ROCK Pi 4C Plus Product Brief
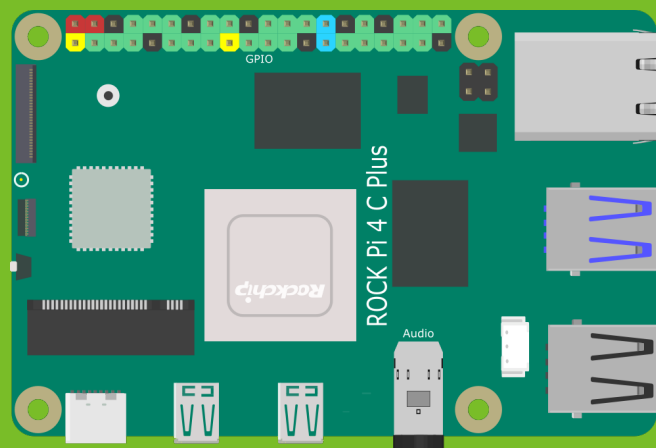
Single Board Computer with dual HDMI

Revision 1.0

ROCKPi Trading Limited

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Contents

1 Introduction

ROCK Pi 4C Plus is a Single Board Computer (SBC) in an ultra-small form factor that offers class-leading performance while leveraging outstanding mechanical compatibility. The ROCK Pi 4C Plus offers makers, IoT enthusiasts, hobbyists, PC DIY enthusiasts and others a reliable and extremely capable platform for building and tinkering their ideas into reality.

ROCK Pi 4C Plus offers only 4GB LPDDR4 ram option.
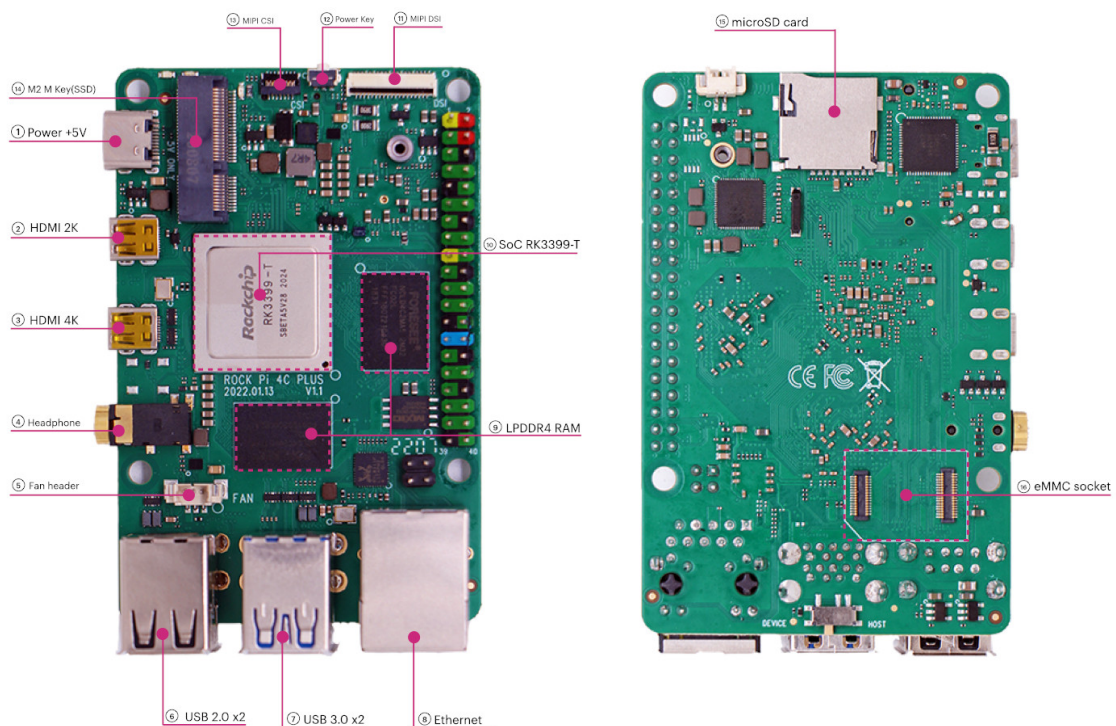
Note: The actual board layout or chips location may change but the main connctors type and location will remain the same.

2 Features

2.1 Hardware

- Dual Cortex-A72, freqency 1.5Ghz(overclock to 2GHz) with quad Cortex-A53, frequency 1.4Ghz(overclock to 1.6GHz)
- Mali T860MP4 gpu, supports OpenGL ES 1.1 /2.0 /3.0 /3.1 /3.2, Vulkan 1.0, Open CL 1.1 1.2, DX11.

- 4GB 64bits LPDDR4
- Dual display via two micro HDMI
- H.265/VP9 (HEVC) hardware decode (up to 4Kp60)
- H.264 hardware decode (up to 1080p60)

2.2 Interfaces

- 802.11 b/g/n/ac Wireless LAN
- Bluetooth 5.0 with BLE
- 1x SD Card
- 2x HDMI ports, one supporting displays up to 4Kp60 resolution, one supporting up to 2Kp60
- 2x USB2 HOST ports
- 1x USB3 HOST port, 1x USB3 OTG port
- 1x Gigabit Ethernet port (supports PoE with add-on PoE HAT)
- 1x camera port (2-lane MIPI CSI)
- 1x display port (4-lane MIPI DSI)
- 40x user GPIO supporting various interface options:

    - 1 x UART
    - 2 x SPI bus
    - 2 x I2C bus
    - 1 x PCM/I2S
    - 1 x SPDIF
    - 1 x PWM
    - 1 x ADC
    - 6 x GPIO
    - 2 x 5V DC power in
    - 2 x 3.3V power pin

2.3 Software

- ARMv8 Instruction Set
- Debian/Ubuntu Linux support
- Android 7.1/Android 9.0/Android 11 support
- Open soruce GPU driver
- Hardware access/control library for Linux/Android

3 Mechanical Specification
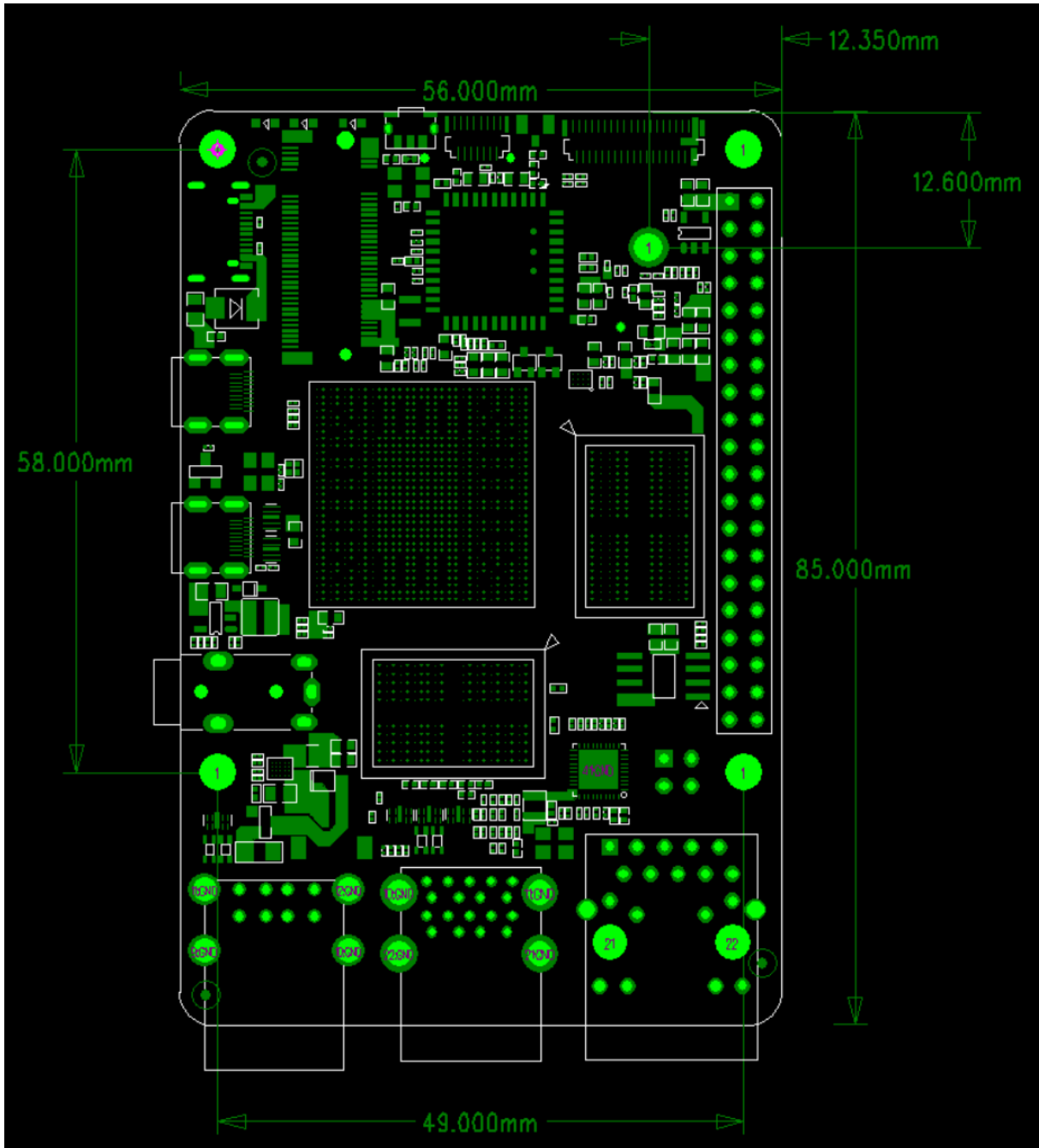
4 Electrical Specification

4.1 Power Requirements

The ROCK Pi 4C Plus can only be powered by +5V.

- USB C 5V
- 5V Power from the GPIO PIN 2 & 4

The recommended power source capacity is at least 5V/3A without M.2 SSD or 5V/5A using with M.2 SSD.

4.2 GPIO Voltage

GPIO	Voltage Level	Tolerance
GPIO3_C0	3.3V	3.465V
ADC_IN0	1.8V	1.98V
Other GPIO	3.0V	3.14V

5 Peripherals

5.1 GPIO Interface

ROCK Pi 4C Plus offers 40P GPIO expansion which is compatible with common accessories(HATs) on the market.

5.1.1 GPIO Alternate Functions

GPIO number	Function2	Function1	GPIO	Pin#	Pin#	GPIO	Function1	Function2	GPIO number
		+3.3V		1	2		+5.0V		
71		I2C7_SDA	GPIO2_A7	3	4		+5.0V		
72		I2C7_SCL	GPIO2_B0	5	6		GND		
75		SPI2_CLK	GPIO2_B3	7	8	GPIO4_C4	UART2_TXD		148
		GND		9	10	GPIO4_C3	UART2_RXD		147
146		PWM0	GPIO4_C2	11	12	GPIO4_A3	I2S1_SCLK		131

GPIO number	Function2	Function1	GPIO	Pin#	Pin#	GPIO	Function1	Function2	GPIO number
150		PWM1	GPIO4_C6	13	14		GND		
149		SPDIF_TX	GPIO4_C5	15	16	GPIO4_D2			154
		+3.3V		17	18	GPIO4_D4			156
40	UART4_TXD	SPI1_TXD	GPIO1_B0	19	20		GND		
39	UART4_RXD	SPI1_RXD	GPIO1_A7	21	22	GPIO4_D5			157
41		SPI1_CLK	GPIO1_B1	23	24	GPIO1_B2	SPI1_CSn		42
		GND		25	26		ADC_IN0		
64		I2C2_SDA	GPIO2_A0	27	28	GPIO2_A1	I2C2_CLK		65
74	I2C6_SCL	SPI2_TXD	GPIO2_B2	29	30		GND		
73	I2C6_SDA	SPI2_RXD	GPIO2_B1	31	32	GPIO3_C0	SPDIF_TX	UART3_CTSn	112
76		SPI2_CSn	GPIO2_B4	33	34		GND		
133		I2S1_LRCK_TX	GPIO4_A5	35	36	GPIO4_A4	I2S1_LRCK_RX		132
158			GPIO4_D6	37	38	GPIO4_A6	I2S1_SDI		134
		GND		39	40	GPIO4_A7	I2S1_SDO		135

5.2 eMMC Socket

ROCK Pi 4C Plus offers a high speed eMMC socket for eMMC modules as OS and data storage. The eMMC socket is compatible with industrial common used pinout and form factor.

5.3 Camera and Display Interfaces

The ROCK Pi 4C Plus has 1x 2-lane MIPI CSI Camera and 1x 4-lane MIPI DSI Display connector. The connector pitch is 0.3mm, for camera/display module with 0.5mm pitch FPC, a 0.3mm to 0.5mm FPC cable is required.

5.4 USB

The ROCK Pi 4C Plus has 2x USB2 HOST, 1x USB3 HOST and 1x USB3 OTG type-A sockets. Downstream USB current is limited to approximately 2.8A in aggregate over the four sockets.

5.5 HDMI

The ROCK Pi 4C Plus has 2x HDMI ports, one support CEC and HDMI 2.0 with resolutions up to 4Kp60, one support CEC

5.6 Audio Jack

The ROCK Pi 4C Plus supports near-CD-quality analogue audio output via a 4-ring 3.5mm headphone jack.

The analog audio output can drive 32 Ohm headphones directly.

5.7 M.2 Connector

The ROCK Pi 4C Plus offers a M.2 M Key socket with PCIe 2.0 x4 interfaces, providing high speed bus access, a standard M.2 2230 mouting hole is on board for 2230 form facor NVMe SSD. SATA SSD is not supported.

5.8 Temperature Range and Thermals

The recommended ambient operating temperature range is 0 to 50 degrees Celcius.

To reduce thermal output when idling or under light load, the ROCK Pi 4C Plus reduces the CPU clock speed and voltage. During heavier load the speed and voltage (and hence thermal output) are increased. The internal governor will throttle back both the CPU speed and voltage to make sure the CPU temperature never exceeds 85 degrees C.

The ROCK Pi 4C Plus will operate perfectly well without any extra cooling and is designed for sprint performance - expecting a light use case on average and ramping up the CPU speed when needed (e.g. when loading a webpage). If a user wishes to load the system continually or operate it at a high termperature at full performance, further cooling may be needed.

6 Availability

ROCK Pi guarantee availability ROCK Pi 4C Plus until at least September 2029.

7 Support

For support please see the hardware documentation section of the Radxa Wiki website and post questions to the Radxa forum.

FCC WARNING

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. This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

15.105 Information to the user.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: 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 or more 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.

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 and your body.

Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination.

The firmware setting is not accessible by the end user.

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

"Contains Transmitter Module 2A3PA-ROCK4C"

Requirement per KDB996369 D03

2.2 List of applicable FCC rules

List the FCC rules that are applicable to the modular transmitter. These are the rules that specifically establish the bands of operation, the power, spurious emissions, and operating fundamental frequencies. DO NOT list compliance to unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a module grant that is extended to a host manufacturer. See also Section 2.10 below concerning the need to notify host manufacturers that further testing is required.3

Explanation: This module meets the requirements of FCC part 15C(15.247).it specifically establish the 6dB Bandwidth,, Peak Output Power, Radiated Spurious Emission, Power Spectral Density, Restricted Band of Operation and Band Edge (Out of Band Emissions) Measurement

2.3 Summarize the specific operational use conditions

Describe use conditions that are applicable to the modular transmitter, including for example any limits on antennas, etc. For example, if point-to-point antennas are used that require reduction in power or compensation for cable loss, then this information must be in the instructions. If the use condition limitations extend to professional users, then instructions must state that this information also extends to the host manufacturer's instruction manual. In addition, certain information may also be needed, such as peak gain per frequency band and minimum gain.

Explanation: The EUT only have one FPC antenna, Yes, the module contains a permanently attached antenna, The antenna gain is 2dBi. The use condition of the prototype is mobile.

2.4 Limited module procedures

If a modular transmitter is approved as a "limited module," then the module manufacturer isresponsible for approving the host environment that the limited module is used with. The manufacturer of a limited module must describe, both in the filing and in the installation instructions, the alternative means that the limited module manufacturer uses to verify that the host meets the necessary requirements to satisfy the module limiting conditions.

A limited module manufacturer has the flexibility to define its alternative method to address the conditions that limit the initial approval, such as: shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation. The alternative method could include that the limited module manufacturer reviews detailed test data or host designs prior to giving the host manufacturer approval.

This limited module procedure is also applicable for RF exposure evaluation when it is necessary to demonstrate compliance in a specific host. The module manufacturer must state how control of the product into which the modular transmitter will be installed will be maintained such that full compliance of the product is always ensured. For additional hosts other than the specific host originally granted with a limited

module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module.
Explanation: The module is a single module.

2.5 Trace antenna designs

For a modular transmitter with trace antenna designs, see the guidance in Question 11 of KDB Publication 996369 D02 FAQ – Modules for Micro-Strip Antennas and traces. The integration information shall include for the TCB review the integration instructions for the following aspects: layout of trace design, parts list (BOM), antenna, connectors, and isolation requirements.

a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna);

b) Each design shall be considered a different type (e.g., antenna length in multiple(s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered);

c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit (PC) board layout;

d) Appropriate parts by manufacturer and specifications;

e) Test procedures for design verification; and

f) Production test procedures for ensuring compliance.

The module grantee shall provide a notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

Explanation: No, The module has no tracking antenna design, is FPC antenna.

2.6 RF exposure considerations

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the host product manufacturer, to define the application conditions (mobile, portable – xx cm from a person's body); and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Explanation: ,This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment, This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body." This module is designed to comply with the FCC statement,
FCC ID is: 2A3PA-ROCK4C.

2.7 Antennas

A list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall also identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an "omni-directional antenna" is not considered to be a specific "antenna type")).

For situations where the host product manufacturer is responsible for an external connector, for example with an RF pin and antenna trace design, the integration instructions shall inform the installer that unique antenna connector must be used on the Part 15 authorized transmitters used in the host product. The module manufacturers shall provide a list of acceptable unique connectors.

Explanation: The EUT only have one FPC antenna, Yes, the module contains a permanently attached antenna, The antenna gain is 2dBi.

2.8 Label and compliance information

Grantees are responsible for the continued compliance of their modules to the FCC rules. This

includes advising host product manufacturers that they need to provide a physical or e-label stating "Contains FCC ID" with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

Explanation: The host system using this module, should have label in a visible area indicated the following texts: "Contains FCC ID: 2A3PA-ROCK4C

2.9 Information on test modes and additional testing requirements₅

Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

The grantee should provide information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular

transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer's determination that a module as installed in a host complies with FCC requirements.

Explanation: WiFiRanger, A LinOra Company can increase the utility of our modular transmitters by providing instructions that simulates or characterizes a connection by enabling a transmitter.

2.10 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15

Subpart B compliant (when it also contains unintentional-radiator digital circuity), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Explanation: The module without unintentional-radiator digital circuity, so the module does not require an evaluation by FCC Part 15 Subpart B. The host shoule be evaluated by the FCC Subpart B.

This product uses FPC antenna with a maximum antenna gain of 2dBi