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ST60
Contactless Connectivity

ST60

Agenda

1 60GHz Technology

2 ST60 Product Overview

3 ST60A2 Demo

4 ST60A3 Product Overview

5 ST60A3 Functional description & Tunneling modes

6 ST60A3 Demo

7 Conclusion

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60GHz Technology Overview

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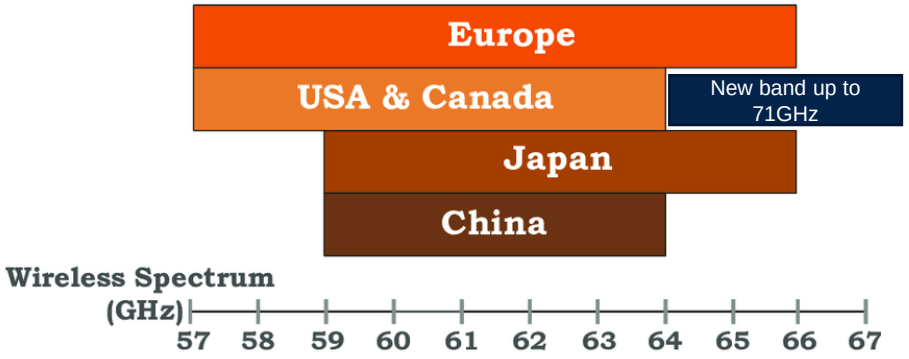
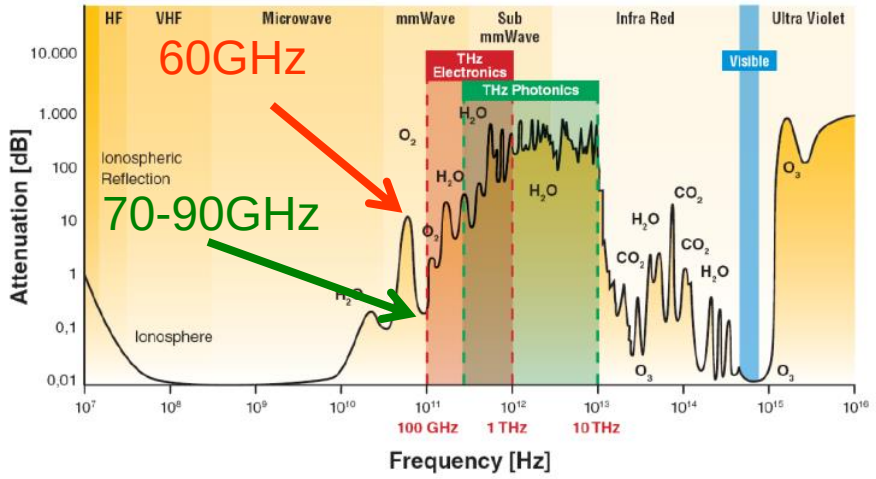
Why 60 GHz?

- 60 GHz band is **un-licensed band**
  - The 60 GHz band has **more bandwidth available** than all the lower unlicensed bands combined (vs 2.4GHz band, 5GHz band …)
  - Worldwide availability of this band, and it can be appreciated that it ranges from **3 to 9 GHz** wide

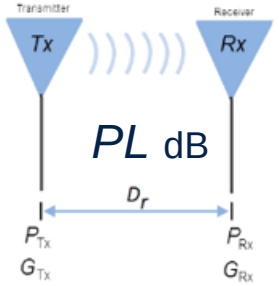
- Up until recent years, the 60 GHz band went largely unused due to the **high oxygen absorption** that signals in this band experience
- Now **low cost RF CMOS technology transceiver** available





….. But for Short distance

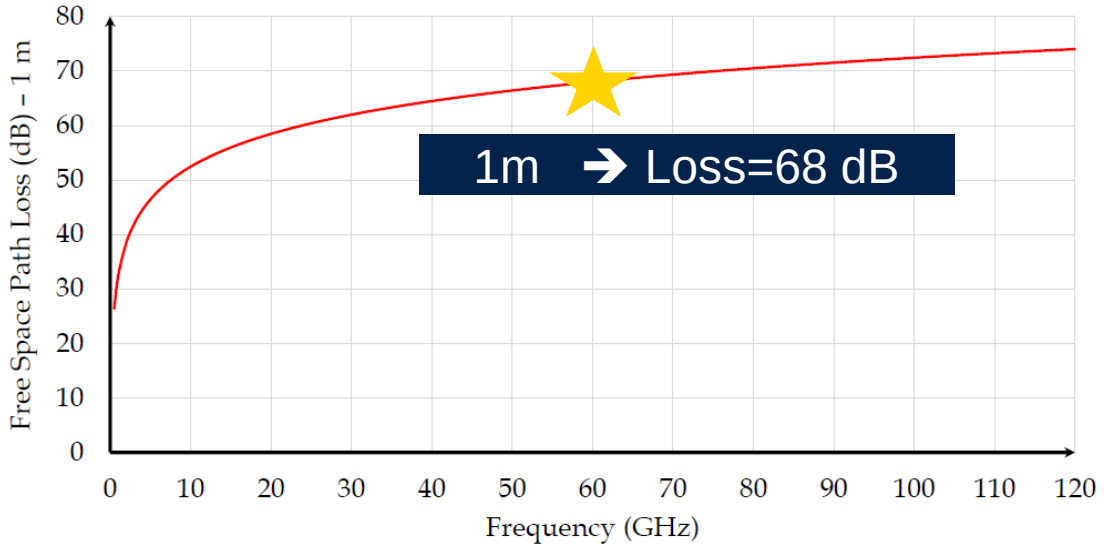
- Free Space path loss assuming 1m-long line-of-sight propagation

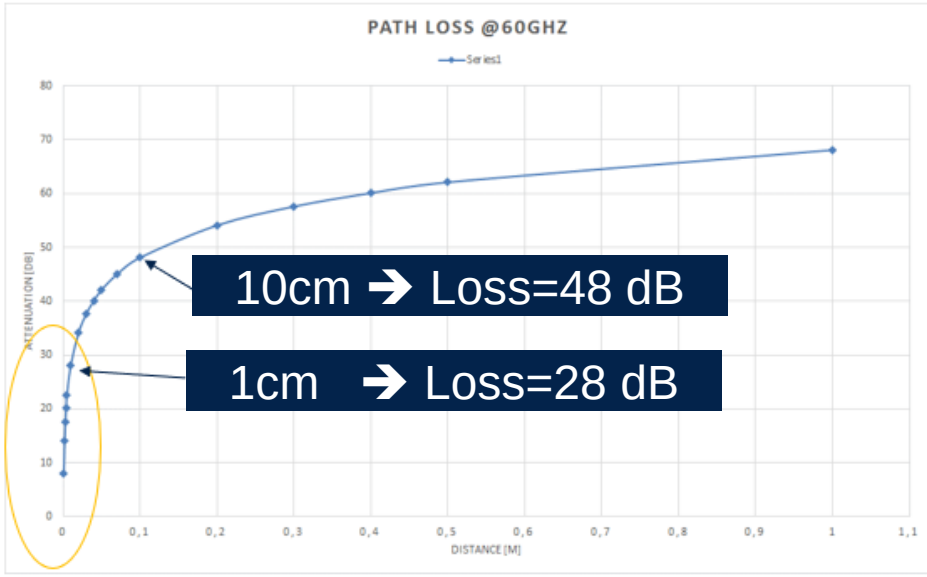


$$R_{\max} = \sqrt{\frac{P_t G_t G_r \lambda^2}{(4\pi)^2 P_{\min}}}$$

Friis' law

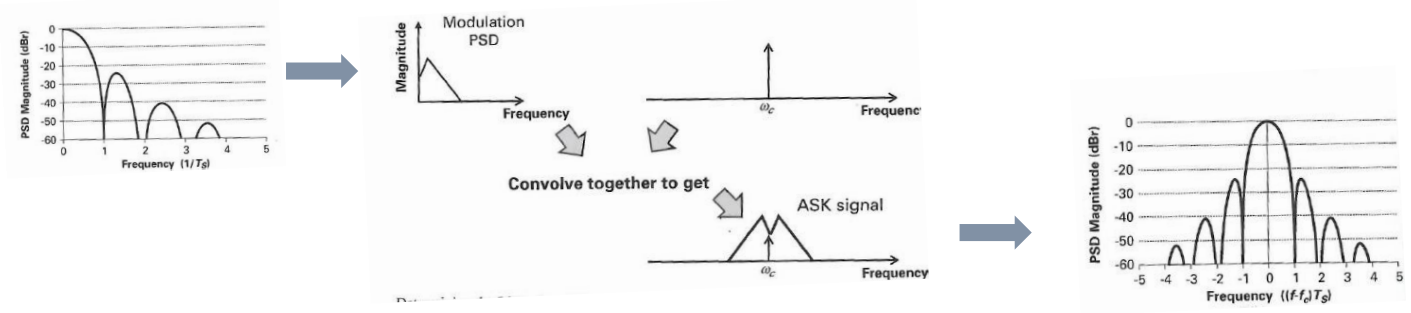
$$PL_{dB} = 20\log\left(\frac{4\pi L}{\lambda}\right) = 20\log\left(\frac{4\pi L f}{c_0}\right)$$

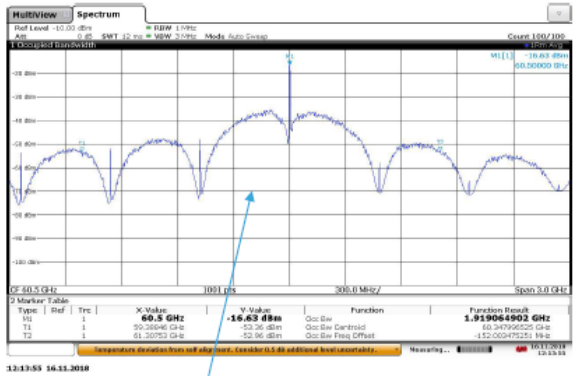




ASK Modulation

- Spectral construction example for ASK,
  - Determining the PSD (*) of an ASK signal by frequency translation of the modulation PSD.
  - Bandwidth of an ASK signal is double the bandwidth of the baseband modulation

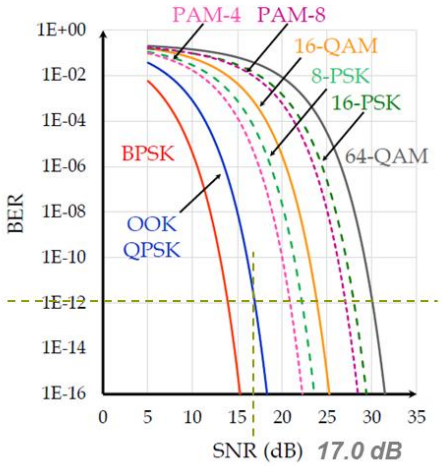




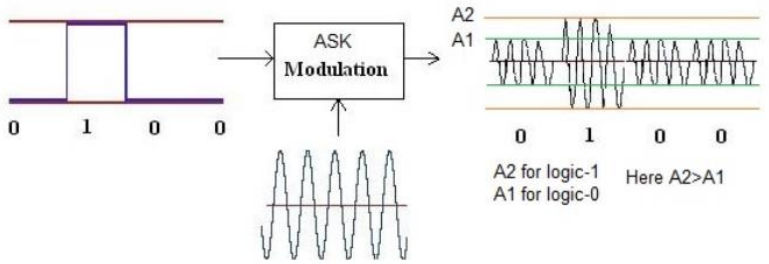
ASK Signal at Fc

(*) PSD is the power spectral density (in a bandwidth specified by applicable regulatory authority) in dBm/MHz

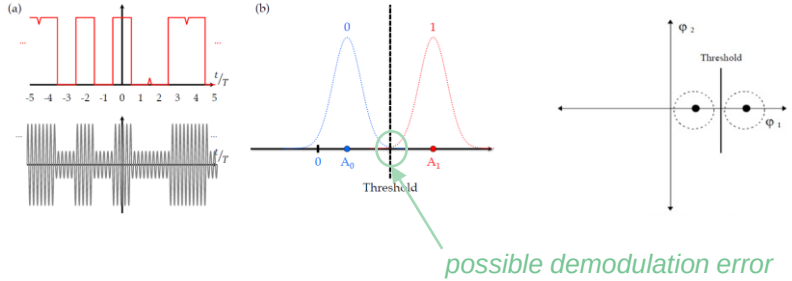
- BER Summary
  - ref Glover 2000 Trail Probability function



- Illustration of ASK Operation:



Time-Domain representation of transmitted bits



Constellation diagram

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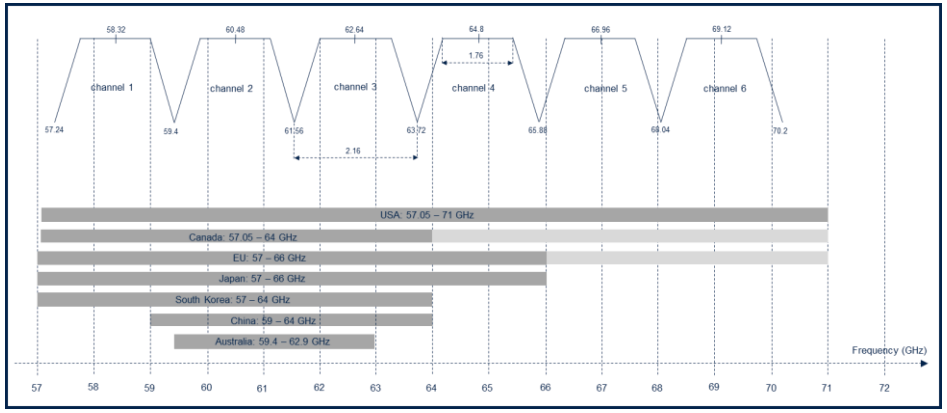
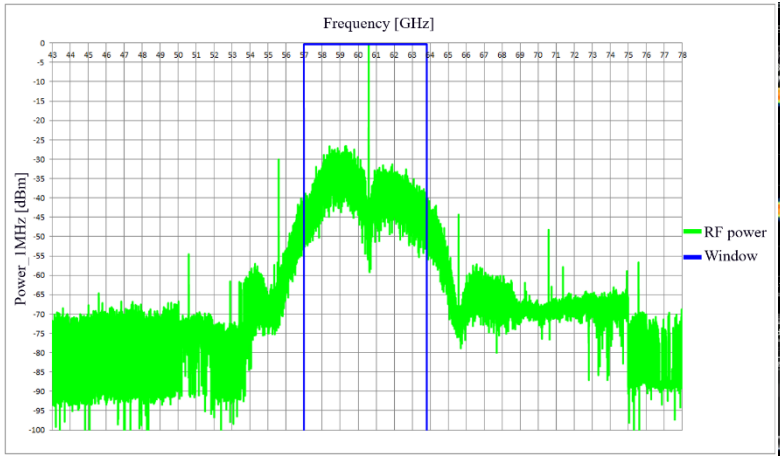
60 GHz V-band: Opportunities & Constraints

- Unlicensed, wide band available
- Regulatory Constraints
  - Example : ETSI Occupied Bandwidth (OBW)
  - 99% RF Power in 57-64 GHz, 100% in 35 GHz span



- Band of Choice for contactless serial bus development
- Contactless link must satisfy spectral and jitter constraints
- Example below: ST60A2 + filtering antenna
  - 99.1% RF power in [57-64] GHz and Total link Jitter 64ps @ 5Gbps



- Higher throughput mandates complex modulation with integrated digital filtering techniques, in advanced CMOS

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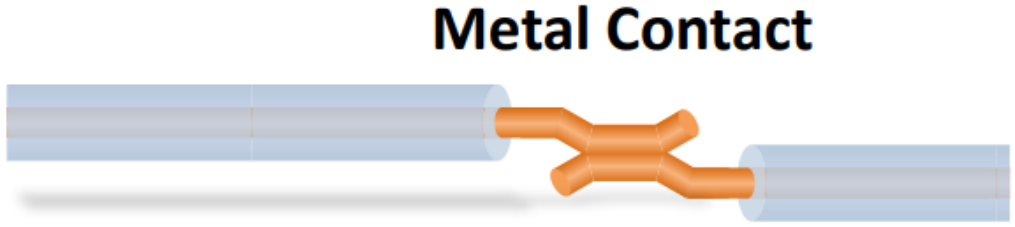
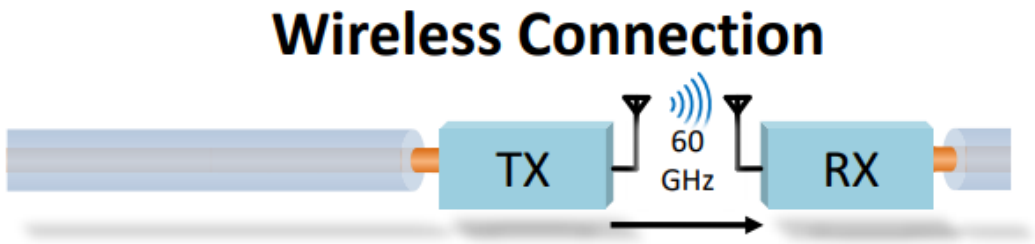
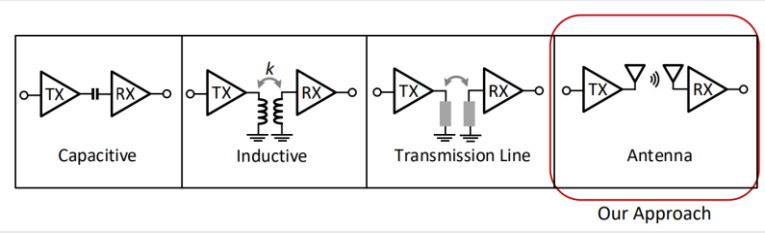
Solid-State Wireless Connection





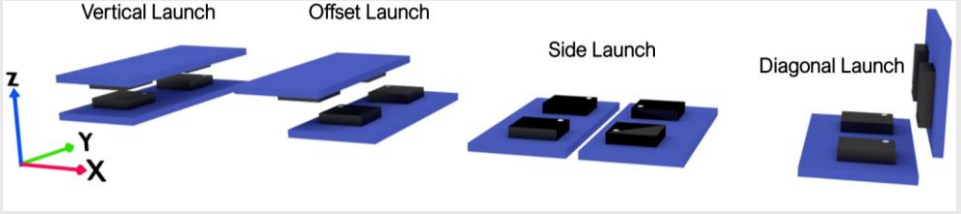
- Unique application of millimeter-wave technology
  - High bandwidth (Gb/s)
  - Low Latency, high data-rate without coding
- Exceptional reliability
  - Zero-wear, zero-corrosion
  - Near-zero sensitivity to vibration/alignment
- Ultraminiature – goes anywhere, everywhere
  - Low cost and simple to use
  - Discrete and/or embeddable technology

Types of Contactless Connectors



- Capacitive, inductive: direct baseband pulse transmission
- Antenna: carrier-modulated mm-wave transmission

New Freedom in Connector Design



- It offers extensive launch freedom while keeping the small form-factor

ST60 Contactless Connectivity

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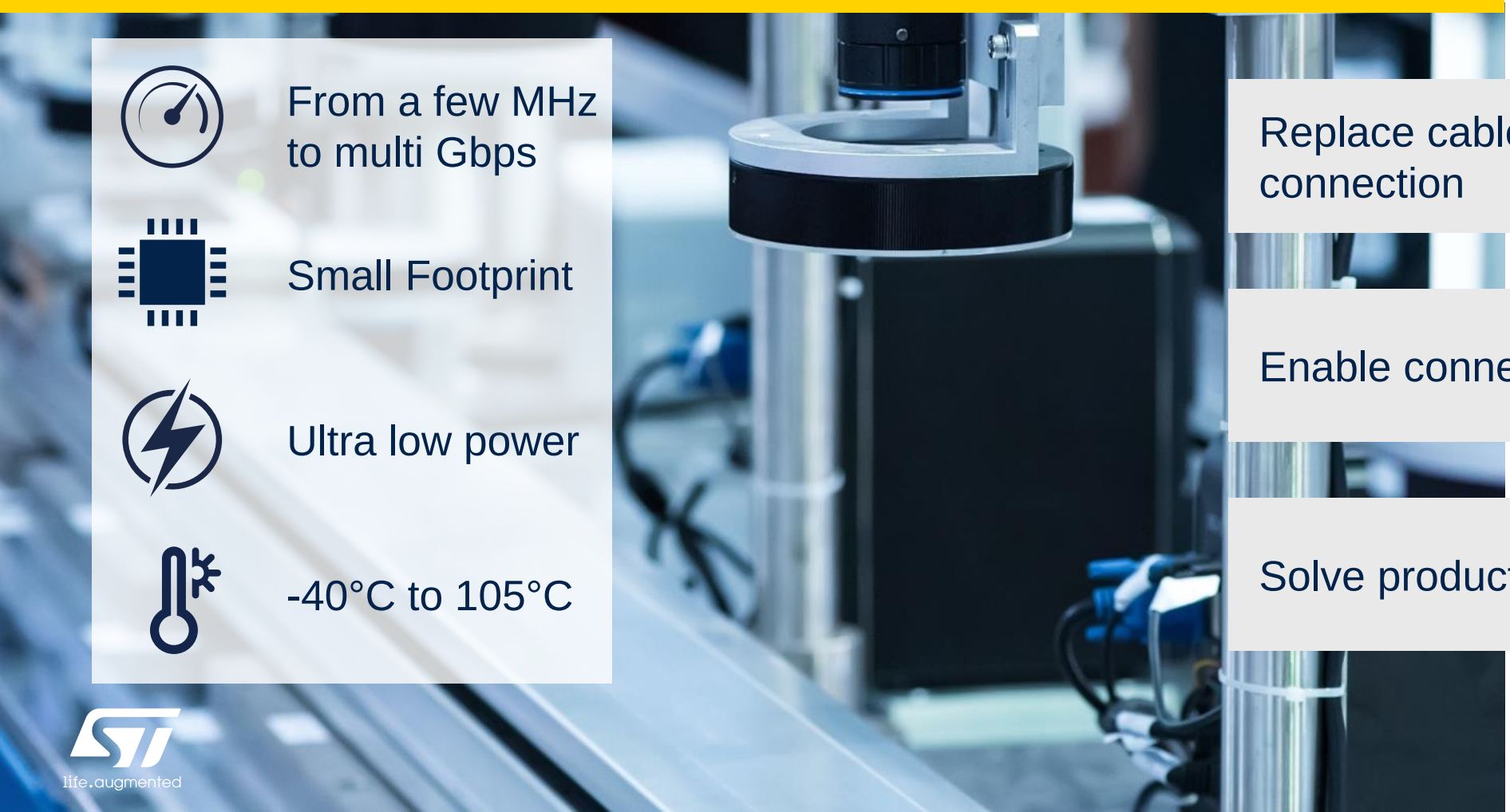
ST60: solutions for contactless connectivity

High-speed, low-power, short range, point to point 60 GHz RF link



- From a few MHz to multi Gbps
- Small Footprint
- Ultra low power
- -40°C to 105°C

Replace cables for board-to-board connection

Enable connector-free solutions

Solve product design challenges

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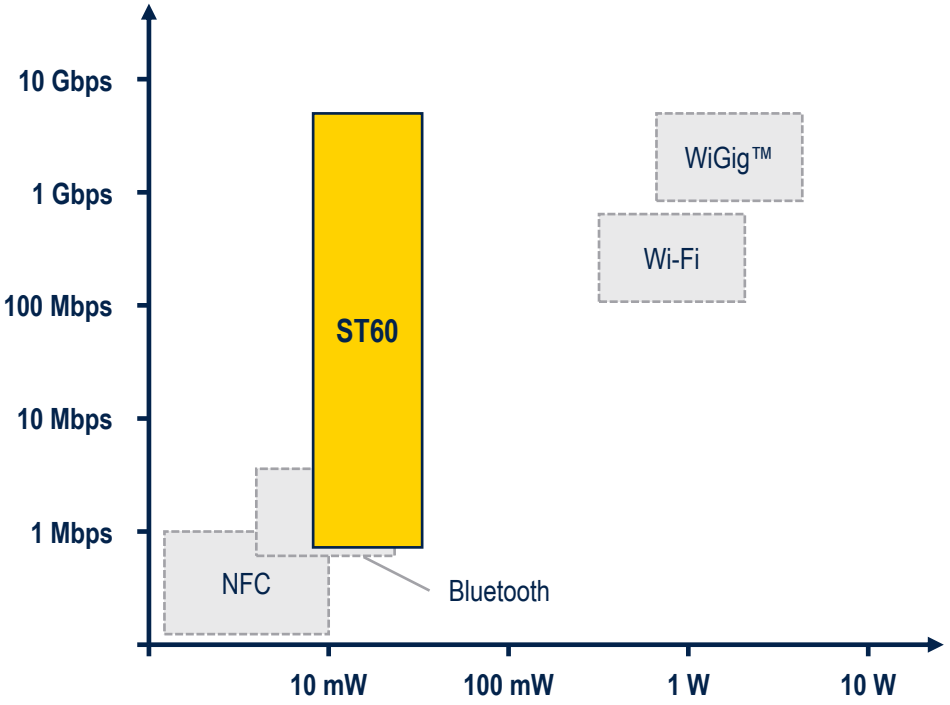
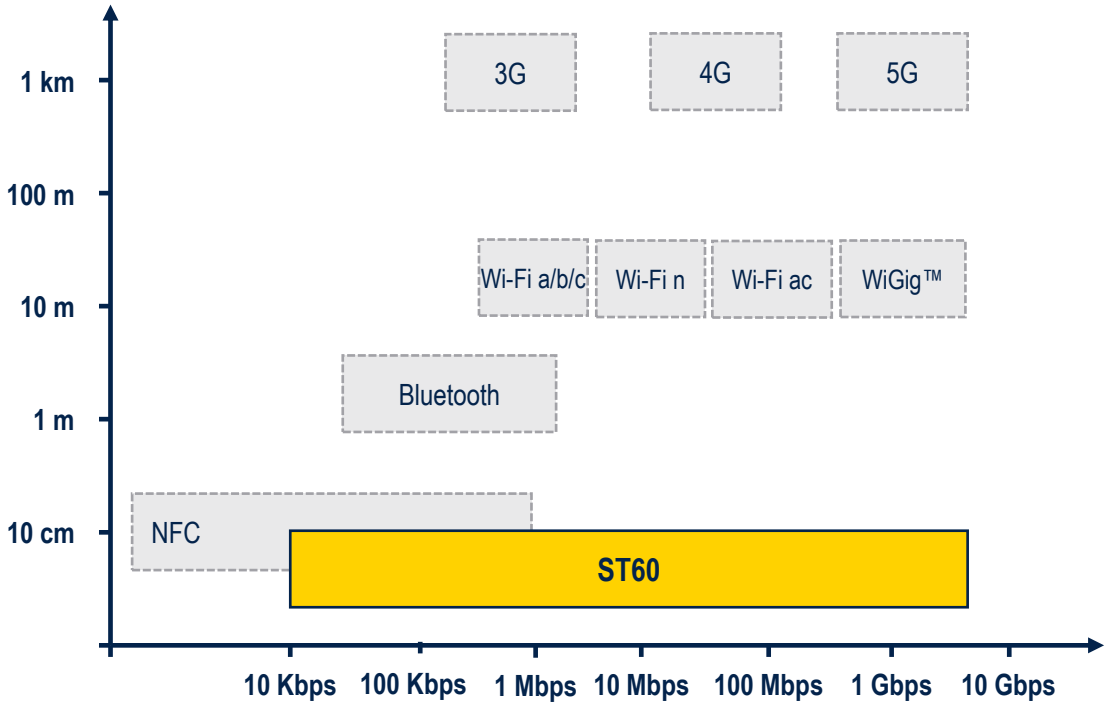
Introducing ST60
60GHz contactless connectivity

Extreme speed performance at very low-power

Industry Best Power per Bit
6.6pJ/bit for Tx & 4.1pJ/bit for Rx



Up to 6.25 Gbps speed



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Factory Automation

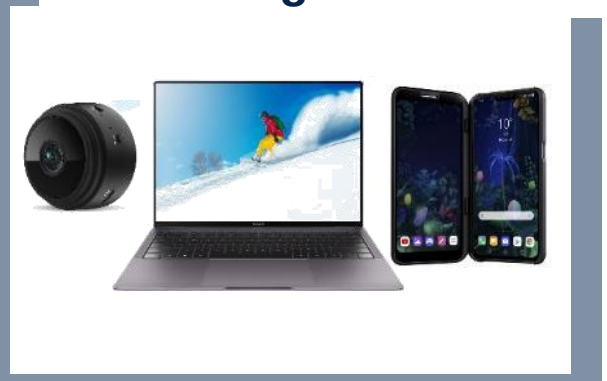
Docking Station

Video Walls

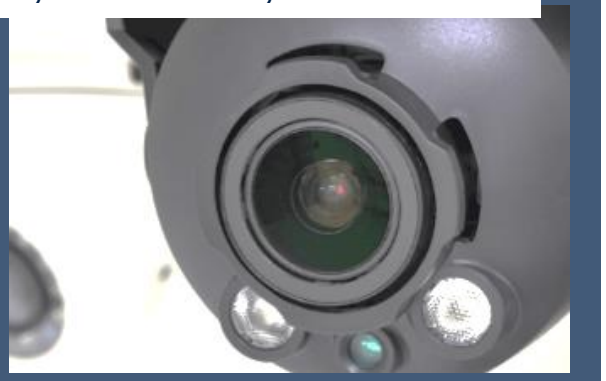
Smart Factory

Market segments: Industrial, Wearable, Consumer

Personal Electronics



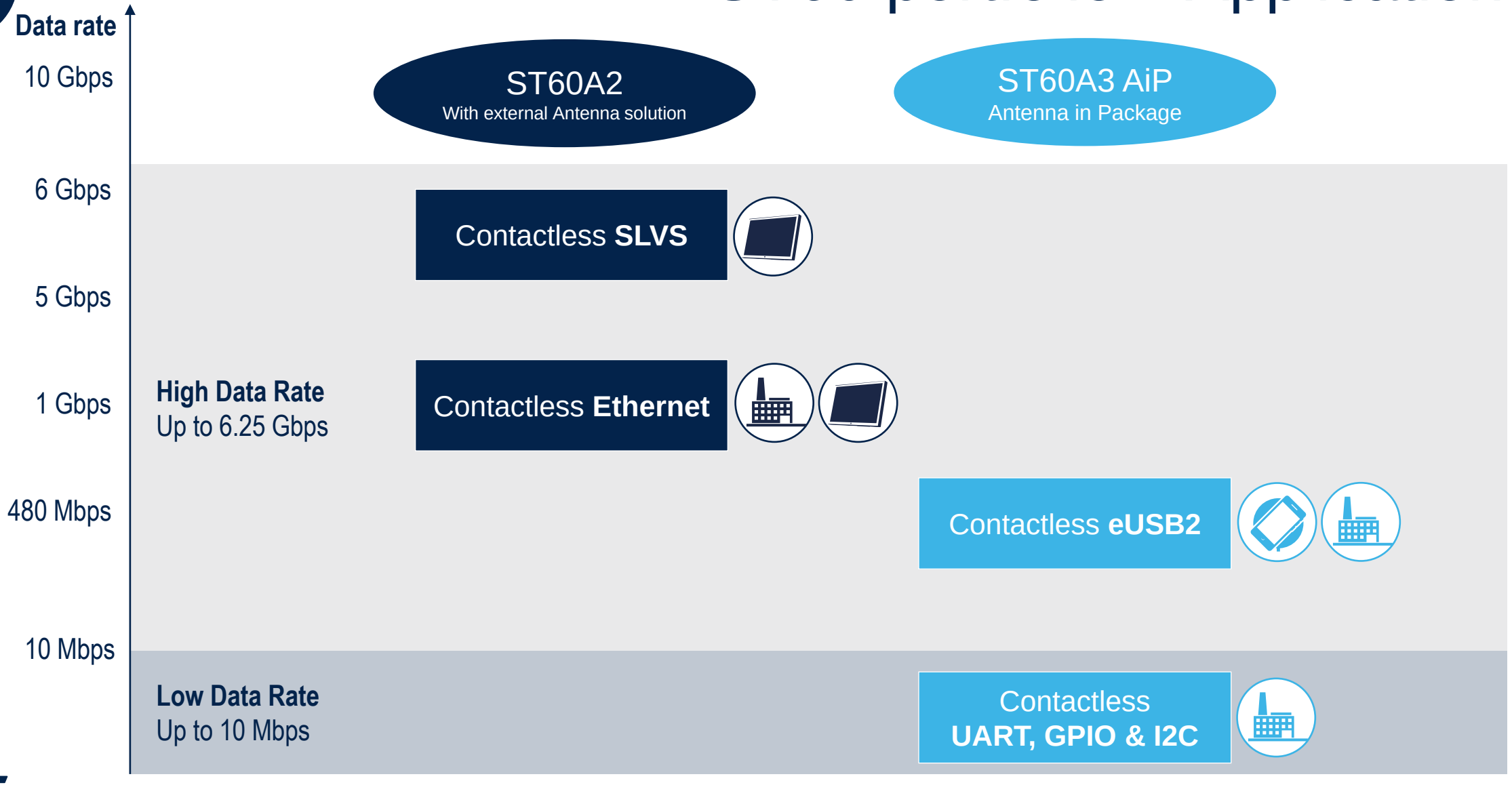
Snap on accessories & modular devices



Camera

Industrial Safety

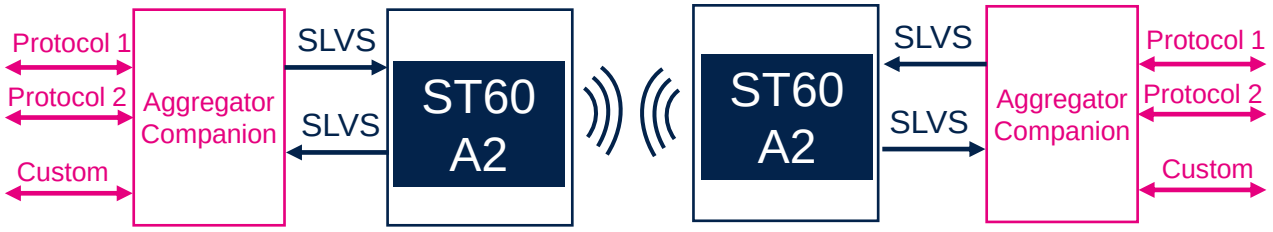
ST60 portfolio – Applications

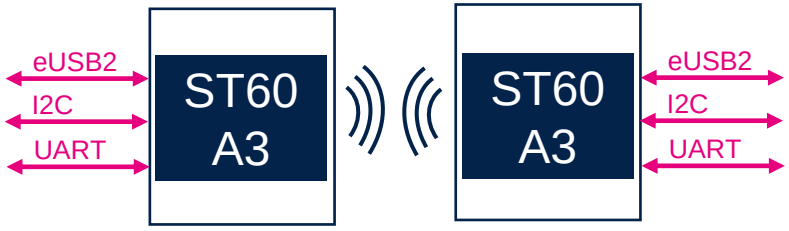


Compliant with 60GHz regulation rules, providing adequate implementation in final application.

Protocol agnostic or protocol aware connector?

- **Protocol agnostic – ST60 A2**
  - A companion chip, or companion IP inside the applicative SOC is required
  - Very flexible: split RF & digital processing
  - Pairing & analysis of RF link quality requires extra analysis
- **Protocol aware – ST60 A3**
  - Self-contained contactless eUSB2 bus repeater
  - Very low BoM with Antenna in Package
  - Pairing & RF link quality analysis information can be multiplexed with data
  - Combines RF and protocol constraints, but brings more power saving opportunities

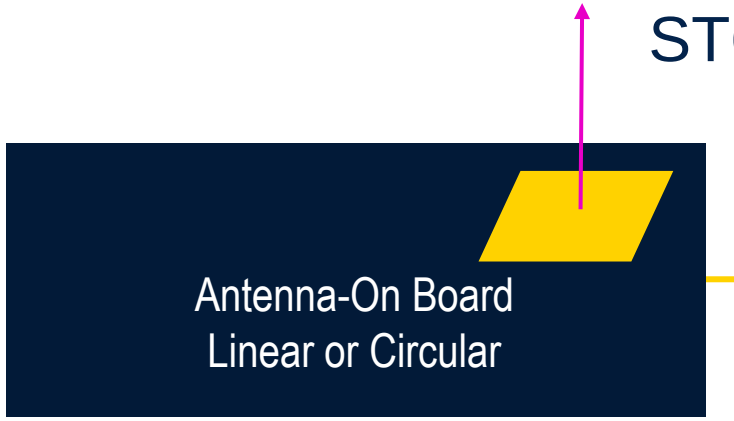




ST60 antenna solutions

Flexible antenna offering

ST60 A2



- Vertical radiation
- Linear/Circular polarization
- Top bottom, device to device

- Horizontal radiation
- Vertical and horizontal polarization available
- Dimensions: 8.25 x 7.4 x 3.4 mm
- Well suited for multilink

ST60 A3

- Broadside radiation
- VFBGA 2.9 x 4.1 x 0.8 mm
- eUSB2, UART, I2C tunneling

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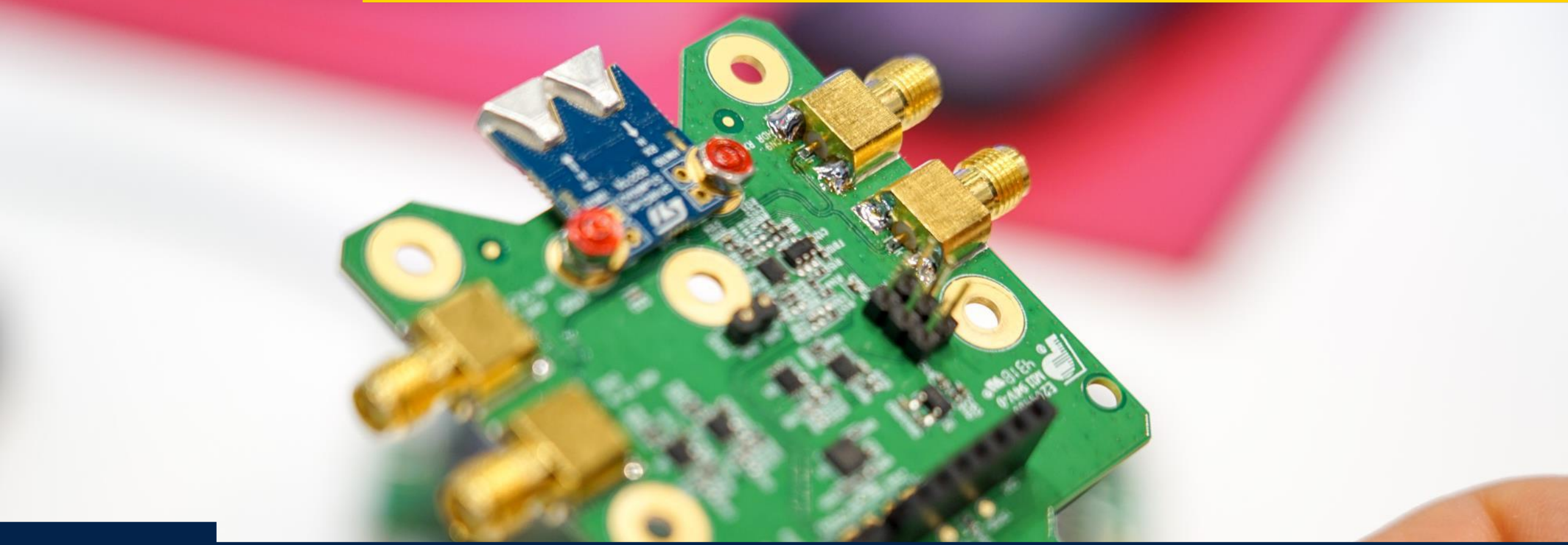
ST60A2 Product Overview



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ST60A2 overview

Compact solution integrating full 60 GHz RF transceiver

Point to Point
Short range
Half Duplex

- Up to 6.25 Gbps
- Small Footprint
- Ultra low power
- -40°C to 105°C

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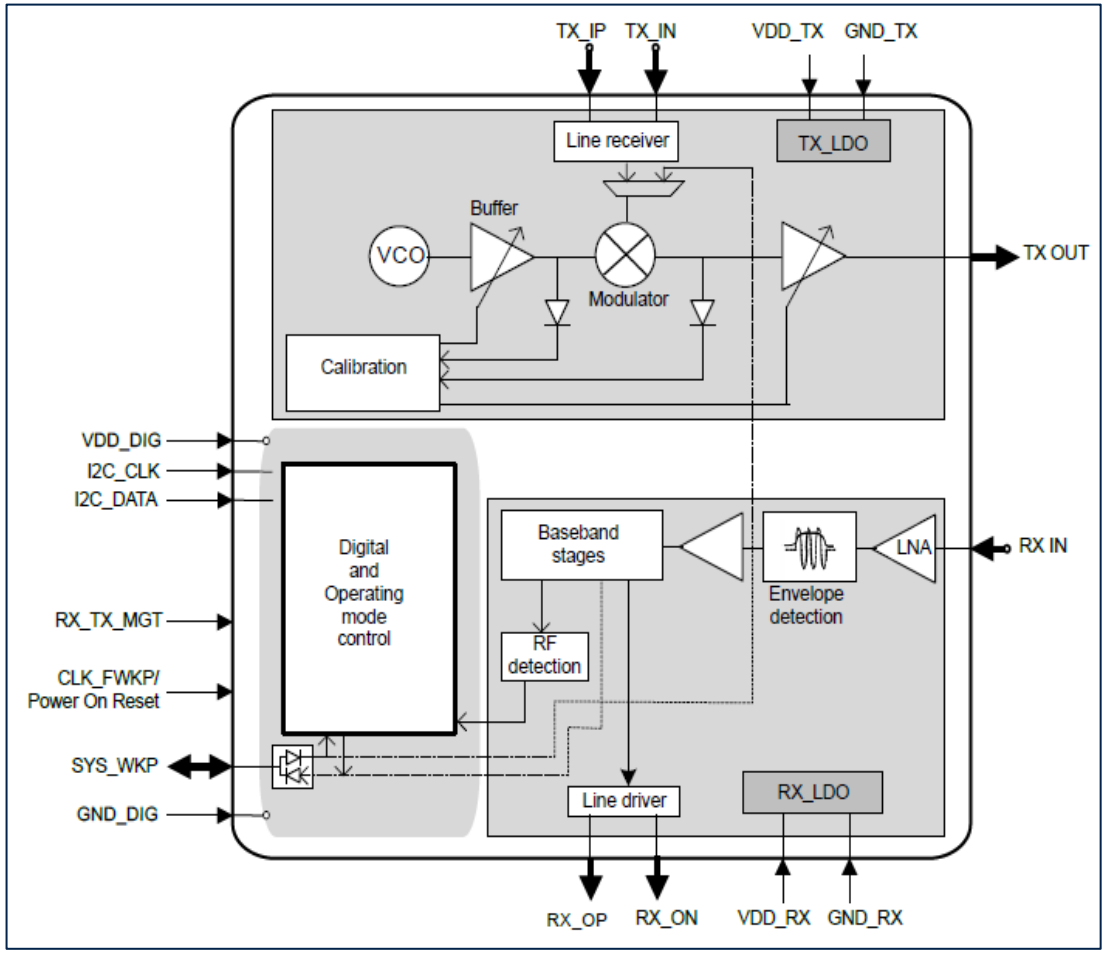
ST60A2 product overview

- Fully integrated 60GHz V-band transceiver:
  - transmit and receive paths
  - power management with single or dual supply
  - configuration through I²C bus or hardware control pins
- Point-to-point wireless link
  - Single-ended CMOS IO up to 100Mbps
  - Differential analog SLVS TX/RX port for up to 6.25Gbps
  - Operate in half-duplex mode with ASK modulation
- Very low power consumption
  - 44mW TX, 27mW RX @ 5Gbps
  - 1.3µW in off mode
- Very small form factor with optimized BOM
  - VFBGA 2.2 mm x 2.2 mm x 0.8 mm, 25 balls, 0.4 mm pitch
  - No need for external RF components nor external clock



ST60A2 operating modes

Full/High Data Rate modes: FDR/HDR

- SLVS differential input-output port (TX/RX)
- Need DC balanced data 8b/10b coded
- FDR mode: from 1 Mbps to 5 Gbps
- HDR mode: from 500 Mbps to 6.25 Gbps
- Typical interfaces:
  - LVDS (need level adaptation)
  - Ethernet SGMII

Contactless Gigabit Ethernet Bridge (SLVS/HDR)

Low Data Rate mode: LDR

- Single-ended CMOS IO: from 9.6 kbps to 100 Mbps
- Typical interfaces: UART, GPIO

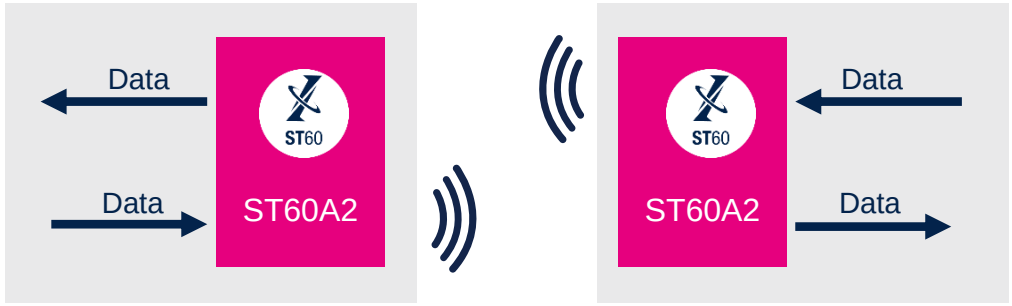
Contactless Fast GPIO (GPIO/LDR)

ST60A2 – key benefits

Compact solution integrating full 60GHz RF transceiver

60Ghz contactless connectivity

- ✓ **-40,+105°C**
- ✓ **BGA 2.2x2.2 mm2**
- ✓ **44 mW Tx, 27 mW Rx**



Up to 6.25Gbps contactless connectivity

Industrial temperature range

Flexible antenna configurations

Cost optimized BoM & miniature footprint

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ST60 Contactless Ethernet

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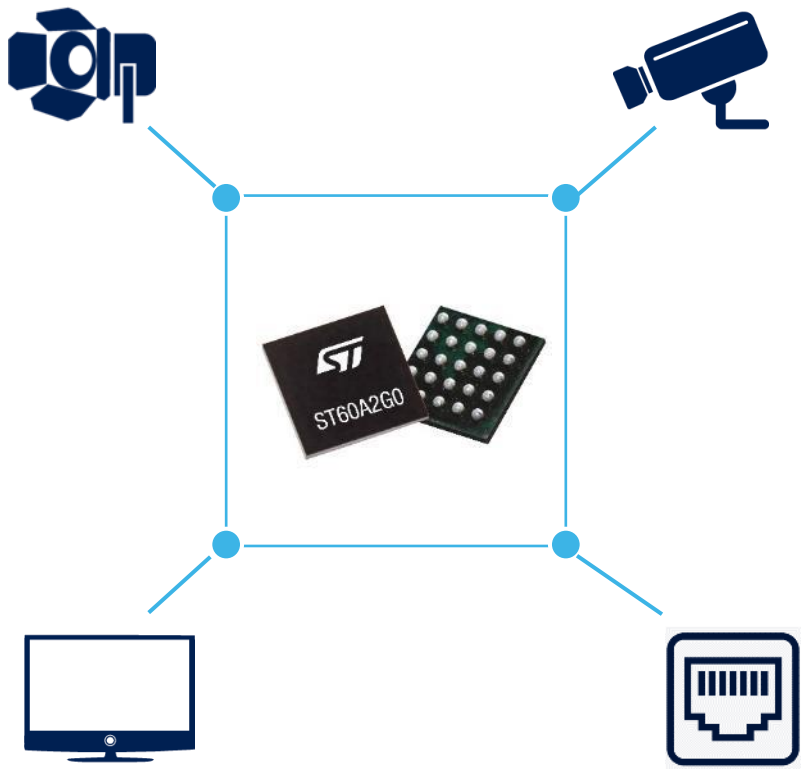
ST60 Contactless Ethernet

Native Ethernet SGMI interface with management of broken links

Factory Automation
- Full 360° motion enablement
- Machinery sealed and resistant to corrosive elements (no connectors)
- Hot swap modular equipment
- Fast field updates
- EMI Resistant

Video Walls and Displays
- Make LED panels plug and play
- Reduce installation cost
- Make hermetically sealed displays
- Reduce the solution cost by eliminating number of CAT5 cables, RGB connectors, SPI connectors



Industrial and Security Cameras
- Make cameras more compact
- Eliminate reliability issues with cable rotations
- Plug and play modules

Ethernet Connectors
- Replace costly IP6x connectors
- Eliminate Ethernet PHY and magnetics from one side of link
- Make Ethernet connections modular & sealed

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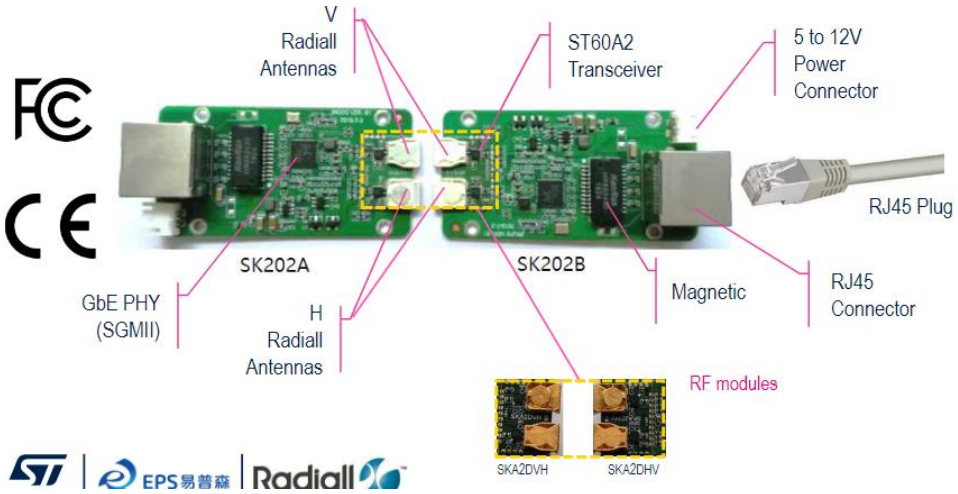
Contactless Gigabit Ethernet Solutions
Horn Antenna



Contactless Gigabit Ethernet Bridge (SLVS/HDR)

- **SK202 Ethernet solution with Horn antenna**
- **Application:**
  - LED panel for modular display walls
  - Video surveillance camera and robotics
  - Contactless Ethernet input
- **Technical Details:**
  - SK202 is a pair of RF modules with H&V horn antenna and G-PHY to achieve 1Gbps data rate Ethernet to 60GHz millimeter Wave Rf signal conversion.
  - The input of SK202 is an RJ45 Gigabit Ethernet Connector supporting 10/100/1000Base-T.
  - SK202 modules are based on leading edge ST60A2 mmW RF transceiver and the output consist in an RF transmission of the corresponding SGMII signal over several centimeter.
  - Distance between Emitter/Receiver: 1 cm
  - Data rate: 1Gbps max

ST60A2 – Product Development Kit

Datasheet

- ST60A2G0 datasheet

Discovery kit

- Firmware
- Reference software
- User guides
- Software user manual

Boards reference design

- Photos
- BOM
- PCB assembly files
- PCB Gerber files
- PCB specification & schematic
- PCB layout (.pcb)
- User manuals

Applications Notes

- Ethernet Boards Design
- Half duplex implementation
- RSSI
- SLVS

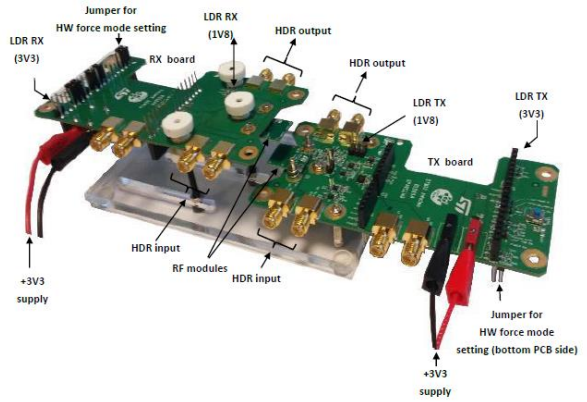
Evaluation kit

- Firmware
- User guide
- GUI user manual

PDK 1.5 Available under NDA

List of boards supported

- **B2265: Mother adapter board for ST60A2 RF board, used with Nucleo F767ZI board**
- **B2266: ST60A2G0 Linear Patch antenna RF board**
- **B2275/76: ST60A2G0 Horn antennas RF board**
- **B2279: ST60A2G0 Circular Patch antenna RF board**
- **B2322: LVDS to SLVS adapter**



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ST60A3 Product Overview

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ST60A3 – Overview

60 GHz V-Band transceiver for contactless connectivity up to 480 Mbps

Point to Point
Short range
Self discovery

- Up to 480 Mbps (eUSB2)
- Small footprint with integrated antenna
- Ultra low power
- -20°C to 85°C

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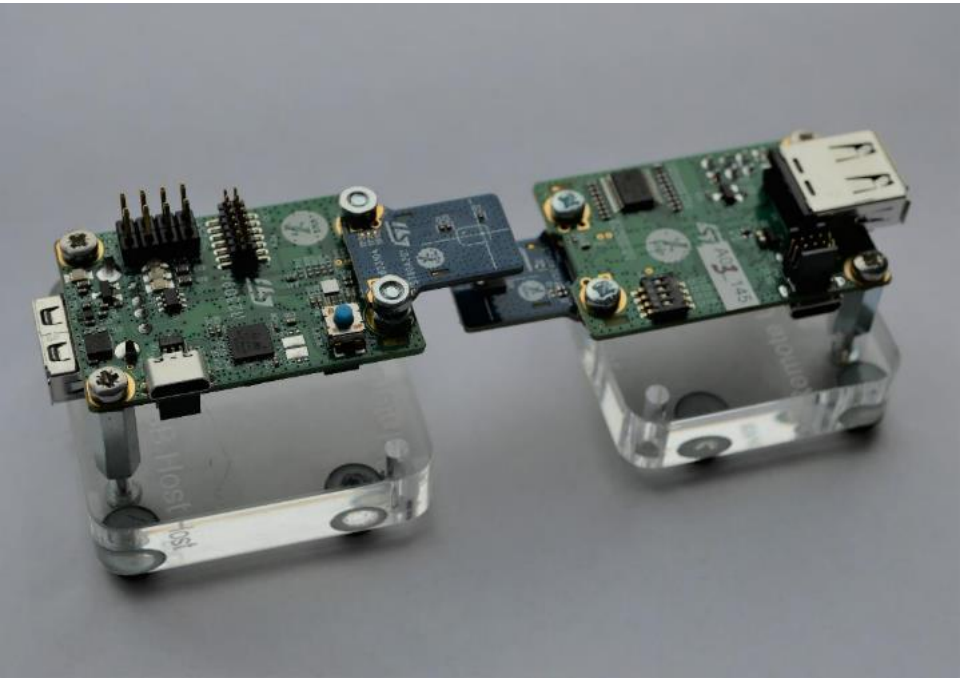
ST60A3 – Overview

60 GHz V-Band transceiver for contactless connectivity up to 480 Mbps



Short range, point to point, low power, self mate detection RF link

eUSB2, GPIO, UART or I2C RF tunneling

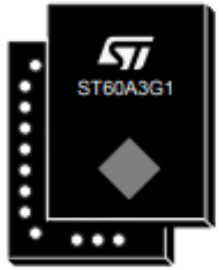
Antenna in Package (AiP) ideally suited for footprint-constrained applications

- Broadside radiation, 44dB typical link budget, up to 6cm Free Space Propagation Loss

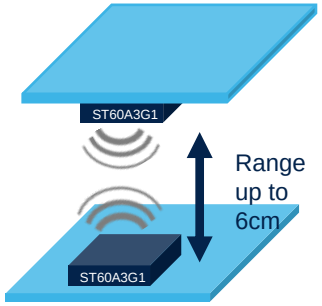
Optimized BoM

Low power consumption

- **eUSB2** HS Rx/Tx – 110 / 130 mW typ.
- **UART/I2C/GPIO** – 90 mW typ.
- Low power mode – 120 µW
- Standby mode – 13 µW typ.



VFBGA 2.9 x 4.1 x 0.8 mm



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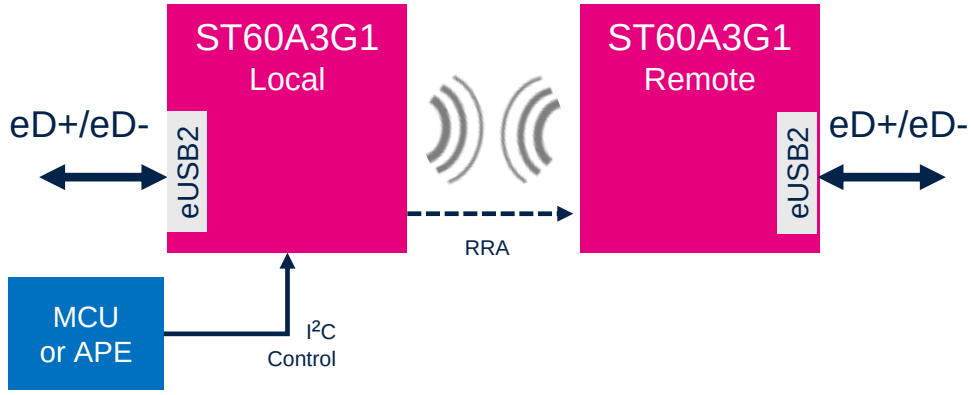
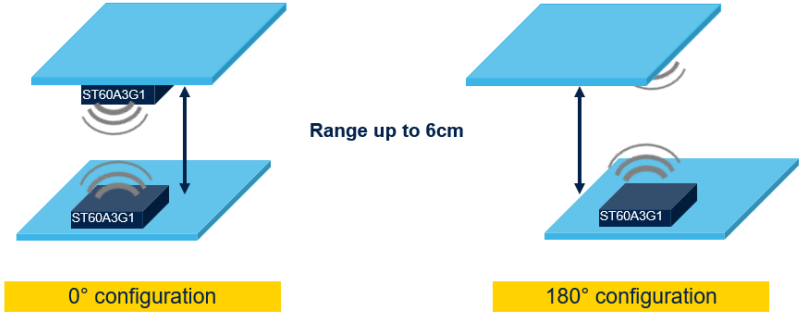
ST60A3 - Functional overview

- **Fully integrated transceiver:**
  - The I²C configuration bus and Hardware Control Pins configure and manage the transitions of the ST60A3G1.
  - No need for external antenna since integrated in package.
- **Power efficient** behavior
  - In Standby mode, RF is disabled. Power consumption is a few µW.
  - Once RF is enabled, both ST60A3G1 will enter a discovery state. Remote power consumption is few µW.
  - When a partner is detected, the RF link is established, and the 2 devices enter in low power mode. Power consumption is in the range of 100µW.
- **Simple integration** within application
  - In low power mode, the Local ST60A3G1 is configured by I²C.
  - The Remote ST60A3G1 is either configured by I²C, or Over-the-air by Remote Register Access (RRA) over the RF link.
  - An I²C command to the Local device will then set the pair of ST60A3G1 in the desired tunneling mode (eUSB2, UART, I²C or GPIO).



Wireless eUSB2 bus with data rate up to 480 Mbps



ST60A3
Functional description & Tunneling modes

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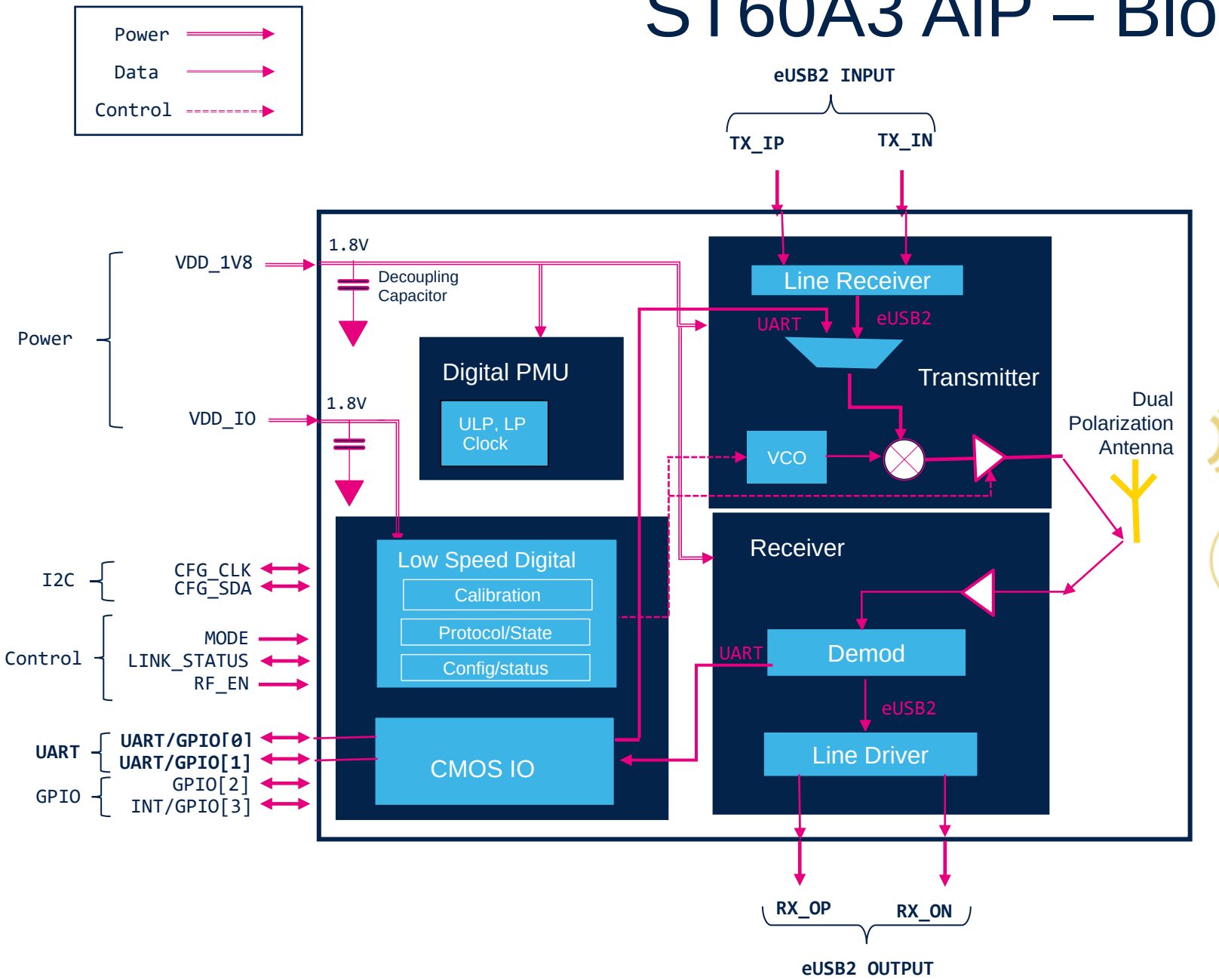
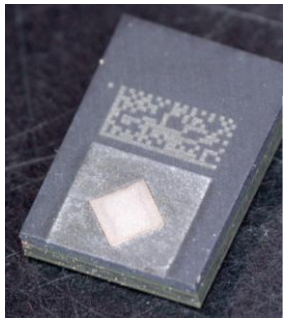
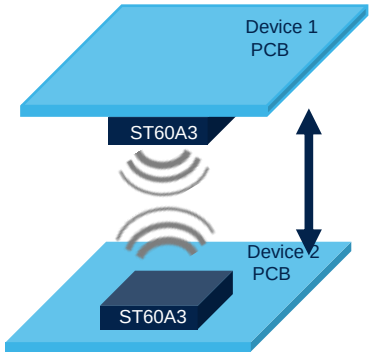
ST60A3 AiP – Block Diagram

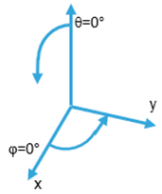


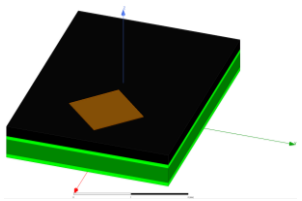




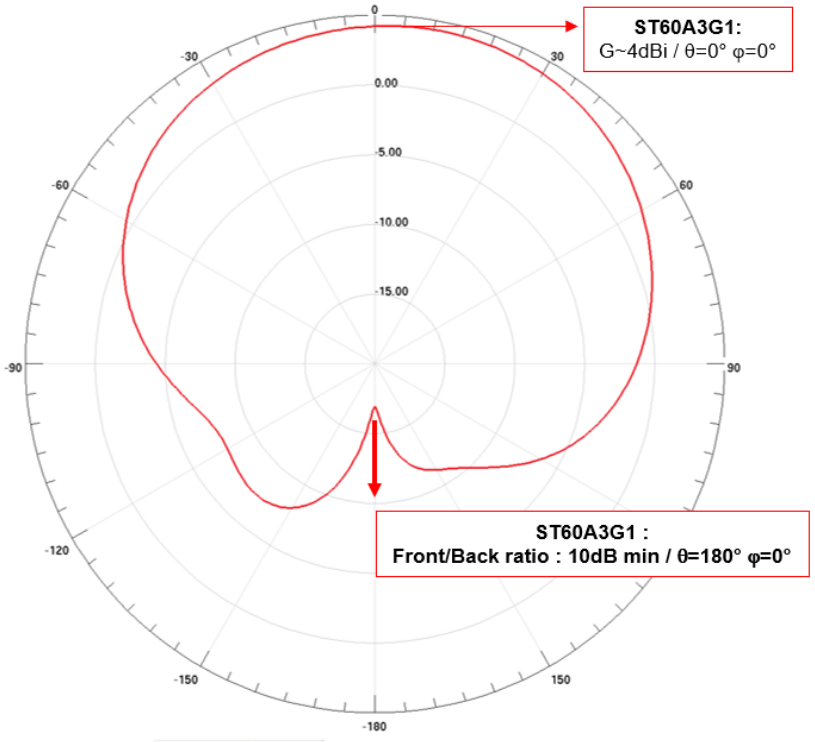
AiP Typical Range ~3cm

Integrated Antenna Characteristics





φ=0° -180<θ<180°



E-plane radiation pattern at 60GHz

- Broad side, Z axis antenna directivity
- +/- 2mm alignment, with 30mm operating range
- Both 180° relative orientations are supported:

Antenna in Package - Key Features-Targets	
Center frequency	60.5 GHz
Polarization	Dual polarization, Linear
Gain	4dBi
VSWR	<2
3dB Aperture	E-Plane: +/-55° H-Plane: +/- 45°
PCB Immunity,	10dB min Front to Back ratio
Typical Operating range	30mm Free Space Propagation Loss
XY Offset	+/-2mm

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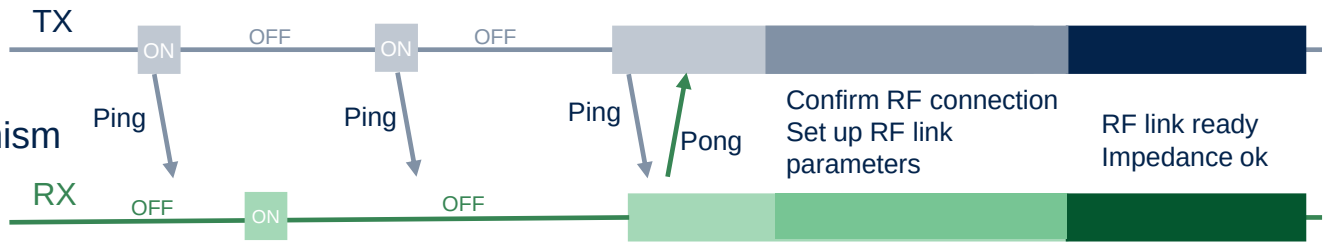
RF Link management

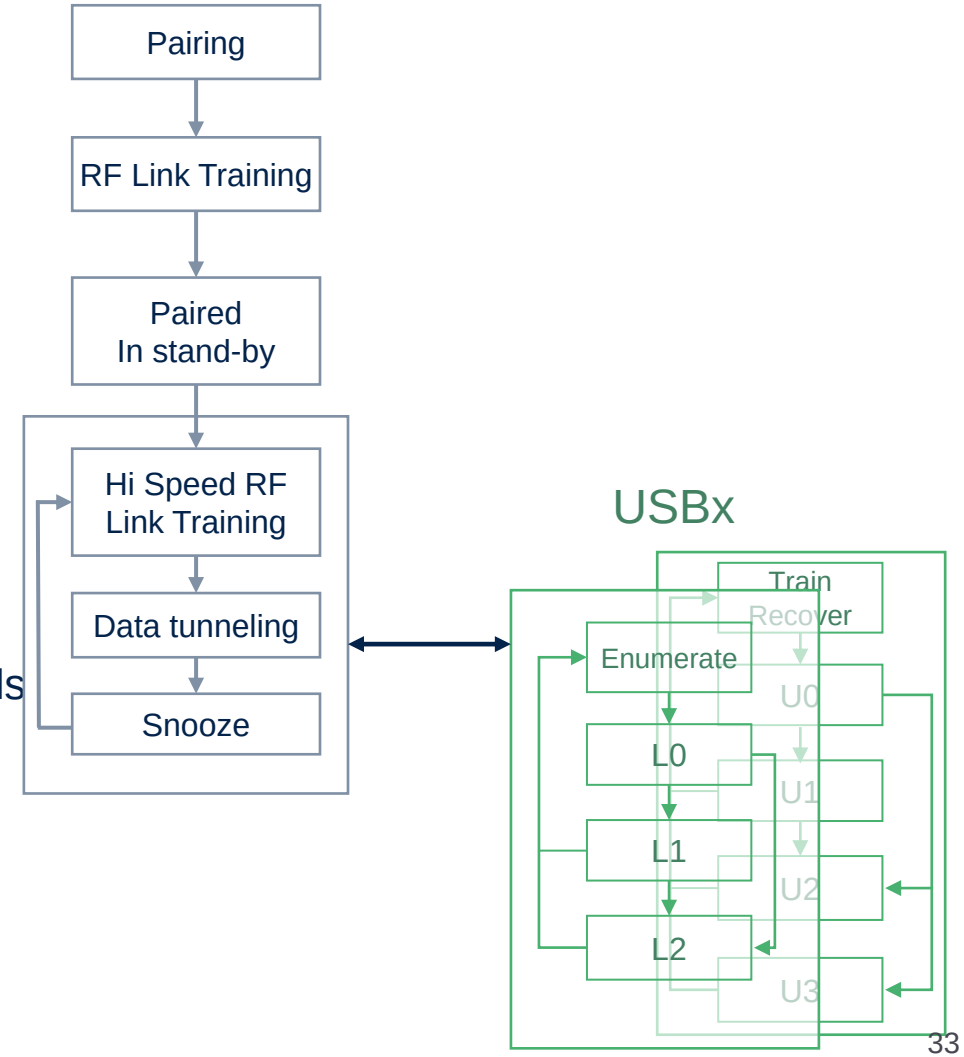
- The RF connector must behave as if it were purely electrical
  - Present the expected impedance at electrical side (high / low impedance)
  - The RF link must be set up prior to any protocol enumeration (even if custom protocol)
- Pairing
  - Ensure potential partner detection
  - Limit RF activation time for detection (low power)
  - Implementation based on slow and simple ping / pong mechanism
- Link integrity
  - Ability to detect breach of link to comply with electrical protocol (present high impedance) and avoid system deadlock
  - Half-duplex:
    - Possibility to rely on protocol messaging such as USB2 Start-of-Frame and send RF-only acknowledgement.
    - When not possible, dedicated check/ack are required
  - Full-duplex: Breach of link is guaranteed by construction
  - When no protocol enumerated (stand by) and during protocol low power states, including Full-duplex ones, dedicated messages are required



Protocol tunneling over RF

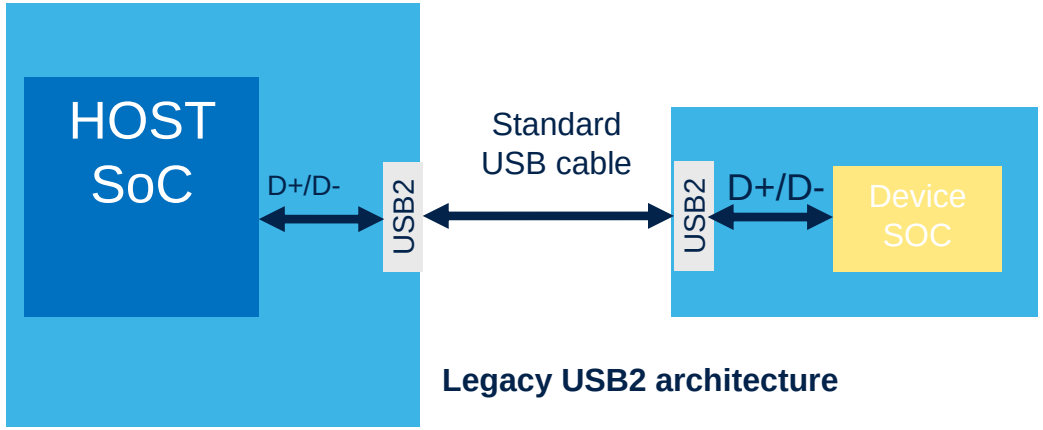
- Quality of Service
  - Parameters can be exchanged across the RF channel to improve the quality of service (Transmitted power, Received power, …)
  - QoS can be done at link initialization but also during the communication. Requires multiplexing control and data by means of time multiplexing or oversampling.

- RF Link State Machine
  - A dedicated RF link state machine handles the RF channel and interacts seamlessly with the FSM of the protocol that is tunneled over the RF channel
  - This adds complexity but offers opportunity to take advantage of protocols low power states

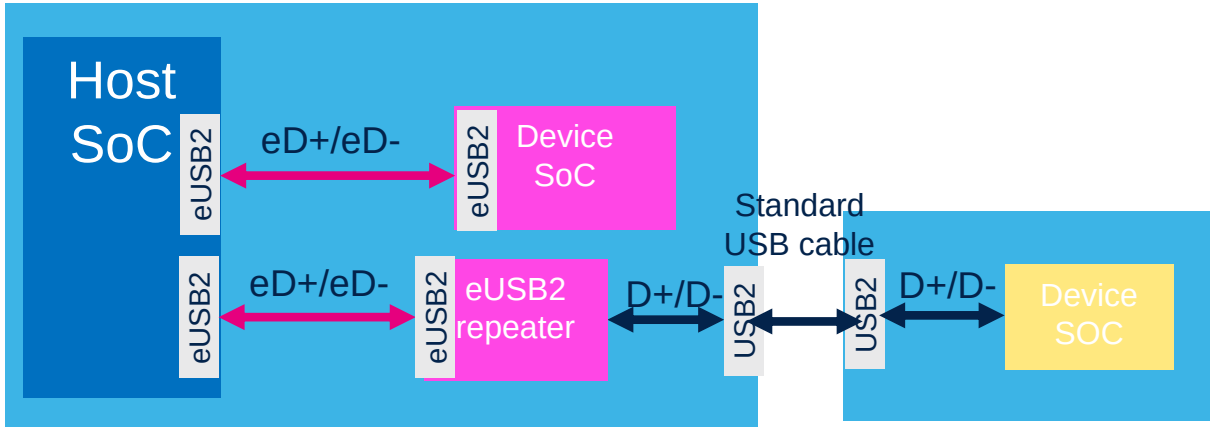


eUSB2 introduction

- What is eUSB2
  - Embedded USB2 spec. released in 2018 by USB forum
  - eUSB2 offers same speed as legacy USB2 replacing 3.3V signaling with 1/1.2V
- Why eUSB2 matters
  - Complexity & Cost of maintaining legacy 3.3V USB2 in advanced SoC are very high
    - Still implementable in 7nm, more complex in 5nm
  - eUSB2 can be used for low voltage inter-chip communications or to provide a fully complaint USB2.0 interface by using an eUSB2 repeater
    - Native mode provides on board chip-chip communications with the benefit of lower I/O voltage and power efficiency while remaining compliant to USB2 at protocol layer
    - Repeater Mode allow to connect to standard Host or Device through a separated eUSB2 repeater



Legacy USB2 architecture

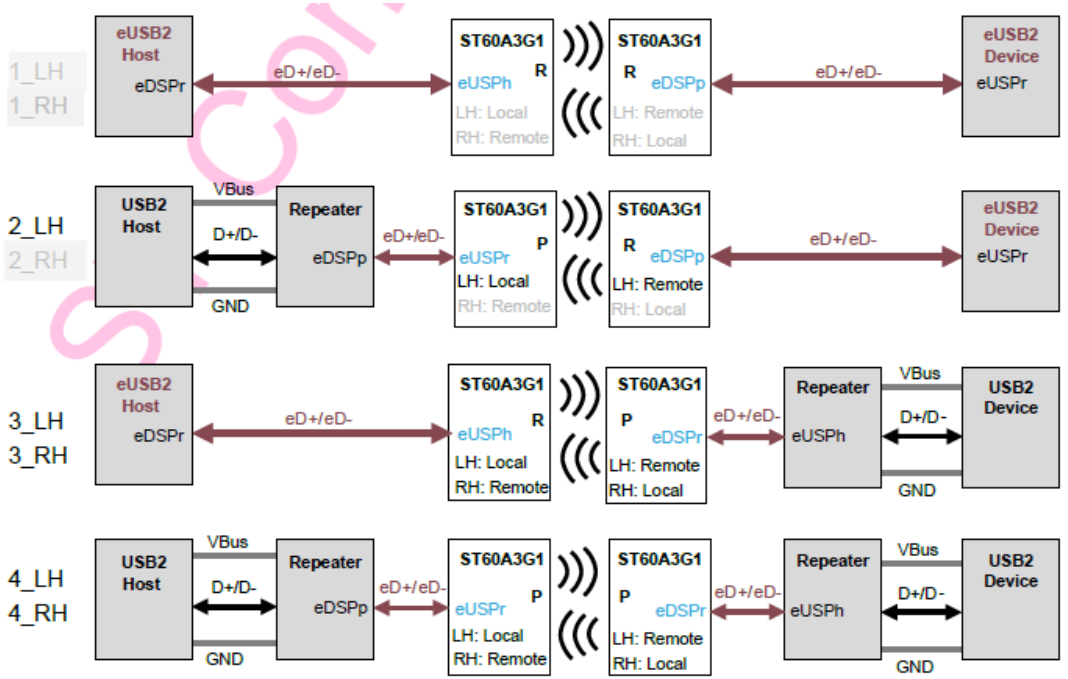


New eUSB2 architecture for SoC in the most advanced process nodes

eUSB2 tunneling

- A pair of ST60A3G1 configured to tunnel eUSB2 traffic behaves as an eUSB2 Hybrid Repeater
- All speed rates are supported:
  - LowSpeed 1.5Mbps
  - FullSpeed 12Mbps
  - HighSpeed 480Mbps
- ST60A3G1 supports the following configurations with eUSB2 role (Port/Repeater) and eUSB2 configuration (eUSPh, eUSPr, eDSPr and eDSPp) :
  - 2_LH, 3_LH, 3_RH, 4_LH and 4_RH are supported.
  - See the ST60A3G1 eUSB2 application note for more detailed information

eUSB2 Hybrid repeater configurations



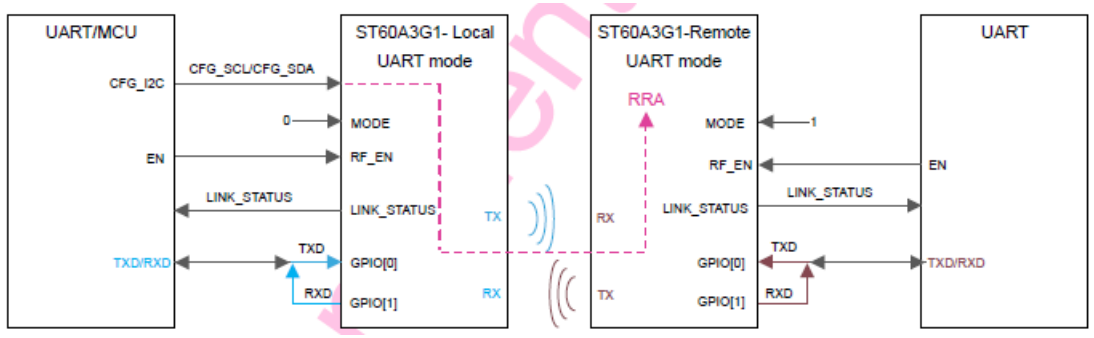
Link parameters for high speed eUSB2 - ST60A3G1

Symbol	Parameter	Conditions[1]	Min	Typ	Max	Unit
TJ_{eUSB2}	total eUSB2 jitter	For a pair of ST60A3G1s with maximum link budget	-	-	212	ps
PL_{eUSB2}	eUSB2 link budget	Maximum path loss supported from TX antenna output to RX antenna input for TJ_{eUSB2} < 212 ps.	-	44	-	dB

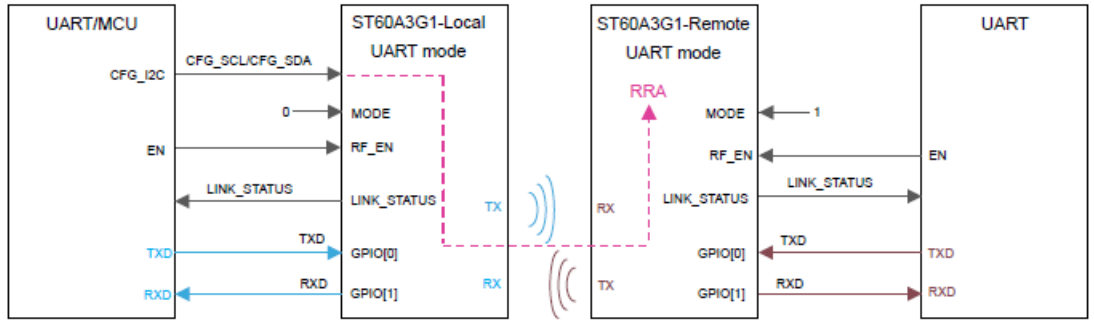
1. *Link budget figures assume line-of-sight propagation considering max antennas gain conditions.*

UART tunneling

- ST60A3G1 acts as a wireless repeater that seamlessly interfaces for UART
  - Data rate from 115200bps up to 6Mbps.
- UART tunneling relies on the usage of CMOS IOs:
  - GPIO[0] for TXD and GPIO[1] for RXD.
  - The associated logic levels are 0/1.8 V
  - The supported UART configuration is 8 bits of data, 1 stop bit and no parity.
- Ultra Low Power & Low Power modes available
  - The ULP mode, while offering lowest power consumption, is limited to UART data rate of 115200 bps.
  - The LP Mode support up to 2.4Mbps full duplex, 6Mbps half duplex data transmission.



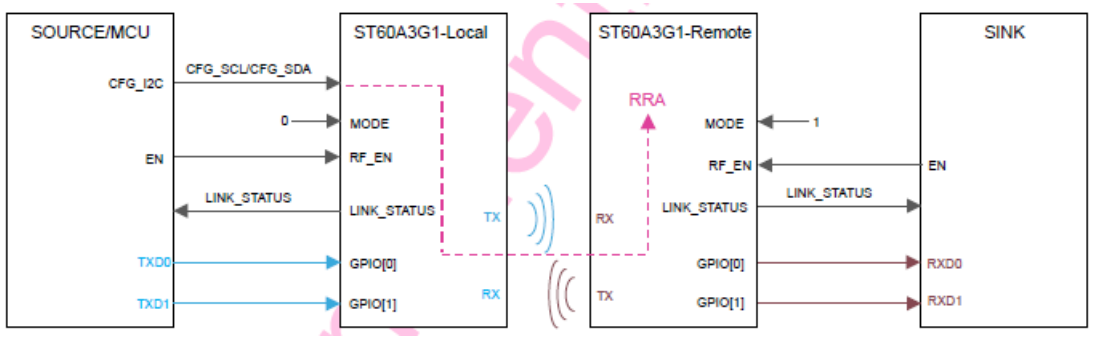
ST60A3G1 half-duplex UART tunneling, with RRA configuration



ST60A3G1 full-duplex UART tunneling, with RRA configuration

GPIO tunneling

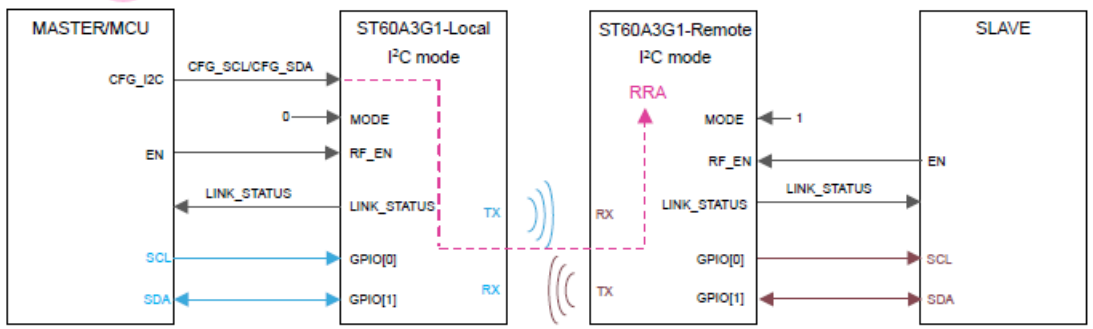
- ST60A3G1 acts as a wireless repeater that seamlessly interfaces for GPIO:
  - LP single direction
  - LP and ULP bidirectional tunneling
- LP single direction GPIO tunneling
  - Up to two GPIOs can be transferred in the same direction
  - Data modulation is optimized to give a power-efficient solution
  - Maximum data rates:
    - Single GPIO : up to 6 Mbps
    - Dual GPIO : up to 4 Mbps (unbalanced traffic), 2+2 Mbps (balanced traffic)
- LP and ULP bidirectional GPIO tunneling
  - 2 GPIOs are transferred in opposite directions, offering the direct possibility to plug to a 2-wire GPIO interface
  - Data rate is limited to 2.4 Mbit/s in LP mode and 115200 bit/s in ULP mode



ST60A3G1 single direction GPIO tunneling, with RRA configuration

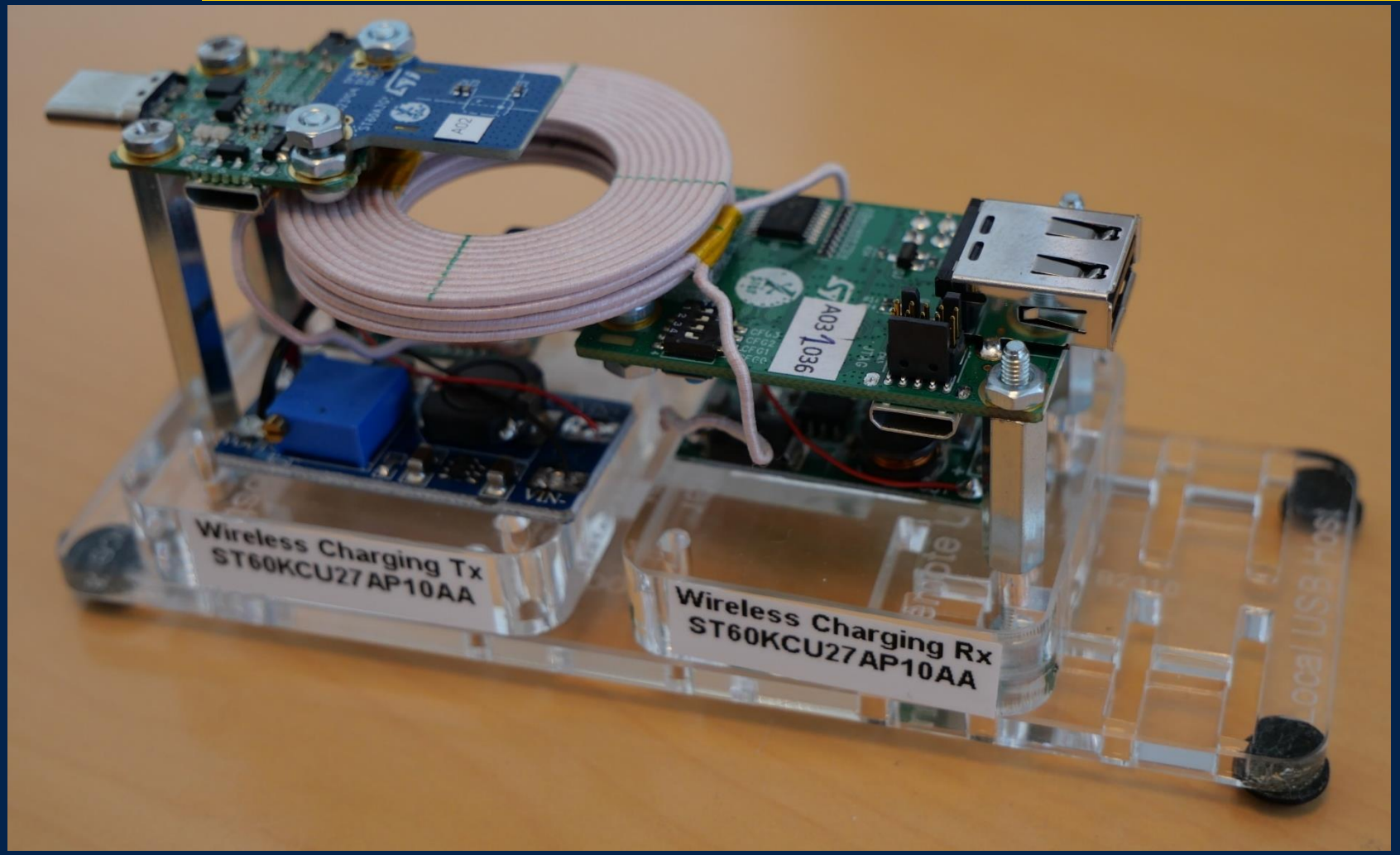
I²C tunneling

- A pair of ST60A3G1 can be configured to tunnel an I²C bus over the RF channel,
  - Not to be confused with I²C port usage to configure the Local device as well as Remote device through RRA.
- Features supported:
  - I²C bus speeds:
    - Standard-mode, Fast-mode and Fast-mode Plus at 1 Mbit/s
  - 7-bit addresses
  - Repeated start condition



ST60A3G1 I²C tunneling, with RRA configuration through I²C configuration port

ST60A3 Contactless USB



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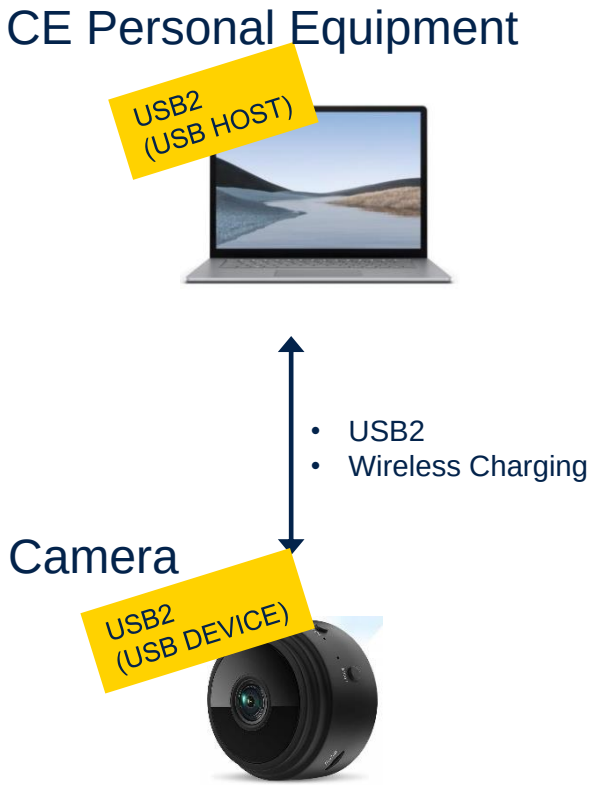
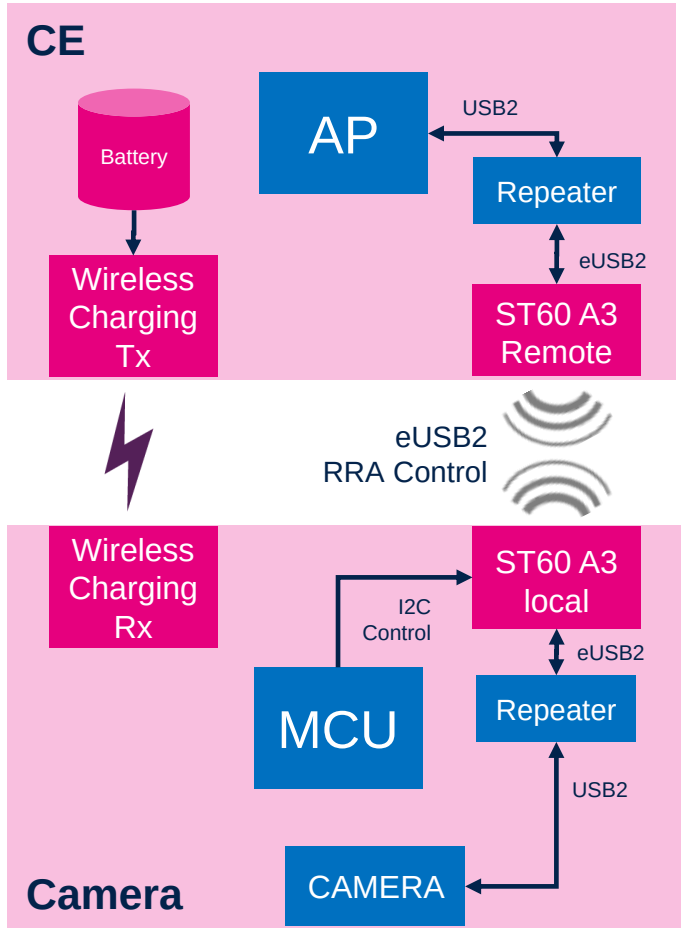
Contactless USB Link

USB2 Camera accessory





No need for repeater if AP natively supporting eUSB2

ST60A3 – Product Development Kit

Datasheet

- ST60A3G1 preliminary databrief

Download

Discovery kit

- Firmware
- Reference software
- User guides
- Software user manual

Boards reference design

- Photos
- BOM
- PCB assembly files
- PCB Gerber files
- PCB specification & schematic
- PCB layout (.pcb)
- User manuals

Applications Notes

- eUSB2 tunneling
- UART/GPIO tunneling
- I2C tunneling

Evaluation kit

- Firmware
- User guide
- GUI user manual

PDK 2.4 Available under NDA

List of boards supported

- **B2265**: Mother adapter board for ST60A3G1 RF board, used with Nucleo F767ZI board
- **B2309**: Mother adapter board with STM32 and repeater for ST60A3G1 RF board
- **B2313**: Mother adapter board with repeater for ST60A3G1 RF board
- **B2310**: ST60A3G1 Antenna In Package RF reference board

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Conclusion

Conclusion

- V-band is well suited for connector-free applications up to multi-gigabit per seconds
- ST has developed expertise in V-band connector-free applications, for low and high data rates, protocol agnostic and protocol aware solutions
- Power consumption is dynamically optimized by considering all states that the system transitions through:
  - Search for partner – Pairing
  - RF ready – deep sleep
  - Data tunneling
    - Leverage on protocol low power states whenever possible

ST60 with Antenna in Package laid by a one US-dime coin

ST60A2 – Getting started

- ST60A2 on-line webinar
  - https://www.st.com/content/st_com/en/about/events/events.html/discover-st60.html
- ST60A2 product brief available on st.com:
  - https://www.st.com/content/st_com/en/products/wireless-transceivers-mcus-and-modules/60-ghz-short-range-rf-transceivers/st60a2g0.html
- ST60 blog with embedded links to videos
  - https://blog.st.com/st60/
- ST60 videos available demonstrating the key features:
  - ST60 Contactless Gigabit Ethernet connection (ST online Embedded World tour 2020)
    - https://www.youtube.com/watch?v=A6LFmL12fdI
  - ST60 RF Data Link Connectivity (ST at Consumer Electronic Show 2020)
    - https://www.youtube.com/watch?v=IVLAw8CfBZI
  - ST60 for short range 60GHz wireless link (ST at Embedded World 2019)
    - https://www.youtube.com/watch?v=AmXwkeoJhPg
- Radiall ST partner page
  - https://www.st.com/content/st_com/en/partner/partner-program/partnerpage/Radiall.html#overview
- MAJA Systems ST Partner Page
  - Maja Systems - STMicroelectronics
- Complete documentation materials available under Non Disclosure Agreement
  - Full datasheet, user manual, antenna design guidelines
  - Evaluation kits and samples
- Please contact your local sales representative

ST60 video trailer

https://youtu.be/NHRDrtExZgY

[60 GHz Contactless Products - STMicroelectronics]

Our technology starts with You

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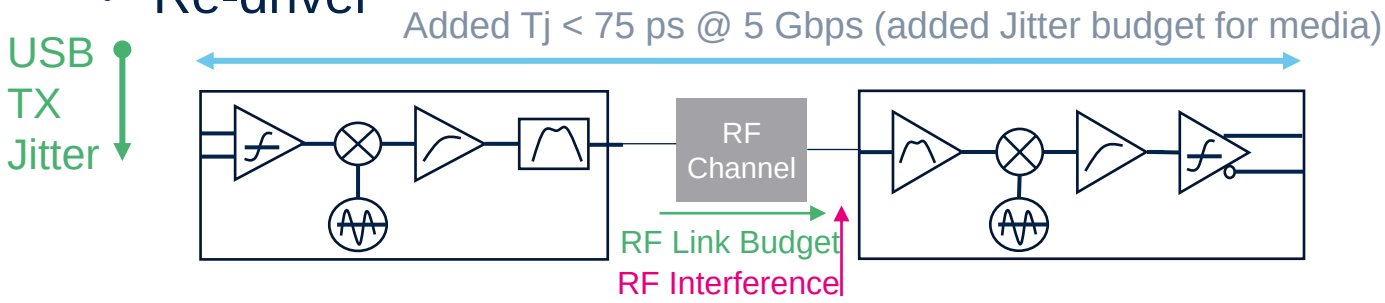
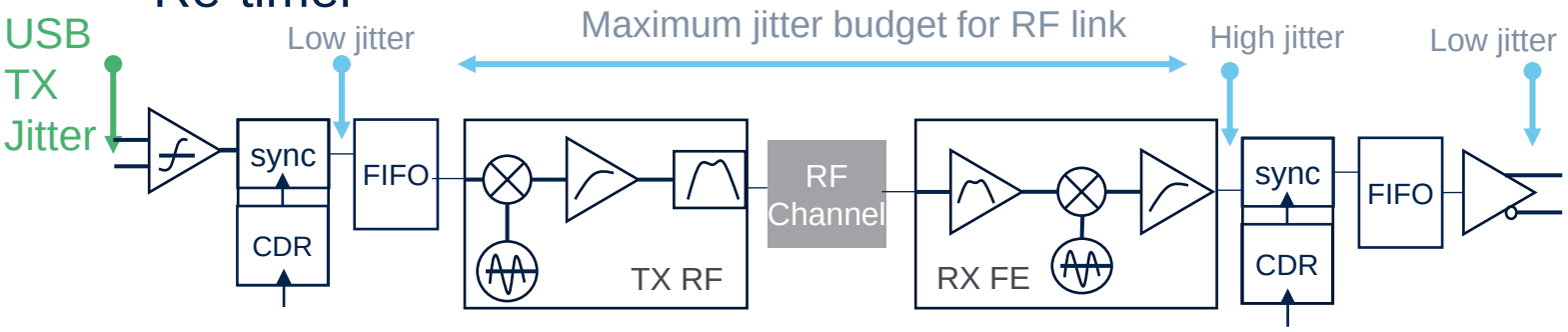
Next step: Contactless universal serial bus: Re-driver or Re-timer

- Re-driver



- RF active TX & RX IC contactless pair fits in passive cable jitter budget (75 ps)
- Link budget & jitter limited in practice by isolation between antennae (Full Duplex)
- Simple ASK modulation / demodulation
- Power Efficient (~8pJ/bit TX, 5pJ/bit RX)

- Re-timer



- USB3 Jitter budget case study for illustration purposes

- Maximize RFIC jitter budget, thus link budget, thanks to symbol sync & CDR
- Separate Reference clock Independent SSC (SRIS) easier to implement than Bit Level Re-timer (BLR)
- Complex modulation, higher throughput
- Seemingly less power efficient (not always true at overall system level)
- Advanced CMOS node (power, digital)

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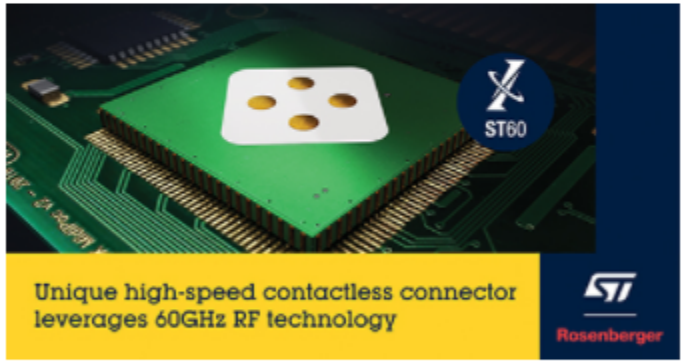
PR

Rosenberger and STMicroelectronics Cooperate to Develop a Unique High-Speed Contactless Connector Based on 60GHz Wireless Technology

First-of-its-kind device targets medical and industrial data transmission, and other high-bandwidth applications

STMicroelectronics (NYSE: STM), a global semiconductor leader serving customers across the spectrum of electronics applications, and **Rosenberger**, a leading manufacturer of impedance-controlled and optical connectivity solutions, today announced their collaboration on a contactless connector for ultra-reliable, short-range, point-to-point full-duplex data exchanges in industrial and medical applications .



Rosenberger's innovative contactless connector, the RoProxCon, leverages ST's 60GHz RF transceiver, the ST60A2, to deliver high-speed data transmission while providing immunity to movement, vibration, rotation, and contaminants such as moisture and dust, which can disrupt conventional pin-and-receptacle interconnects. The ST60A2 combines high-data-rate transmission at Bluetoothâ-like power consumption and promises a new range of medical and industrial applications that are no longer constrained by physical connections.

Link: https://newsroom.st.com/zh/media-center/press-item.html/t4398.html

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PR

Unilumin and STMicroelectronics Jointly Develop LED Display Using ST's 60GHz Contactless Connectivity Chip for Advanced Video Solutions

STMicroelectronics (NYSE: STM), a global semiconductor leader serving customers across the spectrum of electronics applications, and **Unilumin**, a leader in LED displays based in China, today announced that they have worked together to develop a new Unilumin display using the ST60A2, ST's 60GHz RF transceiver for advanced high-data-rate contactless-transfer solutions.

The new range of Unilumin LED displays with the ST60A2 contactless link benefits from the elimination of cables and connectors to achieve significant cost saving by reducing both assembly and maintenance efforts. As important, the contactless approach enhances system reliability for the customers.

The ST60A2 60GHz RF transceiver offers point to point, high-data-rate transmission of up to 6.25 Gbps over distances to a few centimeters. This data link is an ideal solution for video display walls and other large-data applications; it also suits industrial markets since the ST60A2 operates over an extended temperature range of -40 to +105°C. Moreover, ST60A2 offers the flexibility of compatibility with a range of antenna configurations. With a 2.2 x 2.2 mm package footprint, the chip is the smallest device available on the market with ultra-low power consumption of 70mW for a completely contactless link.

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Link: https://newsroom.st.com/media-center/press-item.html/t4382.html

MAJA Systems partner

Maja Systems

Overview | Partner Products | Countries of Operation

Maja Systems: We are a team of innovators with decades of mmWave experience committed to commercializing this technology for a new class of interconnects for demanding T&M, industrial, enterprise and automotive applications.

We provide expertise in both mmW and the digital back end to deliver fully integrated multi-gigabit wire-free data transfer solutions.

MAJA

Products and Services offered:

- *Companion Devices*
- *Hardware Integrated Devices*

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