



CM6530N+CM7104

Demo Board User's Guide

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Revision Notes

Revision	Date	Description
1.0	2023/04/21	First draft

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SECTION 1 OVERVIEW

1.1 Introduction

The CM6530N is a low power USB 2.0 audio controller builds in 8051 for flexible applications. Accompany with ultra low power codec makes it suitable for low power headset, notebook/mobile docking and microphone applications. The internal 8051 can also be developed to different applications, such as Android Phone or idevice Accessories with special functions, such as HID buttons or LED control. The CM6530N is compatible with USB Audio Class 1.0 and USB 2.0 full-speed, Thus it can plug and play without additional software installation on the major operation systems. The I2S support 8~96 KHz sampling rate and 16/24bits resolution.

The CM6530N also integrates 512K Bytes flash (including 32KB F/W programming size) but requires few passive components to make a finish product. Thus it can save the total BOM cost and PCB area can be smaller.

The CM7104 is a highly-integrated Audio DSP plus CODEC system whose high-performance and low-power consumption make it ideal for a wide range of mobile systems, such as Tablet, Smartphone and Ultra-book.

The CM7104 DSP core, Tensilica HiFi EP, with extensive memory resources provides low-power advanced digital signal processing. Given that Tensilica HiFi core is widely used by many third-party software developers, it makes CM7104 create an extensive wide software reference design ecosystem, including multi-microphone advanced voice processing (NS, AEC...etc.), low power speech trigger and recognition, and high-quality well-known branding audio post-processing. The CM7104 integrates a fully-flexible digital mixing and routing with asynchronous sample rate converter (ASRC) to support

the DSP core for wide use case flexibility.

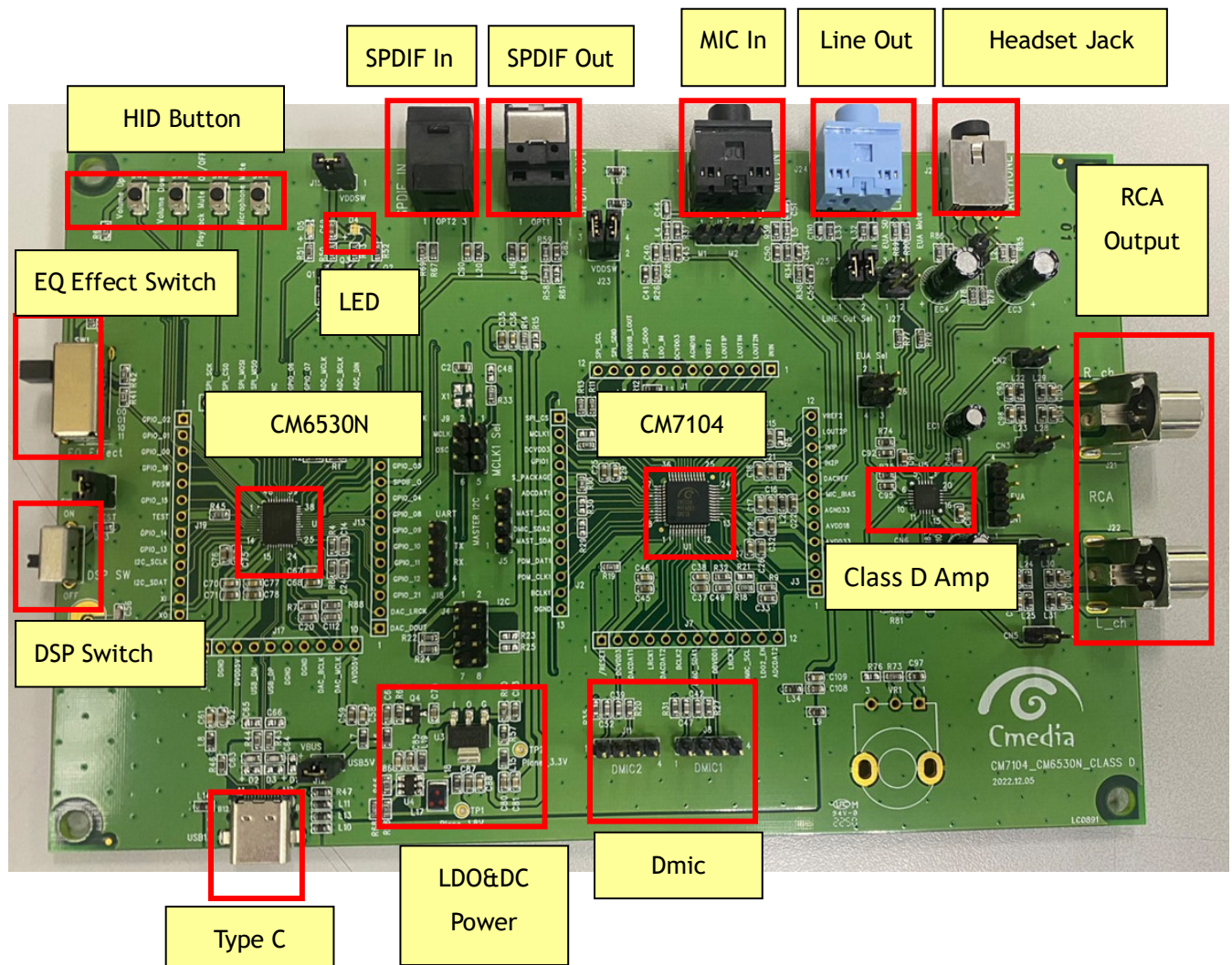
Two digital audio interfaces are provided, supporting I2S/PCM/TDM audio formats. Two differential analog microphone inputs and up to four digital microphone inputs can accept audio signals from multiple microphone or line input sources. Two differential line outputs can provide high performance analog audio signal outputs for connecting high-quality amplification systems.

The CM7104 also combines a variety of low-power fixed-function signal processing components. The advanced multiband DRC (Dynamic Range Control) enables further digital audio processing capabilities on playback or record paths. Advanced DRC function comprises multi-section and multi-band parts, ensuring signal level maintenance, maximizes loudness, and prevents audio clipping and speaker damage.

The CM7104 can be powered from a 1.8V power supply only, and its individual blocks are all design for power efficient target, helping devices to achieve long time playback, record, voice talk...etc. cases. The CM7104 is supplied by a LQFP48 package within 7x7 mm².

1.2 Demo Board Contents

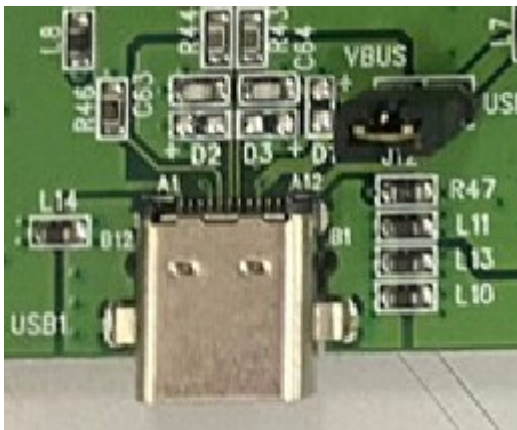
The CM6530N+CM7104 USB Audio controller demo board has several hardware features. With each feature's description in figure, the feature's location can be clearly identified.



SECTION 2 GETTING STARTED

2.1 Board as USB Audio Device

Connect the demo board to the host by plugging the USB core with a type C connector, as shown below.



Type C USB connector (J12)

2.2 Playback / Recording Functions

2.2.1 Line Output (J24)



Line Out (J24) (J25 Pin1-3 & Pin 2-4 short)
Output from the CM7104 without the Class D Amp.

Symbol	Description
Connect J25 Pin1-3	CM7104 audio R_ch output.
Connect J25 Pin2-4	CM7104 audio L_ch output.

A close-up photograph of the underside of the green printed circuit board (PCB). Two large, black electrolytic capacitors are visible, labeled '1000µF 16V'. A USB connector is mounted on the board, with a metal shield and a plastic housing. Various surface-mount components, including resistors and integrated circuits, are visible. The PCB has white text labels such as 'C1', 'C2', 'R1', 'R2', 'R3', 'R4', 'R5', 'R6', 'R7', 'R8', 'R9', 'R10', 'R11', 'R12', 'R13', 'R14', 'R15', 'R16', 'R17', 'R18', 'R19', 'R20', 'R21', 'R22', 'R23', 'R24', 'R25', 'R26', 'R27', 'R28', 'R29', 'R30', 'R31', 'R32', 'R33', 'R34', 'R35', 'R36', 'R37', 'R38', 'R39', 'R40', 'R41', 'R42', 'R43', 'R44', 'R45', 'R46', 'R47', 'R48', 'R49', 'R50', 'R51', 'R52', 'R53', 'R54', 'R55', 'R56', 'R57', 'R58', 'R59', 'R60', 'R61', 'R62', 'R63', 'R64', 'R65', 'R66', 'R67', 'R68', 'R69', 'R70', 'R71', 'R72', 'R73', 'R74', 'R75', 'R76', 'R77', 'R78', 'R79', 'R80', 'R81', 'R82', 'R83', 'R84', 'R85', 'R86', 'R87', 'R88', 'R89', 'R90', 'R91', 'R92', 'R93', 'R94', 'R95', 'R96', 'R97', 'R98', 'R99', 'R100'. The board is labeled 'C1A Mate' and 'ER-1000-16V'.

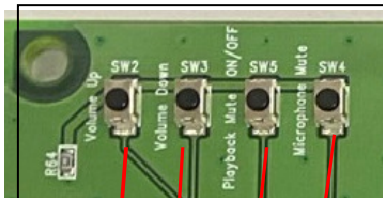
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2.3 Evaluation Board with peripheral Control

CM6530N+CM7104 embedded external peripheral control and functions enable & select pins.

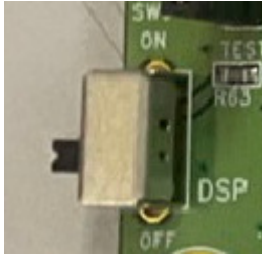
- HID Buttons
- Function Switch
- LED Indicators
- Test Pin (for flash recover)
- GPIO Function Switch Pins

2.3.1 HID Buttons (SW2, SW3, SW4, SW5)



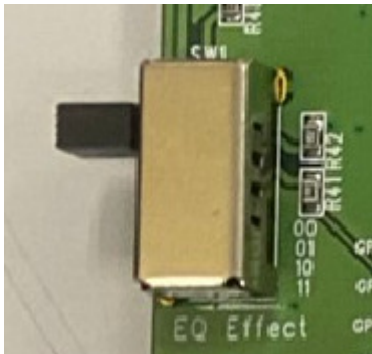
Symbol	Description
SW2(GPIO_00)	Volume Up +
SW3(GPIO_01)	Volume Down-
SW5(GPIO_07)	Playback Mute ON/OFF
SW4(GPIO_03)	Microphone Mute
All the button functions can be replaced by Firmware	

2.3.2 Function Switch (SW6)



Switch the CM7104 DSP ON/OFF by GPIO_15).

2.3.3 EQ Effect Switch (SW1)



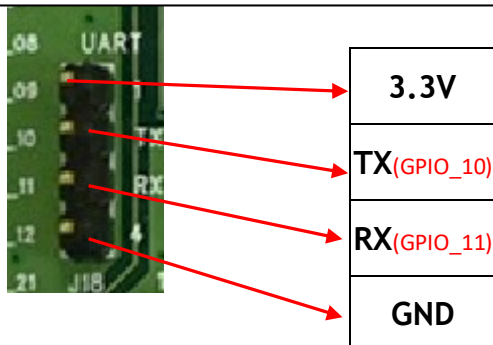
Switch the EQ function by GPIO_12& GPIO_13).

2.3.4 TEST Pin (J14)



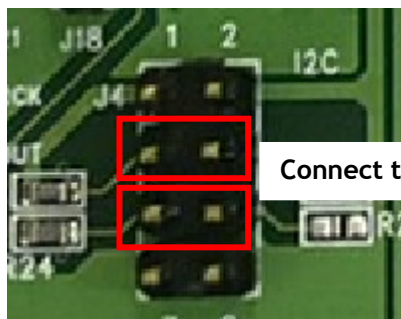
J14	Description
Test	When firmware crash, short this pin could enable firmware recover mode.

2.3.5 UART Interface (J18)



Symbol	Description
Pin1	3V3 for UART Power.
Pin2	UART_TX select by firmware
Pin3	UART_RX select by firmware
Pin4	GND

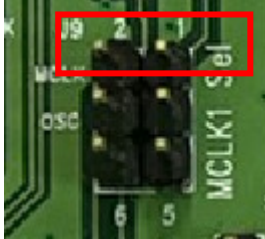
2.3.6 I2C Interface (J4)



Connect the J4 Pin3-4 & Pin 5-6 short for CM6530N+CM7104 I2C

Symbol	Description
Pin1---3.3V	CM6530N LDO output 3.3V
Pin2---3.3V	DBVDD1 with CM7104 3.3V
Pin3---I2C_SDAT	CM6530N I2C data
Pin4---I2C_SDA	CM7104 I2C data
Pin5---I2C_SCLK	CM6530N I2C clock
Pin6---I2C_SCL	CM7104 I2C clock
Pin7---DGND	I2C clock
Pin8---DGND	I2C clock

2.3.7 MCLK1 Sel(J9)



Connect the J9 Pin1-2 select the DAC_MCLK clock.

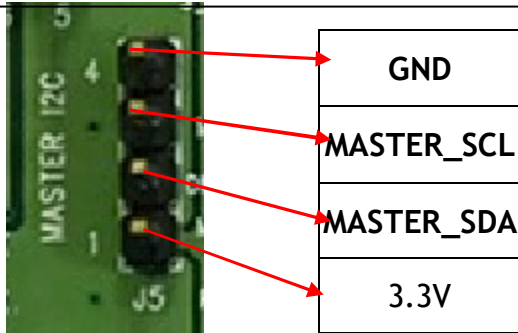
Symbol	Description
Connect J9 Pin1-2	CM7104 MCLK1 from CM6530N DAC_MCLK
Connect J9 Pin3-4	CM7104 MCLK1 from OSC X1
Connect J9 Pin5-6	CM7104 MCLK1 from CM6530N GPIO_09

2.3.8 SPDIF & Class D Amp power pin header (J23)



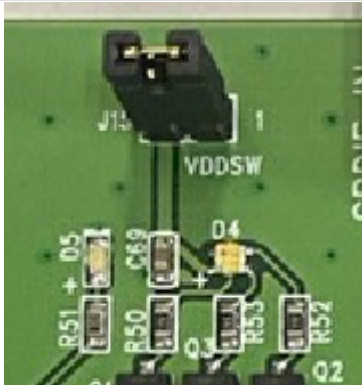
Symbol	Description
Connect J23 Pin1-3	SPDIF 5V power input
Connect J23 Pin2-4	Class D Amp 5V power input

2.3.9 CM7104 Master I2C pin header (J5)



Symbol	Description
Pin1	DBVDD 3.3V
Pin2	MASTER_SDA data pin
Pin3	MASTER_SCL clock pin
Pin4	GND

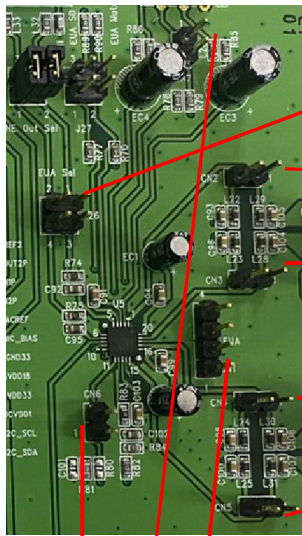
2.3.10 LED (D5) & 3 colors LED (D4)



Pin header J15 is LED 5V power input.

Symbol	Description
Function LED(D4)	Function indicator
Function LED(D5)	DSP algorithm On/Off indicator
LED can be modified by Firmware	

2.3.11 EUA Class D Amp



EUA Sel(J26) pin2 audio L-ch, pin1 R-ch.

CN2 EUA_RN

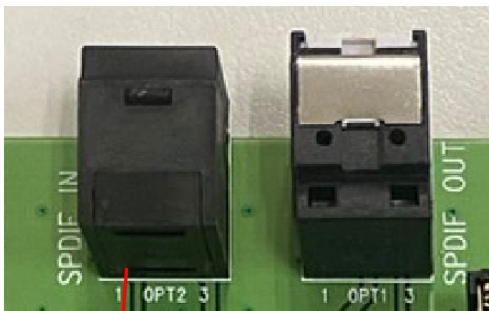
CN3 EUA_RP

CN4 EUA_LP

CN5 EUA_LN

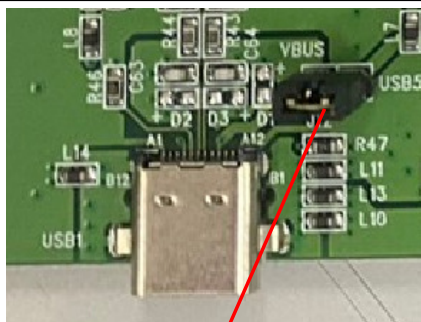
Symbol	Description
EUA Sel(J26)	Connect J26 Pin1-3/Connect J26 Pin2-4
CN1	EUA output pin header
CN6	Floating is disable AGC function, provides the 64 steps AGC (Auto Gain Control) function
CN7	Output mode control input, high for SE output mode and low for BTL mode.

2.3.12 SPDIF OUT(OPT3) & SPDIF IN(OPT2)



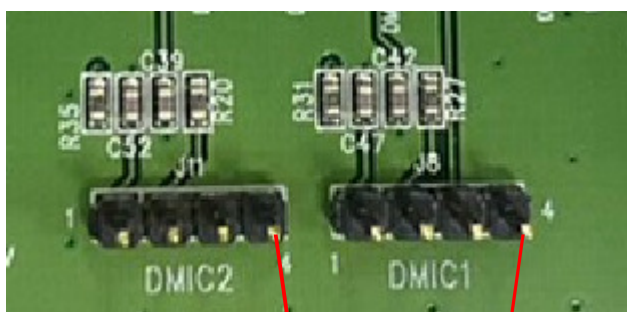
Symbol	Description
OPT2	SPDIF output connector.
OPT3	SPDIF input connector.

2.3.13 Type C VBUS to USB5V (J12)



Symbol	Description
J12	Connect J12 pin1-2 for system USB5V

2.3.14 DMIC1 (J8) & DMIC2 (J11)



Symbol	Description
DMIC1 (J8) Pin1	DBVDD 3.3V for DMIC power
DMIC1 (J8) Pin2	DMIC data1 input
DMIC1 (J8) Pin3	DMIC clock output
DMIC1 (J8) Pin4	Digital GND
DMIC2 (J11) Pin1	DBVDD 3.3V for DMIC power
DMIC2 (J11) Pin2	DMIC Data2 input
DMIC2 (J11) Pin3	DMIC clock output
DMIC2 (J11) Pin4	Digital GND