CONFIDENTIAL B

MEDIATEK

[MT7981]
Antenna Application Note

Outline

- Antenna Design Guide
- Appendix : DBDC Out-band Rejection

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- **Antenna Design Guide**
- Appendix : DBDC Out-band Rejection

Antenna Design Guide

1. Antenna Isolation Suggested (AP / Router)
   - 2.4GHz 2X2 antenna isolation ≥ 23 dB (TGnBNL sensitivity loss <0.5 dB)
   - 5GHz 2X2 antenna isolation > 23 dB (TGnBNL sensitivity loss <0.5 dB)
   - 5GHz 3x3 antenna isolation > 25 dB (TGnBNL sensitivity loss <1 dB)
2. VSWR <2 in 2.4&5 GHz Band
3. Antenna Gain > 1 dBi (depends on customer's spec.)
4. Efficiency > 50%
5. Radiation Pattern : Omni-directional in horizontal plane
6. Polarization (E field) : Vertical polarization (dipole)

Placement Rules of Antenna and RF Cable

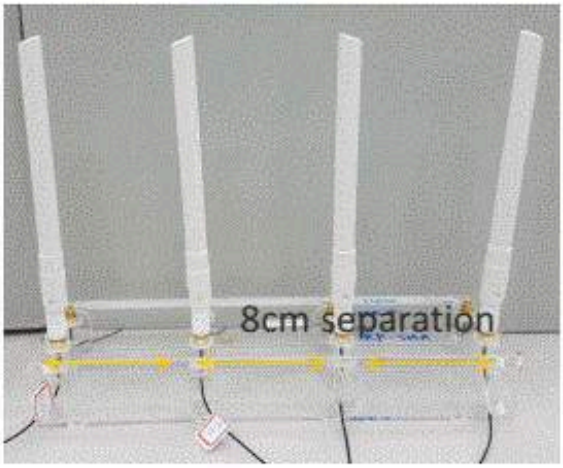
1. Keep antennas and the RF cable away from noise source . Do not route RF cable crossing over the high speed traces . (DDR, HDMI, USB 3.0, SATA)

2. Keep the embedded antenna away from metal components as far as possible, like the metal plate and metal case .

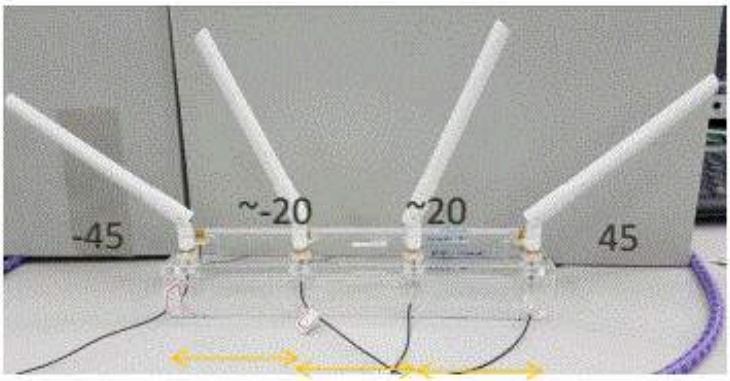
3. Do not route RF cable around the embedded antenna and interfere the radiated pattern of antenna.

Antenna Placement— Isolation Test

Vertical , (0 degree)



20,45 degree tilted



8cm separation

根據天線的隔離度測試, 建議間距 :

1. 天線直立(vertical)排成一直線,間距8cm , 5GHz band天線隔離度已足夠 (>25dB) .
2. 對2.4GHz band而言,間距12cm以上隔離度可以大於25dB .

[Reference] 8cm Separations (2.4 GHz Band)

	Vertical dipole			Slant dipole		
	Whayu 2dBi	Masterwave 4dBi	AC87 4dBi	Whayu 2dBi– 傾斜 20,45	Masterwave 4dBi – 傾斜 20,45	AC87 4dBi– 傾斜 20,45
S01	18	19	17	22.7	23	22.8
S02	26.9	25	24	31	29	56
S03	24.8	27	25.4	35	31.5	52.5
S12	19.1	21.9	17.9	22.5	28	30
S13	24.7	24.3	26	29	30	38
S23	19	17.3	16.7	22.5	23	23.6

[Vertical dipole ,8cm distance]
2.4GHz Band:
1-2 dB sensitivity loss

[Reference] 8cm Separations (5 GHz Band)

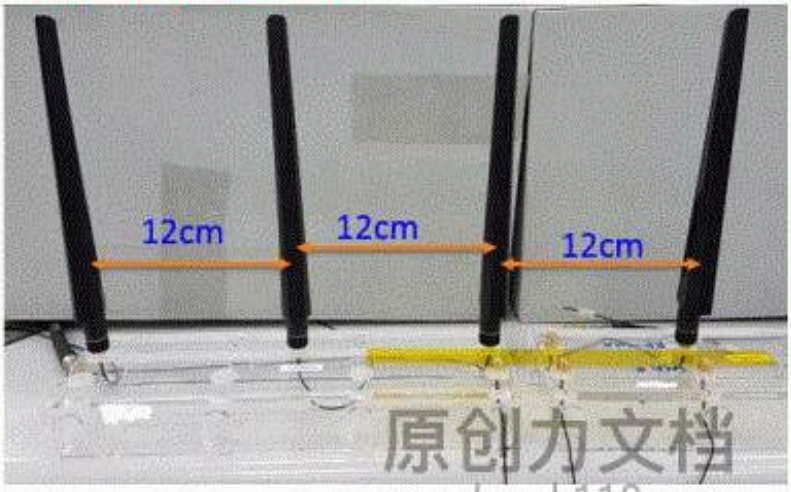
	Whayu 2dBi	Masterwave 4dBi	AC87 4dBi	Whayu 2dBi– 傾斜 22,45	Masterwave 4dBi – 傾斜 22,45	AC87 4dBi– 傾斜 22,45
S01	27	27	26.7	29	46	26.7
S02	40	34	30	37	42	49
S03	34	40	35	49	49.5	51.7
S12	27	28	27	32	30	40
S13	34	34	32	39	40	45
S23	28	27	27	30.8	28	33

Isolations of 5GHz band is good .

[Reference] 12 cm Separations(2.4 GHz Band)

	Whayu 2dBi	Masterwave 4dBi	AC87 4dBi
S01	25	25	22-24
S02	31	29.8	28.5
S03	36	35	27.5
S12	27	36	23.7
S13	33	31	27
S23	28	27	23.5

Vertical dipole
Isolation >25dB



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Appendix

[DBDC] OUT-BAND REJECTION

[DBDC] Maximum Allowed Cross-band Interference Power at chip-in

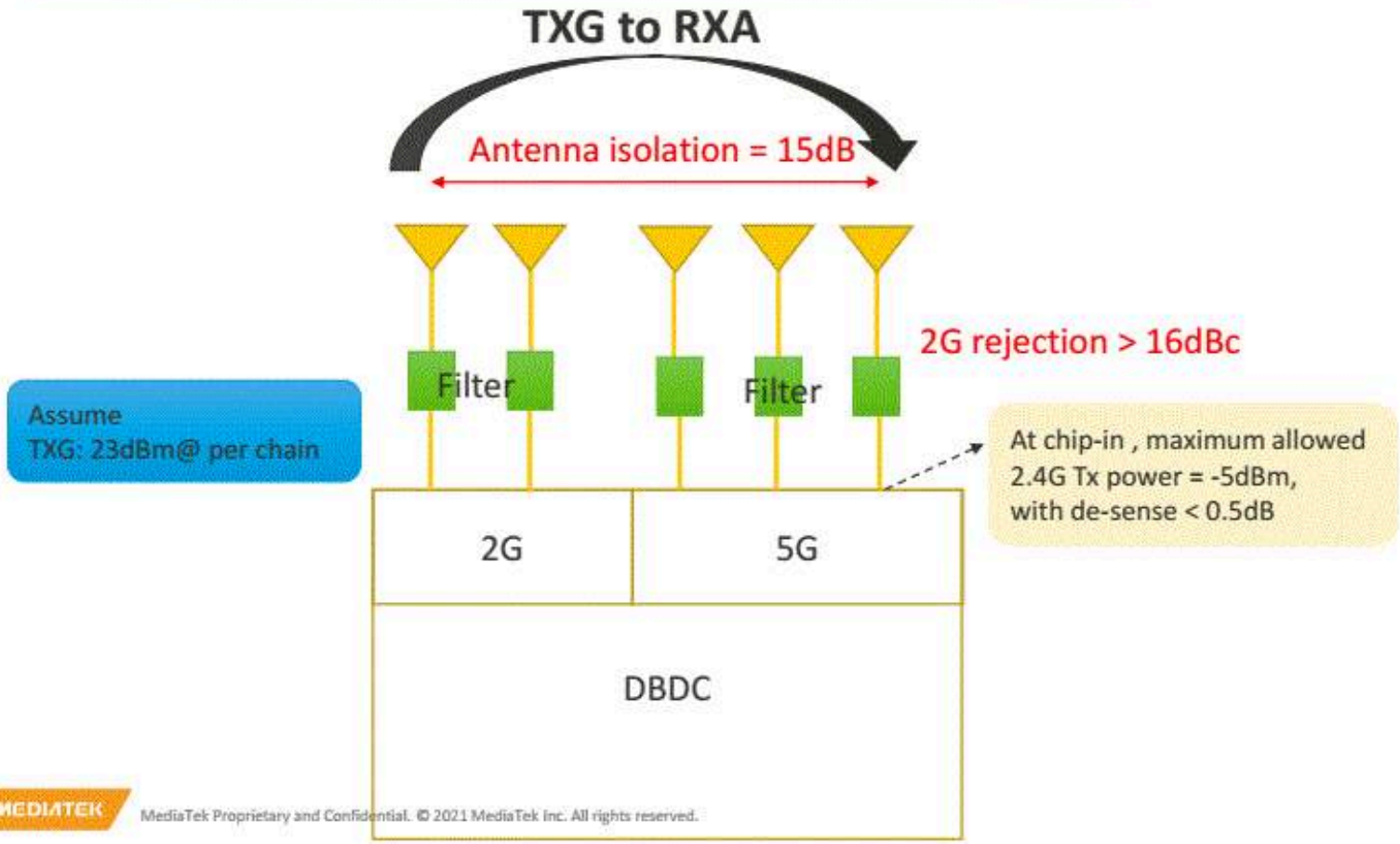
To make de-sense as less as possible ,

- At 5GHz RX port,
  - Maximum allowed input 2.4GHz power <-5dBm , with de-sense < 0.5dB
- At 2.4GHz RX port,
  - Maximum allowed input 5G Tx power < 6dBm , with de-sense<0.5dB

- Out-band rejection depends on the TX power of out-band .
  - The more TX power of out-band is , The higher out-band rejection is .
    - Out-band rejection : [the band rejection of filter] + [cross-band antenna isolation]

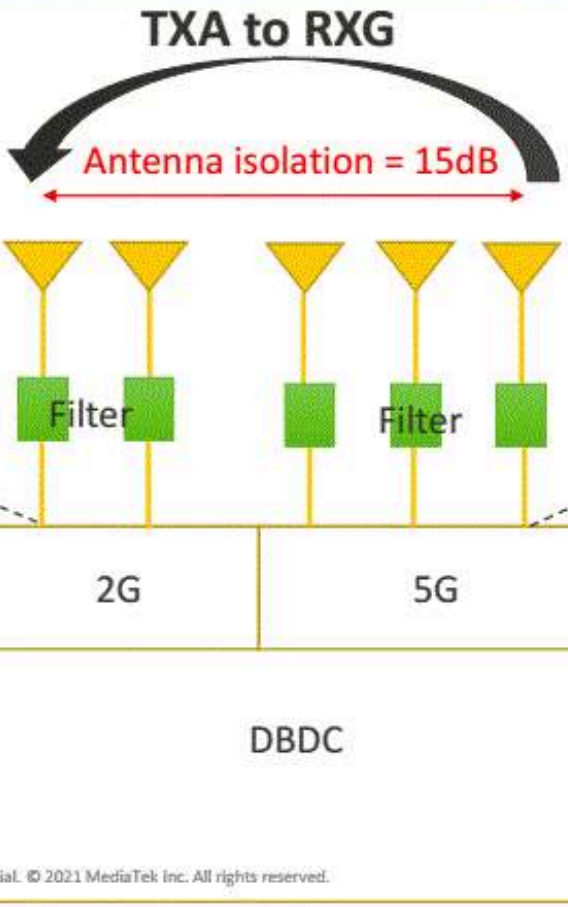
DBDC Cross-Band Rejection

➢Assume the antenna isolation of cross-band is 15dB , the out-band rejection of 5G-port needs to be 16dBc more in 2.4GHz band . (Assume Antenna gain =0 & without BF)



DBDC Cross-Band Rejection

➢Assume the antenna isolation of cross-band is 15dB, the out-band rejection of 2.4G-port needs to be 5dBc more in 5GHz band. (Assume Antenna gain =0 & without BF)



5G rejection > 5dBc

At chip-in , maximum allowed 5G Tx power = 6dBm, with de-sense < 0.5dB

Assume TXA: 23dBm@ per chain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