

MAXIMUM PERMISSIBLE EXPOSURE (MPE)

15.1 Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-15000	/	/	1.0	30

F = frequency in MHz

* = Plane-wave equipment power density

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

台灣檢驗科技股份有限公司

No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號

t (886-2) 2299-3279

f (886-2) 2298-0488

www.tw.sgs.com

Member of SGS Group

802.11a Max. output power

802.11a_MIMO

CH	Frequency (MHz)	Data Rate	AVERAGE POWER (dBm)				TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1	CH 2	CH 3				
36	5180	MCS24	15.61	15.44	15.66	15.81	21.65	146.306	23.98	PASS
44	5220	MCS24	17.87	17.55	17.75	18.13	23.85	242.700	23.98	PASS
48	5240	MCS24	15.82	15.73	15.76	16.09	21.87	153.920	23.98	PASS
149	5745	MCS24	18.31	18.08	18.72	19.14	24.60	288.541	30	PASS
157	5785	MCS24	18.42	18.11	17.94	19.65	24.60	288.704	30	PASS
165	5825	MCS24	18.50	18.42	18.86	19.76	24.94	311.834	30	PASS

MPE Prediction (802.11a 5150~5250)

Max. output power including tune-up tolerancel:	23.85	(dBm)
Max. output power including tune-up tolerancel:	242.66101	(mW)
Duty cycle:	99.99	(%)
Maximum Pav :	242.63674	(mW)
Peak Antenna gain (Maximum):	5.15	(dBi)
Peak Antenna gain (linear):	3.2734069	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5220	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.158	(mW/cm ²)
Measurement Result		
The predicted power density level at 20 cm is 0.158 mW/cm ² .		
This is below the uncontrolled exposure limit of 1 mW/cm ² at 5220MHz.		

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號

台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.tw.sgs.com

Member of SGS Group

MPE Prediction (802.11a 5725~5850)

Max. output power including tune-up tolerancel:	24.94	(dBm)
Max. output power including tune-up tolerancel:	311.88896	(mW)
Duty cycle:	99.99	(%)
Maximum Pav :	311.85777	(mW)
Peak Antenna gain (Maximum):	5.22	(dBi)
Peak Antenna gain (linear):	3.3265955	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5825	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.206	(mW/cm ²)
Measurement Result		
The predicted power density level at 20 cm is 0.206 mW/cm ² .		
This is below the uncontrolled exposure limit of 1 mW/cm ² at 5825MHz.		

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

台灣檢驗科技股份有限公司

No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號

t (886-2) 2299-3279

f (886-2) 2298-0488

www.tw.sgs.com

Member of SGS Group

802.11n_HT20M Max. output power

802.11n_HT20_MIMO

CH	Frequency (MHz)	Data Rate	AVERAGE POWER (dBm)				TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1	CH 2	CH3				
36	5180	MCS24	15.65	15.47	15.67	15.88	21.69	147.589	23.98	PASS
44	5220	MCS24	17.70	17.40	17.25	17.97	23.61	229.588	23.98	PASS
48	5240	MCS24	15.84	15.25	15.10	16.26	21.66	146.493	23.98	PASS
149	5745	MCS24	20.37	20.08	19.89	21.26	26.45	441.911	30	PASS
157	5785	MCS24	20.01	19.4	19.21	20.27	25.76	377.109	30	PASS
165	5825	MCS24	19.85	19.77	20.25	20.97	26.26	422.398	30	PASS

MPE Prediction (802.11n_HT20 5150~5250)

MIMO gain= $G+(10 \log N)= 5.15+3.01= 8.16\text{dBm}$

Max. output power including tune-up tolerancel:	23.61	(dBm)
Max. output power including tune-up tolerancel:	229.61486	(mW)
Duty cycle:	99.99	(%)
Maximum Pav :	229.5919	(mW)
Peak Antenna gain (Maximum):	8.16	(dBi)
Peak Antenna gain (linear):	6.5463617	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5220	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.299	(mW/cm ²)
Measurement Result		
The predicted power density level at 20 cm is 0.299 mW/cm ² .		
This is below the uncontrolled exposure limit of 1 mW/cm ² at 5220MHz.		

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

台灣檢驗科技股份有限公司

No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號

t (886-2) 2299-3279

f (886-2) 2298-0488

www.tw.sgs.com

Member of SGS Group

MPE Prediction (802.11n_HT20 5725~5850)

MIMO gain= $G+(10 \log N)= 5.22+3.01= 8.23\text{dBm}$

Max. output power including tune-up tolerancel:	26.45	(dBm)
Max. output power including tune-up tolerancel:	441.57045	(mW)
Duty cycle:	99.99	(%)
Maximum Pav :	441.52629	(mW)
Peak Antenna gain (Maximum):	8.23	(dBi)
Peak Antenna gain (linear):	6.6527316	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5745	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.585	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.585 mW/cm².

This is below the uncontrolled exposure limit of 1 mW/cm² at 5745MHz.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

台灣檢驗科技股份有限公司

No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號

t (886-2) 2299-3279

f (886-2) 2298-0488

www.tw.sgs.com

Member of SGS Group

802.11n_HT40M Max. output power

802.11n_HT40_MIMO

CH	Frequency (MHz)	Data Rate	AVERAGE POWER (dBm)				TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1	CH 2	CH 3				
38	5190	MCS24	12.91	12.65	13.01	13.41	19.02	79.878	23.98	PASS
46	5230	MCS24	12.97	13.05	12.44	13.45	19.01	79.669	23.98	PASS
151	5755	MCS24	19.52	18.66	18.7	19.81	25.22	332.838	30	PASS
159	5795	MCS24	18.65	19.35	18.32	19.2	24.92	310.479	30	PASS

MPE Prediction (802.11n_HT40 5150~5250)

MIMO gain= $G+(10 \log N)= 5.15+3.01= 8.16\text{dBm}$

Max. output power including tune-up tolerancel:	19.02	(dBm)
Max. output power including tune-up tolerancel:	79.799469	(mW)
Duty cycle:	99.99	(%)
Maximum Pav :	79.791489	(mW)
Peak Antenna gain (Maximum):	8.16	(dBi)
Peak Antenna gain (linear):	6.5463617	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5190	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.104	(mW/cm ²)
Measurement Result		
The predicted power density level at 20 cm is 0.104 mW/cm ² .		
This is below the uncontrolled exposure limit of 1 mW/cm ² at 5190MHz.		

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號

台灣檢驗科技股份有限公司

t (886-2) 2299-3279

f (886-2) 2298-0488

www.tw.sgs.com

Member of SGS Group

MPE Prediction (802.11n_HT40 5725~5850)

MIMO gain= $G+(10 \log N)= 5.22+3.01= 8.23\text{dBm}$

Average output power at antenna input terminal:	25.22	(dBm)
Average output power at antenna input terminal:	332.65955	(mW)
Duty cycle:	99.99	(%)
Maximum Pav :	332.62629	(mW)
Peak Antenna gain (Maximum):	8.23	(dBi)
Peak Antenna gain (linear):	6.6527316	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5755	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.440	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.44 mW/cm².

This is below the uncontrolled exposure limit of 1 mW/cm² at 5755MHz.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

台灣檢驗科技股份有限公司

No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號

t (886-2) 2299-3279

f (886-2) 2298-0488

www.tw.sgs.com

Member of SGS Group

802.11ac VHT80M Max. output power

802.11ac_VHT80_MIMO

CH	Frequency (MHz)	Data Rate	AVERAGE POWER (dBm)				TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1	CH 2	CH 3				
42	5210	MCS24	10.89	10.73	10.89	11.41	17.01	50.215	23.98	PASS
155	5775	MCS24	16.05	14.99	14.42	15.60	21.33	135.799	30	PASS

MPE Prediction (802.11ac_VHT80 5150~5250)

MIMO gain= $G+(10 \log N)= 5.15+3.01= 8.16\text{dBm}$

Average output power at antenna input terminal:	17.01	(dBm)
Average output power at antenna input terminal:	50.234259	(mW)
Duty cycle:	99.99	(%)
Maximum Pav :	50.229236	(mW)
Peak Antenna gain (Maximum):	8.16	(dBi)
Peak Antenna gain (linear):	6.5463617	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5210	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.065	(mW/cm ²)
Measurement Result		
The predicted power density level at 20 cm is 0.065 mW/cm ² .		
This is below the uncontrolled exposure limit of 1 mW/cm ² at 5210MHz.		

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

台灣檢驗科技股份有限公司

No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號

t (886-2) 2299-3279

f (886-2) 2298-0488

www.tw.sgs.com

Member of SGS Group

MPE Prediction (802.11ac_VHT80 5725~5850)

MIMO gain= $G+(10 \log N)= 5.22+3.01= 8.23\text{dBm}$

Average output power at antenna input terminal:	21.33	(dBm)
Average output power at antenna input terminal:	135.83134	(mW)
Duty cycle:	99.99	(%)
Maximum Pav :	135.81776	(mW)
Peak Antenna gain (Maximum):	8.23	(dBi)
Peak Antenna gain (linear):	6.6527316	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5775	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.180	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.18 mW/cm².

This is below the uncontrolled exposure limit of 1 mW/cm² at 5775MHz.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at www.sgs.com/terms_and_conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd.

台灣檢驗科技股份有限公司

No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號

t (886-2) 2299-3279

f (886-2) 2298-0488

www.tw.sgs.com

Member of SGS Group