



# RADIO SPECTRUM TEST REPORT

Product Name	FINGERPRINT SYSTEM
Model Name	BioStation Mifare TC(BSM-TC)
Applicant	Suprema Inc.

## ESTECH CO., LTD

Rm. 1015, World Venture Center II, 426-5 Gasan-dong, Geumcheon-gu,  
Seoul, 153-759, Korea. Tel:82-2-867-3201, Fax:82-2-867-3204



Report Number	ESTR0804-002			
Applicant	Company Name	Suprema Inc.		
	Address	16F Parkview Office Tower, Jeongja-dong, Bundang-gu, Seongnam, Gyeonggi, 463-863 Korea		
Product	Product Name	FINGERPRINT SYSTEM		
	Model No.	BioStation Mifare TC(BSM-TC)	Manufacturer	Suprema Inc.
	Serial No.	NONE	Country of origin	KOREA
Other	Receipt Date	2008-02-21	Receipt Number	ESTR-08-00310
	Issued Date	2008-04-02	Tested Date	2008-02-21 ~2008-04-02
Test Result	Pass			
Standard	<p>- ETSI EN 300 330-2 V1.3.1 (2006-04) Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz</p> <p>- ETSI EN 300 330-1 V1.5.1 (2006-04) Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz</p>			
Tested by	In Ki Hong	(Signature)		
Approved by	Eun Yong Son	(Signature)		
<h2>ESTECH CO., LTD</h2> <p>Rm. 1015 World Venture Center, 426-5 Gasan-dong, Geumcheon-gu,          Seoul, 153-803, Korea. Tel: 82-2-867-3201, Fax: 82-2-867-3204</p>				
<p>o This is certified that the above mentioned products have been tested for the sample provided by client.</p> <p>o No part of this document may not be duplicated or reproduced by any means without the express written permission of Estech Co., Ltd.</p>				



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## 1. General Information

### 1.1 EUT Description

Product Name	<b>FINGERPRINT SYSTEM</b>
Model Name	<b>BioStation Mifare TC(BSM-TC)</b>
Frequency	<b>13.56MHz</b>
Channel	<b>1</b>
Power supply	<b>AC230V</b>
Antenna Type	<b>PCB Pattern Ant.</b>
Modulation	<b>ASK</b>

### 1.2 Technical characteristics of the EUT

#### 1. Transmitter Type

- Inductive loop coil transmitter
- Large loop transmitter
- Other transmitter

#### 2. Transmitter Class

- Product class 1

Average area of loop : 0.014 m<sup>2</sup>

Note : The Area of the loop is the physical area and does not take into account the number of turns.

- Product class 2  
Maximum current in loop :                      Amps
- Product class 3  
Maximum current in loop :                      Amps
- Product class 4

#### 3. Extream Temperature Range

- Category I        (General)    -20 °C to + 55 °C
- Category II      (Portable)    -10 °C to + 55 °C
- Category III     (Equipment for normal indoor use)    0 °C to + 35 °C

#### 4. Construction of Equipment

- Single unit
- Multiple units



**Note : "UNIT" means a physically separate item of the equipment. The equipment under test may consist of two separate units. In this case additional sheets covering the transmitter and receiver characteristics for both units would be required, if unit 1 and unit 2 are covered by the same TYPE DESIGNATION.**

**5. Type of Equipment**

**Fixed Station**

**Mobile Station**

**Portable Station**

**Transponder (Tag)**

**Transmitter**    **Receiver**    **Transceiver**

**Simplex**    **Duplex**

**Integral Antenna**    **Single Antenna Connector**    **Multiple Antenna Connector**  
**No. \_\_\_\_\_.**

**6. Frequency Characteristics**

**Method of frequency generation**

**Crystal**

**Synthesizer**

**Other**

**Transmitter frequency alignment range**

**Note : The alignment range is the frequency range over which the receiver or the transmitter can be programmed and/or realigned to operate, without any physical change to components other than programmable read only memories or crystals (for the receiver or transmitter)**

**Transmitter channel switching frequency range**

**Note : The switching range is the maximum frequency range over which the receiver or the transmitter can be operated without reprogramming or realignment.**

**Channel Separation**

**If applicable, state the maximum number of channels over which the equipment can operate.**



## 2. Laboratory Information

<b>2.1 Laboratory Name</b>	Estech Co., Ltd.
<b>2.2 Location</b>	
<b>Head Office</b>	Rm. 1015, World Venture Center II, 426-5 Gasan-dong Geumcheon-gu, Seoul, 153-803. Korea.
<b>EMC Lab(Ichon)</b>	58-1, Osan-Ri, GaNam-Myon, YeoJoo-Gun, KyungKi-Do, Korea
<b>EMC Lab(Yanggi)</b>	97-1, Hoiuk-Ri Majang-Myon, Icheon-city, KyungKi-Do, Korea
<b>2.3 Quality System</b>	Accredited by KOLAS(ISO/IEC 17025)
<b>2.4 Major Accredited Mark</b>	



## 3. Summary of Test Results

	Technical Requirement reference		Technical Requirement	Test Specification <EN 300 330-2 V1.3.1>	
	Test Items	Ref. Clause	Condition	Ref. Clause	Results
Transmitter	Radiated H-field	4.2.1.1	Applies to transmitters with an integral or dedicated loop antenna	5.1.3.1	Passed
	RF carrier current	4.2.1.2	Applies to Product Class 3	5.1.3.2	N/A
	Radiated E-field	4.2.1.3	Applies to Product Class 4	5.1.3.3	N/A
	Permitted frequency range of the modulation bandwidth	4.2.1.4	Applies to Product all Class	5.1.3.4	Passed
	Conducted spurious emissions at frequencies below 30 MHz	4.2.1.5.1	Applies to Product Class 3	5.1.3.5	N/A
	Conducted spurious emissions at frequencies above 30 MHz	4.2.1.5.2	Applies to Product all Class	5.1.3.6	N/A
	Radiated spurious emissions at frequencies below 30 MHz	4.2.1.5.3	Applies to Product all Class	5.1.3.7	Passed



	Radiated spurious emissions at frequencies above 30 MHz	4.2.1.5.4	Applies to Product all Class	5.1.3.8	Passed
	Duty cycle	4.2.1.6			N/A
Receiver	Adjacent channel selectivity - in band	4.2.2.1	Applies to receiver class 1, when invoked	5.1.4.1	N/A
	Blocking or desensitization	4.2.2.2	Applies to class 1 and class 2 receivers	5.1.4.2	N/A
	Radiated spurious emissions < 30 MHz	4.2.2.3.1	Applies to Product all Class	5.1.4.3	N/A
	Radiated spurious emissions > 30 MHz	4.2.2.3.2	Applies to Product all Class	5.1.4.3	N/A



## 4. Transmitter carrier output levels

### 4-1. Radiated H-Field Strength Measurement

Reference document : Clause 4.2.1.1 ETSI EN 300 330-2 V1.3.1 2006-04  
 ERM; Short Range Devices (SRD); Radio equipment in the frequency range  
 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz  
 Measurement Method : Clause 7.2.1 ETSI EN 300 330-1 V1.5.1 (2006-04)  
 ERM; Short Range Devices (SRD); Radio equipment in the frequency range  
 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz  
 Subclause : 7.2.1.2 Radiated H-Field  
 Environment : Ambient temperature.....17°C Relative humidity.....34%  
 Test Site : Open Area  
 Measurement Distance : 10m

#### 4-1-1 Test Result

Date of test : 17-Mar-08

Test conditions		Transmitter field strength(dBuA/m)				
		CH1				
T <sub>nom</sub> (17)°C	V <sub>nom</sub> (AC230V)	Reading (dBuA)	Ant factor (dB/m)	Cable Loss (dB)	Result Value (dBuA/m)	Limit (dBuA/m)
Maximum deviation from rated output under normal test conditions(dB)		-17.08	18.69	0.58	2.19	60
Remark		See Spectrum mask limit, see attachment 5				

#### 4-1-2 LIMIT

Frequency range (MHz)	H-field field strength limit(Hf) dBuA/m at 10m
0,009 ≤ f < 0,315	30
0,009 ≤ f < 0,03	72 or according to note 1
0,03 ≤ f < 0,05975 0,06025 ≤ f < 0,07 0,119 ≤ f < 0,135	72 at 0,03 MHz descending 3 dB/oct or according to note 1
0,05975 ≤ f < 0,06025 0,07 ≤ f < 0,119 0,135 ≤ f < 0,140	42
0,140 ≤ f < 0,1485	37.7
0,1485 ≤ f < 30	-5(See note 4)
0,315 ≤ f < 0,600	-5
3,155 ≤ f < 3,400	13,5
7,400 ≤ f < 8,800	9
10,2 ≤ f < 11,00	9
6,765 ≤ f ≤ 6,795 13,553 ≤ f ≤ 13,567 26,957 ≤ f ≤ 27,283	42(See note 3)
13,553 ≤ f ≤ 13,567	60(See note 2 and 3)

Note 1 : For the frequency ranges 9 to 70 kHz and 119 to 135 kHz, the following additional restrictions apply to limits above 42 dBuA/m:

- for loop coil antennas with an area ≥ 0.16 m<sup>2</sup> table 4 applies directly;
- for loop coil antennas with an area between 0.05 m<sup>2</sup> and 0.16 m<sup>2</sup> table 4 applies with a correction factor. The limit is : table value + 10\*log(area/0,16 m<sup>2</sup>);
- for loop coil antennas with an area < 0,05 m<sup>2</sup> the limit is 10dB below table 4.

Note 2 : For RFID and EAS applications only. Note 3 : Spectrum mask limit, see annex G. Note 4 : For further information see annex H.

Operating condition : Transmitter

Test Setup : See Attachment 2 Test setup

Test Equipment : See page 16. Test Equipment

Test Procedure : The measurement has been made in accordance with Subclause 7.2.1 of ETSI EN 300 330-1

Remarks : dBuA/m = Measured





## 5.permitted frequency range of the modulation bandwidth

### 5-1.PERMITTED RANGE OF OPERATING FREQUENCIES FOR WIDEBAND EQUIPMENT (> 25kHz)

Reference document : Clause 4.2.1.4 ETSI EN 300 330-2 V1.3.1 2006-04  
 ERM; Short Range Devices (SRD);Radio equipment in the frequency range  
 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz

Measurement Method : Clause 7.3.2 ETSI EN 300 330-1 V1.5.1 (2006-04)  
 ERM;Short Range Devices (SRD);Radio equipment in the frequency range  
 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30  
 MHz

Subclause : 7.3.3 Permitted Frequency range of the modulation bandwidth  
 Environment : Ambient temperature.....21°C Relative humidity.....40%  
 Test Site : Test Room

**Applicants declared operating frequency band :**

**Lowest frequency 13.560 MHz Highest frequency 13.565 MHz**

Date of test : 28-Mar-08

Test conditions		Test Result	
		Frequency MHz (FL)	Frequency MHz (FH)
Temp(-20)°C	V <sub>max</sub> (AC253V)	13.561MHz	13.564MHz
	V <sub>min</sub> (AC207V)	13.560MHz	13.565MHz
Temp(0)°C	V <sub>max</sub> (AC253V)	13.561MHz	13.564MHz
	V <sub>min</sub> (AC207V)	13.560MHz	13.565MHz
Temp(55)°C	V <sub>max</sub> (AC253V)	13.560MHz	13.564MHz
	V <sub>min</sub> (AC207V)	13.560MHz	13.564MHz
Remark			

Where F<sub>L</sub> Lowest frequency at the appropriate spurious emission level

F<sub>H</sub> Highest frequency at the appropriate spurious emission level

Band edge limits and F<sub>LM</sub> = Lowest F<sub>L</sub> (measured) 13.553MHz(Limit)

and

F<sub>HM</sub> = Highest F<sub>H</sub> (measured) 13.567MHz(Limit)



Operating condition : Transmitter

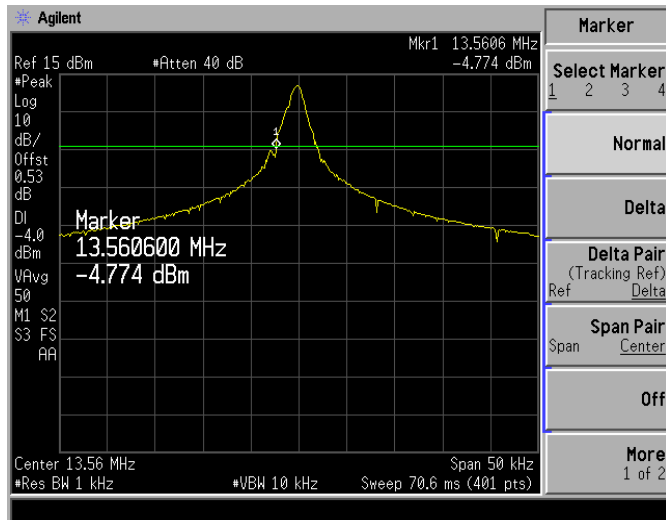
Test Equipment : See page 16. Test Equipment

Test Procedure : The measurement has been made in accordance with Subclause 7.3 of ETSI EN 300 330-1

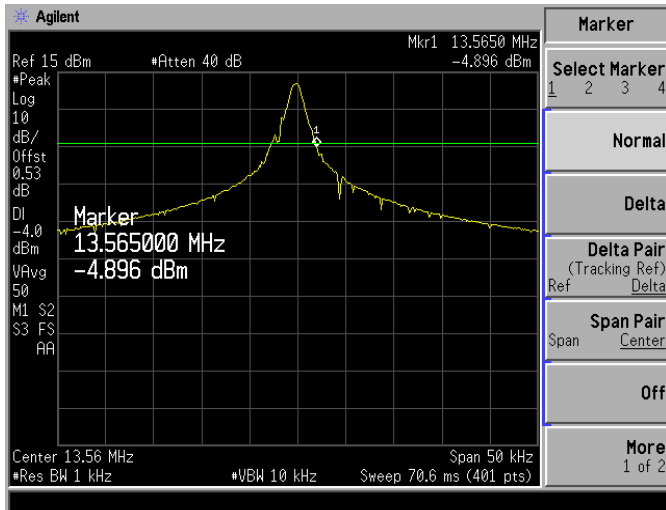


## 5-2. Test Graph for Modulation bandwidth

$F_L(13.560\text{MHz})$  Normal Condition



$F_H(13.565\text{MHz})$  Normal Condition





## 6. Spurious emissions radiated

### 6-1. TRANSMITTER SPURIOUS EMISSIONS RADIATED (< 30 MHz)

Reference document : Clause 4.2.1.5.3 ETSI EN 300 330-2 V1.3.1 2006-04  
 ERM; Short Range Devices (SRD); Radio equipment in the frequency range  
 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz

Measurement Method : Clause 7.4.3 ETSI EN 300 330-1 V1.5.1 (2006-04)  
 ERM; Short Range Devices (SRD); Radio equipment in the frequency range  
 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30  
 MHz

Subclause : 7.4.3.1 Radiated spurious emissions at frequencies below 30MHz  
 Environment : Ambient temperature.....17°C Relative humidity.....34%  
 Test Site : Open Area  
 Measurement Distance : 10m

Date of test : 17-Mar-08

SPURIOUS EMISSIONS LEVEL (dB $\mu$ A/m)							
CH1							
f (MHz)	Band- width** (kHz)	Reading (dB $\mu$ A)	Ant Factor (dB/m)	Cable loss (dB)	Result Value (dBuA/m)	Limit (dBuA/m)	Remark
27.12	9	-37.5	20.05	0.84	-16.61	-3.5	
Remark							

\*\*Bandwidth = the measuring receiver bandwidth

\* Detect Mode : Quasi Peak

\*Note : The EUT does not provide a stand by mode due to its basic nature.

\assessment of occurrence of any unintentional transmission can not be done to this equipment



Operating condition : Transmitter

Test Equipment : See page 16. Test Equipment

Test Procedure : The measurement has been made in accordance with Subclause 7.4.3 of ETSI EN 300 330-1

Remarks : dBuA/m = Measured

Conversion Factor of attachment 4 is following; dBuA=51.5+dBuV

### 6-1-1 LIMIT

State	Frequency $9 \text{ kHz} \leq f < 10 \text{ MHz}$	Frequency $10 \text{ MHz} \leq f < 30 \text{ MHz}$
Transmit	27 dB $\mu$ A/m descending 3 dB/oct	-3.5 dB $\mu$ A/m
Standby	5,5 dB $\mu$ A/m descending 3 dB/oct	-22 dB $\mu$ A/m



## 6-2. TRANSMITTER SPURIOUS EMISSIONS RADIATED(> 30MHz)

Reference document : Clause 4.2.1.5.4 ETSI EN 300 330-2 V1.3.1 2006-04  
 ERM; Short Range Devices (SRD); Radio equipment in the frequency range  
 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz

Measurement Method : Clause 7.4.4 ETSI EN 300 330-1 V1.5.1 (2006-04)  
 ERM; Short Range Devices (SRD); Radio equipment in the frequency range  
 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30  
 MHz

Subclause : 7.4.4.1 Radiated spurious emissions at frequencies  $\geq 30$  MHz  
 Environment : Ambient temperature.....21°C Relative humidity.....44%  
 Test Site : RSE Chamber  
 Measurement Distance : 3m

Date of test : 14-Mar-08

SPURIOUS EMISSIONS LEVEL (nW)				
CH1				
f (MHz)	Band-width** (kHz)	Level (nW)	Limit(nW)	Remark
30.00	100	2.77	250	
466.50	100	0.28	250	
651.80	100	0.88	4	
667.30	100	1.19	4	
706.10	100	0.64	4	
801.10	100	1.19	4	
868.10	100	2.32	250	
935.00	100	1.94	250	
Remark	*See Attachment 4 for the measurement graphs.			

\*\*Bandwidth = the measuring receiver bandwidth

\* Detect Mode : Peak

\*Note : The EUT does not provide a stand by mode due to its basic nature.

Assessment of occurrence of any unintentional transmission can not be done to this equipment.



Operating condition :

Test Setup : Attachment 4 Test setup

Test Equipment : See page 16. Test Equipment

Test Procedure : The measurement has been made in accordance with Subclause 7.4.4 of ETSI EN 300 330-1

Remarks : ERP = Measured

#### 6-2-1 LIMIT

State	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other Frequencies between 30 to 1000 MHz
Operating	4nW	250nW
Standby	2nW	2nW



## 7. Test Equipments

Equipment	Manufacturer	Model	S/N	Next Cal.
Spectrum Analyzer	ADVANTEST	R3273	110600592	2008-06-04
Signal Generator	HP	83620B	3722A00463	2008-09-11
LogBicon Antenna	Schwarzbeck	VULB9160	3142	2008-05-07
LogBicon Antenna	Schwarzbeck	VULB9160	3107	2008-05-22
Horn Antenna	Schwarzbeck	BBHA 9120 D	469	2008-07-24
Preamplifier	HP	8449B	3008A00595	2009-03-07
Preamplifier	Sonoma Instrument	310N		2008-09-28
Compzct	inn-co GmbH	CT 0800	N/A	N/A
Antenna Stand	inn-co GmbH	AS 200 M	10080505	N/A
Turn Device	inn-co GmbH	DE 3600-RH-P	N/A	N/A
Turn table Controller	inn-co GmbH	CO 2000	N/A	N/A
Spectrum Analyzer	Aglient	E4407B	US40241281	2009-02-28
Power Meter	HP	E4418A	GB38272722	2009-02-28
Power Sensor	HP	8481A	3318A96478	2009-02-28
Temp/Humidity Chamber	MYUNG TECHNOLOGY	SM-150-2	04-TH24	2009-03-03
AC Power Source	AC Power Korea	ACP-1010	-	-
Signal Generator	HP	E4432B	GB40050840	2009-02-28





**Attachment 1 : EUT Photographs**



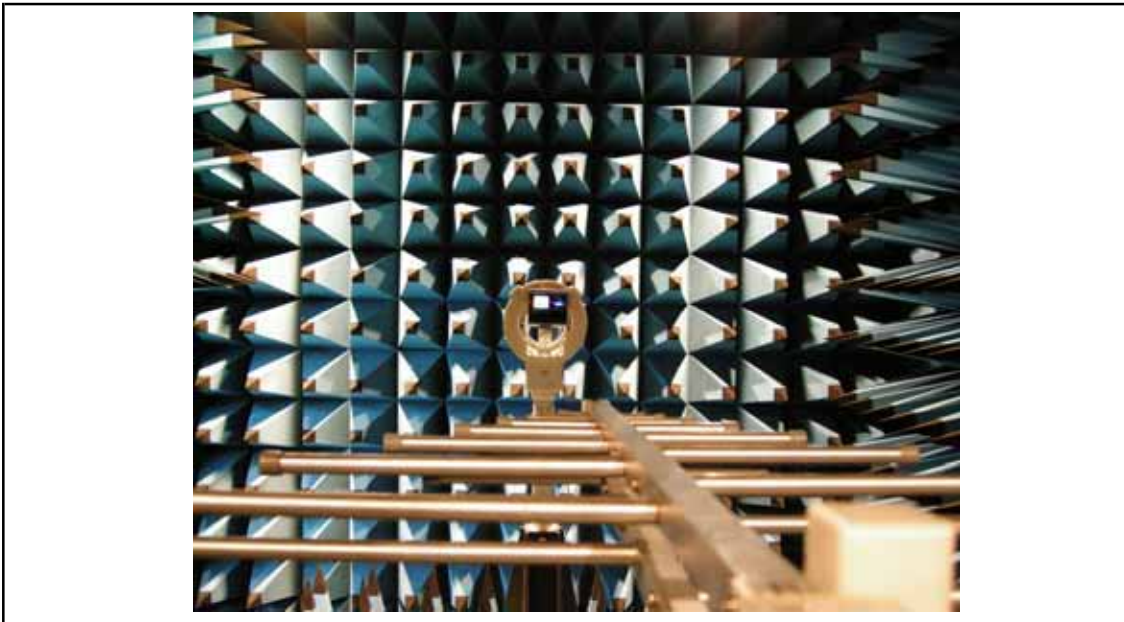




**Attachment 2 : Test Setup Photographs(<30MHz)**



**Test Setup Photographs(>30MHz)**



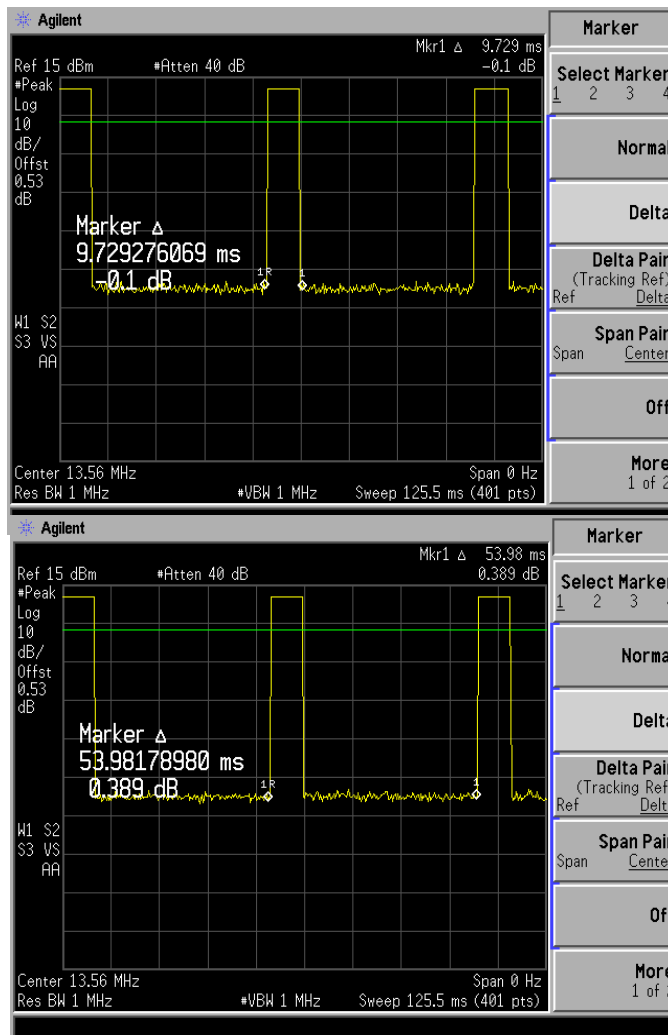
## Attachment 3 : Declared by the manufacturer Duty Cycle

### 1-1 Duty Cycle classes

### 1-2 Limit

Duty cycle Class	Duty cycle ratio
1	<0.1%
2	<1.0%
3	<10%
4	Up to 100%

### 1-3 Test Result-Pass



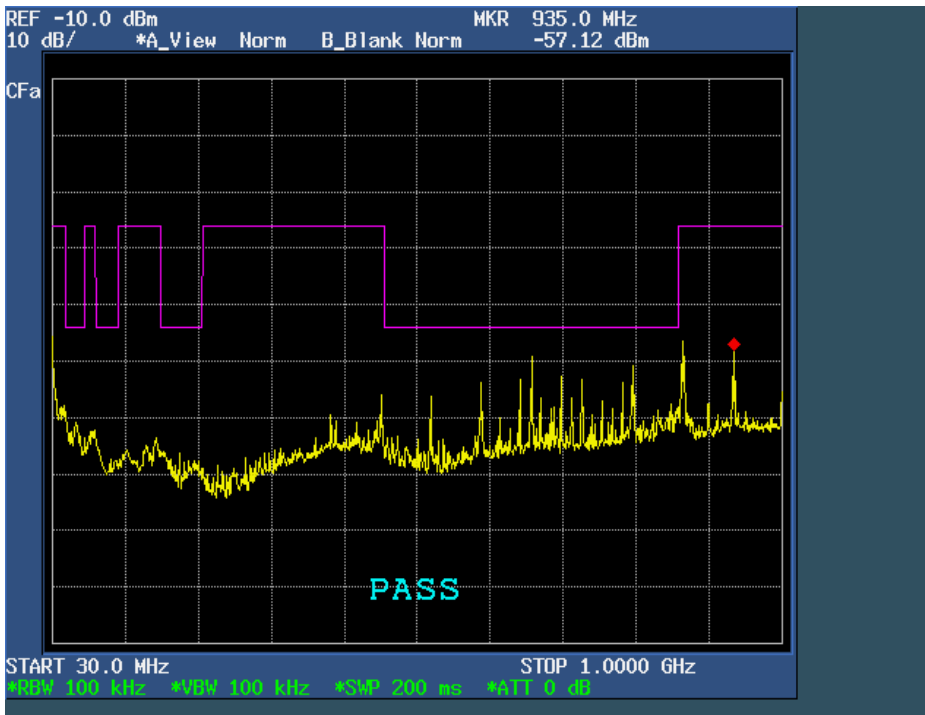


Attachment 4 : TRANSMITTER SPURIOUS EMISSIONS RADIATED

a) 30MHz ~ 1000MHz(Horizontal)

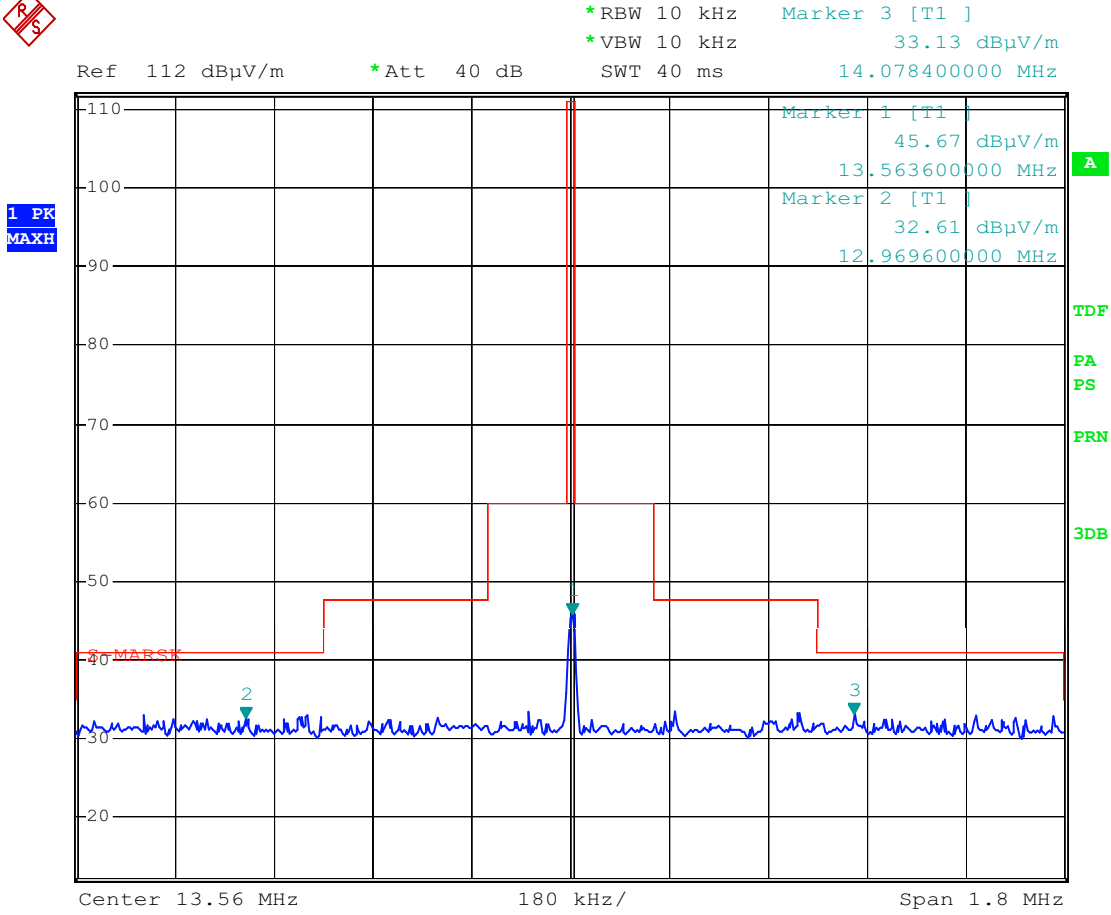


b) 30MHz ~ 1000MHz(Vertical)





**Attachment 5 : Spectrum mask**



Comment: BSM-TC\_VER  
Date: 17.MAR.2008 16:35:23

Remark : Conversion Factor of attachment 5 is following;dBuA=51.5+dBuV