Application Note

Anritsu

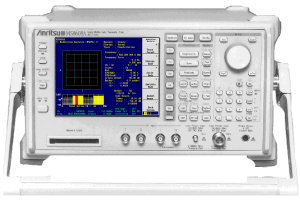
MX860805A/MX860905A

PHS Measurement Software

MS8608A/MS8609A

Digital Mobile Radio Transmitter Tester

MX860805A/MX860905A
PHS Measurement Software
Application Note



April 2006
Anritsu Corporation
Version 1.0

Contents

1. PHS Standard

1.1 Related standard

1.2 Frequency band and channel number

1.3 Transmission power

1.4 Radio frame

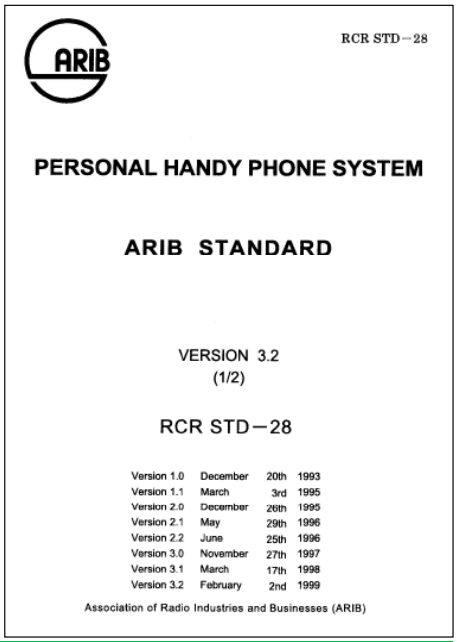
1.5 Test items

1.1 Related standard

PHS is standardized by ARIB Standard RCR STD-28.

ARIB is the group that maintains the standard in Japan.

ARIB: Association of Radio Industries and Business
http://www.arib.or.jp/english/index.html


RCR STD－28

PERSONAL HANDY PHONE SYSTEM

ARIB STANDARD

VERSION 3.2
(1/2)

RCR STD－28

Version 1.0	December	20th	1993
Version 1.1	March	3rd	1995
Version 2.0	December	26th	1995
Version 2.1	May	29th	1996
Version 2.2	June	25th	1996
Version 3.0	November	27th	1997
Version 3.1	March	17th	1998
Version 3.2	February	2nd	1999

Association of Radio Industries and Businesses (ARIB)

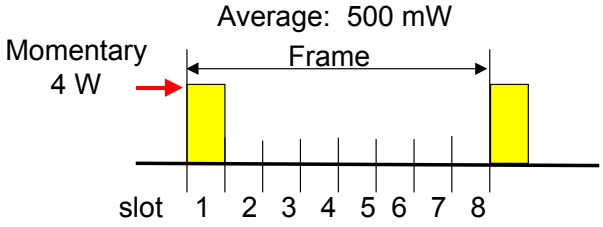
1.2 Frequency band and channel number

CH	Freq. MHz	CH	Freq. MHz	CH	Freq. MHz	CH	Freq. MHz
251	1893.65	18	1900.25	43	1907.75	68	1915.25
252	1893.95	19	1900.55	44	1908.05	69	1915.55
253	1894.25	20	1900.85	45	1908.35	70	1915.85
254	1894.55	21	1901.15	46	1908.65	71	1916.15
255	1894.85	22	1901.45	47	1908.95	72	1916.45
1	1895.15	26	1902.65	48	1909.25	73	1916.75
2	1895.45	27	1902.95	49	1909.55	74	1917.05
3	1895.75	28	1903.25	50	1909.85	75	1917.35
4	1896.05	29	1903.55	51	1910.15	76	1917.65
5	1896.35	30	1903.85	52	1910.45	77	1917.95
6	1896.65	31	1904.15	56	1911.65	78	1918.25
7	1896.95	32	1904.45	57	1911.95	79	1918.55
8	1897.25	33	1904.75	58	1912.25	80	1918.85
9	1897.55	34	1905.05	59	1912.55	81	1919.15
10	1897.85	35	1905.35	60	1912.85	82	1919.45
11	1898.15	36	1905.65	61	1913.15		
12	1898.45	37	1905.95	62	1913.45		
13	1898.75	38	1906.25	63	1913.75		
14	1899.05	39	1906.55	64	1914.05		
15	1899.35	40	1906.85	65	1914.35		
16	1899.65	41	1907.15	66	1914.65		
17	1899.95	42	1907.45	67	1914.95		

1.3 Transmission power

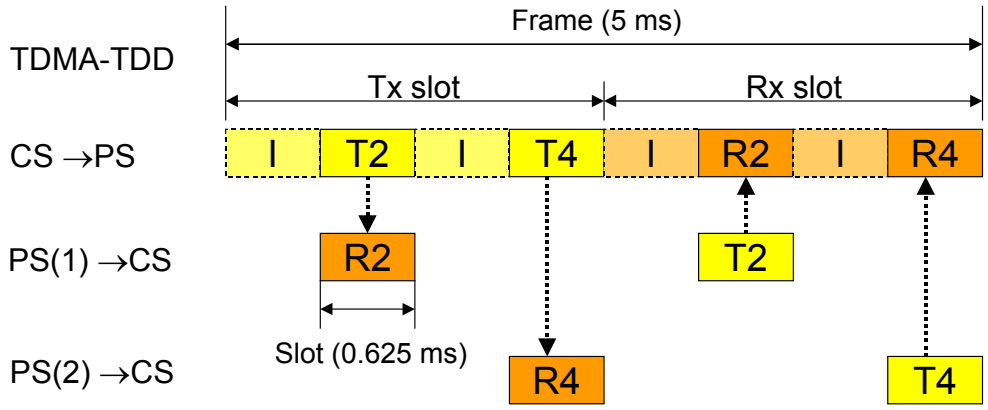
CS (Cell Station) 500 mW max.
PS (Personal Station) 10 mW max.

Transmission power is expressed as average power.
The momentary power is 8 times the average power.



PHS uses the TDMA method.
There are 8 slots in a frame.

1.4 Radio frame



CS: Cell Station, PS: Personal Station, T: Transmit, R: Receive, I: Idle

1.5 Test items

STD-28	Transmission Characteristics	MS8608/09A
3.4.2.1	Transmission power	Yes
3.4.2.2	Transmission of calling identification code	
3.4.2.3	Adjacent channel power	Yes
3.4.2.4	Transient response characteristic of burst transmission	Yes
3.4.2.5	Carrier off time leakage power	Yes
3.4.2.6	Transmission spurious	Yes
3.4.2.7	Allowed value for occupied bandwidth	Yes
3.4.2.8	Frequency stability	Yes
3.4.2.9	Modulation accuracy	Yes
3.4.2.10	Transmission rate accuracy	Yes
3.4.2.11	Cabinet radiation	(Yes)

1.5 Test items

STD-28	Reception Characteristics	MS8608/09A
3.4.3.1	Frequency deviation of local oscillator	
3.4.3.2	Sensitivity	
3.4.3.3	Bit error rate performance	
3.4.3.4	Adjacent channel selectivity	
3.4.3.5	Intermodulation performance	
3.4.3.6	Spurious response immunity	
3.4.3.7	Conducted spurious component	Yes
3.4.3.8	Cabinet radiation	(Yes)
3.4.3.9	Receive signal strength Indicator accuracy	
3.4.3.10	Bit error floor performance	

2. Connections

2.1 Connection to signal generator

2.2 Connection to cell station

2.1 Connection to signal generator

MG3700A

MS8608A

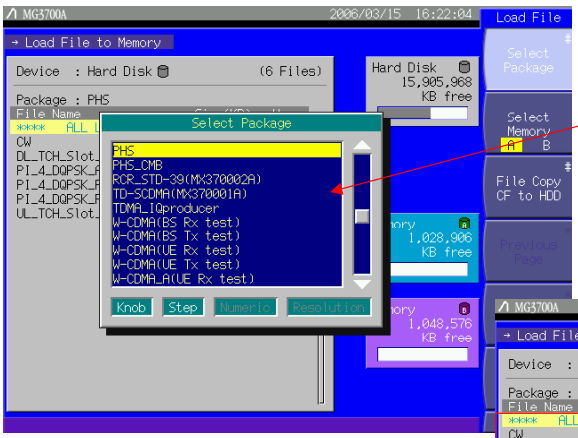
PHS Waveform pattern

DL_TCH_Slot1
UL_TCH_Slot1

MS8609A

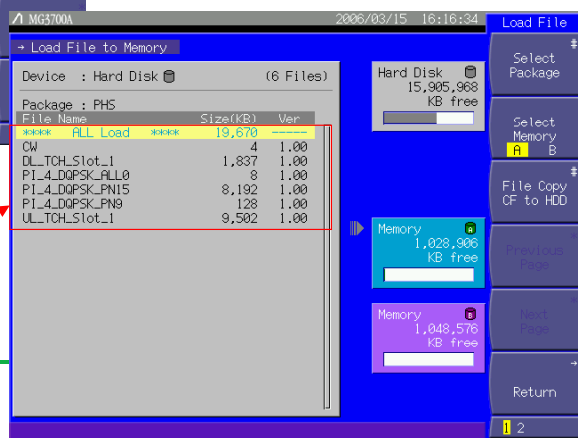
MX860805A/MX860905A
π/4DQPSK Measurement Software

2.1 Connection to signal generator



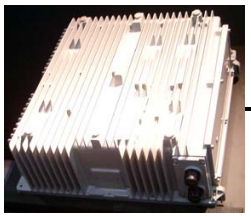
MG3700A Settings

Select PHS using [F1] key (HDD → Memory).



Select ALL Load in PHS.
DL_TCH_Slot_1
UL_TCH_Slot_1

2.2 Connection to cell station



Cell Station

Antenna port

MS8608A

High Power Input Max. +40 dBm
(Low Power Input Max. +20 dBm)

e.g.
Specification
500 mW (27 dBm)
Momentary
4 W (36 dBm)

Need ATT
20 dB or 30 dB

ATT

Not necessary at PS

MS8609A

Input Max. +20 dBm

3. CS Measurements

3.1 MX860x05A π/4DQPSK Measurement Software
3.2 MX860x05A Settings
3.3 Transmission characteristics
(1) Transmission power (3.4.2.1*)
(2) Adjustment channel power (3.4.2.3)
(3) Transient response characteristics of burst transmission (3.4.2.4)
(4) Carrier off time leakage power (3.4.2.5)
(5) Transmission spurious (3.4.2.6)
(6) Allowed value for occupied bandwidth (3.4.2.7)
(7) Frequency stability (3.4.2.8)
(8) Modulation accuracy (3.4.2.9)
(9) Transmission rate accuracy (3.4.2.10)

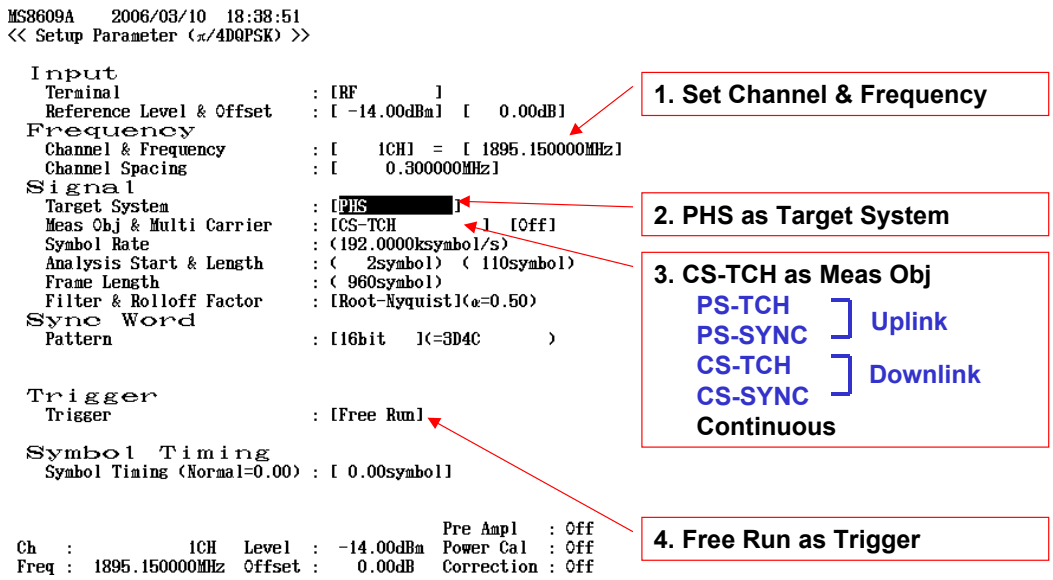
*Chapter of standard

3.1 MX860x05A π/4DQPSK Measurement Software

The MX860805A/MX860905A π/4DQPSK Measurement Software supports the following communication systems.

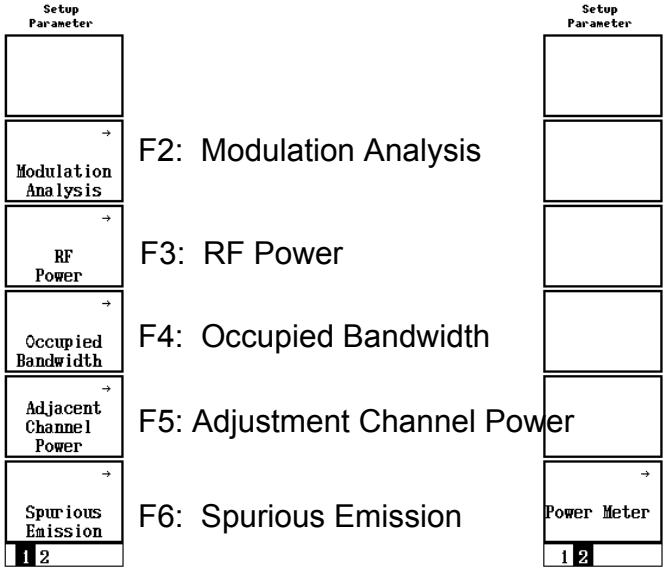
- General π/4DQPSK modulation
- PDC (ARIB STD-27)
- PHS (ARIB STD-28)
- NADC (IS-136)
- ARIB STD-39
- ARIB STD-T61
- ARIB STD-T79

3.2 MX860x05A Settings



3.2 MX860x05A Settings

Measurement items



F2: Modulation Analysis

F3: RF Power

F4: Occupied Bandwidth

F5: Adjustment Channel Power

F6: Spurious Emission

F6: Power Meter

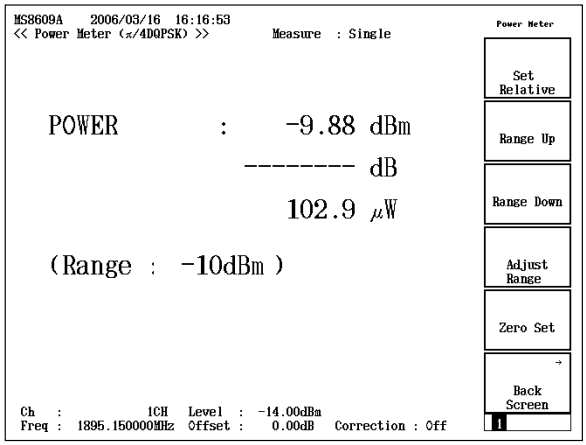
(1) Transmission power (3.4.2.1)

Standards

1. CS: 500 mW max.
2. Other CS, PS: 10 mW
3. Output accuracy: Within +20%, -50%

Definition

1. Antenna measurement port
2. RF Coupler

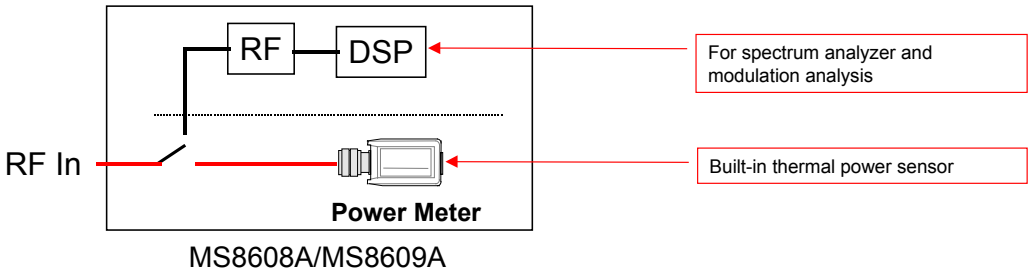


Specification 500 mW

Momentary 4 W max.

Measured by power meter

(1) Transmission power (3.4.2.1)



MS8608A/MS8609A

Internal power sensor and power meter

Accuracy: ±0.4 dB

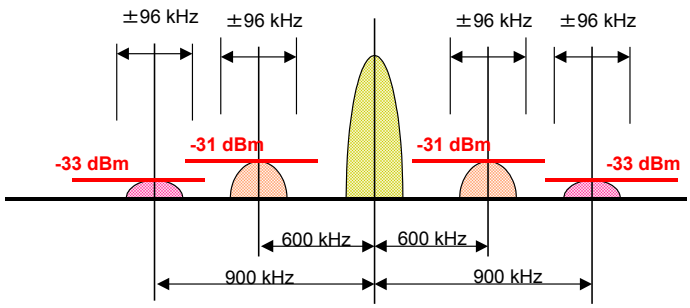
Power meter
1. Press the [More] key at the Setup Parameter screen.
2. Press the [F6] Power Meter key.

Calibration
3. Disconnect the input cable.
4. Press the [F5] Zero set key.
5. Connect the input cable.
6. Press the [F4] Adjust Range key.

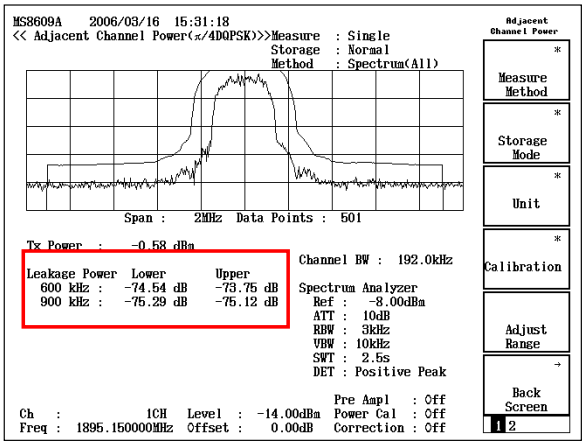
(2) Adjustment channel power (3.4.2.3)

Measure the interference power leaking into the next channel.

Standards
1. 600 kHz offset: 800 nW (-31 dBm) max.
2. 900 kHz offset: 250 nW (-36 dBm) max.



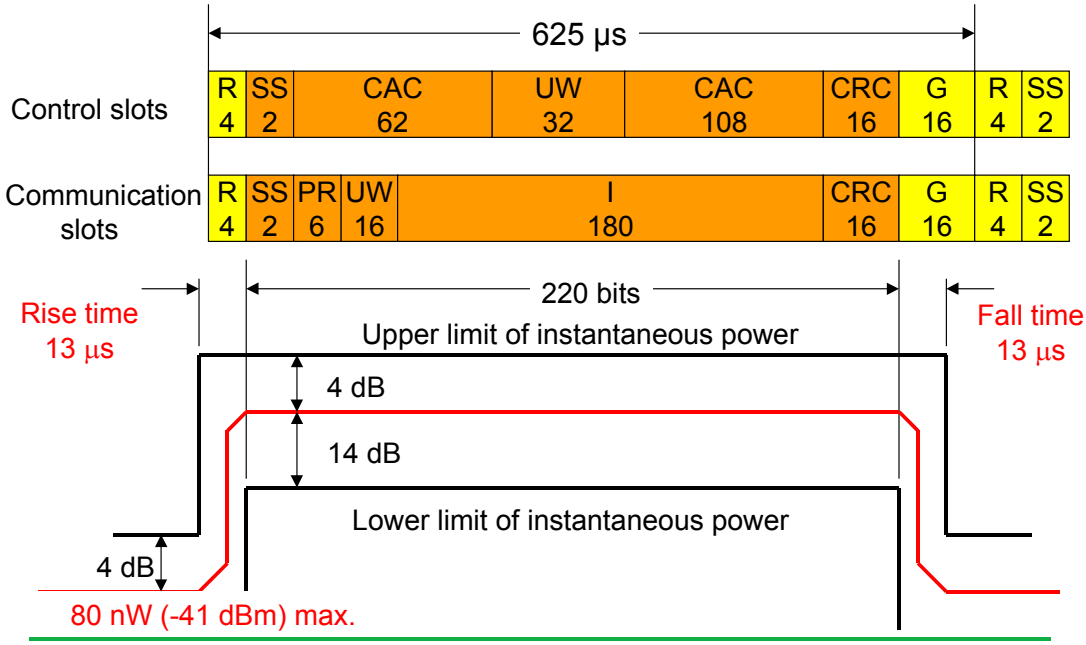
(2) Adjustment channel power (3.4.2.3)



Adjustment channel power

1. Press the [F5] Adjacent Channel Power key at the Setup Parameter screen.
2. Press the [F5] Adjust Range key.
3. Press the [F1] Measure Method key.
4. Press the [F1] Spectrum (All) key.
5. Press the [F6] Return key.

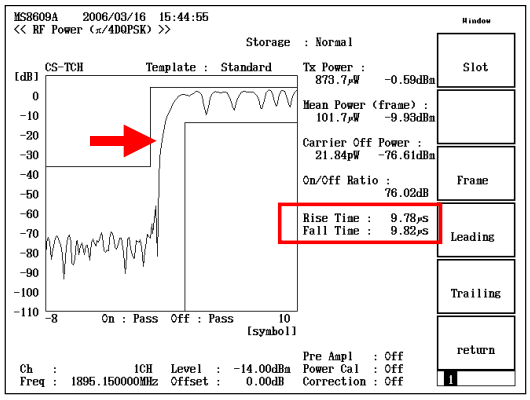
(3) Transient response characteristics of burst transmission (3.4.2.4)

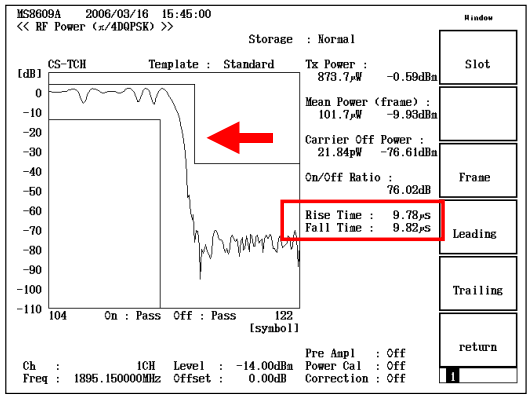


(3) Transient response characteristics of burst transmission (3.4.2.4)

Standards
Rise Time: 13.0 µs max.
Fall Time: 13.0 µs max.

RF Power
1. Press the [F3] RF Power key at the Setup screen.
2. Press the [F4] key, and set Wide Dynamic Range to On.
3. Press the [F5] Adjust Range key.
4. Press the [F1] Window key.
5. Press the [F4] Leading key or [F5] Trailing key.
6. Press the [F6] Return key.

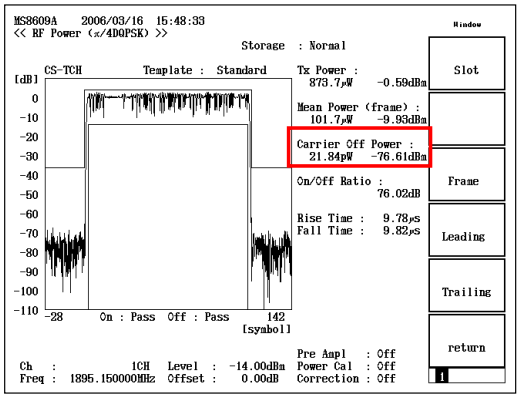


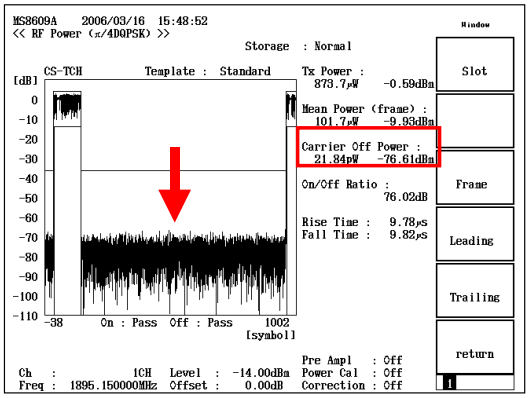


(4) Carrier off time leakage power (3.4.2.5)

Standards: 80 nW (-41 dBm) max.

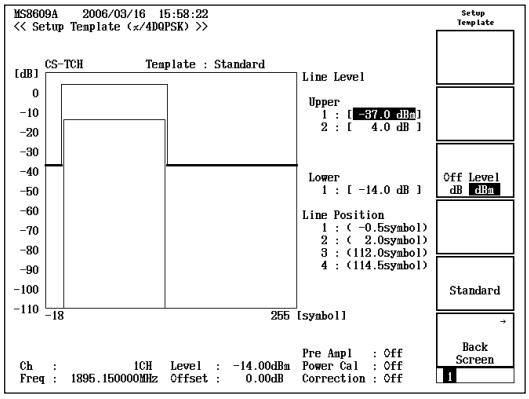
RF Power
1. Press the [F3] RF Power key at the Setup screen.
2. Press the [F4] key, and set Wide Dynamic Range to On.
3. Press the [F3] key, and set Transmit Timing to ON.
4. Press the [F5] Adjust Range key.
5. Press the [F1] Window key.
6. Press the [F1] Slot key or [F3] Frame key.





(4) Carrier off time leakage power (3.4.2.5)

Template



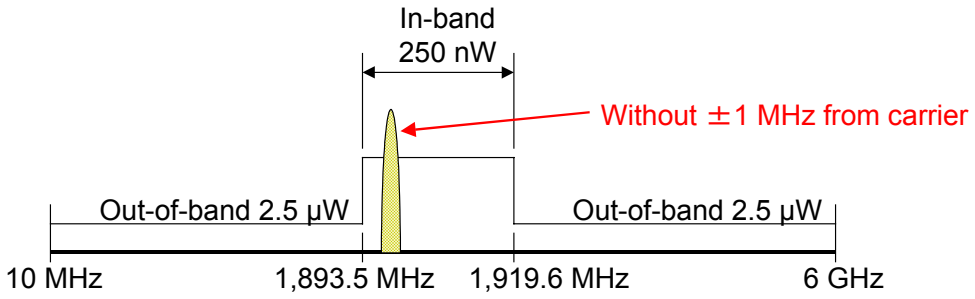
Set Template at RF power

1. Press the [F3] RF Power key at the Setup Parameter screen.
2. Press the [More] key to display the next screen.
3. Press the [F1] Setup Template key.
4. Press the [F5] Standard key.
5. Press the [F6] Back Screen key.

(5) Transmission spurious (3.4.2.6)

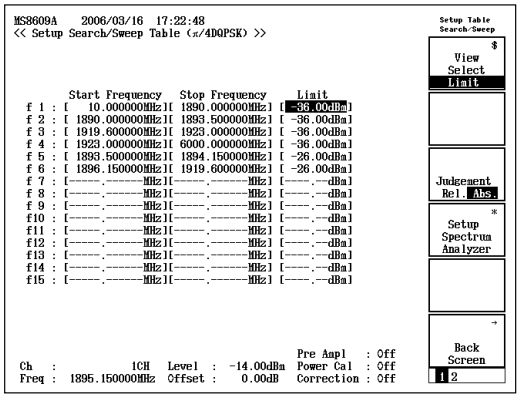
Standards

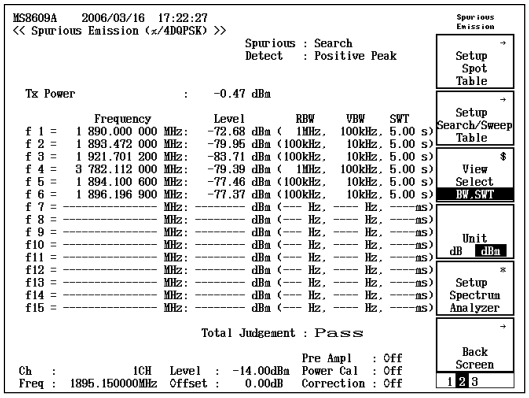
1. In-band (1,893.5 to 1,919.6 MHz): 250 nW (-36 dBm) max.
2. Out-of-band: 2.5 µW (-26 dBm) max.
   (10 MHz to 6 GHz without in-band)



(5) Transmission spurious (3.4.2.6)

The spurious emission function has three measuring methods: Spot mode, Sweep mode, and Search mode.
They simplify measurement of transmission spurious.

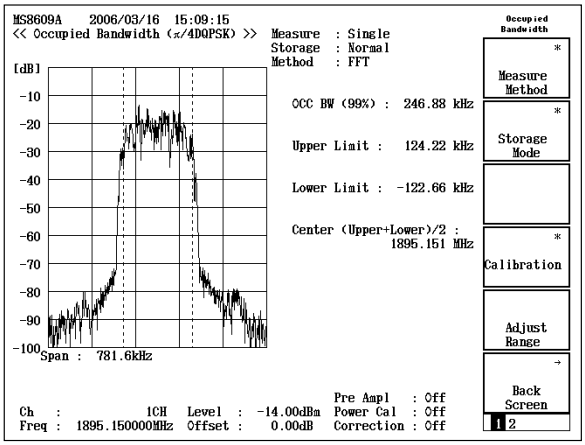




(6) Allowed value for occupation bandwidth (3.4.2.7)

Occupied bandwidth measures the bandwidth containing 99% of total power.

Standards: 288 kHz max.



Measurement condition

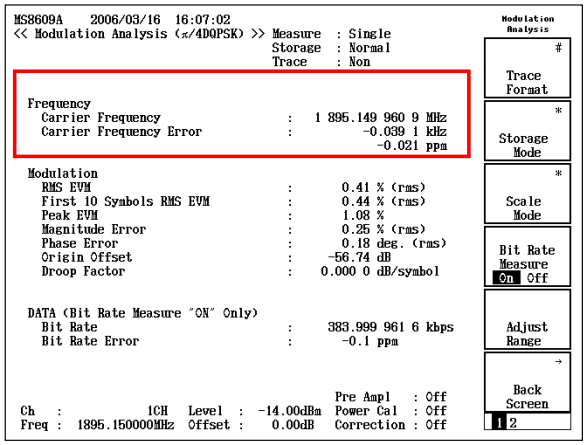
Span: 300 kHz × 2 or 3.5 = 1 MHz
RBW: 300 kHz × 0.03 max. = 3 kHz
VBW: At same level RBW = 3 kHz
Sweep: 5 s.
Detect mode: Positive peak

Occupied bandwidth

1. Press the [F4] Occupied Bandwidth key at the Setup Parameter screen.
2. Press the [F1] Measure Method key.
3. Press the [F1] Spectrum key.
4. Press the [F6] Return key.
4. Press the [F5] Adjust Range key.

(7) Frequency stability (3.4.2.8)

Standards: $\pm 3 \times 10^{-6}$ max.

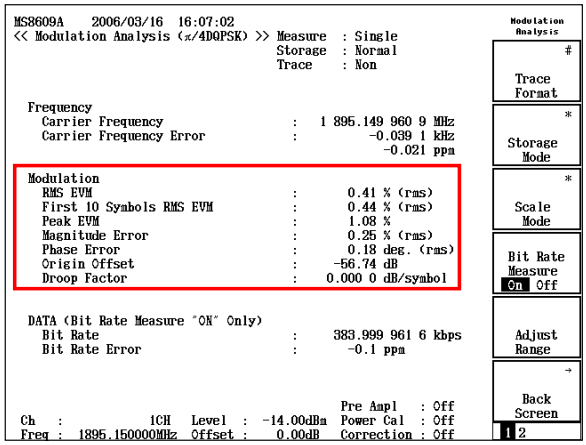


Frequency stability

1. Press the [F1] Modulation Analysis key at the Setup Parameter screen.
2. Press the [F1] Trace Format key and set Non.
3. Press the [F5] Adjust Range key.

(8) Modulation accuracy (3.4.2.9)

Standards: 12.5% max.



Frequency stability

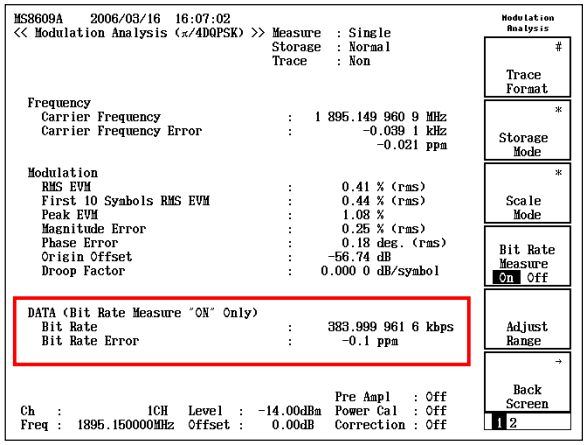
1. Press the [F1] Modulation Analysis key at the Setup Parameter screen.
2. Press the [F1] Trace Format key and set Non.
3. Press the [F5] Adjust Range key.

(9) Transmission rate accuracy (3.4.2.10)

Standards: $\pm 5 \times 10^{-6}$ max.

Frequency stability

1. Press the [F1] Modulation Analysis key at the Setup Parameter screen.
2. Press the [F1] Trace Format key and set Non.
3. Press the [F5] Adjust Range key.
4. Press the [F4] key and set Bit Rate Measure to On.



Bit Rate Measure On

Appendix

1. Other transmission characteristics

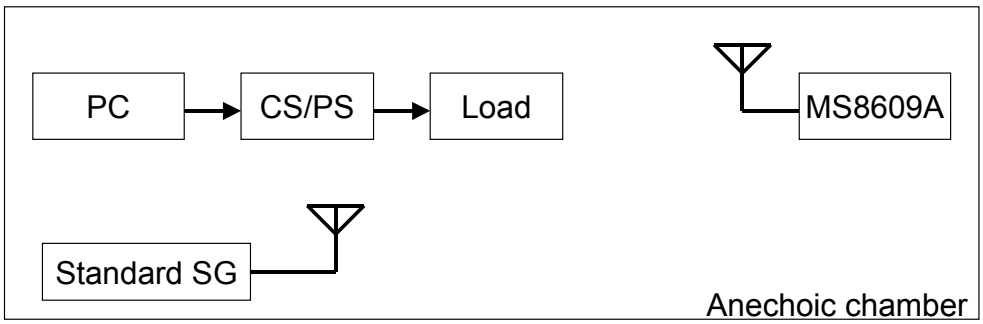
(1) Transmission of calling identification code (3.4.2.2)

1. Personal Stations: 28 bits
2. Digital cordless telephone base stations: 29 bits
3. The signal has the set slot configuration and transmits using channel coding and scrambling.

(2) Cabinet radiation (3.4.2.11)

Standards: 2.5 μW max.

Need anechoic chamber



Anritsu

Specifications are subject to change without notice.

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