1	
MOLD FLATNESS		ccc		0.1	
COPLANARITY		eee		0.08	
LEAD OFFSET		bbb		0.07	
EXPOSED PAD OFFSET		fff		0.1	

MacroSilicon Release For 深圳市视品数字技术有限公司 Internal Use Only

Figure 3. QFN76 Package Diagram

Tel:0551-65317870 Fax:0551-65314133 Web:www.macrosilicon.com Add: North 9F, Building B1, Innovation Industrial Park, NO.800 Wang Jiang Xi Road, Hi-Tech Zone, Heifei, Anhui, China

Top Mark



MacroSilicon Release For
深圳市视品数字技术有限公司
Internal Use Only

Figure 4. MS7200 Top Mark Diagram

Tel:0551-65317870 Fax:0551-65314133 Web:www.macrosilicon.com Add: North 9F, Building B1, Innovation Industrial Park,
NO.800 Wang Jiang Xi Road, Hi-Tech Zone, Heifei, Anhui, China

Revision History

Date	Version	Author	Comments
2020-12-8	V1.0	Wenhao Zhou	Initial Version

MacroSilicon Release For
深圳市视品数字技术有限公司
Internal Use Only

Tel:0551-65317870 Fax:0551-65314133 Web:www.macrosilicon.com Add: North 9F, Building B1, Innovation Industrial Park,
NO.800 Wang Jiang Xi Road, Hi-Tech Zone, Heifei, Anhui, China