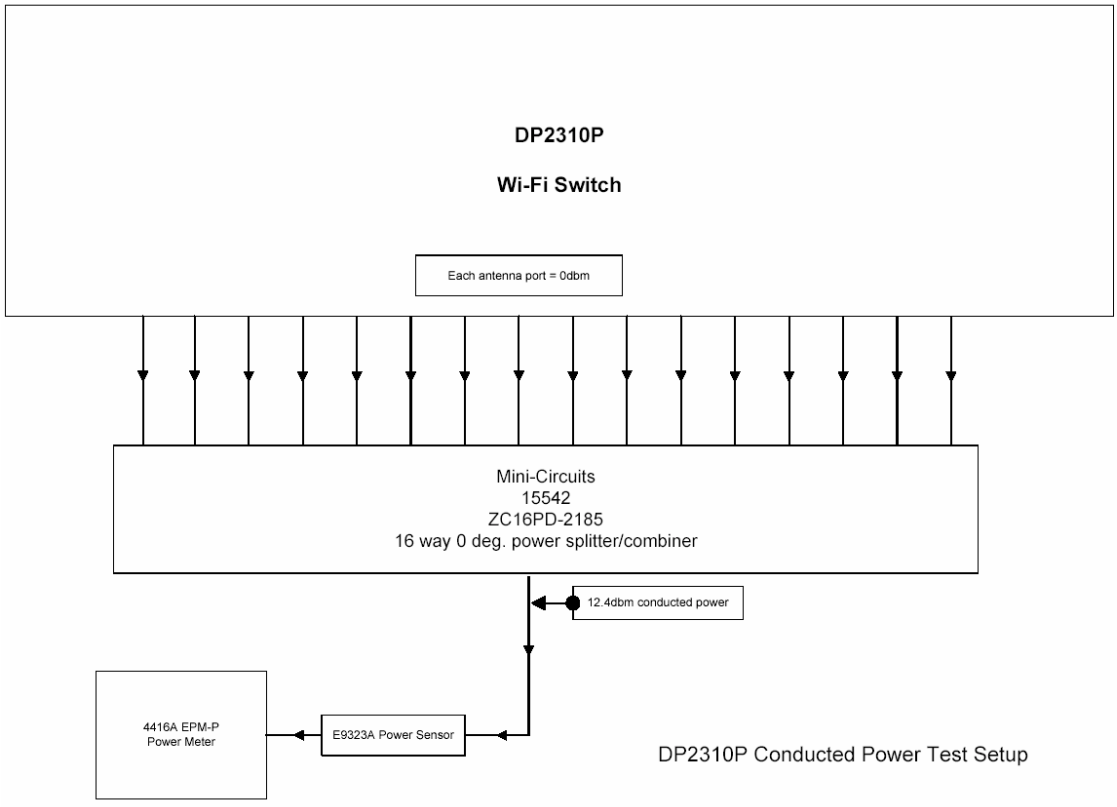
1 Power Output - §15.247(b)

1.1 Power Output Test Procedure

The peak conducted output power of the EUT was measured using an Agilent 4416A EPM-P Series Power Meter with an E9323A Peak and Average Power Sensor. In order to measure the total conducted RF power from the EUT's 16 ports, a 16 input/1 output port-calibrated combiner was connected between the EUT and the power meter. In addition, the power outputs of all the ports were measured and are listed in Table 1-2. Total power was measured by setting the EUT to 0 degree steering mode, -48 degree steering mode and +48 degree steering mode and recording the corresponding power meter values. These readings were then corrected by adding the combiner loss in order to obtain the final total conducted power. The results for these measurements are listed in the table below.



DP2310P Conducted Power Test Setup

The 0 degree steering mode, -48 degree steering mode and +48 degree steering mode were investigated and tested. The values listed in the table represent the maximum conducted power output possible for the 0 degree steering mode. The worst case power values for Channels 1, 6 and 11 in the 1 MBPS, 2 MBPS, 5.5 MBPS and 11 MBPS are included for 0 degree steering mode at a duty cycle greater than 75 percent. Test Equipment used for testing is listed in Table 1-3 below.

Note: The measurement above with the power meter and sensor was verified using the Substitution Power Measurement Method with a signal generator, power meter, diode detector, and an oscilloscope.

1.2 Calibration Procedure for Combiner and Cable

The 16 ports of the EUT were connected via SMA cables of equal lengths and type to a combiner in order to measure the RF conducted output power. The power listed in the table represents the power at the output of the combiner with all ports driving the combiner. All cables were calibrated to determine the cable loss at the investigated frequency as mentioned below:

- Each SMA cable was calibrated with a signal generator and spectrum analyzer and a reference cable
- The loss between each individual input with respect to the output port was determined by loading the other 15 ports and injecting a signal with a known amplitude (using a reference cable). The reading of the amplitude at the spectrum analyzer determines the loss of the combiner for the port investigated.

The losses were similar for all the ports and were only frequency dependent. The power outputs were checked at each of the 16 antenna ports and were measured with the power meter connected directly to the port.

1.3 Total Power Output Test Data

The data in the table below is used to verify the combined EUT output power. When the16 ports of the EUT were set to 0dBm the combined output power using 10log16 equates to 12.4 dBm.

EXAMPLE: Table 1-1
CH: 1
Mode: 11 MBPS
16-port combiner output power: 10 dBm
Cable loss and combiner insertion loss: 2.4dB
Total output power: 12.4 dBm

The total output power was measured at the output of the 16-port combiner using a power meter and sensor at 10dBm. The combiner insertion and cable loss for each port was measured at 2.4 dB. The resulting combined power equates to 12.4 dBm.

Operating Frequency(MHz): 2412, 2437 & 2462
Channel: 1, 6 & 11
Measured Conducted Power. (dBm): See below

Table 1-1: Power Output Test Data (0 degree steering mode)

Data Rate (MBPS)	Channel 1			Channel 6			Channel 11		
	Power at the Combiner (dBm)	Combiner Loss+ Cable Loss (dB)	Power Level Corrected (dBm)	Power at the Combiner (dBm)	Combiner Loss+ Cable Loss (dB)	Power Level Corrected (dBm)	Power at the Combiner (dBm)	Combiner Loss+ Cable Loss (dB)	Power Level Corrected (dBm)
1	9.8	2.4	12.2	8.7	2.0	10.7	9.4	2.5	11.9
2	9.9	2.4	12.3	8.7	2.0	10.7	9.4	2.5	11.9
5.5	9.9	2.4	12.3	8.7	2.0	10.7	9.3	2.5	11.8
11	10.0	2.4	12.4	8.7	2.0	10.7	9.5	2.5	12.0

Measurement accuracy is +/- 0.5 dB

1.4 Power Output at the Ports Test Data

The output power was measured at the output at each of the individual16-ports using a power meter and sensor. The data rate was set at 11Mbs. The values reported below represent the output power at each port (in dBm). To evaluate the total power value, the power outputs have to be converted in linear scale, added and then reconverted in logarithmic scale.

Table 1-2: Power Output Test Data (0 degree steering mode)

	Port Number																Calculated Total Power (dBm)
Channel	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	-0.2	-0.1	-0.3	0.0	0.0	0.0	-0.2	-0.1	0.0	0.0	-0.5	0.0	-0.1	-0.6	-0.5	-0.5	11.9
6	-0.3	-0.4	-0.7	-0.2	0.1	0.0	-0.8	0.0	-0.5	-0.5	-0.7	-0.6	-0.7	-0.9	-0.5	-0.5	11.6
11	0.1	-0.6	-0.3	-0.3	0.0	0.2	-0.1	-0.1	-0.3	0.9	-0.3	-0.1	0.0	-0.9	-0.5	-0.3	11.9

Measurement accuracy is +/- 0.5 dB

1.5 Conclusion

It is not to be expected that the results of the total power measurement using the combiner method and those of the calculated total power through port summation would be the same, nonetheless it is expected that the values would be close. Since the total power using the combiner method provides the worst case measurement, it is used for MPE estimation.

1.6 Test Equipment used for Testing

Table 1-3: Test Equipment Used for Testing (Conducted RF Output)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
901186	Agilent Technologies	E9323A (50MHz-6GHz)	Peak & Average Power Sensor	US40410380
901184	Agilent Technologies	E4416A	EPM-P Power Meter, single channel	GB41050573
N/A	Mini-Circuits	ZC16PD-2185	Power Splitter/Combiner	N/A
901142	Hewlett Packard	HP8660C	Synthesized Signal Generator (9KHZ-3200MHZ)	1947A02956
901263	Agilent Technologies	.01-12 GHZ	SMA Detector	2936A05505
900561	Tektronix	TDS540B	Oscilloscope	B020129
900931	Hewlett Packard	8566B	Spectrum Analyzer (100Hz – 22 GHz)	3138A07771

Test Personnel:

Rachid Sehb		08/05/02
Test Technician/Engineer	Signature	Date Of Test