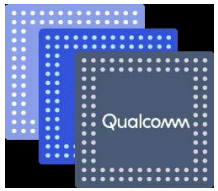
Qualcomm

HW RF Block Diagram Review SOP

KBA-171218015238

Rev. 4



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Revision History

Revision	Date	Description
1	2017-12-19	Initial release
2	2017-12-20	add section: Review comment feedback & customer response
3	2018-1-11	Update subject name
4	2020-3-4	add EN-DC/SRS/MSIM through all pages.

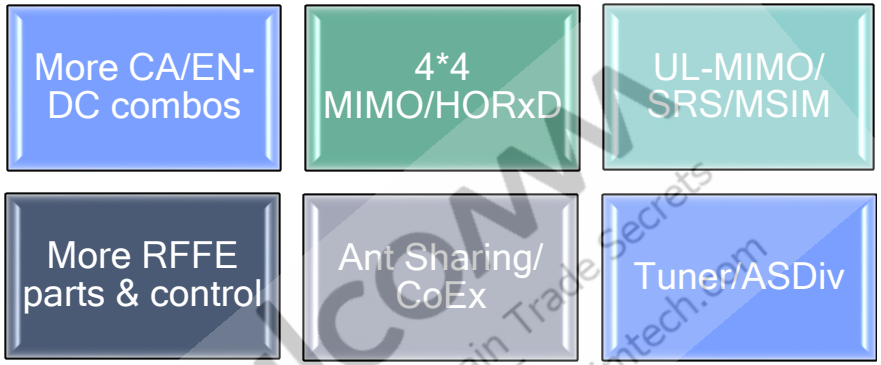
Agenda and Content

- Overview
- Purpose & Check Points
- RF Block Diagram Review Process
- How to raise RF BD review case
- Material required for a RF BD review
- Review comment feedback & customer response

Overview

Overview

- The cell phone front end design is more and more complicated on RF.



- It's very important to find the issue in early stage(earlier than schematic stage)!
  - With RF Block Diagram review we can comment on whether customer's RF front end can support expected features on a platform. Also optimize the design to meet expected features.

Scope

- BD review is mandatory for SM800/700/600 series platforms(such as SM8350/SM8250/SM7250/SM6350/SDX55 etc.).
- For SM400/200 series, if customer has many advanced RF features, or customer will use 1 PCB to cover different market(by different BOM), recommend to raise RF BD review as well.

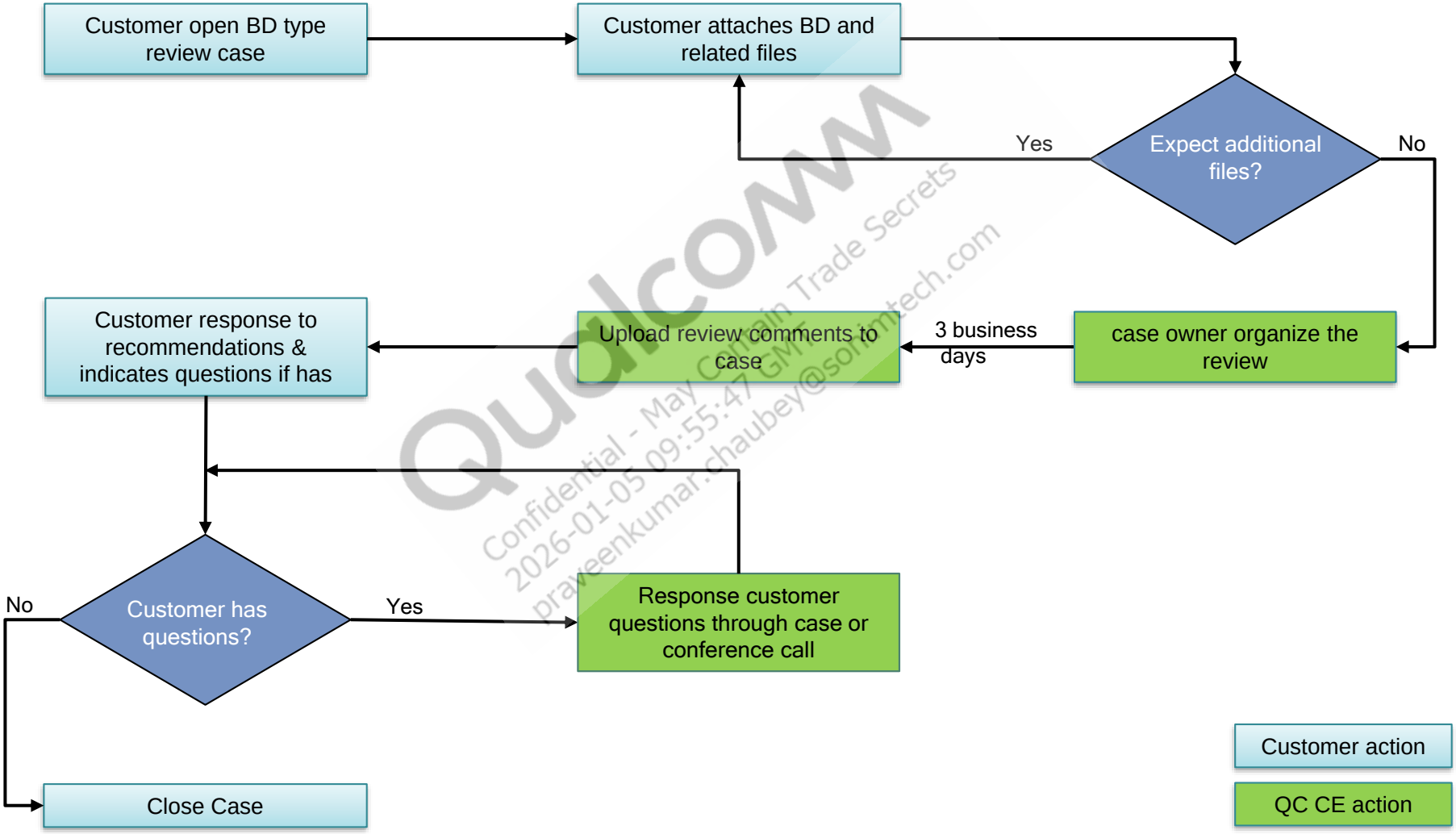
Purpose & Check Points

- The BD review will check if required features/bands/CA/EN-DC can be supported by the platform and check the RF front end architecture.
- The BD review will also check if it meets design rules/limitation of the platform.
- The PORed features and design rules also rely on sw Baseline, it will be checked accordingly in BD review.

Check Points	Comment
Bands are POR or not on a platform	
CA/MIMO/EN-DC combos are POR or not on a platform	
SDR/WTR/QLN port mapping	
CA/MIMO/EN-DC signal path of RF front end	
CA/MIMO/EN-DC internal signal path of SDR/WTR/QLN	
UL-MIMO/SRS/MSIM (design based)	If design support, will review if it follows design rules
ASDiV (design based)	if design support ASDiV, will review if it follows design rules
Ant-sharing (design based)	if design support ant-sharing, will review if it follows design rules
Key RF front end component	such as PAMiD, DRx module, L-PAMiD, Tuner, QLNA, etc.
Special filters/components for CoEx view	such as LPF on LB Tx path, 5G filter on FBRx path, N-plexer, etc
MIPI bus assignment	
Other design rules	such as FBRx connection rule, Tx-Rx leakage path, etc.
GRFC assignment (optional)	It is optional, can be reviewed in BD review or in SCH review case

RF Block Diagram Review Process

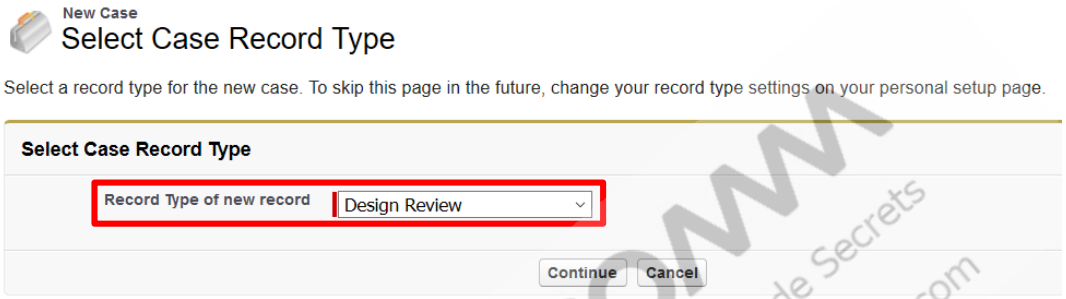
BD review process



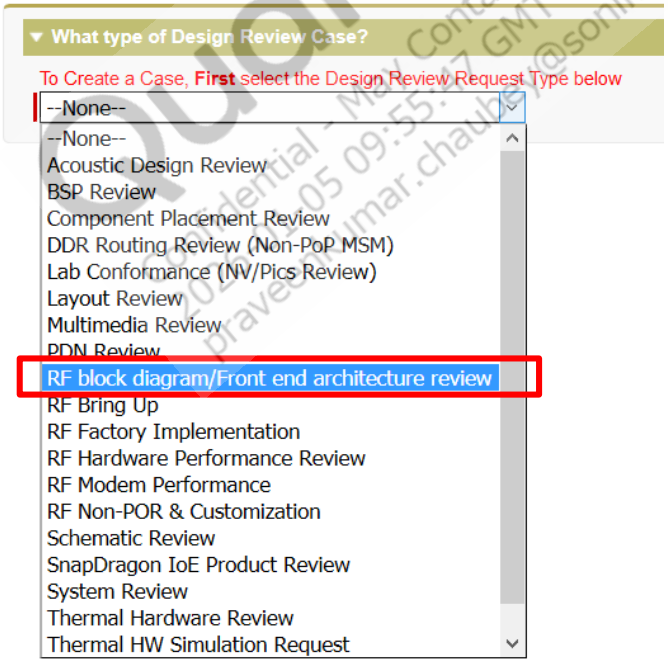
How to raise RF BD review Case

Case type and Key info required

- Step1: select Design Review Case Type when open a BD review case.

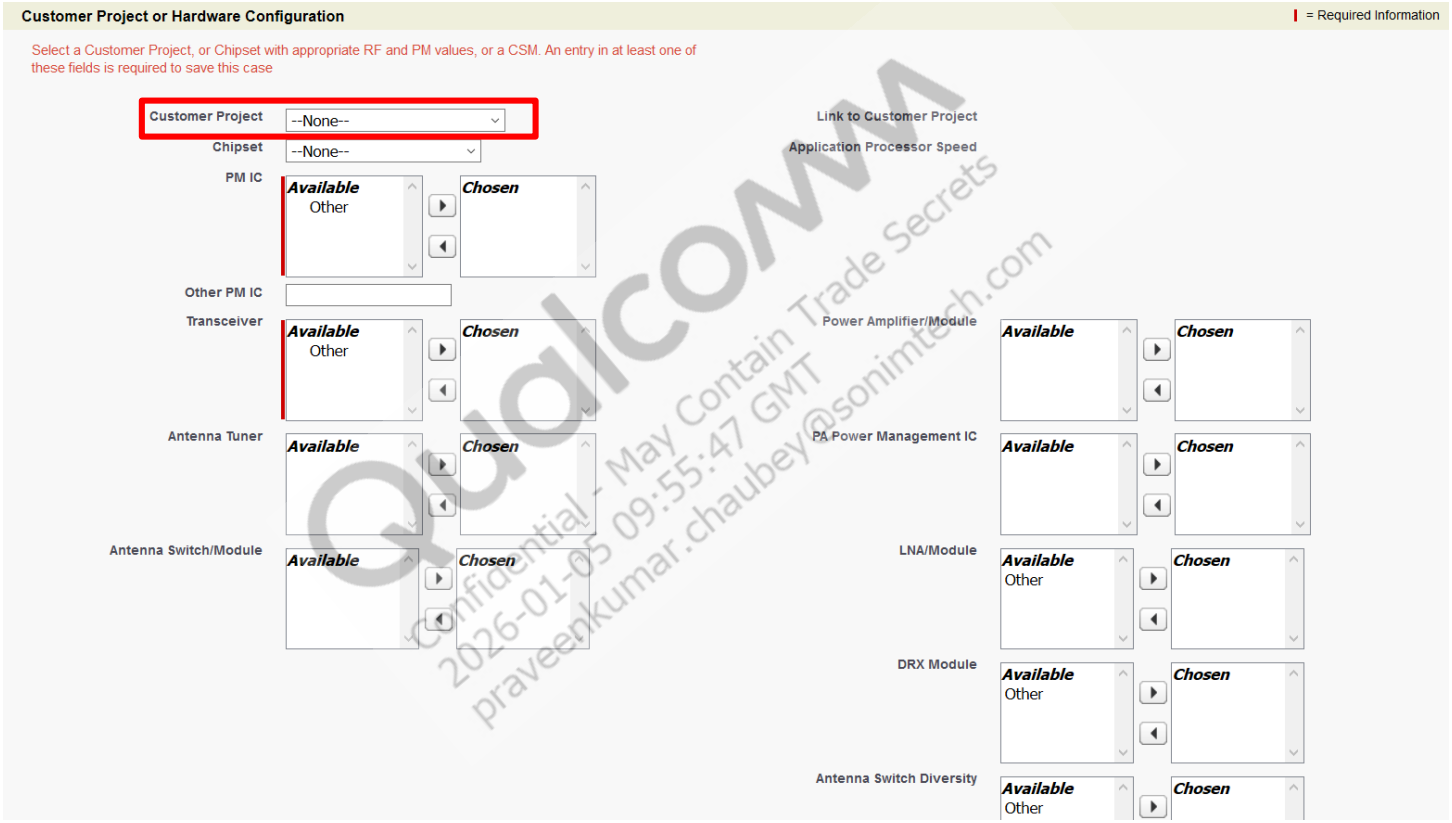


- Step2: select RF Block diagram/Front end architecture review in Design Review Request Type



How to raise RF BD review Case (2)

- Step3: select right Customer Project name and fill the RF related info if they are not auto listed.



Material required for a RF BD review

Provide correct/complete information of the project is significantly important

- Strongly recommend to provide information based on 80-V5756-3 that list what are needed to provide and also provide the suitable format.
- Different file format is acceptable, but must match below highlights.

Highlights of BD review files

1. Block diagram file can be excel file based on 80-V5756-3 or searchable pdf format. Viso source file is not recommended. Pdf format is preferred, as it is easy to mark review comments.
2. Band and tech need to clarify at same time.

GSM	QB or B2,B3,B5,B8			
WCDMA	B1,B2,B5,B8			
LTE	B1,B3,B7,B38,B39,B40,B41		Band support	1,2,3,5,7,8,39,40,41

√ good example

✗ bad example

3. CA/EN-DC combo and 4*4MIMO need to clarify at same time and follow 3GPP format or platform's -650/-651 format.

1A-3A-7A If DLCA only
2A-4A-13A

1A(4*4)+5A(2*2)+7A(2*2)
1A(2*2)+3A(4*4) If No ULCA

√ good example

DLCA/MIMO/ULCA case

CA Configuration	ULCA	4x4 MIMO
CA_1A-3A-19A	.	1A, 3A
CA_1A-3A-20A	3A-20A	1A, 3A
CA_1A-3A-21A	.	.
CA_1A-3C	3C, 1A-3A,	1A, 3C, 1A-3C

√ good example

3DL CA:	B1+B3+B5,B1+B3+B7,B1+B3+B8
4*4 MIMO:	B1,B2,B3,B4

✗ bad example

Material required for a RF BD review (2)

EN-DC Combination	Sub-6GHz TDD <= 100MHz FDD <= 20MHz 4G DL 4x4 MIMO (20L)	Sub-6GHz TDD+TDD <= 200MHz TDD+FDD <= 120MHz 4G DL 4x4 MIMO (8L)	5G-NR DL 4x4 MIMO	4G UL	5G-NR UL
DC_2A-5A_n5A	2A	.	.	2A	n5A
DC_66A_n25A-n41A	.	66A	n25A-n41A	66A	n25A, n41A

√ good example

4. Port mapping file is preferred to be excel format to follow 80-V5756-3. At least to provide a table to show port mapping or mark band information in Block diagram clearly.

➢To check SDR internal path, case owner may request a specified port mapping file, please work with case owner about it.

5. Key features need to highlight with details and project's target baseline info is needed:

➢MSIM, if support, need to provide band/tech combinations of SIM1/SIM2. prefer to have a concurrency table to show full concurrency or DTA, example:

sw baseline: (example, xx_CS1.0)		SIM2 (non-DDS), L/W/G/1x		
SIM1 (DDS)		LTE bands		WCDMA
ENDC, LTE + NR sub6		B34	B40	B8
B3A (2Rx)	N41A (4Rx)	2Rx, FC	DTA	2Rx, FC
Note: "FC" means NR and SIM2's Rx is full concurrency on HW "DTA" means NR diversity tune away to support SIM2, HW is not full concurrency				

Material required for a RF BD review (3)

- SRS, if support, need to provide band/EN-DC combo for detail requirement, such as n41 1T4R for SA/NSA, n78 2T4R for SA, etc. If NR SRS share ANT/XSW with LTE in NSA mode, prefer to have a concurrency table.
- ASDiV, if support, need to provide band/tech list that will enable ASDiV. If co-work with NR SRS, prefer to have a concurrency table, example:

sw baseline: (example, xx_CS1.0)			NR n41 1T4R SRS target ANT			
			TX->ANT0(RX0)	TX->ANT1(RX1)	TX->ANT2(RX2)	TX->ANT3(RX3)
LTE B3 (ASDiV state0)	ANT1	RX1	No	Yes	No	No
	ANT2	RX2	No	No	Yes	No
	ANT3	RX3	No	No	No	Yes
	ANT4	TX/RX0	No	No	No	No
Note: 1. "Yes" means the LTE path in that row will be interrupted by the NR SRS on the ANT in that column 2. "No" means the LTE path in that row will NOT be interrupted by the NR SRS on the ANT in that column						

- Ant-sharing, if support, need to provide WAN/WLAN bands list that share one antenna.

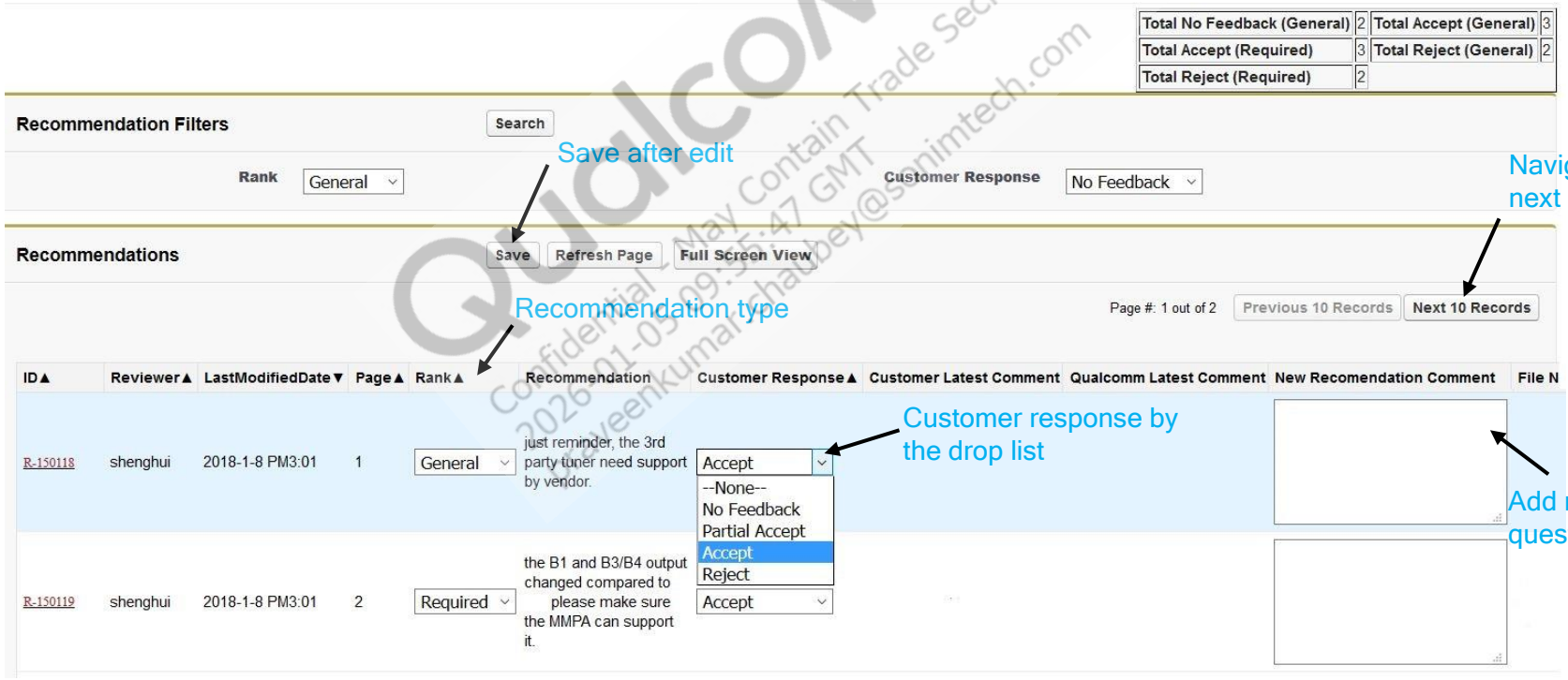
6. MIPI bus assignment is preferred to be excel format, at least to draw it in Block diagram clearly.
7. Additional files:

- To review front end architecture, especially for CA/MIMO/EN-DC design, the front end key integrated component's datasheet is needed if it is NOT from Qualcomm.
  - Such as, PAMiD, DRx module, extractor. Without spec, we can't know how the signal path work in it.

Review comment feedback & customer response

Comment Feedback

- The review comment will be uploaded to case as attachment. Normally, it is the pdf format block diagram file with added comments.
- The comment list also will be shown as **Recommendation Table** in the page of the case.



Review comment feedback & customer response(2)

Customer Response

- Customer need to use the drop list to respond the review comment one by one. Please input questions, explanation of “Reject” in the “**New Recommendation Comment**” field.
- Each item must be responded by drop list before closing case.

Review comment feedback & customer response(3)

Rank of recommendation type

- Two types rank are used to identify the recommendation priority.

[Required]	[General]
Comment(s) provided in this field represent must-change item(s). Customers must implement the change/feedback provided. Failure to comply can cause: • Unacceptable performance degradation • Missing supported feature required by the product • Potential device/interface malfunction • Long term reliability impact • Incompatibility in software/system operation • …	Comment(s) provided in this field are nice-to-have, suggestion(s), or reminder(s) from the CE review team. Customers can implement at their discretion. Potential impacts are: • Additional hardware/software customization effort by the customer • May require addition performance tuning by the customer • May require addition testing by the customer • Missing test feature, prolong bring-up process • Missing nonmandatory feature (especially if that feature becomes mandatory) • …

Questions?

For additional information or to submit technical questions, go to:
https://createpoint.qti.qualcomm.com

File a case with the proper problem area code to ensure that the problem assignment is sent to the correct support team for quicker resolution.

Problem Area Code	Support Team
Case Record Type	Wireless Device Support
Problem Area 1	RF Hardware (cellular)
Problem Area 2	Transceiver or RFFE
Problem Area 3	-