

## 1 MAXIMUM PERMISSIBLE EXPOSURE (MPE) 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 Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	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 <sup>2</sup> )	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

## 802.11a Max. output power

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](http://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](http://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](http://www.tw.sgs.com)

Member of SGS Group

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	13.52	22.491	23.98	PASS
44	5220	<b>14.06</b>	<b>25.468</b>	23.98	PASS
48	5240	14.02	25.235	23.98	PASS
52	5260	<b>13.91</b>	<b>24.604</b>	23.98 or $11+10\log(B) = 23.20$	PASS
60	5300	13.57	22.751	23.98 or $11+10\log(B) = 23.22$	PASS
64	5320	13.87	24.378	23.98 or $11+10\log(B) = 23.22$	PASS
100	5500	<b>15.53</b>	<b>35.727</b>	23.98 or $11+10\log(B) = 23.23$	PASS
116	5580	15.23	33.343	23.98 or $11+10\log(B) = 23.22$	PASS
140	5700	14.14	25.942	23.98 or $11+10\log(B) = 23.21$	PASS

## MPE Prediction (802.11a 5150~5250)

Max. output power including tune-up tolerance:	<b>14.06</b>	(dBm)
Max. output power including tune-up tolerance:	25.468303	(mW)
Duty cycle:	<b>97</b>	(%)
Maximum Pav :	24.704253	(mW)
Peak Antenna gain (Maximum):	<b>5.6</b>	(dBi)
Peak Antenna gain (linear):	3.6307805	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	<b>5220</b>	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.018	(mW/cm <sup>2</sup> )
<b>Measurement Result</b>		
The predicted power density level at 20 cm is 0.018 mW/cm <sup>2</sup> .		
This is below the uncontrolled exposure limit of 1 mW/cm <sup>2</sup> 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](http://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](http://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.

## MPE Prediction (802.11a 5250~5350)

Average output power at antenna input terminal:	13.91	(dBm)
Average output power at antenna input terminal:	24.603676	(mW)
Duty cycle:	97	(%)
Maximum Pav :	23.865566	(mW)
Peak Antenna gain (Maximum):	5.9	(dBi)
Peak Antenna gain (linear):	3.8904514	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5260	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.018	(mW/cm <sup>2</sup> )

### Measurement Result

The predicted power density level at 20 cm is 0.018 mW/cm<sup>2</sup>.

This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 5260MHz.

## MPE Prediction (802.11a 5470~5725)

Average output power at antenna input terminal:	15.53	(dBm)
Average output power at antenna input terminal:	35.727284	(mW)
Duty cycle:	95	(%)
Maximum Pav :	33.94092	(mW)
Peak Antenna gain (Maximum):	4.7	(dBi)
Peak Antenna gain (linear):	2.9512092	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5500	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.020	(mW/cm <sup>2</sup> )

### Measurement Result

The predicted power density level at 20 cm is 0.02 mW/cm<sup>2</sup>.

This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 5500MHz.

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](http://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](http://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.

## 802.11n\_HT20M (MIMO) Max. output power

CH	Frequency (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
		CHAIN 0	CHAIN 1				
36	5180	9.78	11.7	13.86	24.297	21.37	PASS
44	5220	10.04	11.55	13.87	24.381	21.37	PASS
48	5240	10.07	11.5	13.85	24.288	21.37	PASS
52	5260	10.49	11.38	13.97	24.935	21.07 or 11+10log(B) =23.49	PASS
60	5300	9.64	10.9	13.33	21.507	21.07 or 11+10log(B) =23.48	PASS
64	5320	9.75	11.45	13.69	23.404	21.07 or 11+10log(B) =23.48	PASS
100	5500	10.54	12.03	14.36	27.283	22.27 or 11+10log(B) =23.51	PASS
116	5580	10.21	13.49	15.16	32.831	22.27 or 11+10log(B) =23.48	PASS
140	5700	8.9	13.08	14.48	28.086	22.27 or 11+10log(B) =23.48	PASS

## MPE Prediction (802.11n\_HT20 5150~5250)

MIMO gain= G+(10 logN)= 5.6+3.01= 8.61dBm

Average output power at antenna input terminal:	13.87	(dBm)		
Average output power at antenna input terminal:	24.378108	(mW)		
Duty cycle:	97	(%)		
Maximum Pav :	23.646765	(mW)		
Peak Antenna gain (Maximum):	8.61	(dBi)		
Peak Antenna gain (linear):	7.2610596	(numeric)		
Prediction distance:	20	(cm)		
Prediction frequency:	5220	(MHz)		
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )		
Power density at predication frequency at 20 (cm)	0.034	(mW/cm <sup>2</sup> )		
<b>Measurement Result</b>				
The predicted power density level at 20 cm is 0.034 mW/cm <sup>2</sup> .				
This is below the uncontrolled exposure limit of 1 mW/cm <sup>2</sup> 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](http://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](http://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.

## MPE Prediction (802.11n\_HT20 5250~5350)

**MIMO gain= G+(10 logN)= 5.9+3.01= 8.91dBm**

Average output power at antenna input terminal:	13.97	(dBm)
Average output power at antenna input terminal:	24.945947	(mW)
Duty cycle:	97	(%)
Maximum Pav :	24.197569	(mW)
Peak Antenna gain (Maximum):	8.91	(dBi)
Peak Antenna gain (linear):	7.7803655	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5260	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.037	(mW/cm <sup>2</sup> )

### Measurement Result

The predicted power density level at 20 cm is 0.037 mW/cm<sup>2</sup>.

This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 5260MHz.

## MPE Prediction (802.11n\_HT20 5470~5725)

**MIMO gain= G+(10 logN)= 4.7+3.01= 7.71dBm**

Average output power at antenna input terminal:	15.16	(dBm)
Average output power at antenna input terminal:	32.809529	(mW)
Duty cycle:	95	(%)
Maximum Pav :	31.169053	(mW)
Peak Antenna gain (Maximum):	7.71	(dBi)
Peak Antenna gain (linear):	5.9020108	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5580	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.037	(mW/cm <sup>2</sup> )

### Measurement Result

The predicted power density level at 20 cm is 0.037 mW/cm<sup>2</sup>.

This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 5580MHz.

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](http://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](http://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.

## 802.11n\_HT40M (MIMO) Max. output power

CH	Frequency (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
		CHAIN 0	CHAIN 1				
38	5190	9.14	12.27	13.99	25.069	21.37	PASS
46	5230	9.6	12.16	14.08	25.564	21.37	PASS
54	5270	9.94	11.79	13.97	24.964	21.07 or 11+10log(B) =26.59	PASS
62	5310	9.11	11.34	13.38	21.761	21.07 or 11+10log(B) =26.59	PASS
110	5550	10.04	13.00	14.78	30.045	22.27 or 11+10log(B) =26.60	PASS
134	5670	8.93	13.55	14.84	30.463	22.27 or 11+10log(B) =26.60	PASS

## MPE Prediction (802.11n\_HT40 5150~5250)

MIMO gain= G+(10 logN)=5.6+3.01= 8.61dBm

Average output power at antenna input terminal:	14.08	(dBm)
Average output power at antenna input terminal:	25.585859	(mW)
Duty cycle:	97	(%)
Maximum Pav :	24.818283	(mW)
Peak Antenna gain (Maximum):	8.61	(dBi)
Peak Antenna gain (linear):	7.2610596	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5230	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.036	(mW/cm <sup>2</sup> )

### Measurement Result

The predicted power density level at 20 cm is 0.036 mW/cm<sup>2</sup>.

This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 5230MHz.

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](http://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](http://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.

## MPE Prediction (802.11n\_HT40 5250~5350)

MIMO gain= G+(10 logN)= 5.9+3.01= 8.91dBm

Average output power at antenna input terminal:	13.97	(dBm)
Average output power at antenna input terminal:	24.945947	(mW)
Duty cycle:	97	(%)
Maximum Pav :	24.197569	(mW)
Peak Antenna gain (Maximum):	8.91	(dBi)
Peak Antenna gain (linear):	7.7803655	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5270	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.037	(mW/cm <sup>2</sup> )

**Measurement Result**  
The predicted power density level at 20 cm is 0.037 mW/cm<sup>2</sup>.  
This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 5270MHz.

## MPE Prediction (802.11n\_HT40 5470~5725)

MIMO gain= G+(10 logN)= 4.7+3.01= 7.71dBm

Average output power at antenna input terminal:	14.84	(dBm)
Average output power at antenna input terminal:	30.47895	(mW)
Duty cycle:	95	(%)
Maximum Pav :	28.955002	(mW)
Peak Antenna gain (Maximum):	7.71	(dBi)
Peak Antenna gain (linear):	5.9020108	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5670	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.034	(mW/cm <sup>2</sup> )

**Measurement Result**

The predicted power density level at 20 cm is 0.034 mW/cm<sup>2</sup>.

This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 5670MHz.

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](http://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](http://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.