

Introduction

Purpose

- To familiarize customers with Yageo's Wireless Components and their target applications

Objectives

- Portfolio. Antennas, filters and X2Y devices
- Product key features, and some applications
- Application focus summary
- Yageo Selling points

Content

- 20 pages

Learning Time

- 14 minutes



Welcome to Yageo Wireless product training module. This module will introduce customers to antennas, filters, X2Y devices but also to their key applications.

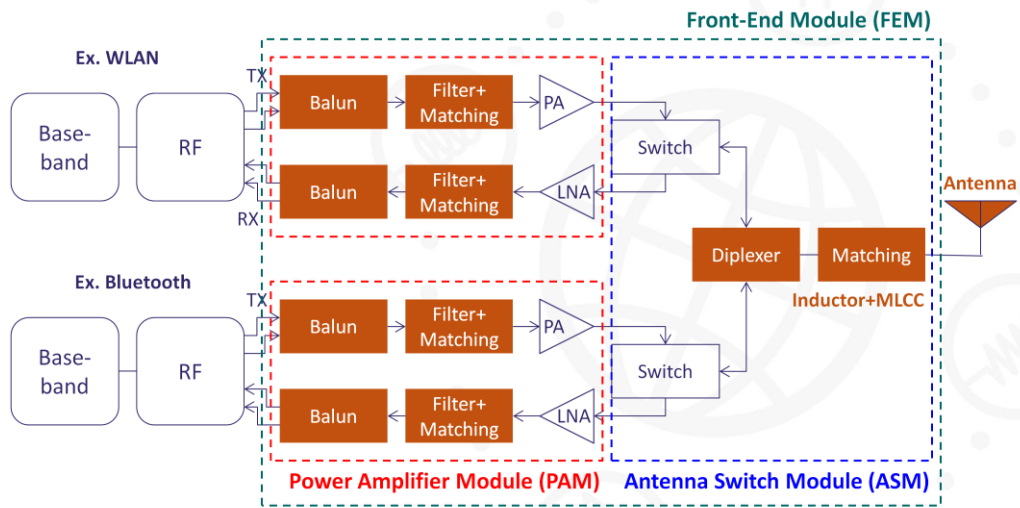
Lastly, in one slide we will summarize the focus applications and the key selling points for yageo. I.e. answer the questions ‘ why use/consider yageo products?’

There are 20 slides and my time target for completing this training unit is about 14minutes.

However there is a lot of information that I could not cover in such a short time, I will only highlight the most important things.

For any additional info or suggestions pls contact our local sales team. Thank you for your interest.

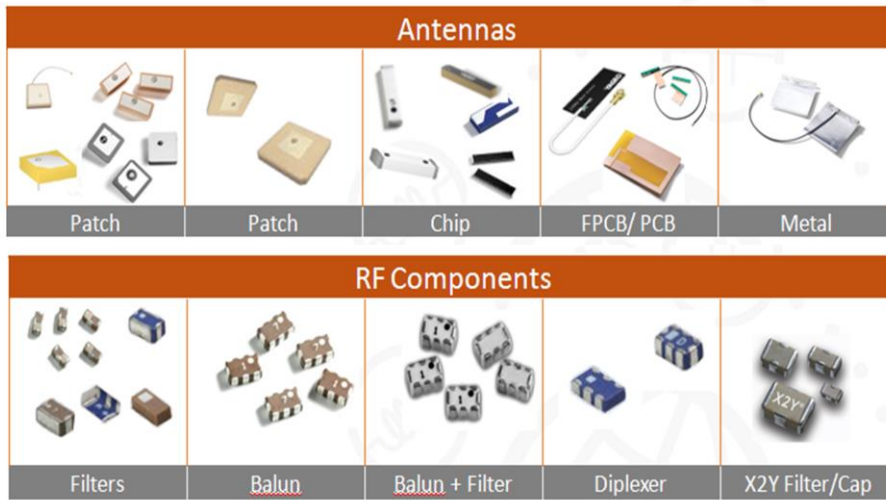
Key Passive Components of RF Circuit Design



For RF FEM (front end modules) designs, Yageo offers many critical components such as antennas, filters, baluns and the corresponding matching networks.

Yageo components/blocks in brown.

Yageo Wireless Portfolio. Antennas and RF components

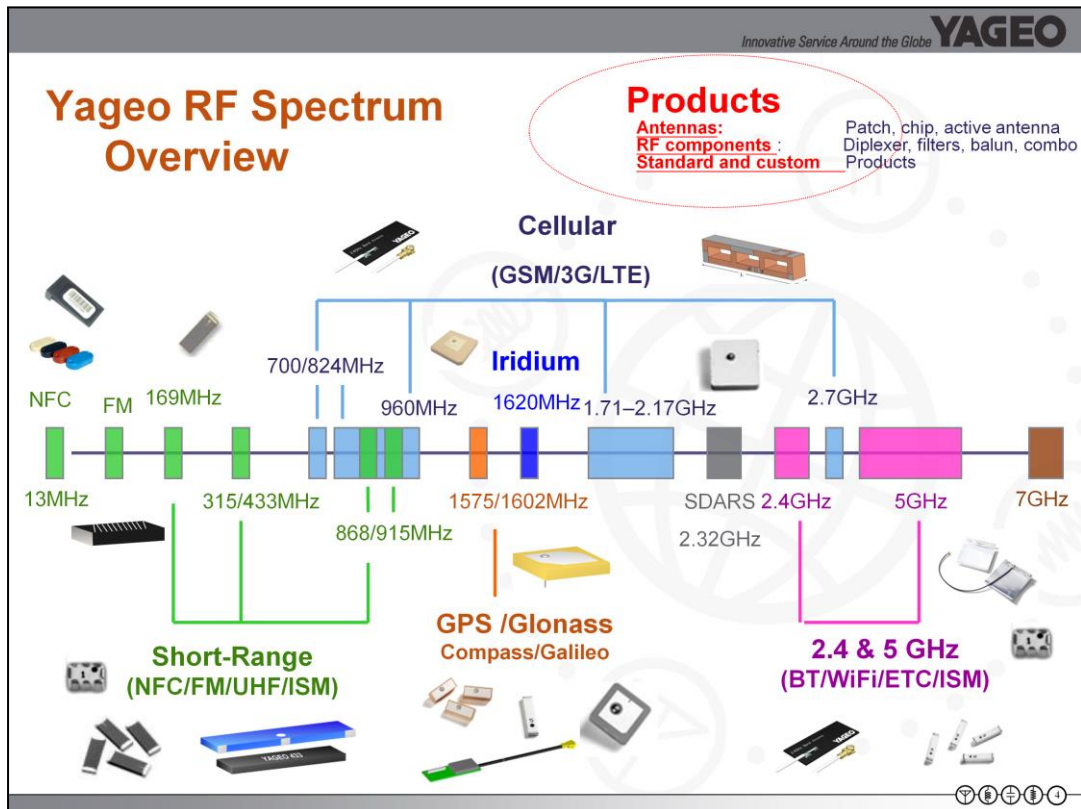


Yageo produces a wide range of wireless components however two main categories:

1. antennas (chip, patch, metal, PCB/FPCB) and active antennas
2. RF Components (filters, baluns, diplexers).

Most of these products are offered as standard products, however we also offer some custom design solutions.

The pictures above give an idea of how the antennas/components look like. Ex. Patch antenna or diplexer.



Yageo offers a broad range of components covering the wide range from 13MHz/NFC to above 7GHz.

Our products support :

1. Bluetooth, WiFi, SDARS (XM/Sirius satellite radio), 3G/LTE+, and GPS/Glonass/Compass.
2. Other technologies such as NFC, Iridium Satellite, Zig-Bee, Short Range ISM bands are also supported.

Additionally we support other bands and applications.

Yageo Wireless. Key Features

- **Compact and low profile**
 - Maximize performance with the smallest size possible
 - The smallest antenna with PCB & ceramic technology
- **Multi-Band & High Efficiency**
 - 3G/LTE: Quad-band and penta-band (850/900/1800/1900/2100 MHz)
 - 4G cellular network, LTE 700 MHz (Band 12,13,17) and 2300/2600 MHz
 - Operating in multi- navigational systems GPS/Glonass/Galileo/Compass
- **High Reliability**
 - Operating temperature range: -40°C ~ +105°C
- **Easy Assembly**
 - Reliable adhesive tape, surface mount, and flexible cable/connector selection



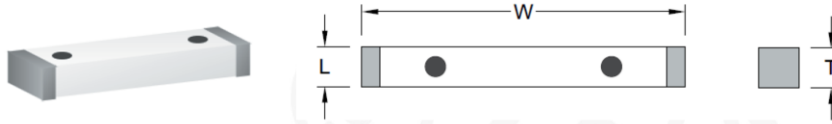
Key features of Yageo wireless components include:

- size/compactness,
- low profile,
- performance (multi-band and high efficiency),
- high reliability and easy assembly.

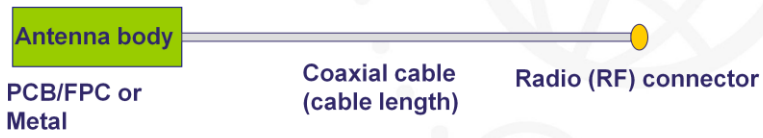
All of these features reduce PCB requirement and TTM/Time to Market.

Antenna Form Factor – Assembly Approaches

- LTCC Ceramic – SMD type



- PCB/Metal with Cable/Connector



- There are different form factors for antennas:
1. Surface-mount type
 2. PCB/metal with cable/connector.

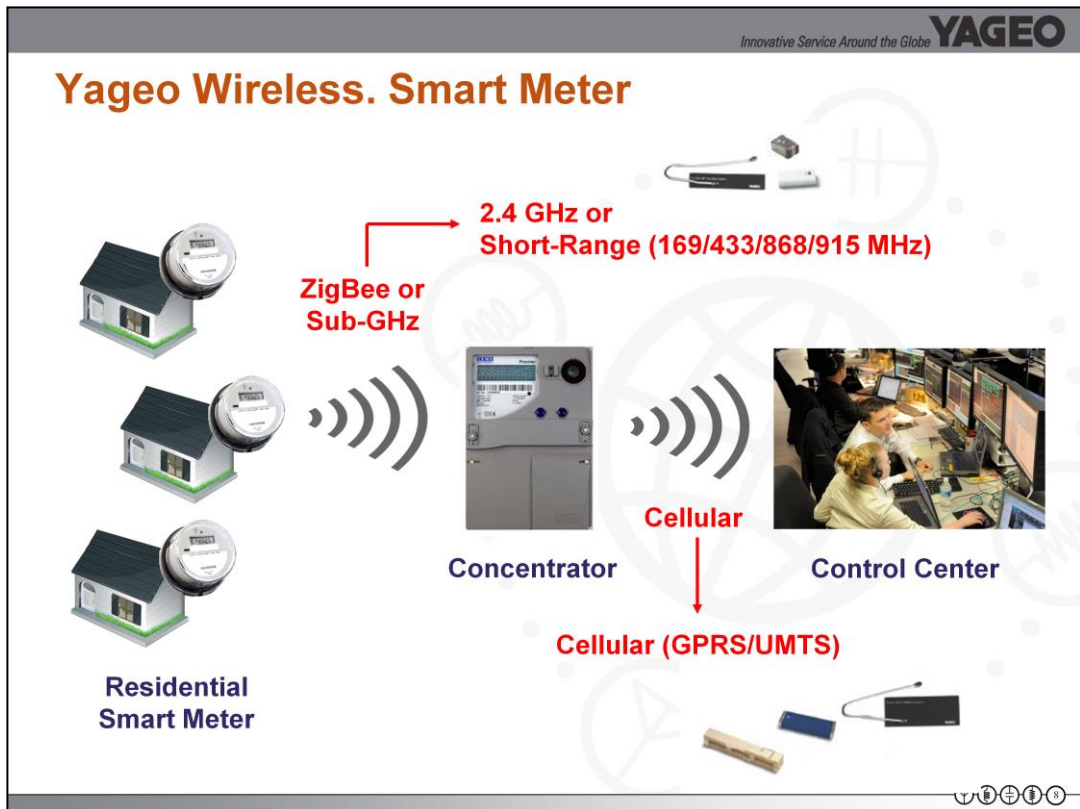


Ex. Automotive applications supported by Yageo's wireless components

The applications supported are :

- Telematics (eCall, OnStar, BMW Assist, MBrace),
- GPS & GLONASS (tracking/navigation),
- Bluetooth connectivity for Infotainment (phones, cameras, surrounding sound),
- TPMS (Tyre Pressure Monitoring Systems),
- Cellular ,
- SDARS (Sirius/XM),
- Access (NFC) etc.

Just some examples of supported technologies.

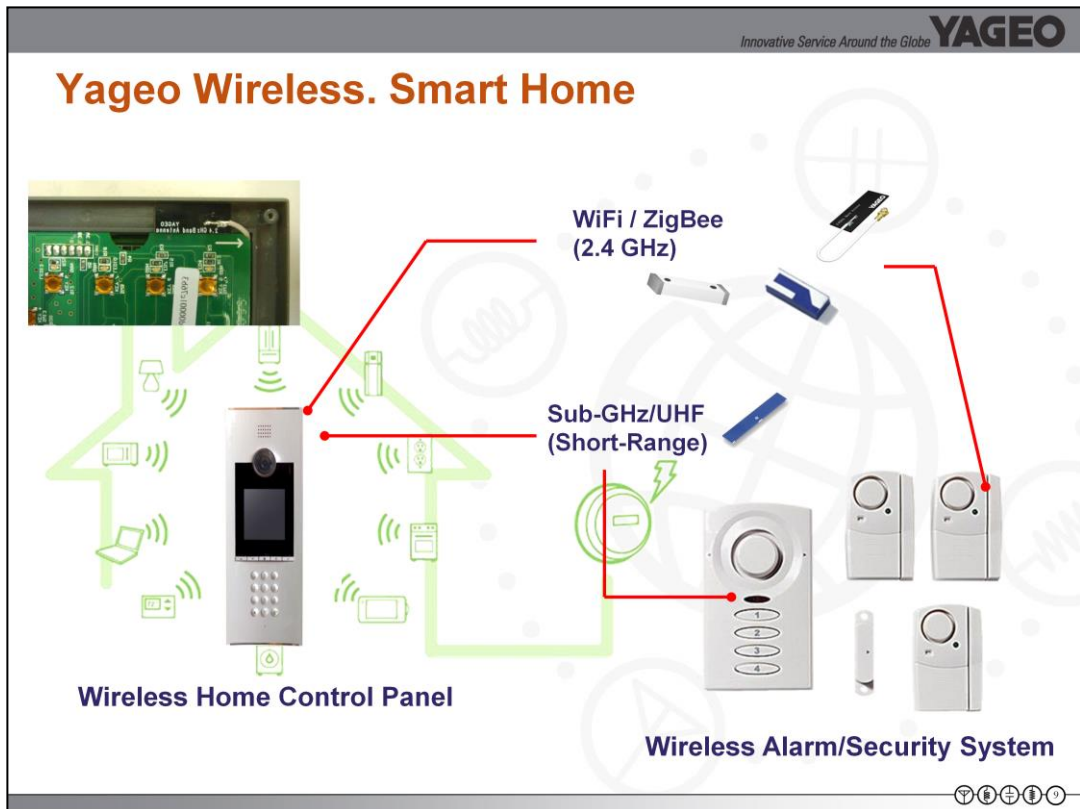


Example. The smart grid is currently one of the fastest growing applications supporting power distribution.

Smart meter, Concentrator are devices sending information wirelessly through technologies such as ZigBee, WiFi, UHF RF (Sub-GHz), and GSM/GPRS.

Every device requires antenna to broadcast and receive signals.

Yageo offers numerous devices supporting this application.

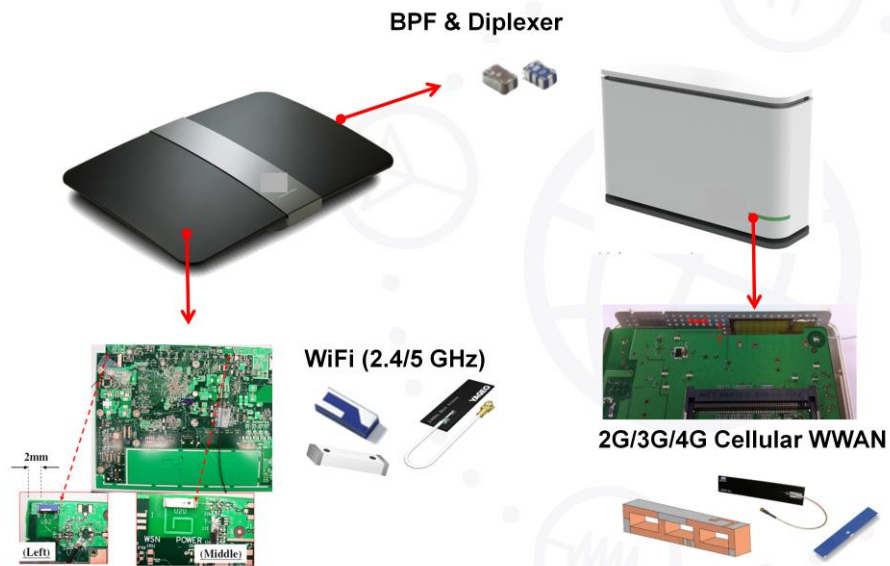


Example. The ‘Smart Home’ is an efficient system to manage home applications such as appliances, AC/Heating, Access and home security.

Many systems/applications such as appliances (washing machine, dryer), security (lights, alarm system, blinds, doors, cameras, garage door...), garden appliances (watering, lighting..) could be monitored and controlled via a smart phone.

Yageo offers numerous antennas/RF components supporting this growing market.

Yageo Wireless. Telecom and Networking



Example. Yageo chip and PCB/metal antennas, balun/filter have been successfully implemented into wireless networking devices such as WiFi router, gateway, repeaters, base station/Femtocell and STB /Set-Top-Box.

Yageo offers a wide range of products supporting this market segment.

Yageo Wireless. Tablet and Mobile Phones

Ultra-small Chip Antenna



Solutions

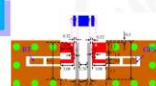
BT / WiFi

- Mono pole Type : 8010 Chip
- PiFa Type : 3216 Chip
- COB Type : 1803/1206/1008 COB



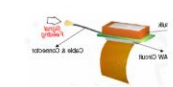
BT + GPS

- PiFa : 5320 Chip
- PiFa : 1003Chip



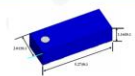
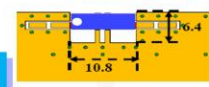
GPS & Glonass

- Monopole Type : 6230
- PiFa type : 3216 Chip
- Active Type : 2006 Active GPS



Dual WiFi (2.4G+5GHz)

- PiFa Type : 5320 Chip



Example. Yageo offers a wide range of antennas and filters for the consumer industry for laptop, tablet, mobile phones.

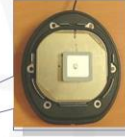
We design extremely small size antennas allowing savings in:

- PCB size/cost,
- assembly cost
- development costs and TTM/Time To Market.

Single mode to multi-band and multi-standard antenna/RF solutions meet today worldwide customer's requirements.

Yageo Wireless. Navigation, Tracking and Tracing

Require high performance



Solutions

GPS (1.575GHz)

- Patch Type : 25x25 , 18x18
15x15 , 12x12
- Active Type : 25x25 GPS Patch w LNA
15x15 GPS Patch w LNA



GPS + Glonass (1.575+1.602GHz)

- Patch Type : 25x25x4
25x25x2



GPS /Glonass/Galileo/Compass

- Patch Type : 25x25x4



Example.

Navigation, Tracking and Tracing systems based on all GNSS standard, GPS/GLONASS/Compass/Galileo systems, are used widely in vehicle, asset tracking.

We are now offering a **new all GNSS band patch antenna** supporting this growing application and market. This quad-band GNSS antenna is able to cover all existing standards for years to come.

Additionally we provide many antenna options for size/shape, model (PIFA/Monopole/patch), pin/SMD type, and active antenna module.

Filter/Balun for Mobile Computing Applications



RF Component Features
 - High rejection @ GSM Band (1800 & 1900MHz)
 @ WCDMA (2110~2170 MHz)
 - Miniature and low profile

High Rejection

- 2012 BPF / Main spec**
 1. Attenuation : 30dB Min @2170MHz
 35dB Min @1710~1990MHz
 I.L : 1.8dB T : 0.8 mm
- 1608 BPF / Main spec**
 1. Attenuation : 35dB Min @ 2110~2170 MHz
 : 40dB Min @ 1920~1990 MHz
 I.L : 3.2dB
 2. Attenuation : 30dB Min @ 2110~2170 MHz
 35dB Min @ 1920~1990 MHz
 I.L : 2.8dB T : 0.6 mm

Low Profile

- 2012 BPF / T : 0.45 mm**
 1. Attenuation : 16dB Min @ 2110~2170 MHz
 32dB Min @ 1920~1980 MHz
 I.L : 2.2dB
- 2012 Diplexer / T : 0.45 mm**
 - I.L : 0.5dB (Low) , 0.65 dB(High)
 - Attenuation : Low : 20dB @ 4800~5900MHz , 20dB @ 7200~7500MHz
 High 20dB @ 824~915MHz , 20dB @ 1800~2500MHz



Example:

For mobile computing application, filters are usually miniature size and profile, however they require high attenuation outside the GSM and WCDMA bands.

Yageo provides a wide range of filters and baluns to support customer designs.

Filter/Balun for Bluetooth/BT Applications

RF Component Features

- High Integration
BPF+ Balun+ Matching circuit
- Low loss
- Low size

Integration design matching circuit

2012 Combo (Balance Filter)

- Conjugate match to CSR BC series
Attenuation : 20dB(Min) @1880~1990MHz
30dB(Min) @4800~5000MHz
I.L : 2.8dB
- Conjugate match to MTK MT6611 / 6612 / 6612 series
Attenuation : 20dB(Min) @1880~1990MHz
30dB(Min) @4800~5000MHz
I.L : 3.2dB

Low Loss

1608 LPF

- I.L : 0.43dB
- Attenuation : 35dB Min @ 4.8 to 5.0GHz
- 27dB Min @ 7.2 to 7.5GHz

1608 BPF

- I.L : 1.7dB
- Attenuation : 20dB Min @ 1710~1990 MHz
- 20dB Min @ 4800~5000 MHz

Example.

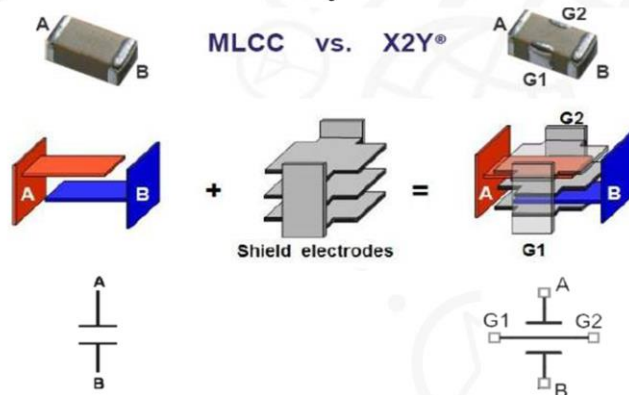
For Bluetooth applications the filters/baluns need to be highly integrated, small size but also low loss as they are usually embedded into portable (low power) devices.

What is X2Y?

- ❑ X2Y is a company that provides license for x2y components

Website : <http://www.x2y.com/index.htm>

- ❑ Yageo is one of their major licensed manufacturers



The company X2Y licenses its products (x2y capacitors) to Yageo and other selected manufacturers.

Basically the X2Y devices are three capacitors in one package (aligned: two on x-axis and one on y-axis).

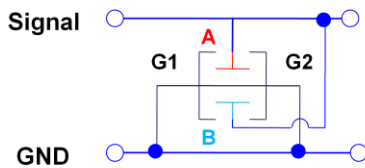
This configuration provides lower inductance (hence better high frequency operation) than conventional three capacitor designs.

X2Y Key Applications



□ Circuit 1 : Decoupling / Bypass

Terminals A & B => to **signal**

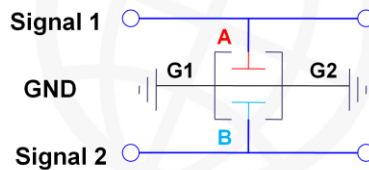


Applications :

1. FPGA , ASIC, CPU Decoupling
2. DDR Memory Decoupling
3. Switching Power Supplies

□ Circuit 2 : EMI Filtering

Terminal A & B => to **signal A and B lines**



Applications :

1. EMI filtering on DC motors
2. Amplifier Filter & EMI suppression
3. High Speed Data Line Filtering

There are almost infinite use for x2y device, however the two key applications are Decoupling/Bypass and EMI filters.

In the case of **decoupling/bypass** a Typical application could be the switched power supplies (DC/DC converters) where there is a lot of noise, signal harmonics from the switching module.

In the case of **EMI filtering**, **x2y work well** for motor applications where there is a lot of noise/harmonics generated by the rotor and its moving parts. X2y devices provide excellent EMI filtering for such applications.

We have multiple customers considering our x2y devices for these two key applications.

Yageo Wireless Component Coding Rule

ANT — 2012 — L — L13 — R — 2400 — A

Product Type

ANT: Antenna
BPF: Band-Pass Filter
LPF: Low-Pass Filter
BLN: Balun
BLF: Balun Filter
DPX: Diplexer

Type

L, F, A: Chip antenna
B: Bulk antenna, E: External
P: PCB, X: FPCB, S: Metal
I: Integrated antenna
J: Integrated antenna (w/ cable)
0 – 9: NB antenna (w/ cable)

Serial No.

**Package Type
& Conn #**

R: Tape & Reel
T: Tray
B: Bulk
0 – 9: NB con

Factory Control Code

A: LTCC
Cable Type
3: 1.13, 7: 1.37, 4: RG-174

1) Size (mm) – SMD (LTCC)

1608: 1.6 x 2.8 mm
2012
2520

2) Connector-Cable length (mm) – Stand-alone

Ex: X100 – IPEX connector, 100 mm cable length
X: IPEX, M: MMCX, S: SMA, Z: Stripped
100: 100 mm cable length

3) Special design customer name (valid for NB project)

Frequency

2400: 2.4 – 2.5 GHz; 2455: 2.4&5 GHz
1575: GPS; 1516: GPS+Glonass
0433: 433 MHz
0870: 868 MHz
0918: 900/1800 MHz
WQUD: 850/900/1800/1900
WPEN: 850/900/1800/1900/2100MHz
And so on

This slide shows Yageo’s part number breakdown for wireless components. Useful for order and product information. However when in doubt, pls contact one of our local sales team.

Yageo Wireless Solutions. Passives. Actives. Wireless Modules



Supporting tomorrow's technologies. Today.

A picture is worth 1000 words.

Here is a summary of the key markets and applications we are present today.

>>From Automotive to Industrial, Telematics, Consumers, Telecom and others.

>>Basically anytime a customer is using a wireless interface, Yageo is there to support the customer requirements

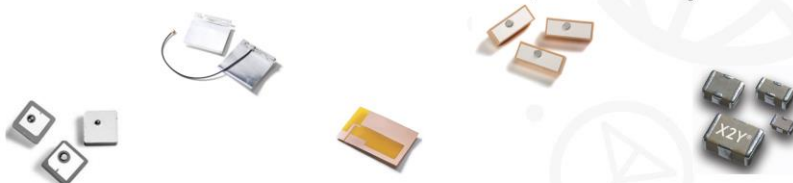
>>both standard products, and with custom made products.

Why Yageo? Key Selling points

- One stop shop (R/C/L, antennas, RF components)
- Wide and broad portfolio
- State-of-the art/best in class components (performance, efficiency, size, etc)
- Fabrication Capacity
- Test/Measurement/Simulation/Analysis labs- **tunning**

- Strong LOCAL technical support (layout, design, T&M, training etc)
- Strong LOCAL sales/marketing/quality support
- LOCAL warehouses, global logistics

- Supporting major OEM, EMS customers
- Wide network of distributors in Europe & Globally



Many customers may ask you ‘ why yageo? I already have two/three antenna suppliers. What is so unique about Yageo?’

This slide summarizes key selling points about Yageo, starting with:

1. ‘one stop shop’
2. to free ‘tunning/layout advice’ (RF designers could save days/weeks of testing by relying on our technical support),
3. to ‘local technical/sales support’ and
4. ‘local warehouse’ (a huge advantage for samples, quick pilot projects..).

We are a truly a local and at the same time a global antenna and RF components manufacturer.

Innovative Service Around the Globe **YAGEO**

Thank you



Thank you for your interest.

For additional information, comments etc, pls contact our local sales team.