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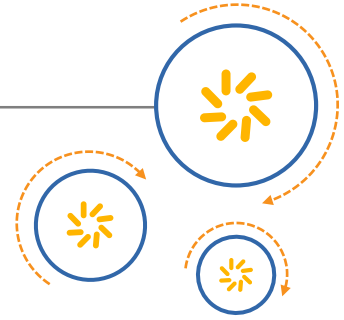
IPQ4019/IPQ4029 AP.DK04 PSGMII Interference at 2.4 GHz

Application Note

80-Y9700-12 Rev. A

December 10, 2015

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

Revision history

Revision	Date	Description
A	December 2015	Initial release

Contents

Figures

1 Introduction

1.1 Purpose

This document is intended to serve as a guide to engineer developers, describing how to solve the PSGMII interference at Wi-Fi 2.4 GHz of IPQ4019/IPQ4029 AP DK04.

1.2 Scope

This document is intended for customers who want to use IPQ4019/IPQ4029 AP DK04, and familiar with the QCA8072/QCA8075.

2 Summary

Interference can be created by PSGMII from 2.4-2.5 GHz that is 802.11b/g/n operating band. Figure 2-1 shows the spur at 2.4375 GHz is large and it will affect the sensitivity especially in channel 5/6/7. With this 2.4375 GHz spur, the Noise Floor (NF) in channel 5/6/7 will be worse than in other channels.

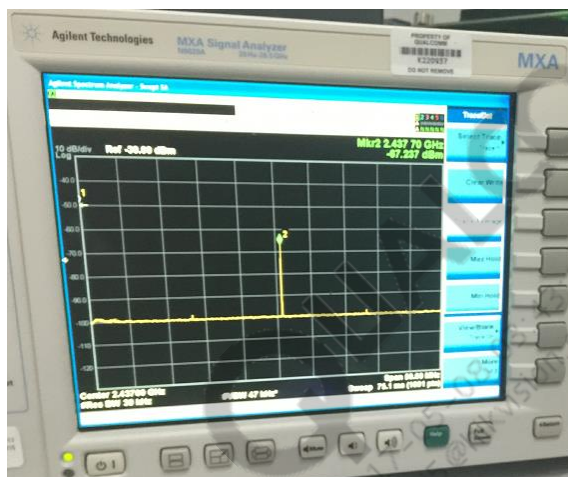Figure 2-1 shows the 2.4375 GHz spur level on spectrum.

Figure 2-1 Spur level at 2.4375 GHz

Below is the snapshot of the NF elevation after completed enclosure assembly. NF is higher in channel 5/6.

NOTE: "48" represents NF > -50 dBm.

3 Solution

NF can be improved by following the steps:

1. Reduce PSGMII Tx amplitude to 280 mV. Configure the registers as follows:

```
#devmem2 0x98288 w 0x8380
#ssdk_sh
#debug phy set 5 0xb 0x8a
#q
```

2. Adjust the yellow highlight capacitor values by using 4.7 pF to filter 2.4375 GHz. The capacitors are the power supply bypass capacitors of QCA8072/QCA8075 (near QCA8072/QCA8075 PSGMII Tx), and can improve QCA8072/QCA8075 PSGMII Tx coupling issue (coupling to adjacent power net).

C201/C15/C210/C213/C222/C217/C226/C225/C435/C437/C204 = 4.7 pF (0201)

3. Adjust the yellow highlight capacitor value by using 4.7 pF to filter 2.4375 GHz. The capacitors are the power supply bypass capacitors of IPQ4019/IPQ4029 (near IPQ4019/IPQ4029 PSGMII Tx), and can improve IPQ4019/IPQ4029 PSGMII Tx coupling issue (coupling to adjacent power net).

C229/C452/C232/C234/C445/C442/C447/C440/C448/C241/C252/C450 = 4.7 pF (0201)
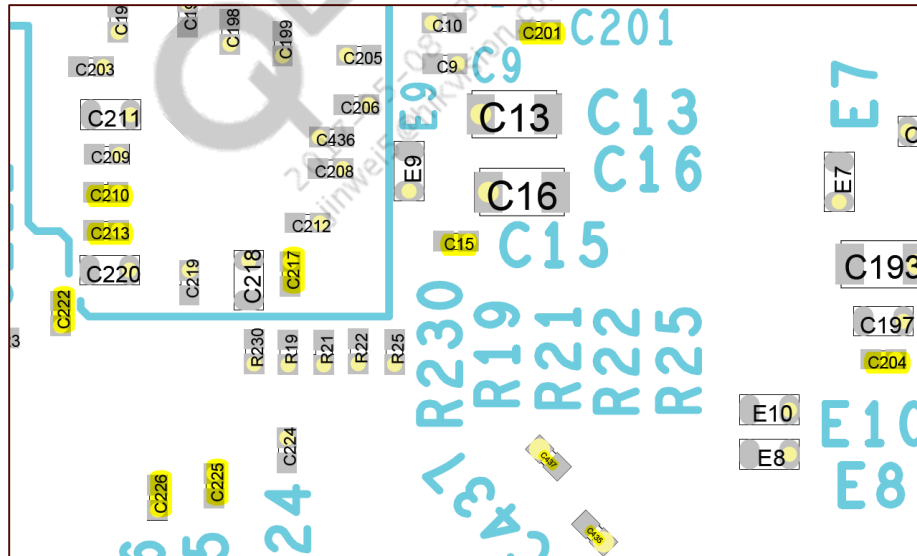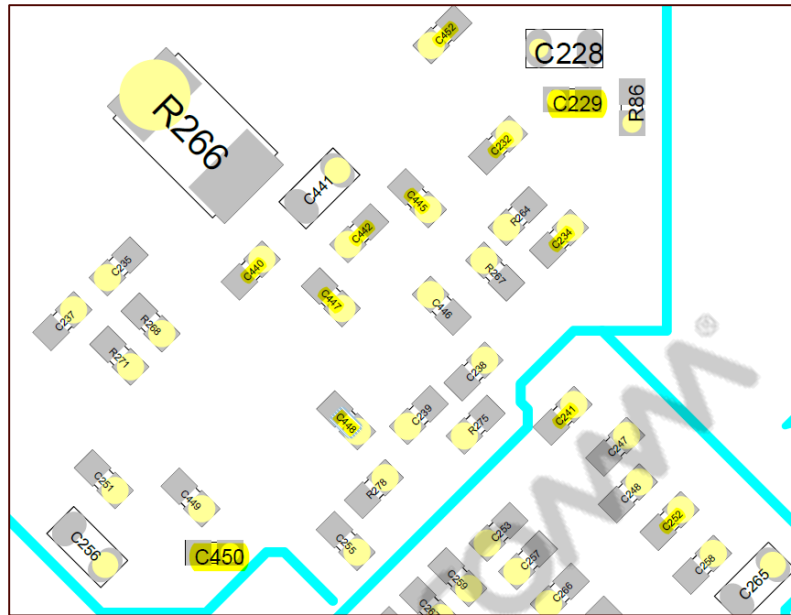
4. Add 4.7 pF capacitor on CLK_25M_O/Sys_Rst_L_Malibu/GPIO44 to improve coupling for adjacent GPIOs issue.

C17/C22/C949 = 4.7 pF (0201)
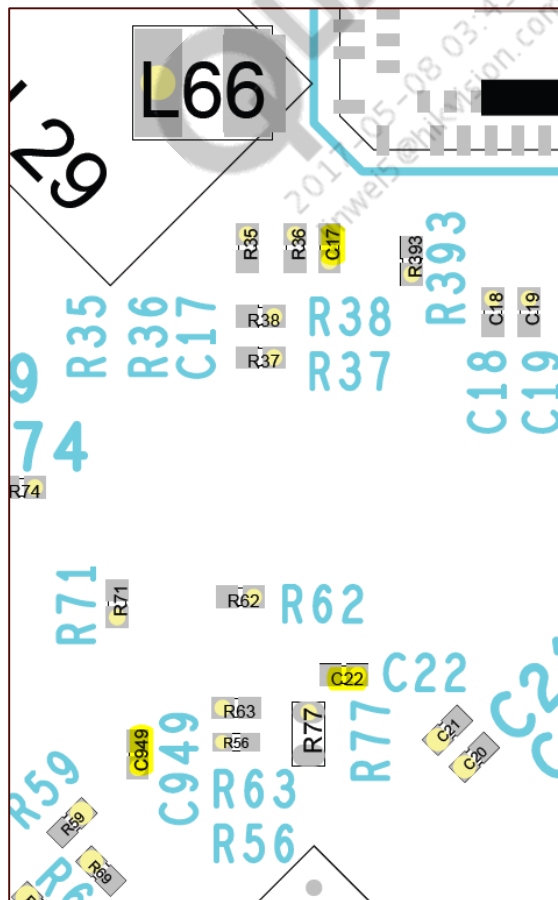
5.　Connect head sink to board GND.
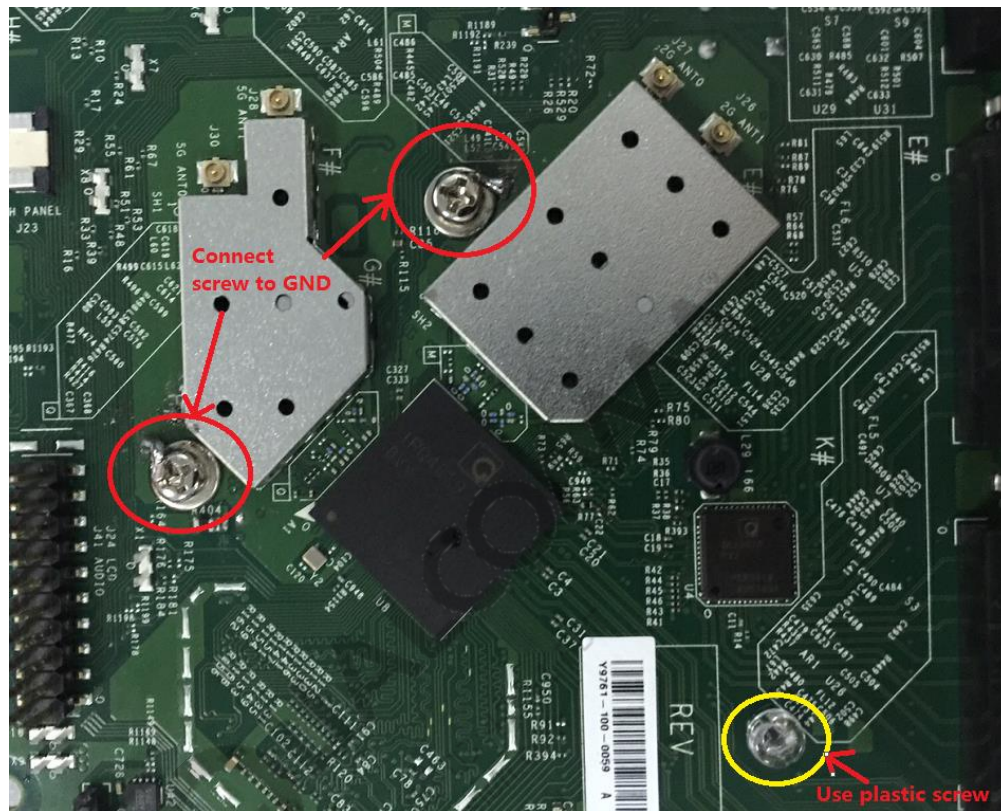
4 Improvement

The usable NF can be get by reducing the 2.4375 GHz spur level after all the rework in 3.

The position of antenna cannot affect the NF.

Adjust the direction of antenna to obtain the following results.

Case 1

```
The number of channels scanned for acs report is:  11
Channel | BSS  | minrssi | maxrssi | NF | Ch load | spect load | sec_chan
-------------------------------------------------------------------------
2412(  1)    0        0        0   -100      1           0           0
2417(  2)    0        0        0   -100      1           0           0
2422(  3)    0        0        0   -100      1           0           0
2427(  4)    0        0        0   -101      1           0           0
2432(  5)    0        0        0    -98      3           0           0
2437(  6)    0        0        0    -99      1           0           0
2442(  7)    0        0        0    -98      4           0           0
2447(  8)    0        0        0   -102      0           0           0
2452(  9)    0        0        0   -102      1           0           0
2457( 10)    0        0        0   -103      1           0           0
2462( 11)    0        0        0   -103      1           0           0
root@OpenWrt:/# wifitool ath1 acsreport
The number of channels scanned for acs report is:  24
```

Case 2

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```
The number of channels scanned for acs report is:  11
Channel | BSS  | minrssi | maxrssi | NF | Ch load | spect load | sec_chan
-----------------------------------------------------------------------
2412 (  1)     0         0         0    -99        1           0          0
2417 (  2)     0         0         0    -99        1           0          0
2422 (  3)     0         0         0    -100       1           0          0
2427 (  4)     0         0         0    -100       1           0          0
2432 (  5)     0         0         0    -98        5           0          0
2437 (  6)     0         0         0    -99        1           0          0
2442 (  7)     0         0         0    -97        1           0          0
2447 (  8)     0         0         0    -102       1           0          0
2452 (  9)     0         0         0    -102       1           0          0
2457 ( 10)     0         0         0    -102       1           0          0
2462 ( 11)     0         0         0    -103       1           0          0
root@OpenWrt:/# wifitool ath1 acsreport
```
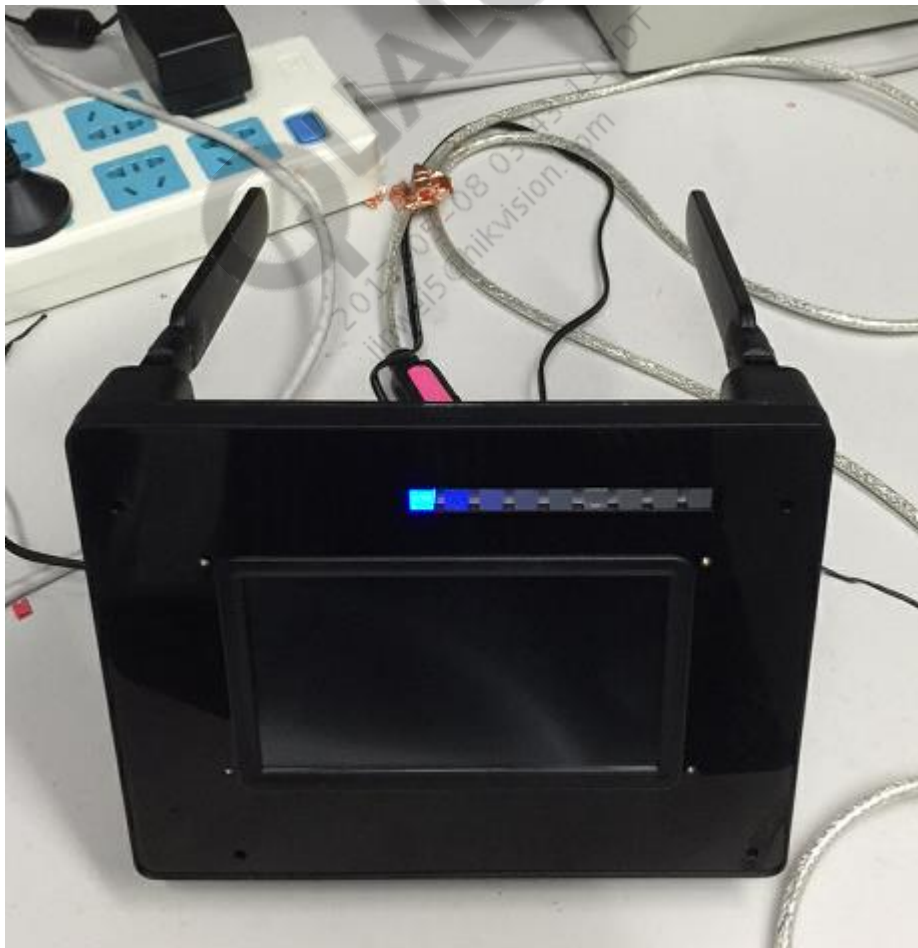
Case 3

```
The number of channels scanned for acs report is:  11
Channel | BSS  | minrssi | maxrssi | NF  | Ch load | spect load | sec_chan
---------------------------------------------------------------------------
2412(  1)    0        0         0       -96      2           0            0
2417(  2)    0        0         0       -98      2           0            0
2422(  3)    0        0         0       -98      2           0            0
2427(  4)    0        0         0      -100      2           0            0
2432(  5)    0        0         0       -97      4           0            0
2437(  6)    0        0         0       -98      1           0            0
2442(  7)    0        0         0       -96      1           0            0
2447(  8)    0        0         0      -101      1           0            0
2452(  9)    0        0         0      -101      2           0            0
2457( 10)    0        0         0      -101      1           0            0
2462( 11)    0        0         0      -102      5           0            0
root@OpenWrt:/# wifitool ath1 acsreport
```

Case 4

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```
The number of channels scanned for acs report is:  11
Channel | BSS  | minrssi | maxrssi | NF  | Ch load | spect load | sec_chan
-------------------------------------------------------------------------
2412(  1)    0         0         0   -100      1          0           0
2417(  2)    0         0         0   -101      1          0           0
2422(  3)    0         0         0   -101      1          0           0
2427(  4)    0         0         0   -102      1          0           0
2432(  5)    0         0         0    -99      4          0           0
2437(  6)    0         0         0   -100      1          0           0
2442(  7)    0         0         0    -98      3          0           0
2447(  8)    0         0         0   -103      1          0           0
2452(  9)    0         0         0   -103      1          0           0
2457( 10)    0         0         0   -103      1          0           0
2462( 11)    0         0         0   -103      1          0           0
root@OpenWrt:/# wifitool ath1 acsreport
```

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