

1 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 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 Permissive 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

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

Maximum Permissible Exposure (MPE) Evaluation (worst case)

802.11b Main						
CH	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit	RESULT
1	2412	1	19.25	84.14	1 Watt = 30.00 dBm	PASS
6	2437	1	19.33	85.70	1 Watt = 30.00 dBm	PASS
11	2462	1	19.41	87.30	1 Watt = 30.00 dBm	PASS
802.11b Main						
CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit	RESULT
1	2412	1	16.82	48.08	1 Watt = 30.00 dBm	PASS
6	2437	1	16.99	50.00	1 Watt = 30.00 dBm	PASS
11	2462	1	16.98	49.89	1 Watt = 30.00 dBm	PASS

MPE Prediction (802.11b 2412~2462)

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

Max. output power including tune-up tolerancel:	16.99	(dBm)
Max. output power including tune-up tolerancel:	50.003453	(mW)
Duty cycle:	98.92	(%)
Maximum Pav :	49.463416	(mW)
Peak Antenna gain (Maximum):	3.22	(dBi)
Peak Antenna gain (linear):	2.0989399	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.021	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.021 mW/cm².

This is below the uncontrolled exposure limit of 1 mW/cm² at 2437MHz.

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

Maximum Permissible Exposure (MPE) Evaluation (worst case)

802.11n_HT20M MIMO								
CH	Frequency (MHz)	Data Rate	Peak Output Power (dBm)		Total Peak Output Power (dBm)	Total Peak Output Power (mW)	Limit	RESULT
			CH 0	CH 1				
1	2412	MCS8	17.10	21.05	22.52	178.64	1 Watt = 29.77 dBm	PASS
6	2437	MCS8	17.22	21.13	22.61	182.44	1 Watt = 29.77 dBm	PASS
11	2462	MCS8	17.06	21.06	22.52	178.46	1 Watt = 29.77 dBm	PASS
802.11n_HT20M MIMO								
CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)		Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit	RESULT
			CH 0	CH 1				
1	2412	MCS8	11.20	14.18	15.95	39.36	1 Watt = 29.77 dBm	PASS
6	2437	MCS8	11.29	14.20	15.99	39.76	1 Watt = 29.77 dBm	PASS
11	2462	MCS8	11.54	14.05	15.98	39.67	1 Watt = 29.77 dBm	PASS

MPE Prediction (802.11n_HT20 2412~2462)

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

MIMO Gain: 3.22+3.01=6.23dBi

Max. output power including tune-up tolerancel:	15.99	(dBm)
Max. output power including tune-up tolerancel:	39.719155	(mW)
Duty cycle:	87.59	(%)
Maximum Pav :	34.790008	(mW)
Peak Antenna gain (Maximum):	6.23	(dBi)
Peak Antenna gain (linear):	4.1975898	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.029	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.029 mW/cm2.

This is below the uncontrolled exposure limit of 1 mW/cm2 at 2437MHz.

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

Maximum Permissible Exposure (MPE) Evaluation (worst case)

802.11n_HT40M MIMO								
CH	Frequency (MHz)	Data Rate	Peak Output Power (dBm)		Total Peak Output Power (dBm)	Total Peak Output Power (mW)	Limit	RESULT
			CH 0	CH 1				
3	2422	MCS8	18.18	21.24	22.98	198.81	1 Watt = 29.77 dBm	PASS
6	2437	MCS8	17.93	20.94	22.70	186.25	1 Watt = 29.77 dBm	PASS
9	2452	MCS8	18.06	21.11	22.86	193.10	1 Watt = 29.77 dBm	PASS
802.11n_HT40M MIMO								
CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)		Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit	RESULT
			CH 0	CH 1				
3	2422	MCS8	10.95	14.19	15.88	38.69	1 Watt = 29.77 dBm	PASS
6	2437	MCS8	11.14	14.27	15.99	39.73	1 Watt = 29.77 dBm	PASS
9	2452	MCS8	11.21	13.96	15.81	38.10	1 Watt = 29.77 dBm	PASS

MPE Prediction (802.11n_HT40 2422~2452)

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

MIMO Gain: 3.22+3.01=6.23dBi

Max. output power including tune-up tolerancel:	15.99	(dBm)
Max. output power including tune-up tolerancel:	39.719155	(mW)
Duty cycle:	81.86	(%)
Maximum Pav :	32.5141	(mW)
Peak Antenna gain (Maximum):	6.23	(dBi)
Peak Antenna gain (linear):	4.1975898	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.027	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.027 mW/cm².

This is below the uncontrolled exposure limit of 1 mW/cm² at 2437MHz.

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