

DESCRIPTION

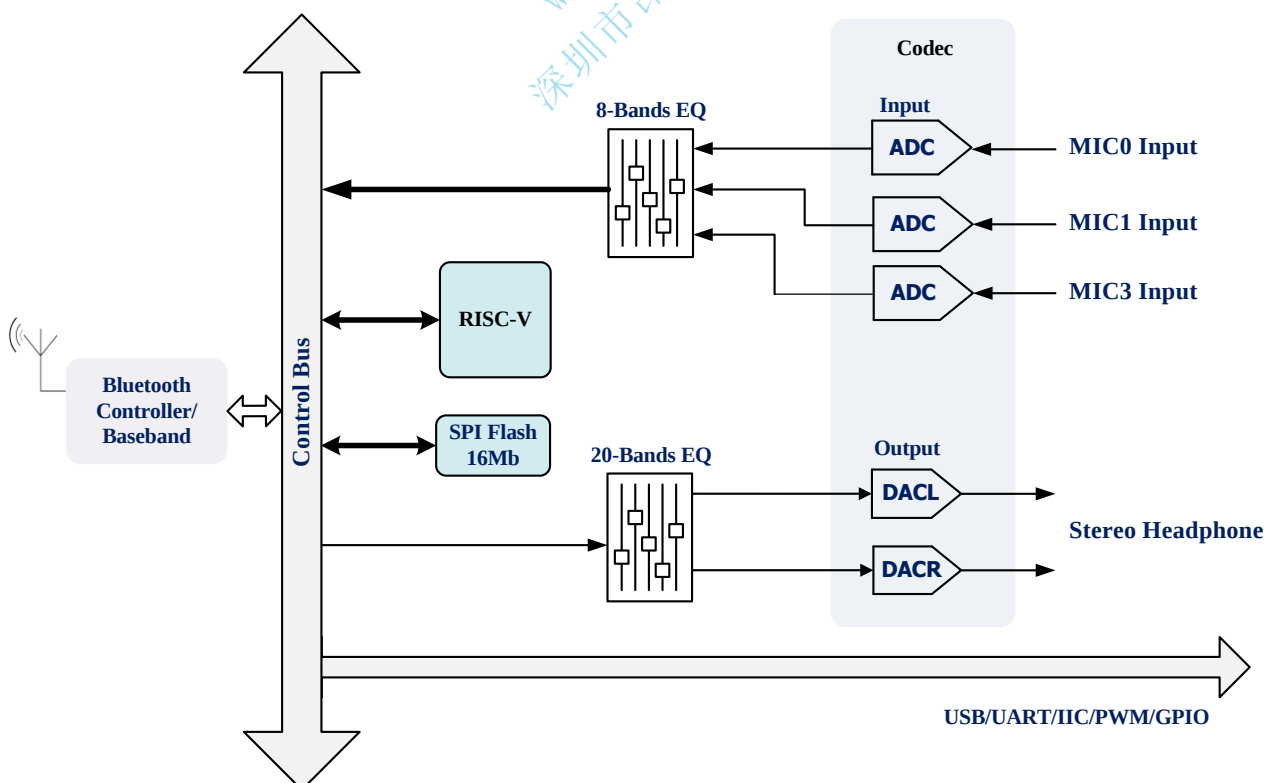
The CM2207 is a highly integrated single-chip Bluetooth audio solution targeting Bluetooth gaming headsets and wireless microphone markets with high performance and low power consumption.

CM2207 adopts RISC-V processor and integrates BT v6.0 to BT classic and 2.4G audio connection, which is fully backward compatible to the previous Bluetooth versions.

CM2207 owns a power management unit (PMU) to establish a stable power source and linear battery charger that allows CM2207 to recharge the battery over USB. With a rich set of interfaces such as USB, SPI, UART, I2C, PWM, capacitive touch key, CM2207 is able to accomplish various audio applications.

Besides, with implementing Cmedia Xear™ Sound Technology- Surround HP and AI noise cancellation, to provide users the best auditory experience at near end, and transmit good voice quality to far end by filtering out the annoying sounds around, like keyboard typing, mouse clicking, fan sound, fan blades running, etc.

BLOCK DIAGRAM



FEATURES

- 32bit RISC-V processor Core, typical speed: 140MHz
- Internal 16M bit flash
- Internal 408KB RAM for data and program
- Compliant with Bluetooth V6.0 (BR/EDR/BLE) specification
- Support Feedforward active noise cancellation (Feedforward ANC)
- TX Transmit Power 11dBm @ Basic Rate
- RX Sensitivity -95dBm @ EDR
- High performance stereo DAC with 122dB SNR, support differential mode.
- High performance ADC with 105dB SNR x 3ch
- Support Sample rate 8, 11.025, 12, 16, 22.05, 32, 44.1, 48 88.2, 96, 176.4 and 192 KHz
- Support USB 2.0 Full speed
- Support 10-bit SARADC x 14ch
- Build in IRTC
- Build in PMU (charger/buck/LDO)
- Support GPIO x16, UART, SPI, IIC, IIS interface
- Support GPIO wakeup or interrupt
- QFN-40 package (4 x 6 mm)

Release Notes

Revision	Date	Description
0.90	2026/07/02	First draft release

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1 Description and overview

The CM2207 is a highly integrated single-chip Bluetooth audio solution targeting Bluetooth gaming headsets and wireless microphone markets with high performance and low power consumption.

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CM2207 owns a power management unit (PMU) to establish a stable power source and linear battery charger that allows CM2207 to recharge the battery over USB. With a rich set of interfaces such as USB, SPI, UART, I2C, PWM, capacitive touch key, CM2207 is able to accomplish various audio applications.

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2 Features

2.1 Application Core and Memory

- 32-bit RISC-V processor core with DSP extension and integrated single-precision FPU
- Typical operating frequency 140 MHz
- 16 Mbit on-chip Flash for application code and audio assets
- 408 KB unified SRAM for code and data
- General-purpose DMA controller (GPDMA)

2.2 Bluetooth Radio

- Compliant with Bluetooth Core Specification v6.0 — supports Basic Rate(BR), Enhanced Data Rate(EDR), and Low Energy operation
- Transmit power up to 11 dBm (BR) and 8 dBm (EDR)
- Receiver sensitivity: -95.5 dBm (BR), -95 dBm (EDR), -99 dBm (BLE 1M), -96 dBm (BLE 2M)
- On-chip 24 MHz crystal oscillator interface

2.3 Proprietary 2.4 GHz Audio Link

- Low-latency 2.4 GHz audio link suitable for gaming and wireless microphone applications, sharing the on-chip RF front-end with the Bluetooth radio

2.4 Audio Subsystem

- High-performance stereo audio DACs
- DAC Signal-to-Noise Ratio: up to 122 dB (DRE on, A-weighted, 32 Ω , VCM = 0.9 V)
- DAC Sample rate range: 8 kHz to 192 kHz
- Three audio ADC channels with single-ended or differential MIC amplifier input

- ADC SNR: up to 105 dB (differential mode); sample rate up to 384 kHz
- Programmable digital audio EQ
- Hardware audio codec engine: SBC, AAC, MP3 (MPEG-1 Layer 1/2/2.5) decoding

2.5 Voice and DSP Acceleration

- Feed-forward noise cancellation
- Three-microphone DNN-based environment noise cancellation (ENC) for the uplink path
- Far-end noise suppression (NR) for downlink listening comfort
- Acoustic echo cancellation (AEC)
- Packet loss concealment (PLC), and CVSD codec acceleration
- Neural-network processing unit (NPU) for low-power inference
- Two programmable accelerator PACC) support a variety of filters, including FIR, BQ, DRC frequency shifter and dynamics EQ
- Support Reel Discrete Fourier Transform for NFFT=128 /2 56 512 1024 (RDFT)

2.6 Peripherals and Connectivity

- Full-speed USB 2.0 host/device controller
- Three full-duplex standard UART channels and one high-speed UART with CTS/RTS
- Two SPI controllers with master and slave operation
- One I²S controller with master and slave operation
- One I²C controller with master and slave operation
- SD memory-card host controller
- IR receiver
- 14-channel 10-bit SARADC
- Two 16-bit and three 32-bit general-purpose timers, plus three 32-bit multifunction timers
- Independent watchdog timer
- Capacitive touch-key controller
- Internal real-time clock (IRTC)

2.7 General-Purpose I/O

- Flexible GPIO pins with Programmable pull up and pull down resistors
- Per-pin programmable internal pull-up and pull-down resistors (three selectable values)
- Support GPIO wakeup or interrupt

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2.8 Power Management

- Integrated Li-ion battery charger with USB power input
- Two switching buck converters (VDDCORE and VDDBT) for high-efficiency operation
- Multiple LDO regulators (VDDIO, VDDBT, VDDCORE) for low-noise analog domains
- Multiple power-domain control with software-managed sleep, idle, and shutdown modes

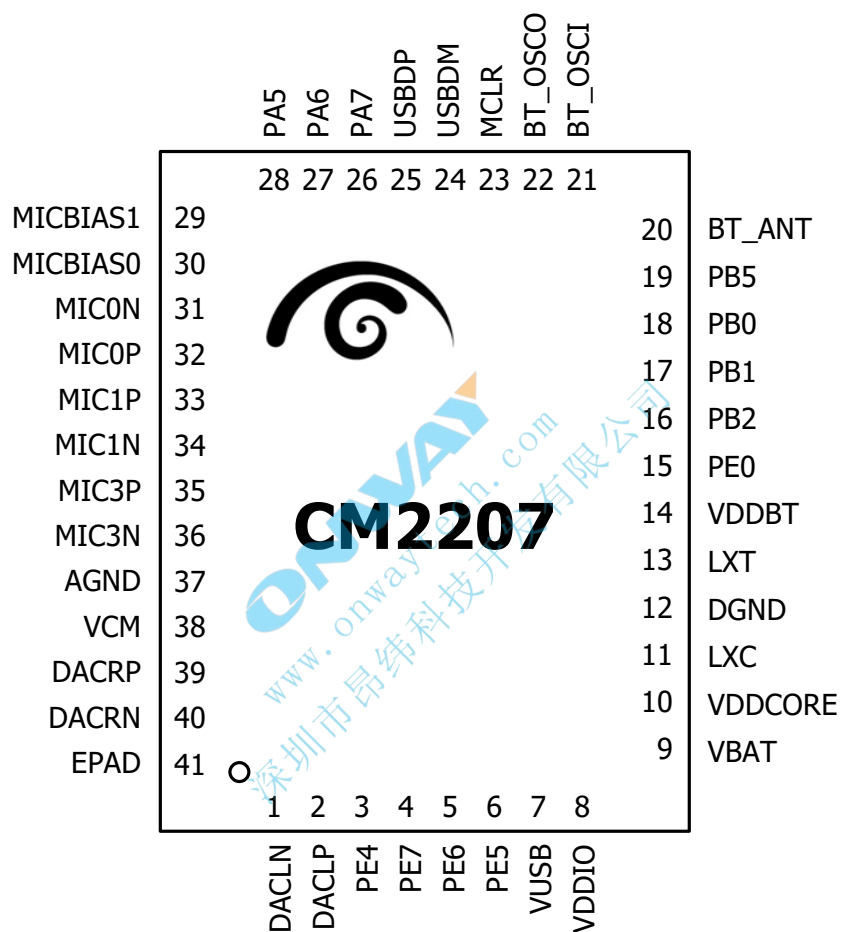
2.9 Target Applications

- Bluetooth and 2.4 GHz wireless gaming headsets
- Wireless microphone systems and lavalier transmitters/receivers
- Voice-enabled smart speakers and IoT audio devices

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3 Pin assignment

3.1 Pin-out diagram



3.2 Pin description

Pin No.	Name	Type	Drive(mA)	Function
1	DACLN	A	/	DAC Left Channel differential negative output
2	DACLP	A	/	DAC Left Channel differential positive output
3	PE4	I/O	8/32	PE4(General purpose input/output)
4	PE7	I/O	8/32	PE7(General purpose input/output)
5	PE6	I/O	8/32	PE6(General purpose input/output)
6	PE5	I/O	8/32	PE5(General purpose input/output)
7	VUSB	PWR	/	VUSB power input
8	VDDIO	PWR	/	VDDIO power output
9	VBAT	PWR	/	VBAT power input
10	VDDCORE	PWR	/	VDDCORE power
11	LXC	PWR	/	Inductor interface for VDDCORE buck
12	DGND	GND	/	Digital Ground
13	LXT	PWR	/	Buck for BT
14	VDDBT	PWR	/	BT power
15	PE0	I/O	8/32	PE0(General purpose input/output)
16	PB2	I/O	8/32	PB2/Touch3(General purpose input/output)/ IIC_DAT
17	PB1	I/O	8/32	PB1/Touch2(General purpose input/output)/ IIC_CLK
18	PB0	I/O	8/32	PB0(General purpose input/output)/Touch1
19	PB5	I/O	8/32	PB5(General purpose input/output)/ Main wakeup source-WK0/ 10S Reset/ Touch0
20	BT_ANT	A	/	BT ANT
21	BT_OSCI	A	/	24M OSC input
22	BT_OSCO	A	/	24M OSC output
23	MCLR	A	/	Manual reset
24	USBDM	I/O	8/32	USB data negative (USB D- signal).
25	USBDP	I/O	8/32	USB data positive (USB D+ signal)/ PB3 for FW update use.
26	PA7	I/O	8/32	PA7/ Touch4(General purpose input/output)/ SPI1DO
27	PA6	I/O	8/32	PA6/ Touch5(General purpose input/output)/ SPI1CLK
28	PA5	I/O	8/32	PA5(General purpose input/output)/

				SPI1DI
29	MICBIAS1	I/O	8/32	Microphone bias1
30	MICBIAS0	I/O	8/32	Microphone bias0
31	MIC0N	A	/	Microphone0 negative input
32	MIC0P	A	/	Microphone0 positive input
33	MIC1P	A	/	Microphone1 positive input
34	MIC1N	A	/	Microphone1 negative input
35	MIC3P	A	/	Microphone3 positive input
36	MIC3N	A	/	Microphone3 negative input
37	AGND	GND	/	Analog Ground
38	VCM	A	/	DAC VCM
39	DACRP	A	/	DAC Right Channel differential positive output
40	DACRN	A	/	DAC Right Channel differential negative output
41	EPAD	GND	/	E-pad

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4 Electrical Characteristics

4.1 Absolute Maximum Ratings

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VUSB	Charger Voltage input	-0.3		5.5	V	
VBAT	Voltage input	-0.3		4.5	V	
VI	Input Voltage	-0.3		3.6	V	
TA	Operating ambient temperature	-40		+85	°C	
TS	Storage temperature	-65		+150	°C	

4.2 Recommended Operational Conditions

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VUSB	Charger Voltage input	4.6	5.0		V	
VBAT	Voltage input	3.0	3.7		V	
TA	Operating ambient temperature		25		°C	

4.3 VDDIO LDO Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VDDIO	Voltage output	2.4	3.3	3.6	V	Light Loading condition Step 0.1v
ΔV_{DDIO}	Output Mismatch 1-sigma	-	8.4	-	mV	VDDIO=3.3v
ILOAD	Maximum output current	-	-	150	mA	@VBAT=3.6v
ISC	Short Circuit Current Limit	-	-	120	mA	@VBAT=3.8v

4.4 VDDBT LDO Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VDDBT/BT_AVDD	Voltage output	0.6	1.35	2.15	V	Light Loading condition Step 0.05v
ΔV_{DDBT}	Output Mismatch 1-sigma	-	9	-	mV	VDDBT=1.35v
ILOAD	Maximum output current	-	-	100	mA	@VBAT=3.0v
ISC	Short Circuit Current Limit	-	-	320	mA	@VBAT=3.8v

4.5 VDDCORE LDO Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VDDCORE	Voltage output	-	0.8	-	V	Light-load; 25 mV step
ΔV_{DDCORE}	Output Mismatch 1-sigma	-	4.3	-	mV	VDDCORE=0.8v
ILOAD	Maximum output current	-	-	30	mA	@VBAT=3.6v
ISC	Short Circuit Current Limit	-	-	300	mA	@VBAT=3.8v

4.6 VDDBT BUCK Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VDDBT	Voltage output	0.6	1.35	2.15	V	Light-load; 50 mV step
Δ VVDDBT	Output Mismatch 1-sigma	-	6	-	mV	VDDBT=1.35v
ILOAD	Maximum output current	-	-	216	mA	@VBAT=3.8v
ISC	Short Circuit Current Limit	-	-	360	mA	@VBAT=3.8v

4.7 VDDCORE BUCK Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VDDCORE	Voltage output		0.8		V	Light Loading condition Step=0.025v
Δ VVDDCORE	Output Mismatch 1-sigma	-	5	-	mV	VDDCORE=0.8v
ILOAD	Maximum output current	-	-	216	mA	@VBAT=3.8v
ISC	Short Circuit Current Limit	-	-	360	mA	@VBAT=3.8v

4.8 IO Parameters

Symbol	Description	Related GPIO	Min	Typical	Max	Units	Conditions
VIL	Low-level input voltage		-0.3		0.99	V	VDDIO=3.3V
VIH	High-level input voltage		2.31		3.6	V	VDDIO=3.3V
Driver Ability 1	Output Driver Ability 1			32		mA	VDDIO=3.3V
Driver Ability 0	Output Driver Ability 0			8		mA	VDDIO=3.3V
RPUP0	Internal pull-up resistor 0		8	10	12	K Ω	
RPUP1	Internal pull-up resistor 1		0.24	0.3	0.36	K Ω	
RPUP2	Internal pull-up resistor 2		160	200	240	K Ω	
RPDN0	Internal pull-down resistor 0		8	10	12	K Ω	
RPDN1	Internal pull-down resistor 1		0.24	0.3	0.36	K Ω	
RPDN2	Internal pull-down resistor 2		160	200	240	K Ω	

4.9 Internal Resistor Characteristics

Port	General Output	High Drive	Internal Pull-Up Resistor (Ω)	Internal Pull-Down Resistor (Ω)	Comment
PA4-PA7 PB0-PB5 PE0, PE4-PE7 PF0-PF1	8mA	32mA	300/10K/200K	300/10K/200K	Internal pull-up/pull-down resistance accuracy +/-20%

4.10 Bluetooth Parameters

Characteristics	Min	Typical	Max	Unit	Conditions
Transmit Power@ Basic Rate	-	11		dBm	
Transmit Power@ EDR		8		dBm	
RMS DEVM	-	9.5	-	%	Maximum TX power 2-DH5 packet
Peak DEVM	-	20		%	
EDR Relative Transmit Power	-	-3	-	dB	
Sensitivity @ Basic Rate	-	-95.5	-	dBm	BER=0.1%, using DH1 packet
Sensitivity @ EDR	-	-95	-	dBm	BER=0.01%, using 2-DH5 packet
Sensitivity @ 1M BLE		-99		dBm	PER=30.8%, 37byte
Sensitivity @ 2M BLE		-96		dBm	PER=30.8%, 37byte

4.11 Power Consumption

Symbol	Description	Min	Typ	Max	Unit	Conditions
Power off	RX Headset	-	301	-	uA	2.4G Audio VBAT = 3.8V Loading = 32 ohm
Power on IDLE	RX Headset	-	4.64	-	mA	
Play 1K Sine wave	RX Headset	-	8.95	-	mA	

Symbol	Description	Min	Typ	Max	Unit	Conditions
Power off	TX Dongle	-	N/A	-	uA	2.4G Audio VBAT = 3.8V
Power on IDLE	TX Dongle	-	9.8	-	mA	
Play 1K Sine wave	TX Dongle	-	10.75	-	mA	

5 Audio performance

5.1 DAC audio quality @VCM=0.6V

Test conditions: Audio DAC Differential Mode, Sin -1Khz, BW=20-20KHz, A-Weighted, Stereo.

Parameter	Min	Typ	Max	Unit	Conditions
Output Level		750		mVrms	32 Ω
Output Level		650		mVrms	16 Ω
SNR		108.7		dB	32 Ω
SNR		107.8		dB	16 Ω
THD+N		-90		dB	32 Ω
THD+N		-90		dB	16 Ω
Noise Floor		2.7		μ Vrms	32 Ω
Noise Floor		2.6		μ Vrms	16 Ω
DNR		108.7		dB	DRE OFF
SNR		120		dB	DRE ON
DRE ON		0.78		μ Vrms	DRE ON

5.2 DAC audio quality @VCM=0.9V

Test conditions: Audio DAC Differential Mode, Sin -1KHz, BW=20-20KHz, A-Weighted, Stereo.

Parameter	Min	Typ	Max	Unit	Conditions
Output Level		1000		mVrms	32 Ω
Output Level		800		mVrms	16 Ω
SNR		111.5		dB	32 Ω
SNR		110.5		dB	16 Ω
THD+N		-90		dB	32 Ω
THD+N		-90		dB	16 Ω
Noise Floor		2.70		uVrms	32 Ω
Noise Floor		2.60		uVrms	16 Ω
DNR		111.5		dB	DRE OFF
SNR		122		dB	DRE ON
DRE ON		0.78		uVrms	DRE ON

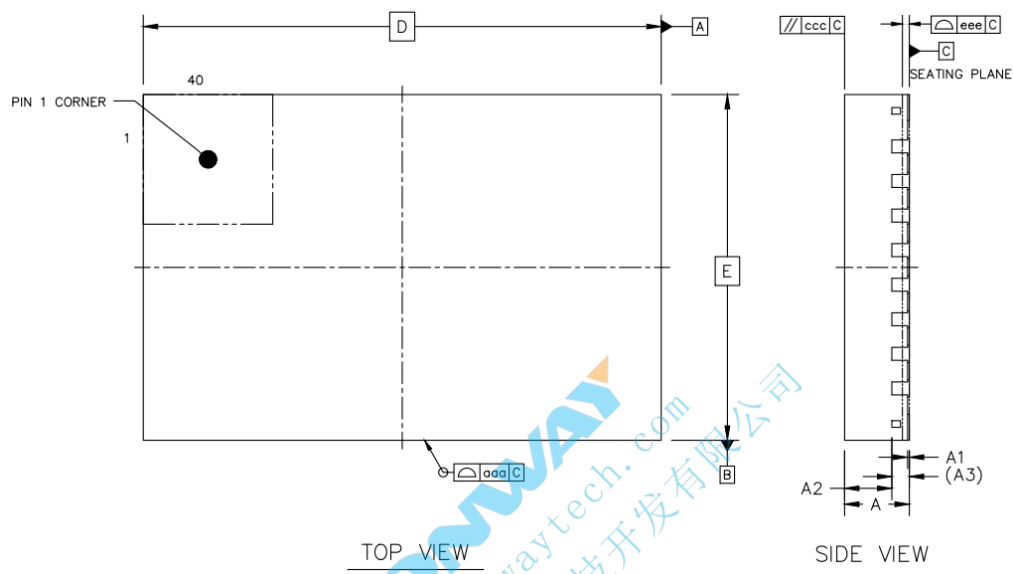
5.3 ADC audio quality

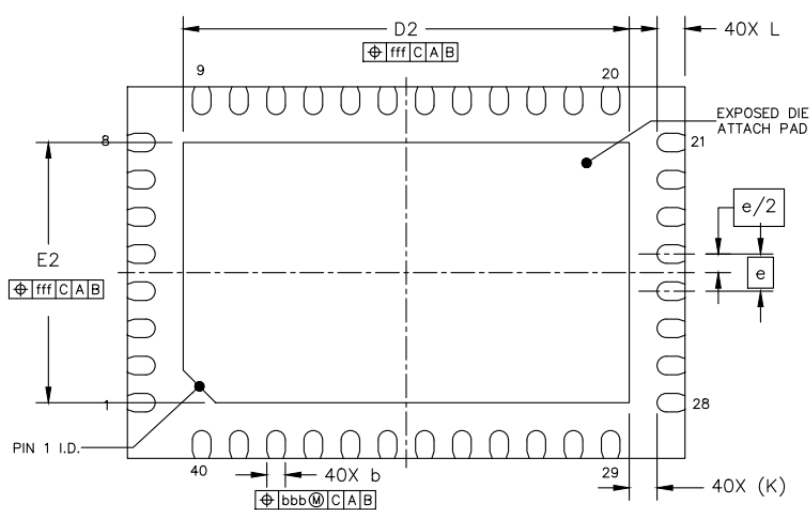
Mode	Sym	Characteristics	Min	Typ	Max	Unit	Conditions
ADC Single-ended Mode	Gain			6		dB	VCM cap=1uF Input -4dBV @ Fin=1KHz Gain = 6dB
	SNR			103		dB	
	THD+N			-74		dB	
	Input Range			-4		dBV	
ADC Differential Mode	Gain			6		dB	VCM cap=1uF Differential input Input -4dBV @ Fin=1KHz Gain=6dB
	SNR			105		dB	
	THD+N			-90		dB	
	Input Range	Maximum input voltage		-4		dBV	

6 Ordering Information

Product Name	Package Marking	Package Type	Transport Media	Storage Temperature
CM2207	CM2207	QFN-40 (4 x 6 mm) Green Package	Tape and Reel	-65 to 150 °C

7 Package dimensions(QFN-40 pin)



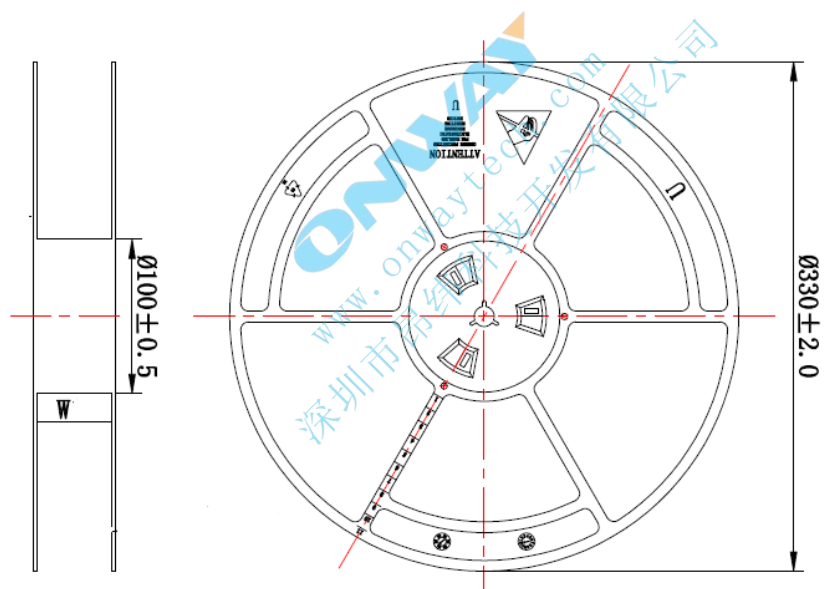
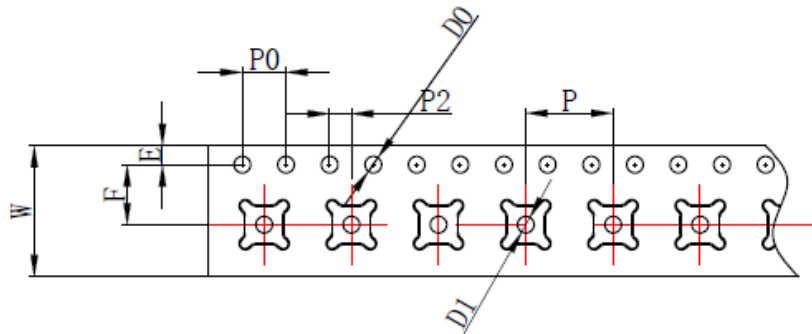


BOTTOM VIEW

	SYMBOL	MIN	NOM	MAX
TOTAL THICKNESS	A	0.7	0.75	0.8
STAND OFF	A1	0	0.02	0.05
MOLD THICKNESS	A2	---	0.55	---
L/F THICKNESS	A3	0.203 REF		
LEAD WIDTH	b	0.15	0.2	0.25
BODY SIZE	X	6 BSC		
	Y	4 BSC		
LEAD PITCH	e	0.4 BSC		
EP SIZE	X	D2	4.7	4.8
	Y	E2	2.7	2.8
LEAD LENGTH	L	0.2	0.3	0.4
LEAD TIP TO EXPOSED PAD EDGE	K	0.3 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		

8 Tape and Reel Information

Product Name	Package Pitch(P)	Hold Pitch(P0)	Reel Diameter	Reel Width
CM2207	8mm	4mm	330mm	12mm



9 Top Marking

Device Name: CM2207

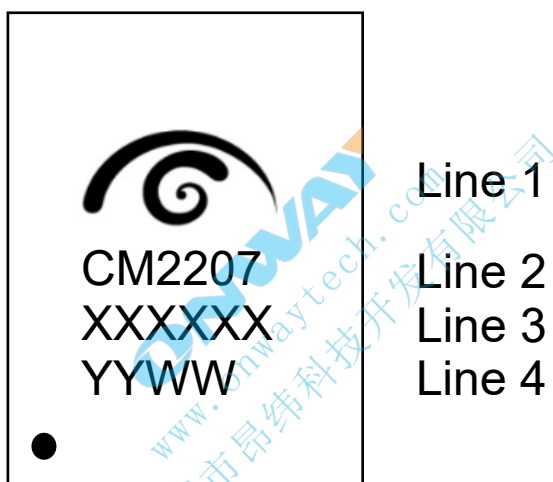
Package Type: QFN 40L 4*6 mm

Line 1: C-Media Logo

Line 2: Device Name

Line 3: Wafer Lot No.

Line 4: Date Code (YYWW)



— End of Datasheet —

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深圳市昂纬科技发展有限公司

C-MEDIA ELECTRONICS INC.
6F., 100, Sec. 4, Civil Boulevard, Taipei, Taiwan 106 R.O.C.
TEL : +886-2-8773-1100
FAX : +886-2-8773-2211
E-MAIL : sales@cmedia.com.tw

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