GTI-RW612B LGA Module

Wireless Microcontroller
IEEE 802.11 ax/ Wi-Fi6 + BLE5.2
802.15.4 Matter over Wi-Fi or Matter over Thread

Datasheet-Rev1.0

Revision History

Revision	Date	Remark
Rev 1.0	Apr 28, 2024	Preliminary

Table of contents

1. General Description

The GTI-RW612B is a high-performance, low-power Wireless 112-pin LGA module with highly integrated MCU and Wi-Fi6 + Bluetooth Low Energy (LE) 5.2 radios that can be applied for a variety of applications like connected smart home devices, gaming controllers, enterprise and industrial automation, smart accessories, and smart energy.
Furthermore, it integrates the 802.15.4 radios to support the Matter over Wi-Fi or Matter over Thread protocol.

The GTI-RW612B module has an MCU subsystem that includes a 260 MHz Arm® Cortex®-M33 core with
TrustZone™-M, 1.2 MB on-chip SRAM, and QSPI interface.

2. Module integration

2.1 Package

- 112-pin LGA package
- 15mm x 35mm size

2.2 On module components

- 512Mb QSPI Flash
- 15mm x 35mm size
- RF front-end including filter, SPDT SW, and Diplexer
- On-module metal 3D antenna for Wi-Fi 5G and 2.4G
- 2x U.FL connectors for external antenna
- 40MHz crystal

2.3 Interfaces

- SWD
- USB2.0
- UART
- I2S
- RMII Ethernet
- LCD
- PDM

- QSPI SRAM
- User GPIOs

3. MCU and radios

3.1 MCU

- 260 MHz ARM Cortex-M33 with TrustZone-M
- On-chip 1.2MB PSRAM
- Quad FlexSPIFlash XIP with on-the-fly decryption
- Flexcommconfigurable as SPI/ I2C/ I2S/ UART
- LCD interface

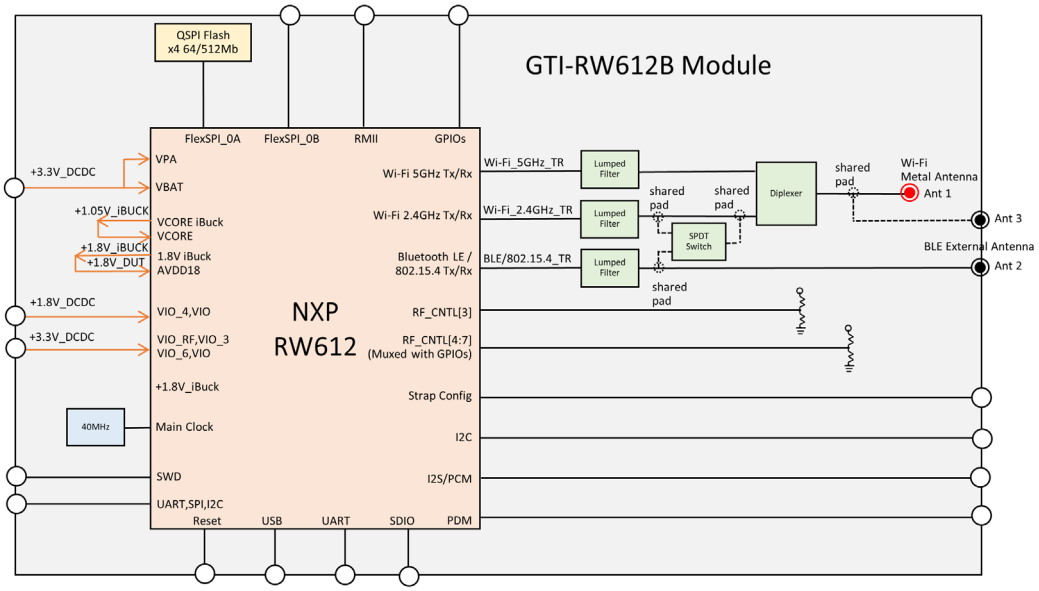
3.2 Wi-Fi 6 Radio

- 1x1, 20MHz, IEEE 802.11ax, 2.4GHz/ 5GHz
- Target wake time, dual carrier modulation, and extended range
- Integrated Wi-Fi PA, LNA, and T/R switch, up to +21dBm TX power
- WPA3 security
- Matter over Wi-Fi

3.3 Bluetooth Low Energy 5.3 / 802.15.4 Radio

- Bluetooth 5.3 certified
- Bluetooth LE 2 Mbit/s high-speed mode, long-range advertising extensions
- Isochronous channels supporting LE Audio
- I2S audio interface
- Integrated PA/ LNA with up to +15dBm TX output
- 802.15.4 radios support Matter over Wi-Fi or Matter over Thread

4. Module Block Diagram

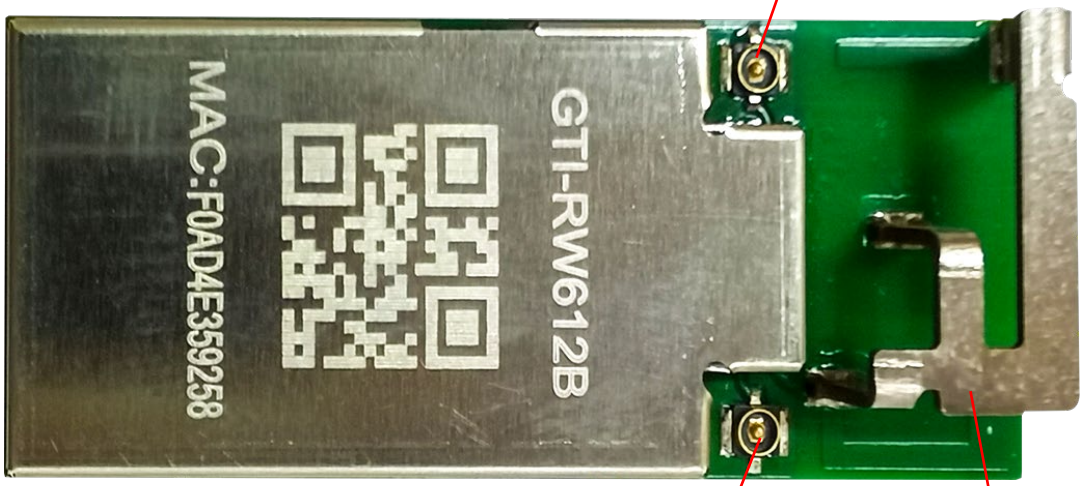


4.1 Module Functions

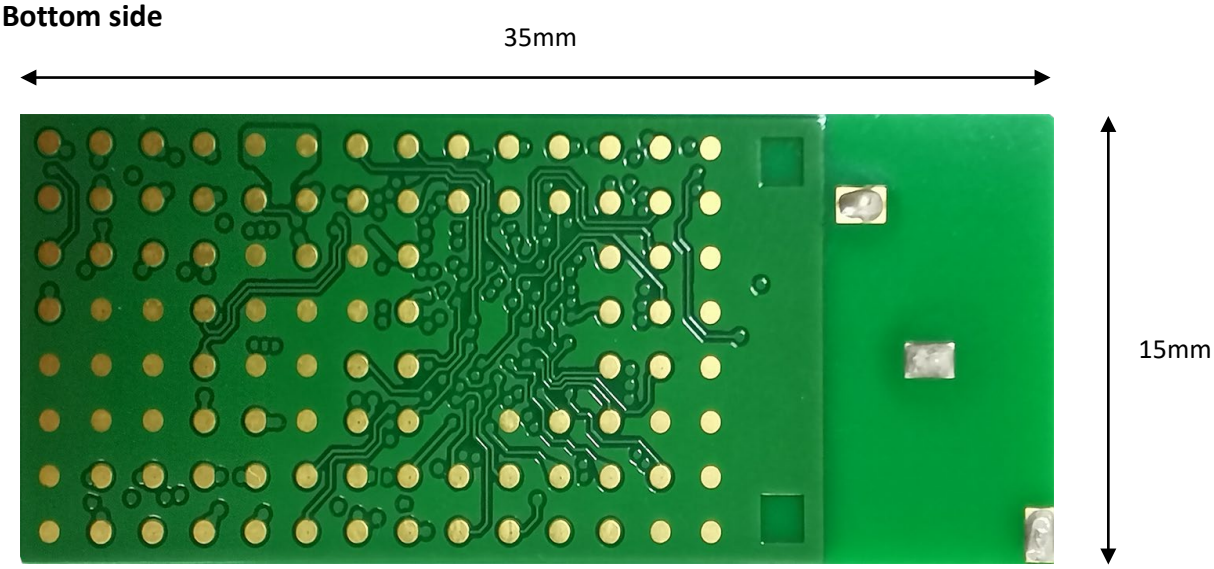
- 512Mb QSPI Flash memory
- On board dual-band 3D metal antenna
- U.FI connectors for alternative 2.4G Wi-Fi or BLE external antenna
- USB2.0 interface
- LCD_SPI interface
- UART via configurable GPIOs
- JTAG via configurable GPIOs
- PWD via configurable GPIOs
- SDIO via configurable GPIOs
- I2S via configurable GPIOs
- SPI via configurable GPIOs
- I2C via configurable GPIOs
- Size: 35x15 mm
- Pin type: LGA 8x14 pads

5. GTI-RW612B Module Appearance

5.1. Top side

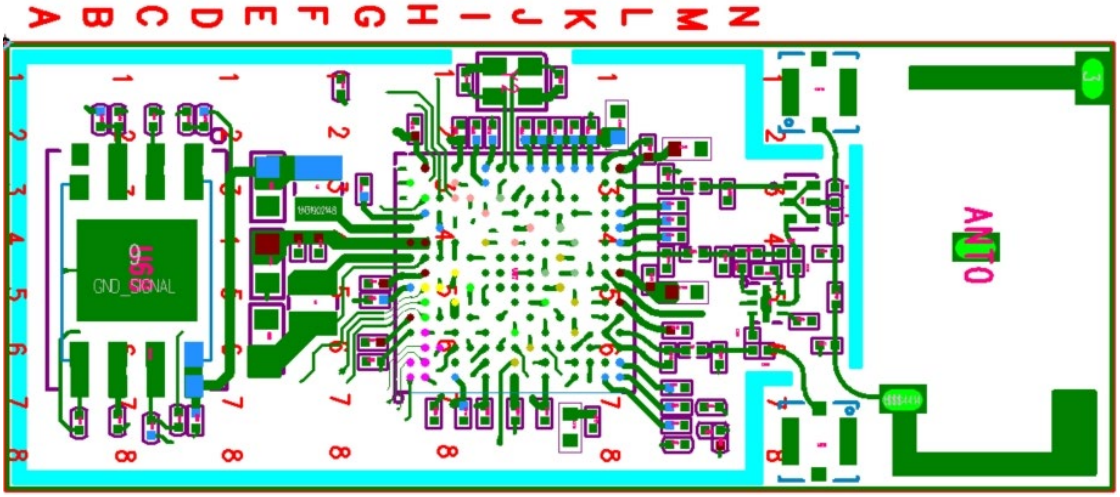


5.2. Bottom side



6. GTI-RW612B Module PCB placement

6.1. Top side



6.2. Bottom side

7. LGA pin descriptions

7.1. Sort by pin numbers

Pad	External Name	Internal GPIO	Description
A1	GND	GND	
A2	GND	GND	
A3	GND	GND	
A4	GND	GND	
A5	GPIO_10	GPIO_10	
A6	GPIO_11	GPIO_11	
A7	GPIO_18	GPIO_18	
A8	GPIO_40	GPIO_40	
B1	GPIO_50	GPIO_50	
B2	GPIO_43	GPIO_43	
B3	GND	GND	
B4	GND	GND	
B5	GND	GND	
B6	GPIO_15	GPIO_15	
B7	GPIO_39	GPIO_39	
B8	GPIO_41	GPIO_41	
C1	GPIO_3	GPIO_3	
C2	ENET_RX_EN	GPIO_62	Ethernet controller receive mode enable
C3	GND	GND	
C4	GND	GND	
C5	GND	GND	
C6	GPIO_19	GPIO_19	
C7	GPIO_37	GPIO_37	
C8	GPIO_38	GPIO_38	
D1	ENET_RX_ER	GPIO_63	Ethernet controller receive error
D2	ENET_TX_DATA0	GPIO_58	Bit 0 of Ethernet transmit data
D3	GPIO_6	GPIO_6	
D4	ENET_RX_DATA1	GPIO_23	ipp_ind_mac0_rxdata1
D5	ENET_RX_DATA0	GPIO_22	ipp_ind_mac0_rxdata0
D6	GPIO_1	GPIO_1	
D7	GPIO_35	GPIO_35	
D8	GPIO_36	GPIO_36	

Pin Description (continued)

Pad	External Name	Internal GPIO	Description
E1	ENET_TX_EN	GPIO_60	Ethernet transmit mode enable
E2	ENET_TX_DATA1	GPIO_59	Bit 1 of Ethernet transmit data
E3	BUCK18_VOUT		Internal 1.8V VIO OUT
E4	GND	GND	
E5	GND	GND	
E6	GND	GND	
E7	USB_ID		
E8	+3.3V_DUT		
F1	ENET_MDC	GPIO_56	Ethernet controller data clock
F2	ENET_TIMER1	GPIO_61	Bit 1 of Ethernet controller timer
F3	GND	GND	
F4	GND	GND	
F5	GND	GND	
F6	USB_VBUS		
F7	USB_DM		
F8	+3.3V_DUT	VDDIO_3	
G1	ENET_RST	GPIO_21	
G2	ENET_INT	GPIO_55	
G3	ENET_MDIO	GPIO_57	Ethernet data input/output management
G4	GPIO_4	GPIO_4	
G5	GND	GND	
G6	GND	GND	
G7	USB_DP		
G8	CONSOLE_TX	GPIO_26	
H1	LCD_SPI_SCK	GPIO_48	LCD SPI interface clock
H2	LCD_SPI_SS	GPIO_49	LCD SPI interface chip select
H3	PDN		**Note *1**
H4	ENET_CLK	GPIO_25	Ethernet controller reference clock
H5	GPIO_27	GPIO_27	
H6	VIO_5		
H7	CONSOLE_RX	GPIO_24	
H8	FC2_I2C_SDA	GPIO_16	Flexcomm 2-I2C_SDA

Note *1

PDN

Full Power-down (input) (active low)

0 = full power-down mode

1 = normal mode

- PDn can accept an input of 1.8V to 4.5V
- PDn may be driven by the host
- PDn must be high for normal operation

No internal pull-up on this pin.

This pin has an always-on internal weak pull-down.

Pin Description (continued)

Pad	External Name	Internal GPIO	Description
I1	LCD_SPI_DC	GPIO_47	LCD SPI interface data/ command output
I2	LCD_SPI_SDIO	GPIO_46	LCD SPI interface data input/ output
I3	NC		
I4	NC		
I5	NC		
I6	NC		
I7	VIO_2		**Note *2**
I8	FC2_I2C_SCL	GPIO_17	Flexcomm 2 backup-I2C clock
J1	EXT_FREQ		External radio frequency input signal **Note *3**
J2	LCD_SPI_RESETN	GPIO_44	output signal to reset the device
J3	GND	GND	
J4	NC		
J5	NC		
J6	NC		
J7	VIO_1		**Note *2**
J8	MCLK	GPIO_5	Input or output for I2S and/or digital microphone
K1	EXT_PRI		**Note *3**
K2	ADC_0	GPIO_42	
K3	PDM_CLK_01	GPIO_53	PDM clock output for DMIC channels 0 and 1
K4	NC		
K5	NC		
K6	NC		
K7	I2S_FDX	GPIO_2	Flexcomm 0 I2S receiver/transmitter
K8	I2S_DATA	GPIO_9	Flexcomm 1 I2S receiver/transmitter

Note *2

VIO0, VIO1

Extrenal 1.8V or 3.3V VIO power supply for GPIO, VIO_SD and VIO_RF, default is 3.3V

Note *3

EXT_FREQ

External radio frequency input signal (optional) -muxed with WCI-2_SOUT signal of WCI-2 interface. Frequency overlap between external radio and Wi-Fi:

- 1: overlap
- 0: non-overlap

This signal is useful when the external radio is a frequency hopping device.

EXT_PRI

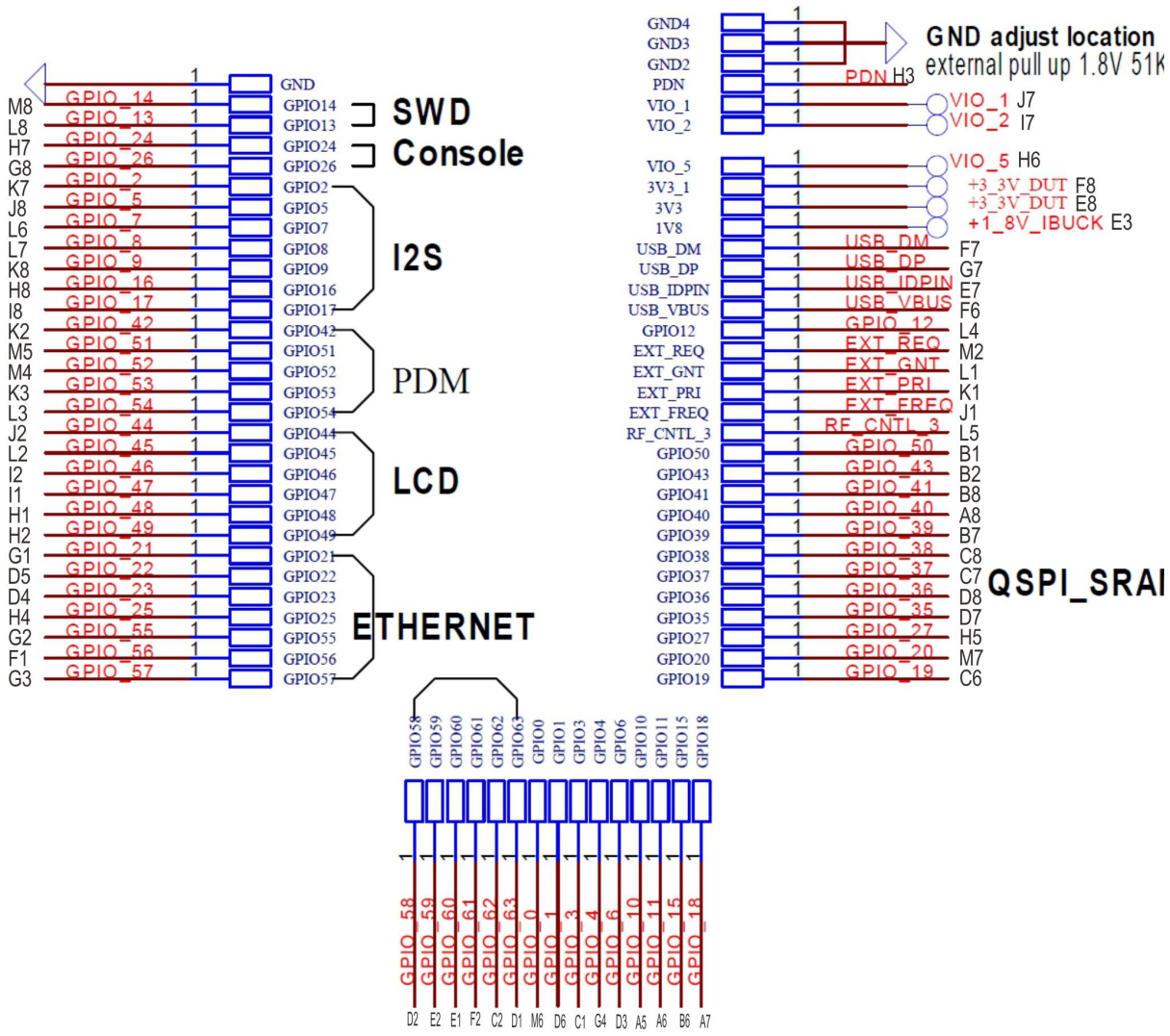
External radio input priority signal (optional)

Priority of the request from the external radio. Can support 1 bit priority (sample once). Can also have Tx/Rx info following the priority info if EXT_STATE is not used.

Pin Description (continued)

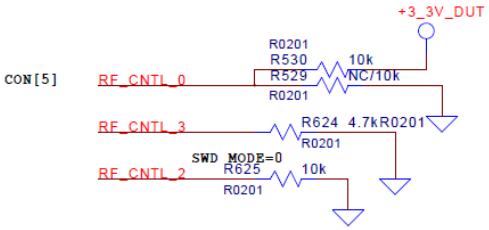
Pad	External Name	Internal GPIO	Description
L1	EXT_GNT		External radio grant output signal (mandatory).
L2	GPIO45	GPIO_45	
L3	PDM_CLK_23	GPIO_54	PDM clock output for DMIC channels 2 and 3
L4	GPIO_12	GPIO_12	
L5	RF_CNTL_3		Wi-Fi RF front-end control line 3
L6	I2S_SCK	GPIO_7	Flexcomm 1 I2S clock
L7	I2S_WS	GPIO_8	Flexcomm 1 I2S word select
L8	SWCLK	GPIO_13	
M1	GND	GND	
M2	EXT_REQ		Request from external radio (mandatory).
M3	GND	GND	
M4	PDM_DATA23	GPIO_52	PDM data input for DMIC channels 2 and 3
M5	PDM_DATA_01	GPIO_51	PDM data input for DMIC channels 0 and 1
M6	GPIO_0	GPIO_0	
M7	GPIO_20	GPIO_20	
M8	SWDIO	GPIO_14	
N1	GND	GND	
N2	GND	GND	
N3	GND	GND	
N4	GND	GND	
N5	GND	GND	
N6	GND	GND	
N7	GND	GND	
N8	GND	GND	

7.2. Sort by pin functions



8. Strap configuration and boot options

STRAP CONFIG



STRAP/CONFIG TABLE

CON	FUNCTION	
[5]	CONFIG XOSC_SEL: RF_CNTL0 1 : 40 MHz (Default) 0 : 38.4 MHz	
[3:0]	CONFIG HOST BOOT[3:0]	
	CON[3:0]	Boot
	1111	Boot from QSPI Flash (Default)
	1110	ISP boot
	1101	Serial Boot
	1100	SDIO boot
	1011	USB boot
	1010	SPI EEPROM boot

CON[3]:always "1"
CON[5]:always "1"

Note:

1. The default is to boot from QSPI Flash
2. It requires the soldering work to change the boot options, please contact Globalscale Technologies for details

9. APPLICATIONS

☐ Industrial

- Building automation
- Smart lighting, security
- Point of Sale (POS) Terminals

☐ Smart Home

- Smart outlet
- Light switch
- Security camera
- Thermostat
- Sprinkler control
- Door lock, doorbell, garage door
- Security system
- Smart display

☐ Smart Devices

- Air purifier
- Pet monitor
- Weighing scale
- Glucometer
- Blood pressure monitor
- Fitness equipment

☐ Smart Appliances

- Refrigerator
- Washer
- Dryer
- Oven Range
- Microwave
- Dishwasher
- Water heater
- Air conditioner
- Robotic vacuum cleaner

☐ Smart accessories

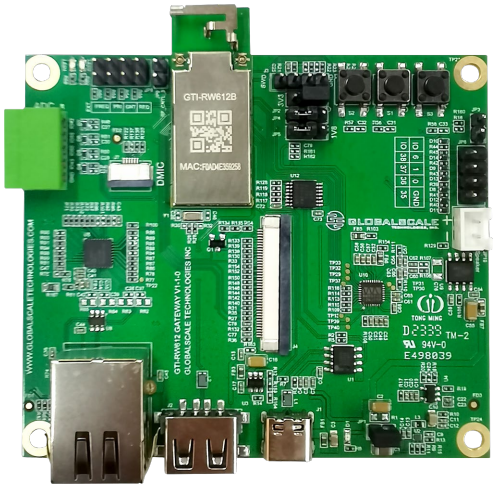
- Smart speakers
- Headset
- Alarm clock
- Gaming accessory
- Remote control

☐ Gateways

- Multi-radio hub
- Smart gateway for Internet connectivity

10. Evaluation Board- Matter gateway

GTI (Globalscale Technologies) has developed the RW612 matter gateway board with the add-on GTI-RW612B module which is appropriate for use as the EVB of this system.



The document named “GTI-RW612 Matter-Thread gateway-Quick Start Guide-Mar 03 2024.pdf” is also available Please contact GTI for them.

11.Contact information

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