QuantalRF

QWX27104 3.8V 5-7 GHz DPD-Efficient Linear FEM

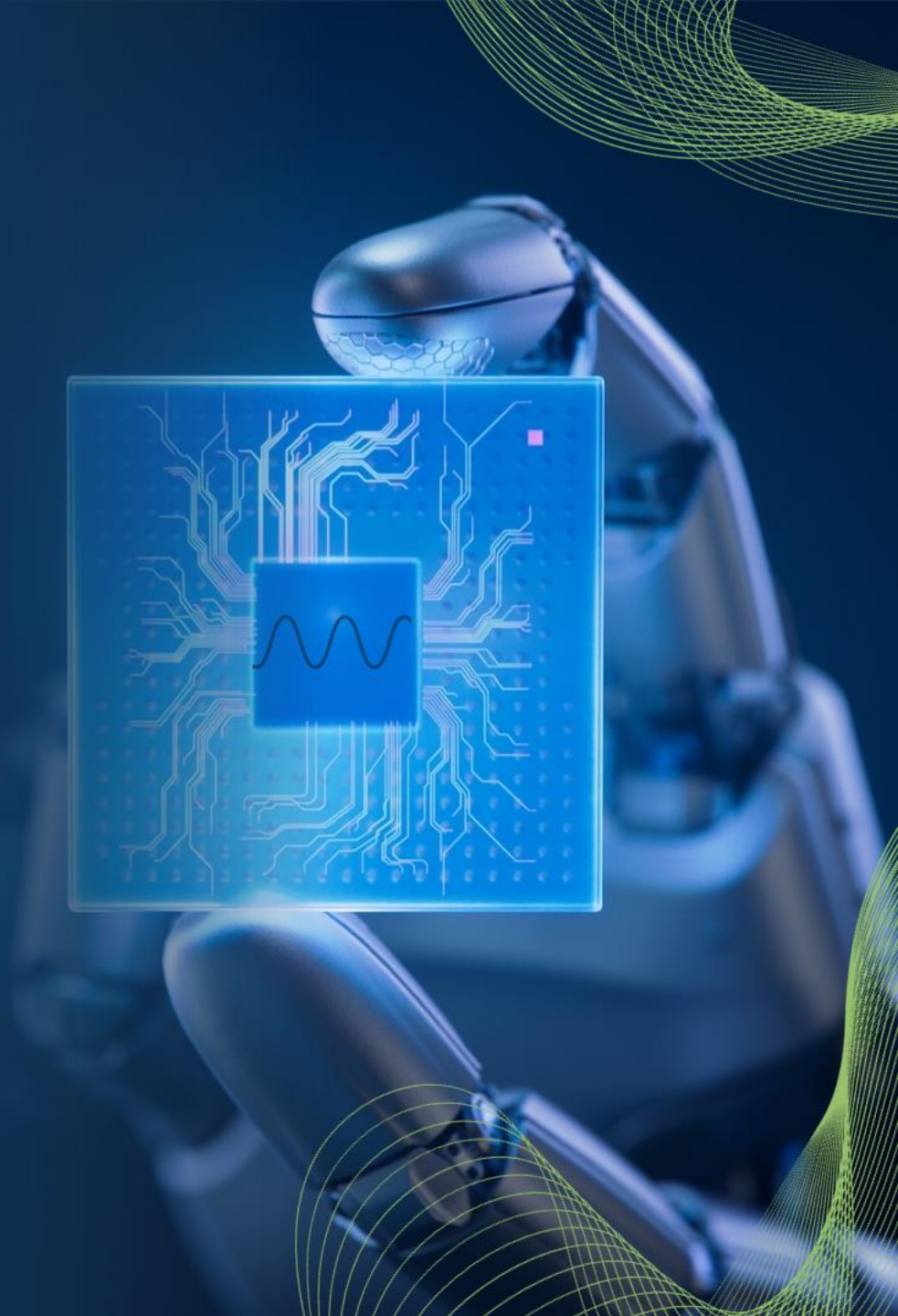
QWX27105 3.8V 5-7 GHz Linear FEM

QWX27106 5V 5-7 GHz Linear FEM

QWX27112 5V 5-7 GHz DPD-Efficient Linear FEM

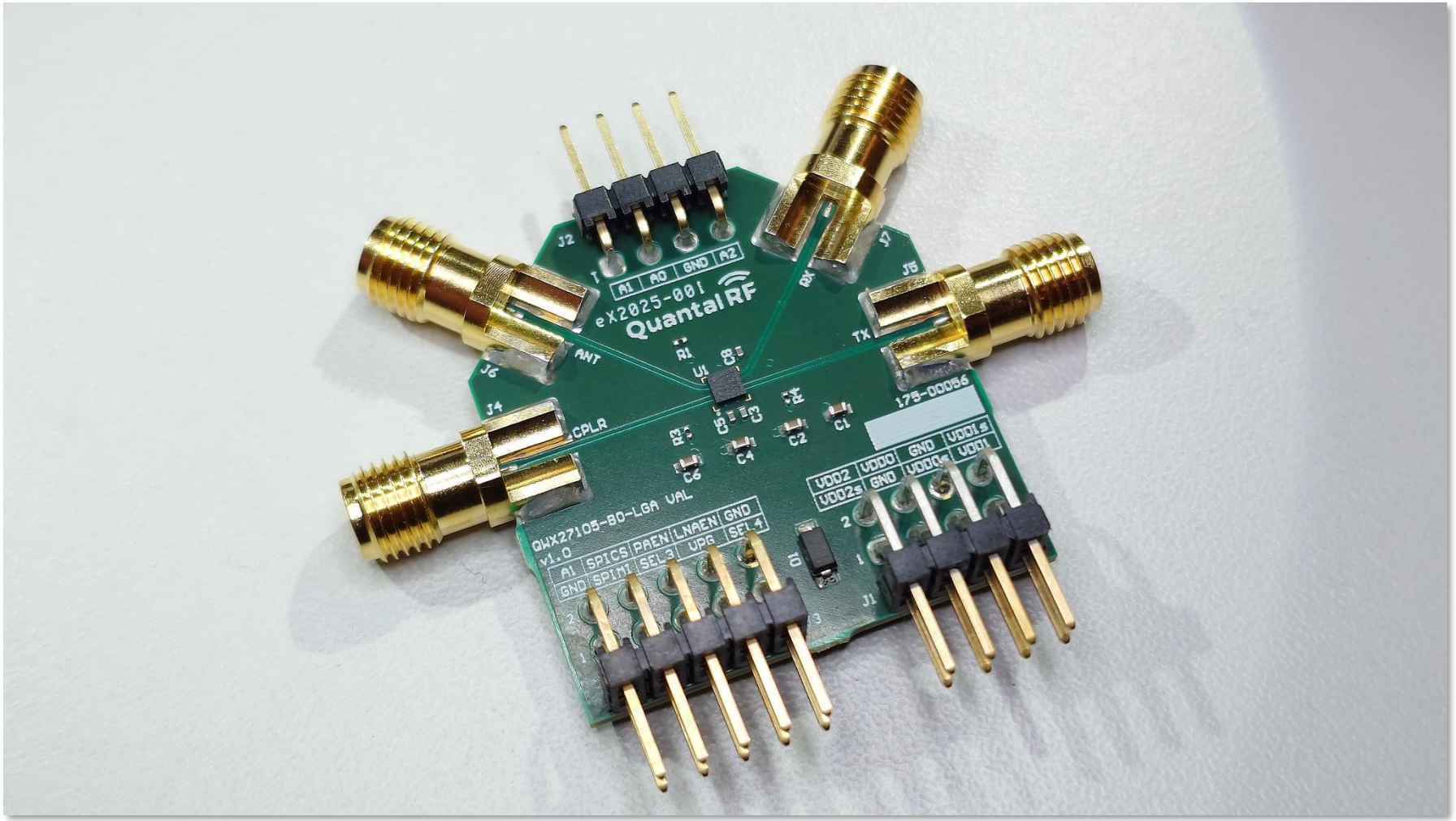
QWX27115 3.3V 5-6.4 GHz DPD-Efficienct Linear FEM

Application Notes



October 2026

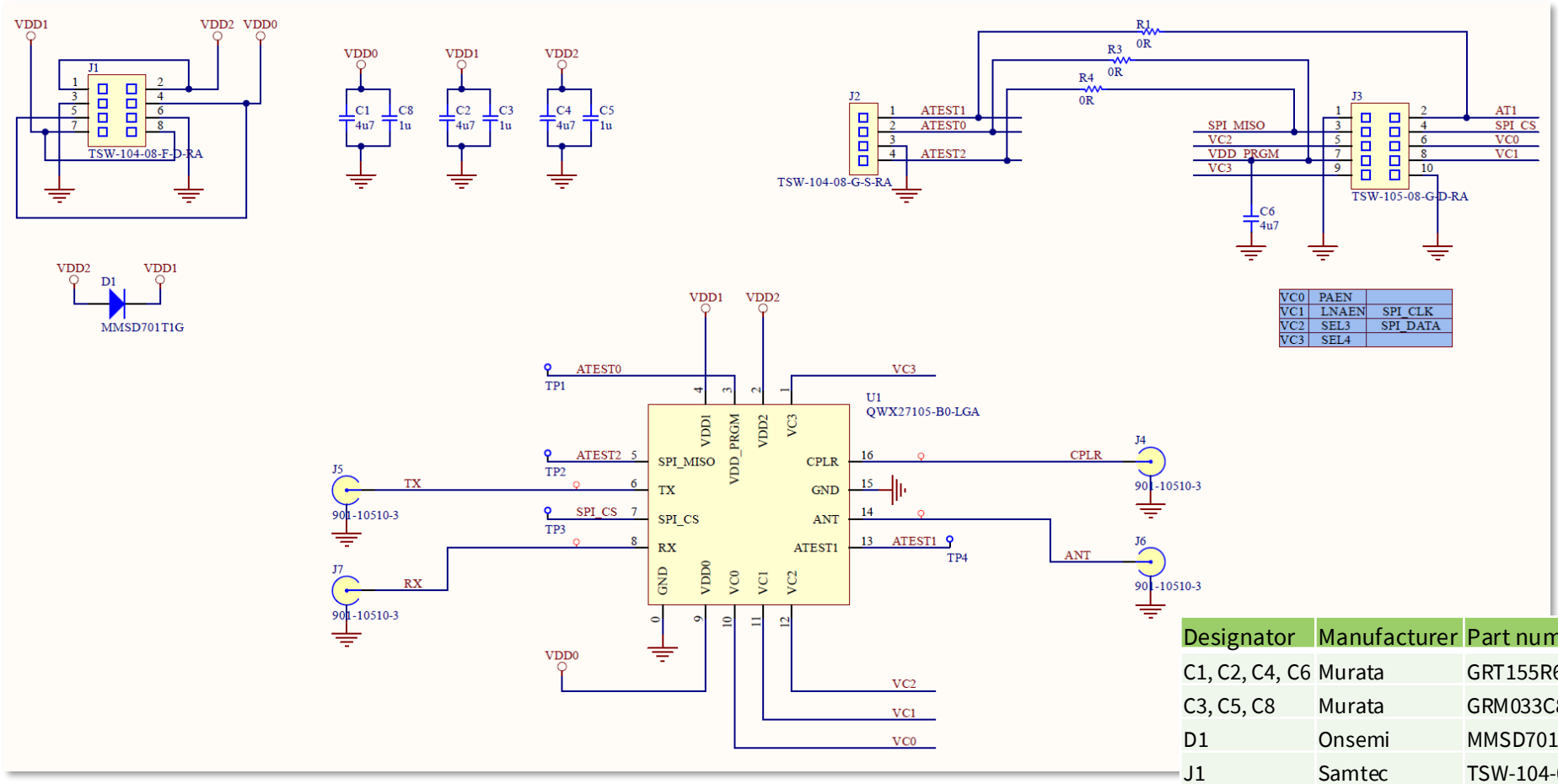
Evaluation Board



QWX27104, QWX27105, QWX27106, QWX27112. QWX27115 all use the same validation board.

QWX27105-B0-LGA silkscreen is printed on all the evaluation boards

Rev 1.0 Schematic



Note: The evaluation board incorporates a diode to protect the circuitry in the event that power is supplied in an incorrect order. VDD1 should be applied before or at the same time as VDD2.

Designator	Manufacturer	Part number	Description
C1, C2, C4, C6	Murata	GRT155R61A475ME13D	Cap. 4.7uF - chip 0402
C3, C5, C8	Murata	GRM033C81A105ME05D	Cap. 1uF - chip 0201
D1	Onsemi	MMSD701T1G	diode, Schottky, 70V, 200mA, SOD-123
J1	Samtec	TSW-104-08-F-D-RA	header (jack), 8p,r/a
J2	Samtec	TSW-104-08-G-S-RA	header (jack), 4p, r/a
J3	Samtec	TSW-105-08-G-D-RA	header (jack), 10p,r/a
J4, J5, J6, J7	Amphenol RF	901-10510-3	coaxial connector - SMA (edge launch)
R1, R3, R4		generic	resistor 0R0 - chip 0201

Functional Modes

Operating mode	Mode name	Signal path	PAEN	LNAEN	SEL3	SEL4
Transmit High Power	TXH	TX to ANT	1	0	0	X
Transmit High Power DPD	TXHD	TX to ANT	0	1	1	X
Transmit Mid Power	TXM	TX to ANT	1	0	1	X
Transmit Mid Power DPD	TXMD	TX to ANT	0	0	1	X
Transmit Low Power	TXL	TX to ANT	1	1	1	X
Receive High Gain	RXH	ANT to RX	0	1	0	X
Receive Low Gain	RXL	ANT to RX	0	0	0	1
RX Bypass	BYP	ANT to RX	1	1	0	X
High Isolation (sleep)	ISO	None	0	0	0	0

Note: The functional modes can be applied for all parts. Please reference QWX27106 & QWX27112 & QWX27115 data sheet for product specific functional modes.

Operating Conditions

QWX27104 & QWX27105

Parameter	Condition	Min	Typ	Max	Unit
Supply voltage	VDD1, VDD2	3.0	3.8	5.0	V
Supply voltage LNA	VDD0	1.65	1.8	1.95	V
Control logic	High Low	1.08 0.00	1.8	3.60 0.40	V V
Operating temperature	Temperature of ground paddle	-40		85	°C

QWX27106 & QWX27112

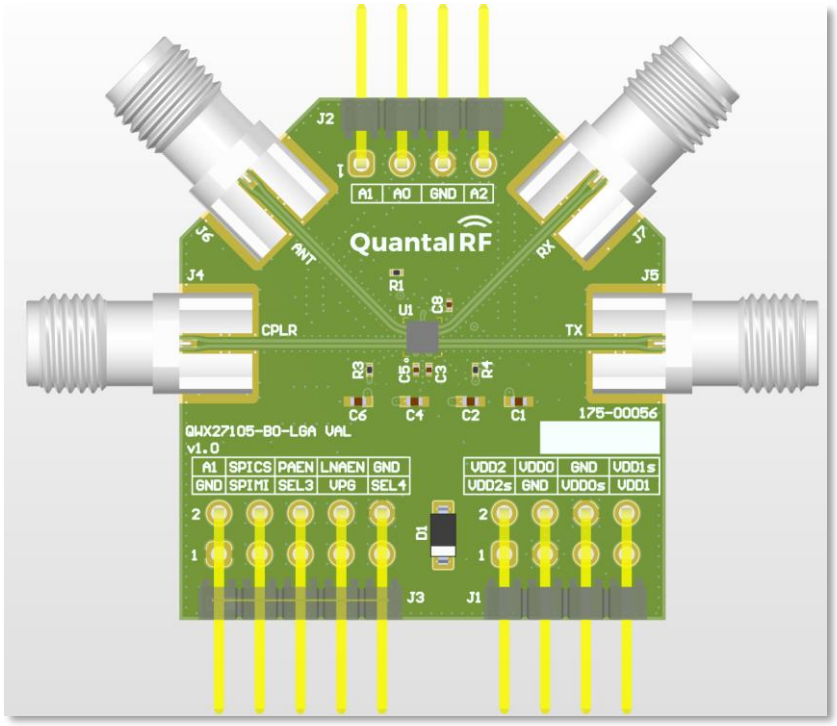
Parameter	Condition	Min	Typ	Max	Unit
Supply voltage	VDD1, VDD2	4.75	5.0	5.25	V
Supply voltage LNA	VDD0	1.65	1.8	1.95	V
Control logic	High Low	1.08 0.00	1.8	3.60 0.40	V V
Operating temperature	Temperature of ground paddle	-40		85	°C

Operating Conditions

QWX27115

Parameter	Condition	Min	Typ	Max	Unit
Supply voltage	VDD1, VDD2	3.0	3.3	5.0	V
Supply voltage LNA	VDD0	1.65	1.8	1.95	V
Control logic	High Low	1.08 0.00	1.8	3.60 0.40	V V
Operating temperature	Temperature of ground paddle	-40		85	°C

QWX271XX Power On Sequence



QWX27104 & QWX27105

- **It is important that VDD2 is never applied before VDD1.** An incorrect power-up sequence could potentially damage the device.
- Apply 1.8 V to VDD0, sense line can be connected to VDD0s
- Apply 3.8 V to VDD1, sense line can be connected to VDD1s
- Apply 3.8 V to VDD2, sense line can be connected to VDD2s

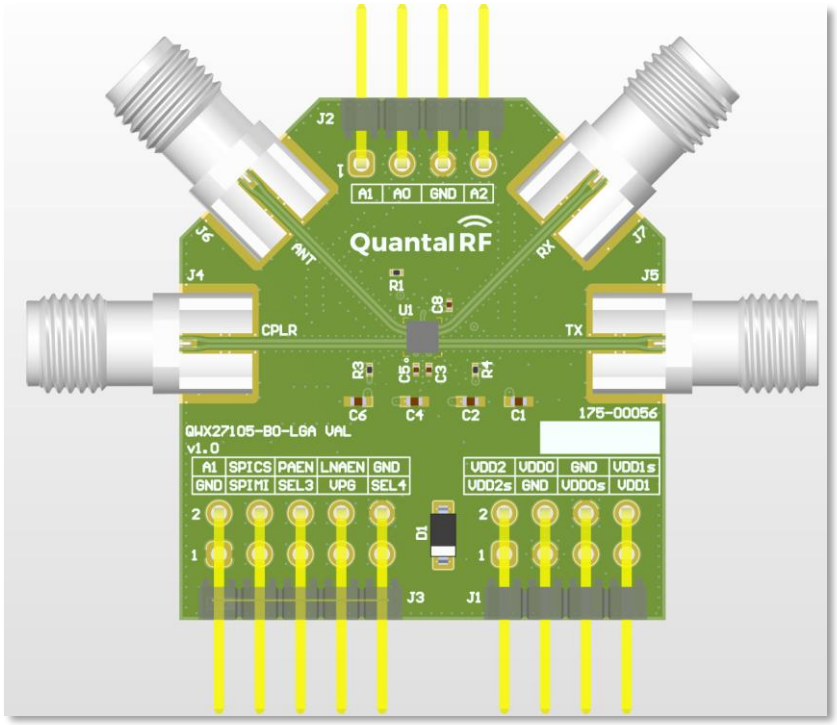
QWX27106 & QWX27112

- **It is important that VDD2 is never applied before VDD1.** An incorrect power-up sequence could potentially damage the device.
- Apply 1.8 V to VDD0, sense line can be connected to VDD0s
- Apply 5 V to VDD1, sense line can be connected to VDD1s
- Apply 5 V to VDD2, sense line can be connected to VDD2s

QWX27115

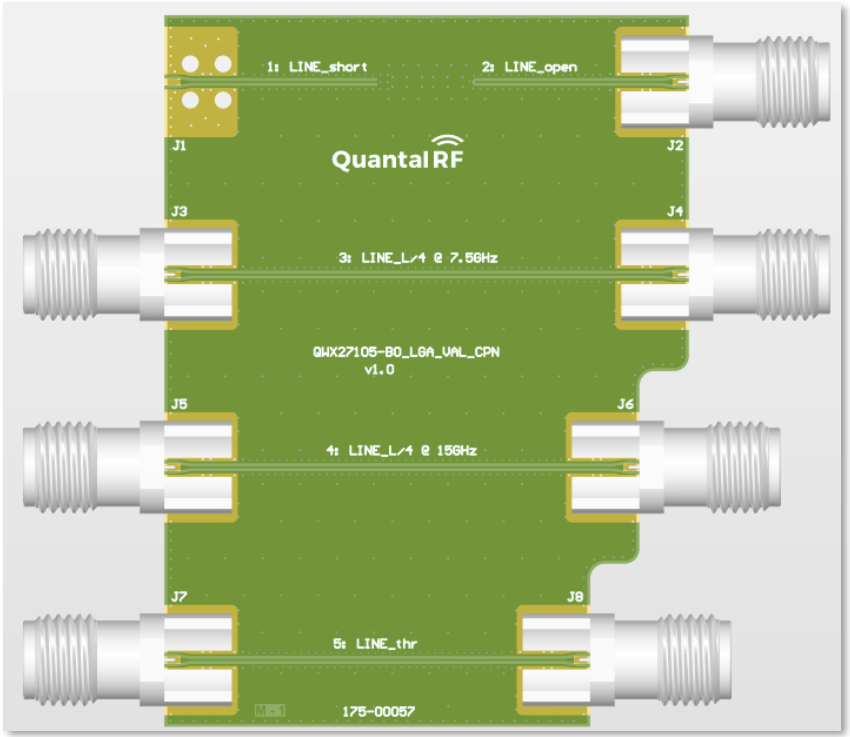
- **It is important that VDD2 is never applied before VDD1.** An incorrect power-up sequence could potentially damage the device.
- Apply 1.8 V to VDD0, sense line can be connected to VDD0s
- Apply 3.3 V to VDD1, sense line can be connected to VDD1s
- Apply 3.3 V to VDD2, sense line can be connected to VDD2s

QWX271XX Power Off Sequence



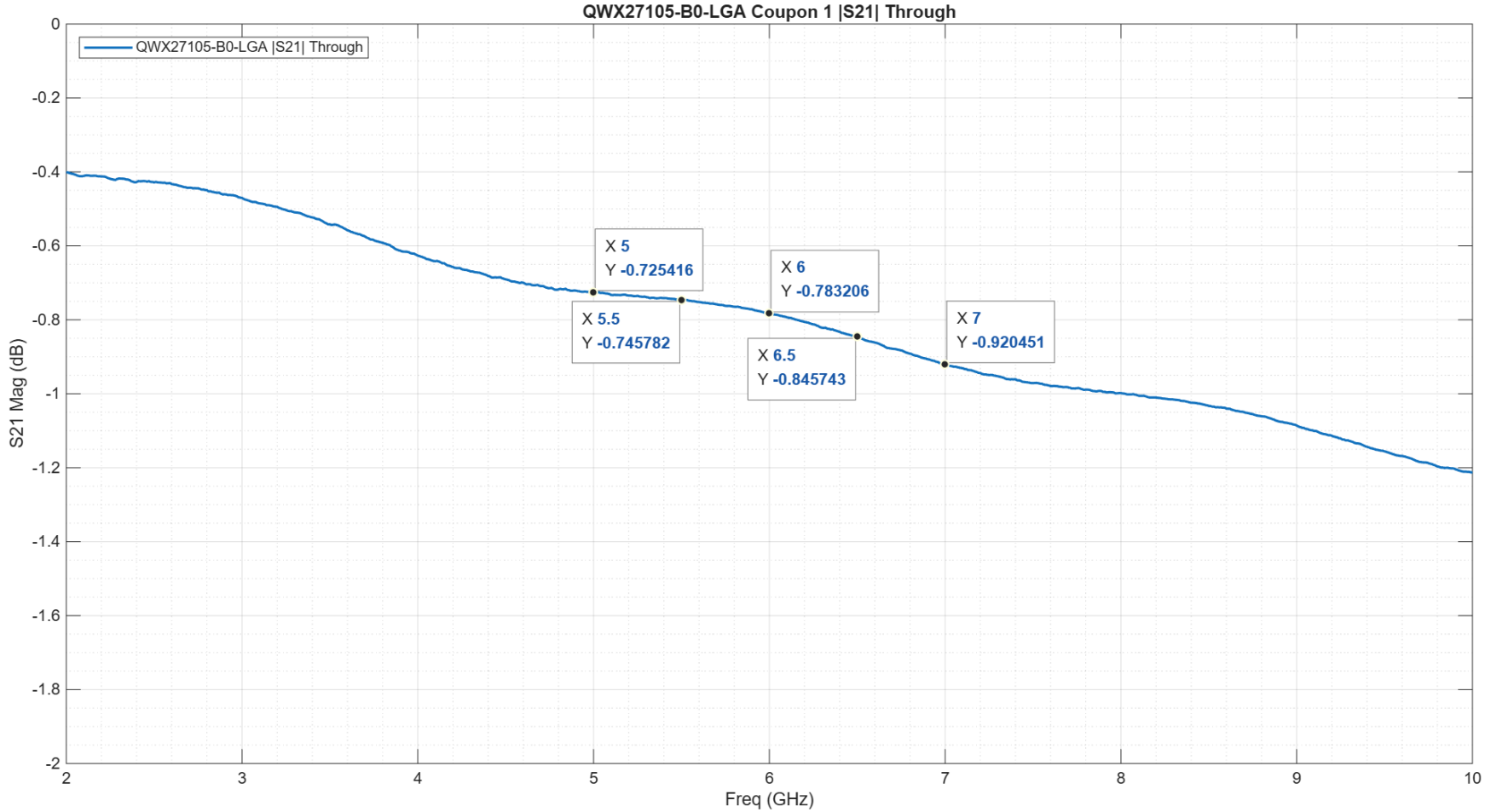
- **It is important that VDD1 is never shut off before VDD2.** An incorrect power-up sequence could potentially damage the device.
- Apply 0 V to VDD2, sense line can be connected to VDD2s
- Apply 0 V to VDD1, sense line can be connected to VDD1s
- Apply 0 V to VDD0, sense line can be connected to VDD0s

QWX271XX PCB De-Embedding



- **TRL calibration:** Use the following traces on the PCB coupon:
  - Trace 2, LINE_open (delay time $\Delta\tau = 0$)
  - Trace 3, LINE_W/4 @ 7.5 GHz, valid range ~2.0 GHz to 13 GHz (delay time $\Delta\tau = 1/(4*7.5\text{GHz}) = 33.3$ ps)
  - Trace 4, LINE_W/4 @ 15 GHz , valid range ~3.5 GHz to 26 GHz (delay time $\Delta\tau = 1/(4*15\text{GHz}) = 16.7$ ps)
  - Trace 5, LINE_thr (delay time $\Delta\tau = 0$)
  - TRL cal can be done using either or both $\lambda/4$ traces.
- **Scalar Loss Subtraction:**
  - PCB trace loss can be individually compensated for at each specific frequency using the measured loss of the coupon through trace (Trace 5, LINE_thr).
  - Input or output trace loss is calculated as half of the full trace loss.
  - Please refer to the PCB coupon s2p file delivered with the EVK or measure S21 on the coupon delivered with the EVK for trace loss.
  - Loss for some frequencies is given in a table on the next slide.

QWX271XX PCB De-Embedding



Frequency (GHz)	Input PCB Loss (dB)	Output PCB Loss (dB)
5.0	0.36	0.36
5.5	0.37	0.37
6.0	0.39	0.39
6.5	0.42	0.42
7.0	0.46	0.46

QuantalRF HOST ADAPTER Background

Frequency Tracking

- The parts employs a unique frequency tracking feature in TX mode, adapting to the input signal in real time and adjusting internal parameters automatically for best performance across the entire 5.15 GHz – 7.125 GHz (5.15-6.425 GHz for QWX27115) range used in Wi-Fi 6E and Wi-Fi 7.
- In regular use, the frequency tracking happens within the first 1 µs of each TX frame.
- In test modes where the TX input frequency may change without the chip being toggled into TX mode, the frequency band needs to be forced to measure the real-world performance.
- The QuantalRF Host adapter enables testing with forced frequency bands. It also enables dynamic TX EVM testing using a trigger signal from the tester.
- Slides below describe the usage of the Host Adapter with QuantalRF's custom user interface.

QuantalRF HOST ADAPTER Test Setup

Connection

- Receptacle labeled “DUT” is connected directly to SPI/GPIO header J3 on EVB.
- Power is connected separately through header J1.
- Host Adapter is connected to host computer using USB cable.
- For dynamic performance measurements, trigger signal from tester is connected to M_SW input.

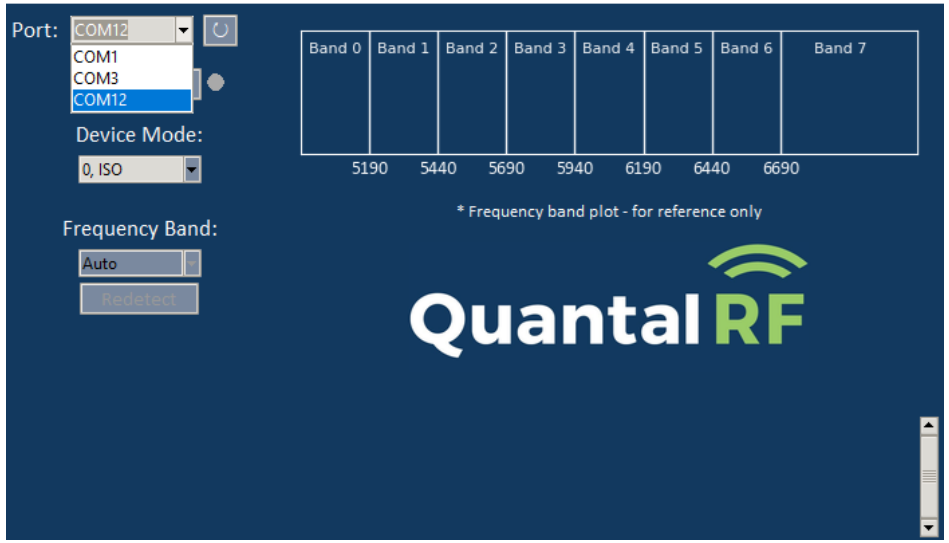


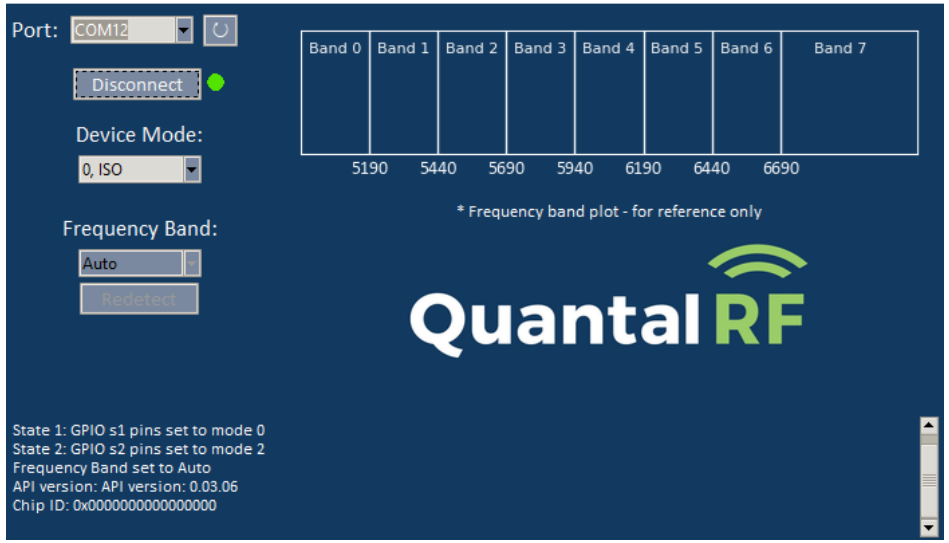
QuantalRF HOST ADAPTER

Operation

Host Connection and Startup

- Run QWX27105_B0_GUI_v0p03.exe file included with kit to open GUI.
- Power on DUT per slide 6.
- Select COM port under Port drop down menu and press Connect button.
- If Chip ID is not present wrong COM Port may be selected.
- If Chip ID is all zero’s, the correct COM Port was selected, check DUT setup and ensure DUT is powered on.
- When powered on the DUT will start up in isolation mode.



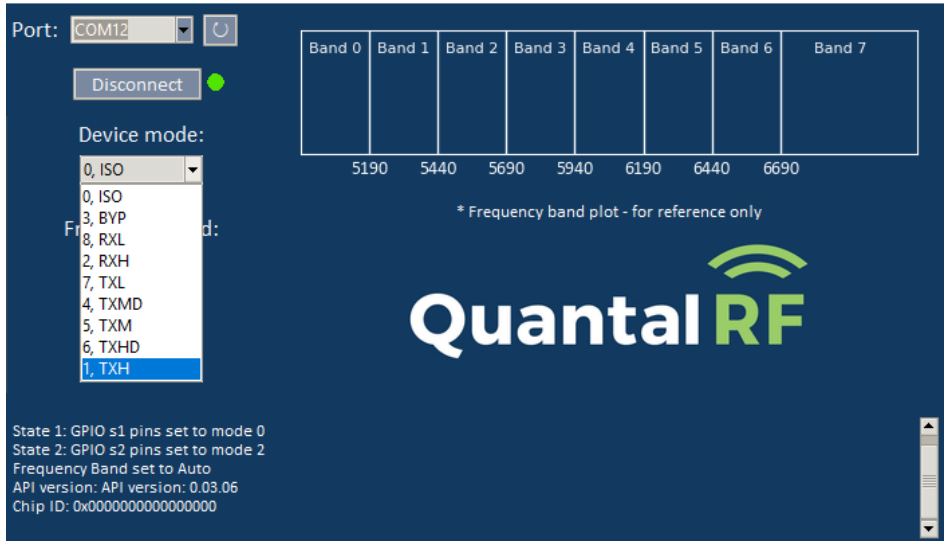


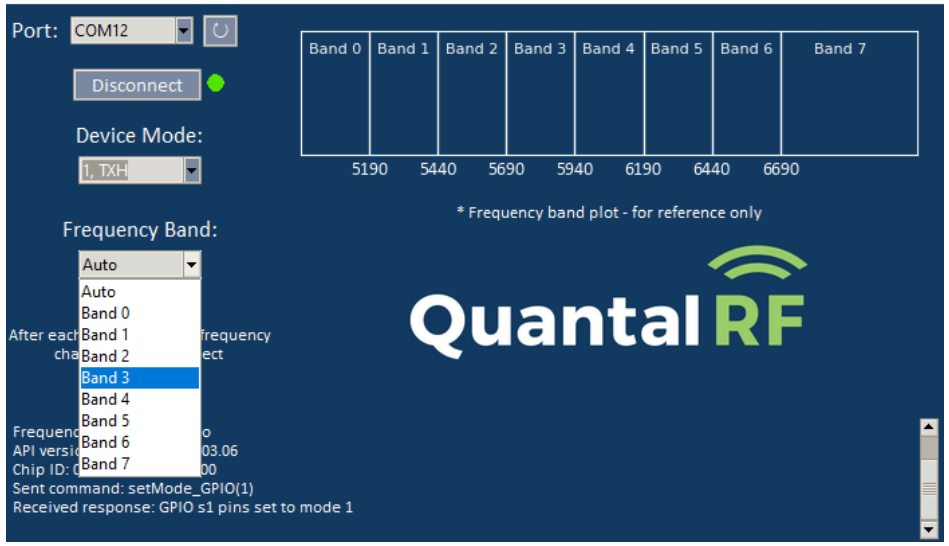
QuantalRF HOST ADAPTER

TX Modes

- Select desired mode for test under Device Mode drop down menu.
- Forced Frequency Band Mode (band override) is required for TX S-Parameter testing. Select the desired band based on the reference diagram.
- QWX27115 is a version optimized for TXL and TXM TX modes, but the other TX modes can still be selected but they will give reduced performance, so they are not to be used on this EVK version.
- QWX27115 is a version optimized for Band 0-4 usage, using bands higher than that will give reduced performance

Operation



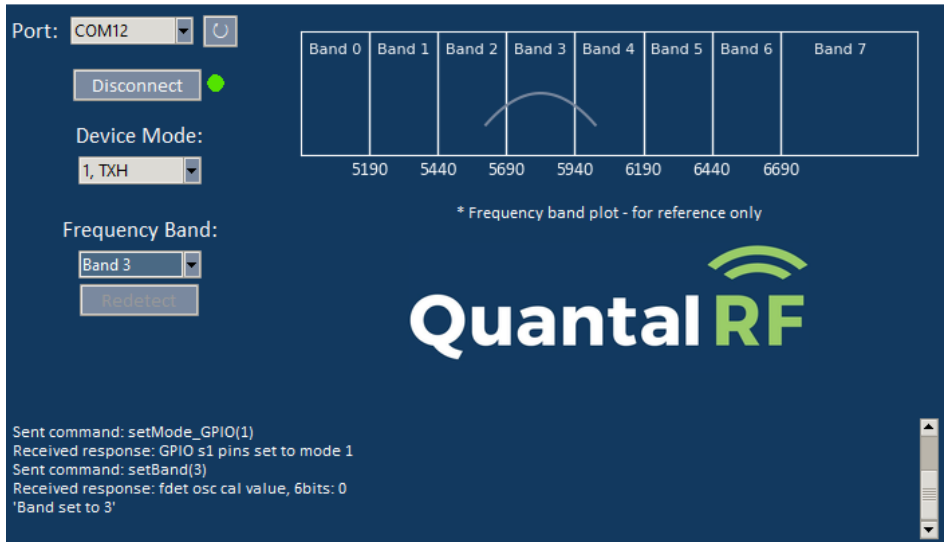


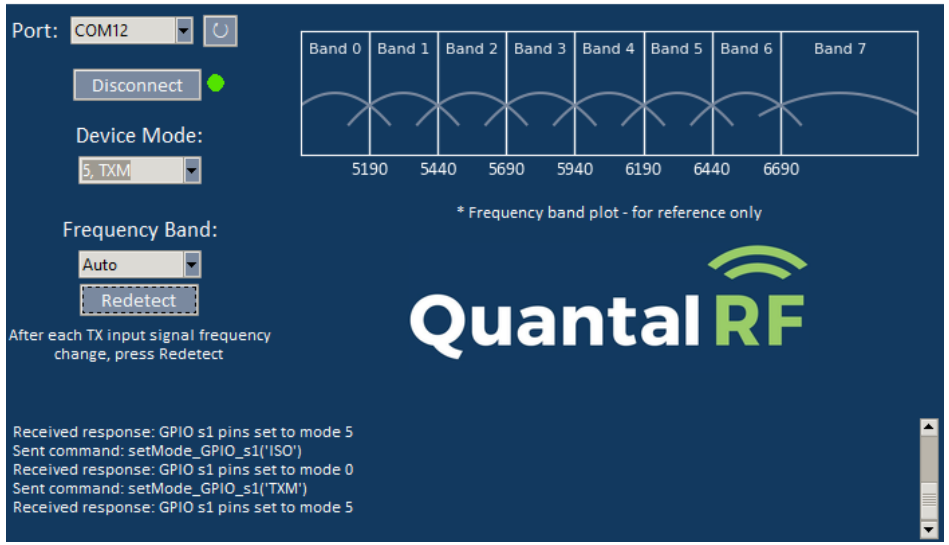
QuantalRF HOST ADAPTER

Operation

TX Modes (continued)

- For dynamic operation connect a trigger signal from the tester to M_SW.
- The chip will then be in the mode selected under the Device Mode drop down menu while the trigger signal is ***low***. When the trigger signal is ***high***, the chip will be in RXH mode.
- Forced Frequency Band Mode may be used during standard TX tests (gain, EVM, compression, SEM, etc.).
- If Auto Frequency Detect Mode is used; first select Auto mode, then apply the desired RF signal. If the signal changes frequency, please repeat these steps, ensuring that the RF signal is only applied after Auto mode is selected.

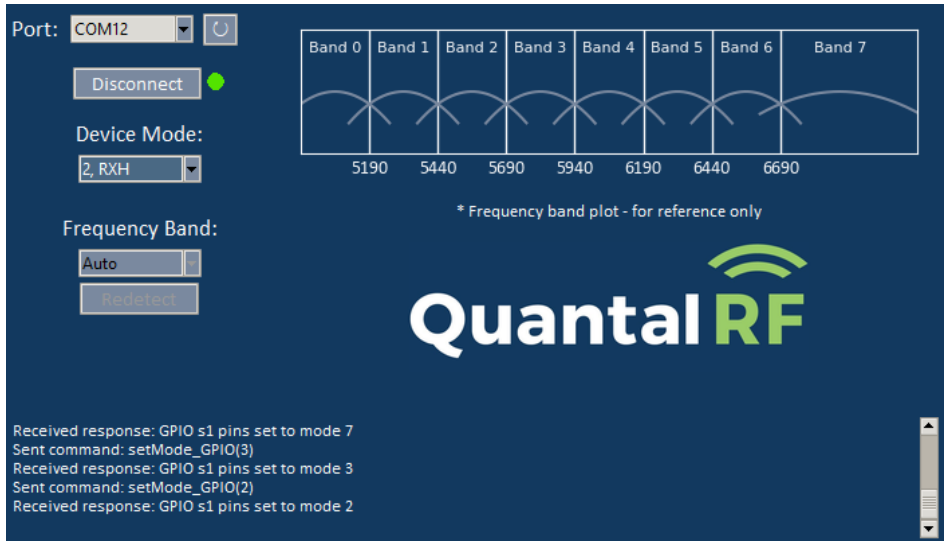




QuantalRF HOST ADAPTER Operation

Other modes

- When the Device Mode is set to isolation, RX, or bypass, the Frequency Band drop down menu will be disabled, as there is no frequency detection used in these modes
- Device Mode should be set to isolation before closing the GUI or disconnecting the DUT. If not, the DUT will remain in the last mode selected.



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