

**HCT CO., LTD.**



PRODUCT COMPLIANCE DIVISION  
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI, KYOUNGKI-DO, 467-701, KOREA  
TEL : +82 31 639 8539 FAX : +82 31 639 8535 [www.hct.co.kr](http://www.hct.co.kr)

## **EMI REPORT (Verification)**

**Suntech International Ltd.**

Room 1201, IT Mirae Tower, 60-21, Gasan-Dong  
Geumcheon-Gu, Seoul, Korea (153-801)

**Date of Issue: May 19, 2008**  
**Test Report No.: HCT-F08-0504**

**Test Site: HCT CO., LTD.**  
**HCT FRN: 0005-8664-21**

**MODEL:**

**ST-100M**

Classification/ Standard(s): FCC PART 15 Subpart B

Equipment (EUT) Type: Quad-band GSM Module

Trade Name: Suntech International Ltd.

Application Type: Verification

Port/ Connector(s): DC IN

The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003. (See Test Report if any modifications were made for compliance)

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

HCT certifies that no party to application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse of 1988, 21 U.S.C.853(a).

**Report prepared by**  
: Yong Hyun Lee  
Test engineer of EMC Tech.Part

**Approved by**  
: Kyoung Hee Yoon  
Manager of EMC Tech.Part

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## 1. GENERAL INFORMATION

### 1.1 Product Description

The Suntech International Ltd. ST-100M Quad-band GSM Module. Its basic purpose is used for communications. It's basic purpose is used for communications. It transmits from GSM 850 (824.20 MHz – 848.80 MHz), GSM1900 (1850.20 MHz – 1909.80 MHz) and receives from GSM 850 (869.20 MHz – 893.80 MHz), GSM1900 (1930.20 MHz – 1989.80 MHz).

MODEL	ST-100M
EUT Type	Quad-band GSM Module
TX Frequency	824.20 MHz – 848.80 MHz (GSM850) 1850.20 MHz – 1909.80 MHz (GSM1900)
RX Frequency	869.20 MHz – 893.80 MHz (GSM850) 1930.20 MHz – 1989.80 MHz (GSM1900)

### 1.2 Related Submittal(s) / Grant(s)

ORIGINAL SUBMITTAL ONLY

### **1.3 Tested System Details**

All equipment descriptions used in the tested system (including inserted cards) are:

DEVICE TYPE	MANUFACTURER	MODEL NUMBER/ PART NUMBER	FCC ID / DoC	CONNECTED TO
Quad-band GSM Module	Suntech International Ltd.	ST-100M	-	Adaptor
Adaptor	Humantech	SE-1210K	-	EUT

### **1.4 Cable Description**

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
Quad-band GSM Module	DC IN	N	N/A	(P) 1.7
	AC IN	N	N/A	(P) 0.9
	ANTENNA	N	Y	(D) 2.5

The marked "(D)" means the Data Cable and "(P)" means the Power Cable.

### **1.5 Noise Suppression Parts on Cable. (I/O CABLE)**

Product Name	Port	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
Quad-band GSM Module	DC IN	N	-	Y	EUT End
	ANTENNA	N	-	Y	EUT End

## **1.6 Test Methodology**

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4/2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

## **1.7 Test Facility**

The open area test site and conducted measurement facility used to collect the radiated data are located at the 254-1, Maekok-Ri, Hobup-Myun, Ichon-Si, Kyoungki-Do, 467-701, KOREA. The site is constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 6, 2006(Registration Number: 90661)

## **1.8 Frequency range of radiated measurements**

An unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table

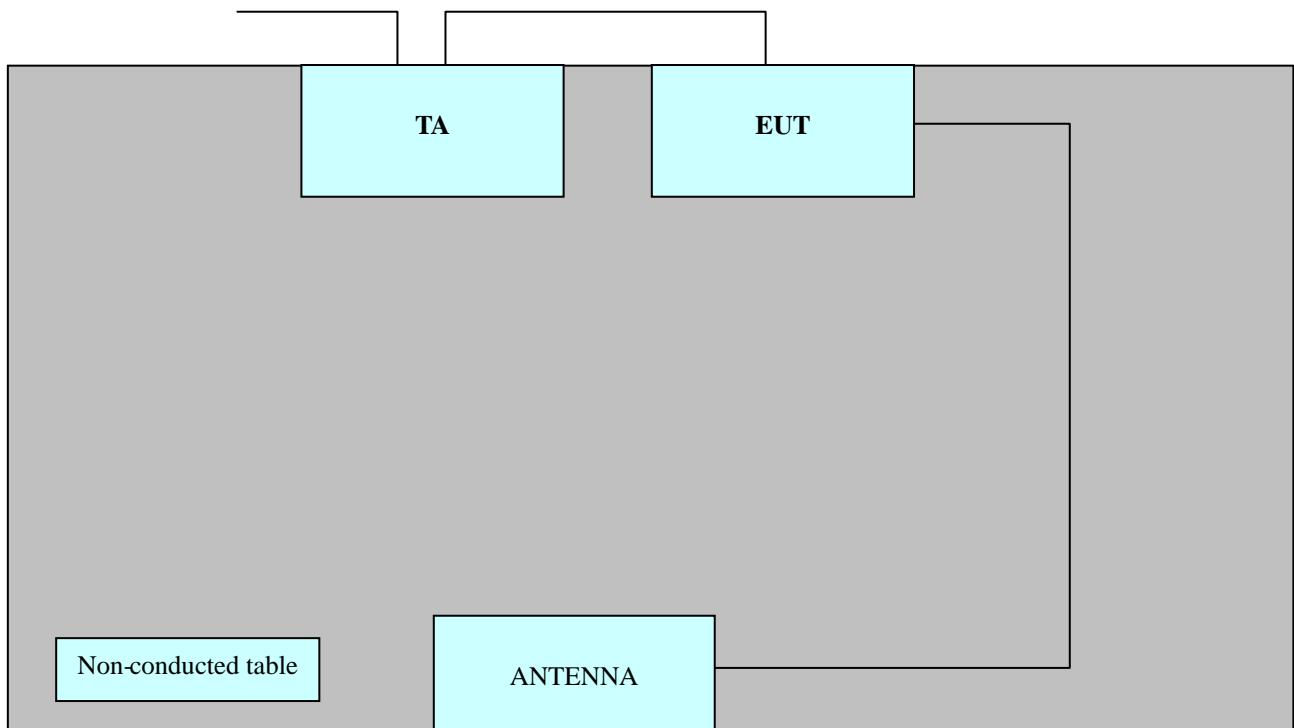
Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705-108	1000
108-500	2000
500-1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

## 2.SYSTEM TEST CONFIGURATION

### 2.1 Configuration of Test system

Line Conducted Test : EUT was connected to LISN, all other supporting equipment were connected to another LISN. Preliminary Power line Conducted Emission tests were performed by using the procedure in ANSI C63.4/2003 7.2.3 to determine the worst operating conditions.

Radiated Emission Test : Preliminary Radiated Emission tests were performed by using the procedure in ANSI C63.4/2003 8.3.1.1 to determine the worst operating condition. Final Radiated Emission tests were performed at 3 meter open area test site.



[Configuration of Tested System]

### **3. PRELIMINARY TEST**

#### **3.1 Conducted Emission Test**

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The worst operating condition
Idle (850,1900) Mode	O

#### **3. 2 Radiated Emission Test**

During Preliminary Test, the Following operation mode was investigated

Operation Mode	The worst operating condition
Idle (850,1900) Mode	O

## **4. CONDUCTED AND RADIATED EMISSION TESTS SUMMARY**

### **4.1 Conducted Emission Test**

The following table shows the highest levels of conducted emissions on both polarization of hot and neutral line.

---

Limit apply to	: CISPR 22 CLASS B
Result	: PASSED BY 23.1 dB
Operating Condition	: Idle Mode
Detector	: Quasi-Peak, Average (6 dB Bandwidth: 9 kHz)
Temperature	: 23.0 °C
Humidity Level	: 41.0 %
Test Date	: May 16, 2008

Power Line Conducted Emissions				CISPR 22 Class B	
Frequency (MHz)	Amplitude (dBuV)	Conductor	Result	Limit (dBuV)	Margin (dB)
0.8720	30.1	HOT	Quasi-Peak	56.0	25.9
0.3751	16.5	HOT	Average	48.0	31.8
0.9920	32.9	NEUTRAL	Quasi-Peak	56.0	23.1
0.3851	16.3	NEUTRAL	Average	48.0	31.9

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Line Conducted Emissions Tabulated Data

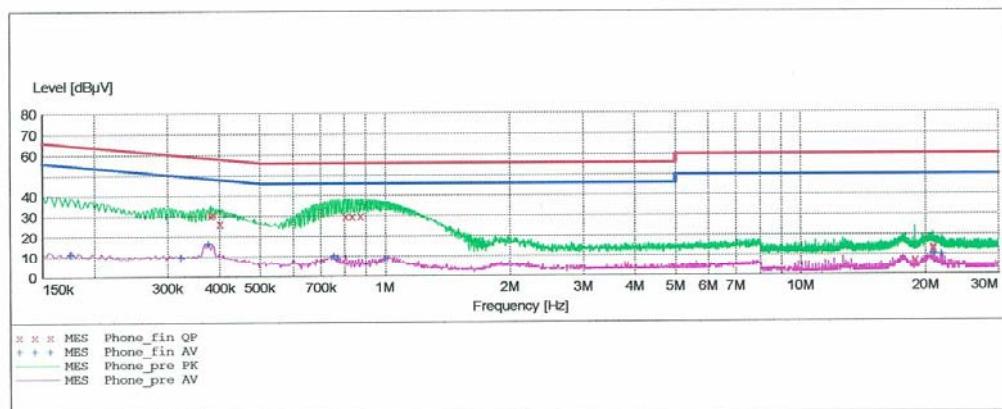
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**EMC TEST LAB.**

EUT: ST-100M  
 Manufacturer: SUNTECH INTERNATIONAL LTD.  
 Operating Condition: IDLE MODE  
 Test Site: SHIELD ROOM  
 Operator: YH.LEE  
 Test Specification: CISPR 22 CLASS B  
 Comment: H

**SCAN TABLE: "CISPR 22 Voltage"**

CISPR 22 Voltage						
Start Frequency	Stop Frequency	Step Width	Detector	Meas.	IF Time	Transducer Bandw.
150.1 kHz	500.0 kHz	2.5 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



**MEASUREMENT RESULT: "Phone\_fin\_QP"**

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.380100	30.70	10.0	58	27.6	---	---
0.385100	30.90	10.0	58	27.3	---	---
0.400100	26.30	10.0	58	31.5	---	---
0.804000	29.80	10.1	56	26.2	---	---
0.832000	29.70	10.1	56	26.3	---	---
0.872000	30.10	10.1	56	25.9	---	---
18.840000	7.50	12.2	60	52.5	---	---
20.864000	13.20	12.3	60	46.8	---	---
20.876000	14.00	12.3	60	46.0	---	---

***MEASUREMENT RESULT: "Phone\_fin AV"***

5/16/2008 1:32PM

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.175100	11.40	10.0	55	43.3	---	---
0.322600	9.70	10.0	50	39.9	---	---
0.375100	16.50	10.0	48	31.8	---	---
0.752000	10.10	10.1	46	35.9	---	---
0.768000	9.10	10.1	46	36.9	---	---
1.000000	8.90	10.1	46	37.1	---	---
20.872000	10.80	12.3	50	39.2	---	---
21.072000	10.20	12.3	50	39.8	---	---
21.876000	10.30	12.4	50	39.7	---	---

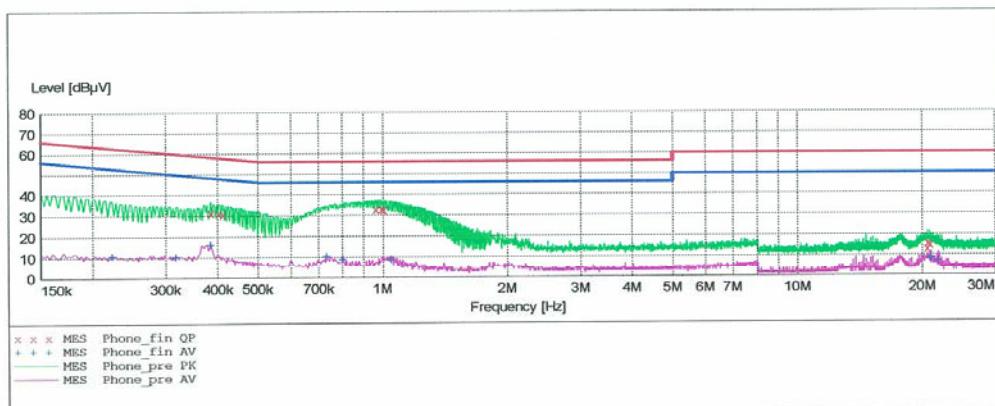
**HCT**

**EMC TEST LAB.**

**EUT:** ST-100M  
**Manufacturer:** SUNTECH INTERNATIONAL LTD.  
**Operating Condition:** IDLE MODE  
**Test Site:** SHIELD ROOM  
**Operator:** YH.LEE  
**Test Specification:** CISPR 22 CLASS B  
**Comment:** N

**SCAN TABLE: "CISPR 22 Voltage"**

CISPR 22 Voltage						
Start Frequency	Stop Frequency	Step Width	Detector	Meas.	IF Time	Transducer
150.1 kHz	500.0 kHz	2.5 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



**MEASUREMENT RESULT: "Phone\_fin\_QP"**

5/16/2008 1:28PM	Frequency	Level	Transd	Limit	Margin	Line	PE
	MHz	dB $\mu$ V	dB	dB $\mu$ V	dB		
	0.385100	31.50	10.0	58	26.7	----	---
	0.402600	31.20	10.0	58	26.6	----	---
	0.412600	30.80	10.0	58	26.8	----	---
	0.964000	32.90	10.1	56	23.1	----	---
	0.992000	32.90	10.1	56	23.1	----	---
	1.004000	32.80	10.1	56	23.2	----	---
	20.592000	13.20	12.3	60	46.8	----	---
	20.668000	15.70	12.3	60	44.3	----	---
	20.872000	15.10	12.3	60	44.9	----	---

**MEASUREMENT RESULT: "Phone\_fin AV"**

5/16/2008 1:28PM

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line dB	PE
0.222600	10.90	10.0	53	41.8	---	---
0.317600	10.50	10.0	50	39.3	---	---
0.385100	16.30	10.0	48	31.9	---	---
0.732000	10.40	10.1	46	35.6	---	---
0.800000	8.90	10.1	46	37.1	---	---
1.048000	8.50	10.1	46	37.5	---	---
20.872000	8.70	12.3	50	41.3	---	---
21.072000	8.50	12.3	50	41.5	---	---
21.876000	7.30	12.4	50	42.7	---	---

## **4.2 Radiated Emission Test**

The following table shows the highest levels of Radiated Emissions on both polarization of horizontal and vertical.

---

Limit apply to	: FCC PART 15 Subpart B						
Result	: PASSED BY 16.5 dB						
Operating Condition	: Idle Mode						
Detector	: Quasi-Peak (6 dB Bandwidth: 120 kHz)						
Temperature	: 23.0 °C						
Humidity Level	: 41.0 %						
Test Date	: May 16, 2008						

---

Frequency	Reading	Ant. Factor	Cable Loss	ANT POL	Total	Limit	Margin
MHz	dBuV	dB/m	dB	(H/V)	dBuV/m	dBuV/m	dB
115.0	7.4	10.6	2.6	V	20.6	43.5	22.9
159.0	5.8	13.0	3.0	H	21.8	43.5	21.7
314.0	11.1	13.0	4.3	H	28.4	46.0	17.6
416.0	9.3	15.4	4.8	H	29.5	46.0	16.5

---

\*\*\* For measurement over 1 GHz, noise level was more than 10 dB below the limit.

## **4.3 Test Setup Photos**

### **4.3.1 Conducted Emission**



#### **4.3.2 Radiated Emission**





## 5. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor.

The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 21.5 dBuV/m is obtained. The Antenna Factor of 7.4 dB and a Cable Factor of 1.1 dB is added. The 30 dBuV/m value is mathematically converted to its corresponding level in  $\mu$ V/m.

$$FS = 21.5 + 7.4 + 1.1 = 30 \text{ dBuV/m}$$

Radiated emission limits

Frequency of emission	Field strength	
	$\mu$ V / m	dB $\mu$ V / m
30 ~ 88	100	40.0
88 ~ 216	150	43.5
216 ~ 960	200	46.0
Above 960	500	54.0

## 6. Test Equipment

<u>Type</u>	<u>Manufacture</u>	<u>Model Number</u>	<u>Next CAL Date</u>
EMI Test Receiver	Rohde & Schwarz	ESI40	2008.11.06
EMI Test Receiver	Rohde & Schwarz	ESCI	2008.06.01
LISN	EMCO	703125	2009.05.04
LISN	Rohde & Schwarz	ESH2-Z5	2009.04.18
LISN	Rohde & Schwarz	ESH3-Z5	2008.06.13
LISN	EMCO	3816/2	2008.06.13
Attenuator	Rohde & Schwarz	ESH3-Z2	2008.10.30
TRILOG Antenna	Schwarzbeck	VULB9168	2009.01.18
Communication Antenna	TDK	LPDA-0802	N/A
Antenna Position Tower	HD	240/520/00	N/A
Base Station	Rohde & Schwarz	CMU 200	2009.02.28
Horn Antenna	Schwarzbeck	BBHA 9120D	2009.03.26
RF-Amplifier	MITEQ	AMF-6D-00101800-35.20P.PS	2009.01.15

## 7. Conclusion

The data collected shows that the Suntech International Ltd. Quad-band GSM Module MODEL: ST-100M Complies with §15.107 and §15.109 of the FCC Rules.