

User Manual for

VOP13082E

VOP13082B

VOP13082D

VOP13082C

Revision	Description of changes	Note
1.0	Created	17 July. 2019

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1 Introduction

This product is VOP13082C, and there are 3 types of different products optionally as VOP13082B, VOP13082D and VOP13082E.

2 Specifications

Quick overview of Specification.

Manufacture	Anam Electronics Co., Ltd.
Product Name	WiFi/BT Platform Module
Model Name	VOP13082E(Alt : VOP13082C, VOP13082B, VOP13082D)

Device	Chip	Vender	Parts Name
	CPU	Mediatek	MT8516
	2.4GHz	Mediatek	MT7668
	MAC/BB/RF		
	2.4GHz PA (Tx)	*Refer to Wireless Spec”	
	2.4GHz LNA (Rx)	*Refer to Wireless Spec”	
	2.4GHz BPF (Rx)	Co-layout	
	5Gz MAC/BB/RF	Mediatek	MT7668
	5Hz PA (Tx)	*Refer to Wireless Spec”	
	5Hz LNA (Rx)	*Refer to Wireless Spec”	
	5Hz BPF (Rx)	Co-layout	
	PHY (WAN)	None	
	PHY (LAN)	TI	DP83822
OS	Linux		
FW	ODM	Anam Electronics Co., Ltd.	
	FW Spec.	Mediatek SDK	
	Driver	Anam Electronics Co., Ltd.	
	Utility	Anam Electronics Co., Ltd.	
Supporting Band	*Refer to Wireless Spec”		
Interface	Item	Link Rate	Number of ports
	LAN	100MBps	1
	USB	480MBps	2
Power supply voltage	+5V		
Power Consumption	Less than 4W		
Dimensions	74mm x 87mm x 16.4 mm(Refer to Mechanical Dimension)		
Environment	Temperature	Humidity	
Operating	-10~70 degC	10~85 % RH	
Storage	-10~85 degC	10~85 % RH	
Design Life	5 years		
Country of origin	Vietnam		

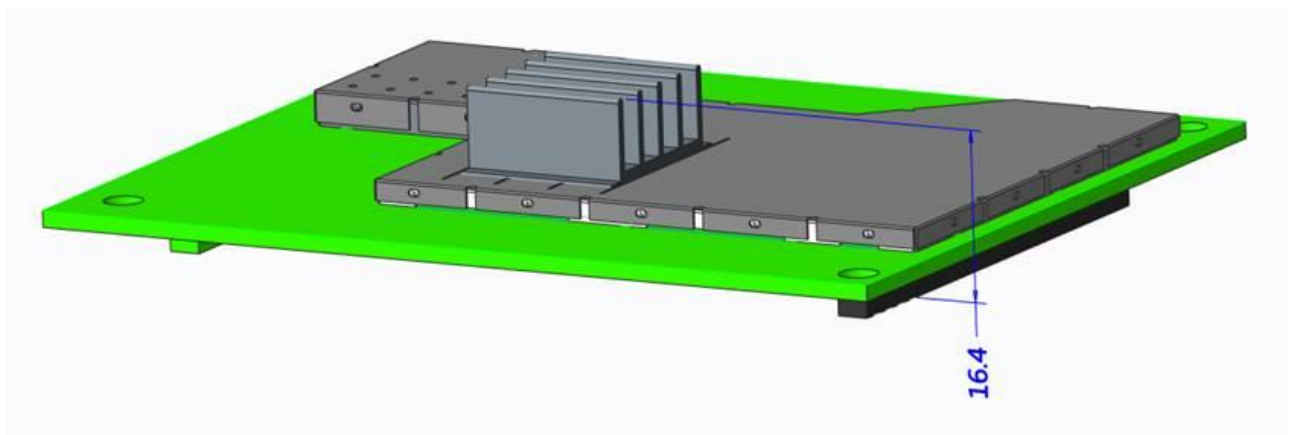
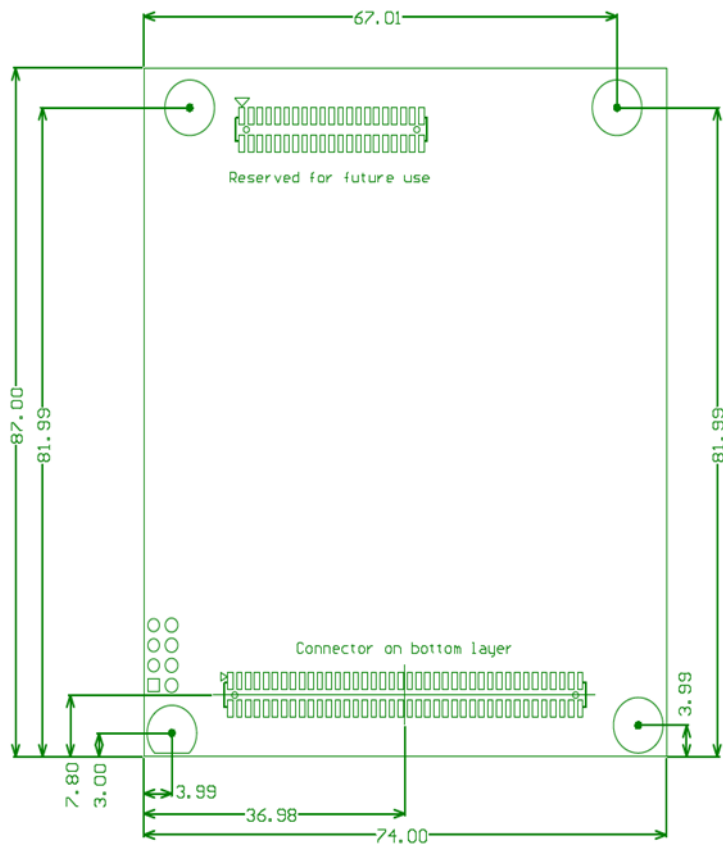
Technical Specification

Items		Description
CPU	Vender/ Parts Number	Mediatek/MT8516
	Operated frequency	1.3 GHz
RAM	Type	DDR3
	Bit length	16 bit
	Operated Frequency	800 MHz
	Memory Size	512MB
ROM	Type	NAND SLC
	I/O interface speed	25ns/Read Cycle Time
	Memory size	1 GB
Wired LAN	Number of Ports	1
	MAC	Mediatek/MT8516
	PHY	Texas Instruments/DP83822
	Type of standards	IEE 802.3u
USB	Number of Ports	2
	Vender/ Parts Number	Mediatek/MT8516
	Type of standard	USB2.0
	Bus Power	Yes

3 Mechanical overview

Mechanical Dimension

The maximum mechanical form factor of the module is shown below.



4 I/O specification

80 pin connector

The 80 pin connector provides all I/O and power supply to the module.

Port Name	PIN	Port Name
PWM0	1	PWM1
PWM2	3	VDD
VDD	5	VDD
MCLK_I2S_0	7	MCLK_I2S_1
GND	9	GND
WS_I2S_0	1	GPIO_39
BITCLK_I2S_0	1	SDOUT_I2S_0
GND	1	GND
WS_I2S_1	1	SDIN_I2S_1
BITCLK_I2S_1	1	GPIO_40
GND	2	GND
WS_I2S_2	2	SDIN_I2S_2
BITCLK_I2S_2	2	GPIO_38
GND	2	GND
I2C0_SDA/GPIO	2	USB2_P2_DM
I2C0_SCL/GPIO	3	USB2_P2_DP
GND	3	GND
I2C1_SDA/GPIO	3	TDN_PHY0_CH1
I2C1_SCL/GPIO	3	TDP_PHY0_CH1
SPI0_SS/GPIO_26	3	TDN_PHY0_CH0
SPI0_MISO/GPIO_27	4	TDP_PHY0_CH0
GND	4	GND
SPI0_CLK/GPIO_28	4	SPI0_MOSI/GPIO_29
UART1_TX/GPIO	4	UART1_RTS/GPIO_30
UART1_RX/GPIO_31	4	UART1_CTS/GPIO_32
USB2_VBUS_EN/GPIO_00	5	PWM3/GPIO
GPIO_02	5	WAKE_UP
GPIO_04	5	GPIO_05
GPIO_06	5	GPIO_07
GPIO_08	5	GPIO_09
GPIO_10	6	GPIO_11
GPIO_12	6	GPIO_13
GPIO_14	6	GPIO_15
GPIO_16	6	GPIO_17
GPIO_18	6	GPIO_19
GPIO_20	7	GPIO_21
GPIO_22	7	FACTORY_RESET
GPIO_24	7	MODULE_IS_AWAKE
ADC_AUXIN_0	7	ADC_AUXIN_1
ADC_AUXIN_2	7	ADC_AUXIN_3

Other connectors

- HDMI Connector (21P)**
This connector provides with HDMI signal and 3.3V power Supply.
- MIC Connector & 2nd USB (9P)**
This connector allows to connect extra two digital microphones & input USB-audio signal.
- Console Connector (4P)**
This connector should be for the only usage of development.
- PLD Update Connector (7P)**
This connector should be for the only usage of development.

5 Wireless Specification

Installed radio system chip (MT7668) includes dual band (2.4GHz & 5GHz) WiFi and Bluetooth.

Wi-Fi

Item	Specification	Remarks
Wi-Fi chip	2x2 MIMO: MT7668	
Connection to main CPU	SDIO	
Media Access Protocol	Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA) with ACK	
Frequency range	2400-2483.5MHz(1-11ch) 2400-2497MHz(1-11ch,13ch,14ch) 5150-5250MHz (W52) 5250-5350MHz (W53) 5470-5725MHz (W56) 5745-5825MHz (W58) DFS support	
Modulation	IEEE802.11ac:Orthogonal Frequency-Division Multiplexing IEEE802.11n: Orthogonal Frequency-Division Multiplexing IEEE802.11a: Orthogonal Frequency-Division Multiplexing IEEE802.11g: Orthogonal Frequency-Division Multiplexing IEEE802.11b: Direct Sequence Spread Spectrum	
Data rates	IEEE802.11ac: (80MHz) up to 866.7Mbps IEEE802.11n: (40MHz) up to 300Mbps IEEE802.11n: (20MHz) up to 150Mbps IEEE802.11a: 54,48,36,24,18,12,9,6Mbps IEEE802.11g: 54,48,36,24,18,12,9,6Mbps IEEE802.11b: 11,5.5,2,1Mbps	
IEEE802.11n/ac Capabilities	2x2 multiple-input multiple-output (MIMO) with two spatial streams 20MHz, 40MHz, 80MHz(ac) channels	
Antenna	2x2MIMO: antenna 2T2R (2 U.FL antenna connectors) Impedance: 50 Ohm	
Receive Sensitivity	IEEE802.11b: -96dBm@1Mbps, -88dBm@11Mbps IEEE802.11g : -93dBm@6Mbps, -75dBm@54Mbps	

	IEEE802.11a: -90dBm@6Mbps, -72dBm@54Mbps IEEE802.11n(HT20):-67dBm@MCS7 IEEE802.11n(HT40):-64dBm@MCS15 IEEE802.11ac(VHT80): -60dBm@MCS9	
Security	Authentication: Open system, Shared Key, WPA/WPA-PSK, WPA2/WPA2-PSK 802.1x (PEAP, TLS, TTLS) Encryption: WEP(64,128bit),TKIP,AES Wi-Fi Protected Access(WPA2,WPA) support WPS Compliant	
IEEE Standard Compliance	IEEE802.11n IEEE802.11g IEEE802.11b IEEE802.11a IEEE802.11ac	

Bluetooth

Item	Specification	Remarks
Interface	SDIO	
Operating Frequency	2.4 - 2.4835 GHz	
Modulation	GFSK 250kHz Adaptive Frequency Hopping, 24bit CRC 128bit AES CCM	
Channel Spacing	1MHz	
Receive Sensitivity	-86dBm at 0.1% BER	
Antenna (Common with one of Wi-Fi antennas)	External U.FL connector Impedance: 50 Ohm	

FCC & IC Statement

FCC ID : MBBVOP13082E

FCC Statement:

FCC Part 15C 15.247, 15E 15.407 is applied to the modular transmitter.

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

This device and its antennas(s) must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.

This device is restricted for indoor use.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

USERS MANUAL OF THE END PRODUCT:

The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. If the device is small or for such use that it is not practicable to place the statement on the product, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains FCC ID : MBBVOP13082E ". If the device is small or for such use that it is not practicable to place the statement on the product, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

IC Statement:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

Pour les produits disponibles aux États-Unis / Canada du marché, seul le canal 1 à 11 peuvent être exploités. Sélection d'autres canaux n'est pas possible.

This device and it's antennas(s) must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with IC multi-transmitter product procedures.

Cet appareil et son antenne (s) ne doit pas être co-localisés ou fonctionnement en association avec une autre antenne ou transmetteur.

Dynamic Frequency Selection (DFS) for devices operating in the bands 5250- 5350 MHz, 5470-5600 MHz and 5650-5725 MHz

Sélection dynamique de fréquences (DFS) pour les dispositifs fonctionnant dans les bandes 5250-5350 MHz, 5470-5600 MHz et 5650-5725 MHz

The device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.

The maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit.

le gain maximal d'antenne permis pour les dispositifs utilisant les bandes 5250-5350 MHz et 5470-5725 MHz doit se conformer à la limite de p.i.r.e.

The maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits specified for point-to-point and non-point-to-point operation as appropriate.

le gain maximal d'antenne permis (pour les dispositifs utilisant la bande 5725-5850 MHz) doit se conformer à la limite de p.i.r.e. spécifiée pour l'exploitation point à point et non point à point, selon le cas.

Users should also be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

De plus, les utilisateurs devraient aussi être avisés que les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5250-5350 MHz et 5650-5850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.

Devices is not capable of transmitting in the band 5600-5650 MHz. This restriction is for the protection of Environment Canada's weather radars operating in this band.

For indoor use only.

Pour une utilisation en intérieur uniquement.

IMPORTANT NOTE:

IC Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

This radio transmitter([IC No:11657A-VOP13082E](#)) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio([IC No:11657A-VOP13082E](#)) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the IC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. If the device is small or for such use that it is not practicable to place the statement on the product, then

following IC statement is required to be available in the users manual: IC statement is required to be available in the users manual: This device complies with Industry Canada license-exempt RSS standard(s). This Class B digital apparatus complies with Canadian ICES-003. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following

" Contains IC : 11657A-VOP13082E "

Antenna List

No	Antenna P/N	Manufacturer	Gain(dBi)		Type	External or Internal
			2.4GHz	5.0GHz		
1	N2420DG3-T2L-PK1-G520U	Airgain	3.1dBi	2.8dBi	PIFA	Internal
2	503021-01113-0BC	Arcadyan Technology Coporation	2.0dBi	2.0dBi	Dipole	External
3	120300055600J	Liteconn Co., Ltd	2.0dBi	2.0dBi	Dipole	External
4	120700034000J	Liteconn Co., Ltd	2.0dBi	2.0dBi	Dipole	External
5	120300055601J	Liteconn Co., Ltd	2.0dBi	2.0dBi	Dipole	External
6	KH-WFDI-AN001	KWANG HYUN AIRTECH	4.0dBi	2.8dBi	PIFA	Internal
7	KH-WFDI-AN002	KWANG HYUN AIRTECH	4.0dBi	2.8dBi	PIFA	Internal
8	KH-WFDI-AN003	KWANG HYUN AIRTECH	3.6dBi	2.1dBi	PIFA	Internal
9	KH-WFDI-AN004	KWANG HYUN AIRTECH	3.6dBi	2.1dBi	PIFA	Internal
10	KH-WFDI-AN005	KWANG HYUN AIRTECH	3.5dBi	2.1dBi	PIFA	Internal
11	KH-WFDI-AN006	KWANG HYUN AIRTECH	3.5dBi	2.1dBi	PIFA	Internal

6 Module Type

There are 4 types of module. The following table describes core component difference.

Module Type	RF Wi-Fi/BT	80pin BtoB conn	42pin BtoB conn.	9pin MIC/USB	21pin HDMI	ADV7611
VOP13082B	YES	YES		YES		
VOP13082C	YES	YES		YES	YES	
VOP13082D	YES	YES	YES			YES
VOP13082E	YES	YES	YES	YES	YES	YES

Appendix - Module Functional Block Diagram

- VOP13082D, VOP13082E-Type Only
- Debug Only

