

1.2 Product features

Radio features	Description
Wi-Fi Standards	Wi-Fi 4 IEEE 802.11 a/b/g/n
Wi-Fi frequency bands	2.4 GHz, channel 1-13 5 GHz, channel 36-165
Bluetooth	Bluetooth 5.2 specification support Bluetooth Low Energy and Bluetooth BR/EDR
Antennas	MAYA-W160: 2 U. FL connectors MAYA-W161: 2 antenna pins MAYA-W166-00B: 1 embedded PCB antenna MAYA-W166-01B: 1 antenna pin
Software features	
Security	WPA3, WPA2, WPA2 and WPA mixed mode
RF calibration and MAC addresses	Available in on-board OTP memory
Wi-Fi operational modes	Station, Access-Point, Wi-Fi direct, or combination of these
Driver support	Free drivers for Linux and Android RTOS (with certain types of NXP MCUs)
Interfaces	
Wi-Fi	SDIO 3.0 (4-bit, up to 100 MHz clock)
Bluetooth	4-wire high-speed UART, HCI transport layer PCM/I2S for audio
Other	GPIOs
Package	
Dimensions	10.4 x 14.3 x 1.8 mm
Mounting	Soldering, 86 pins (LGA)
Environmental data, quality & reliability	
Operating temperature	-40 °C to +85 °C
MSL-level	4
RoHS and REACH compliance	Yes
Electrical data	
RF power supply	3.0–3.6 VDC, 1.8 VDC
I/O power supply	3.3 VDC or 1.8 VDC
Certifications and approvals	
Type approvals	Completed: Europe (RED), US (FCC), Canada (ISED) Planned: Korea, Japan Other country certification: On request
Bluetooth qualification	v5.2 (Bluetooth BR/EDR and Bluetooth low energy)
Support Products	
EVK-MAYA-W161	Evaluation kit for MAYA-W160 or MAYA-W161
EVK-MAYA-W166	Evaluation kit for MAYA-W166-00B
Product variants	
MAYA-W160-00B	Professional grade module with two separate U.FL connectors for Wi-Fi and Bluetooth
MAYA-W161-00B	Professional grade module with two separate antenna pins for Wi-Fi and Bluetooth
MAYA-W166-00B	Professional grade module with embedded PCB antenna for Wi-Fi and Bluetooth
MAYA-W166-01B	Professional grade module with single antenna pin for Wi-Fi and Bluetooth

Table 1: MAYA-W1 series product features

1.3 Block diagram

Four versions of MAYA-W1 are available: MAYA-W161 with two antenna RF pins, MAYA-W160 with two U.FL connectors, **MAYA-W166-00B with a single internal antenna**, and MAYA-W166-01B with a single antenna pin.

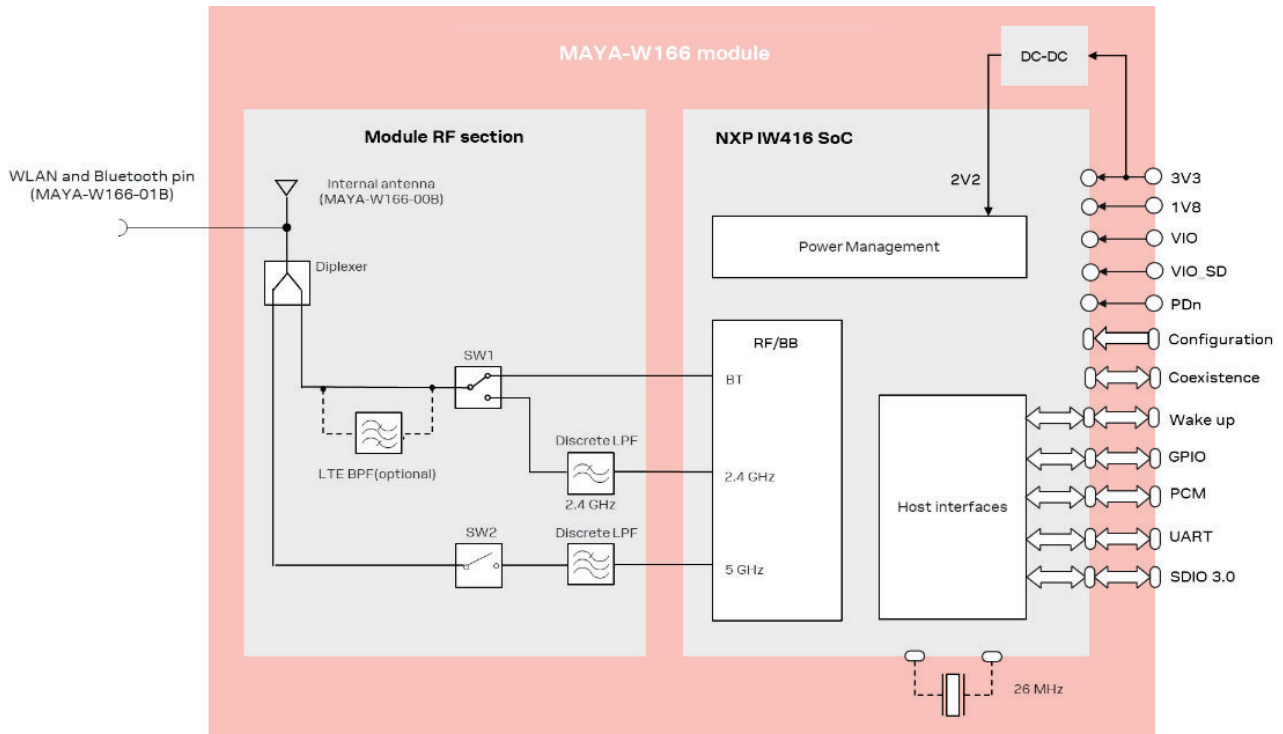


Figure 1: Block diagram of MAYA-166

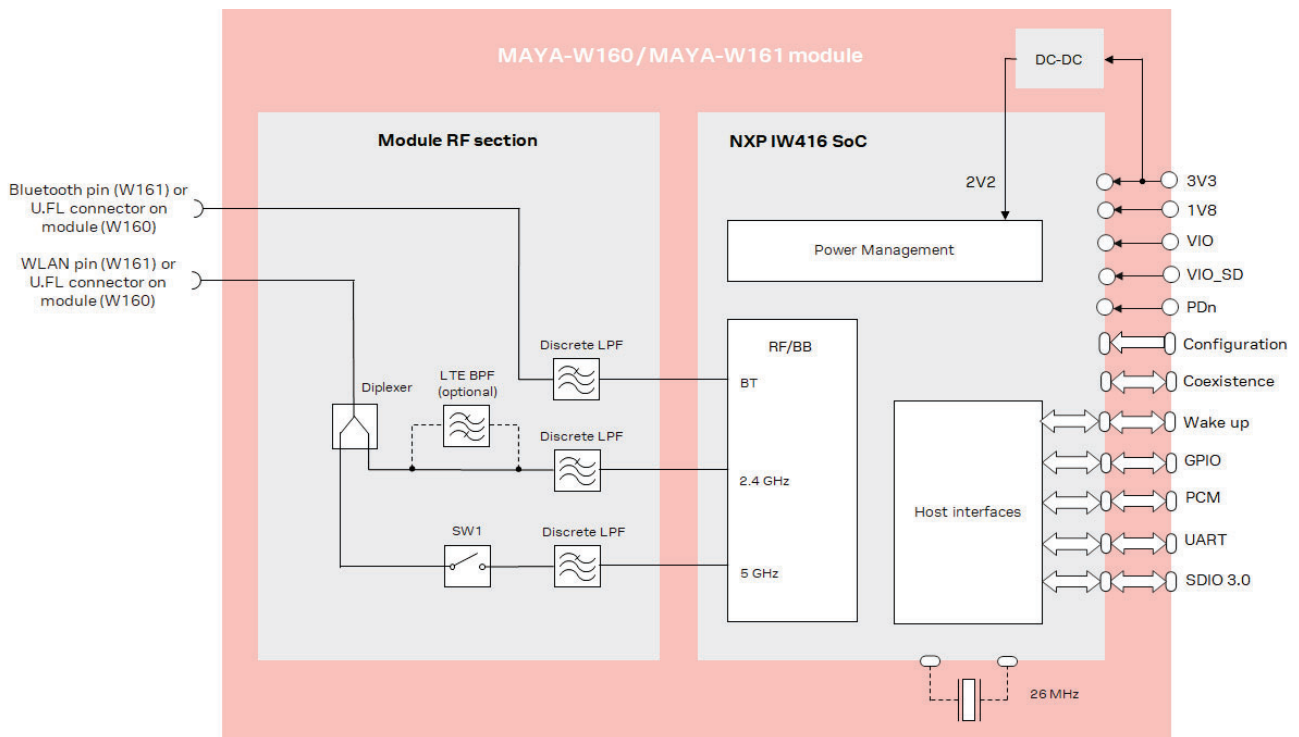


Figure 2: Block diagram of MAYA-161 or MAYA-160

1.4 Product description

MAYA-W1 series comprises ultra-compact Wi-Fi front-end modules with an SDIO host interface and module outline of only 14.3 x 10.4 mm. The module supports Wi-Fi IEEE 802.11a/b/g/n and Bluetooth 5.2 and is developed for reliable, high-demanding, industrial devices and applications. Based on the NXP IW416 chipset, MAYA-W1 includes an integrated MAC/Baseband processor and RF front-end components.

The MAYA-W1 series offers three different antenna solutions:

- MAYA-W160 has two U.FL connectors for connecting external antennas. It includes an integrated discrete filter in the 2.4 GHz band (optional LTE filter for improved coexistence with LTE bands 7, 38, 40 and 41) and 5 GHz band.
- MAYA-W161 has two antenna pins for connecting external antennas. It includes a discrete filter in the 2.4 GHz band (with optional LTE filter for improved coexistence with LTE bands 7, 38, 40 and 41) and 5 GHz band.
- MAYA-W166-00B includes an internal niche antenna and integrated discrete filter in the 2.4 GHz band (with optional LTE filter for improved coexistence with LTE bands 7, 38, 40 and 41) and 5 GHz band.
- MAYA-W166-01B has a single antenna pin for connecting an external antenna. It includes an integrated discrete filter in the 2.4 GHz band (optional LTE filter for improved coexistence with LTE bands 7, 38, 40 and 41) and 5 GHz band.

1.5 Supported features

- Integrated highly effective antenna, antenna pin, or U. FL connectors
- Extended operating temperature range of -40 °C to +85 °C
- Selectable 1.8 V or 3.3 V IO levels
- Simultaneous Wi-Fi and Bluetooth operation with dual antenna configuration
- Shared 2.4 GHz Wi-Fi and Bluetooth operation with single antenna or antenna pin (MAYA-W166)
- Wi-Fi/Bluetooth coexistence support

1.5.1 Wi-Fi features

- Supports Wi-Fi 4, IEEE 802.11 a/b/g/n
- Dual-band 2.4 GHz and 5 GHz
- Single stream 802.11n with 20 and 40 MHz channel width
- Data rate up to 150 Mbps (MCS7)
- 802.11n short and long guard interval
- Dynamic frequency selection (radar detection)
- Power saving features
- SDIO 3.0 device interface
- Security: WPA3, WPA2, WPA2 and WPA mixed mode
- Wi-Fi Standards IEEE 802.11d/e/h/i/k/r/u/v/w
- Supports simultaneous station, access point and P2P modes
- Supports up to eight stations in AP mode

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$T_{OHL D}$	Output hold $C_L \geq 15 \text{ pF}$ (1 card)	DDR 50	1.5	–	–	ns
DAT[3:0] Input (referenced to clock rising and falling edges)						
T_{IS2x}	Input setup time $C_{CARD} \leq 10 \text{ pF}$ (1 card)	DDR 50	3	–	–	ns
T_{IH2x}	Input hold time $C_{CARD} \leq 10 \text{ pF}$ (1 card)	DDR 50	0.8	–	–	ns
DAT[3:0] Output (referenced to clock rising and falling edges)						
$T_{ODLY2x (max)}$	Output delay time during data transfer mode $C_L \leq 25 \text{ pF}$ (1 card)	DDR 50	–	–	7.0	ns
$T_{ODLY2x (min)}$	Output hold time $C_L \geq 15 \text{ pF}$ (1 card)	DDR 50	1.5	–	–	ns

Table 8: SDIO timing data – DDR50 mode (50MHz)

2.2.5 SDIO internal pull-up and pull-down specifications

Parameter	Condition	Min	Typ	Max	Unit
Internal nominal pull-up/pull-down resistance		60	90	120	k Ω

Table 9: SDIO internal pull-up and pull-down specifications

2.3 Antenna interfaces

The MAYA-W1 series supports either **an internal antenna (MAYA-166-00B)** or external antennas connected through an antenna pin or U. FL connectors (MAYA-W161, MAYA-160 or MAYA-W166-01B).

To prevent mutual interference with LTE bands, MAYA-W1 includes an optionally integrated, high-performance 2.4 GHz SAW LTE band pass filter.

2.3.1 Internal antenna

MAYA-W166-00B has an internal niche (embedded) 2.4 / 5 GHz antenna that is specifically designed and optimized for the MAYA form factor.

4.5.3 Antenna Radiation Patterns

The radiation patterns displayed in [Table 27](#) and [Table 28](#) show the radiation patterns of MAYA-W166-00B with internal PCB trace antenna for 2.44 GHz and 5.5 GHz. [Table 29](#) shows the TRP and peak gain for the low, mid, and high channel of the 2.4 GHz and 5 GHz frequency bands.

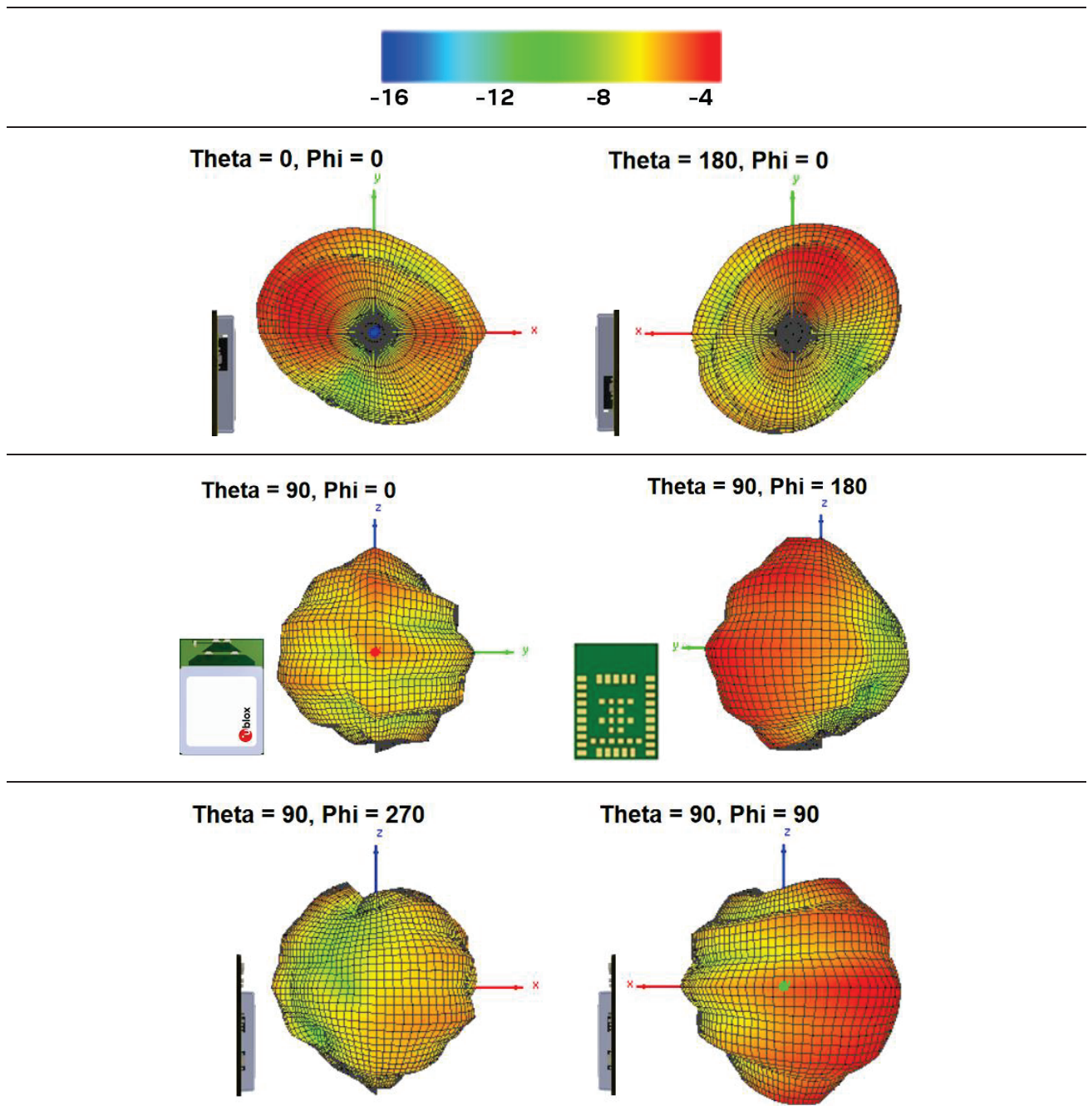
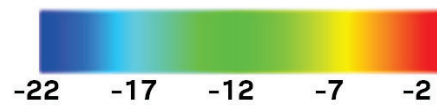
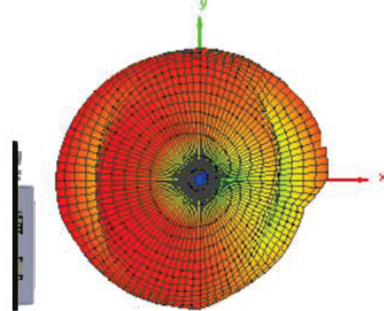


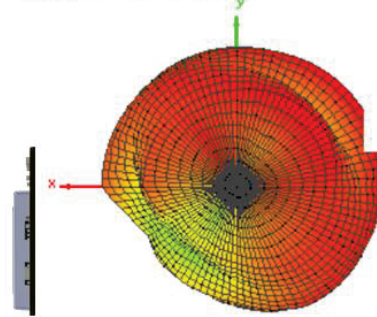
Table 27: Wi-Fi and Bluetooth antenna characteristics at 2.44 GHz



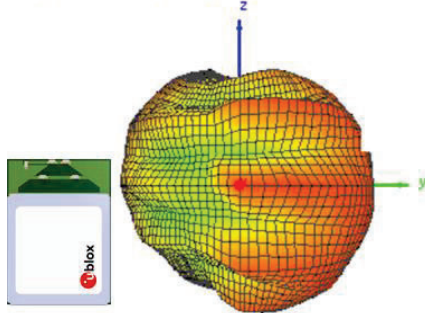
Theta = 0, Phi = 0



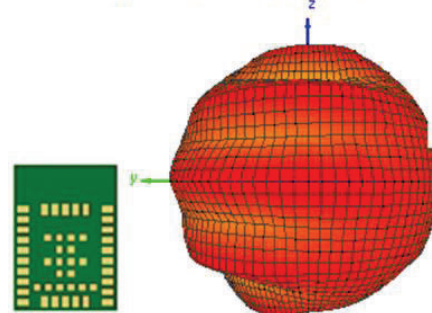
Theta = 180, Phi = 0



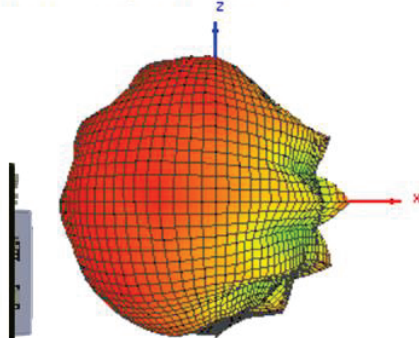
Theta = 90, Phi = 0



Theta = 90, Phi = 180



Theta = 90, Phi = 270



Theta = 90, Phi = 90

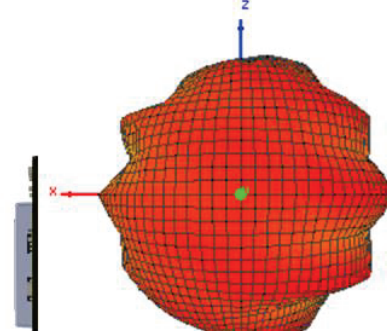


Table 28: Wi-Fi antenna characteristics at 5.50 GHz

Transmission	Measured TRP	Measured peak gain
Channel 1, 2.412 GHz	-6.80 dBm	-3.42 dBi
Channel 6, 2.437 GHz	-6.65 dBm	-4.36 dBi
Channel 13, 2.472 GHz	-7.96 dBm	-5.81 dBi
Channel 36, 5.180 GHz	-3.49 dBm	-0.87 dBi
Channel 100, 5.500 GHz	-3.66 dBm	-1.51 dBi
Channel 159, 5.795 GHz	-4.23 dBm	-2.08 dBi

Table 29: Measured radiated power and peak gain for 0 dBm transmission power