

General

항 목	US PCS	CDMA	AMPS	GPS
Tx Freq. range	1850 ~ 1909.95MHz	824.04 ~ 848.97MHz	824.04 ~ 848.97MHz	-
Rx Freq. range	1930 ~ 1989.95MHz	869.04 ~ 893.97MHz	869.04 ~ 893.97MHz	1575.42MHz
Channel Bandwidth	1.23MHz	30KHz	30KHz	2MHz
Channel Spacing	50KHz	30KHz	30KHz	Not Used
Number of Channel	1200	832	832	1
Duplex Separation	80MHz	45MHz	45MHz	-
Type of Emission	1M25F9W	1M25F9W	40K0F8W, 40K0F1D	-
In/Output Impedance	50Ω	50Ω	50Ω	50Ω
Tx Intermediate Frequency	263.6MHz	228.6MHz	228.6MHz	-
Rx Intermediate Frequency	183.6MHz	183.6MHz	183.6MHz	183.6MHz
Tx Local Frequency	1st($F_{TX}+263.6\text{MHz}$) 2nd(527.2MHz)	1st($F_{TX}+228.6\text{MHz}$) 2nd(457.2MHz)	1st($F_{TX}+228.6\text{MHz}$) 2nd(457.2MHz)	-
Rx Local Frequency	1st($F_{RX}+183.6\text{MHz}$) 2nd(367.2MHz)	1st($F_{RX}+183.6\text{MHz}$) 2nd(367.2MHz)	1st($F_{RX}+183.6\text{MHz}$) 2nd(367.2MHz)	1st($F_{RX}-183.6\text{MHz}$) 2nd(367.2MHz)
TCXO Frequency	19.2MHz	19.2MHz	19.2MHz	19.2MHz
Freq. Stability	($F_{RX}-80\text{MHz}$) $\pm$ 150Hz	($F_{RX}-45\text{MHz}$) $\pm$ 300Hz	$\pm$ 2.5ppm	-
Operating Temperature	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C	-30°C ~ +60°C
Supply Voltage	3.6 ~ 4.2V			
Size and Weight	STD : 70.8 * 47.3 * 6 mm, 38g, 900mAh EXT : 70.8 * 47.3 * 11.3mm, 46g, 1550mAh			

1) PCS CDMA(1900MHz)

A. Transmitter

Waveform Quality : 0.944 or more

Open Loop Power Control Range

. -25dBm : -60.5dBm -41.5dBm

. -65dBm : -20.5dBm +1.5dBm

. -104dBm : +15.0dBm +30dBm

Minimum Tx Power Control : below -50dBm

Closed Loop Power Control Range : ± 24 dB

Maximum RF Output Power : +25dBm

Occupied Bandwidth : 1.23MHz

Conducted Spurious Emission @1.25 MHz: -42dBc/30kHz

B. Receiver

Rx Sensitivity and Dynamic Range :-104dBm, FER=0.5% or less

-25dBm, FER=0.5% or less

Conducted Spurious Emission

. 1930 1990MHz : < -81dBm

. 1850 1910MHz : < -61dBm

. All Other Frequencies : < -47dBm

Single Tone Desensitization : lower than 1 %

Rx Power = -101dBm

Tone Power = -30dBm

Tone Offset from Carrier = ± 1.25 MHz

Intermodulation Spurious Response Attenuation : lower than 1 %

Rx Power = -101dBm

Tone Power 1 = -43dBm

Tone Power 2 = -43dBm

Tone 1 Offset from Carrier = ± 1.25 MHz

Tone 2 Offset from Carrier = ± 2.05 MHz

2) CDMA(800MHz)

A. Transmitter

Waveform Quality : 0.944 or more

Open Loop Power Control Range

. -25dBm : -57.5dBm -38.5dBm

. -65dBm : -17.5dBm +1.5dBm

. -104dBm : +18.0dBm +30dBm

Minimum Tx Power Control : below -50dBm

Closed Loop Power Control Range : ± 24 dB

Maximum RF Output Power : +25.5dBm

Occupied Bandwidth : 1.23MHz

Conducted Spurious Emission @ 0.9 MHz: -42dBc/30kHz

@ 1.25 MHz: -54dBc/30kHz

B. Receiver

Rx Sensitivity and Dynamic Range :-104dBm, FER=0.5% or less

-25dBm, FER=0.5% or less

Conducted Spurious Emission

. 1930 1990MHz : < -81dBm

. 1850 1910MHz : < -61dBm

. All Other Frequencies : < -47dBm

Single Tone Desensitization : lower than 1 %

Rx Power = -101dBm

Tone Power = -30dBm

Tone Offset from Carrier = ± 0.9 MHz

Intermodulation Spurious Response Attenuation : lower than 1 %

Rx Power = -101dBm

Tone Power 1 = -43dBm

Tone Power 2 = -43dBm

Tone 1 Offset from Carrier = ± 0.9 MHz

Tone 2 Offset from Carrier = ± 1.7 MHz

3) AMPS

A. Transmitter

RF Output Power : +25.073dBm

Carrier ON/OFF Conditions

"ON" Condition : within ± 3 dB of specification output(in 2 ms)

"OFF" Condition : below -60dBm(in 2ms)

Compressor

Compression Rate : 2 : 1

Attack Time : 3 ms

Recovery Time : 13.5 ms

Reference Input : input power level for producing a nominal ± 2.9 kHz

: peak frequency deviation of transmitted carrier

Preamphasis : 6dB/OCT within 0.3 3 kHz

Maximum Frequency Deviation

Modulation Deviation Limiting : ± 12 kHz

Supervisory Audio Tone : ± 2 kHz($\pm 10\%$)

Signaling Tone : ± 8 kHz($\pm 10\%$)

Wideband Data : ± 8 kHz($\pm 10\%$)

Post Deviation Limiter Filter

3.0 5.9 kHz : above 40 LOG(F/3000)dB

5.9 6.1 kHz : above 35dB

6.1 15 kHz : above 40 LOG(F/3000)dB

Over 15 kHz : above 28 dB

Spectrum Noise Suppression

For all modulation

fo +20 kHz fo + 45 kHz : above 26dB

For modulation by voice and SAT

fo + 45 kHz : above 63dB+10LOG(PY)dB

For modulation by WBD(without SAT) and ST(with SAT)

fo +45 kHz fo + 60 kHz : above 45 dB

fo +60 kHz fo + 90 kHz : above 65 dB

fo +90 kHz 2 fo : above 63 dB + 10 LOG(PY) dB

(where fo = carrier frequency, PY=mean output power in watts)

Harmonic and conducted Spurious Emissions : below 43 + 10 LOG(PY) dB

B. Receiver

De-emphasis : -6dB/OCT within 0.3 3 kHz

Expander

Expander Rate : 1 : 2

Attack time : within 3 ms

Recovery Time : within 13.5 ms

Reference input : output power level to a 1000Hz tone from a carrier within ± 2.9 kHz
peak frequency deviation

Sensitivity : 12 dB SINAD/-116dBm

Intermodulation Spurious Response Attenuation : above 65dB

RSSI Range : above 60dB

Protection Against Spurious Response Interference : above 60dB

In Band Conducted Spurious Emission

Transmit Band : below -60 dBm

Receive Band : below -80 dBm

Out of Band Conducted Spurious Emissions : below -47dBm

Radiated Spurious Emission

Frequency Range : Maximum Allowable EIRP

25 70MHz : -45dBm

70 130MHz : -41dBm

130 174 MHz : -41 -32dBm

174 260 MHz : -32 dBm

260 470 MHz : -32 -26 dBm

470 1G MHz : -21 dBm

4) GPS

Location Accuracy

For 67% of calls : less than 50 meter

For 95% of calls : less than 150 meter

NAM program can be changed as following table:

Notes:

- In the NAM program mode, each item show you the currently stored data. you can modify the data by entering a new data.
- You can move to next window by pressing "OK" key.
- When you press a wrong number, press "CLR" key to delete the last number or press and hold "CLR" key to delete all number

General Setup

LCD Display	Key in	Funtion
	#, #	Enter the NAM Mode
Enter ??????	222222	Enter random 6-digit code(msL)
SVC Menu ↑↓ 1: Phone # 2: General 3: NAM	1	Choose 'Phone#'
Phone Number 1234567890	OK	- Phone number setup - To change phone number, enter phone # - Store it
MSID 1234567890	OK	- Mobile ID setup - To change phone number, enter phone # - Store it
SVC Menu ↑↓ 1: Phone # 2: General 3: NAM	2	Choose 'General'
ESN B0000000	OK	Electronic Serial Number of the phone is displayed
CAI REVISION 6	OK	Common Air Interface version is displayed
Origination 13k	OK	
SCM 01101010	OK	Station Class Mark displays the power class, transmission, slotted class, dual mode.
Lock Code 0016	4-digit Code, OK	- Lock code, current status is displayed - To change Lock Code, enter a new code - Store it
Slot Mode YES	* or #, OK	- Slot mode. 'Yes' indicates the slot mode. - Change status - Store it
Slot Index 2	0~7, OK	- Slot mode index. The high number means longer sleeping time - To change Slot Index, enter new one - Store it
FORWARD RC 3	OK	

NAM Mode Setup

LCD Display	Key in	Funtion
SVC Menu ↑↓ 1: Phone # 2: General 3: NAM	3	Choose 'NAM'
HOME SID 4120	number OK	SID written in the list,current status is displayed. - Enter new one to change code - Store it
HOME NID 4120	number OK	NID written in the list,current status is displayed. - Enter new one to change code - Store it
MCC 310	number OK	ImSI Mobile Country Code, current code is displayed. - Enter new one to change code - Store it
MNC 00	number OK	ImSI Mobile Network Code, current code is displayed. - Enter new one to change code - Store it
ACCOLC 6	class number OK	CDMA Access Overload Class, current status is displayed - Enter new one to change code - Store it
NAM CDMA Home Sys Reg Yes	* or # OK	CDMA Home system ID, current status is displayed - Enter new one to change code - Store it
NAM CDMA FSID Reg Yes	* or # OK	CDMA foreign SID, current status is displayed. - Enter new one to change code - Store it
CDMA FNID Reg Yes	* or # OK	CDMA foreign NID,current status is displayed. - Enter new one to change code - Store it

1. Definition of Test Commands

- Press following key to enter the test mode ; "4, 7, *, 8, 6, 9, #, 1, 2, 3, 5"

Command No.	Command SW Name	Description
001	T_SUSPEND_I	Enter to TestMode */
002	T_RESTART_I	Escape from TestMode */
003	T_SAVE_VAL_I	Save values to EEPROM */
004	T_WRITE_NV_I	Write the EEPROM item */
005	T_VOLUME_UP_I	Electric Volume Up */
006	T_VOLUME_DOWN_I	Electric Volume Down */
008	T_RECOVER_I	Rebuild Partially */
011	T_CARRIERON_I	Turn on the carrier */
012	T_CARRIEROFF_I	Turn off the carrier */
013	T_LOADSYN_I	Load the synthesizer for locking */
014	T_CDATA_I	Send TX Control data continuously */
015	T_CDTRK_ADJ_I	Adjust CDMA tracking local */
016	T_CDMA_TXADJ_I	Set CDMA/PCS Tx AGC code */
017	T_TRK_ADJ_I	TRK LOCAL ADJUST */
018	T_FM_TXADJ_I	sets tx_agc_adj for fm mode */
019	T_LNA_GAIN_WR_I	Adjust LNA gain */
020	T_LNA_RAS_ADJ_I	Adjust LNA Ras code in array */
021	T_SIO_MODE_I	Change SIO mode */
022	T_TEST_SYS_I	Change band & channel */
023	T_DATASVC_ON_I	Data Service ON for Manufacturing Test */
024	T_DATASVC_OFF_I	Data Service OFF for Manufacturing Test */
025	T_MRU2_TABLE_I	Reset MRU */
026	T_LCD_BUFFER_IC_I	
027	T_NAL_SET_I	
031	T_VERSION_I	Send model/sw ver/hw ver/buyer */
032	T_SNDNAM_I	Send NAM Information */
033	T_SNDVERSION_I	Send Software Version */
034	T_SNDESN_I	Send ESN */
035	T_WRT_PLINFO_I	Write Product line information */
036	T_RD_PLINFO_I	Read Product line information */
037	T_REBUILD_I	Rebuilding EEPROM */

038	T_PHONE_RESET_I	UI Features reset */
039	T_FORMAT_REBUILD_I	
041	T_BACKLIGHT_ON_I	Backlight on */
042	T_BACKLIGHT_OFF_I	Backlight off */
043	T_LAMP_ON_I	LAMP on */
044	T_LAMP_OFF_I	LAMP off */
045	T_VIBRATOR_ON_I	Activate a vibrator */
046	T_VIBRATOR_OFF_I	Inactivate a vibrator */
047	T_DTMFON_I	Turn on DTMF */
048	T_DTMFOFF_I	Turn off DTMF */
049	T_LCD_CONTRAST_I	Change LCD CONTRAST */
050	T_SUB_LCD_CONTRAST_I	FRONT_LCD_CONTRAST */
051	T_BATT_TYPE_I	Check battery type */
052	T_READ_BATT_I	Saved low battery value read */
053	T_VBATT1_I	Set low battey value in the standby */
054	T_VBATT2_I	Set low battey value in the talking */
055	T_WRITE_BATT_I	Write a battery value */
056	T_THERM_READ_I	Read a thermister */
057	T_THERM2_READ_I	Read a thermister2 */
061	T_PCS_RXRAS_ADJ_M_I	Adjust PCS Rx Ras code in array */
062	T_PCS_RXRAS_ADJ_A_I	Adjust PCS Rx Ras code in array */
063	e T_PCS_TXRAS_ADJ_I	Adjust PCS Tx Ras code in array */
064	T_PCS_CH_FLATNESS_I	Adjust PCS Tx Ras channel flatness : dBm */
065	T_PCS_PWR_LIMIT_I	Limit PCS Tx power */
066	T_PCS_TEMPCOMP_I	Compensate PCS Tx Ras code at any temperature */
067	T_PCS_BT_F_I	
071	T_CDMA_RXRAS_ADJ_M_I	Adjust CDMA Rx Ras code in array */
072	T_CDMA_RXRAS_ADJ_A_I	Adjust CDMA Tx Ras code in array */
073	e T_CDMA_TXRAS_ADJ_I	Adjust CDMA Tx Ras code in array */
074	T_CDMA_CH_FLATNESS_I	Adjust CDMA Tx Ras channel flatness : 23dBm */
075	T_CDMA_PWR_LIMIT_I	Limit CDMA Tx power */
076	T_CDMA_TEMPCOMP_I	Compensate CDMA Tx Ras code at any temperature */
077	T_CDMA_BT_F_I	
081	e T_FM_TX_PWR_I	Adjust AMPS Tx power level(2-7) */

082	T_FM_CHAN_FLAT_I	Adjust AMPS Tx power channel flatness */
083	T_FM_TEMPCOMP_I	Compensate AMPS Tx power at any temperature */
084	T_FM_PWRLEVEL_I	Change AMPS power level */
085	T_FM_RSSI_I	
091	T_GPSONE_MODE_I	Set single/continuous mode */
092	T_GPSONE_GPS_RF_DELAY_FOR_PCS_I	dima0122
093	T_GPSONE_PCS_RF_DELAY_I	dima0122
094	T_GPSONE_ACCURACY_I	
095	T_GPSONE_ANT_OFF_DB_I	dima0122
096	T_GPSONE_LO_BIAS_UPDATE_CNT	dima0122
097	T_GPSONE_GPS_LO_CAL_I	dima0122
098	T_GPSONE_GPS_RF_LOSS_I	Set gps rf loss */
099	T_GPSONE_GPS_RF_DELAY_I	Set gps rf delay */
100	T_GPSONE_CDMA_RF_DELAY_I	Set cdma rf delay */
101	T_SET_EXT_AUDIO_I	External audio path on/off */
102	T_FM_VCLINE_I	Enetr FM voice state */
103	T_ALLPATH_I	Tune on the all audio path */
104	T_RXMUTE_I	Mute rx audio */
105	T_RXUNMUTE_I	Unmute rx audio */
106	T_TXMUTE_I	Mute tx audio */
107	T_TXUNMUTE_I	Unmute tx audio */
108	T_LOOPBACK_I	
109	T_STON_I	Turn on ST */
110	T_STOFF_I	Turn off ST */
111	T_SATON_I	Turn on SAT */
112	T_SATOFF_I	Turn off SAT */
113	T_COMPANDORON_I	Turn on compandor */
114	T_COMPANDOROFF_I	Turn off compandor */
115	T_FM_ST_GAIN_I	Adjust FM ST gain */
116	T_FM_SAT_LEVEL_I	Adjust FM SAT level */
117	T_FM_FREQ_SGAIN_I	Adjust FM frequency sense gain */
121	T_TX_LIMITER_I	Adjust Tx Limiter */
122	T_VOC_PCMLPON_I	Turn on to play a PCM LOOP BACK */
123	T_VOC_PCMLPOFF_I	Turn off to play a PCM LOOP BACK */
124	T_PCM_FORMAT_I	

125	T_SND_VOC_CAL_I	
126	T_SND_CDMA_VOC_CAL_I	sdj_vc26
127	T_MAX_I	

2. Commands in Test Mode

1) System Mode Selection

- A. Press "001" : "001" is suspend command
- B. Press "022" : "022" is mode selection command
 - PCS : 3XXXX(XXXX : Channel number)
 - CDMA : 2XXXX(XXXX : Channel number)
 - AMPS : 10000 or 10001
(10000 : AMPS A-Band, 10001 : AMPS B-Band)
- C. Press "OK" button to save changed mode
- D. Press "002" to escape from test mode

2) Channel Change and Tx Power Control

- A. PCS
 - a. Press "001" : Suspend
 - b. Press "013" : Chan____XXXX
Enter the channel number(4-digit), ex) "0600" : set to 600 Ch.
Press "#" : Move to next window
 - c. Press "011" : Carrier On
 - d. Press "014" : CDATA(spread spectrum to 1.23MHz bandwidth)
 - e. Press "016" : CD TXagc_XXX

Enter the AGC code number(3-digit)

(XXX means AGC code, AGC code range is from 000 to 511)

AGC code control Tx output power

B. CDMA

a. Press "001" : Suspend

b. Press "013" : Chan____XXXX

Enter the channel number(4-digit), ex) "0363" : set to 363 Ch.

Press "#" : Move to next window

c. Press "011" : Carrier On

d. Press "014" : CDATA(spread spectrum to 1.23MHz bandwidth)

e. Press "016" : CD TXagc_XXX

Enter the AGC code number(3-digit)

(XXX means AGC code, AGC code range is from 000 to 511)

AGC code controls Tx output power

C. AMPS

a. Press "001" : Suspend

b. Press "013" : Chan____XXXX

Enter the channel number(4-digit), ex) "0363" : set to 363 Ch.

Press "#" : Move to next window

c. Press "011" : Carrier On

d. Press "018" : FM TXagc_XXX

Enter the AGC code number(3-digit)

(XXX means AGC code, AGC code range is from 000 to 511)

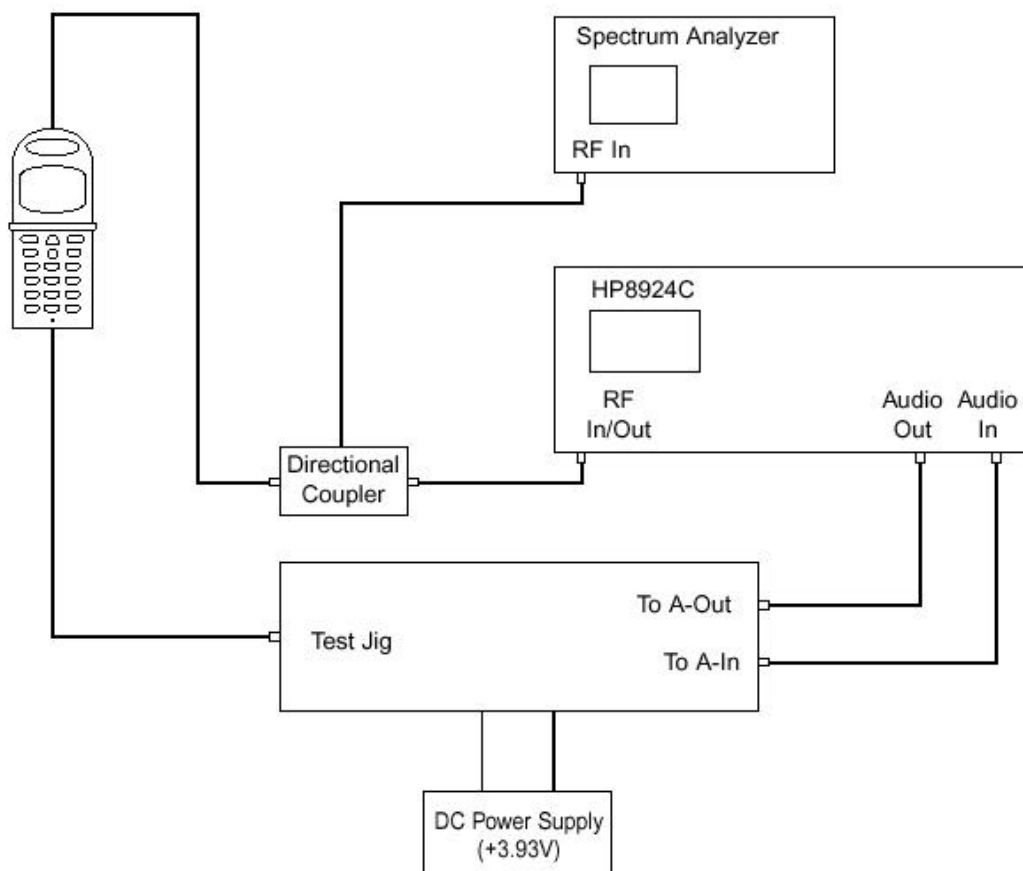
AGC code controls Tx output power

2. Test Procedure

1) Test Equipment

- DC Power Supply
- Test Jig
- Test Cable
- CDMA Mobile Station Test Set : HP8285A, HP83236A, CMD-80, etc
- Spectrum Analyzer(including CDMA Test Mode) HP8596E

2) Test Configuration



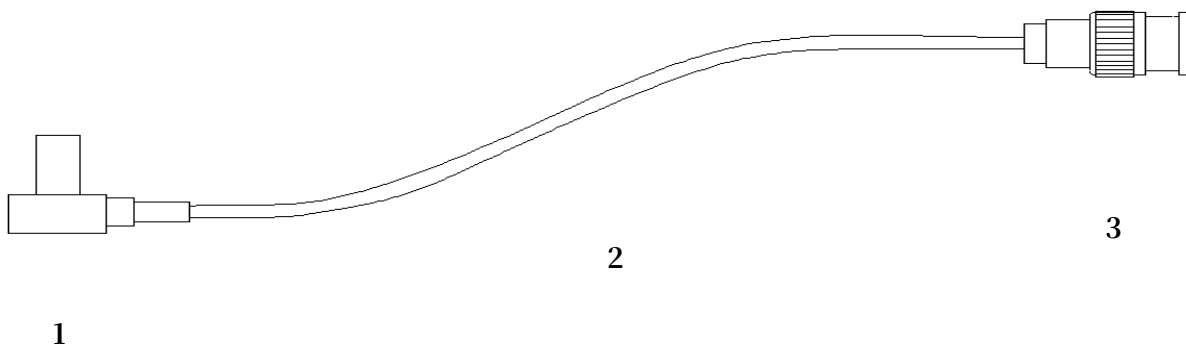
※ CAUTION : The test jig and data cable has a voltage drop of 0.33V at FM Max power output, you'd better set the DC power supply to 3.93V for normal test condition.
(Nominal voltage of battery is 3.6V at cellular phone)

3) GPS Part Test Equipment

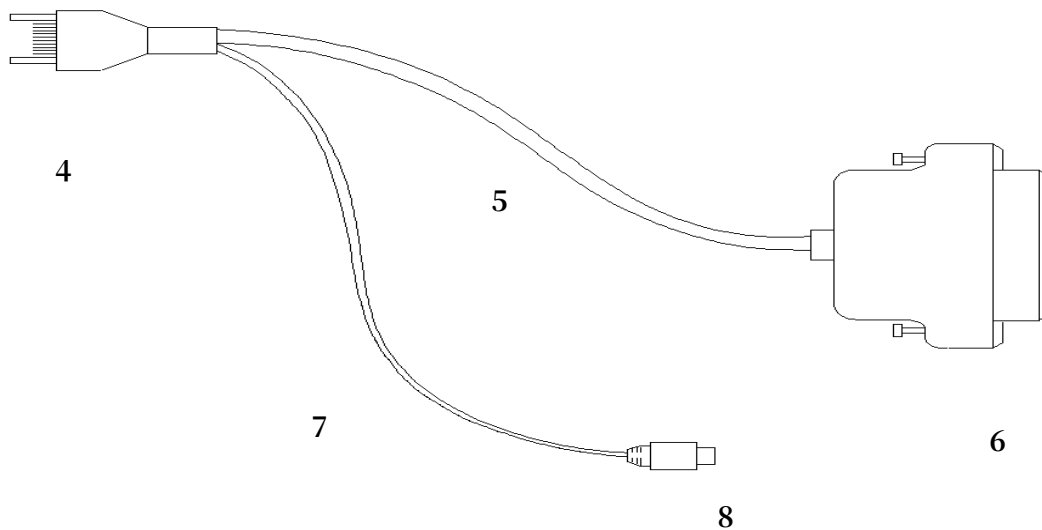
- DC Power Supply
- Test Jig
- Test Cable
- CDMA and GPS Mobile Station Test Set : HP8924C, HP83236A, CMD-80,
PC STR 4775(GPS simulator), etc.

4) Test Cable Description

A. Test Cable



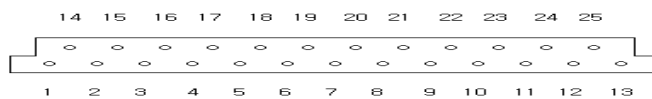
B. Test Cable Name



No.	Name
1	MHC 172
2	RF CABLE (1.5dB Loss for AMPS & CDMA , 2.3dB for PCS)
3	BNC CONNECTOR (RF)
4	PLUG CONNECT TO SPH-A600
5	DATA CABLE
6	25PIN CONNECTOR (DATA)
7	USB CABLE
8	USB 4PIN CONNECTOR

C. Dsub 25 PIN CONNECTOR PIN DESCRIPTION (TEST CABLE 4, BACK SIDE6)

DATA DESCRIPTION	Dsub CONN. PIN NO.		DATA DESCRIPTION	Dsub CONN. PIN NO.
VBATT	4,6		RX_DATA	21
RX_AUDIO	12		TX_DATA	22
TX_AUDIO	10		GND	13,24,25
HP_PWR	7			



D. USB 4 PIN CONNECTOR PIN DESCRIPTION (TEST CABLE 4, BACK SIDE8)

DATA DESCRIPTION	USB CONN PIN NO.		DATA DESCRIPTION	USB CONN PIN NO.
USB_D+	3		RESERVED0	1
USB_D-	2		GND	4



4 3 2 1

E. Conversion Table of Frequency vs Channel

Type	Channel	Conversion Equation	Remark
Tx Freq.	$1 \leq N \leq 799$ $990 \leq N \leq 1023$	$F = 0.03 \times N + 825.00$ $F = 0.03 \times (N - 1023) + 825.00$	N : Ch Number F : Freq. (CDMA/AMPS)
Rx Freq.	$1 \leq N \leq 799$ $990 \leq N \leq 1023$	$F = 0.03 \times N + 870.00$ $F = 0.03 \times (N - 1023) + 870.00$	
Tx Freq.	$0 \leq N \leq 1199$	$F = 0.05 \times N + 1850.00$	N : Ch. Number F ; Freq. (PCS)
Rx Freq.	$0 \leq N \leq 1199$	$F = 0.05 \times N + 1930.00$	