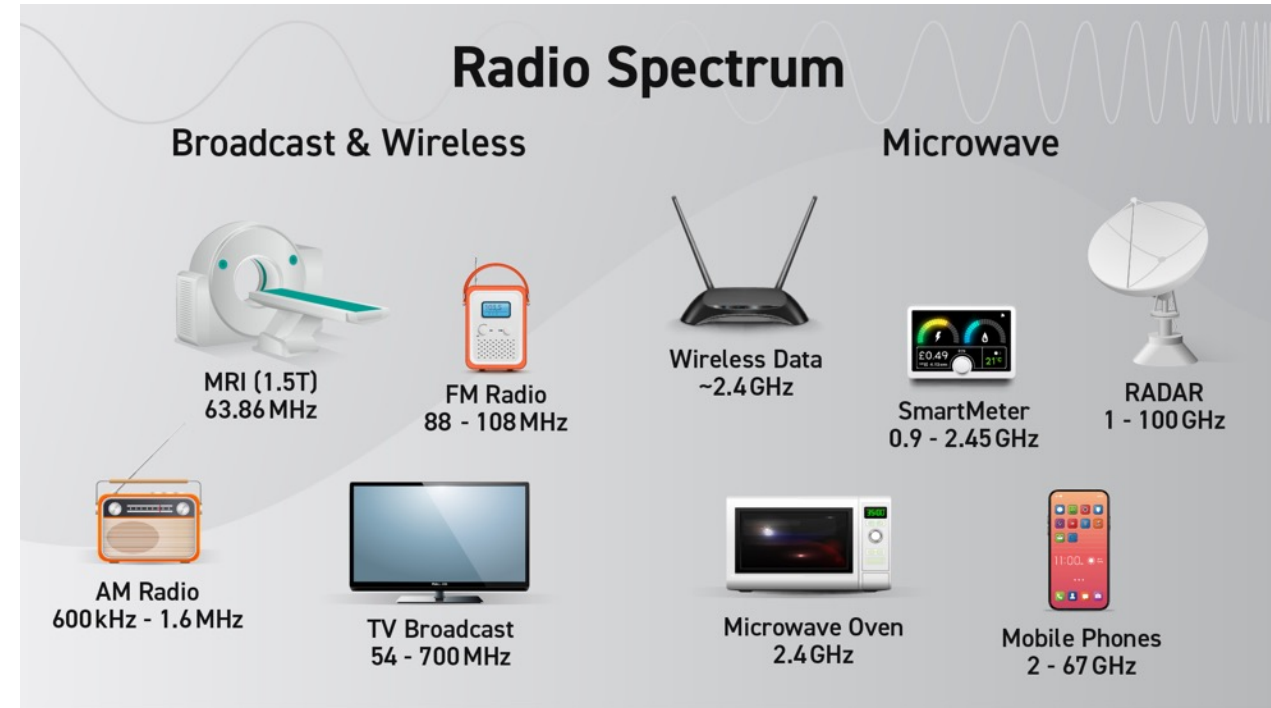


# How to Effectively Configure a Microwave Test Switching System



# Why Are We Here?

- Proliferation of technology using microwave signals
- Volume testing
- The higher the frequency, the greater the challenges
- Do your test engineers have all the skills necessary?
- Tips and caveats to know



# Know Your Test Strategy

- Anticipated DUT volume
- Expected test time
- Acceptable specifications
  - RF power requirements
  - Impedance
  - Insertion losses
  - Crosstalk
- Maintenance – is downtime allocated?
  - Removable microwave relays



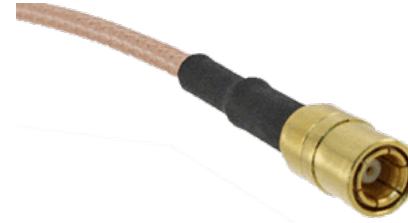
# Relay Types

- Configurations (MUX, changeover, etc.)
- Solid-state (pin diodes, CMOS, arsenide FETs)
  - Long life, virtually infinite & fast
  - Insertion loss, DC blocking, capacitance
- Mechanical switches
  - Lowest insertion loss, better isolation
  - Short life compared to solid state, slow
- Failsafe relays
- Latching relays



# Connectors

- All popular types (bandwidth, coax issues, etc.)
- SMA, SMB, MCX, QMA, F, N
- Multiport RF connector
- Increase in frequency, more care is needed
  - Handling
  - Torque
- Tradeoffs in performance



# Cables

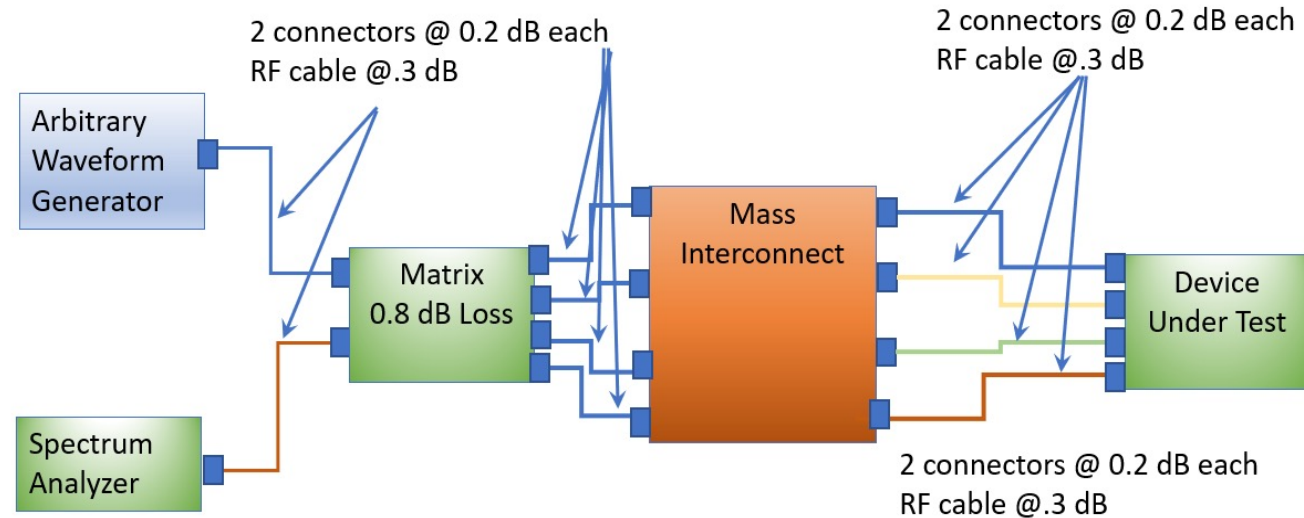
- Different coaxial (coax) types
- Coax versus connector sizes
- “Skin effect” at higher frequencies
- Multiple shields coax
- Semi-rigid
- Conformable
- Flexible



# Stimulus/Masurement Channels - “The Sum of the Whole”

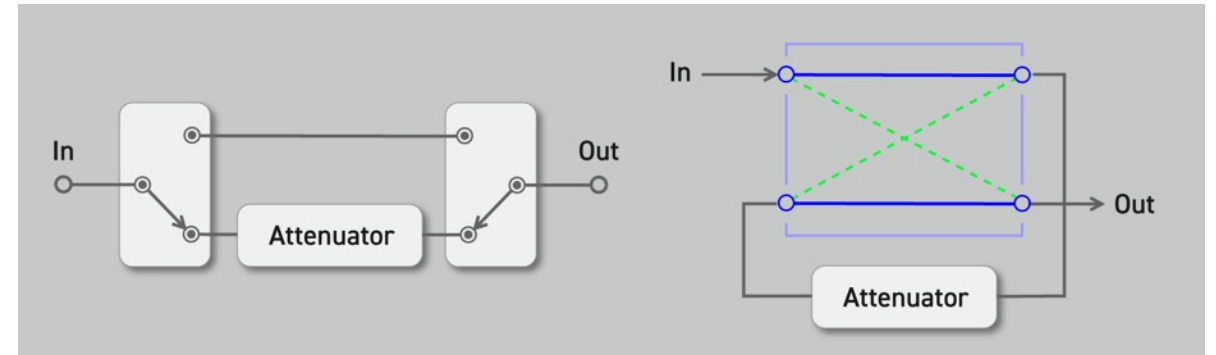
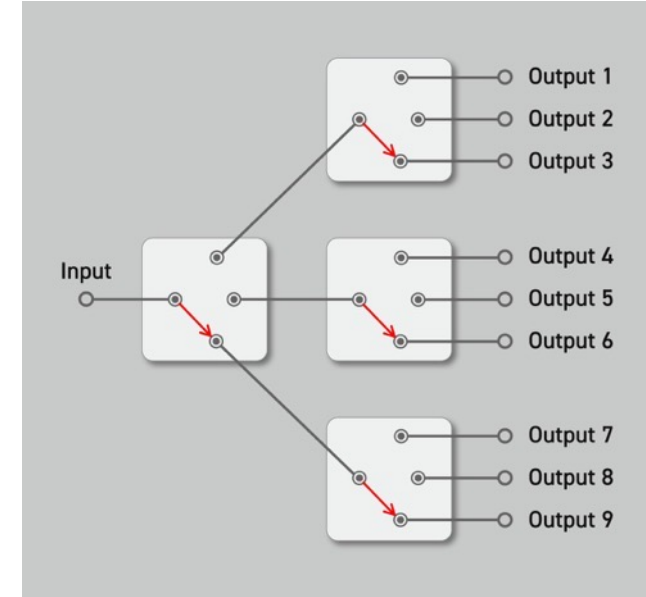
Switching and the entire path of the measurement channel must be considered to confirm that you can stimulate and measure the response of a DUT correctly

- Multiple insertion losses
  - Connectors (cable and instrument)
  - Cables length and types
  - Mass interconnect
- VSWR



# Tips and Techniques

- Correct torque setting for connectors to avoid damage (over tighten) and maintain performance (correct torque)
- Different SMA Connectors
  - Different threads
  - Different center pins
- Multiple relays can be cascaded together to increase MUX sizes and/or create a matrix
- Replace a pair of SPDT with a single transfer switch



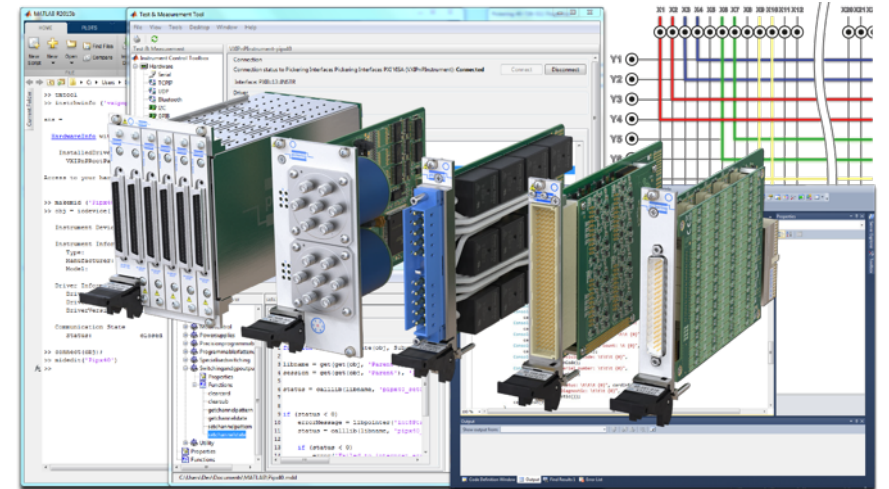
# Conclusions

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- Microwave switching is a mix of instruments, components and compromises
- Know the engineering test specifications up front
- Choice of switching, connectors, cables
- Consider the entire measurement channel
- There are always “Tricks of the Trade” that will help
- Work with experts when necessary

# About Pickering Interfaces

- Platform independent switching and simulation solutions since 1988
- Sales/support centers in UK, US, France, Germany, Sweden, Czech Republic and China
- Sponsor Members of PXISA and LXI Consortium
- Deep Product Portfolio
  - E.g. – 1,600+ PXI modules, 290+ LXI products
- Strong Customer Focus
  - COTS and custom designs
  - Cable/interconnect design tool and services
  - Field diagnostic self-test tools
  - Self-repair on some products
- Long-Term Support
  - Still support products designed in 1980's
  - Rarely obsolete



# Pickering Interfaces RF and Microwave Offerings

- 700+ choices in PXI & PXIe
- 100+ choices in LXI
- Bandwidth from 10 MHz to 67 GHz
- Changeover, DPDT, matrices, multiplexers
- Solid-state or mechanical relays
- Turnkey microwave switch & signal routing subsystems



# Thank You – Q&A Session

## Contact Us

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#### Design

Defining a test system can be challenging. Your goal as a test architect is to accelerate your test system design process using a flexible platform. Having a vendor with the expertise you need will help you get the job done, on time and on budget.

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#### Deploy

Once your system is defined and architected, you need to solve the challenges of deploying that system into production. We provide resources to reduce test integration time and increase test throughput.

[Read more](#)



#### Sustain

A strategic test development strategy does not stop at the design and deployment phase. In order to sustain the system once in production, you need to have quality hardware and tools for diagnosis—maximizing uptime and lowering the total cost of ownership.

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