

INTERTEK TESTING SERVICES

Radio Frequency Radiation Exposure, FCC Rule 15.247(i):

The EUT is a HUAWEI Ascend Y 101;
HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone.

According to the DA 00-705 and KDB 447498,

The power thresholds for source-based time-averaging conducted output power (in the worst-case duty cycle of 2DH1 of $\pi/4$ -DQPSK modulation type)

$$= 4.54 * (T_{on} / (T_{on} + T_{off})) \text{ mW}$$

$$< 4.54 \text{ mW, since } (T_{on} / (T_{on} + T_{off})) < 1$$

The power thresholds for source-based time-averaging radiated output power (The worst-case radiated emission is 101.2dB μ V/m at 3m in $\pi/4$ -DQPSK modulation type)

$$= [(FS * D)^2 / 30] * (T_{on} / (T_{on} + T_{off})) \text{ mW}$$

$$= 3.95 * (T_{on} / (T_{on} + T_{off})) \text{ mW}$$

$$< 3.95 \text{ mW, since } (T_{on} / (T_{on} + T_{off})) < 1$$

And SAR Low Threshold Level:

$$60/f \text{ (GHz)} = 60/2.45$$

$$= 24.5 \text{ mW}$$

$$= 13.9 \text{ dBm}$$

Since the source-based time-averaging conducted output power and radiated output power is well below the SAR low threshold level, so the EUT is considered to comply with SAR requirement without testing.

Table 11-1: The peak conducted power for WiFi

802.11b (dBm)

Channel\data rate	1Mbps	2Mbps	5.5Mbps	11Mbps
1	18.36	18.34	18.29	18.36
6	18.53	18.51	18.52	18.43
11	18.86	18.82	18.80	18.86

802.11g (dBm)

Channel\data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
1	20.09	20.01	19.95	19.82	19.80	19.74	19.90	19.81
6	20.20	20.16	20.01	19.87	19.92	19.85	19.66	19.78
11	20.42	20.40	20.38	20.26	20.24	20.35	20.39	20.19

20M 802.11n (dBm)

Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
1	11.93	11.86	11.82	11.73	11.92	11.52	11.23	11.20
6	12.30	12.06	12.10	11.94	11.91	11.84	11.81	11.70
11	12.67	12.60	12.54	12.42	12.30	12.24	12.56	12.06

Table 11-2: The average conducted power for WiFi

802.11b (dBm)

Channel\data rate	1Mbps	2Mbps	5.5Mbps	11Mbps
1	14.36	14.25	14.27	14.35
6	14.35	14.34	14.33	14.25
11	14.25	14.20	14.24	14.23

802.11g (dBm)

Channel\data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
1	12.39	12.25	12.32	12.20	12.46	12.33	12.16	12.14
6	12.86	12.57	12.34	12.56	12.25	12.33	12.40	12.13
11	12.94	12.82	12.56	12.57	12.64	12.35	12.40	12.33

20M 802.11n (dBm)

Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
1	5.25	5.16	5.24	5.30	5.22	5.10	5.13	5.20
6	5.35	5.23	5.26	5.31	5.24	5.20	5.13	5.06
11	5.33	5.16	5.20	5.03	4.92	4.35	4.96	4.83

According to the above WiFi average power, WiFi 802.11b SAR should be tested in the lowest rate, high channel. SAR is not required for 802.11n channels if the output power is less than 0.25dB higher than that measured on the corresponding 802.11b channels, and for each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 0.25dB higher than those measured at the lowest data rate. According to the above conducted power, the EUT should be tested for “802.11b, 1Mbps, channel 11”. The head and body SAR tests of 802.11g are according to the maximum SAR values in the test mode of 802.11b situation.

13 Simultaneous TX SAR Considerations

13.1 Introduction

The following procedures adopted from “FCC SAR Considerations for Cell Phones with Multiple Transmitters” are applicable to handsets with built-in unlicensed transmitters such as 802.11 a/b/g and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

For this device,

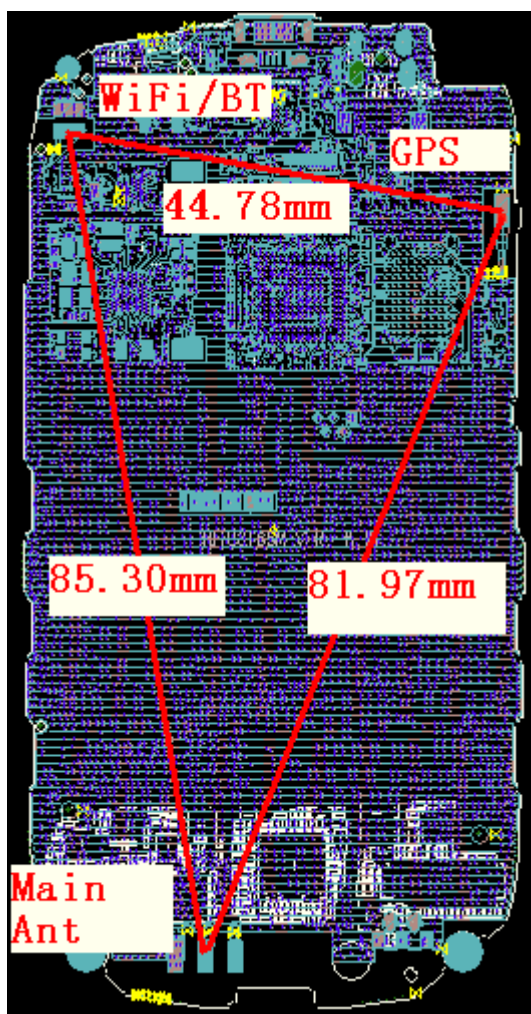
13.2 Transmit Antenna Separation Distances

The distance between BT/WiFi antenna and main antenna is $>5\text{cm}$. The location of the antennas inside mobile phone is shown below:

ANSI C95.1 - 1999, IEEE 1528 - 2003, OET Bulletin 65 (Edition 97-01)

Equipment: HUAWEI U8186-5/U8186-5

REPORT NO.: I12GW7125-FCC-SAR



Picture 20: Antenna Locations

	TOP	BOTTOM	LEFT	RIGHT
GPS ANT distance	77mm	6mm	1.2mm	42mm
WIFI ANT distance	10mm	72mm	46mm	0.5mm
MAIN ANT distance	95mm	0.8mm	1.0mm	1.2mm

13.3 Simultaneous Transmission for (EUT Model Name)

Table 12-1: Summary of Transmitters

Band/Mode	F(GHz)	60/f power threshold (mW)	RF output power (mW)
Bluetooth	2.441	24.6	4.54
2.4GHz WLAN 802.11 b/g	2.45	24.5	110.15

According to the conducted power measurement result, we can draw the conclusion that: stand-alone SAR and simultaneous transmission SAR for Bluetooth should not be performed. Stand-alone SAR for WiFi should be performed. Then, simultaneous transmission SAR for WiFi is considered with measurement results of GSM and WiFi.

Table 12-2 SAR Evaluation Requirements for Multiple Transmitter Handsets

	Individual Transmitter	Simultaneous Transmission
Licensed Transmitters	<u>Routine evaluation required</u>	<u>SAR not required:</u>
Unlicensed Transmitters	<u>When there is no simultaneous transmission –</u> - output ≤ 60/f: SAR not required - output > 60/f: stand-alone SAR required <u>When there is simultaneous transmission –</u> <u>Stand-alone SAR not required when</u> - output $\leq 2 \cdot P_{Ref}$ and antenna is ≥ 5.0 cm from other antennas - output $\leq P_{Ref}$ and antenna is ≥ 2.5 cm from other antennas - output $\leq P_{Ref}$ and antenna is < 2.5 cm from other antennas, each with either output power $\leq P_{Ref}$ or 1-g SAR < 1.2 W/kg <u>Otherwise stand-alone SAR is required</u> <u>When stand-alone SAR is required</u> - test SAR on highest output channel for each wireless mode and exposure condition - if SAR for highest output channel is $> 50\%$ of SAR limit, evaluate all channels according to normal procedures	<u>Unlicensed only</u> - when stand-alone 1-g SAR is not required and antenna is ≥ 5 cm from other antennas <u>Licensed & Unlicensed</u> - when the sum of the 1-g SAR is < 1.6 W/kg for all simultaneous transmitting antennas - when SAR to peak location separation ratio of simultaneous transmitting antenna pair is < 0.3 <u>SAR required:</u> <u>Licensed & Unlicensed</u> antenna pairs with SAR to peak location separation ratio ≥ 0.3; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply

Table 12-3: The sum of SAR values for GSM/WCDMA and WiFi

	Position	GSM/WCDMA	WiFi	Sum
Maximum SAR value for Head(mW/g)	Left hand, Touch cheek	0.822	0.060	0.882
	Right hand, Touch cheek	1.01	0.094	1.104
Maximum SAR value for Body(mW/g)	Toward Ground	0.724	0.196	0.920

According to the above table, the sum of SAR values for 3G and WiFi antenna < 1.6 W/kg. So simultaneous transmission SAR is not required.