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W-CDMA/GSM Measurement

Radio Communication Analyzer MT8820B/MT8820C/MT8821C

Revision History

Ver. No	Date	Contents	Related product software version
1.00	May 2015	MT8820B/20C/21C W/G Application Note (Ver 1.00) succeeded MT8820B/20C W/G Application Note (Ver 6.00) Overall: Changed model name from MT8820B/C to “equipment” Overall: Added MT8821C option model names to MT8820B/C option model names Added MT8821C software specification Changed 1.10 CALIBRATION and 2.13 CALIBRATION to refer to the application note for UE Calibration.	MX882000C Ver23.20 MX882001C Ver23.03 MX882100C Ver30.00 MX882101C Ver30.00
1.01	Jan 2016	Corrected error in red box in figure	MX882000C Ver23.30 MX882001C Ver23.04 MX882100C Ver30.13 MX882101C Ver30.13
2.00	Jun 2016	• Added the judgment procedure using 3GPP TS51.010-1 measurement procedure to 2.3.7 Output RF spectrum • Added the judgment procedure using 3GPP TS51.010-1 measurement procedure to 2.5.5 Output RF spectrum in GPRS multislot configuration. • Added the judgment procedure using 3GPP TS51.010-1 measurement procedure to 2.8.5Output RF spectrum	MX882000C Ver23.30 MX882001C Ver23.04 MX882100C Ver30.32 MX882101C Ver30.32

Contents

1. W-CDMA Measurement Software

1.1. Specifications

1.1.1. MT8820B/20C software specification

Table 1.1.1-1 Specifications for MX882000C W-CDMA Measurement Software

Item	Specifications	
Electrical characteristics	Typical values (typ.) are only for reference and are not guaranteed.	
Frequency/Modulation measurement	Frequency	300 to 2700 MHz
	Input level	–30 to +35 dBm (Main)
	Carrier frequency accuracy	±(Set frequency ×Reference oscillator accuracy +10 Hz)
	Modulation accuracy	
	Residual vector error	≤2.5% (When one DPCCH signal and one DPDCH signal are input)
Amplitude measurement	Frequency	300 to 2700 MHz
	Input level	–65 to +35 dBm (Main)
	Measurement accuracy	MT8820B/MT8815B ±0.5 dB (–25 to +35 dBm), ±0.7 dB (–55 to –25 dBm), ±0.9 dB (–65 to –55 dBm), after calibration MT8820C ±0.5 dB (–20 to +35 dBm), typ. ±0.3 dB (–20 to +35 dBm), ±0.7 dB (–50 to –20 dBm), ±0.9 dB (–60 to –50 dBm), after calibration, 10 to 40°C
	Linearity	±0.2 dB (–40 to 0 dB, ≥–50 dBm), ±0.4 dB (–40 to 0 dB, ≥–65 dBm),
	Measurement object	DPCH, PRACH

Table 1.1.1-1 Specifications for MX882000C W-CDMA Measurement Software (Cont'd)

Item	Specifications	
Occupied bandwidth	Frequency	300 to 2700 MHz
	Input level	–10 to +35 dBm (Main)
Adjacent channel leakage power	Frequency	300 to 2700 MHz
	Input level	–10 to +35 dBm (Main)
	Measurement point	±5 MHz, ±10 MHz
	Measurement range	≥50 dB (±5 MHz), ≥55 dB (±10 MHz)
RF signal generator	Output frequency	300 to 2700 MHz (1 Hz steps)
	Channel level (CPICH, P-CCPCH, SCH, PICH, DPCH, S-CCPCH, AICH)	Off, –30.0 to 0.0 dB (0.1 dB steps, Relative level with Ior (Total power))
	Channel level (OCNS)	Off, automatic setting
	Channel level accuracy	±0.2 dB (Relative level accuracy with Ior (Total power))
	AWGN level	Off, –20 to +5 dB (0.1 dB steps, Relative level with Ior (Total power))
	AWGN level accuracy	±0.2 dB (Relative level accuracy with Ior (Total power))
Error rate measurement	Function	Applying PN9 or PN15 pattern to DTCH
	Measurement item	BER, BLER
	BER measurement object	Loop Back data applied to uplink DTCH and serial data input from the call processing I/O port on the rear panel
	BLER measurement object	Loop Back data applied to uplink DTCH
Call processing	Call control	Location registration, call origination, call termination, handover, network-side release, UE-side release (Execution of the operation conforming to the 3GPP standard and pass/fail judgment can be performed.)
	UE control	Output level, Loopback (UE control conforming to the 3GPP standard can be performed.)

Table 1.1.1-2 Specifications for MX882000C-001 W-CDMA Voice Codec

Item	Specifications	
Function	End-to-end communications test between a handset connected to the MT8820C and UE. Encode the voice from Audio Input, Output the decoded voice to AF Output. Encode the tone signal and Output the tone signal to AF Output. Measure the voice signal from AF Input and decoded voice signal.	
Voice codec	AMR 12.2 kbps	
Codec level adjustment	Encoder input gain	–3.00 to 3.00 dB, 0.01 dB steps
	Handset microphone volume	0, 1, 2, 3, 4, 5
	Handset speaker volume	0, 1, 2, 3, 4, 5
AF output	Frequency range	30 Hz to 10 kHz, Resolution 1 Hz
	Accuracy	±(Setting Frequency × Reference oscillator accuracy +0.1 Hz)
	Level setting range	0 to 5 Vpeak (AF Output connector)
	Setting resolution	1 mV (≤5 Vpeak), 100 μV (≤500 mVpeak), 10 μV (≤50 mVpeak)
	Accuracy	±0.2 dB (≥10 mVpeak, ≥50 Hz), ±0.3 dB (≥10 mVpeak, <50 Hz)
	Waveform distortion	Band at ≤30 kHz ≤–60 dB (≥500 mVpeak, ≤5 kHz), ≤–54 dB (≥70 mVpeak)
	Output impedance	≤1 Ω
	Max. output current	100 mA
AF input	Frequency range	50 Hz to 10 kHz
	Input voltage range	1 mVpeak to 5 Vpeak (AF Input connector)
	Max. allowable input voltage	30 Vrms
	Frequency measurement accuracy	± (Reference oscillator accuracy + 0.5 Hz)
	Level measurement accuracy	±0.2 dB (≥10 mV peak, ≥50 Hz) ±0.4 dB (≥1 mV peak, ≥1 kHz)
	SINAD measurement	Frequency at 1 kHz ≥60 dB (≥1000 mV peak) ≥54 dB (>50 mV peak) ≥46 dB (≥10 mV peak)
	Distortion rate measurement	Frequency at 1 kHz ≤–60 dB (≥1000 mV peak) ≤–54 dB (>50 mV peak) ≤–46 dB (≥10 mV peak)
	Input impedance	100 kΩ

Table 1.1.1-3 Specifications for MX882000C-011 HSDPA Measurement Software

Item	Specifications	
Function	RF TRX tests (Tx measurement and Rx measurement) related to HSDPA	
Amplitude measurement	This item depends on the MX882000C's performance. Measurement object	DPCH, HS-DPCCH
Throughput measurement	Function	Throughput measurement using Fixed Reference Channel (H-Set)
	Measurement object	ACK and NACK applied to HS-DPCCH
CQI measurement	Measurement object	Periodically reported CQI value applied to HS-DPCCH
Call processing	Call control	Location registration, Fixed reference channel (Execution of the operation conforming to the 3GPP standard and pass/fail judgment can be performed.)
	UE control	Output level (UE control conforming to the 3GPP standard can be performed.)

Table 1.1.1-4 Specifications for MX882000C-012 HSDPA H-Set 6 Throughput Test

Item	Specifications	
Function	Throughput tests related to HSDPA H-Set 6	
Throughput measurement	Function	Throughput measurement using Fixed Reference Channel (H-Set 6)
	Measurement object	ACK and NACK applied to HS-DPCCH
CQI measurement	Measurement object	Periodically reported CQI value applied to HS-DPCCH
Call processing	Call control	Location registration, Fixed reference channel (Execution of the operation conforming to the 3GPP standard and pass/fail judgment can be performed.)
	UE control	Output level (UE control conforming to the 3GPP standard can be performed.)

Table 1.1.1-5 Specifications for MX882000C-013 HSDPA High Data Rate

Item	Specifications	
Function	Throughput tests on HSDPA (H-Set 6) or at the peak rate of Category 6, 8, 9 or 10 UE	
Throughput measurement	Function	Throughput measurement using "Fixed Reference Channel (H-Set 6)" or "HS-SCCH or HS-PDSCH equivalent to the peak rate of Category 6, 8, 9 or 10 UE"
	Measurement object	ACK and NACK applied to HS-DPCCH
CQI measurement	Measurement object	Periodically reported CQI value applied to HS-DPCCH

Table 1.1.1-6 Specifications for MX882000C-021 HSUPA Measurement Software

Item	Specifications	
Function	RF TRX tests (Tx measurement and Rx measurement) related to HSUPA	
Amplitude measurement	This item depends on the MX882000C's performance.	
	Measurement object	DPCH, HS-DPCCH, E-DPCCH, E-DPDCH
Call processing	Call control	Location registration, E-DCH RF Test (Execution of the operation conforming to the 3GPP standard and pass/fail judgment can be performed.)
	UE control	Output level (UE control conforming to the 3GPP standard can be performed.)
	Monitoring	E-DCH throughput (Throughput measurement of E-DCH by monitoring E-TFCI included in the uplink E-DPCCH)

Table 1.1.1-7 Specifications for MX882000C-031 HSPA Evolution Measurement Software

Item	Specifications	
Amplitude measurement	This item depends on the MX882000C's performance.	
	Measurement object	DPCH, HS-DPCCH, E-DPCCH, E-DPDCH
Throughput measurement	Function	Throughput measurement using "Fixed Reference Channel (H-Set 8)" or "HS-SCCH or HS-PDSCH equivalent to the peak rate of Category 13 or 14 UE"
	Measurement object	ACK and NACK applied to HS-DPCCH
CQI measurement	Measurement object	Periodically reported CQI value applied to HS-DPCCH
Call processing	Call control	Location registration, Fixed Reference Channel, E-DCH RF Test (Execution of the operation conforming to the 3GPP standard and pass/fail judgment can be performed.)
	UE control	Output level (UE control conforming to the 3GPP standard can be performed.)
	Monitoring	E-DCH throughput (Throughput measurement of E-DCH by monitoring E-TFCI included in the uplink E-DPCCH)

Table 1.1.1-8 Specifications for MX882000C-032 DC-HSDPA Measurement Software

Item	Specifications	
Function	RF RX tests (Rx measurement) related to DC-HSDPA	
Throughput measurement	Function	Throughput measurement using “Fixed Reference Channel” or “HS-SCCH or HS-PDSCH equivalent to the peak rate of Category 22 or 24 UE”
	Measurement object	ACK and NACK applied to HS-DPCCH
CQI measurement	Measurement object	Periodically reported CQI value applied to HS-DPCCH
Call processing	Call control	Location registration, Fixed reference channel (Execution of the operation conforming to the 3GPP standard and pass/fail judgment can be performed.)
	UE control	Output level (UE control conforming to the 3GPP standard can be performed.)

Table 1.1.1-9 Specifications for MX882000C-033 DC-HSUPA Measurement Software

Item	Specifications	
Function	RF TX tests (Tx measurement) related to DC-HSUPA	
Amplitude measurement	This item depends on the MX882000C’s performance.	
	Measurement object	DPCH, HS-DPCCH, E-DPCCH, E-DPDCH
Call processing	Call control	Location registration, E-DCH RF Test (Execution of the operation conforming to the 3GPP standard and pass/fail judgment can be performed.)
	UE control	Output level (UE control conforming to the 3GPP standard can be performed.)

*MX882000C-032 DC-HSDPA Measurement Software supports MT8820C. MT8820B/15B does not support the MX882000C-032.

1.1.2. MT8821C Specification

Table 1.1.2-1Specifications for MX882100C W-CDMA Measurement Software

Item	Specifications	
Electrical characteristics	Typical values (typ.) are only for reference and are not guaranteed.	
Frequency/ Modulation measurement	Frequency	350 to 2700 MHz For the frequencies below 500 MHz, only the following range meets the specifications: 452.5 to 457.5 MHz (LTE Operating Band31)
	Input level	–30 to +35 dBm (Main1/2)
	Carrier frequency accuracy	±(Set frequency ×Reference oscillator accuracy +10 Hz)
	Modulation accuracy	
	Residual vector error	≤2.5% (When one DPCCH signal and one DPDCH signal are input)
Amplitude measurement	Frequency	350 to 2700 MHz For the frequencies below 500 MHz, only the following range meets the specifications: 452.5 to 457.5 MHz (LTE Operating Band31)
	Input level	–65 to +35 dBm (Main1/2)
	Measurement accuracy	±0.5 dB (–30 to +35 dBm), typ. ±0.3 dB (–30 to +35 dBm), ±0.7 dB (–55 to –30 dBm), ±0.9 dB (–65 to –55 dBm), after calibration 10 to 40°C
	Linearity	±0.2 dB (–40 to 0 dB, ≥–55 dBm), ±0.4 dB (–40 to 0 dB, ≥–65 dBm),
	Relative measurement error	
		Range <2 dB typ. ±0.10 dB (–40 to 0 dB, ≥–50 dBm)
	Measurement object	DPCH, PRACH

Table 1.1.2-1Specifications for MX882100C W-CDMA Measurement Software(Cont'd)

Item	Specifications	
Occupied bandwidth	Frequency	350 to 2700 MHz For the frequencies below 500 MHz, only the following range meets the specifications: 452.5 to 457.5 MHz (LTE Operating Band31)
	Input level	–10 to +35 dBm (Main1/2)
Adjacent channel leakage power	Frequency	350 to 2700 MHz For the frequencies below 500 MHz, only the following range meets the specifications: 452.5 to 457.5 MHz (LTE Operating Band31)
	Input level	–10 to +35 dBm (Main1/2)
	Measurement range	≥50 dB (±5 MHz), ≥55 dB (±10 MHz)
RF signal generator	Output frequency	300 to 2700 MHz (1 Hz steps)
	Channel level (CPICH, P-CCPCH, SCH, PICH, DPCH, S-CCPCH, AICH)	Off, –30.0 to 0.0 dB (0.1 dB steps, Relative level with Ior (Total power))
	Channel level (OCNS)	Off, automatic setting
	Channel level accuracy	±0.2 dB (Relative level accuracy with Ior (Total power))
	AWGN level	Off, –20 to +5 dB (0.1 dB steps, Relative level with Ior (Total power))
	AWGN level accuracy	±0.2 dB (Relative level accuracy with Ior (Total power))
Error rate measurement	Function	Applying PN9 or PN15 pattern to DTCH
	Measurement item	BER, BLER
	BER measurement object	Loop Back data applied to uplink DTCH and serial data input from the call processing I/O port on the rear panel
	BLER measurement object	Loop Back data applied to uplink DTCH
Call processing	Call control	Location registration, call origination, call termination, handover, network-side release, UE-side release (Execution of the operation conforming to the 3GPP standard and pass/fail judgment can be performed.)
	UE control	Output level, Loopback (UE control conforming to the 3GPP standard can be performed.)

Table 1.1.2-2 Specifications for MX882100C-001 W-CDMA Voice Codec

Item	Specifications	
Function	End-to-end communications test between a handset connected to the MT8821C and UE. Encode the voice from Audio Input, Output the decoded voice to AF Output. Encode the tone signal and Output the tone signal to AF Output. Measure the voice signal from AF Input and decoded voice signal.	
Voice codec	AMR 12.2 kbps	
Codec level adjustment	Encoder input gain	–3.00 to 3.00 dB, 0.01 dB steps
	Handset microphone volume	0, 1, 2, 3, 4, 5
	Handset speaker volume	0, 1, 2, 3, 4, 5
AF output	Frequency range	30 Hz to 10 kHz, Resolution 1 Hz
	Accuracy	±(Setting Frequency × Reference oscillator accuracy +0.1 Hz)
	Level setting range	0 to 5 Vpeak (AF Output connector)
	Setting resolution	1 mV (≤5 Vpeak), 100 μV (≤500 mVpeak), 10 μV (≤50 mVpeak)
	Accuracy	±0.2 dB (≥10 mVpeak, ≥50 Hz), ±0.3 dB (≥10 mVpeak, <50 Hz)
	Waveform distortion	Band at ≤30 kHz ≤–60 dB (≥500 mVpeak, ≤5 kHz), ≤–54 dB (≥70 mVpeak)
	Output impedance	≤1 Ω
	Max. output current	100 mA
AF input	Frequency range	50 Hz to 10 kHz
	Input voltage range	1 mVpeak to 5 Vpeak (AF Input connector)
	Max. allowable input voltage	30 Vrms
	Frequency measurement accuracy	±(Reference oscillator accuracy+0.5 Hz)
	Level measurement accuracy	±0.2 dB (≥10 mV peak, ≥50 Hz) ±0.4 dB (≥1 mV peak, ≥1 kHz)
	SINAD measurement	Frequency at 1 kHz ≥60 dB (≥1000 mV peak) ≥54 dB (>50 mV peak) ≥46 dB (≥10 mV peak)
	Distortion rate measurement	Frequency at 1 kHz ≤–60 dB (≥1000 mV peak) ≤–54 dB (>50 mV peak) ≤–46 dB (≥10 mV peak)
	Input impedance	100 kΩ

Table 1.1.2-3 Specifications for MX882100C-002 W-CDMA External Packet Data

Item	Specifications
Function	Data transfer with external UE via the Ethernet port on the W-CDMA measurement hardware
External Packet Data	Channel Coding Packet DTCH Data Pattern External PPP Packet, External IP Packet Max. transfer rate (Downlink) W-CDMA: 384 kbps HSDPA: 388 kbps (16QAM), 267 kbps (QPSK)

Table 1.1.2-4 MX882100C-003 W-CDMA Video Phone Test

Item	Specifications
Function	End-to-end video communication tests by connecting the MT8821C's 10Base-T 1 and 2 ports (Phone1 and Phone2) with each other, and connecting MT8821C with two sets of UE via two RF ports

Table 1.1.2-5 Specifications for MX882100C-005 W-CDMA A-GPS

Item	Specifications
Function	A-GPS tests defined in the 3GPP specifications

Table 1.1.2-6 Specifications for MX882100C-019 HSPA Measurement Software

Item	Specifications	
Function	• RF TRX tests (Tx measurement and Rx measurement) related to HSPA and HSPA Evolution • Throughput tests related to HSDPA on the Fixed Reference Channel (H-Set 6 or 8) or at the peak rate of Category 6, 8, 9, 10, 13 or 14 UE	
Amplitude measurement	This item depends on the MX882100C's performance. Measurement object	DPCH, HS-DPCCH, E-DPCCH, E-DPDCH
Throughput measurement	Function	• Throughput measurement using Fixed Reference Channel (H-Set) • Throughput measurement using "FRC (H-Set 6 or 8)" and "HS-SCCH or HS-PDSCH equivalent to the peak rate of Category 6, 8, 9, 10, 13 or 14 UE"
	Measurement object	ACK and NACK applied to HS-DPCCH
Call processing	Call control	Location registration, Fixed Reference Channel, E-DCH RF Test (Execution of the operation conforming to the 3GPP standard and pass/fail judgment can be performed.)
	UE control	Output level (UE control conforming to the 3GPP standard can be performed.)
	Monitoring	E-DCH throughput (Throughput measurement of E-DCH by monitoring E-TFCI included in the uplink E-DPCCH)

Table 1.1.2-7 Specifications for MX882100C-032 DC-HSDPA Measurement Software

Item	Specifications	
Function	RF RX tests (Rx measurement) related to DC-HSDPA	
Throughput measurement	Function	Throughput measurement that uses HS-SCCH or HS-PDSCH equivalent to the peak rate of Category 22 or 24 UE
	Measurement object	ACK and NACK applied to HS-DPCCH
CQI measurement	Measurement object	Periodically reported CQI value applied to HS-DPCCH
Call processing	Call control	Location registration, Fixed reference channel (Execution of the operation conforming to the 3GPP standard and pass/fail judgment can be performed.)
	UE control	Output level (UE control conforming to the 3GPP standard can be performed.)

Table 1.1.2-8 Specifications for MX882100C-033 DC-HSUPA Measurement Software

Item	Specifications	
Function	RF TX tests (Tx measurement) related to DC-HSUPA	
Amplitude measurement	This item depends on the MX882100C's performance.	
	Measurement object	DPCH, HS-DPCCH, E-DPCCH, E-DPDCH
Call processing	Call control	Location registration, E-DCH RF Test (Execution of the operation conforming to the 3GPP standard and pass/fail judgment can be performed.)
	UE control	Output level (UE control conforming to the 3GPP standard can be performed.)

1.2. 3GPP Measurement Specification Table

1.2.1. MX882000C/MX882100C - MT8820B/20C/21C W-CDMA Measurement Software

	Item (TS 34.121 V9.4.0)	Comment	
5	**Transmitter Characteristics**		
5.2	Maximum Output Power		√√
5.2A	Maximum Output Power with HS-DPCCH (Release 5 only)	MX882000C-011 MX882100C-019	√√
5.2AA	Maximum Output Power with HS-DPCCH (Release 6 and later)	MX882000C-011 MX882100C-019	√√
5.2B	Maximum Output Power with HS-DPCCH and E-DCH	MX882000C-021 MX882100C-019	√√
5.2BA	UE Maximum Output Power for DC-HSUPA(QPSK)	MX882000C-033 MX882100C-033	√√
5.2BB	UE Maximum Output Power for DC-HSUPA(16QAM)	MX882000C-033 MX882100C-033	√√
5.2C	UE relative code domain power accuracy	MX882000C-011 MX882100C-019	√√
5.2D	UE Relative Code Domain Power Accuracy for HS-DPCCH and EDCH	MX882000C-021 MX882100C-019	√√
5.2DA	UE Relative Code Domain Power Accuracy for DC-HSUPA with QPSK	MX882000C-033 MX882100C-033	√√
5.2E	UE Relative Code Domain Power Accuracy for HS-DPCCH and E-DCH with 16QAM	MX882000C-031 MX882100C-019	√√
5.2EA	UE Relative Code Domain Power Accuracy for DC-HSUPA with 16QAM	MX882000C-033 MX882100C-019	√√
5.3	Frequency Error		√√
5.3A	Frequency Error for DC-HSUPA	MX882000C-033 MX882100C-033	√√
5.4	**Output Power Dynamics in Uplink**		
5.4.1	Open Loop Power Control in Uplink		√√
5.4.1A	Open Loop Power Control in Uplink for DC-HSUPA	MX882000C-033 MX882100C-033	√√
5.4.2	Inner Loop Power Control in Uplink		√√
5.4.2A	Inner Loop Power Control in Uplink for DC-HSUPA	MX882000C-033 MX882100C-033	√√
5.4.3	Minimum Output Power		√√
5.4.4	Out-of-synchronisation handling of output power		√√
5.4.4A	Out-of-synchronisation handling of output power for a UE which supports type1 for DCH		√√
5.5	Transmit ON/OFF Power		√√
5.6	Change of TFC		√√
5.7	Power setting in uplink compressed mode		√√
5.7A	HS-DPCCH (Rel-6)	MX882000C-011 MX882100C-019	√√
5.7A	HS-DPCCH Power Control (Rel-7 and later)	MX882000C-011	√√

		MX882100C-019	
5.8	Occupied Bandwidth (OBW)		√√
5.8A	Occupied Bandwidth (OBW) for DC-HSUPA	MX882000C-033 MX882100C-033	√√
5.9	Spectrum emission mask		√√
5.9A	Spectrum Emission Mask with HS-DPCCH	MX882000C-011 MX882100C-019	√√
5.9B	Spectrum Emission Mask with E-DCH	MX882000C-021 MX882100C-019	√√
5.9C	Additional Spectrum Emission Mask for DC-HSUPA(QPSK)	MX882000C-033 MX882100C-033	√√
5.9D	Additional Spectrum Emission Mask for DC-HSUPA(16QAM)	MX882000C-033 MX882100C-033	√√
5.10	Adjacent Channel Leakage Power Ratio (ACLR)		√√
5.10A	Adjacent Channel Leakage Power Ratio (ACLR) with HS-DPCCH	MX882000C-011 MX882100C-019	√√
5.10B	Adjacent Channel Leakage Power Ratio (ACLR) with E-DCH	MX882000C-021 MX882100C-019	√√
5.10C	Adjacent Channel Leakage Power Ratio (ACLR) with E-DCH for DC-HSUPA(QPSK)	MX882000C-033 MX882100C-033	√√
5.10D	Adjacent Channel Leakage Power Ratio (ACLR) with E-DCH for DC-HSUPA(16QAM)	MX882000C-033 MX882100C-033	√√
5.11	Spurious Emissions	Requires SPA	√
5.12	Transmit Intermodulation	Requires SG and SPA	√
5.13	**Transmit Modulation**		
5.13.1	Error Vector Magnitude (EVM)		√√
5.13.1A	Error Vector Magnitude (EVM) with HS-DPCCH (Rel-6)	MX882000C-011 MX882100C-019	√√
5.13.1A	Error Vector Magnitude (EVM) with HS-DPCCH (Rel-7 and later)	MX882000C-011 MX882100C-019	√√
5.13.1AA	Error Vector Magnitude (EVM) and phase discontinuity with HS-DPCCH	MX882000C-011 MX882100C-019	√√
5.13.1AAA	EVM and IQ origin offset for HS-DPCCH and E-DCH with 16 QAM	MX882000C-031 MX882100C-019	√√
5.13.2	Peak code domain error	Single Code Only	√√
5.13.2A	Relative Code Domain Error with HS-DPCCH	MX882000C-011 MX882100C-019	√√
5.13.2B	Relative Code Domain Error with HS-DPCCH and E-DCH	MX882000C-021 MX882100C-019	√√
5.13.2BA	Relative Code Domain Error with HS-DPCCH and E-DCH for DC-HSUPA	MX882000C-033 MX882100C-033	√√
5.13.2C	Relative Code Domain Error for HS-DPCCH and E-DCH with 16QAM	MX882000C-031 MX882100C-019	√√
5.13.2CA	Relative Code Domain Error for HS-DPCCH and E-DCH 16QAM for DC-HSUPA	MX882000C-033 MX882100C-033	√√
5.13.3	UE phase discontinuity		√√
5.13.4	PRACH preamble quality		√√

5.13.5	In-band emission for DC-HSUPA	MX882000C-033 MX882100C-033	√√
6	**Receiver Characteristics**		
6.2	Reference Sensitivity Level		√√
6.2A	Reference Sensitivity Level for DC-HSDPA	MX882000C-032 MX882100C-032	√√
6.2C	Reference Sensitivity Level for Single band 4C-HSDPA	MX882000C-034 MX882100C-034	√√
6.2D	Reference Sensitivity Level for Dual band 4C-HSDPA	MX882000C-034 MX882100C-034	√√
6.3	Maximum Input Level		√√
6.3A	Maximum Input Level for HS-PDSCH Reception (16QAM)	MX882000C-011 MX882100C-019	√√
6.3B	Maximum Input Level for HS-PDSCH Reception (64QAM)	MX882000C-031 MX882100C-019	√√
6.3C	Maximum Input Level for DC-HSDPA Reception (16QAM)	MX882000C-032 MX882100C-032	√√
6.3D	Maximum Input Level for DC-HSDPA Reception (64QAM)	MX882000C-032 MX882100C-032	√√
6.3G	Maximum Input Level for 4C-HSDPA Reception (16QAM)	MX882000C-034 MX882100C-034	√√
6.3GA	Maximum Input Level for 4C-HSDPA Reception (16QAM) (3carrier)	MX882000C-034 MX882100C-034	√√
6.3H	Maximum Input Level for 4C-HSDPA Reception (64QAM)	MX882000C-034 MX882100C-034	√√
6.3HA	Maximum Input Level for 4C-HSDPA Reception (64QAM) (3carrier)	MX882000C-034 MX882100C-034	√√
6.4	Adjacent Channel Selectivity (ACS)	Requires SG	√
6.5	Blocking Characteristics	Requires SG	√
6.5A	Blocking Characteristics for DC-HSDPA	Requires SG	√
6.6	Spurious Response	Requires SG	√
6.6A	Spurious Response for DC-HSDPA	Requires SG	√
6.7	Intermodulation Characteristics	Requires SG	√
6.7A	Intermodulation Characteristics for DC-HSDPA	Requires SG	√
6.8	Spurious Emissions	Requires SPA	√

√√: Supported | √: Requires external equipment (SPA or SG) | F: Future Support | –: Not Supported

	Item	Comment	
7	**Performance requirements**		
7.2	Demodulation in Static Propagation conditions		√√
7.3	Demodulation of DCH in Multi-path Fading Propagation conditions	Requires Fading Simulator Except test 13 to 16	√
7.4	Demodulation of DCH in Moving Propagation conditions	Requires Fading Simulator	√
7.5	Demodulation of DCH in Birth-Death Propagation conditions	Requires Fading Simulator	√
7.5A	Demodulation of DCH in high speed train condition	Requires Fading Simulator	√
7.6	Demodulation of DCH in downlink Transmit diversity modes		–
7.7	Demodulation in Handover conditions		–
7.8	Power control in downlink		–
7.9	Downlink compressed mode		–
7.10	Blind Transport format detection		–
7.11	Demodulation of Paging Channel (PCH)		–
7.12	Detection of Acquisition Indicator (AI)		–
7.13	UE UL power control operation with discontinuous UL DPCCH transmission operation		–

√√: Supported | √: Requires external equipment (SPA or SG) | F: Future Support | –: Not Supported

1.2.2. W-CDMA Bands

The equipment supports W-CDMA Band I to XIX.

Note1: For MT8820B/C, Band IX requires MX882050C-009 W-CDMA Band IX, For MT8821C, this is available as standard.
Note2: For MT8820B/C, Band XI requires MX882050C-008 W-CDMA Band XI, For MT8821C, this is available as standard.
Note3: For MT8820B/C, Band XII, XIII, XIV, XIX, XX, XXI require MX882050C-007 W-CDMA Band XII, XIII, XIV, XIX, XX, XXI. For MT8821C, this is available as standard.

1.3. TRX Measurement (Fundamental Measurement)

The control software is presupposed to have been created using GPIB. See the operation manual for details of GPIB commands and manual operations. GPIB commands are in bold red.

1.3.1. Connection with Test Loop Mode

Measurement is performed with Test Loop Mode1. The connection procedures are shown below.

By turning off ATT Flag, the UE can stop location registration (only inside registered network).
If location registration is not needed, turn off the ATT Flag (**ATTFLAG OFF**) before turning on UE power.
For optimum measurement, connection should be executed after turning off the Measurement Report (**MEASREP OFF**).

1. Execute **PRESET_3GPP** to preset parameter for 3GPP.
2. Execute **INTEGRITY ON** to set [Integrity Protection] to [On].
3. Execute **DRXCYCLNG 64** to set [DRX Cycle Length] to [64] Frame (= 640 ms).
4. Turn on the UE power.
5. Execute **CALLSTAT?** and wait until the response becomes 2 (= Idle (Regist)).
6. Execute **CALLSA** to connect with Test Loop Mode1.
7. Execute **CALLSTAT?** and wait until the response becomes 7 (= Test Loop Mode 1).

1.3.2. Disconnection with Test Loop Mode

1. Execute **CALLSO** to disconnect with Test Loop Mode1.
2. Execute **CALLSTAT?** and wait until the response becomes 2 (= Idle(Regist)).

1.3.3. Channel Switching using Handover

Usually, measurement is performed at three frequency points (L, M, H). In this case, the Channel can be switched quickly without reconnection by switching it at handover with a higher output level. When a GPIB command is sent during handover, it waits until handover ends.

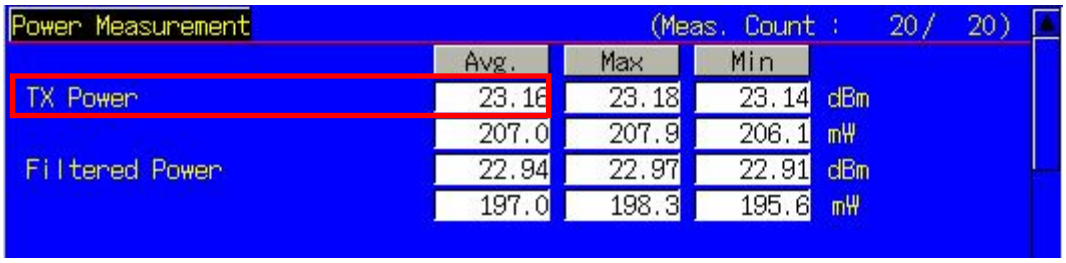
1. Execute TRX measurement at M channel.
2. Execute **CHAN 9613** to handover to L channel.
3. Execute TRX measurement.
4. Execute **CHAN 9887** to handover to H channel.
5. Execute TRX measurement.

1.3.4. Selecting Test Items

Set unnecessary items, such as BER and BLER measurements (**BER_MEAS OFF**, **BLER_MEAS OFF**), to off to reduce measurement time.
Execute **ALLMEASITEMS_OFF** to set all measurements to off.

1.3.5. 5.2 Maximum Output Power

1. Connect with Test Loop Mode1.
2. Execute **ILVL 35.0** to set Input Level to [+35.0] dBm.
3. Execute **OLVL -106** to set [Output Level] to [–106] dBm.
4. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].
5. Execute **PWR_MEAS ON** to set [Power Measurement] to [On].
6. Execute **PWR_AVG 20** to set [Average Count] of power measurement to [20] times.
7. Execute **SWP** to perform power measurement.
8. Execute **AVG_POWER?** to read the power measurement result.
9. Confirm the measurement result is 24 dBm (Tolerance +1.7/-3.7 dB).



TX Power means Mean power (5 MHz band), and Filtered Power means RRC filtered mean power.

1.3.6. 5.3 Frequency Error

Average measurement result is the average value of signed measurement results. Max and Min results must be used.

1. Connect with Test Loop Mode1.
2. Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
3. Execute **OLVL -106** to set [Output Level] to [–106] dBm.
4. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].
5. Execute **FREQ_MEAS ON** to set [Frequency Error] measurement to [On].
6. Execute **FREQ_AVG 20** to set [Average Count] of Frequency Error measurement to [20] times.
7. Execute **SWP** to perform Frequency Error measurement.
8. Execute **MAX_CARRFERR? PPM** to read the Frequency Error measurement result.
9. Execute **MIN_CARRFERR? PPM** to read the Frequency Error measurement result.
10. Confirm the measurement result is lower than (0.1 ppm + 10 Hz).

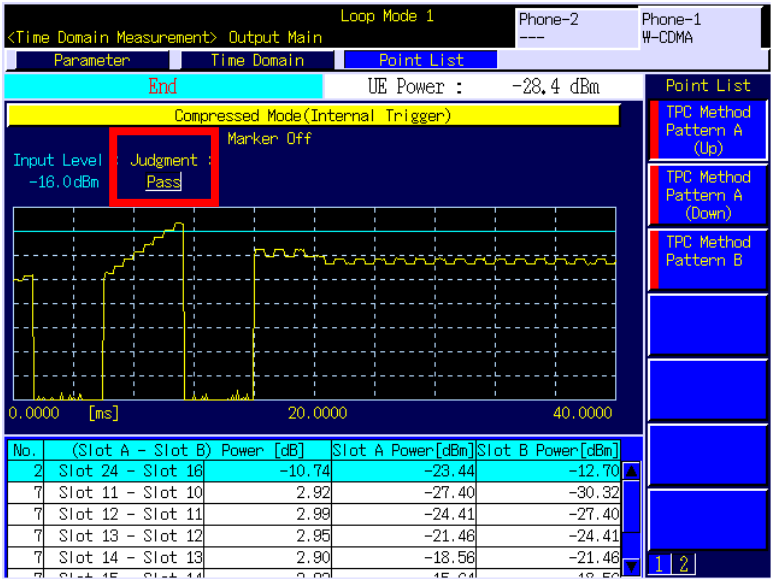
Max and Min results must be used for signed measurements such as Frequency Error.

1.3.7. 5.7 Power setting in uplink compressed mode

1. Connect with Test Loop Mode1. (Refer to 1.3.1.)
2. Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
3. Execute **MEASOBJ COMPRESS** to set [Measurement Object] to [Compressed Mode].
4. Execute **TPCSTEP 2** to set [TPC Step Size] to [2 dB].
5. Execute **ILVL -36.0** to set [Input Level] to [-36.0] dBm.
6. Wait until the UE power is -36.0 dBm.
7. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].

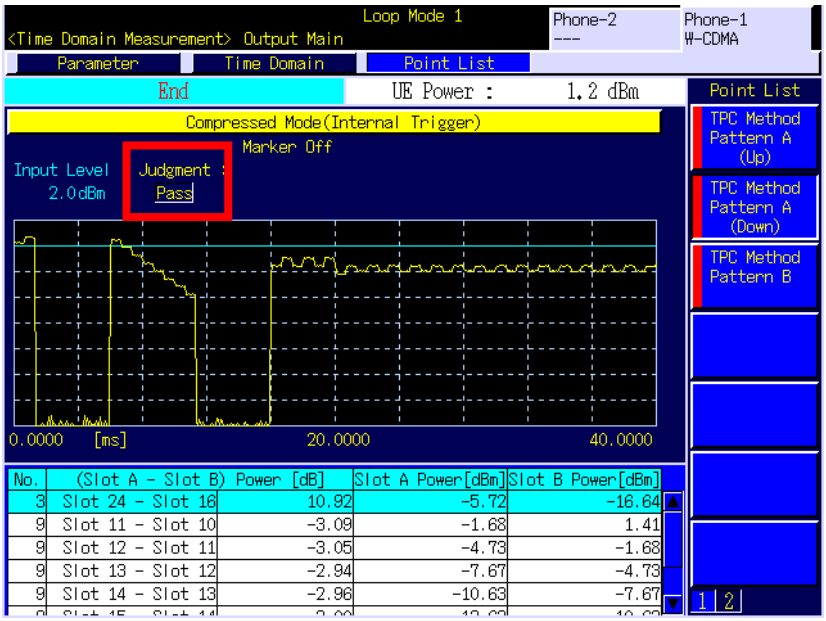
[Pattern A(Up)]

8. Execute **ILP_TPC PAT_A_UP** to set [TPC Method] to [Pattern A(Up)].
9. Execute **ILVL -16.0** to set [Input Level] to [-16.0] dBm.
10. Execute **SWP** to perform measurement.
11. Execute **COMPPASS?** to read the measurement result.
12. Confirm the measurement result is PASS.



[Pattern A(Down)]

13. Execute **ILP_TPC PAT_A_DOWN** to set [TPC Method] to [Pattern A(Down)].
14. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
15. Execute **ILVL 2.0** to set [Input Level] to [2.0] dBm.
16. Wait about 30ms until the UE power becomes [2.0] dBm.
17. Execute **SWP** to perform measurement.
18. Execute **COMPPASS?** to read the measurement result.
19. Confirm the measurement result is PASS.

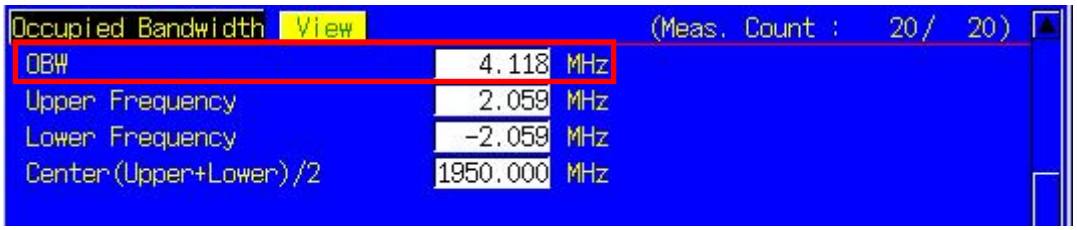


[Pattern B]

20. Execute **ILP_TPC PAT_B** to set [TPC Method] to [Pattern B].
21. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
22. Execute **ILVL -10.0** to set [Input Level] to [-10.0] dBm.
23. Wait about 30ms until the UE power becomes [-10.0] dBm.
24. Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
25. Execute **SWP** to perform measurement.
26. Execute **COMPPASS?** to read the measurement result.
27. Confirm the measurement result is PASS.

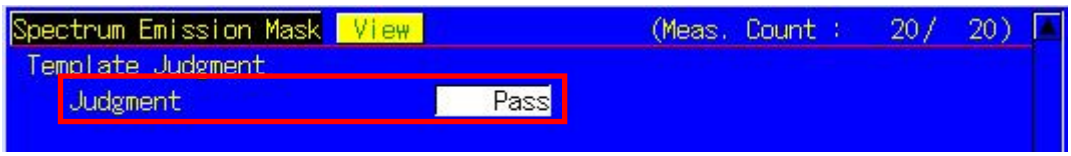
1.3.8. 5.8 Occupied Bandwidth

1. Connect with Test Loop Mode1.
2. Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
3. Execute **OLVL -106** to set [Output Level] to [–106] dBm.
4. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].
5. Execute **OBW_MEAS ON** to set [Occupied Bandwidth] measurement to [On].
6. Execute **OBW_AVG 20** to set [Average Count] of Occupied Bandwidth measurement to [20] times.
7. Execute **SWP** to perform Occupied Bandwidth measurement.
8. Execute **OBW?** to read the Occupied Bandwidth measurement result.
9. Confirm the measurement result lower than 5 MHz.



1.3.9. 5.9 Spectrum Emission Mask

1. Connect with Test Loop Mode1.
2. Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
3. Execute **OLVL -106** to set [Output Level] to [–106] dBm.
4. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].
5. Execute **SMASK_MEAS ON** to set [Spectrum Emission Mask] measurement to [On].
6. Execute **SMASK_AVG 20** to set [Average Count] of Spectrum Emission Mask measurement to [20] times.
7. Execute **SWP** to perform Spectrum Emission Mask measurement.
8. Execute **SMASKPASS?** to read the Spectrum Emission Mask measurement result.
9. Confirm the measurement result is PASS.



1.3.10. 5.10 Adjacent Channel Leakage Power

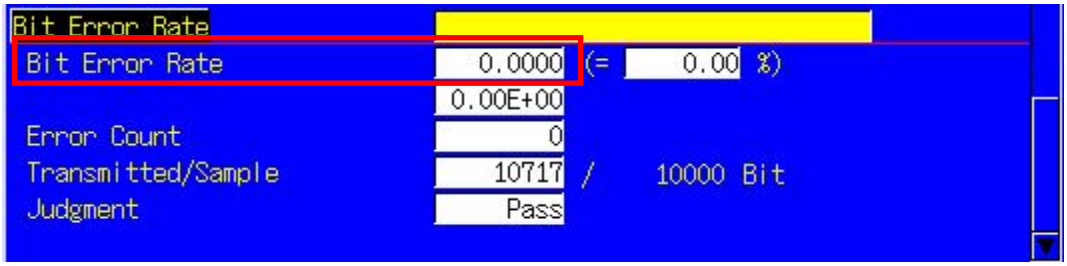
1. Connect with Test Loop Mode1.
2. Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
3. Execute **OLVL -106** to set [Output Level] to [–106] dBm.
4. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].
5. Execute **ADJ_MEAS ON** to set [Adjacent Channel Power] measurement to [On].
6. Execute **ADJ_AVG 20** to set [Average Count] of Adjacent Channel Power measurement to [20] times.
7. Execute **SWP** to perform Adjacent Channel Power measurement.
8. Execute **AVG_MODPWR? LOW10** to read the Adjacent Channel Power measurement result.
9. Confirm the measurement result is lower than -42.2 dB.
10. Execute **AVG_MODPWR? LOW5** to read the Adjacent Channel Power measurement result.
11. Confirm the measurement result is lower than -32.2 dB.
12. Execute **AVG_MODPWR? UP5** to read the Adjacent Channel Power measurement result.
13. Confirm the measurement result is lower than-32.2 dB.
14. Execute **AVG_MODPWR? UP10** to read the Adjacent Channel Power measurement result.
15. Confirm the measurement result is lower than –42.2 dB.

1.3.11. 5.13.1 Error Vector Magnitude (EVM)

1. Connect with Test Loop Mode1.
2. Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
3. Execute **OLVL -106** to set [Output Level] to [–106] dBm.
4. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].
5. Execute **INC_ORGNOFS ON** to set [EVM include Origin Offset] to [On].
6. Execute **MOD_MEAS ON** to set [Modulation Analysis] measurement to [On].
7. Execute **MOD_AVG 20** to set [Average Count] of Modulation Analysis measurement to [20] times.
8. Execute **SWP** to perform modulation analysis measurement.
9. Execute **AVG_EVM?** to read the EVM (Error Vector Magnitude) measurement result.
10. Confirm the measurement result is lower than 17.5%.
11. Execute **TOCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
12. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
13. Execute **ILVL -18.0** to set [Input Level] to [–18.0] dBm.
14. Wait about 200mm seconds until the UE power becomes [–18.0] dBm.
15. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
16. Repeat procedures 8, 9, and 10.

1.3.12. 6.2 Reference Sensitivity Level

1. Connect with Test Loop Mode1.
2. Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
3. Execute **OLVL -106** to set [Output Level] to [–106] dBm. (in case of Band I)
4. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].
5. Execute **BER_MEAS ON** to set [Bit Error Rate] measurement to [On].
6. Execute **BER_SAMPLE 10000** to set [Number of Sample] at BER measurement to [10000] bits.
7. Execute **SWP** to perform BER measurement.
8. Execute **BER?** to read the BER measurement result.
9. Confirm the measurement result is lower than 0.001 (0.1%).



1.3.13. Measurement Time Reduction using Batch Process

The above TRX test items can be measured under the same measurement condition, so measurement time can be reduced by performing all measurements simultaneously.

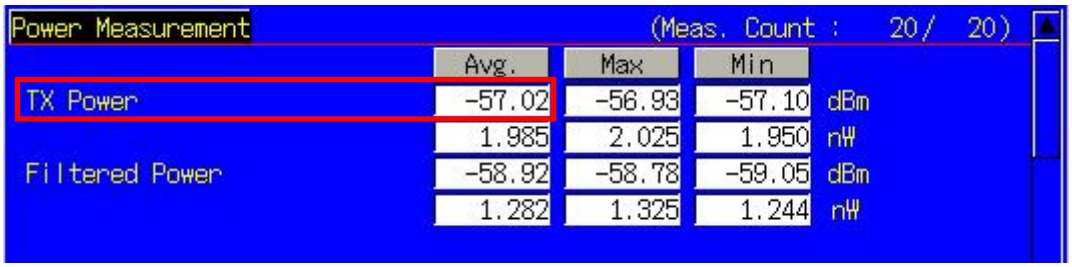
1. Connect with Test Loop Mode1.
2. Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
3. Execute **OLVL -106** to set [Output Level] to [–106] dBm.
4. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].
5. Execute **INC_ORGNOFS ON** to set [EVM include Origin Offset] to [On].
6. Execute **ALLMEASITEMS ON,20,ON,20,ON,20,ON,20,ON,20,ON,20,OFF,1,ON,OFF**, to set all measurements to [On] other than [Code Domain Power] and [BLER Measurement], and to set [Average Count] to [20] times.
7. Execute **BER_SAMPLE 10000** to set [Number of Sample] at BER measurement samples to [10000] bits.
8. Execute **SWP** to perform the measurement.
9. Execute **AVG_POWER?**, etc., to read the measurement result.

*There are items that cannot be measured with the same parameter.

1.3.14. 5.4.3 Minimum Output Power

The procedure, how to measure Minimum Output Power on Fundamental Measurement screen, is shown below (It can be also measured simultaneously with Inner Loop Power Control in the Uplink STEP E, G).

1. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
2. Execute **ILVL -30.0** to set [Input Level] to [–30.0] dBm.
3. Execute **OLVL -93.0** to set [Output Level] to [–93.0] dBm.
4. Execute **TPCPAT ALL0** to set [Power Control Bit Pattern] to [ALL0].
5. Execute **PWR_MEAS ON** to set [Power Measurement] to [On].
6. Execute **PWR_AVG 20** to set [Average Count] of power measurement to [20] times.
7. Execute **SWP** to perform the measurement.
8. Execute **AVG_POWER?** to read the power measurement result.
9. Confirm the measurement result is lower than –49 dBm.



1.4. Open Loop Power Control Measurement

The following is measured using RACH with Time Mask measurement on the Time Domain Measurement screen.

On the Time Domain Measurement screen,
RRC Filter Off (TDM_RRC OFF) corresponds to Mean power (5 MHz band), and
RRC Filter On (TDM_RRC ON) corresponds to RRC filtered mean power.

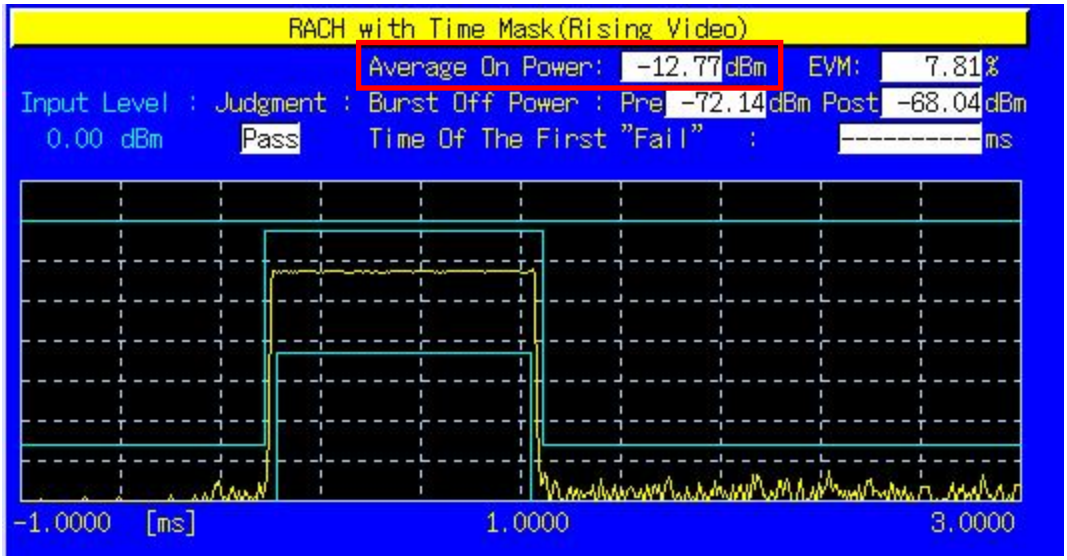
1. Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
2. Execute **MEASOBJ RACHTMSK** to set [Measurement Object] to [RACH with Time Mask].
3. Execute **TIMSPAN 4.0MS** to set [Time Span] of Time Domain measurement to [4.0] ms.
4. Execute **TRGDELAY -1.0MS** to set [Trigger Delay] of Time Domain measurement to [–1.0] ms.
5. Execute **MAXULPWR 24** to set [Maximum Allowed UL TX Power] to [24.0] dBm.
6. Execute **RABCONNECT OFF_FAST** to set [RAB connection] to [Off - Fast].

Maximum Allowed TX Power is a standard parameter of Cell Selection and Reselection. Power Class must be set lower than Maximum Allowed TX Power, so the UE can perform Cell Selection and Reselection with Sensitivity Level. For example, when UE Power Class is 3, MAXULPWR is 24.0.

By turning off RAB connection, the call status can be returned to Idle without connecting RAB at Test Loop Mode connection.

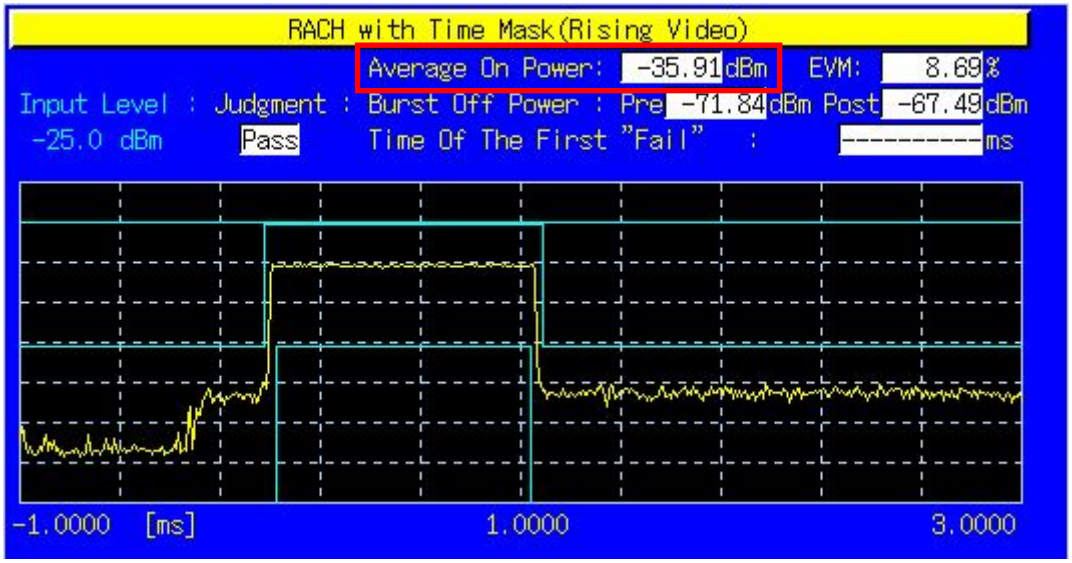
1.4.1. 5.4.1 Open Loop Power Control in Uplink (RX-middle)

1. Execute **OLVL -65.7** to set [Output Level] to [–65.7] dBm.
2. Execute **CPICHPWR -3.9** to set [Downlink CPICH] to [-3.9] dB.
3. Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
4. Execute **CPICHTXPWR 28** to set [Primary CPICH DL TX Power] to [+28] dBm.
5. Execute **INTERFERENCE -101** to set [UL Interference] to [–101] dBm.
6. Execute **CONSTANT -10** to set [Constant Value] to [–10] dB.
7. Execute **TDM_RRC OFF** to set to [RRC Filter] to [Off].
8. Turn on UE power to perform Registration.
9. Execute **SWPANDPG** to perform RACH measurement with Test Loop Mode.
10. Execute **RACHPWR_AVG?** to read the RACH power measurement result.
11. Confirm the measurement result is –13.4 dBm (±10 dB).



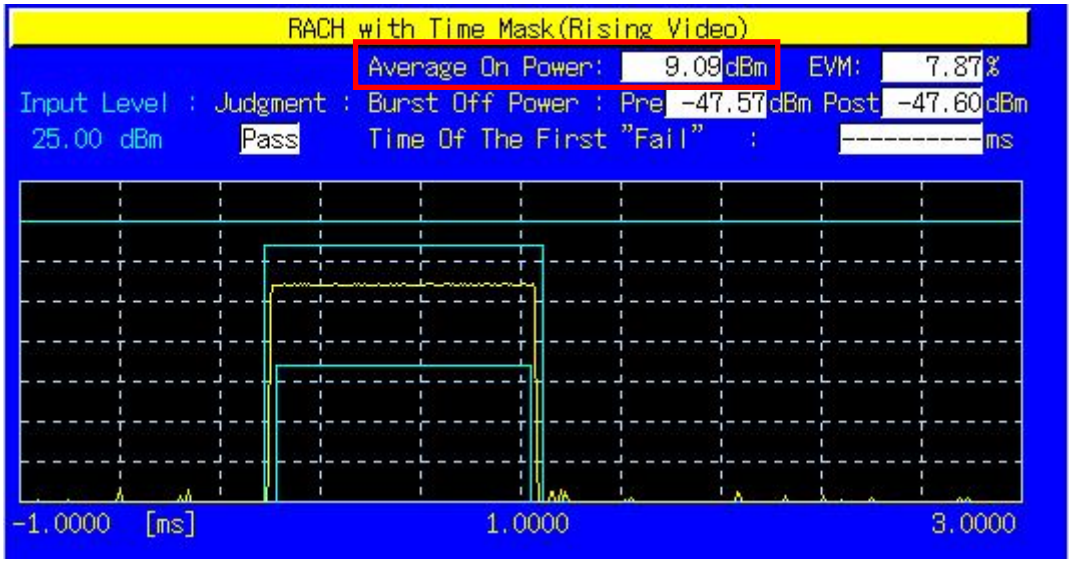
1.4.2. 5.4.1 Open Loop Power Control in Uplink (RX Upper dynamic end)

1. Execute **OLVL -25.0** to set [Output Level] to [ovel]t dBm.
2. Execute **CPICHPWR -3.9** to set [Downlink CPICH] to [-3.9] dB.
3. Execute **ILVL -25.0** to set [Input Level] to [ovel]e dBm.
4. Execute **CPICHTXPWR 19** to set [Primary CPICH DL TX Power] to [+19] dBm.
5. Execute **INTERFERENCE -75** to set [UL Interference] to [–75] dBm.
6. Execute **CONSTANT -10** to set [Constant Value] to [–10] dB.
7. Execute **TDM_RRC OFF** to set [RRC Filter] to [Off].
8. Turn on the UE to perform Registration.
9. Execute **SWPANDPG** to perform RACH measurement with Test Loop Mode.
10. Execute **RACHPWR_AVG?** to read the RACH power measurement result.
11. Confirm the measurement result is **–**37.1 dBm (±10 dB).



1.4.3. 5.4.1 Open Loop Power Control in Uplink (RX-Sensitivity level)

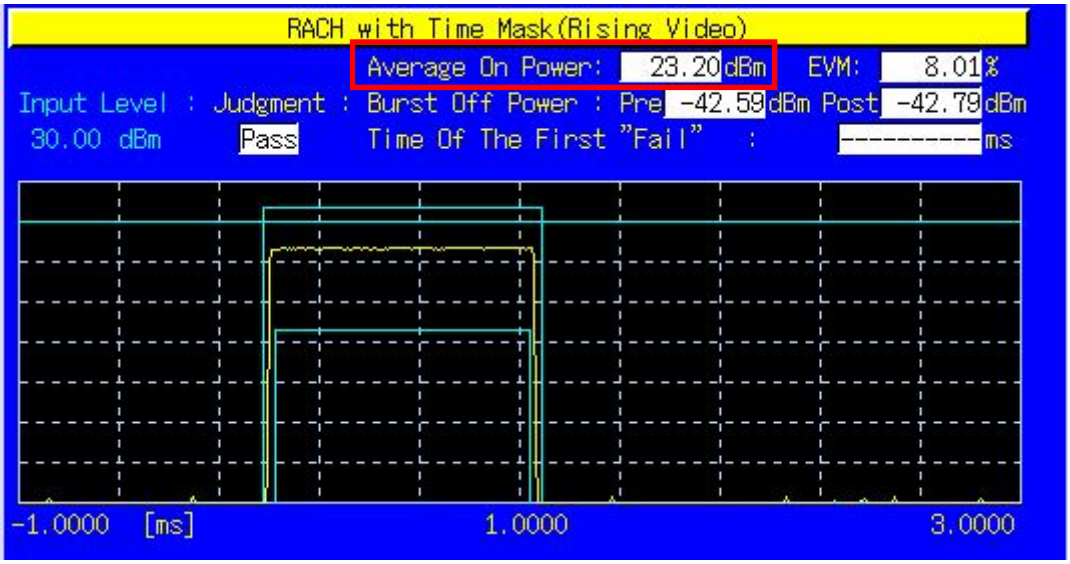
1. Execute **OLVL -65.7** to set [Output Level] to [–65.7] dBm.
2. Execute **CPICHPWR -3.9** to set [Downlink CPICH] to [-3.9] dB.
3. Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
4. Execute **CPICHTXPWR 19** to set [Primary CPICH DL TX Power] to [+19] dBm.
5. Execute **INTERFERENCE -110** to set [UL Interference] to [–110] dBm.
6. Execute **CONSTANT -10** to set [Constant Value] to [–10] dB.
7. Execute **TDM_RRC OFF** to set [RRC Filter] to [Off].
8. Turn on the UE and perform Registration.
9. Execute **OLVL -106.7** to set [Output Level] to [–106.7] dBm.
10. Execute **SWPANDPG** to perform RACH measurement with Test Loop Mode.
11. Execute **RACHPWR_AVG?** to read the RACH power measurement result.
12. Confirm the measurement result is +8.9 dBm (±10 dB).



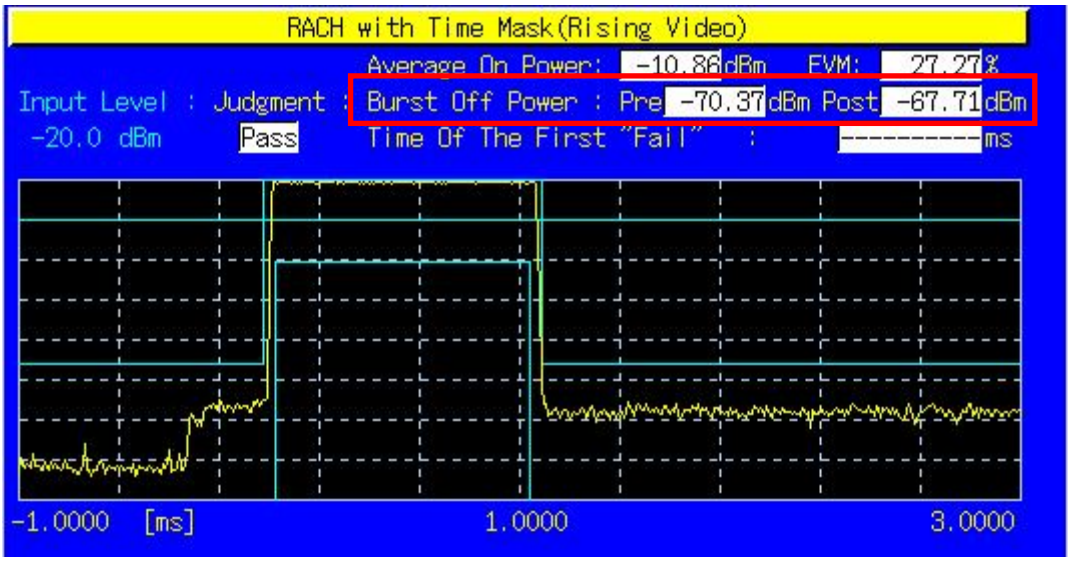
1.4.4. 5.5 Transmit ON/OFF Power

Due to dynamic range limits (40 dB), the On Power and Off Power cannot be measured simultaneously, so measurement must be performed twice by changing the Input level. An example of how to measure a UE in Power Class 3 is shown below.

1. Execute **OLVL -65.7** to set [Output Level] to [–65.7] dBm.
2. Execute **CPICHPWR -3.9** to set [Downlink CPICH] to [-3.9] dB.
3. Execute **ILVL 30.0** to set [Input Level] to [+30.0] dBm.
4. Execute **CPICHTXPWR 19** to set [Primary CPICH DL TX Power] to [+19] dBm.
5. Execute **INTERFERENCE -95** to set [UL Interference] to [–95] dBm.
6. Execute **CONSTANT -10** to set [Constant Value] to [–10] dB.
7. Execute **TEMPPOS ON** to set [Template] at RACH Parameter to [On].
8. Execute **TDM_RRC OFF** to set [RRC Filter] to [Off].
9. Turn on the UE and perform Registration.
10. Execute **OLVL -106.7** to set [Output Level] to [–106.7] dBm.
11. Execute **SWPANDPG** to perform RACH measurement in Test Loop Mode.
12. Execute **RACHPWR_AVG?** to read the RACH power measurement result.
13. Confirm the measurement result is 24.0 dBm (Tolerance +1.7/–3.7 dB).



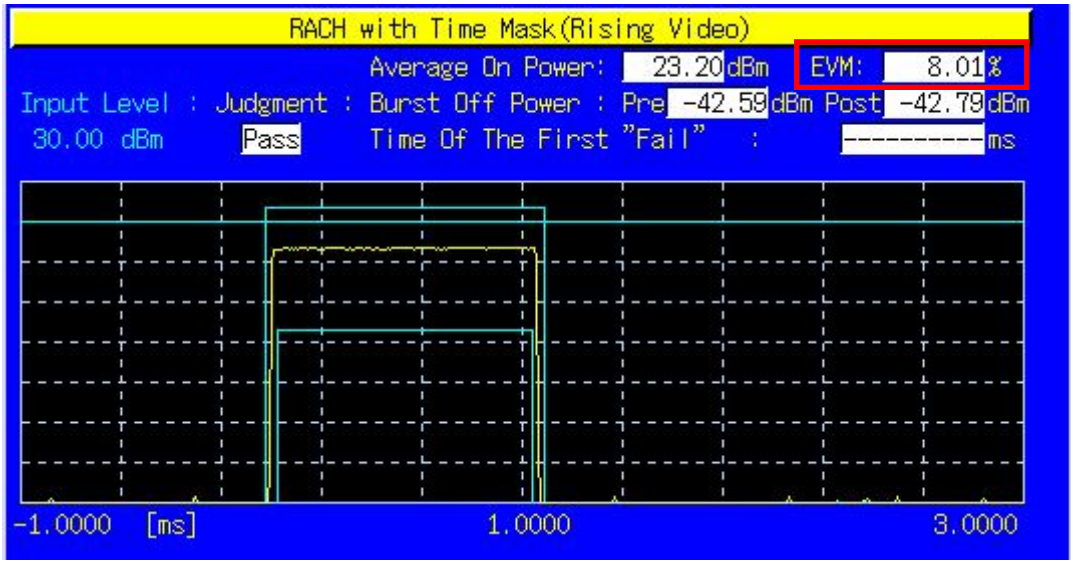
14. Disconnect with Test Loop Mode.
15. Execute **ILVL -20.0** to set [Input Level] to [ovel]e dBm.
16. Execute **TEMPPOS OFF** to set [Template] at RACH Parameter to [Off].
17. Execute **TDM_RRC ON** to set [RRC Filter] to [On].
18. Execute **SWPANDPG** to perform RACH measurement in Test Loop Mode.
19. Execute **RACHOFFPWR_AVG?** to read the Burst Off Power measurement result.
20. Confirm the measurement result is lower than -55 dBm.



1.4.5. 5.13.4 PRACH Preamble Quality

Although RACH Sub Channel and PRACH Signature cannot be specified, the EVM and Frequency Error of RACH can be measured. An example of how to measure a UE in Power Class3 is shown below.

1. Execute **OLVL -98.1** to set [Output Level] to [–ovel] dBm.
2. Execute **CPICHPWR -3.9** to set [Downlink CPICH] to [-3.9] dB.
3. Execute **ILVL 30.0** to set [Input Level] to [+30.0] dBm.
4. Execute **CPICHTXPWR 24** to set [Primary CPICH DL TX Power] to [+24] dBm.
5. Execute **INTERFERENCE -92** to set [UL Interference] to [–92] dBm.
6. Execute **CONSTANT -10** to set [Constant Value] to [–10] dB.
7. Turn on the UE and perform Registration.
8. Execute **SWPANDPG** to perform RACH measurement in Test Loop Mode.
9. Execute **RACHEVM?** to read the RACH EVM measurement result.
10. Confirm the measurement result is lower than 17.5%.
11. Execute **RACHFERR? PPM** to read the RACH Frequency Error measurement result.
12. Confirm the measurement result is lower than (0.1 ppm + 10 Hz).



1.4.6. Continuous Measurement of Open Loop Power Control

Open Loop Power Control measurement is performed by changing Primary CPICH DL TX Power, UL Interference and Constant Value. However, these parameters are for broadcast information, so some time is required to reflect the parameter changes at the UE side. To perform continuous Open Loop Power Control measurement, the parameters must be reflected at the UE using one of following methods.

1) Wait about 5 s after changing parameters (when changing parameters, the equipment sends BCCH modification info to the UE as PAGING TYPE1 message. It takes about 5 s until the UE reflects the changes).

2) Turn on the UE power again after changing the parameters and wait until the UE starts Registration.

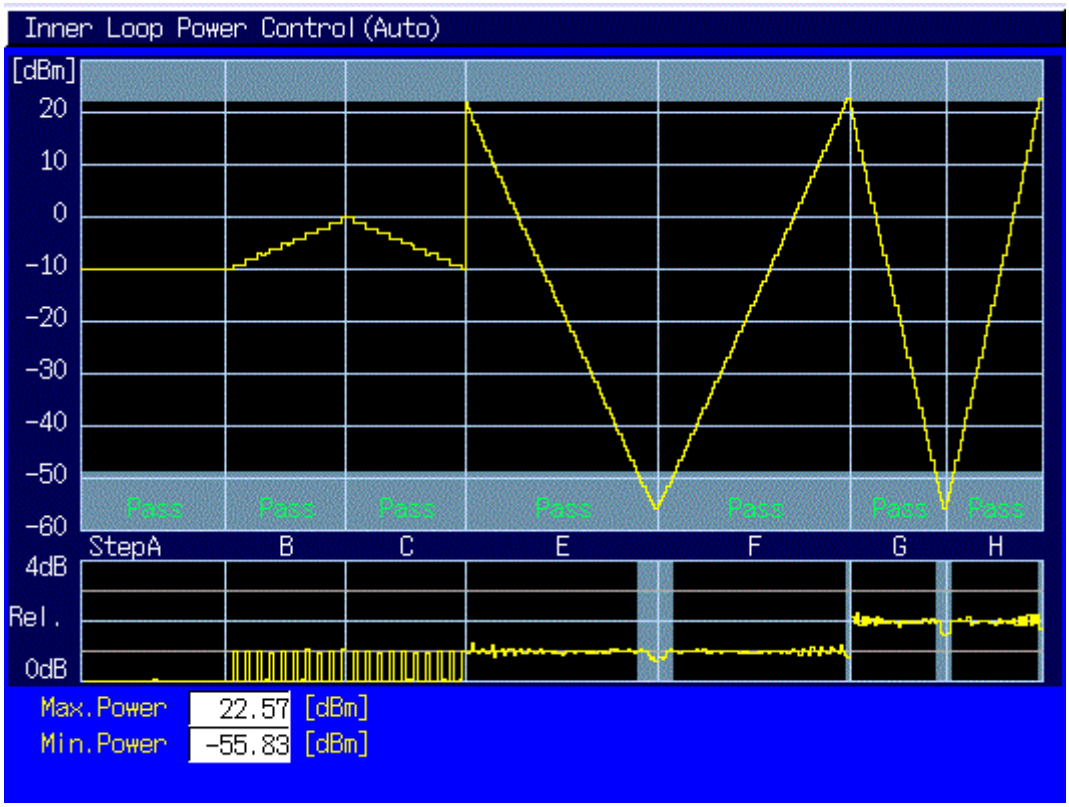
3) In addition to changing the above parameters, change the LAC parameter and wait until the UE starts Registration.

The UE can be notified quickly about the change of broadcast information by executing **DRXCYCLNG 64** to set [CN DRX Cycle Length] to [64] Frame, which is the minimum value.

1.5. Inner Loop Power Control Measurement

1.5.1. 5.4.2 Inner Loop Power Control in the Uplink

1. Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
2. Execute **MEASOBJ ILPC_AUTO** to set [Measurement Object] to [Inner Loop Power Control (Auto)].
3. Execute **OLVL -93** to set [Output Level] to [–93] dBm.
4. Connect using Test Loop Mode1.
5. Execute **ILPC_MEAS AUTO_ALL** to set [ILPC Measurement Method] to [Auto (Step All)].
6. Execute **SWP** to perform measurement.
7. Execute **ILPC_PASS? ALL** and check the measurement result is PASS.



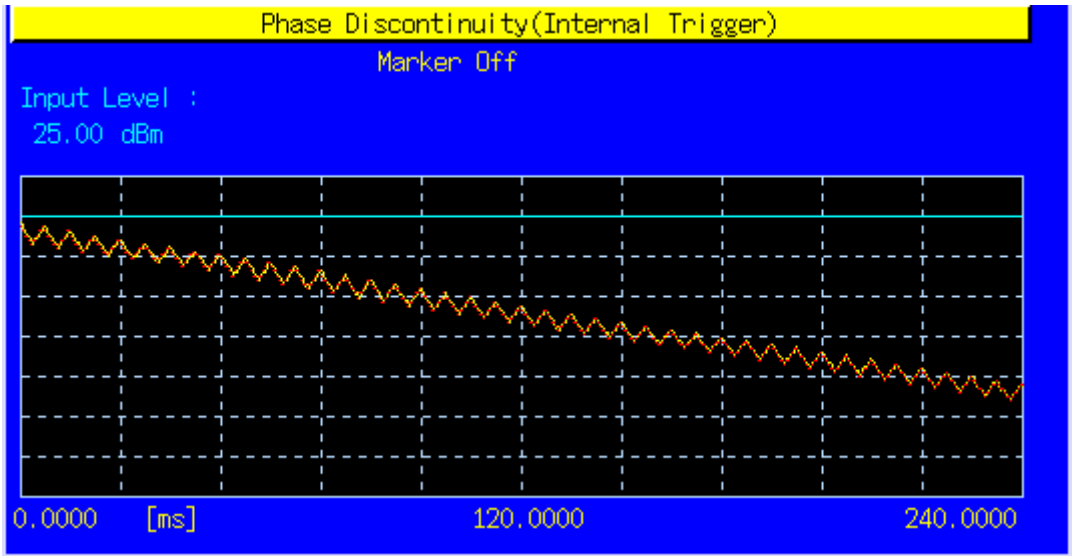
1.5.2. 5.13.3 UE Phase Discontinuity

UE phase discontinuity uses Phase Discontinuity measurement on the Time Domain Measurement screen.
Due to dynamic range limits (40 dB), measurement cannot be performed once; it must be executed four times with different Input Levels.

1. Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
2. Execute **MEASOBJ PHASEDISC** to set [Measurement Object] to [Phase Discontinuity].
3. Execute **SLOTLIST ON** to display slot list.
4. Execute **REGSLOTLIST 0-359** to register Slot0~Slot359 for the slot list.
5. Execute **TIMESPAN 240.0MS** to set [Time Span] of Time Domain measurement to [240.0] ms.
6. Execute **OLVL –93** to set [Output Level] to [–93] dBm.
7. Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
8. Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
9. Execute **TDM_RRC OFF** to set [RRC Filter] to [Off].
10. Connect with Test Loop Mode1.
11. Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
12. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].

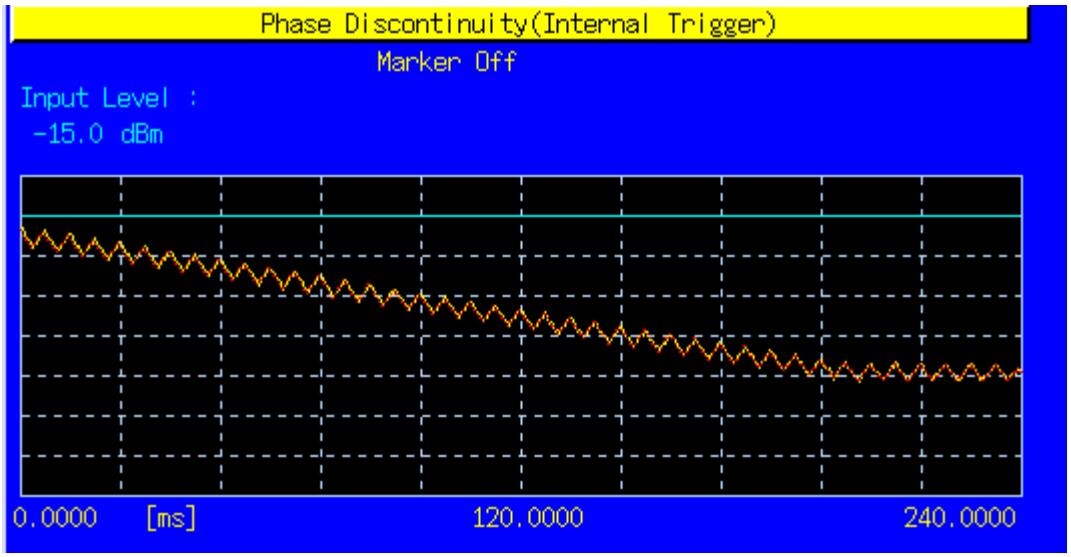
[5Down4Up Step1]

13. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
14. Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
15. Execute **ILP_TPC 5DW4UP** to set [TPC Method] to [5Down4Up].
16. Execute **ILP_CMDSLOT 5DW4UP,360** to set [Length] of 5Down4Up to [360] Slot.
17. Execute **SWP** to perform measurement.
18. Execute **SLOT_PHSAEDISC? ALL** to read the Phase Discontinuity measurement result.
19. Confirm the measurement result is lower than 36deg.
    When the result is over 36deg under 66deg, check whether the next four results are consecutively under 36deg.
20. Execute **SLOT_EVM? ALL** to read the EVM measurement result.
21. Confirm the measurement result is lower than 17.5%.
22. Execute **SLOT_FERR? ALL** to read the Frequency Error measurement result.
23. Confirm the measurement result is lower than (0.1 ppm + 10 Hz).



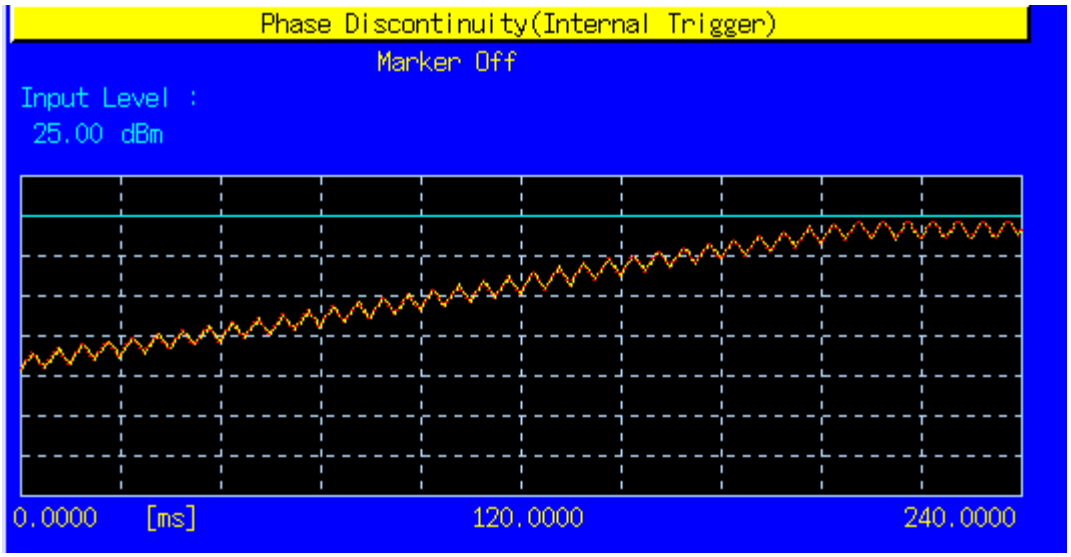
[5Down4Up Step2]

24. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
25. Execute **ILVL -15.0** to set [Input Level] to [–15.0] dBm.
26. Execute **ILP_TPC 5DW4UP** to set [TPC Method] to [5Down4Up].
27. Execute **ILP_CMDSLOT 5DW4UP,360** to set [Length] of 5Down4Up to [360] Slot.
28. Execute **SWP** to perform measurement.
29. Execute **SLOT_PHSAEDISC? ALL** to read the Phase Discontinuity measurement result.
30. Confirm the measurement result is lower than 36deg.
    When the result is over 36deg and under 66deg, check whether the next four results are consecutively under 36deg.
31. Execute **SLOT_EVM? ALL** to read the EVM measurement result.
32. Confirm the measurement result is lower than 17.5%.
33. Execute **SLOT_FERR? ALL** to read the Frequency Error measurement result.
34. Confirm the measurement result is lower than (0.1 ppm + 10 Hz).



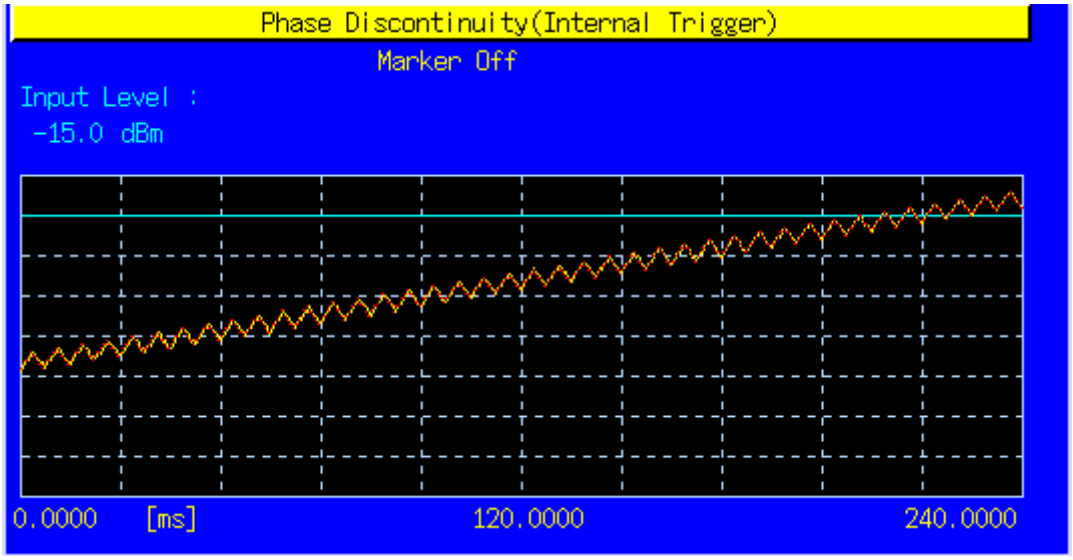
[5Up4Down Step1]

35. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
36. Execute **ILVL -15.0** to set [Input Level] to [–15.0] dBm.
37. Execute **ILP_TPC 5UP4DW** to set [TPC Method] to [5Up4Down].
38. Execute **ILP_CMDSLOT 5UP4DW,360** to set [Length] of 5Up4Down to [360] Slot.
39. Execute **SWP** to perform measurement.
40. Execute **SLOT_PHSAEDISC? ALL** to read the Phase Discontinuity measurement result.
41. Confirm the measurement result is lower than 36deg.
    When the result is over 36deg and under 66deg, check whether the next four results are consecutively under 36deg.
42. Execute **SLOT_EVM? ALL** to read the EVM measurement result.
43. Confirm the measurement result is lower than 17.5%.
44. Execute **SLOT_FERR? ALL** to read the Frequency Error measurement result.
45. Confirm the measurement result is lower than (0.1 ppm + 10 Hz).



[5Up4Down Step2]

46. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
47. Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
48. Execute **ILP_TPC 5UP4DW** to set [TPC Method] to [5Up4Down].
49. Execute **ILP_CMDSLOT 5UP4DW,360** to set [Length] of 5Up4Down to [360] Slot.
50. Execute **SWP** to perform measurement.
51. Execute **SLOT_PHSAEDISC? ALL** to read the Phase Discontinuity measurement result.
52. Confirm the measurement result is lower than 36deg.
    When the result is over 36deg and under 66deg, check whether the next four results are consecutively under 36deg.
53. Confirm the measurement result is lower than 17.5%.
54. Execute **SLOT_FERR? ALL** to read the Frequency Error measurement result.
55. Confirm the measurement result is lower than (0.1 ppm + 10 Hz).



1.6. Other Measurements

1.6.1. 5.4.4 Out-of-synchronization of output power.

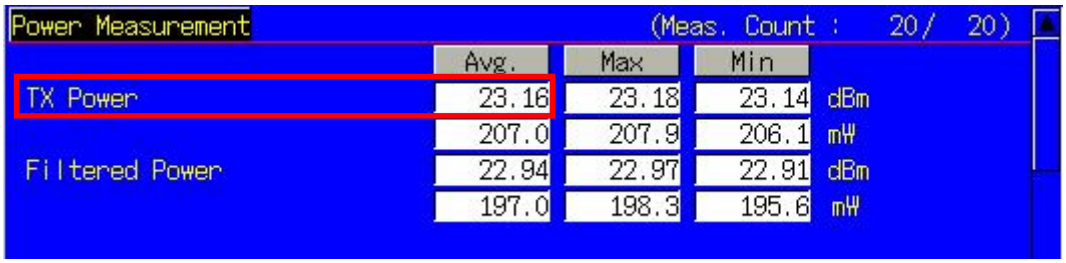
5.4.4AOut-of-synchronization handling of output power for a UE which supports type1 for DCH

This measurement requires an exact time change. We recommend automated measurement using a PC controller.

1. Execute **CALLDROP OFF** to set [Call Drop] to [Off].
2. Execute **UETIM_T313 15** to set [T313] to [15] s.
3. Execute **UETIM_N313 200** to set [N313] to [200].
4. Turn on the UE to execute Registration.
5. Connect with Test Loop Mode1.
6. Execute **ILVL 25.0** to set [Input Level] to [25.0] dBm.
7. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].
8. Execute **OLVL -61.0** to set [Output Level] to [–61.0] dBm.
9. Execute **AWGNLVL ON** to set [AWGN Level] to [On].
10. Execute **AWGNPWR 1.0** to set [Ior/Ioc] to [-1.0] dB.
11. Execute **ALLMEASITEMS ON,1,OFF,1,OFF,1OFF,1,OFF,1,OFF,1,OFF,1,OFF,OFF** to set [Power Measurement] to [On] and to set [Average Count] of Power measurement to [1] time.

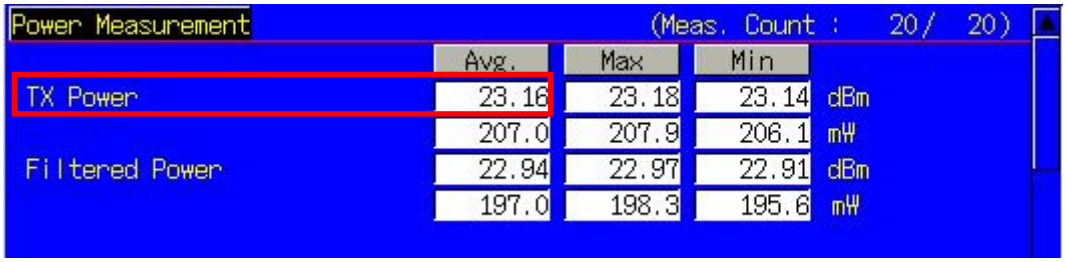
[Step A]

12. (In case of 5.4.4) Execute **DDPCHPWR -16.6** to set [DPCH_Ec/Ior] to [–16.6] dB.
    (In case of 5.4.4A) Execute **DDPCHPWR -19.6** to set [DPCH_Ec/Ior] to [–19.6] dB.
13. Execute **SWP** to perform power measurement.
14. Execute **AVG_POWER?** to read the power measurement result.
15. Confirm the Maximum Output Power.



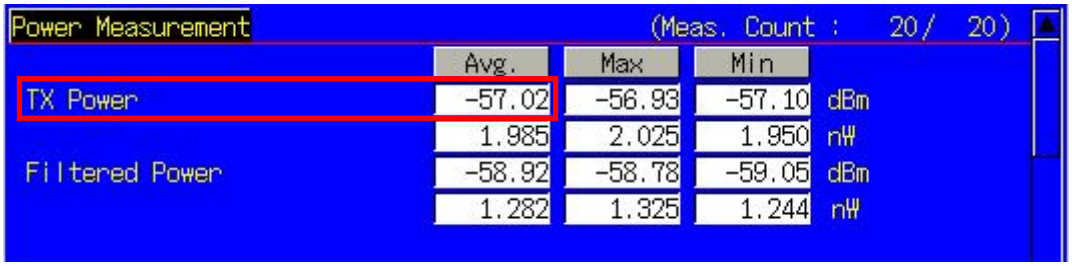
[Step B]

16. (In case of 5.4.4) Execute **DDPCHPWR -21.6** to set [DPCH_Ec/Ior] to [Power.sul
    (In case of 5.4.4A) Execute **DDPCHPWR -24.6** to set [DPCH_Ec/Ior] to [e ower.sul
17. Wait 5 s.
18. Execute **SWP** to perform power measurement.
19. Execute **AVG_POWER?** to read the power measurement result.
20. Confirm voice calling is not disconnected.



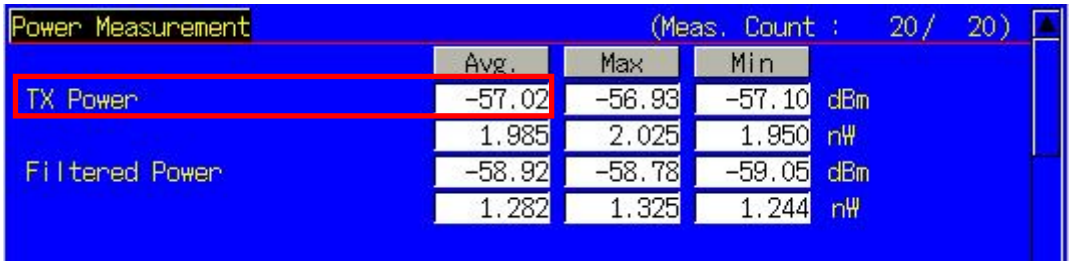
[Step C]

21. (In case of 5.4.4) Execute **DDPCHPWR -28.4** to set [DPCH_Ec/Ior] to [t disconn
    (In case of 5.4.4A) Execute **DDPCHPWR -31.4** to set [DPCH_Ec/Ior] to [e disconn
22. Wait 200 ms.
23. Execute **SWP** to perform power measurement.
24. Execute **AVG_POWER?** to read the power measurement result.
25. Confirm voice calling is disconnected (low level).
26. Wait 5 s.



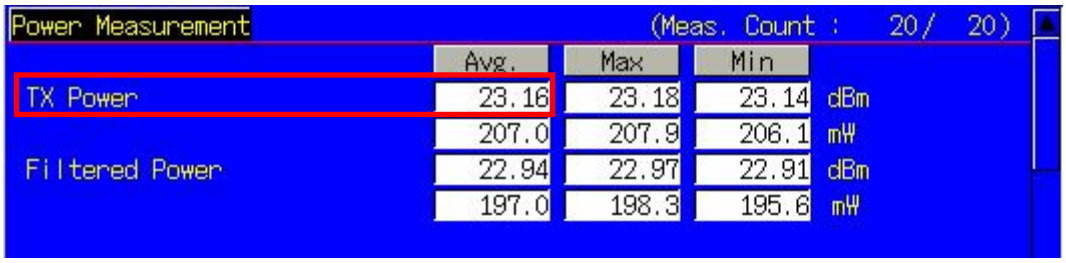
[Step D]

27. (In case of 5.4.4) Execute **DDPCHPWR -24.4** to set [DPCH_Ec/Ior] to [sconnecte
    (In case of 5.4.4A) Execute **DDPCHPWR -27.4** to set [DPCH_Ec/Ior] to [e connecte
28. Wait 5 s.
29. Execute **SWP** to perform power measurement.
30. Execute **AVG_POWER?** to read the power measurement result.
31. Confirm voice calling is disconnected (low level).



[Step E]

32. (In case of 5.4.4) Execute **DDPCHPWR -17.6** to set [DPCH_Ec/Ior] to [sconnecte
    (In case of 5.4.4A) Execute **DDPCHPWR -20.6** to set [DPCH_Ec/Ior] to [e connecte
33. Wait 200 ms.
34. Execute **SWP** to perform power measurement.
35. Execute **AVG_POWER?** to read the power measurement result.
36. Confirm voice calling is connected (high level).



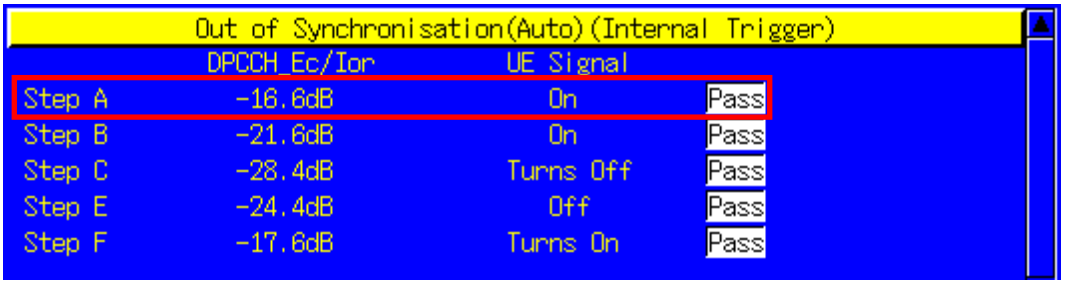
1.6.2. 5.4.4 Out-of-synchronisation of output power (Auto)

5.4.4AOut-of-synchronization handling of output power for a UE which supports type1 for DCH

1. Execute **UETIM_T313 15** to set [T313] to [15] s.
2. Execute **UETIM_N313 200** to set [N313] to [200].
3. Turn on the UE to execute Registration.
4. Connect with Test Loop Mode1.
5. Execute **OLVL -61.0** to set [Output Level] to [–61.0] dBm.
6. Execute **AWGNLVL ON** to set [AWGN Level] to [On].
7. Execute **AWGNPWR 1.0** to set [Ior/Ioc] to [-1.0] dB.
8. Execute **SCRSEL TDMEAS** and display the Time Domain Measurement screen.
9. Execute **MEASOBJ OUTSYNC_AUTO** to set [Measurement Object] to [Out of Synchronisation(Auto)].
10. Execute **SWP** to perform Out of Synchronisation measurement.

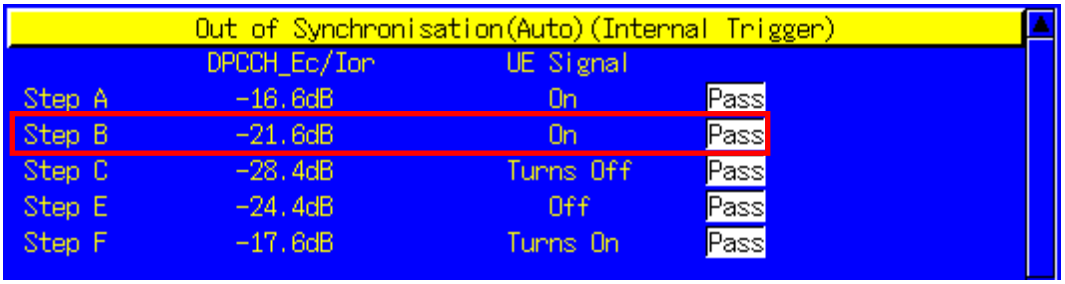
[Step A]

11. Execute **OUTSYNC_PASS? A** to read the Step A measurement result.
12. Confirm the measurement result is PASS. (UE transmitter is not switched off.)



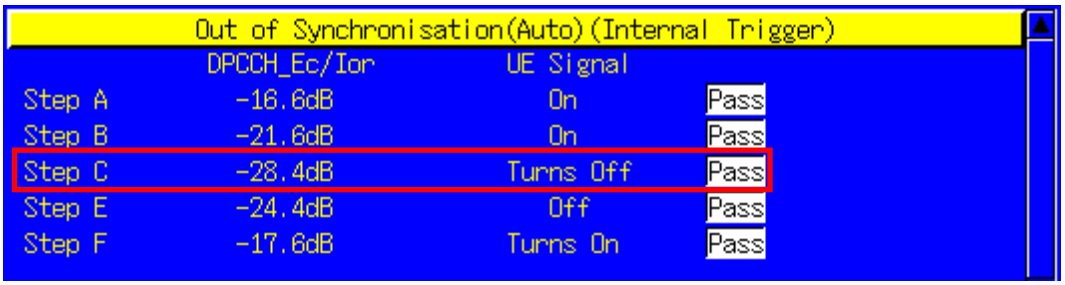
[Step B]

13. Execute **OUTSYNC_PASS? B** to read the Step B measurement result.
14. Confirm the measurement result is PASS. (UE transmitter is not switched off.)



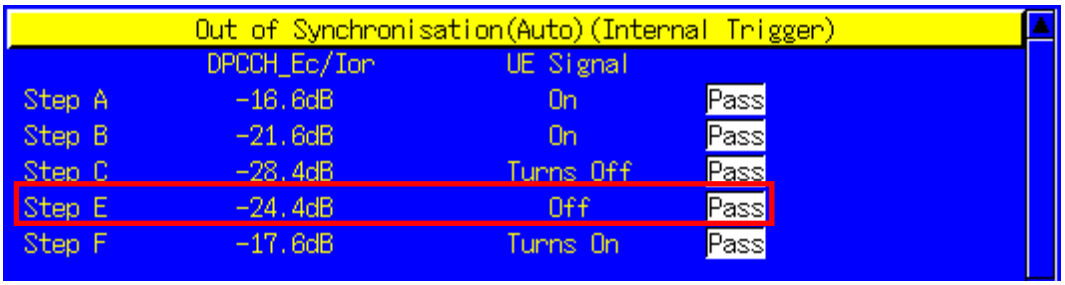
[Step C]

15. Execute **OUTSYNC_PASS? C** to read the Step C measurement result.
16. Confirm the measurement result is PASS. (UE transmitter has been switched off.)



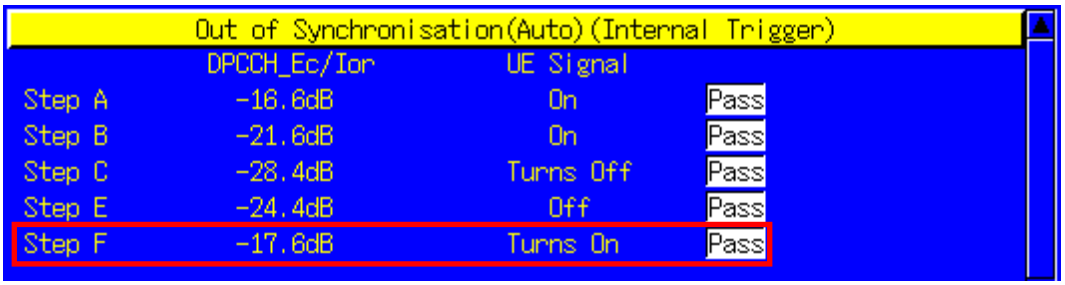
[Step E]

17. Execute **OUTSYNC_PASS? E** to read the Step E measurement result.
18. Confirm the measurement result is PASS. (UE transmitter is not switched on.)



[Step F]

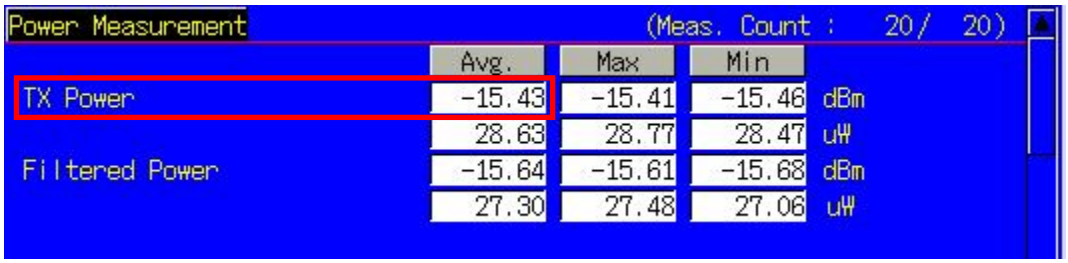
19. Execute **OUTSYNC_PASS? F** to read the Step F measurement result.
20. Confirm the measurement result is PASS. (UE transmitter has been switched on.)



1.6.3. 5.6 Change of TFC

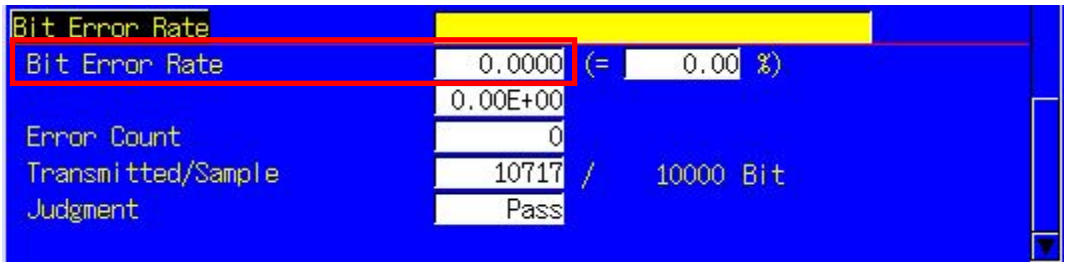
1. Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
2. Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
3. Connect with Test Loop Mode1.
4. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
5. Execute **DTCHPAT PN9** to set [DTCH Data Pattern] to [PN9].
6. Execute **ALLMEASITEMS ON,20,OFF,1,OFF,1,OFF,1,OFF,1,OFF,1OFF,1,OFF,OFF** to set [Power Measurement] to [On] and to set [Average Count] to [20] times.
7. Execute **SWP** to perform power measurement.
8. Execute **AVG_POWER?** to read the power measurement result.

9. Execute **DTCHPAT NODATA** to set [DTCH Data Pattern] to [No Data].
10. Execute **SWP** to perform power measurement.
11. Execute **AVG_POWER?** to read the power measurement result.
12. Confirm the result is ±7 dB (Tolerance ±2.3 dB) compared to the result of procedure 8.



1.6.4. 6.3 Maximum Input Level

1. Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
2. Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
3. Connect with Test Loop Mode1.
4. Execute **OLVL -25.7** to set [Output Level] to [–25.7] dBm.
5. Execute **CPICHPWR -10.0** to set [CPICH_Ec/Ior] to [-10.0] dBm.
6. Execute **PCCPCHPWR -12.0** to set [P-CCPCH_Ec/Ior] to [–12.0] dB.
7. Execute **SCHPWR -12.0** to set [SCH_Ec/Ior] to [–12.0] dB.
8. Execute **PICHPWR -15.0** to set [PICH_Ec/Ior] to [–15.0] dB.
9. Execute **DDPCHPWR -19.0** to set [DPCH_Ec/Ior] to [–19.0] dB.
10. Execute **ILVL 20.0** to set [Input Level] to [+20.0] dBm.
11. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
12. Execute **ALLMEASITEMS OFF,1,OFF,1,OFF,1,OFF,1,OFF,1,OFF,1,OFF,1,ON,OFF,** to set [BER] measurement to [On].
13. Execute **BER_SAMPLE 10000** to set [Number of Sample] at BER measurement to [10000] bits.
14. Execute **SWP** to perform BER measurement.
15. Execute **BER?** to read the BER measurement result.
16. Confirm the result is lower than 0.1%.



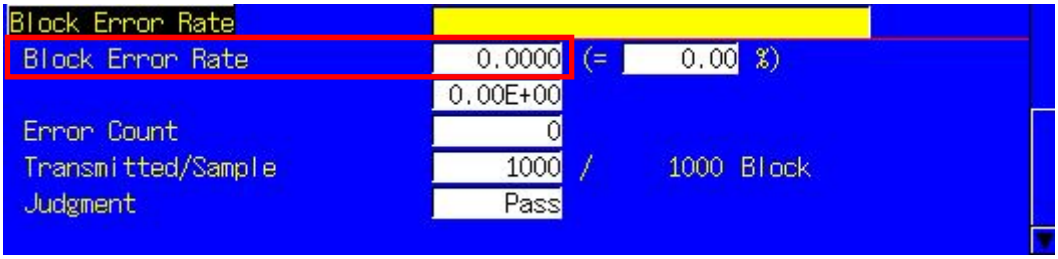
1.6.5. 6.8 Spurious Emissions

1. Execute **RRCSTATE CELLFACH** to set [RRC State] to [CELL_FACH].
2. Turn on the UE and execute Registration.
3. When **CALLSA** is executed, UE becomes CELL_FACH.
4. Spurious Emissions can be measured by connecting an external Spectrum Analyzer.

1.6.6. 7.2 Demodulation in Static Propagation Condition

The following measurement example is for a User bit rate of 12.2 kbps.
Measurement can be performed in the same way for 64, 144, and 384 kbps by changing measurement parameters.

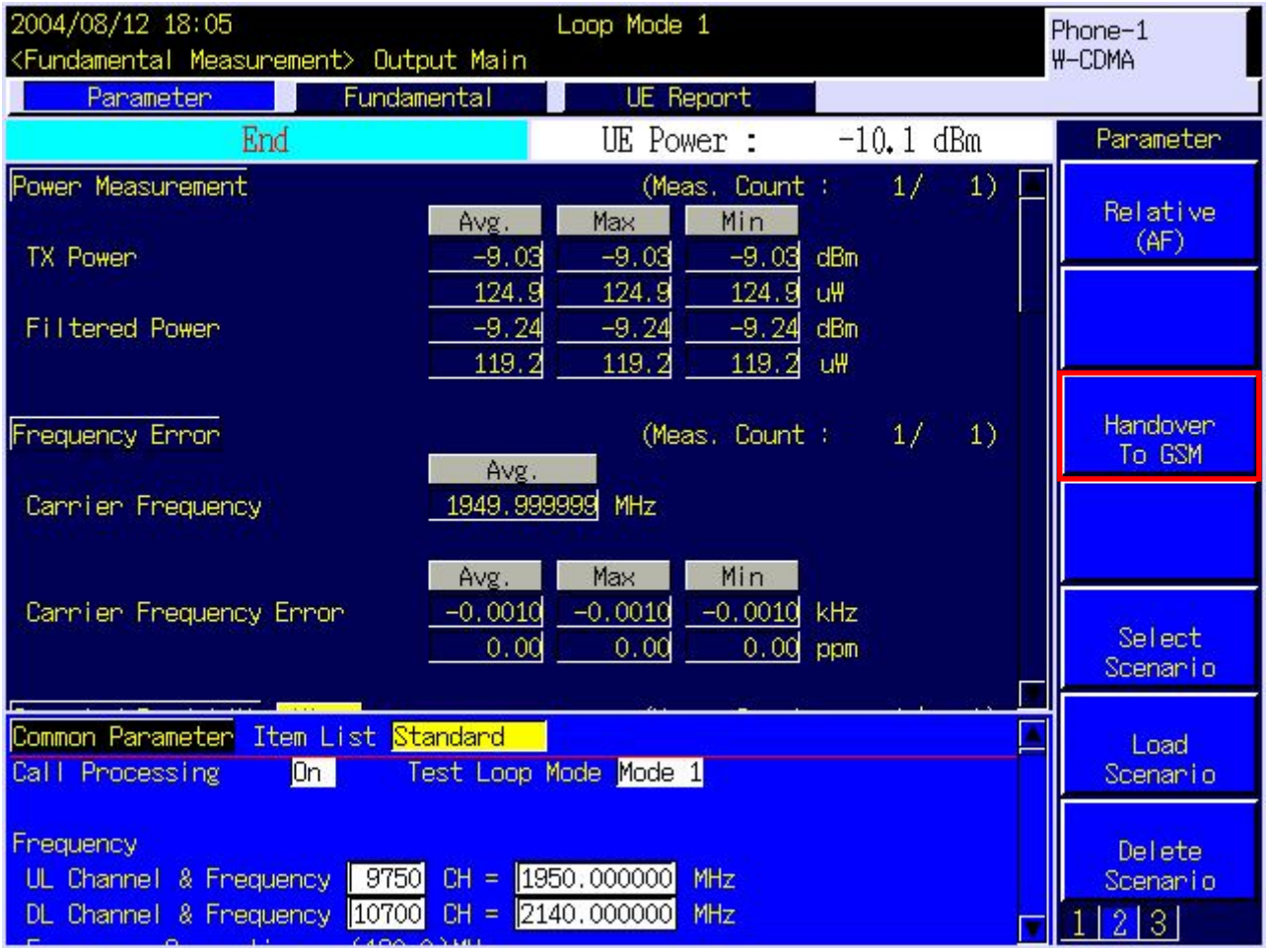
1. Execute **TESTMODE MODE2** to set [Test Loop Mode] to [Mode 2].
2. Execute **MAXRATE 12.2** to set [Prioritized Ribs DL Max. Rate] to [12.2 kbps].
3. Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
4. Connect with Test Loop Mode2.
5. Execute **OLVL -60.7** to set [Output Level] to [–60.7] dBm.
6. Execute **AWGNLVL ON** to set [AWGN Level] to [On].
7. Execute **AWGNPWR -0.7** to set [AWGN Level] to [–0.7] dB.
8. Execute **CPICHPWR -10.0** to set [CPICH_Ec/Ior] to [–10.0] dB.
9. Execute **PCCPCHPWR -12.0** to set [P-CCPCH_Ec/Ior] to [–12.0] dB.
10. Execute **SCHPWR -12.0** to set [SCH_Ec/Ior] to [–12.0] dB.
11. Execute **PICHPWR -15.0** to set [PICH_Ec/Ior] to [–15.0] dB.
12. Execute **DDPCHPWR -16.5** to set [DPCH_Ec/Ior] to [–16.5] dB.
13. Execute **ALLMEASITEMS OFF,1,OFF,1,OFF,1,OFF,1,OFF,1,OFF,1,OFF,1,OFF,ON,** to set [BLER] measurement to [On].
14. Execute **BLER_SAMPLE 1000** to set [Number of Sample] at BLER measurement to [1000] Block.
15. Execute **SWP** to perform BLER measurement.
16. Execute **BLER?** to read the BLER measurement result.
17. Confirm the result is lower than 0.01.



1.7. Reduction of W-CDMA/GSM Measurement Time by Inter-RAT Handover

When W-CDMA and GSM TRX measurement is performed using a single platform, test times can be cut by executing Inter-RAT Handover from W-CDMA to GSM, and by eliminating GSM call processing. The Output Level must be set higher so handover will not fail.

1. Execute **STDSEL GSM** to change the system (Std Select) to GSM.
2. Execute **PRESET**, **BANDCAL**, etc., and initialize GSM etc. (Refer to 2.3.)
3. Execute **STDSEL WCDMA** and change the system (Std Select) to W-CDMA.
4. Execute **PRESET_3GPP**, **BANDCAL**, **INTEGRITY ON** etc., and initialize W-CDMA etc. (Refer to 1.3.1.)
5. Connect with Test Loop Mode and execute TRX measurement.
6. After the measurement, leave it connected in Test Loop Mode.
7. Execute **ISHO GSM** to handover to GSM.
8. Perform TRX measurement in GSM.

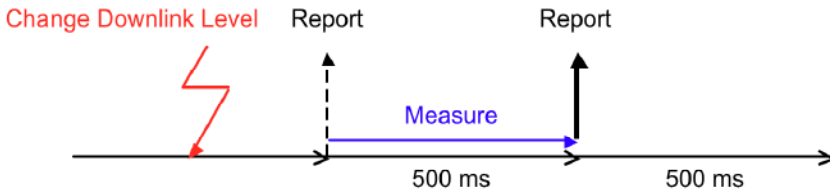


1.8. UE Report

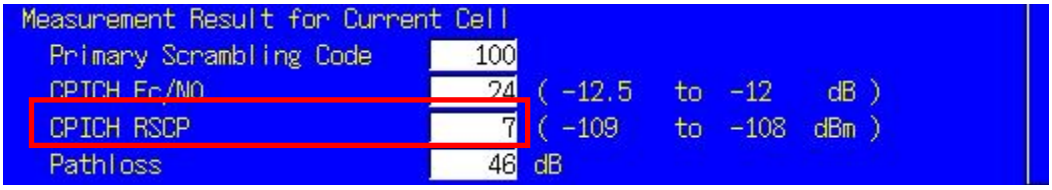
It is possible to have the UE send a Measurement Report to the tester. An example of how to obtain the CPICH RSCP Report value is shown below.

UE Report is sent every 500 ms.

Use the second UE Report, because the first UE Report after changing Downlink Level is the value measured before the change.



1. Execute call processing with Test Loop Mode1.
2. Execute **MEASREP ON** to set [Measurement Report] to [On] to command the UE to send Measurement Report.
3. Execute **OLVL –108** to set [Output Level] to [–108] dBm.
4. Execute **CALLRFR** to initialize UE Report value.
5. Execute **CPICH_RSCP? FLAG** and wait until the response becomes 1 (first time).
6. Execute **CALLRFR** to initialize UE Report value.
7. Execute **CPICH_RSCP? FLAG** and wait until the response becomes 1 (second time).
8. Execute **CPICH_RSCP?** to read the CPICH RSCP value.
9. Return to 4 when reading the Report value again.



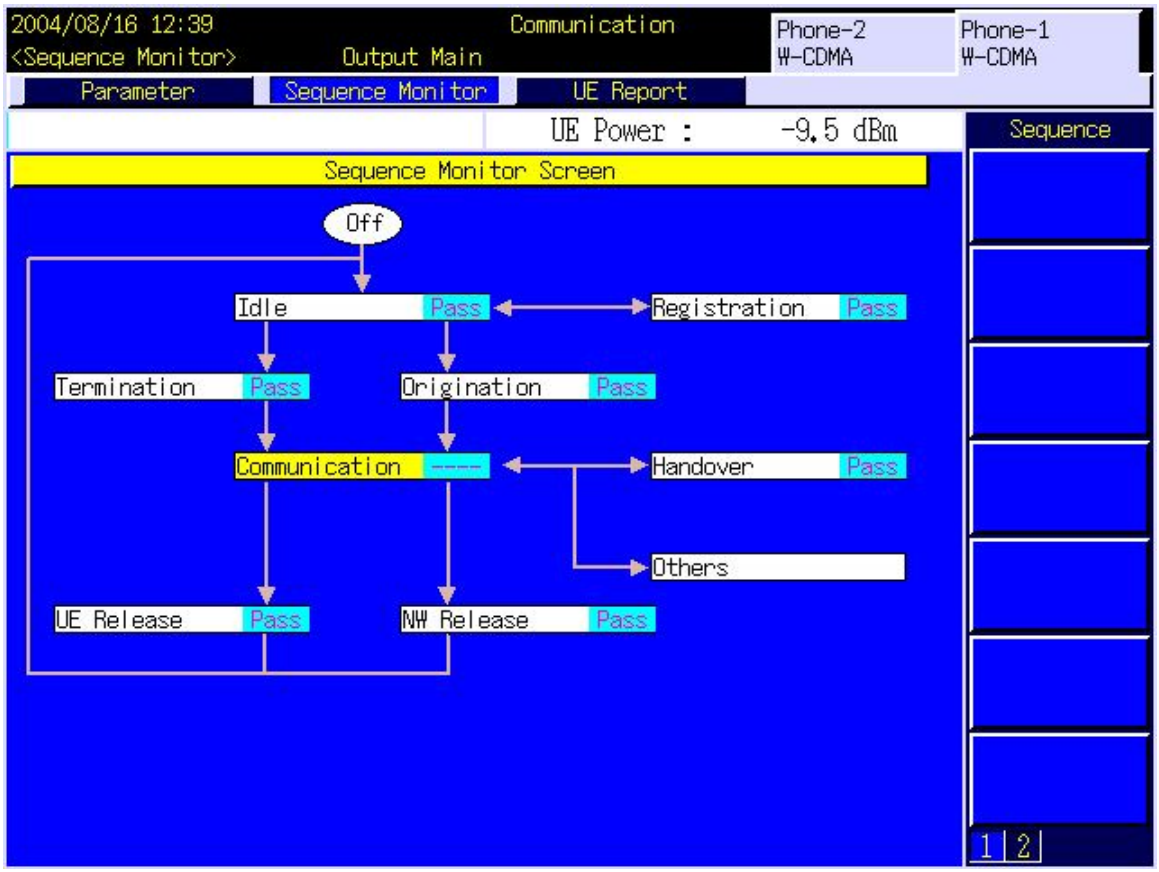
1.9. Functional Test

1.9.1. Voice Call

For W-CDMA, AMR12.2 kbps Voice Call can be tested by using Call Processing function. An example of the Origination test is shown below.

1. Set [Call Processing] of Common Parameter to [On].
2. Set [Test Loop Mode] of Common Parameter to [Off].
3. Set [Channel Coding] of Common Parameter to [Voice].
4. When setting [Integrity Protection] of Call Processing Parameter to [On], confirm the [Authentication Key] with the SIM value.
5. Call from the UE using any telephone number.
   The Call Processing state changes to Origination. The originated telephone number can be checked on the UE Report screen.
6. The Call Processing state changes to Communication. The equipment and UE can communicate with each other.
7. Set [DTCH Data Pattern] at Common Parameter to [Echo] and perform the voice communication test with echo-back.
8. Disconnect the equipment or UE. Press the [End Call] key when disconnecting from the equipment.
   The Call Processing state changes to UE Release or NW Release.

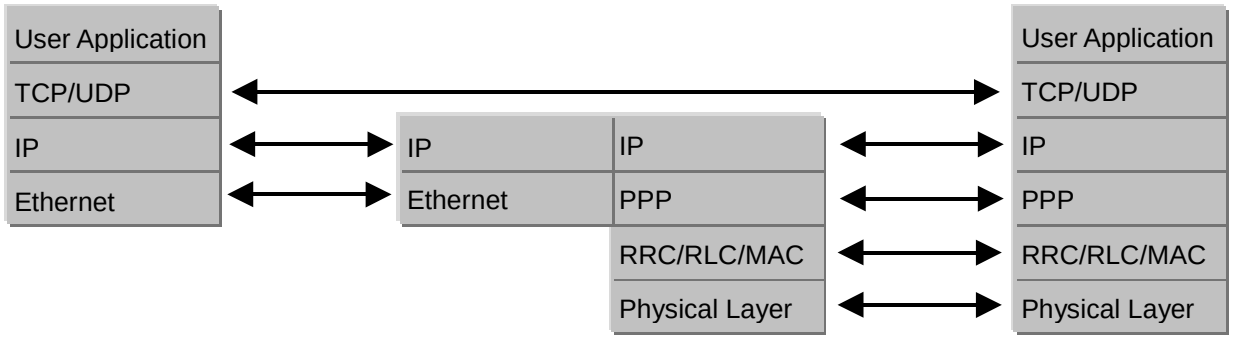
The result (Pass/Fail) is checked at the Sequence Monitor screen.



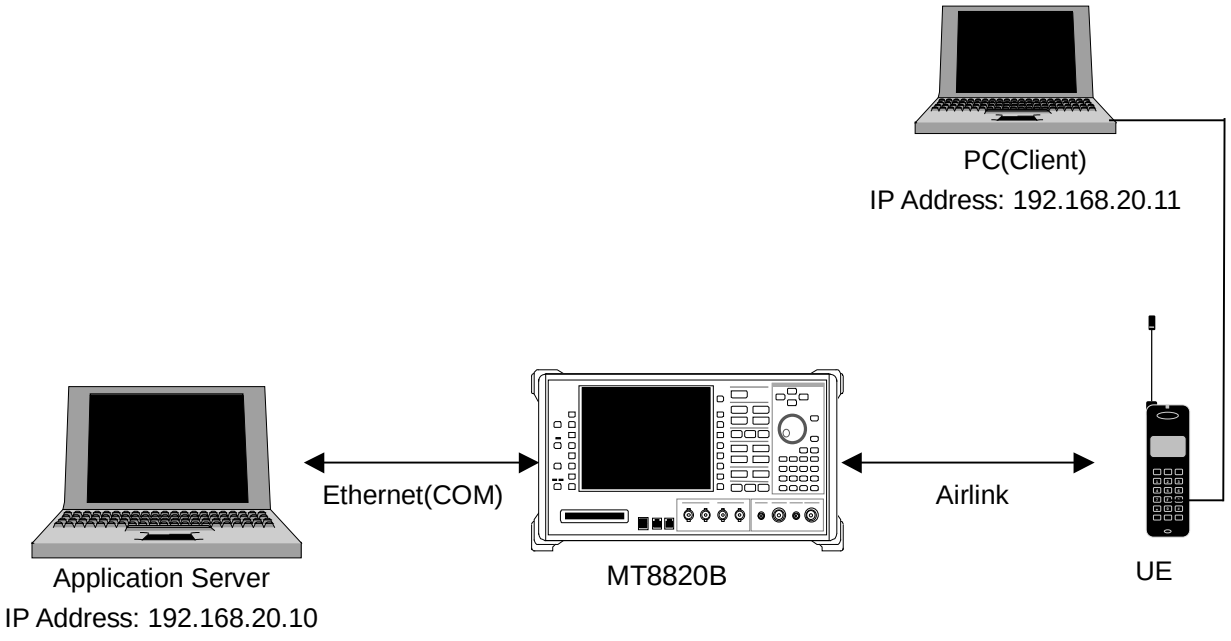
1.9.2. External Packet Data

For W-CDMA, DL 384 kbps and UL64 kbps packet connection can be tested by using the MX88205xC-002 W-CDMA External Packet Data option and Call Processing function.
PPP and IP connections are supported.

The equipment supports communications between server and Client PCs by supporting the PPP or IP protocols over a wireless interface. Generally, PPP is used for dial-up connections and IP is used for web browsing and sending/receiving mail.



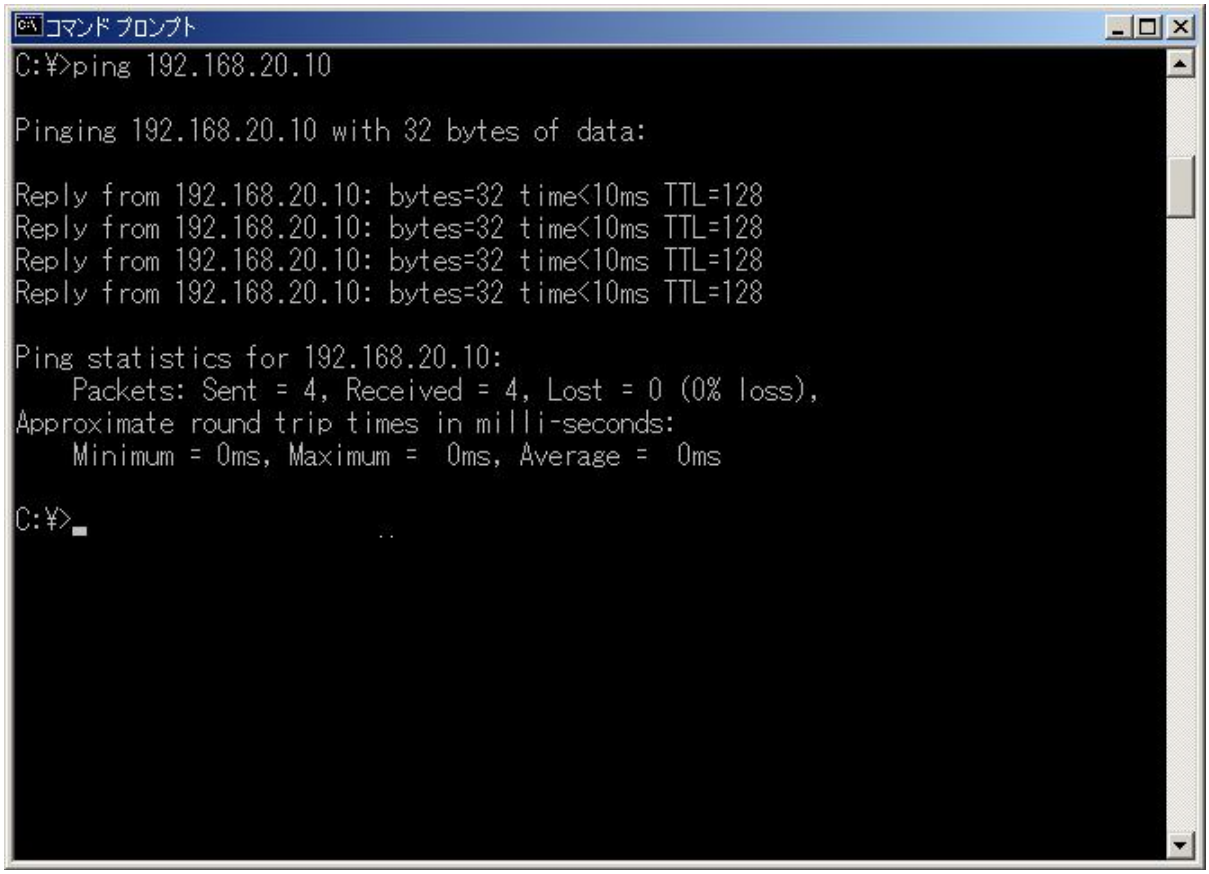
1. Connection without Gateway



<Items to prepare>
UE supporting PPP or IP connection
Server PC
Client PC
Crossover cable for connection between the equipment and Server PC

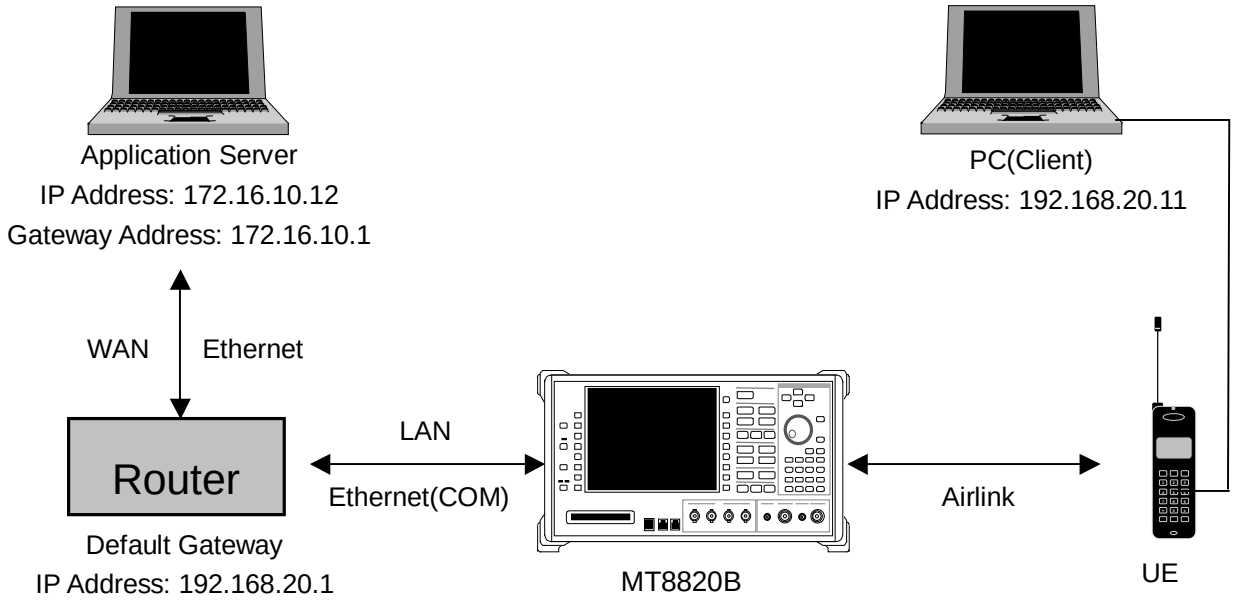
1. Set 10Base-T [Default Gateway] to [0.0.0.0] at the System Config screen (The Gateway function is off).
2. Reload W-CDMA applications at the Standard Load screen.
3. Set [Call Processing] of Common Parameter to [On].
4. Set [Test Loop Mode] of Common Parameter to [Off].

5. Set [Channel Coding] of Common Parameter to [Packet].
6. When setting [Integrity Protection] of Call Processing Parameter to [On], confirm the [Authentication Key] at the SIM value.
7. Set [CPICH_Ec/Ior], [P-CCPCH_Ec/Ior], [SCH_Ec/Ior], [PICH_Ec/Ior] and [DPCH_Ec/Ior] of Physical Channel Parameter to [–6.0] dB.
8. Confirm the IP address of the Server PC using [Server IP Address] of the equipment Call Processing Parameter. Then check that the DHCP setting of the PC is turned off.
9. By using the Client PC dial-up connection, confirm the automatic IP address acquisition is turned on.
10. Set [Client IP Address] of Call Processing Parameter, which is allocated to Client PC at connection.
11. Set [DTCH Data Pattern] of Common Parameter to [External PPP Packet] (PPP connection) or [External IP Packet] (IP connection).
12. Turn on the UE power to perform Registration. Registration is performed twice (CS and PS) when [Registration Mode] is set in [Auto]
13. Set the Client PC user name and password to perform dial-up.
14. User name: PPP_CLIENT
    Password: MT8820A
15. The Call Processing state changes to Communication and the equipment and UE can communicate.
16. The connection status can be checked by executing a ping command from the Client PC to the Server PC.
17. The data transmission speed can be measured by installing a FTP server in the Server PC.
18. Disconnect from the Client PC.
19. The Call Processing state changes to UE Release.



2. Connection using Gateway

Packet communications between different segments can be verified by connecting a Gateway between the equipment and Server PC.



<Items to prepare>
UE supporting PPP or IP connection
Server PC
Client PC
Gateway
Straight-through cable for connection between Gateway and the equipment, or Gateway and Server PC

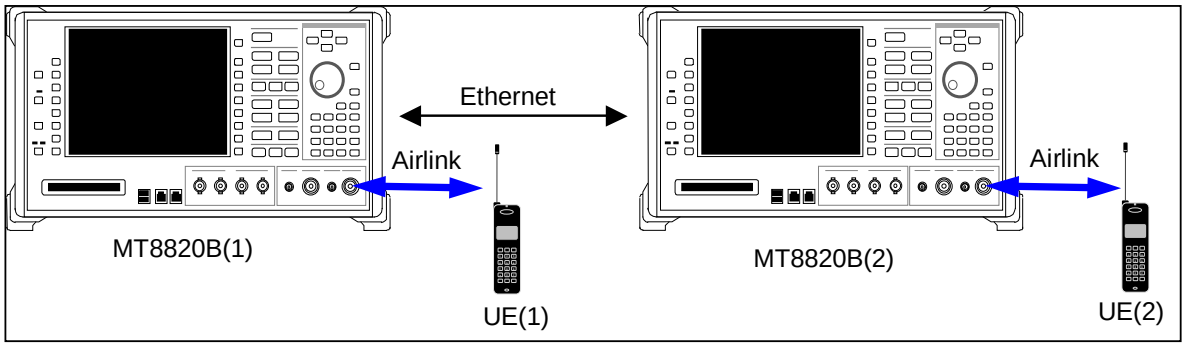
1. Set 10Base-T [Default Gateway] and [Subnet Mask] on System Config screen. At this time, the Default Gateway address is set to the same IP address as the router at the LAN side. (For example, when the IP address of the LAN side of the router is set to 192.168.20.1, the equipment Default Gateway address must be set to 192.168.20.1).
2. Reload WCDMA applications at the Standard Load screen.
3. Set [Call Processing] of Common Parameter to [On].
4. Set [Test Loop Mode] of Common Parameter to [Off].
5. Set [Channel Coding] of Common Parameter to [Packet].
6. When setting [Integrity] of Call Processing Parameter to [On], confirm the [Authentication Key] at the SIM value.
7. Set [CPICH_Ec/Ior], [P-CCPCH_Ec/Ior], [SCH_Ec/Ior], [PICH_Ec/Ior] and [DPCH_Ec/Ior] of Physical Channel Parameter to [–6.0] dB.
8. Set the IP address of the Server PC. The address must be in the same segment as the IP address of WAN side of router.
9. Set the IP address of the LAN side of the router to the Default Gateway of the Server PC.
10. By using the Client PC dial-up connection, confirm automatic IP address acquisition is turned on.
11. Set [Server IP Address] of Call Processing Parameter to the same IP address as the Default Gateway (procedure 1 above).
12. Set [Client IP Address] of Call Processing Parameter allocated to the Client PC when connecting. The address must be in the same segment as the Default Gateway (procedure 1 above).
13. Set [DTCH Data Pattern] of Common Parameter to [External PPP Packet] (PPP connection) or [External IP Packet] (IP connection).
14. Turn on the UE power and perform Registration. Registration is performed twice (CS and PS) when [Registration Mode] is set in [Auto].
15. Set the Client PC user name and password to perform dial-up.

16. User name: PPP_CLIENT
    Password: MT8820A
17. The Call Processing state changes to [Communication] and the equipment and UE can communicate.
18. The connection state can be checked by executing the ping command from the Client PC to the Server PC.
19. The data transmission speed can be measured by setting up an FTP server etc., on the Server PC.
20. Disconnect from the Client PC.
21. The Call Processing state changes to [UE Release].

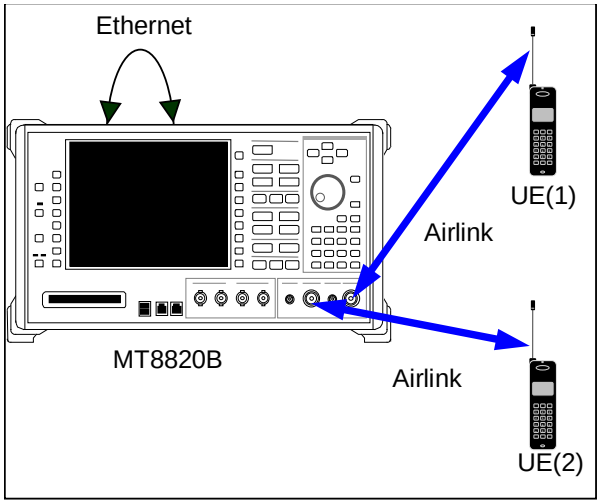
1.9.3. Videophone

End-to-end 64-kbps W-CDMA videophone tests can be performed by connecting two units with the MX88205xC-003 W-CDMA Video Phone Test option installed.
In addition, this test can be performed using one equipment supporting Parallelphone measurement.

<Items to prepare>
Two equipment, or single equipment supporting Parallelphone measurement.
Two videophones
Crossover cable for connecting equipment and equipment



When using two MT8820B/C



When using single MT8820B/C supporting Parallelphone measurement

An example of how to perform the end-to-end videophone test is shown below.

1. Use a crossover cable to connect the 10Base-T port 1 of two equipment. When using a single equipment supporting Parallelphone measurement, connect 10Base-T port 1 and port 2 using a crossover cable.
2. Set [Call Processing] of Common Parameter to [On].
3. Set [Test Loop Mode] of Common Parameter to [Off].
4. Set [Channel Coding] of Common Parameter to [Audio & Visual].
5. Set [DTCH Data Pattern] of Common Parameter to [No Data].
6. When setting [Integrity] of Call Processing Parameter to [On], confirm the [Authentication Key] using the SIM value.
7. Press the [Start Call] key of the equipment connected to the UE (1) as shown above. (When using a single equipment supporting Parallelphone measurement, press the [Start Call] key of UE (1)).
8. Call from UE (2).
9. Answer the call as soon as UE (1) starts ringing.
10. The Call Processing state changes to Communication and the UEs can perform end-to-end communication.
11. Check the video and voice of the two videophones.
12. Press [End Call] of both equipment to disconnect.
    The Call Processing state changes to NW Release.

1.10. Calibration Measurement Function

Refer to the Application Note for UE Calibration about the Calibration Measurement Function.

1.11. HSDPA Measurement

1.11.1. Location Registration of Fixed Reference Channel

When connecting with HSDPA, Location registration must be performed using Fixed Reference Channel.

1. Execute **PRESET_3GPP** to preset parameters for 3GPP.
2. Execute **CHCODING FIXREFCH** to set [Channel Coding] to [Fixed Reference Channel].
3. Execute **INTEGRITY ON** to set [Integrity Protection] to [On].
4. Execute **REGMODE COMBINED** to set [Registration Mode] to [Combined].
5. Turn on the UE.
6. Execute **CALLSTAT?** and wait until the response becomes 2 (= Idle(Regist)).

1.11.2. Connection of Fixed Reference Channel

An example of how to connect Fixed Reference Channel after location registration is shown below. (See 1.11.1 Location Registration of Fixed Reference Channel.)

[Connection of H-Set1 QPSK]

1. Execute **HSHSET HSET1_QPSK** to set [H-Set] to [H-Set1(QPSK)].
2. Execute **CALLSA** to connect with Fixed Reference Channel.
3. Execute **CALLSTAT?** and wait until the response becomes 7 (= Test Loop Mode).

[Connection of H-Set1 16QAM]

1. Execute **HSHSET HSET1_16QAM** to set H-Set to [H-Set1(16QAM)].
2. Execute **CALLSA** to connect with Fixed Reference Channel.
3. Execute **CALLSTAT?** and wait until response becomes 7 (= Test Loop Mode).

1.11.3. Disconnection of Fixed Reference Channel

1. Execute **CALLSO** to disconnect from Fixed Reference Channel.
2. Execute **CALLSTAT?** and wait until the response becomes 2 (= Idle(Regist)).

1.11.4. Channel Change by Handover

Usually, measurement is performed at three frequency points (L, M, H). In this case, Channel can be quickly switched without reconnection by switching it at handover with a higher output level and βc for UL DPCCH. When a GPIB command is sent during handover, it waits until handover ends.

1. Perform TRX measurement with M channel.
2. Execute **CHAN 9613** to handover to L channel.
3. Perform TRX measurement.
4. Execute **CHAN 9887** to handover to H channel.
5. Perform TRX measurement.

1.11.5. Change of Tβc, βd by Transport Channel Reconfiguration

When performing HSDPA measurement, gain parameters such as βc, βd, must be changed according to the measurement conditions. In this case, measurement can be performed without reconnection by changing parameters during call processing at Transport Channel Reconfiguration. In addition, when a GPIB command sent during Transport Channel Reconfiguration, it waits until Transport Channel Reconfiguration ends.

1. Execute connection with Fixed Reference Channel.
2. Execute **ULGAINPAR 2,15,8,8,8** to set [βc] to [2], [βd] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8].
3. Perform TX measurement.
4. Execute **ULGAINPAR 11,15** to set [βc] to [11], [βd] to [15].
5. Perform TX measurement.
6. Execute **ULGAINPAR 15,8** to set [βc] to [15], [βd] to [8].
7. Perform TX measurement.
8. Execute **ULGAINPAR 15,4** to set [βc] to [15], [βd] to [4].
9. Perform TX measurement.

1.11-1 Beta values for transmitter characteristics tests with HS-DPCCH (3GPP TS 34.121 Table C.10.1.4)

Sub-test	β_c	β_d	β_c/β_d	β_{HS}
1	2/15	15/15	2/15	4/15
2*	**12/15**	15/15	12/15	24/15
3	15/15	8/15	15/8	30/15
4	15/15	4/15	15/4	30/15

*The equipment supports 3GPP TS 34.121 Table C.10.1.4 Note4 and adopts β_c =11/15.
*"Note 4: For subtest 2 the ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c= **11/15** and β_d = 15/15."*

1.11.6. Selection of Measurement Items

The equipment is preset for W-CDMA measurement.
Since HSDPA Throughput measurement, CQI measurement items are preset to off, turn these items on to measure (**TPUT_MEAS ON**, **CQI_MEAS ON**).
Although other measurement items are preset to on, turn off unnecessary items, such as BER measurement and BLER measurement, to cut the measurement time (**BER_MEAS OFF**, **BLER_MEAS OFF**).

1.11.7. 5.2A Maximum Output Power with HS-DPCCH (Release 5 only)
5.2AA Maximum Output Power with HS-DPCCH (Release 6 and later)

1. Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. Execute **CHCODING FIXREFCH** to set [Channel Coding] to [Fixed Reference Channel].
3. Execute **SET_PWRPAT HSMAXPWR** to set [CQI Feedback Cycle] to [4 ms], [Ack-Nack Repetition Factor] to [3], [CQI Repetition Factor] to [2], and [TPC Algorithm] to [2].
4. Connect with Fixed Reference Channel H-Set1 (QPSK).
5. Execute **ILVL 24.0** to set [Input Level] to [+24.0] dBm.
6. Execute **OLVL -86.0** to set [Output Level] to [–86.0] dBm.
7. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].
8. Execute **DTCHPAT PN9** to set [DTCH Data Pattern] to [PN9].
9. Execute **PWR_MEAS ON** to set [Power measurement] to [On].
10. Execute **PWR_AVG 20** to set [Average Count] of Power measurement to [20] times.

[Subtest1]

11. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
12. Execute **SET_HSSUBTEST SUBTEST1** to set [Beta C] to [2], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
13. Execute **SWP** to perform Power measurement.
14. Execute **AVG_POWER?** to read the Power measurement result.
15. Confirm the measurement result is +24 dBm (Tolerance +1.7/-3.7 dB).

[Subtest2]

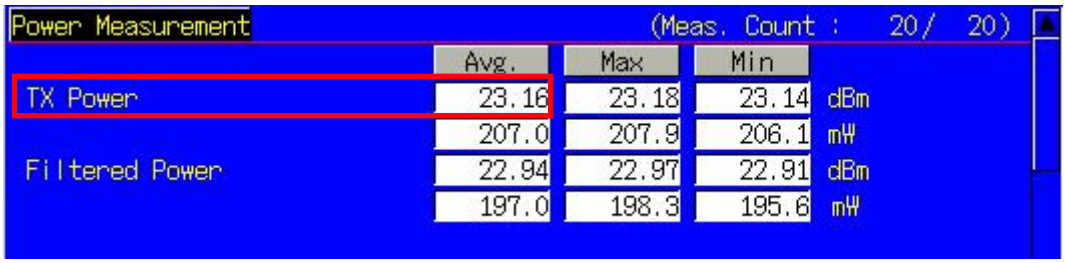
16. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
17. Execute **SET_HSSUBTEST SUBTEST2** to set [Beta C] to [11], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
18. Execute **SWP** to perform Power measurement.
19. Execute **AVG_POWER?** to read the Power measurement result.
20. Confirm the measurement result is +24 dBm (Tolerance +1.7/–3.7 dB). .

[Subtest3]

21. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
22. Execute **SET_HSSUBTEST SUBTEST3** to set [Beta C] to [15], [Beta D] to [8], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
23. Execute **SWP** to perform Power measurement.
24. Execute **AVG_POWER?** to read the Power measurement result.
25. Confirm the measurement result is the following value
    When specification is 5.2A : +23 dBm (Tolerance +2.7/–3.7 dB).
    When specification is 5.2AA : +23.5 dBm (Tolerance +2.2/–3.7 dB).

[Subtest4]

26. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
27. Execute **SET_HSSUBTEST SUBTEST4** to set [Beta C] to [15], [Beta D] to [4] [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
28. Execute **SWP** to perform Power measurement.
29. Execute **AVG_POWER?** to read the Power measurement result.
30. Confirm the measurement result is the following value
    When specification is 5.2A : +22 dBm (Tolerance +3.7/–3.7 dB).
    When specification is 5.2A A: +23.5 dBm (Tolerance +2.2/–3.7 dB).



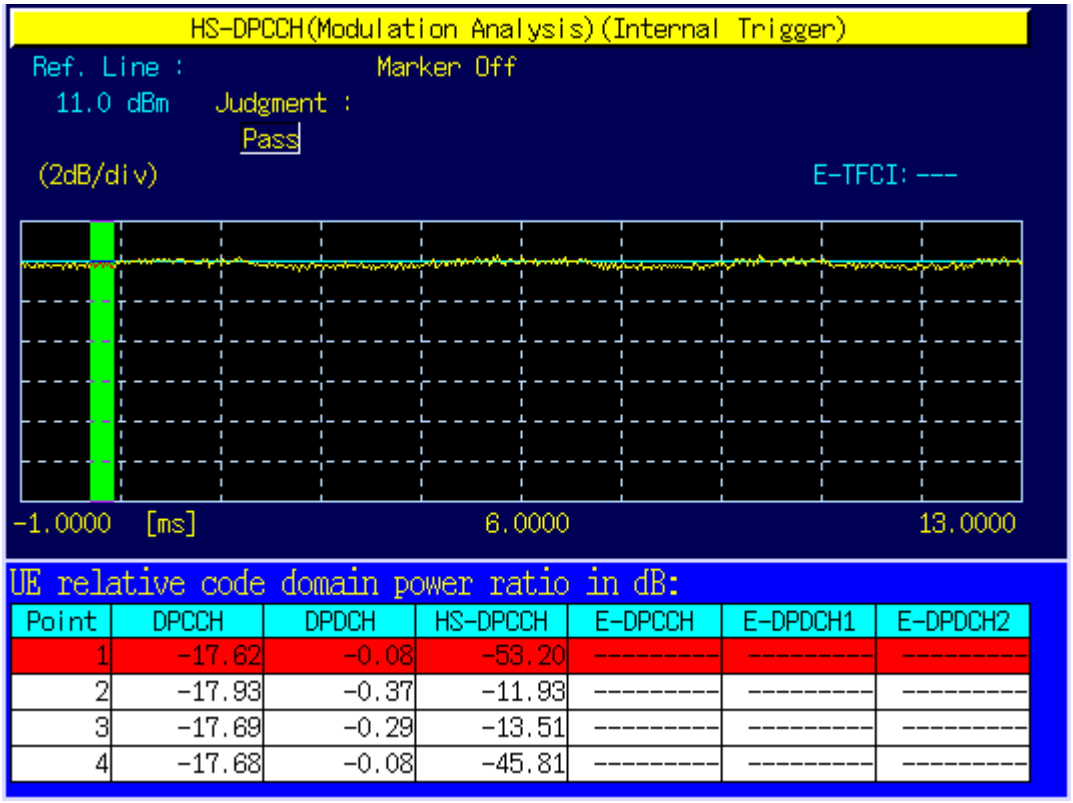
TX Power means Mean power (5 MHz bandwidth), Filtered Power means RRC filtered mean power.

1.11.8. 5.2C UE Relative Code Domain Power Accuracy (Release 6 and later)

1. Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. Execute **CHCODING FIXREFCH** to set [Channel Coding] to [Fixed Reference Channel].
3. Execute **SET_PWRPAT HSPC** to set [CQI Feedback Cycle] to [4 ms], [Ack-Nack Repetition Factor] to [1], [CQI Repetition Factor] to [1], and [TPC Algorithm] to [2].
4. Connect with Fixed Reference Channel H-Set1 (QPSK).
5. Execute **DTCHPAT PN9** to set [DTCH Data Pattern] to [PN9].
6. Execute **OLVL -86.0** to set [Output Level] to [–86.0] dBm.
7. Execute **SCRSEL TDMEAS** to set [Screen] to [Time Domain Measurement].
8. Execute **MEASOBJ HSDPCCH_MA** to set [Measurement Object] to [HS-DPCCH Modulation Analysis].
9. Execute **HSMA_ITEM CDP** to set measurement result of HS-DPCCH (Modulation Analysis) to [CDP Ratio].
10. Execute **TDM_RRC OFF** to set [RRC Filter] to [Off].
11. Execute **HSSCCH OFF** to set [HS-SCCH power] to [Off].
12. Execute **CQIFEEDBACK 0** to set [CQI Feedback Cycle] to [0 ms].
13. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
14. Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
15. Wait 100 ms until the UE power becomes 0.0 dBm.
16. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
17. Execute **HSSCCH ON** to set [HS-SCCH power] to [On].
18. Execute **CQIFEEDBACK 4** to set [CQI Feedback Cycle] to [4 ms].
19. Execute **ILVL 10.0** to set [Input Level] to [10.0] dBm.

[Subtest1]

20. Execute **SET_HSDELTA_CQI 7** to set [Delta CQI Setting] to [7].
21. Execute **SET_HSSUBTEST SUBTEST1** to set [Beta C] to [2], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [7].
22. Execute **SWP** to perform Power measurement.
23. Execute **CDPPASS?** to read the result. Confirm the result is PASS.
    When the result is within the Accuracy [dB] in 3GPP TS.34.121 Table 5.2C.4, it means PASS. If not, it means FAIL.

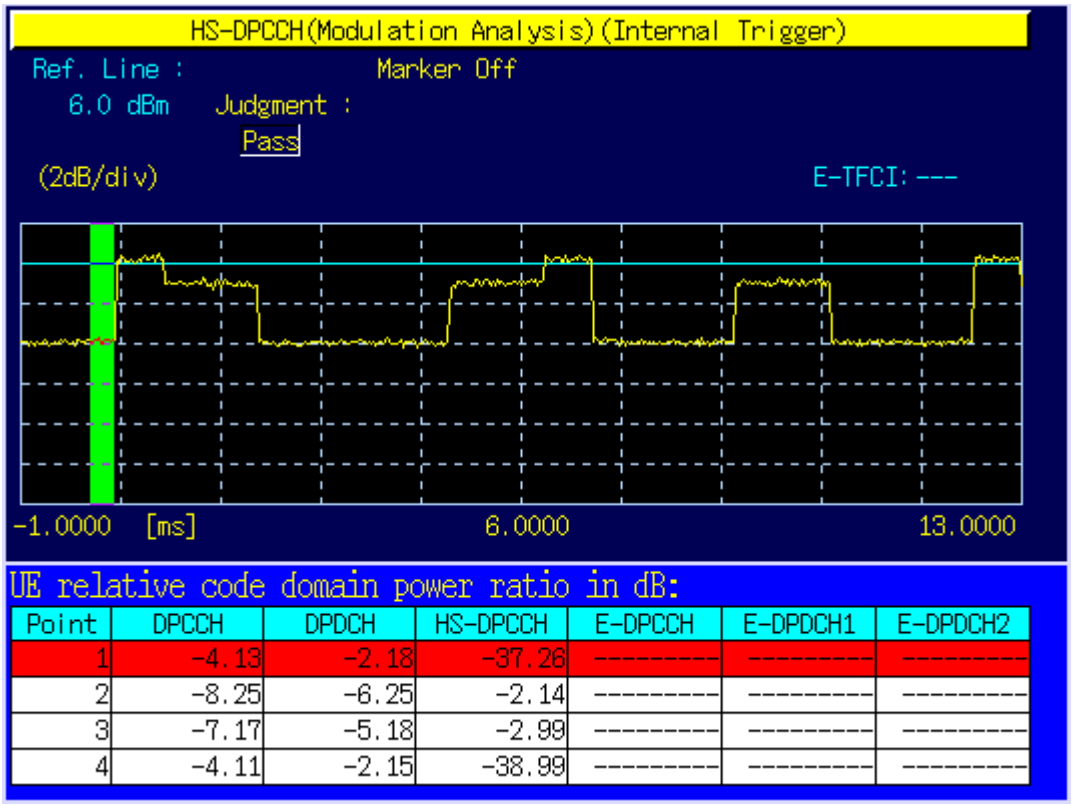


UE relative code domain power ratio in dB:

Point	DPCCH	DPDCH	HS-DPCCH	E-DPCCH	E-DPDCH1	E-DPDCH2
1	-17.62	-0.08	-53.20	---------	---------	---------
2	-17.93	-0.37	-11.93	---------	---------	---------
3	-17.69	-0.29	-13.51	---------	---------	---------
4	-17.68	-0.08	-45.81	---------	---------	---------

[Subtest2]

24. Execute **SET_HSDELTA_CQI 7** to set [Delta CQI Setting] to [7].
25. Execute **SET_HSSUBTEST SUBTEST2** to set [Beta C] to [11], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [7].
26. Execute **SWP** to perform Power measurement.
27. Execute **CDPPASS?** to read the result. Confirm the result is PASS.
    When the result is within the Accuracy [dB] in 3GPP TS.34.121 Table 5.2C.4, it means PASS. If not, it means FAIL.

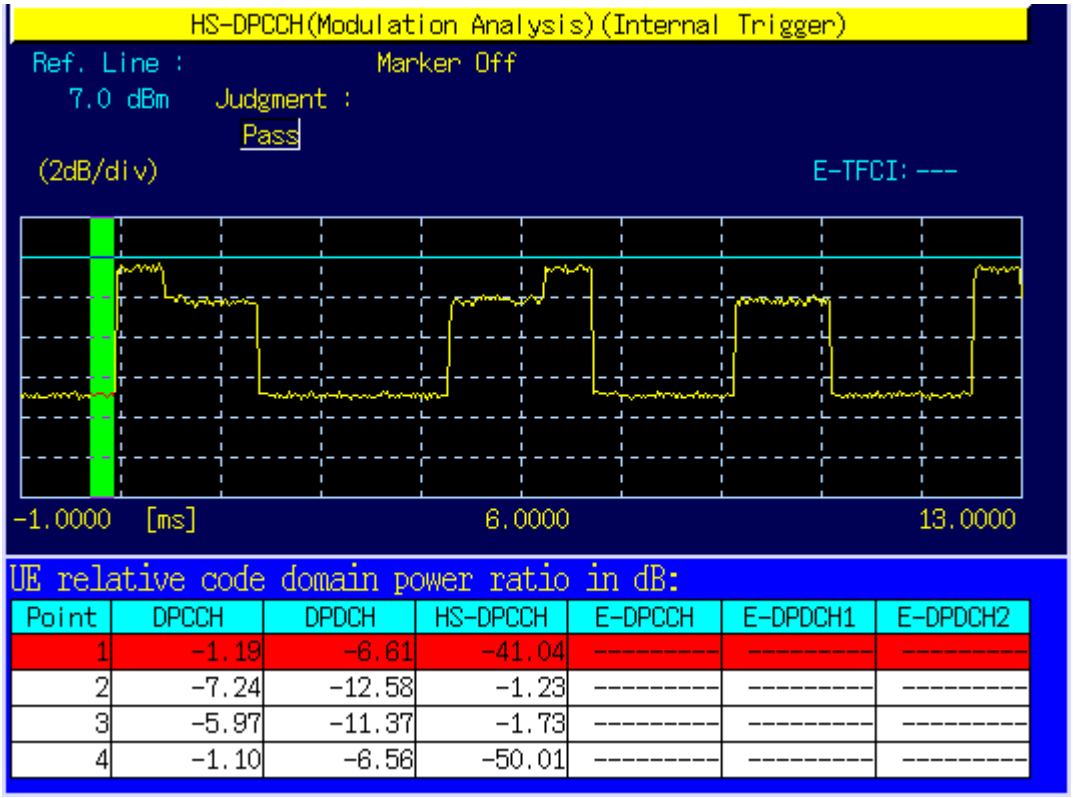


UE relative code domain power ratio in dB:

Point	DPCCH	DPDCH	HS-DPCCH	E-DPCCH	E-DPDCH1	E-DPDCH2
1	-4.13	-2.18	-37.26	---------	---------	---------
2	-8.25	-6.25	-2.14	---------	---------	---------
3	-7.17	-5.18	-2.99	---------	---------	---------
4	-4.11	-2.15	-38.99	---------	---------	---------

[Subtest3]

28. Execute **SET_HSDELTA_CQI 7** to set [Delta CQI Setting] to [7].
29. Execute **SET_HSSUBTEST SUBTEST3** to set [Beta C] to [15], [Beta D] to [8], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [7].
30. Execute **SWP** to perform Power measurement.
31. Execute **CDPPASS?** to read the result. Confirm the result is PASS.
    When the result is within the Accuracy [dB] in 3GPP TS.34.121 Table 5.2C.4, it means PASS. If not, it means FAIL.

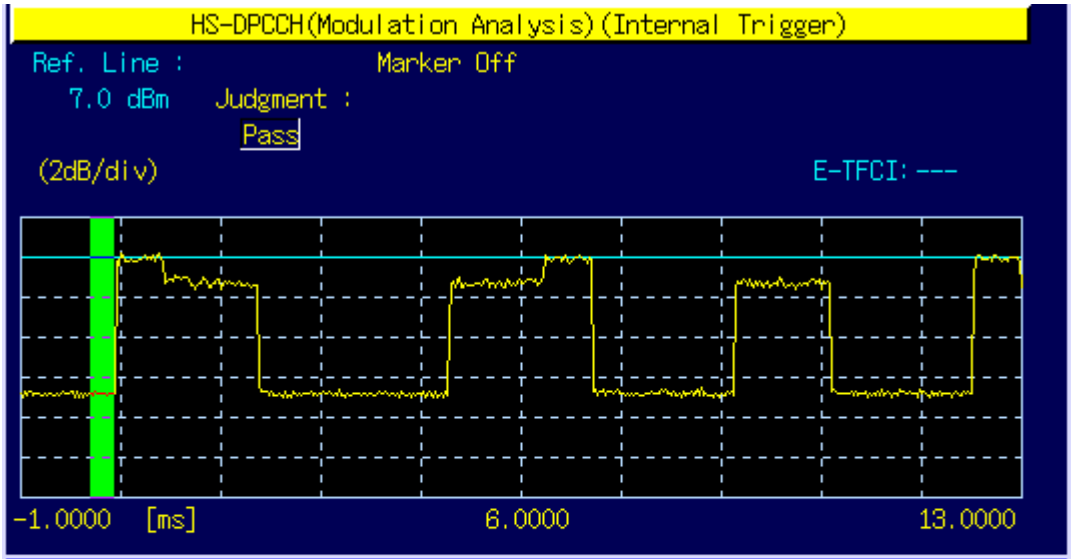


UE relative code domain power ratio in dB:

Point	DPCCH	DPDCH	HS-DPCCH	E-DPCCH	E-DPDCH1	E-DPDCH2
1	-1.19	-6.61	-41.04	---------	---------	---------
2	-7.24	-12.58	-1.23	---------	---------	---------
3	-5.97	-11.37	-1.73	---------	---------	---------
4	-1.10	-6.56	-50.01	---------	---------	---------

[Subtest4]

32. Execute **SET_HSDELTA_CQI 7** to set [Delta CQI Setting] to [7].
33. Execute **SET_HSSUBTEST SUBTEST4** to set [Beta C] to [15], [Beta D] to [4], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [7].
34. Execute **SWP** to perform Power measurement.
35. Execute **CDPPASS?** to read the result. Confirm the result is PASS.
    When the result is within the Accuracy [dB] in 3GPP TS.34.121 Table 5.2C.4, it means PASS. If not, it means FAIL.



UE relative code domain power ratio in dB:

Point	DPCCH	DPDCH	HS-DPCCH	E-DPCCH	E-DPDCH1	E-DPDCH2
1	-0.43	-11.87	-49.69	---------	---------	---------
2	-7.10	-18.19	-1.04	---------	---------	---------
3	-5.70	-16.80	-1.50	---------	---------	---------
4	-0.31	-11.77	-44.90	---------	---------	---------

1.11-2 UE relative code domain power nominal ratios (3GPP TS 34.121 Table 5.2C.3)

Subtest in table C.10.1.4	Measurement point	Expected Relative Code Domain Power in dB		
		DPCCH	DPDCH	HS-DPCCH
1	1	–17.6	–0.08	OFF
	2	–17.9	–0.4	–11.8
	3	–17.8	–0.3	–13.7
	4	–17.6	–0.08	OFF
2	1	–4.1	–2.1	OFF
	2	–8.2	–6.2	–2.1
	3	–7.1	–5.2	–3
	4	–4.1	–2.1	OFF
3	1	–1.1	–6.5	OFF
	2	–7.2	–12.7	–1.2
	3	–5.8	–11.3	–1.8
	4	–1.1	–6.5	OFF
4	1	–0.3	–11.8	OFF
	2	–7.1	–18.5	–1
	3	–5.6	–17.1	–1.5
	4	–0.3	–11.8	OFF

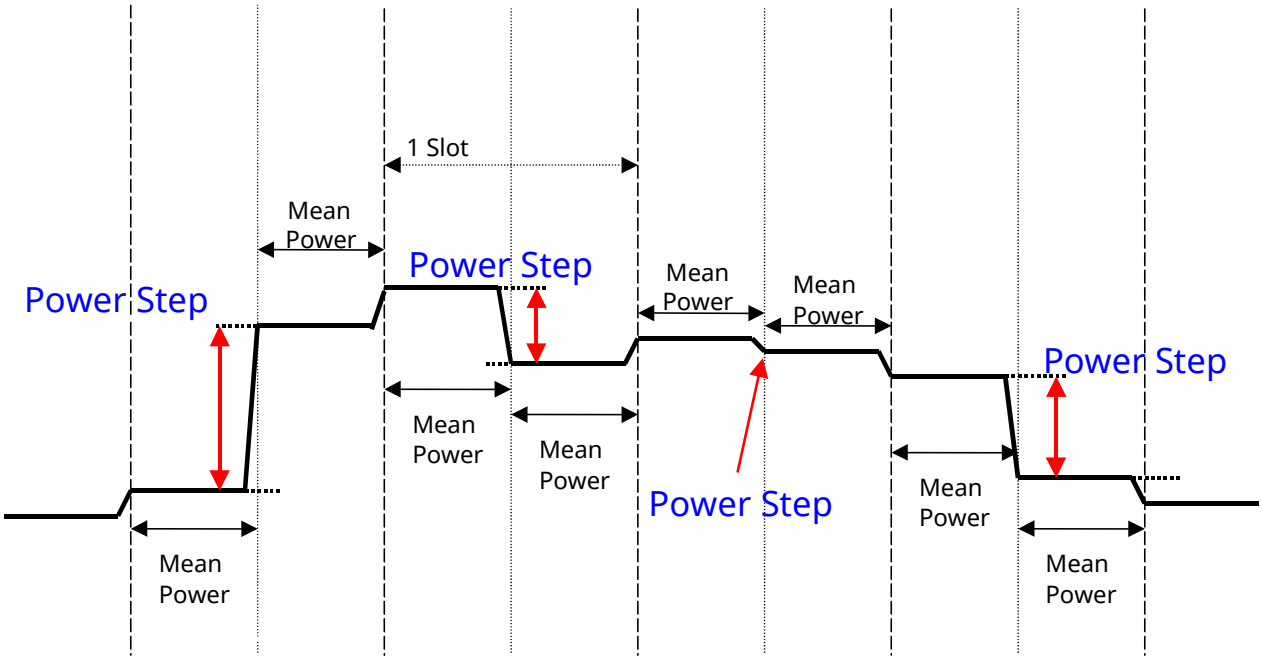
1.11-3 UE relative code domain power accuracy test requirements (3GPP TS 34.121 Table 5.2C.4)

Nominal CDP Ratio	Accuracy (dB)
≥–10 dB	±1.7
–10 dB to ≥–15 dB	±2.3
–15 dB to ≥–20 dB	±2.9

1.11.9. 5.7A HS-DPCCH Power Control

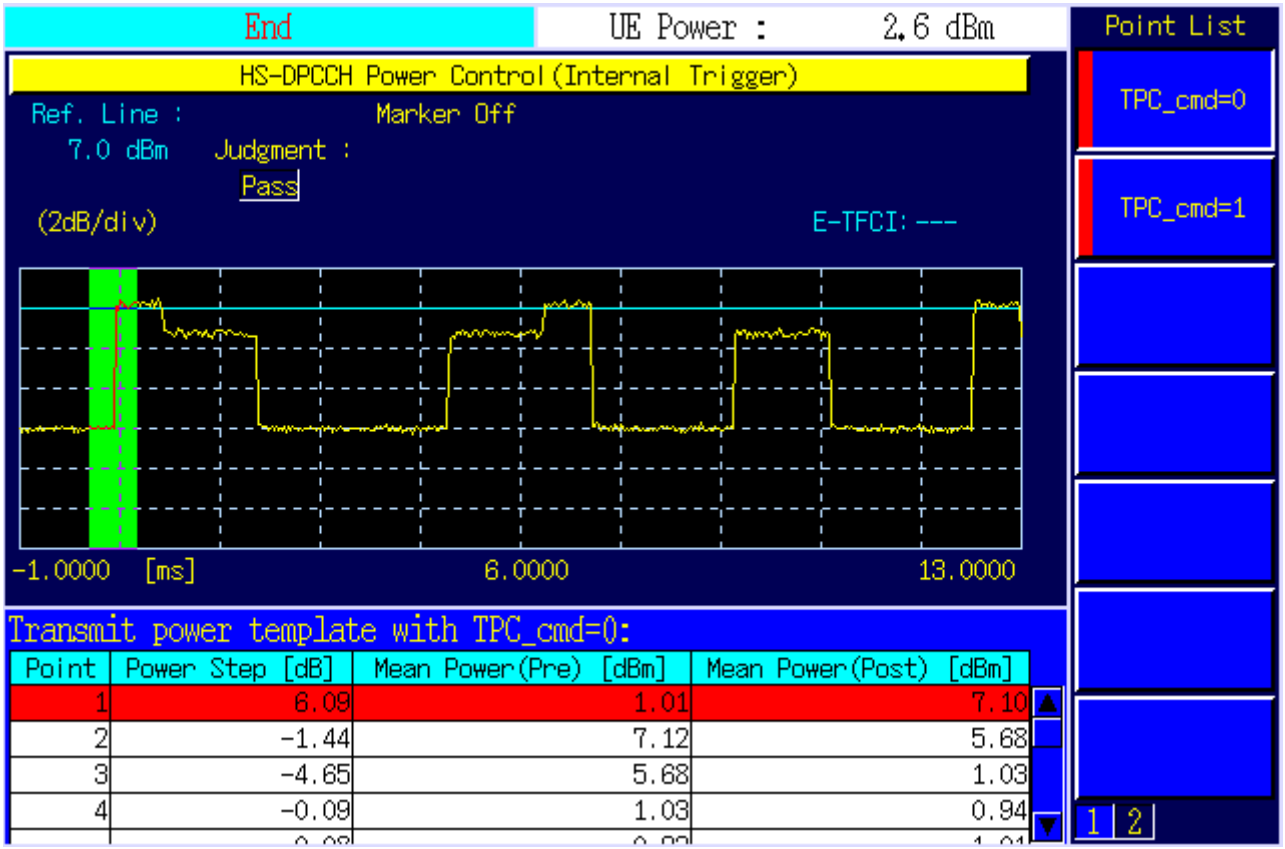
1. Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. Execute **CHCODING FIXREFCH** to set [Channel Coding] to [Fixed Reference Channel].
3. Execute **SET_PWRPAT HSPC** to set [CQI Feedback Cycle] to [4 ms], [Ack-Nack Repetition Factor] to [1], [CQI Repetition Factor] to [1], and [TPC Algorithm] to [2].
4. Execute **SET_HSDELTA_CQI 7** to set [Delta CQI Setting] to [7].
5. Execute **SET_HSSUBTEST SUBTEST3** to set [Beta C] to [15], [Beta D] to [8], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [7]. (3GPP TS 34.121 Table C.10.1.4 Subtest 3)
6. Connect with Fixed Reference Channel H-Set1 (QPSK).
7. Execute **DTCHPAT PN9** to set [DTCH Data Pattern] to [PN9].
8. Execute **OLVL -86.0** to set [Output Level] to [–86.0] dBm.
9. Execute **SCRSEL TDMEAS** to set [Screen] to [Time Domain Measurement].
10. Execute **MEASOBJ HSDPCCH_PC** to set [Measurement Object] to [HS-DPCCH Power Control].
11. Execute **TDM_RRC OFF** to set [RRC Filter] to [Off].

1.11-1 Transmit power template



[TPC_cmd = 0]

12. Execute **HSSCCH OFF** to set [HS-SCCH power] to [Off].
13. Execute **CQIFEEDBACK 0** to set [CQI Feedback Cycle] to [0 ms].
14. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
15. Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
16. Wait 100 ms until the UE power becomes 0.0 dBm.
17. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
18. Execute **HSSCCH ON** to set [HS-SCCH power] to [On].
19. Execute **CQIFEEDBACK 4** to set [CQI Feedback Cycle] to [4 ms].
20. Execute **ILVL 10.0** to set [Input Level] to [10.0] dBm.
21. Execute **OLVL -86.0** to set [Output Level] to [–86.0] dBm.
22. Execute **HSPC_CMD 0** to set a template for HS-DPCCH Power Control to [TPC_cmd = 0].
23. Execute **SWP** to perform HS-DPCCH measurement.
24. Execute **HSPCPASS?** to read the HS-DPCCH measurement result. Confirm the result is PASS.
    When all Power Step results are within the Allowed Transmitter power step range [dB] in 3GPP TS.34.121 Table 5. 7A.2. it means PASS. If not, it means FAIL.

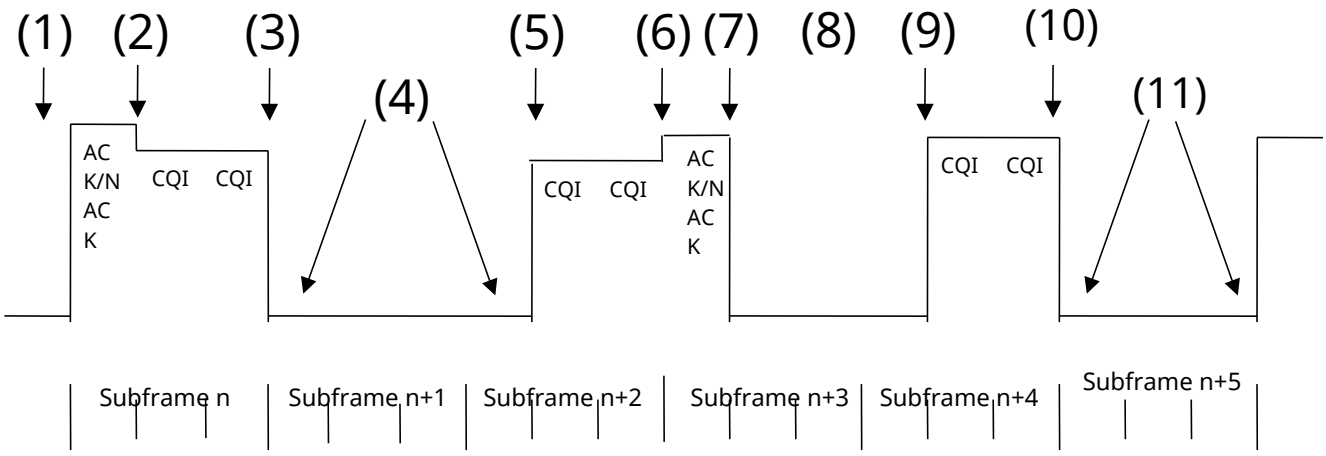


Point	Power Step [dB]	Mean Power(Pre) [dBm]	Mean Power(Post) [dBm]
1	6.09	1.01	7.10
2	-1.44	7.12	5.68
3	-4.65	5.68	1.03
4	-0.09	1.03	0.94

1.11-4 3GPP TS34.121 Table 5.7A.2: Transmitter power test requirements for TPC_cmd=0

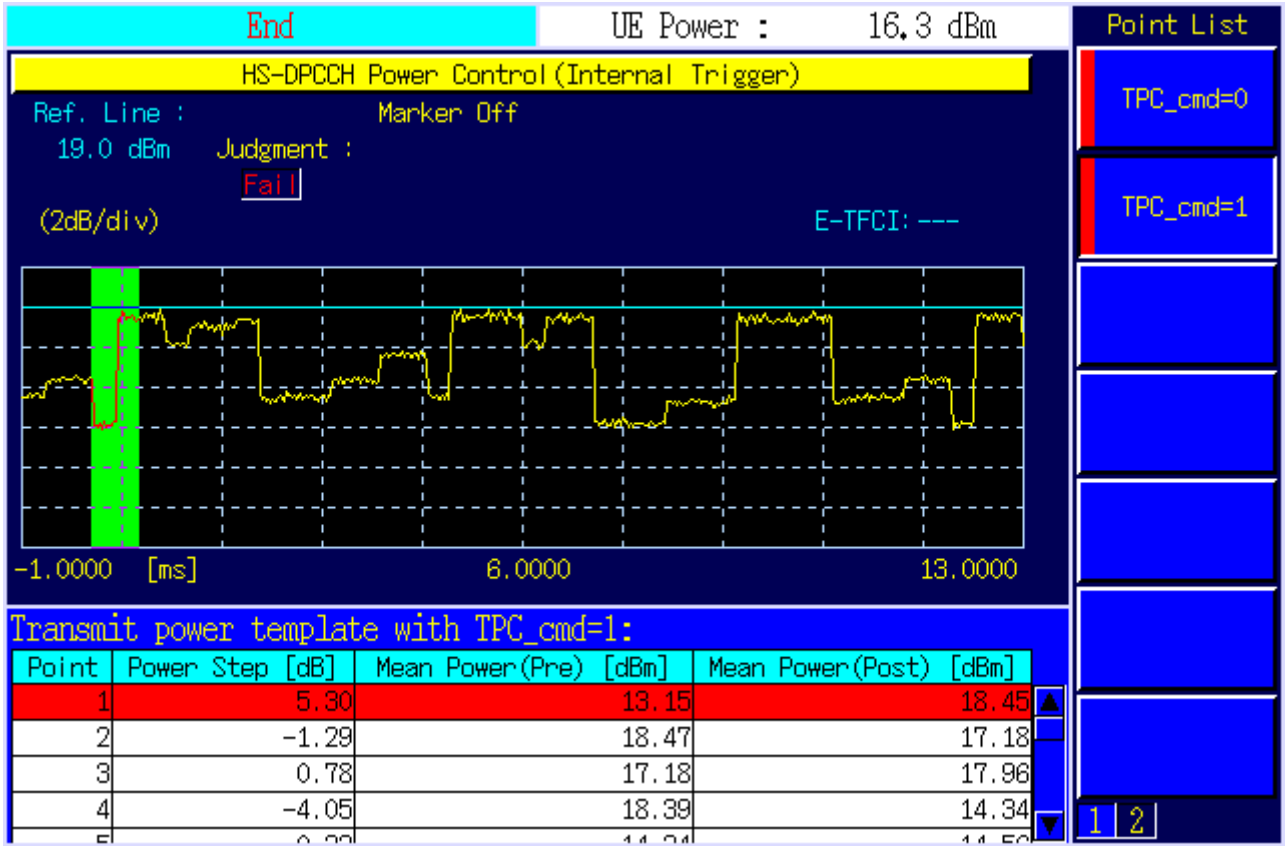
Sub-test in table C.10.1.4	Power step	Nominal Power step size, ΔP [dB]	Rounded Power step size, ΔP [dB]	Transmitter power step Tolerance [dB]	Allowed Transmitter power step range [dB]
3	1	6.14	6	+/- 2.3	3.7 to 8.44
	2	-1.38	-1	+/- 0.6	-1.98 to -0.4
	3	-4.76	-5	+/- 2.3	-7.3 to -2.46
	4[1]	0	0	+/- 0.6	-0.6 to 0.6
	5	4.76	5	+/- 2.3	2.46 to 7.3
	6	1.38	1	+/- 0.6	0.4 to 1.98
	7	-6.14	-6	+/- 2.3	-8.44 to -3.7
	8[1]	0	0	+/- 0.6	-0.6 to 0.6
	9	4.76	5	+/- 2.3	2.46 to 7.3
	10	-4.76	-5	+/- 2.3	-7.3 to -2.46
	11[1]	0	0	+/- 0.6	-0.6 to 0.6
Note 1: Two test points					

1.11-2 Transmit power template below max power with TPC_cmd = 0



[TPC_cmd = 1]

25. Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
26. Execute **TPCALGO 1** to set [TPC Algorithm] to [1].
27. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].
28. Wait 100 ms until the UE power becomes maximum.
29. Execute **HSPC_CMD 1** to set the template for HS-DPCCH Power Control to [TPC_cmd = 1].
30. Execute **SWP** to perform HS-DPCCH measurement.
31. Execute **HSPCPASS?** to read the HS-DPCCH measurement result. Confirm the result is PASS.
    When all Power Step results are within the Allowed Transmitter power step range [dB] in 3GPP TS.34.121 Table 5. 7A.2. it means PASS. If not, it means FAIL.



Point	Power Step [dB]	Mean Power(Pre) [dBm]	Mean Power(Post) [dBm]
1	5.30	13.15	18.45
2	-1.29	18.47	17.18
3	0.78	17.18	17.96
4	-4.05	18.39	14.34

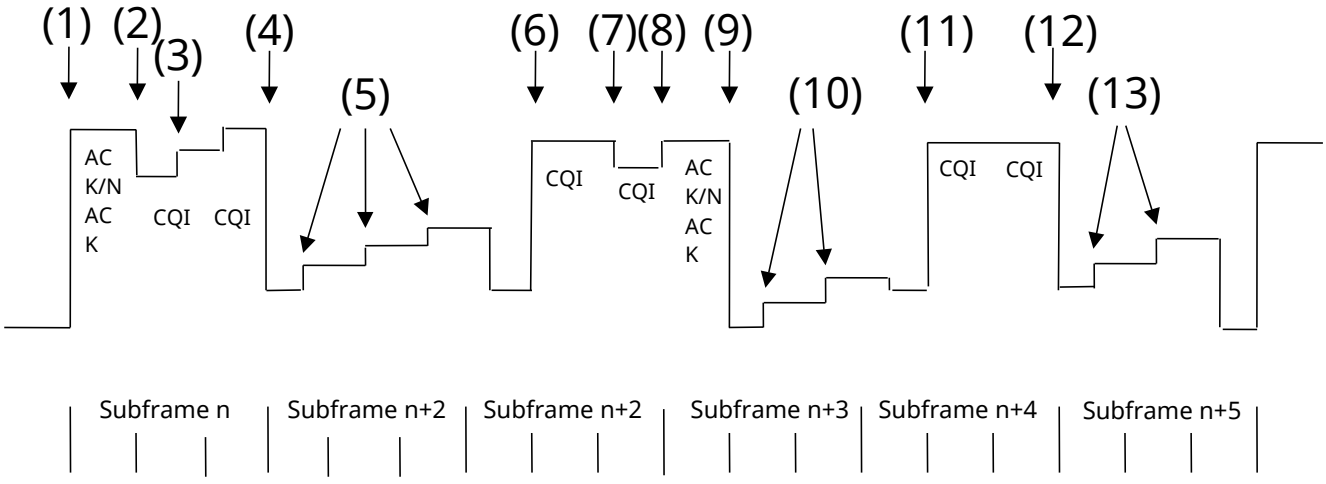
1.11-5 3GPP TS34.121 Table 5.7A.3: Transmitter power test requirements for TPC_cmd=1

Sub-test in table C.10.1.4	Power step	Nominal Power step size, ΔP [dB]	Rounded Power step size, ΔP [dB]	Transmitter power step Tolerance [dB]	Allowed Transmitter power step range [dB]
3	1	6.14	6	+/- 2.3	3.7 to 8.44
	2	-1.38	-1	+/- 0.6	-1.98 to -0.4
	3[3]	No requirements	No requirements	NA	No requirements
	4	-4.76	-5	+/- 2.3	-7.3 to -2.46
	5[1]	1	1	+/- 0.6	0.4 to 1.6
	6	4.76	5	+/- 2.3	2.46 to 7.3
	7[3]	No requirements	No requirements	NA	No requirements
	8	1.38	1	+/- 0.6	0.40 to 1.98
	9	-6.14	-6	+/- 2.3	-8.44 to -3.7
	10[2]	1	1	+/- 0.6	0.4 to 1.6
	11	4.76	5	+/- 2.3	2.46 to 7.3
	12	-4.76	-5	+/- 2.3	-7.3 to -2.46
	13[2]	1	1	+/- 0.6	0.4 to 1.6

Note 1: Three test points
Note 2: Two test points
Note 3: In these test points rel-6 UE performs additional power scaling due to changes in allowed MPR, and therefore there are no requirements specified for transmitter power steps.

Note: Test points 3 and 7 were removed because the 3GPP ST34.121 (V8.3.0) 5.7A HS-DPCCH power control specification changed with V10.50.

1.11-3 Transmit power template below max power with TPC_cmd = 1



1.11.10. 5.9A Spectrum Emission Mask with HS-DPCCH

1. Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. Execute **CHCODING FIXREFCH** to set [Channel Coding] to [Fixed Reference Channel].
3. Execute **SET_PWRPAT HSMAXPWR** to set [CQI Feedback Cycle] to [4 ms], [Ack-Nack Repetition Factor] to [3], [CQI Repetition Factor] to [2], and [TPC Algorithm] to [2].
4. Connect with Fixed Reference Channel H-Set1 (QPSK).
5. Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
6. Execute **OLVL -86.0** to set [Output Level] to [–86.0] dBm.
7. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].
8. Execute **DTCHPAT PN9** to set [DTCH Data Pattern] to [PN9].
9. Execute **SMASK_MEAS ON** to set [Spectrum Emission Mask] measurement to [On].
10. Execute **SMASK_AVG 20** to set [Average Count] of SEM measurement to [20] times.

[Subtest1]

11. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
12. Execute **SET_HSSUBTEST SUBTEST1** to set [Beta C] to [2], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
13. Execute **SWP** to perform SEM measurement.
14. Execute **SMASKPASS?** to read the SEM measurement result. Confirm the measurement result is PASS.

[Subtest2]

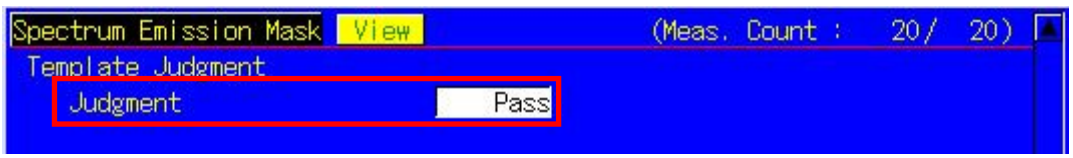
15. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
16. Execute **SET_HSSUBTEST SUBTEST2** to set [Beta C] to [11], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
17. Execute **SWP** to perform SEM measurement.
18. Execute **SMASKPASS?** to read the SEM measurement result. Confirm the measurement result is PASS.

[Subtest3]

19. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
20. Execute **SET_HSSUBTEST SUBTEST3** to set [Beta C] to [15], [Beta D] to [8], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
21. Execute **SWP** to perform SEM measurement.
22. Execute **SMASKPASS?** to read the SEM measurement result. Confirm the measurement result is PASS.

[Subtest4]

23. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
24. Execute **SET_HSSUBTEST SUBTEST4** to set [Beta C] to [15], [Beta D] to [4], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
25. Execute **SWP** to perform SEM measurement.
26. Execute **SMASKPASS?** to read the SEM measurement result. Confirm the measurement result is PASS.



1.11.11. 5.10A Adjacent Channel Leakage Power Ratio (ACLR) with HS-DPCCH

1. Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. Execute **CHCODING FIXREFCH** to set [Channel Coding] to [Fixed Reference Channel].
3. Execute **SET_PWRPAT HSMAXPWR** to set [CQI Feedback Cycle] to [4 ms], [Ack-Nack Repetition Factor] to [3], [CQI Repetition Factor] to [2], and [TPC Algorithm] to [2].
4. Connect with Fixed Reference Channel H-Set1 (QPSK).
5. Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
6. Execute **OLVL -86.0** to set [Output Level] to [–86.0] dBm.
7. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].
8. Execute **DTCHPAT PN9** to set [DTCH Data Pattern] to [PN9].
9. Execute **ADJ_MEAS ON** to set [Adjacent Channel Power](ACLR) measurement to [On].
10. Execute **ADJ_AVG 20** to set [Average Count] of ACLR measurement to [20] times.

[Subtest1]

11. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
12. Execute **SET_HSSUBTEST SUBTEST1** to set [Beta C] to [2], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
13. Execute **SWP** to perform ACLR measurement.
14. Execute **AVG_MODPWR? LOW10, AVG_MODPWR? LOW5, AVG_MODPWR? UP5, AVG_MODPWR? UP10** to read the ACLR measurement results.
15. Compare the measurement result with the table below.

[Subtest2]

16. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
17. Execute **SET_HSSUBTEST SUBTEST1** to set [Beta C] to [11], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
18. Execute **SWP** to perform ACLR measurement.
19. Execute **AVG_MODPWR? LOW10, AVG_MODPWR? LOW5, AVG_MODPWR? UP5, AVG_MODPWR? UP10** to read the ACLR measurement results.
20. Compare the measurement result with the table below.

[Subtest3]

21. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
22. Execute **SET_HSSUBTEST SUBTEST1** to set [Beta C] to [15], [Beta D] to [8], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
23. Execute **SWP** to perform ACLR measurement.
24. Execute **AVG_MODPWR? LOW10, AVG_MODPWR? LOW5, AVG_MODPWR? UP5, AVG_MODPWR? UP10** to read the ACLR measurement results.
25. Compare the measurement result with the table below.

[Subtest4]

26. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
27. Execute **SET_HSSUBTEST SUBTEST1** to set [Beta C] to [15], [Beta D] to [4], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
28. Execute **SWP** to perform ACLR measurement.
29. Execute **AVG_MODPWR? LOW10, AVG_MODPWR? LOW5, AVG_MODPWR? UP5, AVG_MODPWR? UP10** to read the ACLR measurement results.
30. Compare the measurement result with the table below.

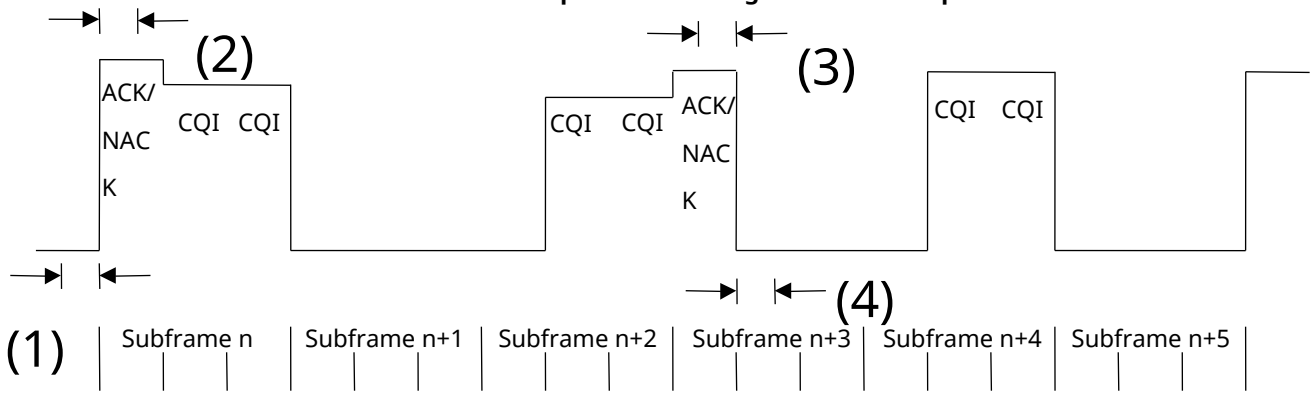
1.11-6 UE ACLR (3GPP TS 34.121 Table 5.10A.3)

Power Class	UE Channel	ACLR Limit
3	+5 MHz or –5 MHz	32.2 dB
3	+10 MHz or –10 MHz	42.2 dB

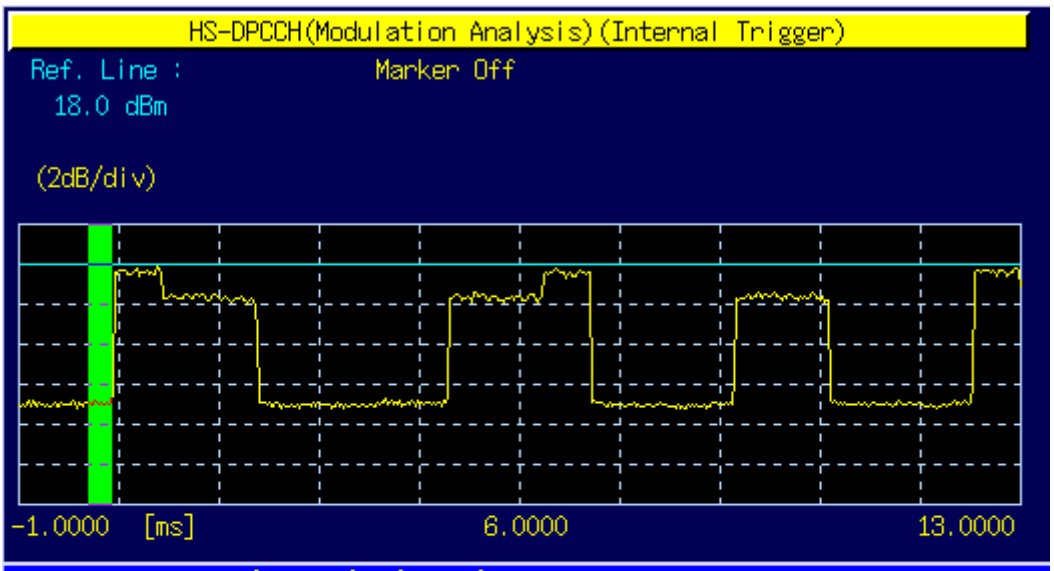
1.11.12. 5.13.1A Error Vector Magnitude (EVM) with HS-DPCCH
5.13.1AA Error Vector Magnitude (EVM) and Phase Discontinuity with HS-DPCCH

1. Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. Execute **CHCODING FIXREFCH** to set [Channel Coding] to [Fixed Reference Channel].
3. Execute **SET_PWRPAT HSPC** to set [CQI Feedback Cycle] to [4 ms], [Ack-Nack Repetition Factor] to [1], [CQI Repetition Factor] to [1], and [TPC Algorithm] to [2].
4. Execute **SET_HSDELTA_CQI 7** to set [Delta CQI Setting] to [7].
5. Execute **SET_HSSUBTEST SUBTEST3** to set [Beta C] to [15], [Beta D] to [8], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [7].
6. Connect with Fixed Reference Channel H-Set1 (QPSK).
7. Execute **OLVL -86.0** to set [Output Level] to [–86.0] dBm.
8. Execute **DTCHPAT PN9** to set [DTCH Data Pattern] to [PN9].
9. Execute **SCRSEL TDMEAS** to set [Screen] to [Time Domain Measurement].
10. Execute **MEASOBJ HSDPCCH_MA** to set [Measurement Object] to [HS-DPCCH Modulation Analysis].
11. Execute **HSMA_ITEM EVMPHASE** to set [Point List] to [EVM to Phase Disc.].
12. Execute **TDM_RRC OFF** to set [RRC Filter] to [Off].

1.11-4 HS-DPCCH on/off pattern showing measurement positions



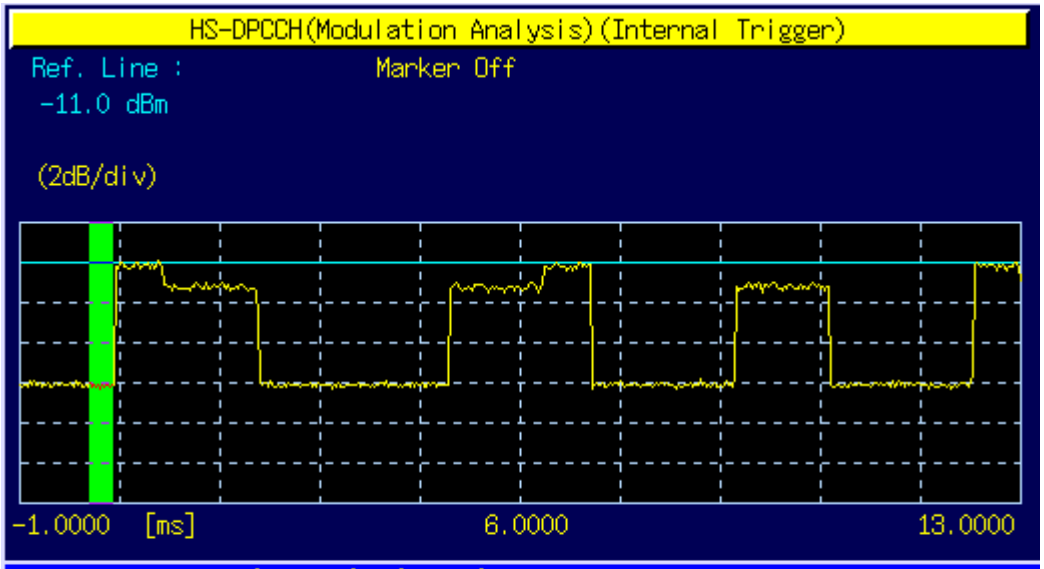
13. Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
14. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].
15. Wait 300 ms until the UE becomes Max Power.
16. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
17. Execute **SWP** to perform Modulation Analysis measurement.
18. Execute **EVMPHASEPASS?** to read the result. Confirm the result is PASS.
    When the Phase Discontinuity measurement result is within [±36deg] and the EVM measurement result is less than 17.5%, it means PASS. If not, it means FAIL.



EVM and phase discontinuity with HS-DPCCH:

Point	EVM [%]	Freq.Err.[ppm]	Phase Discontinuity [deg]
1	5.58	0.02	----------
2	6.11	0.03	-4.03
3	4.19	0.00	----------
4	4.67	-0.01	-1.30

19. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
20. Execute **HSSCCH OFF** to set [HS-SCCH power] to [Off].
21. Execute **CQIFEEDBACK 0** to set [CQI Feedback Cycle] to [0 ms].
22. Execute **ILVL -18.0** to set [Input Level] to [–18.0] dBm.
23. Wait 200 ms until the UE power becomes [–18.0] dBm.
24. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
25. Execute **HSSCCH ON** to set [HS-SCCH power] to [On].
26. Execute **CQIFEEDBACK 4** to set [CQI Feedback Cycle] to [4 ms].
27. Execute **ILVL -10.0** to set [Input Level] to [–10.0] dBm.
28. Execute **SWP** to perform Modulation Analysis measurement.
29. Execute **EVMPHASEPASS?** to read the result. Confirm the result is PASS.
    When the Phase Discontinuity measurement result is within [±36deg] and the EVM measurement result is less than 17.5%, it means PASS. If not, it means FAIL.



EVM and phase discontinuity with HS-DPCCH:

Point	EVM [%]	Freq.Err.[ppm]	Phase Discontinuity [deg]
1	5.28	0.01	--------
2	4.00	0.01	-0.28
3	5.51	0.00	---------
4	5.53	0.00	-0.77

1.11.13. 5.13.2A Relative Code Domain Error with HS-DPCCH

1. Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. Execute **CHCODING FIXREFCH** to set [Channel Coding] to [Fixed Reference Channel].
3. Execute **SET_PWRPAT HSMAXPWR** to set [CQI Feedback Cycle] to [4 ms], [Ack-Nack Repetition Factor] to [3], [CQI Repetition Factor] to [2], and [TPC Algorithm] to [2].
4. Connect with Fixed Reference Channel H-Set1 (QPSK).
5. Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
6. Execute **OLVL -86.0** to set [Output Level] to [–86.0] dBm.
7. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].
8. Execute **DTCHPAT PN9** to set [DTCH Data Pattern] to [PN9].
9. Execute **RCDE_MEAS ON** to set [RCDE] measurement to [On].
10. Execute **RCDE_AVG 20** to set [Average Count] of RCDE measurement to [20] times.

- When input level set to max power

[Subtest1]

11. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
12. Execute **SET_HSSUBTEST SUBTEST1** to set [Beta C] to [2], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
13. Execute **SWP** to perform RCDE measurement.
14. Execute **AVG_DPCCHECDP?** to read the ECDP - DPCCH measurement result.
15. Execute **AVG_DPDCHECDP?** to read the ECDP - DPDCH measurement result.
16. Execute **AVG_HSDPCCHECDP?** to read the ECDP - HS-DPCCH measurement result.
17. Execute **AVG_DPCCHRCDE?** to read the Relative Code Domain Error - DPCCH measurement result.
18. Execute **AVG_DPDCHRCDE?** to read the Relative Code Domain Error - DPDCH measurement result.
19. Execute **AVG_HSDPCCHRCDE?** to read the Relative Code Domain Error - HS-DPCCH measurement result.
20. Confirm the Relative Code Domain Error is
    Relative Code Domain Error ≤ –15.5 dB, when –21 dB < ECDP and
    Relative Code Domain Error ≤ –36.5 – ECDP, when –30 dB ≤ ECDP ≤ –21dB.

[Subtest3]

21. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
22. Execute **SET_HSSUBTEST SUBTEST3** to set [Beta C] to [15], [Beta D] to [8], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
23. Execute **SWP** to perform RCDE measurement.
24. Execute **AVG_DPCCHECDP?** to read the ECDP - DPCCH measurement result.
25. Execute **AVG_DPDCHECDP?** to read the ECDP - DPDCH measurement result.
26. Execute **AVG_HSDPCCHECDP?** to read the ECDP - HS-DPCCH measurement result.
27. Execute **AVG_DPCCHRCDE?** to read the Relative Code Domain Error - DPCCH measurement result.
28. Execute **AVG_DPDCHRCDE?** to read the Relative Code Domain Error - DPDCH measurement result.
29. Execute **AVG_HSDPCCHRCDE?** to read the Relative Code Domain Error - HS-DPCCH measurement result.
30. Confirm the Relative Code Domain Error is
    Relative Code Domain Error ≤ –15.5dB, when –21dB < ECDP and
    Relative Code Domain Error ≤ –36.5 – ECDP, when –30 dB ≤ ECDP ≤ –21dB.

[Subtest4]

31. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
32. Execute **SET_HSSUBTEST SUBTEST4** to set [Beta C] to [15], [Beta D] to [4], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
33. Execute **SWP** to perform RCDE measurement.
34. Execute **AVG_DPCCHECDP?** to read the ECDP - DPCCH measurement result.
35. Execute **AVG_DPDCHECDP?** to read the ECDP - DPDCH measurement result.
36. Execute **AVG_HSDPCCHECDP?** to read the ECDP - HS-DPCCH measurement result.
37. Execute **AVG_DPCCHRCDE?** to read the Relative Code Domain Error - DPCCH measurement result.
38. Execute **AVG_DPDCHRCDE?** to read the Relative Code Domain Error - DPDCH measurement result.
39. Execute **AVG_HSDPCCHRCDE?** to read the Relative Code Domain Error - HS-DPCCH measurement result.
40. Confirm the Relative Code Domain Error is
    Relative Code Domain Error ≤ –15.5 dB, when –21 dB < ECDP and
    Relative Code Domain Error ≤ –36.5 – ECDP, when –30 dB ≤ ECDP ≤ –21dB.

- When input level set to –18.0 dBm

[Sub-test1]

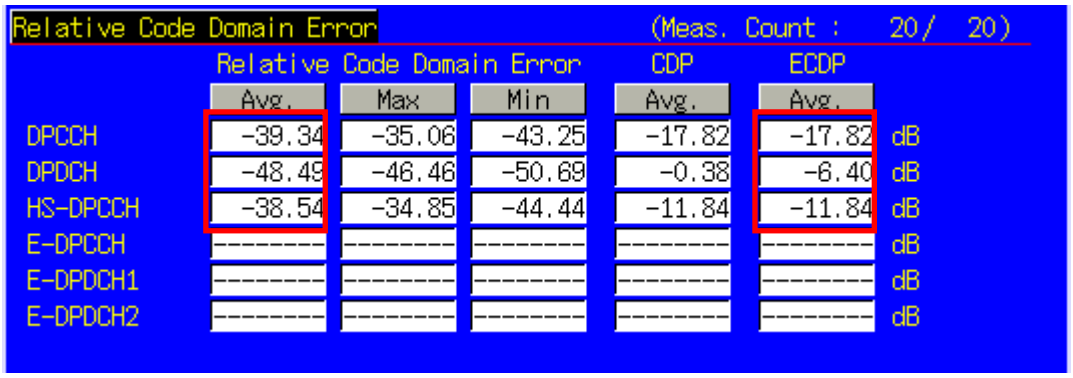
41. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
42. Execute **SET_HSSUBTEST SUBTEST1** to set [Beta C] to [2], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
43. Execute **HSSCCH OFF** to set [HS-SCCH power] to [Off].
44. Execute **CQIFEEDBACK 0** to set [CQI Feedback Cycle] to [0 ms].
45. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
46. Execute **ILVL -18.0** to set [Input Level] to [–18.0] dBm.
47. Wait 200 ms until the UE power becomes [–18.0] dBm.
48. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
49. Execute **HSSCCH ON** to set [HS-SCCH power] to [On].
50. Execute **CQIFEEDBACK 4** to set [CQI Feedback Cycle] to [4 ms].
51. Execute **ILVL -10.0** to set [Input Level] to [–10.0] dBm.
52. Execute **SWP** to perform RCDE measurement.
53. Execute **AVG_DPCCHECDP?** to read the ECDP - DPCCH measurement result.
54. Execute **AVG_DPDCHECDP?** to read the ECDP - DPDCH measurement result.
55. Execute **AVG_HSDPCCHECDP?** to read the ECDP - HS-DPCCH measurement result.
56. Execute **AVG_DPCCHRCDE?** to read the Relative Code Domain Error - DPCCH measurement result.
57. Execute **AVG_DPDCHRCDE?** to read the Relative Code Domain Error - DPDCH measurement result.
58. Execute **AVG_HSDPCCHRCDE?** to read the Relative Code Domain Error - HS-DPCCH measurement result.
59. Confirm the Relative Code Domain Error is
    Relative Code Domain Error ≤ –15.5 dB, when –21 dB < ECDP and
    Relative Code Domain Error ≤ –36.5 – ECDP, when –30 dB ≤ ECDP ≤ –21dB.

[Sub-test3]

60. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
61. Execute **SET_HSSUBTEST SUBTEST3** to set [Beta C] to [15], [Beta D] to [8], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
62. Execute **HSSCCH OFF** to set [HS-SCCH power] to [Off].
63. Execute **CQIFEEDBACK 0** to set [CQI Feedback Cycle] to [0 ms].
64. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
65. Execute **ILVL -18.0** to set [Input Level] to [–18.0] dBm.
66. Wait 200 ms until the UE power becomes [–18.0] dBm.
67. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
68. Execute **HSSCCH ON** to set [HS-SCCH power] to [On].
69. Execute **CQIFEEDBACK 4** to set [CQI Feedback Cycle] to [4 ms].
70. Execute **ILVL -10.0** to set [Input Level] to [–10.0] dBm.
71. Execute **SWP** to perform RCDE measurement.
72. Execute **AVG_DPCCHECDP?** to read the ECDP - DPCCH measurement result.
73. Execute **AVG_DPDCHECDP?** to read the ECDP - DPDCH measurement result.
74. Execute **AVG_HSDPCCHECDP?** to read the ECDP - HS-DPCCH measurement result.
75. Execute **AVG_DPCCHRCDE?** to read the Relative Code Domain Error - DPCCH measurement result.
76. Execute **AVG_DPDCHRCDE?** to read the Relative Code Domain Error - DPDCH measurement result.
77. Execute **AVG_HSDPCCHRCDE?** to read the Relative Code Domain Error - HS-DPCCH measurement result.
78. Confirm the Relative Code Domain Error is
    Relative Code Domain Error ≤ –15.5 dB, when –21 dB < ECDP and
    Relative Code Domain Error ≤ –36.5 – ECDP, when –30 dB ≤ ECDP ≤ –21dB.

[Sub-test4]

79. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
80. Execute **SET_HSSUBTEST SUBTEST4** to set [Beta C] to [15], [Beta D] to [4], [Delta ACK] to [8], [Delta NACK] to [8], and [Delta CQI] to [8].
81. Execute **HSSCCH OFF** to set [HS-SCCH power] to [Off].
82. Execute **CQIFEEDBACK 0** to set [CQI Feedback Cycle] to [0 ms].
83. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
84. Execute **ILVL -18.0** to set [Input Level] to [–18.0] dBm.
85. Wait 200 ms until the UE power becomes [–18.0] dBm.
86. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
87. Execute **HSSCCH ON** to set [HS-SCCH power] to [On].
88. Execute **CQIFEEDBACK 4** to set [CQI Feedback Cycle] to [4 ms].
89. Execute **ILVL -10.0** to set [Input Level] to [–10.0] dBm.
90. Execute **SWP** to perform RCDE measurement.
91. Execute **AVG_DPCCHECDP?** to read the ECDP - DPCCH measurement result.
92. Execute **AVG_DPDCHECDP?** to read the ECDP - DPDCH measurement result.
93. Execute **AVG_HSDPCCHECDP?** to read the ECDP - HS-DPCCH measurement result.
94. Execute **AVG_DPCCHRCDE?** to read the Relative Code Domain Error - DPCCH measurement result.
95. Execute **AVG_DPDCHRCDE?** to read the Relative Code Domain Error - DPDCH measurement result.
96. Execute **AVG_HSDPCCHRCDE?** to read the Relative Code Domain Error - HS-DPCCH measurement result.
97. Confirm the Relative Code Domain Error is
    Relative Code Domain Error ≤ –15.5 dB, when –21 dB < ECDP and
    Relative Code Domain Error ≤ –36.5 – ECDP, when –30 dB ≤ ECDP ≤ –21dB.

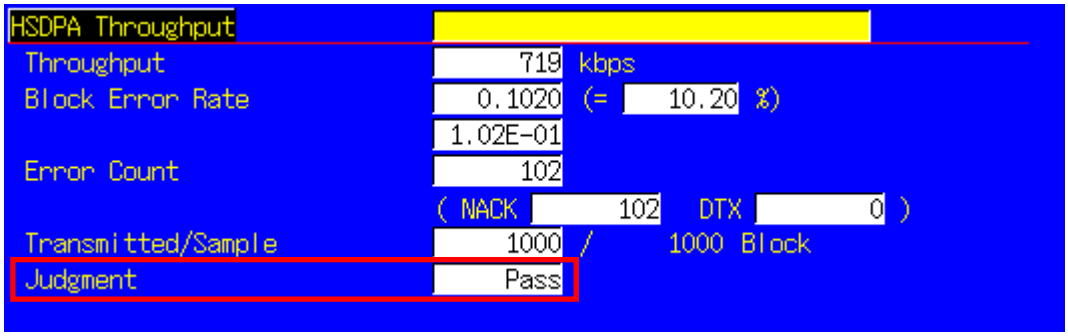


1.11-7 3GPP TS34.121 Table 5.13.2A.5: Relative Code Domain Error test requirement

ECDP dB	Relative Code Domain Error dB
-21 < ECDP	≤ -15.5
-30 ≤ ECDP ≤ -21	≤ -36.5 - ECDP
ECDP < -30	No requirement

1.11.14. 6.3A Maximum Input Level for HS-PDSCH Reception (16QAM)

1. Execute **ULGAINPAR 8,15,8,8,8** to set [Beta C] to [8], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8].
2. Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
3. Execute **CHAN 9750** to set to M channel. (in case of Band I)
4. Connect with Fixed Reference Channel H-Set1(16QAM).
5. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
6. Execute **ILVL 20.0** to set [Input Level] to [+20.0] dBm.
7. Wait 100 ms until UE power becomes [+20.0] dBm.
8. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
9. Execute **OLVL -25.7** to set [Output Level] to [–25.7] dBm.
10. Execute **DDPCHPWR -13.0** to set [DPCH_Ec/Ior] to [–13.0] dB.
11. Execute **HSSCCHPWR -13.0** to set [HS-SCCH_Ec/Ior] to [–13.0] dB.
12. Execute **HSPDSCHPWR -3.0** to set [HS-PDSCH_Ec/Ior] to [–3.0] dB.
13. Execute **TPUT_MEAS On** to set [HSDPA Throughput] measurement to [On].
14. Execute **TPUT_SAMPLE 1000** to set [Number of Sample] of HSDPA Throughput to [1000] Block.
15. Execute **SWP** to perform HSDPA Throughput measurement.
16. Execute **TPUTPASS?** to read the HSDPA Throughput measurement result.



1.12. HSUPA Measurement

1.12.1. E-DCH RF Test Location Registration

Location registration with E-DCH RF Test is required when connecting using HSUPA.

1. Execute **PRESET_3GPP** to preset parameter for 3GPP.
2. Execute **CHCODING EDCHTEST** to set [Channel Coding] to [E-DCH RF Test].
3. Execute **HSUSET TTI10_QPSK** to set [HSUPA Set of Parameters] to [TTI 10ms(QPSK)].
4. Execute **INTEGRITY On** to set [Integrity Protection] to [On].
5. Turn on the UE.
6. Execute **CALLSTAT?** and wait until the response becomes 2 (= Idle(Regist)).

1.12.2. E-DCH RF Test Connection

The process for performing E-DCH RF Test connection after location registration is shown below. (See 1.12.1 E-DCH RF Test Location Registration.)

1. Execute **CALLSA** to connect with E-DCH RF Test.
2. Execute **CALLSTAT?** and wait until the response becomes 7 (= Test Loop Mode).

1.12.3. E-DCH RF Test Disconnection

1. Execute **CALLSO** to disconnect from E-DCH RF Test.
2. Execute **CALLSTAT?** and wait until the response becomes 2 (= Idle(Regist)).

1.12.4. Channel Change at Handover

Usually, measurement is performed at three frequency points (L, M, H). In this case, the Channel can be switched quickly without reconnection by switching it at handover with a higher output level. When a GPIB command is sent during handover, it waits until handover ends.

1. Execute TRX measurement with M channel.
2. Execute **CHAN 9613** to handover to L channel.
3. Execute TRX measurement.
4. Execute **CHAN 9887** to handover to H channel.
5. Execute TRX measurement.

1.12.5. Change of βc and βd by Transport Channel Reconfiguration

When performing HSUPA measurement, gain parameters such as βc, βd must be changed according to the measurement conditions. In this case, measurement can be performed without reconnection by changing parameters during call processing at Transport Channel Reconfiguration. In addition, when a GPIB command is sent during Transport Channel Reconfiguration, it waits until Transport Channel Reconfiguration ends.

1. Connect with E-DCH RF Test.
2. Execute **ALLREFETFCI 5,11,4,67,18,71,23,75,26,81,27** to set [Number of E-TFCIs] to [5], [Reference E-TFCI] to [11,67,71,75,81], [Reference E-TFCI PO] to [4,18,23,26,27].
3. Execute **ULGAINPAR 12,15,8,8,8,6** to set [βc] to 12, [βd] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [6].
4. Perform Tx measurement.
5. Execute **ALLREFETFCI 2,11,4,92,18** to set [Number of E-TFCIs] to [2], [Reference E-TFCI] to [11,92], [Reference E-TFCI PO] to [4,18].
6. Execute **ULGAINPAR 6,15,8,8,8,8** to set [βc] to [6], [βd] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [8].
7. Perform Tx measurement.

1.12.6. Measurement Item Selection

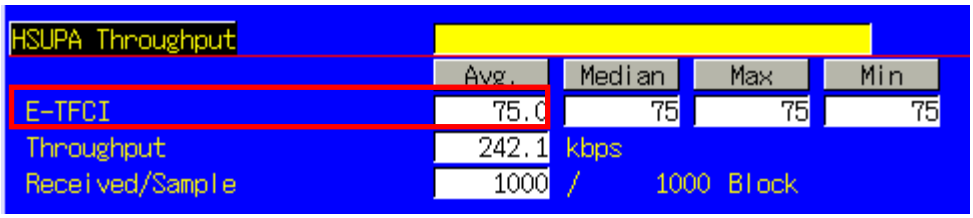
The MT8820/15B is preset for W-CDMA measurement.
Since HSUPA Throughput measurement items are preset to off, turn on these items to measure (**TPUTU_MEAS ON**)
Although other measurement items are preset to on, turn off unnecessary items, such as BER measurement and BLER measurement, to cut the measurement time (**BER_MEAS OFF**, **BLER_MEAS OFF**).

1.12.7. 5.2B Maximum Output Power with HS-DPCCH and E-DCH

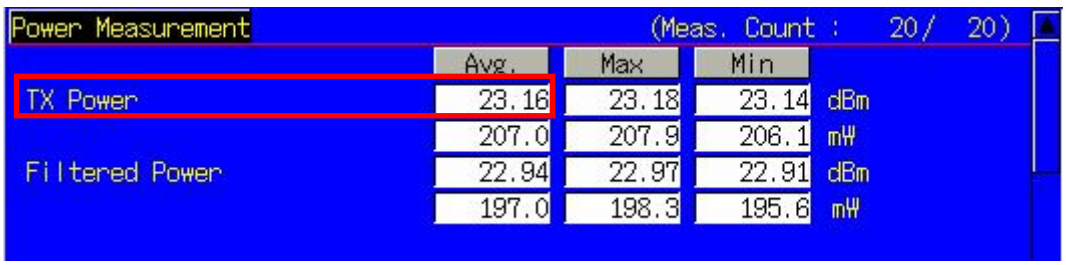
1. Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. Execute **CHCODING EDCHTEST** to set [Channel Coding] to [E-DCH RF Test].
4. Execute **HSUSET TTI10_QPSK** to set [HSUPA Set of Parameters] to [TTI 10ms(QPSK)].
5. Execute **SET_PWRPAT HSMAXPWR** to set [CQI Feedback Cycle] to [4 ms], [Ack-Nack Repetition Factor] to [3], [CQI Repetition Factor] to [2], and [TPC Algorithm] to [2].
6. Connect with Fixed Reference Channel H-Set1 (QPSK).
7. Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
8. Execute **PWR_MEAS ON** to set [Power measurement] to [On].
9. Execute **PWR_AVG 20** to set [Average Count] of Power measurement to [20] times.
10. Execute **TPUTU_MEAS ON** to set [HSUPA Throughput] measurement to [On].
11. Execute **TPUTU_SAMPLE 15** to set [HSUPA Throughput - Number of Sample] to [15].
12. Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].

[Subtest1]

13. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
14. Execute **SET_HSSUBTEST SUBTEST1** to set [Absolute Grant Value] to [20], [Number of E-TFCIs] to [5], [Reference E-TFCI] to [11,67,71,75,81], [Reference E-TFCI PO] to [4,18,23,26,27], [Beta C] to [10], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [6].
15. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
16. Execute **ILVL 16.0** to set [Input Level] to [+16.0] dBm.
17. Wait 150 ms until the UE power becomes 16.0 dBm.
18. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
19. Execute **ILVL 26.0** to set [Input Level] to [+26.0] dBm.
20. Execute **SWP** to perform HSUPA Throughput measurement and confirm the E-TFCI measurement result is 75.
21. Execute **TPC_CMD_UP** to raise [TxPower] only 1 dB and wait 150 ms.
22. Execute **SWP** to perform HSUPA Throughput measurement.



23. Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 75.
24. Repeat procedures 21 to 23 until the E-TFCI measurement result is not 75. Execute measurement by reducing [Input Level] only 1 dB, and confirm the E-TFCI measurement result is 75 again.
25. Execute **TPC_CMD_DOWN** to reduce [TxPower] only 1 dB and wait 150 ms.
26. Execute **SWP** to perform HSUPA Throughput measurement, and confirm the E-TFCI measurement result is 75. (Repeat procedures 25 and 26 if the E-TFCI measurement result is not 75.)
27. Execute **AVG_POWER?** to read the Power measurement result.
28. Confirm the measurement result is +24 dBm (Tolerance +1.7/–6.7 dB).



TX Power means Mean power (5 MHz band), and Filtered Power means RRC filtered mean power.

[Subtest2]

29. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
30. Execute **SET_HSSUBTEST SUBTEST2** to set [Absolute Grant Value] to [12], [Number of E-TFCIs] to [5], [Reference E-TFCI] to [11,67,71,75,81], [Reference E-TFCI PO] to [4,18,23,26,27], [Beta C] to [6], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [8].
31. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
32. Execute **ILVL 14.0** to set [Input Level] to [+14.0] dBm.
33. Wait 150 ms until the UE power becomes 14.0 dBm.
34. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
35. Execute **ILVL 26.0** to set [Input Level] to [+26.0] dBm.
36. Execute **SWP** to perform HSUPA Throughput measurement, and confirm the E-TFCI measurement result is 67.
37. Execute **TPC_CMD_UP** to raise [TxPower] only 1 dB and wait 150 ms.
38. Execute **SWP** to perform HSUPA Throughput measurement.
39. Execute **AVG_ETFCI?** to read E-TFCI measurement result, and confirm it is 67.
40. Repeat procedures 37 to 39 until the E-TFCI measurement result is not 67.
41. Execute **TPC_CMD_DOWN** to reduce [TxPower] only 1 dB and wait 150 ms.
42. Execute **SWP** to perform HSUPA Throughput measurement, and confirm the E-TFCI measurement result is 67.
    (Repeat procedures 41 and 42 if the E-TFCI measurement result is not 67.)
43. Execute **AVG_POWER?** to read the Power measurement result.
44. Confirm the measurement result is +22 dBm (Tolerance +3.7/–5.2 dB).

[Subtest3]

45. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
46. Execute **SET_HSSUBTEST SUBTEST3** to set [Absolute Grant Value] to [15], [Number of E-TFCIs] to [2], [Reference E-TFCI] to [11,92], [Reference E-TFCI PO] to [4,18], [Beta C] to [15], [Beta D] to [9], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [8].
47. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
48. Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
49. Wait 100 ms until the UE power becomes 15.0 dBm.
50. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
51. Execute **ILVL 26.0** to set [Input Level] to [+26.0] dBm.
52. Execute **SWP** to perform HSUPA Throughput measurement, and confirm the E-TFCI measurement result is 92.
53. Execute **TPC_CMD_UP** to raise [TxPower] only 1 dB and wait 150 ms.
54. Execute **SWP** to perform HSUPA Throughput measurement.
55. Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 92.
56. Repeat procedures 53 to 55 until the E-TFCI measurement result is not 92.
57. Execute **TPC_CMD_DOWN** to reduce [TxPower] only 1 dB and wait 150 ms.
58. Execute **SWP** to perform HSUPA Throughput measurement, and confirm the E-TFCI measurement result is 92.
    (Repeat procedures 57 and 58 if the E-TFCI measurement result is not 92.)
59. Execute **AVG_POWER?** to read the Power measurement result.
60. Confirm the measurement result is +23 dBm (Tolerance +2.7/–5.2 dB).

[Subtest4]

61. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
62. Execute **SET_HSSUBTEST SUBTEST4** to set [Absolute Grant Value] to [17], [Number of E-TFCIs] to [5], [Reference E-TFCI] to [11,67,71,75,81], [Reference E-TFCI PO] to [4,18,23,26,27], [Beta C] to [2], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [5].
63. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
64. Execute **ILVL 14.0** to set [Input Level] to [+14.0] dBm.
65. Wait 100 ms until the UE power becomes 14.0 dBm.
66. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
67. Execute **ILVL 26.0** to set [Input Level] to [+26.0] dBm.
68. Execute **SWP** to perform HSUPA Throughput measurement, and confirm the E-TFCI measurement result is 71.
69. Execute **TPC_CMD_UP** to raise [TxPower] only 1 dB and wait 150 ms.
70. Execute **SWP** to perform HSUPA Throughput measurement.
71. Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 71.
72. Repeat procedures 69 to 71 until the E-TFCI measurement result is not 71.
73. Execute **TPC_CMD_DOWN** to reduce [TxPower] only 1 dB and wait 150 ms.
74. Execute **SWP** to perform HSUPA Throughput measurement, and confirm the E-TFCI measurement result is 71.
    (Repeat procedures 73 and 74 if the E-TFCI measurement result is not 71.)
75. Execute **AVG_POWER?** to read Power measurement result.
76. Confirm the measurement result is +22 dBm (Tolerance +3.7/–5.2 dB).

[Subtest5 –before v8.7.0]

77. Execute **SUBTEST5_VER OLD** to set [Sub-test5 Version] to [Old].
78. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
79. Execute **SET_HSSUBTEST SUBTEST5** to set [Absolute Grant Value] to [21], [Number of E-TFCIs] to [5], [Reference E-TFCI] to [11,67,71,75,81], [Reference E-TFCI PO] to [4,18,23,26,27], [Beta C] to [14], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [7].
80. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
81. Execute **ILVL 16.0** to set [Input Level] to [+16.0] dBm.
82. Wait 100 ms until the UE power becomes 16.0 dBm.
83. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
84. Execute **ILVL 26.0** to set [Input Level] to [+26.0] dBm.
85. Execute **SWP** to perform HSUPA Throughput measurement, and confirm the E-TFCI measurement result is 81.
86. Execute **TPC_CMD_UP** to raise [TxPower] only 1 dB and wait 150 ms.
87. Execute **SWP** to perform HSUPA Throughput measurement.
88. Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 81.
89. Repeat procedures 86 to 88 until the E-TFCI measurement result is not 81.
90. Execute **TPC_CMD_DOWN** to reduce [TxPower] only 1 dB and wait 150 ms.
91. Execute **SWP** to perform HSUPA Throughput measurement, and confirm the E-TFCI measurement result is 81.
92. Repeat procedures 90 and 91 if the E-TFCI measurement result is not 81.)
93. Execute **AVG_POWER?** to read the Power measurement result.
94. Confirm the measurement result is +24 dBm (Tolerance +1.7/–6.7 dB).

Supports Sub-test5 specification revised by change from V20.10 to 3GPP TS34.121 v8.8.0
The test procedure after 3GPP TS34.121 v8.8.0 is:

[Sub-test5 – after v8.8.0]

95. Execute **TPUTU_MEAS OFF** to set [HSUPA Throughput measurement] to [Off].
96. Execute **SUBTEST5_VER NEW** to set [Sub-test5 Version] to [New].
97. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
98. Execute **SET_HSSUBTEST SUBTEST5** to set [Absolute Grant Value] to [12], [Number of E-TFCIs] to [1], [Reference E-TFCI] to [67], [Reference E-TFCI PO] to [18], [Delta ACK] to [0], [Delta NACK] to [0], [Delta CQI] to 0, [Delta E-DPCCH] to [0], [minimum set of E-TFCI] to [67], [Power Control Algorithm] to [1].
99. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
100. Execute **ILVL 16.0** to set [Input Level] to [+16.0] dBm.
101. Wait 150 ms until the UE power becomes 16.0 dBm.
102. Execute **ILVL 26.0** to set [Input Level] to [+26.0] dBm.
103. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL1].
104. Wait 150 ms until the UE power becomes Max Power.
105. Execute **SWP** to perform Power measurement.
106. Execute **AVG_POWER?** to read the Power measurement result.
107. Confirm the measurement result is +24 dBm (Tolerance +1.7/-3.7 dB).

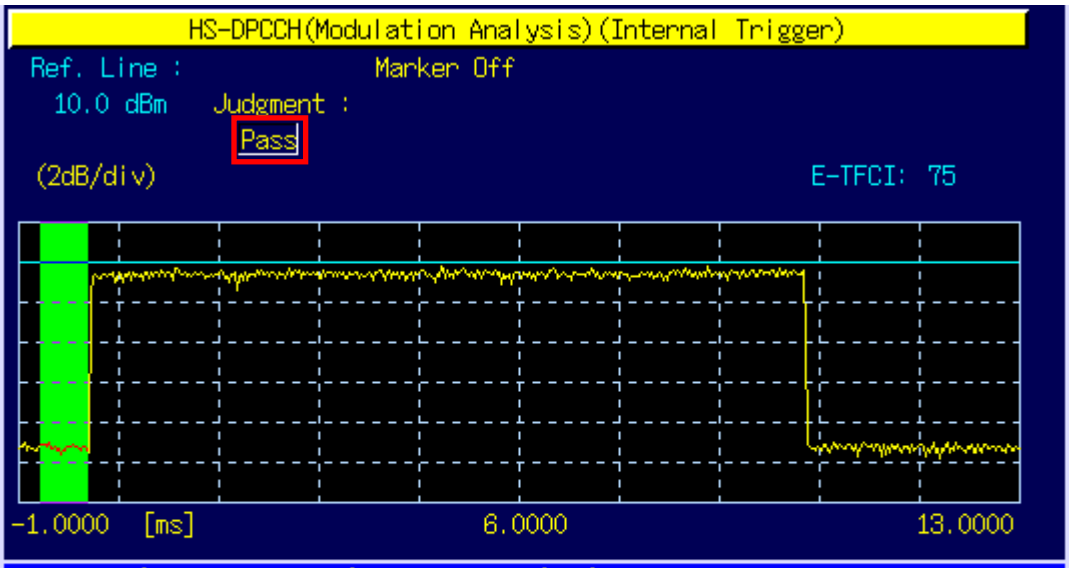
1.12.8. 5.2D UE Relative Code Domain Power Accuracy for HS-DPCCH and E-DCH

The following procedure is based on the 3GPP TS 34.121-1 V9.1.0 procedure.

1. Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. Execute **CHCODING EDCHTEST** to set [Channel Coding] to [E-DCH RF Test].
4. Execute **HSUSET TTI10_QPSK** to set [HSUPA Set of Parameters] to [TTI 10ms(QPSK)].
5. Execute **SET_PWRPAT HSMAXPWR** to set [CQI Feedback Cycle] to [4 ms], [Ack-Nack Repetition Factor] to [3], [CQI Repetition Factor] to [2], and [TPC Algorithm] to [2].
6. Connect with E-DCH RF Test, TTI 10 ms.
7. Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
8. Execute **TPUTU_MEAS ON** to set [HSUPA Throughput] measurement to [On].
9. Execute **TPUTU_SAMPLE 15** to set [HSUPA Throughput - Number of Sample] to [15].

[Subtest1]

10. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
11. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
12. Execute **SET_HSSUBTEST SUBTEST1** to set [Absolute Grant Value] to [20], [Number of E-TFCIs] to [5], [Reference E-TFCI] to [11,67,71,75,81], [Reference E-TFCI PO] to [4,18,23,26,27], [Beta C] to [10], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [6].
13. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
14. Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
15. Wait 150 ms until the UE power becomes 15.0 dBm.
16. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
17. Execute **SWP** to perform HSUPA Throughput measurement.
18. Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 75.
19. Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
20. Execute **MEASOBJ HSDPCCH_MA** to set [Measurement Object] to [HS-DPCCH Modulation Analysis].
21. Execute **HSMA_ITEM CDP** to set measurement result of HS-DPCCH (Modulation Analysis) to [CDP Ratio].
22. Execute **SWP** to perform CDP Ratio measurement.
23. Execute **CDPPASS?** to read the SEM measurement result. Confirm the measurement result is PASS.
    When the result is within the Accuracy [dB] in 3GPP TS.34.121 Table 5.2D.8, it means PASS. If not, it means FAIL.

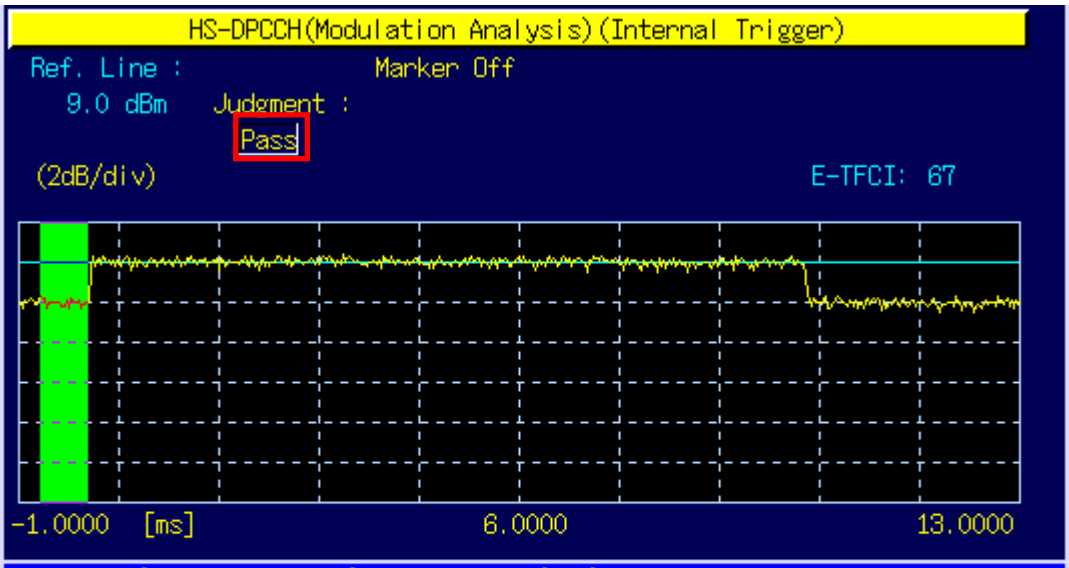


UE relative code domain power ratio in dB:

Point	DPCCH	DPDCH	HS-DPCCH	E-DPCCH	E-DPDCH1	E-DPDCH2
1	-9.34	-6.63	-3.32	-7.29	-18.95	-55.09
2	-18.58	-15.90	-12.52	-16.55	-0.55	-34.18
3	-9.39	-6.68	-3.35	-7.33	-19.01	-49.23

[Subtest2]

24. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
25. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
26. Execute **SET_HSSUBTEST SUBTEST2** to set [Absolute Grant Value] to [12], [Number of E-TFCIs] to [5], [Reference E-TFCI] to [11,67,71,75,81], [Reference E-TFCI PO] to [4,18,23,26,27], [Beta C] to [6], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [8].
27. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
28. Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
29. Wait 150 ms until the UE power becomes 15.0 dBm.
30. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
31. Execute **SWP** to perform HSUPA Throughput measurement.
32. Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 75.
33. Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
34. Execute **MEASOBJ HSDPCCH_MA** to set [Measurement Object] to [HS-DPCCH Modulation Analysis].
35. Execute **HSMA_ITEM CDP** to set measurement result of HS-DPCCH (Modulation Analysis) to [CDP Ratio].
36. Execute **SWP** to perform CDP Ratio measurement.
37. Execute **CDPPASS?** to read the SEM measurement result. Confirm the measurement result is PASS. When the result is within the Accuracy [dB] in 3GPP TS.34.121 Table 5.2D.8, it means PASS. If not, it means FAIL.

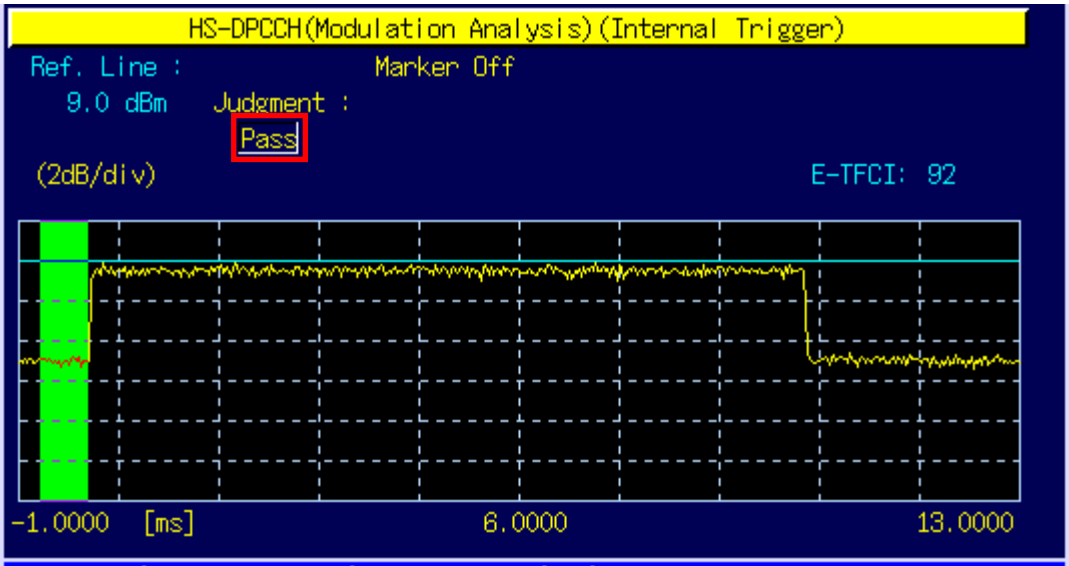


UE relative code domain power ratio in dB:

Point	DPCCH	DPDCH	HS-DPCCH	E-DPCCH	E-DPDCH1	E-DPDCH2
1	-11.91	-3.90	-5.85	-5.85	-21.39	-55.37
2	-14.08	-6.03	-8.00	-7.95	-4.08	-34.11
3	-11.93	-3.91	-5.84	-5.84	-21.43	-58.49

[Subtest3]

38. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
39. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
40. Execute **SET_HSSUBTEST SUBTEST3** to set [Absolute Grant Value] to [15], [Number of E-TFCIs] to [2], [Reference E-TFCI] to [11,92], [Reference E-TFCI PO] to [4,18], [Beta C] to [15], [Beta D] to [9], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [8].
41. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
42. Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
43. Wait 150 ms until the UE power becomes 15.0 dBm.
44. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
45. Execute **SWP** to perform HSUPA Throughput measurement.
46. Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 75.
47. Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
48. Execute **MEASOBJ HSDPCCH_MA** to set [Measurement Object] to [HS-DPCCH Modulation Analysis].
49. Execute **HSMA_ITEM CDP** to set measurement result of HS-DPCCH (Modulation Analysis) to [CDP Ratio].
50. Execute **SWP** to perform CDP Ratio measurement.
51. Execute **CDPPASS?** to read the SEM measurement result. Confirm the measurement result is PASS.
    When the result is within the Accuracy [dB] in 3GPP TS.34.121 Table 5.2D.8, it means PASS. If not, it means FAIL.

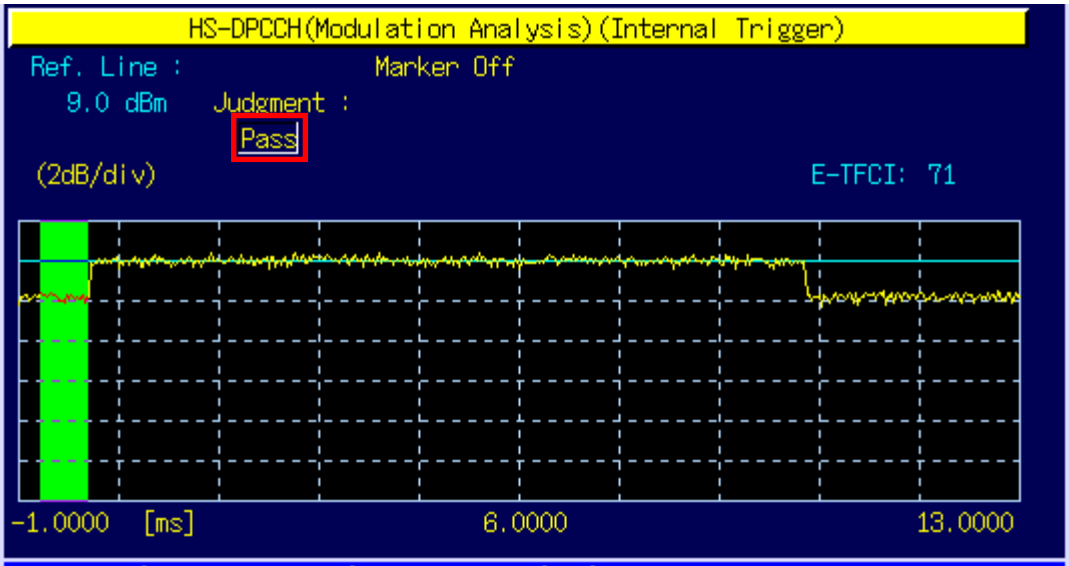


UE relative code domain power ratio in dB:

Point	DPCCH	DPDCH	HS-DPCCH	E-DPCCH	E-DPDCH1	E-DPDCH2
1	-9.77	-14.20	-3.75	-3.75	-19.29	-55.92
2	-14.62	-19.08	-8.63	-8.63	-4.70	-4.70
3	-9.79	-14.18	-3.76	-3.75	-19.39	-55.85

[Subtest4]

52. Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
53. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
54. Execute **SET_HSSUBTEST SUBTEST4** to set [Absolute Grant Value] to [17], [Number of E-TFCIs] to [5], [Reference E-TFCI] to [11,67,71,75,81], [Reference E-TFCI PO] to [4,18,23,26,27], [Beta C] to [2], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [5].
55. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
56. Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
57. Wait 150 ms until the UE power becomes 15.0 dBm.
58. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
59. Execute **SWP** to perform HSUPA Throughput measurement.
60. Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 75.
61. Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
62. Execute **MEASOBJ HSDPCCH_MA** to set [Measurement Object] to [HS-DPCCH Modulation Analysis].
63. Execute **HSMA_ITEM CDP** to set measurement result of HS-DPCCH (Modulation Analysis) to [CDP Ratio].
64. Execute **SWP** to perform CDP Ratio measurement.
65. Execute **CDPPASS?** to read the SEM measurement result. Confirm the measurement result is PASS.
    When the result is within the Accuracy [dB] in 3GPP TS.34.121 Table 5.2D.8, it means PASS. If not, it means FAIL.



UE relative code domain power ratio in dB:

Point	DPCCH	DPDCH	HS-DPCCH	E-DPCCH	E-DPDCH1	E-DPDCH2
1	-17.96	-0.45	-11.97	-18.01	-27.31	-39.05
2	-19.71	-2.22	-13.66	-19.68	-4.76	-34.67
3	-17.91	-0.45	-11.96	-18.05	-27.19	-38.35

1.12-1 3GPP TS34.121 Table 5.2D.7: UE relative code domain power nominal ratios

Subtest in Table C.11.1.3	Measure-ment Point	Expected Relative Code Domain Power in dB					
		DPCCH	DPDCH	HS-DPCCH	E-DPCCH	E-DPDCH1	E-DPDCH2
1	1	–9.3	–6.6	–3.3	–7.3	–18.9	OFF
	2	–18.5	–15.8	–12.5	–16.5	–0.5	OFF
	3	–9.3	–6.6	–3.3	–7.3	–18.9	OFF
2	1	–11.9	–3.9	–5.8	–5.8	–21.4	OFF
	2	–14.0	–6.0	–8.0	–8.0	–4.1	OFF
	3	–11.9	–3.9	–5.8	–5.8	–21.4	OFF
3	1	–9.8	–14.2	–3.7	–3.7	–19.3	OFF
	2	–14.6	–19.1	–8.6	–8.6	–4.7	–4.7
	3	–9.8	–14.2	–3.7	–3.7	–19.3	OFF
4	1	–17.9	–0.4	–11.9	–17.9	–27.5	OFF
	2	–19.7	–2.2	–13.7	–19.7	–4.7	OFF
	3	–17.9	–0.4	–11.9	–17.9	–27.5	OFF

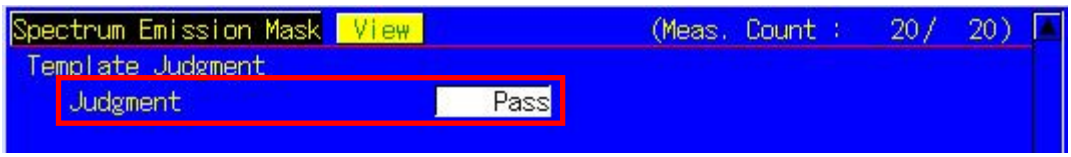
1.12-2 3GPP TS34.121 Table 5.2D.8: UE relative code domain power accuracy test requirements

Nominal CDP ratio	Accuracy (dB)
≥–10 dB	±1.7
–10 dB to ≥–15 dB	±2.3
–15 dB to ≥–20 dB	±2.9

1.12.9. 5.9B Spectrum Emission Mask with E-DCH

The following procedure is based on the 3GPP TS 34.121-1 V9.1.0 procedure.

The process is same as 1.12.7. 5.2B Maximum Output Power with HS-DPCCH and E-DCH.
Execute **SMASK_MEAS ON** at process 10, **SMASK_AVG 20** at process 11, and execute **SMASKPASS?** at each Subtest process 27, 43, 59, 75, 93, and 106 to read the SEM measurement result.



1.12.10. 5.10B Adjacent Channel Leakage Power Ratio (ACLR) with E-DCH

The following procedure is based on the 3GPP TS 34.121-1 V9.1.0 procedure (for power class 3).

The process is same as 1.12.7. 5.2B Maximum Output Power with HS-DPCCH and E-DCH.
Execute **ADJ_MEAS ON** at process 10, **ADJ_AVG 20** at process 11, and execute **AVG_MODPWR? LOW10, AVG_MODPWR? LOW5, AVG_MODPWR? UP5, AVG_MODPWR? UP10** at each Subtest procedure 27, 43, 59, 75, 93, and 106 to read the ACLR measurement result.

1.12-3 UE ACLR (3GPP TS 34.121 Table 5.10B.2)

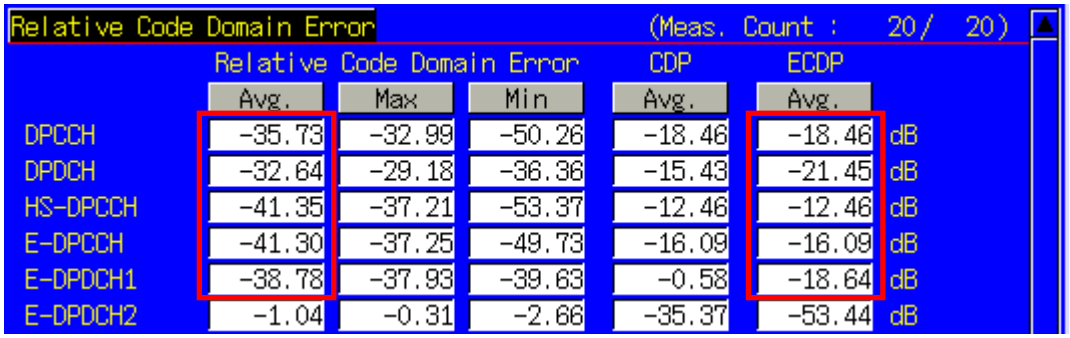
Power Class	UE channel	ACLR limit
3	+5 MHz or –5 MHz	32.2 dB
3	+10 MHz or –10 MHz	42.2 dB

1.12.11. 5.13.2B Relative Code Domain Error with HS-DPCCH and E-DCH

1. Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. Execute **CHCODING EDCHTEST** to set [Channel Coding] to [E-DCH RF Test].
4. Execute **HSUSET TTI10_QPSK** to set [HSUPA Set of Parameters] to [TTI 10ms(QPSK)].
5. Execute **SET_PWRPAT HSMAXPWR** to set [CQI Feedback Cycle] to [4 ms], [Ack-Nack Repetition Factor] to [3], [CQI Repetition Factor] to [2], and [TPC Algorithm] to [2].
6. Connect with E-DCH RF Test, TTI 10ms.
7. Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
8. Execute **DTCHPAT PN9** to set [DTCH Data Pattern] to [PN9].
9. Execute **RCDE_MEAS ON** to set [RCDE measurement] to [On].
10. Execute **RCDE_AVG 20** to set [Average Count] of RCDE measurement to [20] times.
11. Execute **TPUTU_MEAS ON** to set [HSUPA Throughput measurement] to [On].
12. Execute **TPUTU_SAMPLE 15** to set [HSUPA Throughput - Number of Sample] to [15].

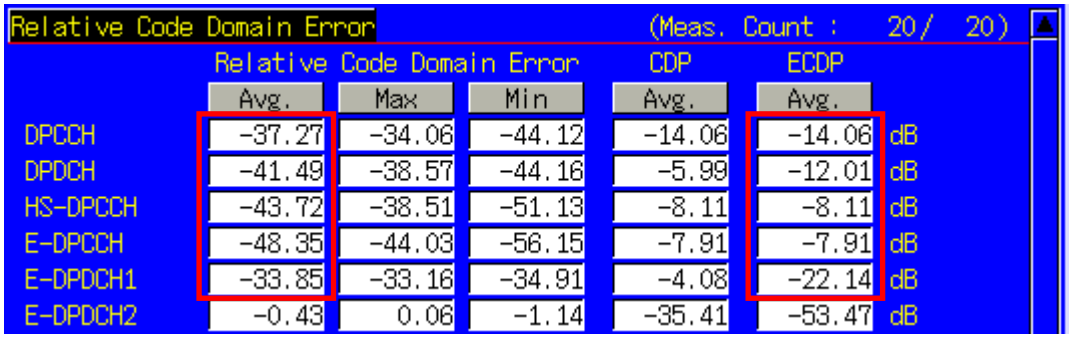
[Subtest1]

13. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
14. Execute **SET_HSSUBTEST SUBTEST1** to set [Absolute Grant Value] to [20], [Number of E-TFCIs] to [5], [Reference E-TFCI] to [11,67,71,75,81], [Reference E-TFCI PO] to [4,18,23,26,27], [Beta C] to [10], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [6].
15. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
16. Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
17. Wait 150 ms until the UE power becomes 15.0 dBm.
18. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
19. Execute **SWP** to perform HSUPA Throughput measurement and RCDE measurement .
20. Execute **AVG_ETFCI?** to read the E-TFCH measurement result and confirm it is 75.
21. Execute **AVG_DPCCHECDP?** to read the ECDP - DPCCH measurement result.
22. Execute **AVG_DPDCHECDP?** to read the ECDP - DPDCH measurement result.
23. Execute **AVG_HSDPCCHECDP?** to read the ECDP - HS-DPCCH measurement result.
24. Execute **AVG_EDPCCHECDP?** to read the ECDP - E-DPCCH measurement result.
25. Execute **AVG_EDPDCH1ECDP?** to read the ECDP - E-DPDCH1 measurement result.
26. Execute **AVG_DPCCHRCDE?** to read the Relative Code Domain Error - DPCCH measurement result.
27. Execute **AVG_DPDCHRCDE?** to read the Relative Code Domain Error - DPDCH measurement result.
28. Execute **AVG_HSDPCCHRCDE?** to read the Relative Code Domain Error - HS-DPCCH measurement result.
29. Execute **AVG_EDPCCHRCDE?** to read the Relative Code Domain Error - E-DPCCH measurement result.
30. Execute **AVG_EDPDCH1RCDE?** to read the Relative Code Domain Error - E-DPDCH1 measurement result.
31. Confirm the Relative Code Domain Error is
    Relative Code Domain Error ≤ –15.5 dB, when –21 dB < ECDP and
    Relative Code Domain Error ≤ –36.5 – ECDP, when –30 dB ≤ ECDP ≤ –21 dB.
32. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
33. Execute **ILVL -18.0** to set [Input Level] to [-18.0] dBm.
34. Wait 150 ms until the UE power becomes -18.0 dBm.
35. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
36. Repeat procedures 19 to 31.



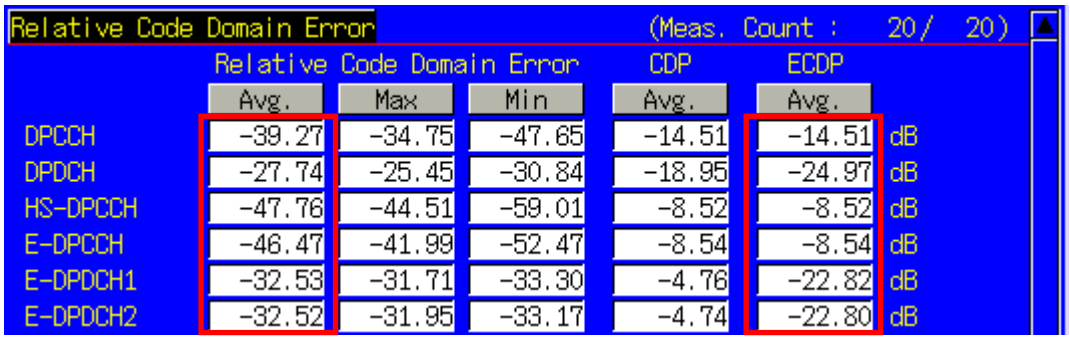
[Subtest2]

37. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
38. Execute **SET_HSSUBTEST SUBTEST2** to set [Absolute Grant Value] to [12], [Number of E-TFCIs] to [5], [Reference E-TFCI] to [11,67,71,75,81], [Reference E-TFCI PO] to [4,18,23,26,27], [Beta C] to [6], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [8].
39. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
40. Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
41. Wait 150 ms until the UE power becomes 15.0 dBm.
42. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
43. Execute **SWP** to perform HSUPA Throughput measurement and RCDE measurement.
44. Execute **AVG_ETFCI?** to read the E-TFCH measurement result and confirm it is 67.
45. Execute **AVG_DPCCHECDP?** to read the ECDP - DPCCH measurement result.
46. Execute **AVG_DPDCHECDP?** to read the ECDP - DPDCH measurement result.
47. Execute **AVG_HSDPCCHECDP?** to read the ECDP - HS-DPCCH measurement result.
48. Execute **AVG_EDPCCHECDP?** to read the ECDP - E-DPCCH measurement result.
49. Execute **AVG_EDPDCH1ECDP?** to read the ECDP - E-DPDCH1 measurement result.
50. Execute **AVG_DPCCHRCDE?** to read the Relative Code Domain Error - DPCCH measurement result.
51. Execute **AVG_DPDCHRCDE?** to read the Relative Code Domain Error - DPDCH measurement result.
52. Execute **AVG_HSDPCCHRCDE?** to read the Relative Code Domain Error - HS-DPCCH measurement result.
53. Execute **AVG_EDPCCHRCDE?** to read the Relative Code Domain Error - E-DPCCH measurement result.
54. Execute **AVG_EDPDCH1RCDE?** to read the Relative Code Domain Error - E-DPDCH1 measurement result.
55. Confirm the Relative Code Domain Error is
    Relative Code Domain Error ≤ –15.5dB, when –21dB < ECDP and
    Relative Code Domain Error ≤ –36.5 – ECDP, when –30 dB ≤ ECDP ≤ –21dB.
56. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
57. Execute **ILVL -18.0** to set [Input Level] to [-18.0] dBm.
58. Wait 150 ms until the UE power becomes -18.0 dBm.
59. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
60. Repeat procedures 43 to 55.



[Subtest3]

61. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
62. Execute **SET_HSSUBTEST SUBTEST3** to set [Absolute Grant Value] to [15], [Number of E-TFCIs] to [2], [Reference E-TFCI] to [11,92], [Reference E-TFCI PO] to [4,18], [Beta C] to [15], [Beta D] to [9], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [8].
63. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
64. Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
65. Wait 150 ms until the UE power becomes 15.0 dBm.
66. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
67. Execute **SWP** to perform HSUPA Throughput measurement and RCDE measurement .
68. Execute **AVG_ETFCI?** to read the E-TFCH measurement result and confirm it is 92.
69. Execute **AVG_DPCCHECDP?** to read the ECDP - DPCCH measurement result.
70. Execute **AVG_DPDCHECDP?** to read the ECDP - DPDCH measurement result.
71. Execute **AVG_HSDPCCHECDP?** to read the ECDP - HS-DPCCH measurement result.
72. Execute **AVG_EDPCCHECDP?** to read the ECDP - E-DPCCH measurement result.
73. Execute **AVG_EDPDCH1ECDP?** to read the ECDP - E-DPDCH1 measurement result.
74. Execute **AVG_EDPDCH2ECDP?** to read the ECDP - E-DPDCH2 measurement result.
75. Execute **AVG_DPCCHRCDE?** to read the Relative Code Domain Error - DPCCH measurement result.
76. Execute **AVG_DPDCHRCDE?** to read the Relative Code Domain Error - DPDCH measurement result.
77. Execute **AVG_HSDPCCHRCDE?** to read the Relative Code Domain Error - HS-DPCCH measurement result.
78. Execute **AVG_EDPCCHRCDE?** to read the Relative Code Domain Error - E-DPCCH measurement result.
79. Execute **AVG_EDPDCH1RCDE?** to read the Relative Code Domain Error - E-DPDCH1 measurement result.
80. Execute **AVG_EDPDCH2RCDE?**to read the Relative Code Domain Error - E-DPDCH2 measurement result.
81. Confirm the Relative Code Domain Error is
    Relative Code Domain Error ≤ –15.5dB, when –21dB < ECDP and
    Relative Code Domain Error ≤ –36.5 – ECDP, when –30 dB ≤ ECDP ≤ –21 dB.
82. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
83. Execute **ILVL -18.0** to set [Input Level] to [-18.0] dBm.
84. Wait 150 ms until the UE power becomes -18.0 dBm.
85. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
86. Repeat procedures 67 to 81.



[Subtest4]

87. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
88. Execute **SET_HSSUBTEST SUBTEST4** to set [Absolute Grant Value] to [17], [Number of E-TFCIs] to [5], [Reference E-TFCI] to [11,67,71,75,81], [Reference E-TFCI PO] to [4,18,23,26,27], [Beta C] to [2], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [5].
89. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
90. Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
91. Wait 150 ms until the UE power becomes 15.0 dBm.
92. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
93. Execute **SWP** to perform HSUPA Throughput measurement and RCDE measurement .
94. Execute **AVG_ETFCI?** to read the E-TFCH measurement result and confirm it is 71.
95. Execute **AVG_DPCCHECDP?** to read the ECDP - DPCCH measurement result.
96. Execute **AVG_DPDCHECDP?** to read the ECDP - DPDCH measurement result.
97. Execute **AVG_HSDPCCHECDP?** to read the ECDP - HS-DPCCH measurement result.
98. Execute **AVG_EDPCCHECDP?** to read the ECDP - E-DPCCH measurement result.
99. Execute **AVG_EDPDCH1ECDP?** to read the ECDP - E-DPDCH1 measurement result.
100. Execute **AVG_DPCCHRCDE?** to read the Relative Code Domain Error - DPCCH measurement result.
101. Execute **AVG_DPDCHRCDE?** to read the Relative Code Domain Error - DPDCH measurement result.
102. Execute **AVG_HSDPCCHRCDE?** to read the Relative Code Domain Error - HS-DPCCH measurement result.
103. Execute **AVG_EDPCCHRCDE?** to read the Relative Code Domain Error - E-DPCCH measurement result.
104. Execute **AVG_EDPDCH1RCDE?** to read the Relative Code Domain Error - E-DPDCH1 measurement result.
105. Confirm the Relative Code Domain Error is
Relative Code Domain Error ≤ –15.5dB, when –21 dB < ECDP and
Relative Code Domain Error ≤ –36.5 – ECDP, when –30 dB ≤ ECDP ≤ –21 dB.
106. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
107. Execute **ILVL -18.0** to set [Input Level] to [-18.0] dBm.
108. Wait 150 ms until the UE power becomes -18.0 dBm.
109. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
110. Repeat procedures 93 to 105.

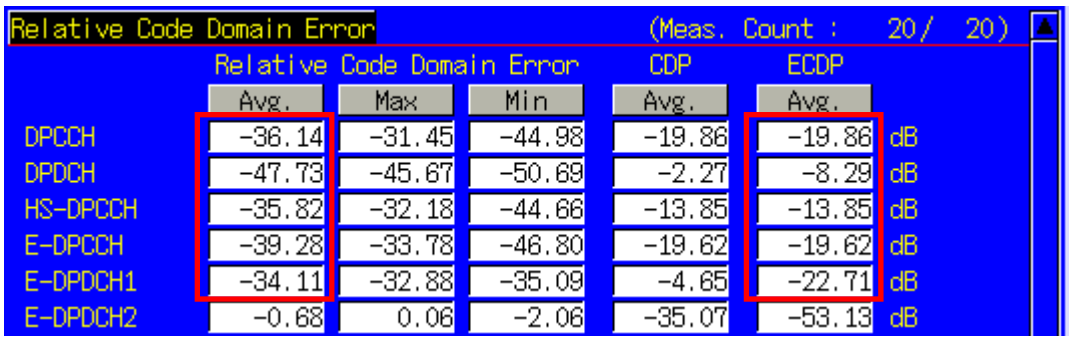


Table 1.12-4 3GPP TS34.121 Table 5.13.2B.8: Nominal ECDP Ratios

Subtest in Table C.11.1.3	Code	Nominal Code Domain Power	Spreading Factor	Nominal ECDP
1	DPCCH	–18.5	256	–18.5
	DPDCH	–15.8	64	–21.8
	HS-DPCCH	–12.5	256	–12.5
	E-DPCCH	–16.5	256	–16.5
	E-DPDCH	–0.5	4	–18.6
2	DPCCH	–14.0	256	–14.0
	DPDCH	–6.0	64	–12.0
	HS-DPCCH	–8.0	256	–8.0
	E-DPCCH	–8.0	256	–8.0
	E-DPDCH	–4.1	4	–22.2
3	DPCCH	–14.6	256	–14.6
	DPDCH	–19.1	64	–25.1
	HS-DPCCH	–8.6	256	–8.6
	E-DPCCH	–8.6	256	–8.6
	E-DPDCH1	–4.7	4	–22.8
	E-DPDCH2	–4.7	4	–22.8
4	DPCCH	–19.7	256	–19.7
	DPDCH	–2.2	64	–8.2
	HS-DPCCH	–13.7	256	–13.7
	E-DPCCH	–19.7	256	–19.7
	E-DPDCH	–4.7	4	–22.8

Table 1.12-5 3GPP TS34.121 Table 5.13.2B.9: Relative Code Domain Error Test Requirement

ECDP dB	Relative Code Domain Error dB
–21 < ECDP	≤ –15.5
–30 ≤ ECDP ≤ –21	≤ –36.5 – ECDP
ECDP < –30	No requirement

1.13. HSPA Evolution Measurement

1.13.1. E-DCH RF Test (TTI 2ms/16QAM) Location Registration

Location registration with E-DCH RF Test (TTI 2ms/16QAM) required to connect with HSPA Evolution.

1. Execute **PRESET_3GPP** to initialize the parameter settings for 3GPP.
2. Execute **CHCODING EDCHTEST** to set [Channel Coding] to [E-DCH RF Test].
   Execute **CHCODING FIXREFCH** to set [Channel Coding] to [Fixed Reference Channel] to test TS34.121 6.3B.
3. Execute **HSUSET TTI2_16QAM** to set [HSUPA Set of Parameters] to [TTI 2ms(16QAM)].
   Execute **HSHSET HSET8_64QAM** to set to [H-Set8(64QAM)] to test TS34.121 6.3B.
4. Execute **INTEGRITY ON** to set [Integrity Protection] to [On].
5. UE power On.
6. Execute **CALLSTAT?** and wait until the response returns 2(=Idle(Regist)).

1.13.2. E-DCH RF Test (TTI 2ms/16QAM) Connection

Execute the following procedure (refer to location registration procedure of item 1.13.1 E-D~CH RF Test (TTI 2 ms/16QAM) after terminal location registration is completed.

1. Execute **CALLSA** to connect with E-DCH RF Test (TTI 2ms/16QAM).
2. Execute **CALLSTAT?** and wait until the response returns 7(=Test Loop Mode).

1.13.3. E-DCH RF Test (TTI 2ms/16QAM) Disconnection

1. Execute **CALLSO** to disconnect E-DCH RF Test (TTI 2ms/16QAM).
2. Execute **CALLSTAT?** and wait until the response returns 2(=Idle(Regist)).

1.13.4. Channel Change by Handover

Measurement is usually executed for three frequency (L, M, and H) points. In this case, if the channel is switched by handover, the channel can be switched quickly because it is not necessary to reconnect. At handover, the Output Level is increased slightly so that handover does not fail. However, execution of any GPIB commands sent while handover is executing is delayed until handover is completed.

1. Perform TRX measurement with M channel.
2. Execute **CHAN 9613** to handover to L channel.
3. Perform TRX measurement.
4. Execute **CHAN 9887** to handover to H channel.
5. Perform TRX measurement.

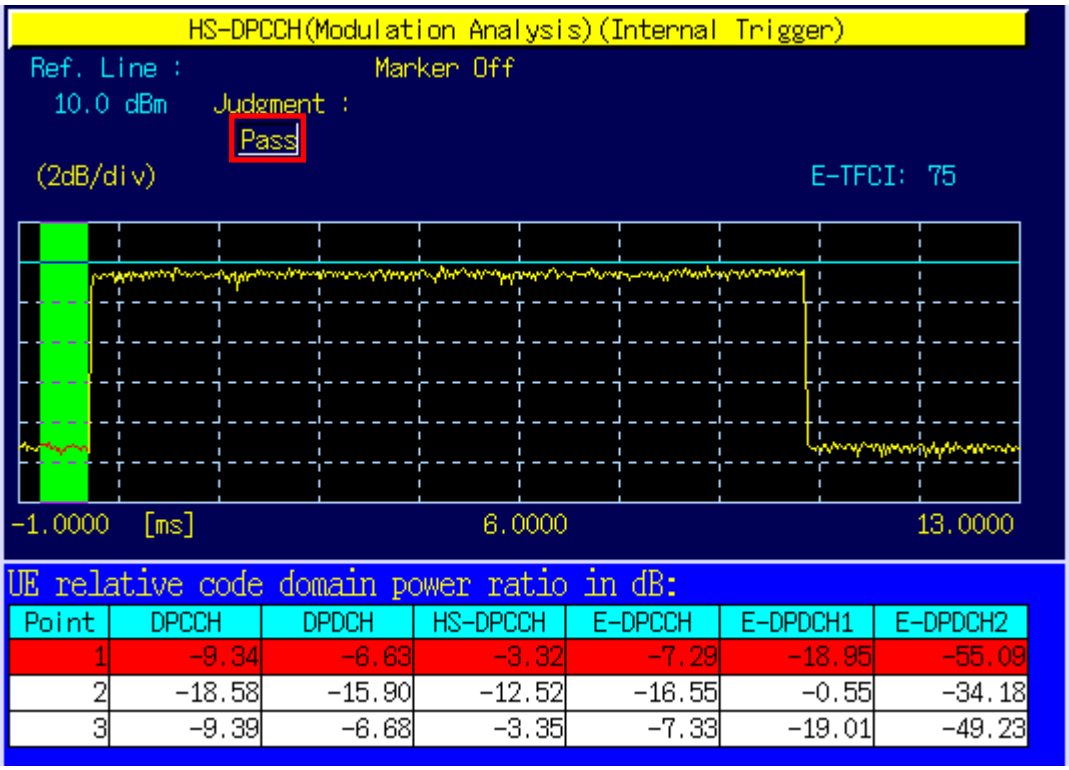
1.13.5. 5.2E UE Relative Code Domain Power Accuracy for HS-DPCCH and E-DCH with 16QAM

The following procedure is based on the 3GPP TS 34.121-1 V9.1.0 procedure.

1. Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. Execute **CHCODING EDCHTEST** to set [Channel Coding] to [E-DCH RF Test].
4. Execute **HSUSET TTI2_16QAM** to set [HSUPA Set of Parameters] to [TTI 2ms(16QAM)].
5. Execute **SET_PWRPAT HSMAXPWR** to set [CQI Feedback Cycle] to [4] ms, [Ack-Nack Repetition Factor] to [3], [CQI Repetition Factor] to [2], [TPC Algorithm] to [2].
6. Connect with E-DCH RF Test, TTI 2 ms (16QAM).
7. Execute **OLVL -86.0** to set [Output Level] to [-86.0] dBm.
8. Execute **TPUTU_MEAS ON** to set [HSUPA Throughput] measurement to [On].
9. Execute **TPUTU_SAMPLE 15** to set [HSUPA Throughput - Number of Sample] to [15].

[Sub-test1]

10. Execute **SCRSEL FMEAS** to set Fundamental Measurement screen.
11. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8]
12. Execute **SET_HSSUBTEST SUBTEST1** to set [Absolute Grant Value] to [14], [Number of E-TFCIs] to [3], [Reference E-TFCI] to [105,116,127], [Reference E-TFCI PO] to [12,14,16], [Beta C] to [15], [Beta D] to [0], [Delta ACK] to[8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [8].
13. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern を Inner Loop Power Control].
14. Execute **ILVL 16.0** to set [Input Level] to [+16.0] dBm.
15. Wait 150 ms until the UE power becomes 16.0 dBm.
16. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
17. Execute **ILVL 26.0** to set [Input Level] to [+26.0] dBm.
18. Execute **SWP** to perform HSUPA Throughput measurement and confirm the E-TFCI measurement result is 105.
19. Execute **TPC_CMD_UP** to raise [TxPower] only 1 dB and wait 150 ms.
20. Execute **SWP** to perform HSUPA Throughput measurement.]
21. Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 105.
22. Repeat steps 19 through 21 until the E-TFCI measurement result becomes not 105.
23. Execute **TPC_CMD_DOWN** to reduce [TxPower] only 1 dB and wait 150 ms.
24. Execute **SWP** to perform HSUPA Throughput measurement and confirm the E-TFCI measurement result is 105.
    (Repeat steps 23 and 24 if the E-TFCI measurement result is not 105.)
25. Execute **SCRSEL TDMEAS** to set Domain Measurement screen.
26. Execute **MEASOBJ HSDPCCH_MA** to set [Measurement Object] to [HS-DPCCH Modulation Analysis].
27. Execute **HSMA_ITEM CDP** to display the results of the HS-DPCCH (Modulation Analysis) measurement at CDP Ratio.
28. Execute **SWP** to perform CDP Ratio measurement.
29. Execute **CDPPASS?** to read the result. Confirm the result is PASS.
    When the result is the Accuracy [dB] in 3GPP TS.34.121 Table 5.2E.6, it means PASS. If not, it means FAIL.



Point	DPCCH	DPDCH	HS-DPCCH	E-DPCCH	E-DPDCH1	E-DPDCH2
1	-9.34	-6.63	-3.32	-7.29	-18.95	-55.09
2	-18.58	-15.90	-12.52	-16.55	-0.55	-34.18
3	-9.39	-6.68	-3.35	-7.33	-19.01	-49.23

Chart 1.13-1 3GPP TS34.121 Table 5.2E.5: UE relative code domain power nominal ratios

Sub-Test in Table C.11.1.4	Meas Point	Expected Relative Code Domain Power in dB					
		DPCCH	**HS-DPCCH**	**E-DPCCH**	**E-DPDCH 1**	**E-DPDCH 2**	**E-DPDCH 3,4**
1	1	-9.6	-3.6	-3.6	-19.1	OFF	OFF
	2	-13.4	-7.4	-7.4	-7.4	-7.4	-9.4
	3	-9.6	-3.6	-3.6	-19.1	OFF	OFF

Chart 1.13-2 3GPP TS34.121 Table 5.2E.6: UE relative code domain power accuracy test requirements, HSDPA and E-DCH with 16QAM

Nominal CDP ratio	Accuracy (dB)
≥ -10 dB	±1.7
-10 dB to ≥ -15 dB	±2.3
-15 dB ≥ -20 dB	±2.9
-20 dB ≥ -30 dB	[±3.5]

1.13.6. 5.13.1AAA EVM and IQ origin offset for HS-DPCCH and E-DCH with 16 QAM

The following procedure is based on the 3GPP TS 34.121-1 V9.1.0 procedure.

1. Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. Execute **CHCODING EDCHTEST** to set [Channel Coding] [E-DCH RF Test].
4. Execute **HSUSET TTI2_16QAM** to set [HSUPA Set of Parameters] to [TTI 2ms(16QAM)].
5. Execute **SET_PWRPAT HSMAXPWR** to set [CQI Feedback Cycle] to [4] ms, [Ack-Nack Repetition Factor] to [3], [CQI Repetition Factor] to [2], [TPC Algorithm] to [2].
6. Connect with E-DCH RF Test, TTI 2 ms (16QAM).
7. Execute **OLVL -86.0** to set [Output Level] to [-86.0] dBm.
8. Execute **MOD_MEAS ON** to set [Modulation Analysis] to [On].
9. Execute **MOD_AVG 20** to set [Average Count] of Modulation Analysis measurement to [20] times.

[Sub-test1]

10. Execute **SCRSEL FMEAS** to set Fundamental Measurement screen.
11. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
12. Execute **SET_HSSUBTEST SUBTEST1** to set [Absolute Grant Value] to [14], [Number of E-TFCIs] to [3], [Reference E-TFCI] to [105,116,127], [Reference E-TFCI PO] to [12,14,16], [Beta C] to 15, [Beta D] to [0], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [8].
13. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
14. Execute **ILVL -28.0** to set [Input Level] to [-28.0] dBm.
15. Wait 150 ms until the UE power becomes -28.0 dBm.
16. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
17. Execute **SWP** to perform Modulation Analysis measurement.
18. Execute **AVG_ORGNOFS?** to read Origin Offset measurement result.
19. Confirm the measurement result is <16.5 dB.

1.13.7. 5.13.2C Relative Code Domain Error for HS-DPCCH and E-DCH with 16QAM

The following procedure is based on the 3GPP TS 34.121-1 V9.1.0 procedure.

1. Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. Execute **CHCODING EDCHTEST** to set [Channel Coding] to [E-DCH RF Test].
4. Execute **HSUSET TTI2_16QAM** to set [HSUPA Set of Parameters] to [TTI 2ms(16QAM)].
5. Execute **SET_PWRPAT HSMAXPWR** to set [CQI Feedback Cycle] to [4] ms, [Ack-Nack Repetition Factor] to 3, [CQI Repetition Factor] to [2], [TPC Algorithm] to [2].
6. Connect with E-DCH RF Test, TTI 10 ms (16QAM).
7. Execute **OLVL -86.0** to set [Output Level] to [-86.0] dBm.
8. Execute **RCDE_MEAS ON** to set RCDE measurement to [On].
9. Execute **RCDE_AVG 20** to set [Average Count]of RCDE measurement to [20] times.
10. Execute **TPUTU_MEAS ON** to set [HSUPA Throughput] measurement to [On].
11. Execute **TPUTU_SAMPLE 15** to set [HSUPA Throughput - Number of Sample] to [15].

[Sub-test1]

12. Execute **SCRSEL FMEAS** to set Fundamental Measurement screen.
13. Execute **SET_HSDELTA_CQI 8** to set [Delta CQI Setting] to [8].
14. Execute **SET_HSSUBTEST SUBTEST1** to set [Absolute Grant Value] to [14], [Number of E-TFCIs] to [3], [Reference E-TFCI] to [105,116,127], [Reference E-TFCI PO] to [12,14,16], [Beta C] to [15], [Beta D] to [0], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8], [Delta E-DPCCH] to [8].
15. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
16. Execute **ILVL 16.0** to set [Input Level] to [+16.0] dBm.
17. Wait 150 ms until the UE power becomes [16.0] dBm.
18. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
19. Execute **ILVL 26.0** to set [Input Level] to [+26.0] dBm.
20. Execute **SWP** to perform HSUPA Throughput measurement and confirm the E-TFCI measurement result is 105.
21. Execute **TPC_CMD_UP** to raise [TxPower] only 1 dB and wait 150 ms.
22. Execute **SWP** to perform HSUPA Throughput measurement.
23. Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 105.
24. Repeat steps 21 through 23 until the E-TFCI measurement result becomes not 105.
25. Execute **TPC_CMD_DOWN** to reduce [TxPower] only 1 dB and wait 150 ms.
26. Execute **SWP** to perform HSUPA Throughput measurement and confirm the E-TFCI measurement result is 105.
    (Repeat steps 25 and 26 if the E-TFCI measurement result is not 105.)
27. Execute **AVG_DPCCHECDP?** to read the ECDP – DPCCH measurement result.
28. Execute **AVG_HSDPCCHECDP?** to read the ECDP - HS-DPCCH measurement result.
29. Execute **AVG_EDPCCHECDP?** to read the ECDP - E-DPCCH measurement result.
30. Execute **AVG_DPCCHRCDE?** to read the Relative Code Domain Error – DPCCH measurement result.
31. Execute **AVG_HSDPCCHRCDE?** to read the Relative Code Domain Error - HS-DPCCH measurement result.
32. Execute **AVG_EDPCCHRCDE?** to read the Relative Code Domain Error - E-DPCCH measurement result.
33. Confirm the Relative Code Domain Error is
    Relative Code Domain Error <= -17.5 dB, when -22dB < ECDP and
    Relative Code Domain Error <= -39.5 – ECDP, when -30dB <= ECDP <= -22dB.
34. Execute **AVG_EDPDCH1ECDP?** to read the ECDP - E-DPDCH1 measurement result.
35. Execute **AVG_EDPDCH2ECDP?** to read the ECDP - E-DPDCH2 measurement result.
36. Execute **AVG_EDPDCH3ECDP?** to read the ECDP - E-DPDCH3 measurement result.
37. Execute **AVG_EDPDCH4ECDP?** to read the ECDP - E-DPDCH4 measurement result.
38. Execute **AVG_EDPDCH1RCDE?** to read the Relative Code Domain Error - E-DPDCH1 measurement result.
39. Execute **AVG_EDPDCH2RCDE?** to read the Relative Code Domain Error - E-DPDCH2 measurement result.
40. Execute **AVG_EDPDCH3RCDE?** to read the Relative Code Domain Error - E-DPDCH3 measurement result.
41. Execute **AVG_EDPDCH4RCDE?** to read the Relative Code Domain Error - E-DPDCH4 measurement result.
42. Confirm the Relative Code Domain Error is
    Relative Code Domain Error <= -17.5 dB, when -25.5dB < ECDP,
    Relative Code Domain Error <= -43.0 – ECDP, when –30 dB <= ECDP <= -25.5 dB.
43. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
44. Execute **ILVL -18.0** to set [Input Level] to [-18.0] dBm.
45. Wait 150 ms until the UE power becomes -18.0 dBm.
46. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
47. Repeat procedures 19 to 36.

Chart 1.13-3 3GPP TS34.121 Table 5.13.2C.7: Nominal ECDP ratios

Sub-Test in Table C.11.1.4	Code	Nominal Code Domain Power	Spreading Factor	Nominal ECDP
1	DPCCH	-13.4	256	-13.4
	HS-DPCCH	-7.4	256	-7.4
	E-DPCCH	-7.4	256	-7.4
	E-DPDCH1	-7.4	2	-28.5
	E-DPDCH2	-7.4	2	-28.5
	E-DPDCH3	-9.4	4	-27.5
	E-DPDCH4	-9.4	4	-27.5

Chart 1.13-4 3GPP TS34.121 Table 5.13.2C.8: Relative Code Domain Error test requirement, codes without 16QAM

ECDP dB	Average Relative Code Domain Error dB
-22 < ECDP	≤ -17.5
-30 ≤ ECDP ≤ -22	≤ -39.5 - ECDP
ECDP < -30	No requirement

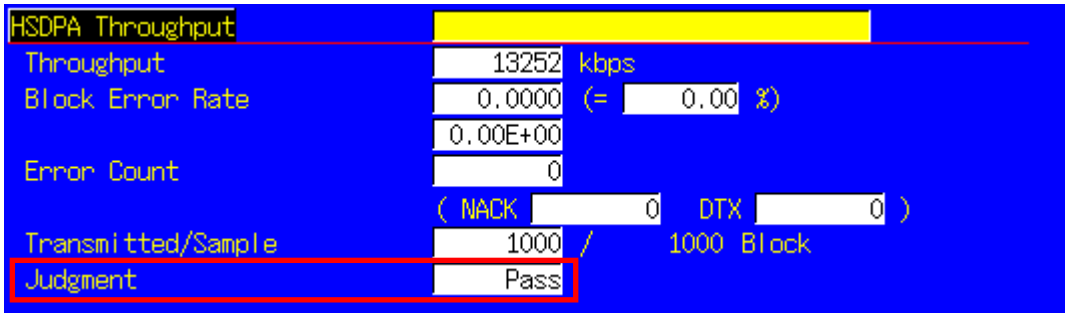
Chart 1.13-5 3GPP TS34.121 Table 5.13.2C.9: Relative Code Domain Error test requirement with 16QAM

ECDP dB	Average Relative Code Domain Error dB
-25.5 < ECDP	≤ -17.5
-30 ≤ ECDP ≤ -25.5	≤ -43.0 – ECDP
ECDP < -30	No requirement

1.13.8. 6.3B Maximum Input Level for HS-PDSCH Reception (64QAM)

The following procedure is based on the 3GPP TS 34.121-1 V9.1.0 procedure.
This test connects with Fixed Reference Channel H-Set8 (64QAM).

1. Execute **ULGAINPAR 8,15,8,8,8** to set [Beta C] to [8], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8].
2. Execute **TPCALGO 2** to set [TPC Algorithm] to [2].
3. Execute **CHAN 9750** to set to M channel (for Band I).
4. Execute **CHCODING FIXREFCH** to set [Channel Coding] to [Fixed Reference Channel].
5. Execute **HSHSET HSET8_64QAM** to set [HSUPA Set of Parameters] to [H-Set8(64QAM)].
6. Connect with Fixed Reference Channel, H-Set8(64QAM).
7. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
8. Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
9. Wait 100 ms until the UE power becomes [0.0] dBm.
10. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
11. Execute **OLVL -25.7** to set [Output Level] to [-25.7] dBm.
12. Execute **DDPCHPWR -13.0** to set [DPCH_Ec/Ior] to [-13.0] dB.
13. Execute **HSSCCHPWR -13.0** to set [HS-SCCH_Ec/Ior] to [-13.0 dB].
14. Execute **HSPDSCHPWR -2.0** to set [HS-PDSCH_Ec/Ior] to [-2.0] dB.
15. Execute **TPUT_MEAS ON** to set [HSDPA Throughput] measurement to [On].
16. Execute **TPUT_SAMPLE 1000** to set number of HSDPA Throughput measurement sample to [1000] Block.
17. Execute **TPUT_LIMIT 11800** to set lower limit of HSDPA Throughput measurement to [11800] kbps.
18. Execute **SWP** to perform HSDPA Throughput measurement.
19. Execute **TPUTPASS?** to read HSDPA Throughput measurement result. Confirm the result is PASS.



1.14. DC-HSDPA Measurement

* This chapter explains measurements when Phone1 and Phone 2 are used as Serving Cell and Secondary Serving Cell, respectively for DC-HSDPA connection.

1.14.1. Synchronization of Frame Timing between 2 cells

Synchronizing frame timing between 2 cells is required when connecting with DC-HSDPA.

1. **[Phone1]** Execute **ENTERSYNC IN_SLAVE** to be slave condition of frame timing synchronization.
2. **[Phone2]** Execute **ENTERSYNC MASTER** to perform frame timing synchronization.
3. **[Phone1]** Execute **ENTERSYNC?** to check response becomes 1 (synchronized).

1.14.2. Location Registration for DC-HSDPA

Location registration with Combined is required when connecting using DC-HSDPA.

1. **[Phone1-2]** Execute **PRESET_3GPP** to preset parameters for 3GPP.
2. **[Phone1-2]** Execute **CHCODING FRC_DCHSDPA** to set [Channel Coding] to [FRC for DC-HSDPA].
3. **[Phone1]** Execute **INTEGRITY ON** to set [Integrity Protection] to [On].
4. **[Phone1]** Execute **REGMODE COMBINED** to set [Registration Mode] to [Combined].
5. **[Phone2]** Execute **LVL OFF** to set [Output Level Total)] to [Off] for Secondary Serving Cell.
6. **[Phone2]** Execute **CALLPROC OFF** to set [Call Processing] of Secondary Serving Cell to [Off] to output each channel.
7. Turn on the UE power.
8. **[Phone1]** Execute **CALLSTAT?** and wait until the response becomes 2 (= Idle (Regist)).

1.14.3. Connection with DC-HSDPA

The process after location registration is shown below. (See 1.14.2 Location Registration for DC-HSDPA.)

[H-Set12(QPSK) connection example]

1. **[Phone1]** Execute **DCHSHSET HSET12_QPSK** to set [Channel Coding] to [FRC for DC-HSDPA]&[H-Set12(QPSK)].
2. **[Phone1]** Execute **S_DLCHAN 10725** to set [Second Cell UARFCN] to [10725]CH for Secondary Serving Cell (when the DL channel of Serving Cell is 10700).
3. **[Phone1]** Execute **CALLSA** to connect with DC-HSDPA
4. **[Phone1]** Execute **CALLSTAT?** and wait until the response becomes 7 (=Test Loop Mode).
5. **[Phone2]** Execute **DCHSHSET HSET12_QPSK** to set [Channel Coding] to [FRC for DC-HSDPA]&[H-Set12(QPSK)].
6. **[Phone2]** Execute **DLCHAN 10725** to set [DL Channel & Frequency] to [10725]CH for Secondary Serving Cell.
7. **[Phone2]** Execute **LVL ON** to set [Output Level(Total)] to [On] for Secondary Serving Cell.

1.14.4. Disconnection with DC-HSDPA

1. **[Phone1]** Execute **CALLSO** to disconnect with DC-HSDPA (by pressing “End Call” key).
2. **[Phone1]** Execute **CALLSTAT?** and wait until the response becomes 2 (=Idle(Regist)).

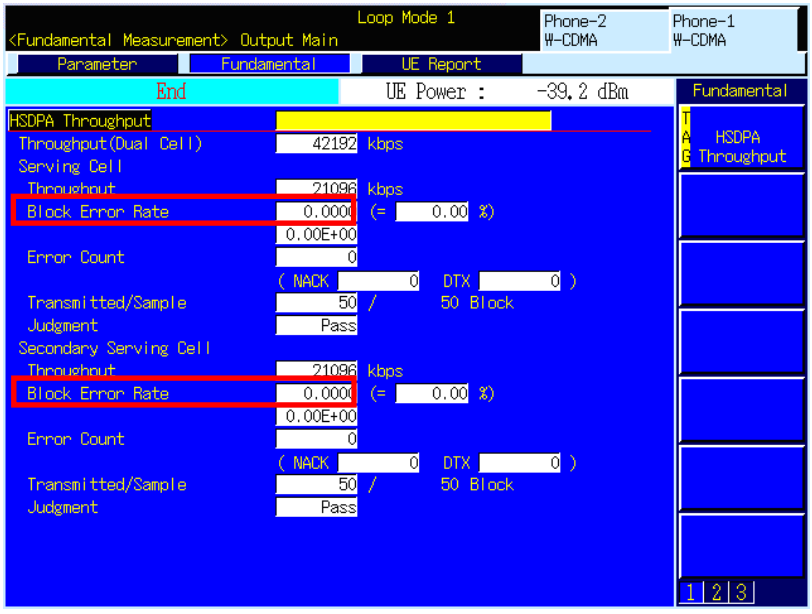
1.14.5. Channel Switching using Handover

Usually, measurement is performed at three frequency points (L, M, H). In this case, the Channel can be switched quickly without reconnection by switching it at handover with a higher output level and Beta C for UL DPCCH. When a GPIB command is sent during handover, it waits until handover ends.

1. **[Phone1]** Execute RX measurement with M channel.
2. **[Phone1]** Execute **S_DLCHAN 10588** to set [Second Cell UARFCN] to [10588]CH for Secondary Serving Cell.
3. **[Phone1]** Execute **CHAN 9613** (or **DLCHAN 10563**) to set [UL Channel & Frequency] to [9613]CH and perform handover to L channel.
4. **[Phone2]** Execute **DLCHAN 10588** to set [DL Channel & Frequency] to [10588]CH for Secondary Serving Cell.
5. **[Phone1]** Execute RX measurement.
6. **[Phone1]** Execute **S_DLCHAN 10812** to set [Second Cell UARFCN] to [10812]CH for Secondary Serving Cell.
7. **[Phone1]** Execute **CHAN 9887** (or **DLCHAN 10837**) to set [UL Channel & Frequency] to [9887]CH and perform handover to handover to H channel.
8. **[Phone2]** Execute **DLCHAN 10812** to set [DL Channel & Frequency] to [10812]CH for Secondary Serving Cell.
9. **[Phone1]** Execute RX measurement.

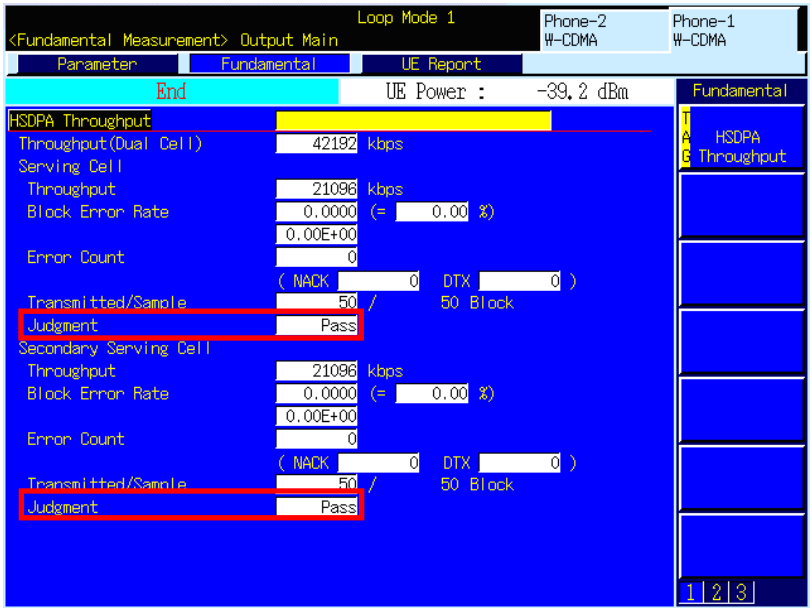
1.14.7. 6.2A Reference Sensitivity Level for DC-HSDPA

1. **[Phone1]** Execute **ULGAINPAR 8,15,8,8,8** to set [Beta C] to [8], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8].
2. **[Phone1]** Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
3. **[Phone1]** Execute **S_DLCHAN 10725** to set [Second Cell UARFCN] to [10725]CH for Secondary Serving Cell.
4. **[Phone1]** Execute **CHAN 9750** (or **DLCHAN 10700**) to set [UL Channel & Frequency] to [9750]CH Cell (M channel, when Band I).
5. **[Phone2]** Execute **DLCHAN 10725** to set [DL Channel & Frequency] to [10725]CH for Secondary Serving Cell Cell (M channel, when Band I).
6. Connect with Fixed Reference Channel H-Set12(QPSK) (see 1.14.3 Connection with DC-HSDPA).
7. **[Phone1]** Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL 1].
8. **[Phone1-2]** Execute **OLVL -102** to set [Output Level(Total)] to [-102] dBm (when Band I).
9. **[Phone1-2]** Execute **HSSCCHPWR -9.0** to set [HS-SCCH_Ec/Ior] to [-9.0] dB.
10. **[Phone1-2]** Execute **HSPDSCHPWR -10.3** to set [HS-PDSCH_Ec/Ior] to [-10.3] dB.
11. **[Phone1]** Execute **TPUT_MEAS ON** to set [HSDPA Throughput measurement] to [On].
12. **[Phone1]** Execute **TPUT_SAMPLE 1000** to set [Number of Sample] at HSDPA Throughput to [1000] Block.
13. **[Phone1]** Execute **SWP** to perform HSDPA Throughput measurement.
14. **[Phone1]** Execute **TPUT_BLER?** to read the Block Error Rate measurement result of Serving Cell. Confirm the measurement result is lower than 0.1.
15. **[Phone1]** Execute **TPUT_S_BLER?** to read the Block Error Rate measurement result of Secondary Serving Cell. Confirm the measurement result is lower than 0.1.



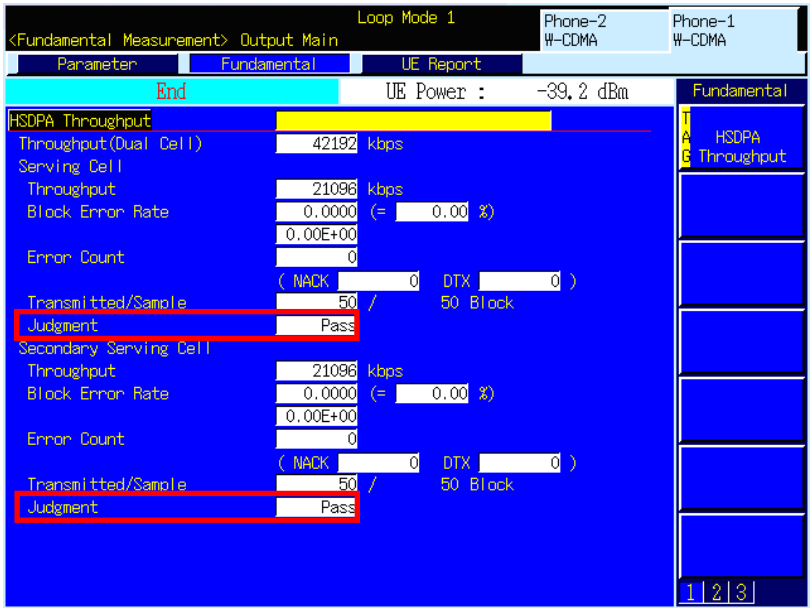
1.14.8. 6.3C Maximum Input Level for DC-HSDPA Reception (16QAM)

1. **[Phone1]** Execute **ULGAINPAR 8,15,8,8,8** to set [Beta C] to [8], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8].
2. **[Phone1]** Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
3. **[Phone1]** Execute **S_DLCHAN 10725** to set [Second Cell UARFCN] to [10725]CH for Secondary Serving Cell.
4. **[Phone1]** Execute **CHAN 9750** (or **DLCHAN 10700**) to set [UL Channel & Frequency] to [9750]CH Cell (M channel, when Band I).
5. **[Phone2]** Execute **DLCHAN 10725** to set [DL Channel & Frequency] to [10725]CH for Secondary Serving Cell (M channel, when Band I).
6. Connect with Fixed Reference Channel H-Set1A(16QAM) (see 1.14.3 Connection with DC-HSDPA).
7. **[Phone1]** Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
8. **[Phone1]** Execute **ILVL 20.0** to set [Input Level] to [+20.0] dBm.
9. Wait 100 ms until UE power becomes +20.0 dBm.
10. **[Phone1]** Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
11. **[Phone1-2]** Execute **OLVL -25.7** to set [Output Level(Total)] to [-25.7] dBm.
12. **[Phone1-2]** Execute **DDPCHPWR -13.0** to set [DPCH_Ec/Ior] to [-13.0] dB.
13. **[Phone1-2]** Execute **HSSCCHPWR -13.0** to set [HS-SCCH_Ec/Ior] to [-13.0] dB.
14. **[Phone1-2]** Execute **HSPDSCHPWR -3.0** to set [HS-PDSCH_Ec/Ior] to [-3.0] dB.
15. **[Phone1]** Execute **TPUT_MEAS ON** to set [HSDPA Throughput measurement] to [On].
16. **[Phone1]** Execute **TPUT_SAMPLE 1000** to set [Number of Sample] at HSDPA Throughput to [1000] Block.
17. **[Phone1]** Execute **TPUT_LIMIT 700** to set [Lower Limit] at HSDPA Throughput to [700] kbps.
18. **[Phone1]** Execute **SWP** to perform HSDPA Throughput measurement.
19. **[Phone1]** Execute **TPUTPASS?** to read the HSDPA Throughput measurement reault of Serving Cell. Confirm the result is PASS.
20. **[Phone1]** Execute **TPUTPASS_S?** to read HSDPA Throughput measurement result of Secondary Serving Cell. Confirm the result is PASS.



1.14.9. 6.3D Maximum Input Level for DC-HSDPA Reception (64QAM)

1. **[Phone1]** Execute **ULGAINPAR 8,15,8,8,8** to set [Beta C] to [8], [Beta D] to [15], [Delta ACK] to 8, [Delta NACK] to [8], [Delta CQI] to [8].
2. **[Phone1]** Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
3. **[Phone1]** Execute **S_DLCHAN 10725** to set [Second Cell UARFCN] to [10725]CH for Secondary Serving Cell.
4. **[Phone1]** Execute **CHAN 9750** (or **DLCHAN 10700**) to set [UL Channel & Frequency] to [9750]CH (M channel, when Band I).
5. **[Phone2]** Execute **DLCHAN 10725** to set [DL Channel & Frequency] to [10725]CH for Secondary Serving Cell (M channel, when Band I).
6. Connect with Fixed Reference Channel H-Set8A(64QAM) (see 1.14.3 Connection with DC-HSDPA).
7. **[Phone1]** Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
8. **[Phone1]** Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
9. Wait 100 ms until UE power becomes 0.0 dBm.
10. **[Phone1]** Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
11. **[Phone1-2]** Execute **OLVL -25.7** to set [Output Level(Total)] to [-25.7] dBm.
12. **[Phone1-2]** Execute **DDPCHPWR -13.0** to set [DPCH_Ec/Ior] to [-13.0] dB.
13. **[Phone1-2]** Execute **HSSCCHPWR -13.0** to set [HS-SCCH_Ec/Ior] to [-13.0] dB.
14. **[Phone1-2]** Execute **HSPDSCHPWR -2.0** to set [HS-PDSCH_Ec/Ior] to [-2.0] dB.
15. **[Phone1]** Execute **TPUT_MEAS ON** to set [HSDPA Throughput measurement] to [On].
16. **[Phone1]** Execute **TPUT_SAMPLE 1000** to set [Number of Sample] ot HSDPA Throughput to [1000] Block.
17. **[Phone1]** Execute **TPUT_LIMIT 11800** to set [Lower Limit] at HSDPA Throughput to [11800] kbps.
18. **[Phone1]** Execute **SWP** to perform HSDPA Throughput measurement.
19. **[Phone1]** Execute **TPUTPASS?** to read the HSDPA Throughput measurement result of Serving Cell. Confirm the result is PASS.
20. **[Phone1]** Execute **TPUTPASS_S?** to read the HSDPA Throughput measurement result of Secondary Serving Cell. Confirm the result is PASS.



1.15. 4C-HSDPA Measurement

1.15.1. Connection and Disconnection with Single band 4C-HSDPA

1.15.1.1. Location Registration for Single band 4C-HSDPA

Location registration with Combined is required when connecting using Single band 4C-HSDPA.

1. Execute **PRESET_3GPP** to initialize the parameter settings for 3GPP.
2. Execute **CHCODING FRC_MCHSDPA** to set [Channel Coding] to [FRC for MC-HSDPA].
3. Execute **INTEGRITY ON** to set [Integrity Protection] to [On].
4. Execute **REGMODE COMBINED** to set [Registration Mode] to [Combined].
5. Turn on the UE power.
6. Execute **CALLSTAT?** and wait until the response becomes 2 (= Idle (Regist)).

1.15.1.2. Connection with Single band 4C-HSDPA

The process after location registration is shown below. (See 1.15.1.1 Location Registration for Single band 4C-HSDPA.)

[H-Set1B (16QAM) connection example]

1. Execute **TTL_SERVING_CELL 3** to set [Total Serving Cells] to [3].
2. Execute **MCHSHSET HSET1B_16QAM** to set [H-Set] to [H-Set1B (16QAM)].
3. Execute **CALLSA** to connect with 4C-HSDPA.
4. Execute **CALLSTAT?** and wait until the response becomes 7 (=Test Loop Mode).

1.15.1.3. Disconnection with Single Band 4C-HSDPA

1. Execute **CALLSO** to disconnect with 4C-HSDPA (by pressing “End Call” key).
2. Execute **CALLSTAT?** and wait until the response becomes 2 (=Idle(Regist)).

1.15.1.4. Channel Switching using Handover(Single band 4C-HSDPA)

Usually, measurement is performed at three frequency points (L, M, H). In this case, the Channel can be switched quickly without reconnection by switching it at handover with a higher output level and Beta C for UL DPCCH. When a GPIB command is sent during handover, it waits until handover ends.

1. Execute RX measurement with M channel.
2. Execute **CHAN 9613** (or **DLCHAN 10563**) to set [UL Channel & Frequency] to [9613]CH and perform handover to L channel.
   (Secondary Serving Cell1 and Secondary serving Cell2 are set automatically. When the DL channel of Serving Cell is 10563, the Second Serving Cell1 is 10588 and the Second Serving Cell2 is 10613.)
3. Execute RX measurement.

1.15.2. Connection and Disconnection with Dual band 4C-HSDPA

* This section explains measurements when Phone1 and Phone 2 are used as Serving Cell and Secondary Serving Cell, respectively for Dual band 4C-HSDPA connection.

1.15.2.1. Synchronization of Frame Timing between 2 cells

Synchronizing frame timing between 2 cells is required when connecting with Dual band 4C-HSDPA.

1. **[Phone1]** Execute **ENTERSYNC IN_SLAVE** to be slave condition of frame timing synchronization.
2. **[Phone2]** Execute **ENTERSYNC MASTER** to perform frame timing synchronization.
3. **[Phone1]** Execute **ENTERSYNC?** to check response becomes 1 (synchronized).

1.15.2.2. Location Registration for Dual Band 4C-HSDPA

Location registration with Combined is required when connecting using Dual band 4C-HSDPA.

1. **[Phone1-2]** Execute **PRESET_3GPP** to preset parameters for 3GPP.
2. **[Phone1-2]** Execute **CHCODING FRC_MCHSDPA** to set [Channel Coding] to [FRC for MC-HSDPA].
3. **[Phone1]** Execute **INTEGRITY ON** to set [Integrity Protection] to [On].
4. **[Phone1]** Execute **REGMODE COMBINED** to set [Registration Mode] to [Combined].
5. **[Phone2]** Execute **LVL OFF** to set [Output Level Total)] to [Off] for Secondary Serving Cell.
6. **[Phone2]** Execute **CALLPROC OFF** to set [Call Procesing] of Secondary Serving Cell to [Off] to output each channel.
7. Turn on the UE power.
8. **[Phone1]** Execute **CALLSTAT?** and wait until the response becomes 2 (= Idle (Regist)).

1.15.2.3. Connection with Dual Band 4C-HSDPA

The process after location registration is shown below. (See 1.15.2.1 Location Registration for Dual band 4C-HSDPA.)

[H-Set1C (16QAM) connection example]

1. **[Phone1]** Execute **TTL_SERVING_CELL 4** to set [Total Serving Cells] to [4].
2. **[Phone1]** Execute **CELL_ASSIGN 3CELL_1** to set [Serving Cells Assignment] to [3Cells-1].
3. **[Phone1]** Execute **MCHSHSET HSET1C_16QAM** to set [H-Set] to [H-Set1C (16QAM)].
4. **[Phone1]** Execute **S1_DLCHAN 10725** to set [Second Cell UARFCN 1st] to [10725]CH for Secondary Serving Cell1 (for Band I)
5. **[Phone1]** Execute **S2_DLCHAN 10750** to set [Second Cell UARFCN 2nd] to [10750]CH for Secondary Serving Cell2 (for Band I).
6. **[Phone1]** Execute **S3_DLCHAN 4625** to set [Second Cell UARFCN 3rd] to [4625]CH for Secondary Serving Cell3 (for Band VIII).
7. **[Phone1]** Execute **CALLSA** to connect with 4C-HSDPA.
8. **[Phone1]** Execute **CALLSTAT?** and wait until the response becomes 7 (=Test Loop Mode)
9. **[Phone2]** Execute **TTL_SERVING_CELL 4** to set [Total Serving Cells] to [4].
10. **[Phone2]** Execute **CELL_ASSIGN 1CELL** to set [Serving Cells Assignment] to [1Cells].
11. **[Phone2]** Execute **MCHSHSET HSET1C_16QAM** to set [H-Set] to [H-Set1C (16QAM)].
12. **[Phone2]** Execute **DLCHAN 4625** to set [Second Cell UARFCN 3rd] to [4625]CH for Secondary Serving Cell3 (for Band VIII).
13. **[Phone2]** Execute **LVL ON** to set [Output Level(Total)] to [On] for Secondary Serving Cell.

1.15.2.4. Disconnection with Dual Band 4C-HSDPA

1. **[Phone1]** Execute **CALLSO** to disconnect with 4C-HSDPA (by pressing “End Call” key).
2. **[Phone1]** Execute **CALLSTAT?** and wait until the response becomes 2 (=Idle(Regist)).

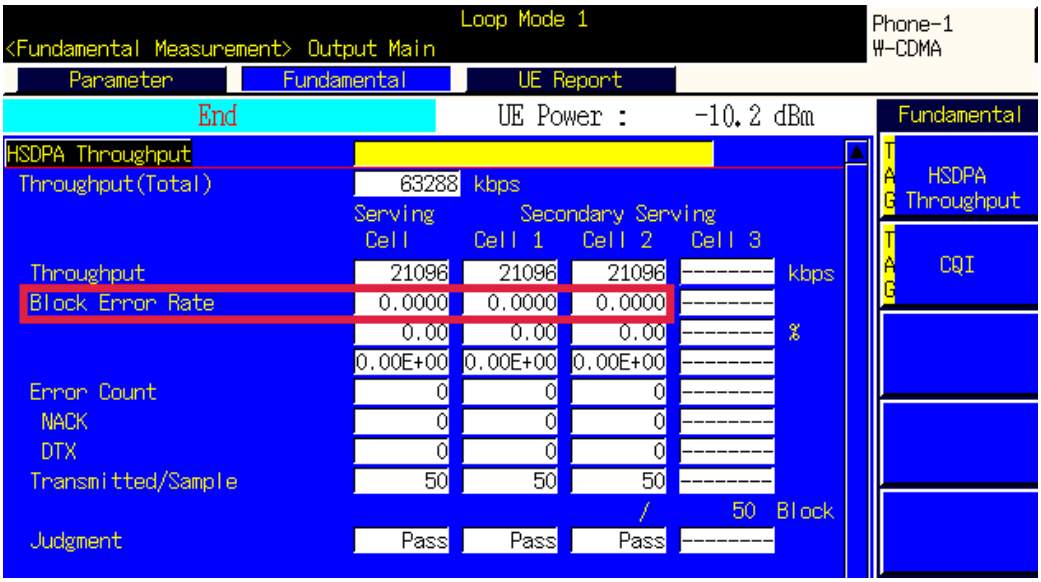
1.15.2.5. Channel Switching using Handover(Dual band 4C-HSDPA)

Usually, measurement is performed at three frequency points (L, M, H). In this case, the Channel can be switched quickly without reconnection by switching it at handover with a higher output level and Beta C for UL DPCCH. When a GPIB command is sent during handover, it waits until handover ends.

1. **[Phone1]** Execute RX measurement with M channel.
2. **[Phone1]** Execute **S1_DLCHAN 10588** to set [Second Cell UARFCN 1st] to [10588]CH for Secondary Serving Cell1 (for Band I).
3. **[Phone1]** Execute **S2_DLCHAN 10613** to set [Second Cell UARFCN 2nd] to [10613]CH for Secondary Serving Cell2 (for Band I).
4. **[Phone1]** Execute **S3_DLCHAN 4700** to set [Second Cell UARFCN 3rd] to [4700]CH for Secondary Serving Cell3 (for Band VIII).
5. **[Phone1]** Execute **CHAN 9613** (or **DLCHAN 10563**) to set [UL Channel & Frequency] to [9613]CH and perform handover to L channel.
6. **[Phone2]** Execute **DLCHAN 4700** to set [Second Cell UARFCN 3rd] to [4700]CH for Secondary Serving Cell3 (for Band VIII).
7. **[Phone1]** Execute RX measurement.
8. **[Phone1]** Execute **S1_DLCHAN 10812** to set [Second Cell UARFCN 1st] to [10812]CH for Secondary Serving Cell1 (for Band I).
9. **[Phone1]** Execute **S2_DLCHAN 10787** to set [Second Cell UARFCN 2nd] to [10787]CH for Secondary Serving Cell2 (for Band I).
10. **[Phone1]** Execute **S3_DLCHAN 4800** to set [Second Cell UARFCN 3rd] to [4800]CH for Secondary Serving Cell3 (for Band VIII).
11. **[Phone1]** Execute **CHAN 9887** (or **DLCHAN 10837**) to set [UL Channel & Frequency] to [9887]CH and perform handover to X channel.
12. **[Phone2]** Execute **DLCHAN 4700** to set [Second Cell UARFCN 3rd] to [4700]CH for Secondary Serving Cell3 (for Band VIII).
13. **[Phone1]** Execute RX measurement.

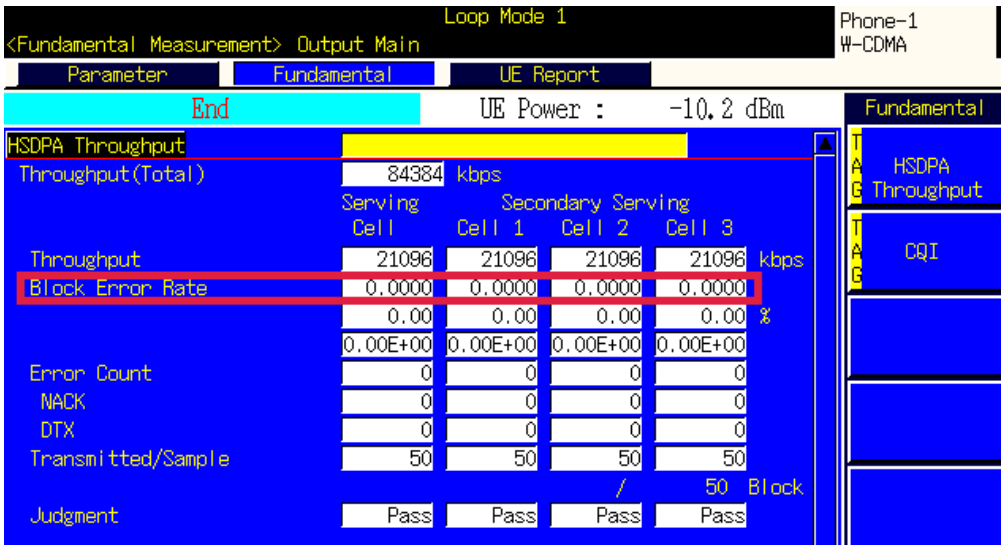
1.15.3. 6.2C Reference Sensitivity Level for Single band 4C-HSDPA

1. Execute **ULGAINPAR 8,15,8,8,8** to set [Beta C] to [8], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8].
2. Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
3. Execute **CQIFEEDBACK 4** to set [CQI Feedback Cycle] to [4 ms].
4. Execute **CHAN 9750** (or **DLCHAN 10700**) to set [UL Channel & Frequency] to [9750]CH Cell (M channel, for Band I).
5. Connect with Fixed Reference Channel H-Set1B (16QAM) (see 1.15.1 Connection and Disconnection with Single band 4C-HSDPA).
6. Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL 1].
7. Execute **OLVL -102** to set [Output Level(Total)] to [-102] dBm (for Band I).
8. Execute **HSSCCHPWR -9.0** to set [HS-SCCH_Ec/Ior] to [-9.0] dB.
9. Execute **HSPDSCHPWR -10.3** to set [HS-PDSCH_Ec/Ior] to [-10.3] dB.
10. Execute **TPUT_MEAS ON** to set [HSDPA Throughput measurement] to [On].
11. Execute **TPUT_SAMPLE 1000** to set [Number of Sample] at HSDPA Throughput to [1000] Block.
12. Execute **SWP** to perform HSDPA Throughput measurement.
13. Execute **TPUT_BLER?** to read the Block Error Rate measurement result of Serving Cell. Confirm the measurement result is lower than 0.1.
14. Execute **TPUT_S_BLER? 1** to read the Block Error Rate measurement result of Secondary Serving Cell1. Confirm the measurement result is lower than 0.1.
15. Execute **TPUT_S_BLER? 2** to read the Block Error Rate measurement result of Secondary Serving Cell2. Confirm the measurement result is lower than 0.1.



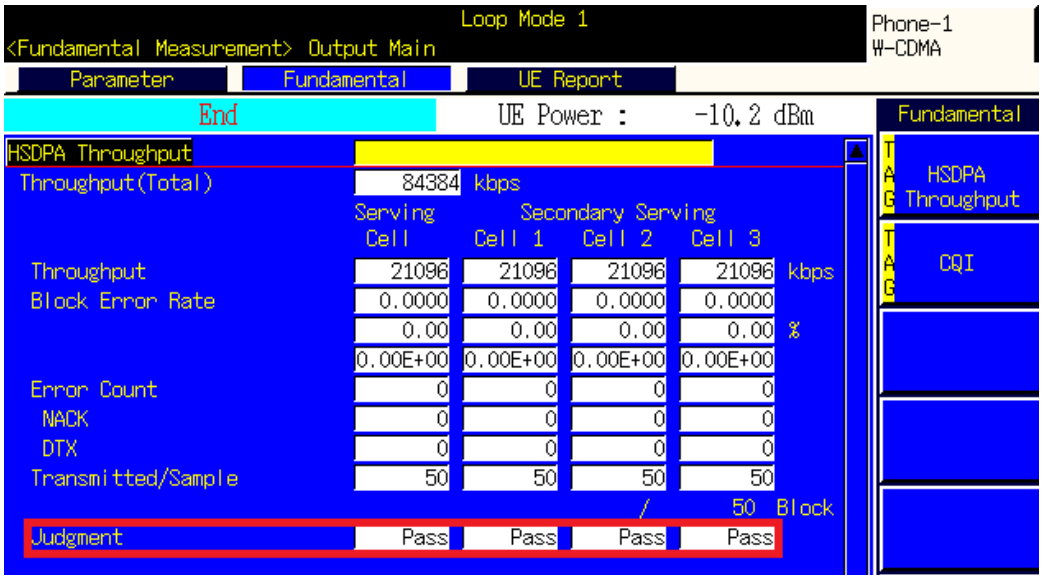
1.15.4. 6.2D Reference Sensitivity Level for Dual band 4C-HSDPA

1. **[Phone1]** Execute **ULGAINPAR 8,15,8,8,8** to set [Beta C] to [8], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8].
2. **[Phone1]** Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
3. **[Phone1]** Execute **CQIFEEDBACK 4** to set [CQI Feedback Cycle] to [4 ms].
4. **[Phone1]** Execute **CHAN 9750** (or **DLCHAN 10700**) to set [UL Channel & Frequency] to [9750]CH Cell (M channel, for Band I).
5. **[Phone1]** Execute **S1_DLCHAN 10725** to set [Second Cell UARFCN 1st] to [10725]CH for Secondary Serving Cell1 (for Band I).
6. **[Phone1]** Execute **S2_DLCHAN 10750** to set [Second Cell UARFCN 2nd] to [10750]CH for Secondary Serving Cell2 (for Band I).
7. **[Phone1]** Execute **S3_DLCHAN 4625** to set [Second Cell UARFCN 3rd] to [4625]CH for Secondary Serving Cell3 (for Band VIII).
8. **[Phone2]** Execute **DLCHAN 4625** to set [Second Cell UARFCN 3rd] to [4625]CH for Secondary Serving Cell3 (for Band VIII).
9. Connect with Fixed Reference Channel H-Set1C (16QAM) (see 1.15.2 Connection and Disconnection with Dual band 4C-HSDPA).
10. **[Phone1]** Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [ALL 1].
11. **[Phone1]** Execute **OLVL -102** to set [Output Level(Total)] to [-102] dBm (for Band I).
12. **[Phone2]** Execute **OLVL -99** to set [Output Level(Total)] to [-99] dBm (for Band VIII).
13. **[Phone1-2]** Execute **HSSCCHPWR -9.0** to set [HS-SCCH_Ec/Ior] to [-9.0] dB.
14. **[Phone1-2]** Execute **HSPDSCHPWR -10.3** to set [HS-PDSCH_Ec/Ior] to [-10.3] dB.
15. **[Phone1]** Execute **TPUT_MEAS ON** to set [HSDPA Throughput measurement] to [On].
16. **[Phone1]** Execute **TPUT_SAMPLE 1000** to set [Number of Sample] at HSDPA Throughput to [1000] Block.
17. **[Phone1]** Execute **SWP** to perform HSDPA Throughput measurement.
18. **[Phone1]** Execute **TPUT_BLER?** to read the Block Error Rate measurement result of Serving Cell. Confirm the measurement result is lower than 0.1.
19. **[Phone1]** Execute **TPUT_S_BLER? 1** to read the Block Error Rate measurement result of Secondary Serving Cell1. Confirm the measurement result is lower than 0.1.
20. **[Phone1]** Execute **TPUT_S_BLER? 2** to read the Block Error Rate measurement result of Secondary Serving Cell2. Confirm the measurement result is lower than 0.1.
21. **[Phone1]** Execute **TPUT_S_BLER? 3** to read the Block Error Rate measurement result of Secondary Serving Cell3. Confirm the measurement result is lower than 0.1.



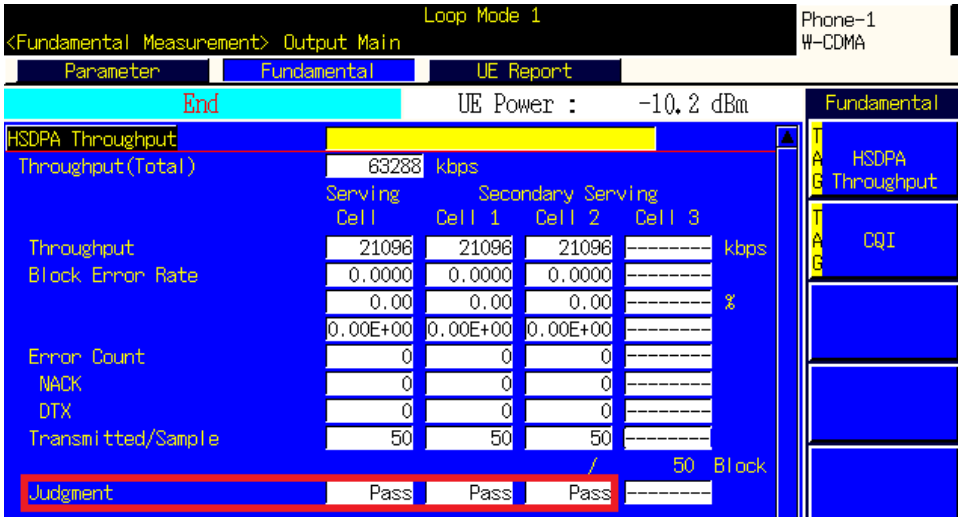
1.15.5. 6.3G Maximum Input Level for 4C-HSDPA Reception (16QAM)

1. **[Phone1]** Execute **ULGAINPAR 8,15,8,8,8** to set [Beta C] to [8], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8].
2. **[Phone1]** Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
3. **[Phone1]** Execute **CHAN 9750** (or **DLCHAN 10700**) to set [UL Channel & Frequency] to [9750]CH Cell (M channel, for Band I).
4. **[Phone1]** Execute **S1_DLCHAN 10725** to set [Second Cell UARFCN 1st] to [10725]CH for Secondary Serving Cell1 (for Band I).
5. **[Phone1]** Execute **S2_DLCHAN 10750** to set [Second Cell UARFCN 2nd] to [10750]CH for Secondary Serving Cell2 (for Band I).
6. **[Phone1]** Execute **S3_DLCHAN 4625** to set [Second Cell UARFCN 3rd] to [4625]CH for Secondary Serving Cell3 (for Band VIII).
7. **[Phone2]** Execute **DLCHAN 4625** to set [Second Cell UARFCN 3rd] to [4625]CH for Secondary Serving Cell3 (for Band VIII).
8. Connect with Fixed Reference Channel H-Set1C (16QAM) (see 1.15.2 Connection and Disconnection with Dual band 4C-HSDPA).
9. **[Phone1]** Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
10. **[Phone1]** Execute **ILVL 20.0** to set [Input Level] to [+20.0] dBm.
11. Wait 100ms until UE power becomes +20.0 dBm.
12. **[Phone1]** Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
13. **[Phone1-2]** Execute **OLVL -22.7** to set [Output Level(Total)] to [-22.7] dBm.
14. **[Phone1-2]** Execute **DDPCHPWR -13.0** to set [DPCH_Ec/Ior] to [-13.0] dB.
15. **[Phone1-2]** Execute **HSSCCHPWR -13.0** to set [HS-SCCH_Ec/Ior] to [-13.0] dB.
16. **[Phone1-2]** Execute **HSPDSCHPWR -3.0** to set [HS-PDSCH_Ec/Ior] to [-3.0] dB.
17. **[Phone1]** Execute **TPUT_MEAS ON** to set [HSDPA Throughput measurement] to [On].
18. **[Phone1]** Execute **TPUT_SAMPLE 1000** to set [Number of Sample] at HSDPA Throughput to [1000] Block.
19. **[Phone1]** Execute **TPUT_LIMIT 700** to set [Lower Limit] at HSDPA Throughput to [700] kbps.
20. **[Phone1]** Execute **SWP** to perform HSDPA Throughput measurement.
21. **[Phone1]** Execute **TPUTPASS?** to read the HSDPA Throughput measurement result of Serving Cell. Confirm the result is PASS.
22. **[Phone1]** Execute **TPUTPASS_S? 1** to read HSDPA Throughput measurement result of Secondary Serving Cell1. Confirm the result is PASS.
23. **[Phone1]** Execute **TPUTPASS_S? 2** to read HSDPA Throughput measurement result of Secondary Serving Cell2. Confirm the result is PASS.
24. **[Phone1]** Execute **TPUTPASS_S? 3** to read HSDPA Throughput measurement result of Secondary Serving Cell3. Confirm the result is PASS.



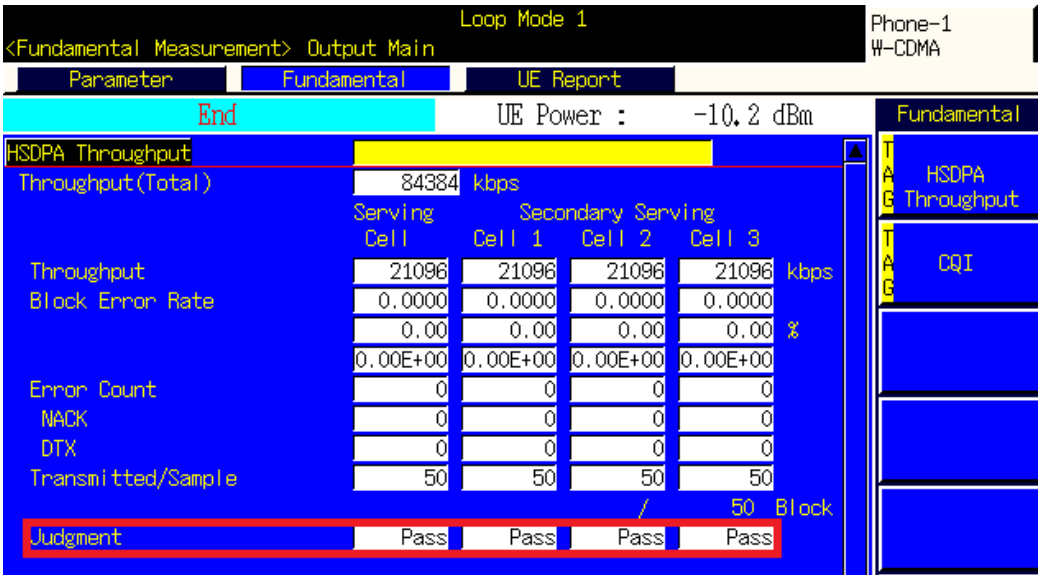
1.15.6. 6.3GA Maximum Input Level for 4C-HSDPA Reception (16QAM) (3carrier)

1. Execute **ULGAINPAR 8,15,8,8,8** to set [Beta C] to [8], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8].
2. Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
3. Execute **CHAN 9750** (or **DLCHAN 10700**) to set [UL Channel & Frequency] to [9750]CH Cell (M channel, for Band I).
4. Connect with Fixed Reference Channel H-Set1B (16QAM) (see 1.15.1 Connection and Disconnection with Single band 4C-HSDPA)
5. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
6. Execute **ILVL 20.0** to set [Input Level] to [+20.0] dBm.
7. Wait 100ms until UE power becomes +20.0 dBm.
8. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
9. Execute **OLVL -22.7** to set [Output Level(Total)] to [-22.7] dBm.
10. Execute **DDPCHPWR -13.0** to set [DPCH_Ec/Ior] to [-13.0] dB.
11. Execute **HSSCCHPWR -13.0** to set [HS-SCCH_Ec/Ior] to [-13.0] dB.
12. Execute **HSPDSCHPWR -3.0** to set [HS-PDSCH_Ec/Ior] to [-3.0] dB.
13. Execute **TPUT_MEAS ON** to set [HSDPA Throughput measurement] to [On].
14. Execute **TPUT_SAMPLE 1000** to set [Number of Sample] at HSDPA Throughput to [1000] Block.
15. Execute **TPUT_LIMIT 700** to set [Lower Limit] at HSDPA Throughput to [700] kbps
16. Execute **SWP** to perform HSDPA Throughput measurement.
17. Execute **TPUTPASS?** to read the HSDPA Throughput measurement result of Serving Cell. Confirm the result is PASS.
18. Execute **TPUTPASS_S? 1** to read HSDPA Throughput measurement result of Secondary Serving Cell1. Confirm the result is PASS.
19. Execute **TPUTPASS_S? 2** to read HSDPA Throughput measurement result of Secondary Serving Cell2. Confirm the result is PASS.



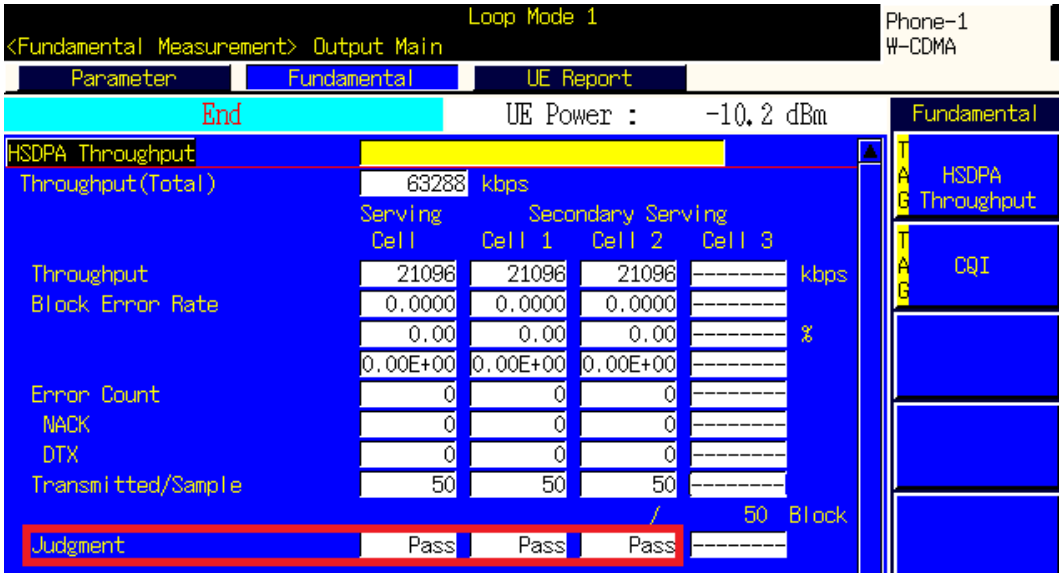
1.15.7. 6.3H Maximum Input Level for 4C-HSDPA Reception (64QAM)

1. **[Phone1]** Execute **ULGAINPAR 8,15,8,8,8** to set [Beta C] to [8], [Beta D] to [15], [Delta ACK] to [8], [Delta NACK] to [8], [Delta CQI] to [8].
2. **[Phone1]** Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
3. **[Phone1]** Execute **CHAN 9750** (or **DLCHAN 10700**) to set [UL Channel & Frequency] to [9750]CH Cell (M channel, for Band I).
4. **[Phone1]** Execute **S1_DLCHAN 10725** to set [Second Cell UARFCN 1st] to [10725]CH for Secondary Serving Cell1 (for Band I).
5. **[Phone1]** Execute **S2_DLCHAN 10750** to set [Second Cell UARFCN 2nd] to [10750]CH for Secondary Serving Cell2 (for Band I).
6. **[Phone1]** Execute **S3_DLCHAN 4625** to set [Second Cell UARFCN 3rd] to [4625]CH for Secondary Serving Cell3 (for Band VIII).
7. **[Phone2]** Execute **DLCHAN 4625** to set [Second Cell UARFCN 3rd] to [4625]CH for Secondary Serving Cell3 (for Band VIII).
8. Connect with Fixed Reference Channel H-Set8C (64QAM). (see 1.15.2 Connection and Disconnection with Dual band 4C-HSDPA).
9. **[Phone1]** Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
10. **[Phone1]** Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
11. Wait 100ms until UE power becomes 0.0 dBm.
12. **[Phone1]** Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
13. **[Phone1-2]** Execute **OLVL -22.7** to set [Output Level(Total)] to [-22.7] dBm.
14. **[Phone1-2]** Execute **DDPCHPWR -13.0** to set [DPCH_Ec/Ior] to [-13.0] dB.
15. **[Phone1-2]** Execute **HSSCCHPWR -13.0** to set [HS-SCCH_Ec/Ior] to [-13.0] dB.
16. **[Phone1-2]** Execute **HSPDSCHPWR -2.0** to set [HS-PDSCH_Ec/Ior] to [-2.0] dB.
17. **[Phone1]** Execute **TPUT_MEAS ON** to set [HSDPA Throughput measurement] to [On].
18. **[Phone1]** Execute **TPUT_SAMPLE 1000** to set [Number of Sample] at HSDPA Throughput to [1000] Block.
19. **[Phone1]** Execute **TPUT_LIMIT 11800** to set set [Lower Limit] at HSDPA Throughput to [11800] kbps.
20. **[Phone1]** Execute **SWP** to perform HSDPA Throughput measurement.
21. **[Phone1]** Execute **TPUTPASS?** to read the HSDPA Throughput measurement result of Serving Cell. Confirm the result is PASS.
22. **[Phone1]** Execute **TPUTPASS_S? 1** to read HSDPA Throughput measurement result of Secondary Serving Cell1. Confirm the result is PASS.
23. **[Phone1]** Execute **TPUTPASS_S? 2** to read HSDPA Throughput measurement result of Secondary Serving Cell2. Confirm the result is PASS.
24. **[Phone1]** Execute **TPUTPASS_S? 3** to read HSDPA Throughput measurement result of Secondary Serving Cell3. Confirm the result is PASS.



1.15.8. 6.3HA Maximum Input Level for 4C-HSDPA Reception (64QAM) (3carrier)

1. Execute **ULGAINPAR 8,15,8,8,8** to set [Beta C] to [8], [Beta D] to [15], [Delta ACK] to 8, [Delta NACK] to [8], [Delta CQI] to [8].
2. Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
3. Execute **CHAN 9750** (or **DLCHAN 10700**) to set [UL Channel & Frequency] to [9750]CH (M channel, for Band I).
4. Connect with Fixed Reference Channel H-Set1B(16QAM) (see 1.15.1 Connection and Disconnection with Single band 4C-HSDPA).
5. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
6. Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
7. Wait 100ms until UE power becomes 0.0 dBm.
8. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
9. Execute **OLVL -22.7** to set [Output Level(Total)] to [-22.7] dBm.
10. Execute **DDPCHPWR -13.0** to set [DPCH_Ec/Ior] to [-13.0] dB.
11. Execute **HSSCCHPWR -13.0** to set [HS-SCCH_Ec/Ior] to [-13.0] dB.
12. Execute **HSPDSCHPWR -2.0** to set [HS-PDSCH_Ec/Ior] to [-2.0] dB.
13. Execute **TPUT_MEAS ON** to set [HSDPA Throughput measurement] to [On].
14. Execute **TPUT_SAMPLE 1000** to set [Number of Sample] at HSDPA Throughput to [1000] Block.
15. Execute **TPUT_LIMIT 11800** to set set [Lower Limit] at HSDPA Throughput to [11800] kbps.
16. Execute **SWP** to perform HSDPA Throughput measurement.
17. Execute **TPUTPASS?** to read the HSDPA Throughput measurement result of Serving Cell. Confirm the result is PASS.
18. Execute **TPUTPASS_S? 1** to read HSDPA Throughput measurement result of Secondary Serving Cell1. Confirm the result is PASS.
19. Execute **TPUTPASS_S? 2** to read HSDPA Throughput measurement result of Secondary Serving Cell2. Confirm the result is PASS.



1.16. DC-HSUPA Measurement

*This chapter describes measurements when Phone1 and Phone 2 are used as Serving Cell and Secondary Serving Cell, respectively for DC-HSUPA connection.

1.16.1. Synchronization of Frame Timing between 2 cells

Synchronizing frame timing between 2 cells is required when connecting with DC-HSDPA.

1. **[Phone1]** Execute **ENTERSYNC IN_SLAVE** to be slave condition of frame timing synchronization.
2. **[Phone2]** Execute **ENTERSYNC MASTER** to perform frame timing synchronization.
3. **[Phone1]** Execute **ENTERSYNC?** to check response becomes 1 (synchronized).

1.16.2. Location Registration for DC-HSUPA

Location registration with Combined is required when connecting with DC-HSUPA.

1. **[Phone1-2]** Execute **PRESET_3GPP** to preset parameters for 3GPP.
2. **[Phone1]** Execute **CHCODING EDCHTEST_DC** to set [Channel Coding] to [E-DCH RF Test for DC-HSUPA].
3. **[Phone1]** Execute **INTEGRITY ON** to set [Integrity Protection] to [On].
4. **[Phone1]** Execute **REGMODE COMBINED** to set [Registration Mode] to [Combined].
5. **[Phone2]** Execute **CHCODING EDCHTEST_DC** to set [Channel Coding] to [EDCH RF Test for DC-HSUPA].
6. **[Phone2]** Execute **LVL OFF** to set [Output Level Total)] to [Off] for Secondary Serving Cell.
7. **[Phone2]** Execute **CALLPROC OFF** to set [Call Processing] of Secondary Serving Cell to [Off] to output each channel.
8. Turn on the UE power.
9. **[Phone1]** Execute **CALLSTAT?** and wait until the response becomes 2 (= Idle (Regist)).

1.16.3. Connection with DC-HSUPA(QPSK)

The process after location registration is shown below. (see 1.15.2 Location Registration for DC-HSUPA.)

1. **[Phone1]** Execute **DCHSUSET TTI2_QPSK** to set [DC-HSUPA Set of Parameters] to [TTI 2ms(QPSK)].
2. **[Phone1]** Execute **S_DLCHAN 10725** to set [Second Cell UARFCN] to [10725]CH for Secondary Serving Cell (when the DL channel of Serving Cell is 10700).
3. **[Phone1]** Execute **DPCCHPWROFS -80** to set DPCCH Power Offset Level to [-80] dB.
4. **[Phone1]** Execute **DELTA_ACK 0** to set [Delta ACK] to [0].
5. **[Phone1]** Execute **DELTA_NACK 0** to set [Delta NACK] to [0].
6. **[Phone1]** Execute **DELTA_CQI 0** to set [Delta CQI] to [0].
7. **[Phone1]** Execute **DELTA_EC 0** to set [Delta E-DPCCH] to [0].
8. **[Phone1]** Execute **MINSET_ETFCI 67** to set [E-DCH minimum set of E-TFCI] to [67].
9. **[Phone1]** Execute **ALLREFETFCI 2,1,12,68,19** to set [Number of E-TFCIs] to [2], [Reference E-TFCI] to [1,68], [Reference E-TFCI PO] to [12,19].
10. **[Phone1]** Execute **CALLSA** to connect with DC-HSDPA+DC-HSUPA.
11. **[Phone1]** Execute **CALLSTAT?** and wait until the response becomes 7 (=Test Loop Mode).
12. **[Phone2]** Execute **DCHSUSET TTI2_QPSK** to set [DC-HSUPA Set of Parameters] to [TTI 2ms(QPSK)].
13. **[Phone2]** Execute **DCHSUCELL SEC** to set [DC-HSUPA Set of Parameters-Serving Cell Type] to [Secondary].
14. **[Phone2]** Execute **DLCHAN 10725** to set [DL Channel & Frequency] to [10725]CH for Secondary Serving Cell.
15. **[Phone2]** Execute **EAGCHCODE 10** to set [E-AGCH Channelization Code] to [10].
16. **[Phone2]** Execute **EHICHCODE 4** to set [E-HICH Channelization Code] to [4].
17. **[Phone2]** Execute **LVL ON** to set [Output Level(Total)] to [On] for Secondary Serving Cell.

1.16.4. Connection with DC-HSUPA(16QAM)

The process after location registration is shown below. (See 1.15.2 Location Registration for DC-HSUPA.)

1. **[Phone1]** Execute **DCHSUSET TTI2_16QAM** to set [DC-HSUPA Set of Parameters] to [TTI 2ms(16QAM)].
2. **[Phone1]** Execute **S_DLCHAN 10725** to set [Second Cell UARFCN] to [10725]CH for Secondary Serving Cell (when the DL channel of Serving Cell is 10700).
3. **[Phone1]** Execute **DPCCHPWROFS -80** to set DPCCH Power Offset Level to [-80] dB.
4. **[Phone1]** Execute **DELTA_ACK 6** to set [Delta ACK] to [6].
5. **[Phone1]** Execute **DELTA_NACK 6** to set [Delta NACK] to [6].
6. **[Phone1]** Execute **DELTA_CQI 6**to set [Delta CQI] to [6].
7. **[Phone1]** Execute **DELTA_EC 0** to set [Delta E-DPCCH] to [0].
8. **[Phone1]** Execute **MINSET_ETFCI 67** to set [E-DCH minimum set of E-TFCI] to [67].
9. **[Phone1]** Execute **ALLREFETFCI 2,1,12,68,19** to set [Number of E-TFCIs] to [2], [Reference E-TFCI] to [1,68], [Reference E-TFCI PO] to [12,19].
10. **[Phone1]** Execute **CALLSA** to connect with DC-HSDPA+DC-HSUPA.
11. **[Phone1]** Execute **CALLSTAT?** and wait until the response becomes 7 (=Test Loop Mode).
12. **[Phone2]** Execute **DCHSUSET TTI2_16QAM** to set [DC-HSUPA Set of Parameters] to [TTI 2ms(16QAM)].
13. **[Phone2]** Execute **DCHSUCELL SEC** to set [DC-HSUPA Set of Parameters-Serving Cell Type] to [Secondary].
14. **[Phone2]** Execute **DLCHAN 10725** to set [DL Channel & Frequency] to [10725]CH for Secondary Serving Cell.
15. **[Phone2]** Execute **EAGCHCODE 10** to set [E-AGCH Channelization Code] to [10].
16. **[Phone2]** Execute **EHICHCODE 4** to set [E-HICH Channelization Code] to [4].
17. **[Phone2]** Execute **LVL ON** to set [Output Level(Total)] to [On] for Secondary Serving Cell.

1.16.5. Disconnection with DC-HSUPA

1. **[Phone2]** Execute **HSSCCH OFF** to set [HSSCCH power] to [Off] for Secondary Serving Cell.
2. **[Phone1]** Execute **CALLSO** to disconnect with DC-HSUPA (by pressing “End Call” key).
3. **[Phone1]** Execute **CALLSTAT?** and wait until the response becomes 2 (=Idle(Regist)).

1.16.6. Channel Switching using Handover

Usually, measurement is performed at three frequency points (L, M, H). In this case, the Channel can be switched quickly without reconnection by switching it at handover with a higher output level and Beta C for UL DPCCH. When a GPIB command is sent during handover, it waits until handover ends.

1. **[Phone2]** Execute **HSSCCH OFF** to set [HSSCCH power] to [Off] for Secondary Serving Cell.
2. **[Phone1]** Execute RX measurement with M channel.
3. **[Phone1]** Execute **S_DLCHAN 10588** to set [Second Cell UARFCN] to [10588]CH for Secondary Serving Cell.
4. **[Phone1]** Execute **CHAN 9613** (or **DLCHAN 10563**) to set [UL Channel & Frequency] to [9613]CH and perform handover to L channel.
5. **[Phone2]** Execute **DLCHAN 10588** to set [DL Channel & Frequency] to [10588]CH for Secondary Serving Cell.
6. **[Phone1]** Execute RX measurement.
7. **[Phone1]** Execute **S_DLCHAN 10812** to set [Second Cell UARFCN] to [10812]CH for Secondary Serving Cell.
8. **[Phone1]** Execute **CHAN 9887** (or **DLCHAN 10837**) to set [UL Channel & Frequency] to [9887]CH and perform handover to handover to H channel.
9. **[Phone2]** Execute **DLCHAN 10812** to set [DL Channel & Frequency] to [10812]CH for Secondary Serving Cell.
10. **[Phone2]** Execute **HSSCCH ON** to set [HSSCCH power] to [On] for Secondary Serving Cell.
11. **[Phone1]** Execute RX measurement.

1.16.7. Measurement Item Selection

For DC-HSUPA Measurement, Phone1 and Phone 2 are used as Serving Cell and Secondary Serving Cell, respectively for DC-HSUPA connection. Phone1 and 2 have different measurement methods as follows.
(These differences depend on the parameter setting of “DC-HSUPA Set of Parameters – Serving Cell Type”.)

MT8820C Fundamental Measurement specification table of "E-DCH RF Test for DC-HSDUPA"

Fundamental Measurement Items	DC-HSUPA Set of Parameters - Serving Cell Type	
	Primary Cell(Phone1)	Secondary Cell(Phone2)
Power Measurement	Primary&Secondary	Secondary(*2)
Frequency Error	Primary	Secondary
Occupied Bandwidth(*1)	Primary&Secondary	-
Spectrum Emission Mask(*1)	Primary&Secondary	-
Adjacent Channel Power(*1)	Primary&Secondary	-
Modulation Analysis	Primary	Secondary
Peak Code Domain Error	Primary	Secondary
Relative Code Domain Error	Primary	Secondary
Bit Error Rate	-	-
Block Error Rate	-	-
HSDPA Throughput	Primary&Secondary	-
CQI	Primary&Secondary	-
HSUPA Throughput	Primary	Secondary

"Primary": MT8820C measures UE as Serving Cell.
"Secondary": MT8820C measures UE as Secondary Serving Cell .
"Primary+Secondary": MT8820C measures UE as Serving Cell/Secondary Serving Cell at the same time.
"-": Measurement result is not valid.
(*1) To measure these items, other items should be turned off.
For example, Power Measurement and Spectrum Emission Mask cannot be measured at the same time.
(*2) Measurement results are displayed on the Primary results area.

The MT8820/15B is set for W-CDMA measurement at preset.
Since DC-HSUPA Throughput measurement items are set to off, turn on these items to measure (**TPUTU_MEAS ON**).
Although BER measurement and BLER measurement are unnecessary items, turn off these items to cut the measurement time (**BER_MEAS OFF**, **BLER_MEAS OFF**).

1.16.8. 5.2BA UE Maximum Output Power for DC-HSUPA(QPSK)

1. **[Phone1]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. **[Phone1]**Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. **[Phone1]**Execute **TPCALGO 1** to set [TPC Algorithm] to [1].
4. **[Phone1]**Connect with DC-HSUPA(QPSK).
5. **[Phone1]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
6. **[Phone1]**Execute **OBW_MEAS OFF** to set [Occupied Bandwidth measurement] to [Off].
7. **[Phone1]**Execute **SMASK_MEAS OFF** to set [Spectrum Emission Mask measurement] to [Off].
8. **[Phone1]**Execute **ADJ_MEAS OFF** to set [Adjacent Channel Power measurement] to [Off].
9. **[Phone1]**Execute **PWR_MEAS ON** to set [Power measurement] to [On].
10. **[Phone1]**Execute **PWR_AVG 20** to set [Average Count] of Power measurement to [20] times.
11. **[Phone1]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
12. **[Phone1]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
13. **[Phone2]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
14. **[Phone2]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
15. **[Phone2]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
16. **[Phone2]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
17. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
18. **[Phone1]**Execute **ILVL 10.0** to set [Input Level] to [+10.0] dBm.
19. **[Phone2]**Execute **ILVL 10.0** to set [Input Level] to [+10.0] dBm.
20. Wait 150ms until the UE power becomes 10.0 dBm.
21. **[Phone1]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
22. **[Phone2]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
23. **[Phone1]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
24. **[Phone2]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
25. Wait 150ms until the UE power reaches Maximum Power.
26. **[Phone1]**Execute **SWP** to perform Power measurement.
27. **[Phone1]**Execute **AVG_POWER?** to read the Power measurement result as Power1.
28. **[Phone1]**Execute **AVG_POWER_S?** to read the Power measurement result as Power2.

    Confirm the measurement result (above Power1+Power2) is +22.5 dBm (Tolerance +3.2/–4.7)

To measure Power, OBW,SEM and ACLR measurement items should be turned off.

1.16.9. 5.2BB UE Maximum Output Power for DC-HSUPA(16QAM)

1. **[Phone1]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. **[Phone1]**Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. **[Phone1]**Execute **TPCALGO 1** to set [TPC Algorithm] to [1].
4. **[Phone1]**Connect with DC-HSUPA(16QAM).
5. **[Phone1]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
6. **[Phone1]**Execute **OBW_MEAS OFF** to set [Occupied Bandwidth measurement] to [Off].
7. **[Phone1]**Execute **SMASK_MEAS OFF** to set [Spectrum Emission Mask measurement] to [Off].
8. **[Phone1]**Execute **ADJ_MEAS OFF** to set [Adjacent Channel Power measurement] to [Off].
9. **[Phone1]**Execute **PWR_MEAS ON** to set [Power measurement] to [On].
10. **[Phone1]**Execute **PWR_AVG 20** to set [Average Count] of Power measurement to [20] times.
11. **[Phone1]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
12. **[Phone1]**Execute **ABSGNTVAL 24** to set [Absolute Grant Value] to [24].
13. **[Phone2]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
14. **[Phone2]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
15. **[Phone2]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
16. **[Phone2]**Execute **ABSGNTVAL 24** to set [Absolute Grant Value] to [24].
17. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
18. **[Phone1]**Execute **ILVL 10.0** to set [Input Level] to [+10.0] dBm.
19. **[Phone2]**Execute **ILVL 10.0** to set [Input Level] to [+10.0] dBm.
20. Wait 150ms until the UE power becomes 10.0 dBm.
21. **[Phone1]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
22. **[Phone2]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
23. **[Phone1]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].

24. **[Phone2]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
25. Wait 150ms until the UE power reaches Maximum Power.
26. **[Phone1]**Execute **SWP** to perform Power measurement.
27. **[Phone1]**Execute **AVG_POWER?** to read the Power measurement result as Power1.
28. **[Phone1]**Execute **AVG_POWER_S?** to read the Power measurement result as Power2.
    Confirm the measurement result (above Power1+Power2) is +22.5 dBm (Tolerance +3.2/–4.7)

To measure Power, OBW, SEM and ACLR measurement items should be turned off.

1.16.10. 5.2DA UE Relative Code Domain Power Accuracy for DC-HSUPA with QPSK

1. **[Phone1]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. **[Phone1]**Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. **[Phone1]**Execute **TPCALGO 2** to set [TPC Algorithm] to [2].
4. **[Phone1]**Connect with DC-HSUPA(QPSK).
5. **[Phone1]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
6. **[Phone1]**Execute **OBW_MEAS OFF** to set [Occupied Bandwidth measurement] to [Off].
7. **[Phone1]**Execute **SMASK_MEAS OFF** to set [Spectrum Emission Mask measurement] to [Off].
8. **[Phone1]**Execute **ADJ_MEAS OFF** to set [Adjacent Channel Power measurement] to [Off].
9. **[Phone1]**Execute **TPUTU_MEAS ON** to set [HSUPA Throughput] measurement to [On].
10. **[Phone1]**Execute **TPUTU_SAMPLE 15** to set [HSUPA Throughput - Number of Sample] to [15].
11. **[Phone1]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
12. **[Phone1]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
13. **[Phone2]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
14. **[Phone2]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
15. **[Phone2]**Execute **OBW_MEAS OFF** to set [Occupied Bandwidth measurement] to [Off].
16. **[Phone2]**Execute **SMASK_MEAS OFF** to set [Spectrum Emission Mask measurement] to [Off].
17. **[Phone2]**Execute **ADJ_MEAS OFF** to set [Adjacent Channel Power measurement] to [Off].
18. **[Phone2]**Execute **PWR_MEAS ON** to set [Power measurement] to [On].
19. **[Phone2]**Execute **PWR_AVG 20** to set [Average Count] of Power measurement to [20] times.
20. **[Phone2]**Execute **TPUTU_MEAS ON** to set [HSUPA Throughput] measurement to [On].
21. **[Phone2]**Execute **TPUTU_SAMPLE 15** to set [HSUPA Throughput - Number of Sample] to [15].
22. **[Phone2]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
23. **[Phone2]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
24. **[Phone1]**Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
25. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
26. **[Phone2]**Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
27. **[Phone2]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
28. **[Phone1]**Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
29. **[Phone2]**Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
30. Wait 150ms until the UE power becomes 15.0 dBm.
31. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
32. **[Phone1]**Execute **SWP** to perform HSUPA Throughput measurement.
33. **[Phone1]**Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 1.
34. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
35. **[Phone2]**Execute **SWP** to perform HSUPA Throughput measurement.
36. **[Phone2]**Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 1.
37. **[Phone1]**Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
38. **[Phone1]**Execute **MEASOBJ HSDPCCH_MA** to set [Measurement Object] to [HS-DPCCH Modulation Analysis].
39. **[Phone1]**Execute **HSMA_ITEM CDP** to set measurement result of HS-DPCCH (Modulation Analysis) to [CDP Ratio].
40. **[Phone1]**Execute **SWP** to perform CDP Ratio measurement.
41. **[Phone1]**Confirm the measurement results of Relative Code Domain Power are as follows.
    DPCCH -5.8dB(Accuracy +/-1.7), HS-DPCCH -15.3(Accuracy +/-2.9),
    E-DPCCH -15.3(Accuracy +/-2.9), E-DPDCH -1.7(Accuracy +/-1.7)
42. **[Phone2]**Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
43. **[Phone2]**Execute **MEASOBJ HSDPCCH_MA** to set [Measurement Object] to [HS-DPCCH Modulation Analysis].
44. **[Phone2]**Execute **HSMA_ITEM CDP** to set measurement result of HS-DPCCH (Modulation Analysis) to [CDP Ratio].

45. **[Phone2]**Execute **SWP** to perform CDP Ratio measurement.
46. **[Phone2]**Confirm the measurement results of Relative Code Domain Power are as follows.
DPCCH -5.6dB(Accuracy +/-1.7),
E-DPCCH -15.2(Accuracy +/-2.9), E-DPDCH -1.6(Accuracy +/-1.7)

To measure Power/ HSUPA Throughput, OBW,SEM and ACLR measurement items should be turned off.

1.16.11. 5.2EA UE Relative Code Domain Power Accuracy for DC-HSUPA with 16QAM

1. **[Phone1]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. **[Phone1]**Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. **[Phone1]**Execute **TPCALGO 2** to set [TPC Algorithm] to [2].
4. **[Phone1]**Connect with DC-HSUPA(16QAM).
5. **[Phone1]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
6. **[Phone1]**Execute **OBW_MEAS OFF** to set [Occupied Bandwidth measurement] to [Off].
7. **[Phone1]**Execute **SMASK_MEAS OFF** to set [Spectrum Emission Mask measurement] to [Off].
8. **[Phone1]**Execute **ADJ_MEAS OFF** to set [Adjacent Channel Power measurement] to [Off].
9. **[Phone1]**Execute **TPUTU_MEAS ON** to set [HSUPA Throughput] measurement to [On].
10. **[Phone1]**Execute **TPUTU_SAMPLE 15** to set [HSUPA Throughput - Number of Sample] to [15].
11. **[Phone1]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
12. **[Phone1]**Execute **ABSGNTVAL 24** to set [Absolute Grant Value] to [24].
13. **[Phone2]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
14. **[Phone2]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
15. **[Phone2]**Execute **OBW_MEAS OFF** to set [Occupied Bandwidth measurement] to [Off].
16. **[Phone2]**Execute **SMASK_MEAS OFF** to set [Spectrum Emission Mask measurement] to [Off].
17. **[Phone2]**Execute **ADJ_MEAS OFF** to set [Adjacent Channel Power measurement] to [Off].
18. **[Phone2]**Execute **PWR_MEAS ON** to set [Power measurement] to [On].
19. **[Phone2]**Execute **PWR_AVG 20** to set [Average Count] of Power measurement to [20] times.
20. **[Phone2]**Execute **TPUTU_MEAS ON** to set [HSUPA Throughput] measurement to [On].
21. **[Phone2]**Execute **TPUTU_SAMPLE 15** to set [HSUPA Throughput - Number of Sample] to [15].
22. **[Phone2]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
23. **[Phone2]**Execute **ABSGNTVAL 24** to set [Absolute Grant Value] to [24].
24. **[Phone1]**Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
25. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
26. **[Phone2]**Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
27. **[Phone2]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
28. **[Phone1]**Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
29. **[Phone2]**Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
30. Wait 150ms until the UE power becomes 15.0 dBm.
31. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
32. **[Phone1]**Execute **SWP** to perform HSUPA Throughput measurement.
33. **[Phone1]**Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 1.
34. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
35. **[Phone2]**Execute **SWP** to perform HSUPA Throughput measurement.
36. **[Phone2]**Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 1.
37. **[Phone1]**Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
38. **[Phone1]**Execute **MEASOBJ HSDPCCH_MA** to set [Measurement Object] to [HS-DPCCH Modulation Analysis].
39. **[Phone1]**Execute **HSMA_ITEM CDP** to set measurement result of HS-DPCCH (Modulation Analysis) to [CDP Ratio].
40. **[Phone1]**Execute **SWP** to perform CDP Ratio measurement.
41. **[Phone1]**Confirm the measurement results of Relative Code Domain Power are as follows.
DPCCH -24.0dB(Accuracy +/-3.5), HS-DPCCH -21.9(Accuracy +/-3.5),
E-DPCCH -15.9(Accuracy +/-2.9),
E-DPDCH1/E-DPDCH2 -4.9(Accuracy +/-1.7),
E-DPCCH3/E-DPDCH4 -7.9(Accuracy +/-1.7),
42. **[Phone2]**Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
43. **[Phone2]**Execute **MEASOBJ HSDPCCH_MA** to set [Measurement Object] to [HS-DPCCH Modulation Analysis].
44. **[Phone2]**Execute **HSMA_ITEM CDP** to set measurement result of HS-DPCCH (Modulation Analysis) to [CDP

Ratio].

45. **[Phone2]**Execute **SWP** to perform CDP Ratio measurement.
46. **[Phone2]**Confirm the measurement results of Relative Code Domain Power are as follows.
    DPCCH -23.9dB(Accuracy +/-3.5), E-DPCCH -15.9(Accuracy +/-2.9),
    E-DPDCH1/E-DPDCH2 -4.9(Accuracy +/-1.7),
    E-DPCCH3/E-DPDCH4 -7.9(Accuracy +/-1.7),

To measure Power/ HSUPA Throughput, OBW,SEM and ACLR measurement items should be turned off.

1.16.12. 5.3A Frequency Error for DC-HSUPA

To connect with DC-HSUPA(QPSK), See 2.3.1 Connection with DC-HSUPA(QPSK).

1. **[Phone1]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. **[Phone1]**Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. **[Phone1]**Execute **TPCALGO 1** to set [TPC Algorithm] to [1].
4. **[Phone1]**Connect with DC-HSUPA(QPSK).
5. **[Phone1]**Execute **OLVL -102.7** to set [Output Level] to [-102.7dBm].
6. **[Phone1]**Execute **OBW_MEAS OFF** to set [Occupied Bandwidth measurement] to [Off].
7. **[Phone1]**Execute **SMASK_MEAS OFF** to set [Spectrum Emission Mask measurement] to [Off].
8. **[Phone1]**Execute **ADJ_MEAS OFF** to set [Adjacent Channel Power measurement] to [Off].
9. **[Phone1]**Execute **FREQ_MEAS ON** to set [Frequency measurement] to [On].
10. **[Phone1]**Execute **FREQ_AVG 20** to set [Average Count] of Frequency measurement to [20] times.
11. **[Phone1]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
12. **[Phone1]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
13. **[Phone2]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
14. **[Phone2]**Execute **OLVL -102.7** to set [Output Level] to [-102.7dBm].
15. **[Phone2]**Execute **OBW_MEAS OFF** to set [Occupied Bandwidth measurement] to [Off].
16. **[Phone2]**Execute **SMASK_MEAS OFF** to set [Spectrum Emission Mask measurement] to [Off].
17. **[Phone2]**Execute **ADJ_MEAS OFF** to set [Adjacent Channel Power measurement] to [Off].
18. **[Phone2]**Execute **FREQ_MEAS ON** to set [Frequency measurement] to [On].
19. **[Phone2]**Execute **FREQ_AVG 20** to set [Average Count] of Frequency measurement to [20] times.
20. **[Phone2]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
21. **[Phone2]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
22. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
23. **[Phone1]**Execute **ILVL 10.0** to set [Input Level] to [+10.0] dBm.
24. **[Phone2]**Execute **ILVL 10.0** to set [Input Level] to [+10.0] dBm.
25. Wait 150 ms until the UE power becomes 10.0 dBm.
26. **[Phone1]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
27. **[Phone2]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
28. **[Phone1]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
29. **[Phone2]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
30. Wait 150 ms until the UE power reaches Maximum Power.
31. **[Phone1]**Execute **SWP** to perform Frequency measurement.
32. **[Phone2]**Execute **SWP** to perform Frequency measurement.
33. **[Phone1]**Execute **MAX_CARRFERR? PPM** to read the Frequency Error measurement result.
34. **[Phone1]**Execute **MIN_CARRFERR? PPM** to read the Frequency Error measurement result.
35. **[Phone1]**Confirm the measurement result is lower than (0.1 ppm + 10 Hz).
36. **[Phone2]**Execute **MAX_CARRFERR? PPM** to read the Frequency Error measurement result.
37. **[Phone2]**Execute **MIN_CARRFERR? PPM** to read the Frequency Error measurement result.
38. **[Phone2]**Confirm the measurement result is lower than (0.1 ppm + 10 Hz).

To measure Frequency Error, OBW,SEM and ACLR measurement items should be turned off.

1.16.13. 5.4.1A Open Loop Power Control in the Uplink for DC-HSUPA

The following measurement uses Open Loop Power Control measurement on the Time Domain Measurement screen.

The process after location registration is shown below. (see 1.16.2 Location Registration for DC-HSUPA.)

1. **[Phone1]**Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
2. **[Phone1]**Execute **MEASOBJ DCHSUPA_OLPC** to set [Measurement Object] to [DC-HSUPA Open Loop Power Control].
3. **[Phone1]**Execute **TDM_RRC OFF** to set to [RRC Filter] to [Off].
4. **[Phone2]**Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
5. **[Phone2]**Execute **MEASOBJ DCHSUPA_OLPC** to set [Measurement Object] to [DC-HSUPA Open Loop Power Control].
6. **[Phone2]**Execute **TDM_RRC OFF** to set to [RRC Filter] to [Off].
7. **[Phone2]**Execute **TIMEOUT 15** to set [Timeout Length] to [15] s.
8. **[Phone1]**Execute **MAXULPWR 24** to set [Maximum Allowed UL TX Power] to [24.0] dBm.

Maximum Allowed TX Power is a standard parameter of Cell Selection and Reselection. Power Class must be set lower than Maximum Allowed TX Power, so the UE can perform Cell Selection and Reselection with Sensitivity Level. For example, when UE Power Class is 3, MAXULPWR is 24.0.

1.16.14. 5.4.1A Open Loop Power Control in the Uplink for DC-HSUPA (RX-middle)

1. **[Phone1]**Execute **OLVL -65.7** to set [Output Level] to [–65.7] dBm.
2. **[Phone1]**Execute **CPICHPWR -3.9** to set [Downlink CPICH] to [-3.9] dB.
3. **[Phone1]**Execute **HSPDSCHPWR -6.5** to set [HS-PDSCH_Ec/Ior] to [–6.5] dB.
4. **[Phone1]**Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
5. **[Phone1]**Execute **DPCCHPWROFS -84** to set [DPCCH Power Offset] to [-84] dB.
6. **[Phone2]**Execute **OLVL -65.7** to set [Output Level] to [–65.7] dBm.
7. **[Phone2]**Execute **CPICHPWR -3.9** to set [Downlink CPICH] to [-3.9] dB.
8. **[Phone2]**Execute **HSPDSCHPWR -6.5** to set [HS-PDSCH_Ec/Ior] to [–6.5] dB.
9. **[Phone2]**Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
10. **[Phone2]**Execute **LVL ON** to set [Output Level(Total)] to [On] for Secondary Serving Cell.
11. **[Phone2]**Execute **SWP** to perform measurement.
12. **[Phone1]**Execute **SWPANDPG** to connect with DC-HSUPA(QPSK) and to perform measurement.
13. **[Phone1]**Execute **MKRL_TDM?** to read the measurement result.
14. **[Phone2]**Execute **MKRL_TDM?** to read the measurement result.
15. **[Phone1]**Confirm the measurement result is –14.4 dBm (±10 dB).
16. **[Phone2]**Confirm the measurement result is –14.4 dBm (±10 dB).
17. **[Phone2]**Execute **LVL OFF** to set [Output Level(Total)] to [Off] for Secondary Serving Cell.
18. Disconnection with DC-HSUPA.

1.16.15. 5.4.1A Open Loop Power Control in the Uplink for DC-HSUPA (RX Upper dynamic end)

1. **[Phone1]**Execute **OLVL -25.0** to set [Output Level] to [–25.0] dBm.
2. **[Phone1]**Execute **CPICHPWR -3.9** to set [Downlink CPICH] to [-3.9] dB.
3. **[Phone1]**Execute **HSPDSCHPWR -6.5** to set [HS-PDSCH_Ec/Ior] to [–6.5] dB.
4. **[Phone1]**Execute **ILVL -25.0** to set [Input Level] to [-25.0] dBm.
5. **[Phone1]**Execute **DPCCHPWROFS -66** to set [DPCCH Power Offset] to [-66] dB.
6. **[Phone2]**Execute **OLVL –25.0** to set [Output Level] to [–25.0] dBm.
7. **[Phone2]**Execute **CPICHPWR -3.9** to set [Downlink CPICH] to [-3.9] dB.
8. **[Phone2]**Execute **HSPDSCHPWR -6.5** to set [HS-PDSCH_Ec/Ior] to [–6.5] dB.
9. **[Phone2]**Execute **ILVL -25.0** to set [Input Level] to [-25.0] dBm.
10. **[Phone2]**Execute **LVL ON** to set [Output Level(Total)] to [On] for Secondary Serving Cell.
11. **[Phone2]**Execute **SWP** to perform measurement.
12. **[Phone1]**Execute **SWPANDPG** to connect with DC-HSUPA(QPSK) and to perform measurement.

13. **[Phone1]**Execute **MKRL_TDM?** to read the measurement result.
14. **[Phone2]**Execute **MKRL_TDM?** to read the measurement result.
15. **[Phone1]**Confirm the measurement result is –37.1 dBm (±10 dB).
16. **[Phone2]**Confirm the measurement result is –37.1 dBm (±10 dB).
17. **[Phone2]**Execute **LVL OFF** to set [Output Level(Total)] to [Off] for Secondary Serving Cell.
18. Disconnection with DC-HSUPA.

1.16.16. 5.4.1A Open Loop Power Control in the Uplink for DC-HSUPA (RX-Sensitivity level)

1. **[Phone1]**Execute **OLVL -106.0** to set [Output Level] to [–106.0] dBm for Band I. For other Bands, refer to Table 6.2.2 below.
2. **[Phone1]**Execute **CPICHPWR -3.9** to set [Downlink CPICH] to [-3.9] dB.
3. **[Phone1]**Execute **HSPDSCHPWR -6.5** to set [HS-PDSCH_Ec/Ior] to [–6.5] dB.
4. **[Phone1]**Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
5. **[Phone1]**Execute **DPCCHPWROFS -108** to set [DPCCH Power Offset] to [-108] dB for Band I, IV, VI, IX, X, XI, XIX, XXI. Or execute **DPCCHPWROFS -108** to set [DPCCH Power Offset] to [-106] dB for Band II, III, V, VII, VIII, XII, XIII, XIV, XX, XXI.
6. **[Phone2]**Execute **OLVL -106.0** to set [Output Level] to [–106.0] dBm.
7. **[Phone2]**Execute **CPICHPWR -3.9** to set [Downlink CPICH] to [-3.9] dB.
8. **[Phone2]**Execute **HSPDSCHPWR -6.5** to set [HS-PDSCH_Ec/Ior] to [–6.5] dB.
9. **[Phone2]**Execute **ILVL 25.0** to set [Input Level] to [25.0] dBm.
10. **[Phone2]**Execute **LVL ON** to set [Output Level(Total)] to [On] for Secondary Serving Cell.
11. **[Phone2]**Execute **SWP** to perform measurement.
12. **[Phone1]**Execute **SWPANDPG** to connect with DC-HSUPA(QPSK) and to perform measurement.
13. **[Phone1]**Execute **MKRL_TDM?** to read the measurement result.
14. **[Phone2]**Execute **MKRL_TDM?** to read the measurement result.
15. **[Phone1]**Confirm the measurement result is +8.7 dBm (±10 dB) for Band I, II, IV, V, VI, VII, X, XI, XIX, XXI, or +7.7 dBm(±10 dB) for Band III, VIII, IX, XII, XIII, XIV, XX, XXII.
16. **[Phone2]** Confirm the measurement result is +8.7 dBm (±10 dB) for Band I, II, IV, V, VI, VII, X, XI, XIX, XXI, or +7.7 dBm(±10 dB) for Band III, VIII, IX, XII, XIII, XIV, XX, XXII.
17. **[Phone2]**Execute **LVL OFF** to set [Output Level(Total)] to [Off] for Secondary Serving Cell.
18. Disconnection with DC-HSUPA.

Table 6.2.2: Test parameters for Reference Sensitivity Level

Operating Band	Unit	DPCH_Ec <REFSENS>	<REF$\hat{I}_{or}$>
I	dBm/3.84 MHz	-116.3	-106
II	dBm/3.84 MHz	-114.3	-104
III	dBm/3.84 MHz	-113.3	-103
IV	dBm/3.84 MHz	-116.3	-106
V	dBm/3.84 MHz	-114.3	-104
VI	dBm/3.84 MHz	-116.3	-106
VII	dBm/3.84 MHz	-114.3	-104
VIII	dBm/3.84 MHz	-113.3	-103
IX	dBm/3.84 MHz	-115.3	-105
X	dBm/3.84 MHz	-116.3	-106
XI	dBm/3.84 MHz	-116.3	-106
XII	dBm/3.84 MHz	-113.3	-103
XIII	dBm/3.84 MHz	-113.3	-103
XIV	dBm/3.84 MHz	-113.3	-103
XIX	dBm/3.84 MHz	-116.3	-106
XX	dBm/3.84 MHz	-113.3	-103
XXI	dBm/3.84 MHz	-116.3	-106
XXII	dBm/3.84 MHz	-113.3	-103
XXV	dBm/3.84 MHz	-112.8	-102.5
XXVI	dBm/3.84 MHz	-112.8	-102.5

NOTE 1: For Power class 3 and 3bis this shall be at the maximum output power.
NOTE 2: For Power class 4 this shall be at the maximum output power.
NOTE 3: For the UE which supports both Band III and Band IX operating frequencies, the reference sensitivity level of -113.8 dBm DPCH_Ec <REFSENS> shall apply for Band IX. The corresponding <REF$\hat{I}_{or}$> is -103.5 dBm.
NOTE 4: For the UE which supports DB-DC-HSDPA configuration 2, the reference sensitivity level of -113.3 dBm/3.84 MHz DPCH_Ec <REFSENS> shall apply for Band II. The corresponding <REF$\hat{I}_{or}$> is -103 dBm/3.84 MHz.
NOTE 5: For the UE which supports DB-DC-HSDPA configuration 2, the reference sensitivity level of -115.3 dBm/3.84 MHz DPCH_Ec <REFSENS> shall apply for Band IV. The corresponding <REF$\hat{I}_{or}$> is -105 dBm/3.84 MHz.

1.16.17. 5.4.2A Inner Loop Power Control in the Uplink for DC-HSUPA

On the Time Domain Measurement with DC-HSUPA, Inner Loop Power Control (Auto) is not supported.

The following measurement uses Inner Loop Power Control measurement on the Time Domain Measurement screen. Due to limits on the equipment dynamic range (40 dB), Test Steps E, F, G, and H cannot be measured simultaneously, so measurement must be performed twice by changing the Input Level.

1. **[Phone1]**Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
2. **[Phone1]**Execute **MEASOBJ ILPC** to set [Measurement Object] to [Inner Loop Power Control].
3. **[Phone1]**Execute **SLOTLIST ON** to display the slot list.
4. **[Phone1]**Execute **REGSLOTLIST 0-59** to register Slot0~Slot59 for the slot list.
5. **[Phone1]**Execute **TIMSPAN 40.0MS** to set [Time Span] of Time Domain measurement to [40.0] ms.
6. **[Phone1]**Execute **OLVL -93** to set [Output Level] to [–93] dBm.
7. **[Phone1]**Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
8. **[Phone1]**Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
9. **[Phone1]**Execute **TDM_RRC OFF** to set [RRC Filter] to [Off].
10. **[Phone1]**Execute **VFILTLEN 0.1US** to set [Video Filter Length] to [0.1] µs.
11. **[Phone2]**Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
12. **[Phone2]**Execute **MEASOBJ ILPC** to set [Measurement Object] to [Inner Loop Power Control].
13. **[Phone2]**Execute **SLOTLIST ON** to display the slot list.
14. **[Phone2]**Execute **REGSLOTLIST 0-59** to register Slot0~Slot59 for the slot list.
15. **[Phone2]**Execute **TIMSPAN 40.0MS** to set [Time Span] of Time Domain measurement to [40.0] ms.
16. **[Phone2]**Execute **OLVL -93** to set [Output Level] to [–93] dBm.
17. **[Phone2]**Execute **TDM_RRC OFF** to set [RRC Filter] to [Off].
18. **[Phone2]**Execute **VFILTLEN 0.1US** to set [Video Filter Length] to [0.1] µs.
19. **[Phone1]**Connect with DC-HSUPA(QPSK).

1.16.17.1. Inner Loop Power Control Parameter

Inner Loop Power Control Parameter of Call Processing Parameter is the steady-state setting of the TPC command. When Power Control Bit Pattern is set to [Inner Loop Power Control], the TPC command is sent automatically to adjust UE output power to be Input Level.

In the case of Inner Loop Power Control Parameter of Time Domain Parameter, the TPC command between Slot 0 and the specified Slot is set only when Measurement Object of Time Domain Measurement is measured using Inner Loop Power Control. After sending the specified number of slots, the TPC command set at Call Processing Parameter is sent.

Sometimes, at Inner Loop Power Control measurement, the UE output power must be set lower (or higher) than [Input Level] before measurement.
Examples of how to set Input Level to +30 dBm and UE output power to -10 dBm are shown below.

1. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
2. **[Phone1]**Execute **ILVL -10.0** to set [Input Level] to [–10.0] dBm.
3. **[Phone1]**Wait until the UE power becomes –10.0 dBm.
4. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
5. **[Phone1]**Execute **ILVL 30.0** to set [Input Level] to [+30.0] dBm.
6. **[Phone2]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
7. **[Phone2]**Execute **ILVL -10.0** to set [Input Level] to [–10.0] dBm.
8. **[Phone2]**Wait until the UE power becomes –10.0 dBm.
9. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
10. **[Phone2]**Execute **ILVL 30.0** to set [Input Level] to [+30.0] dBm.

1.16.17.2. Measurement of Inner Loop Power Control in Uplink for DC-HSUPA

To connect with DC-HSUPA(QPSK), See 1.16.3 Connection with DC-HSUPA(QPSK).

[Step A]

1. **[Phone1]**Execute **ILP_TPC A** to set [TPC Method] to [Step A].
2. **[Phone2]** Execute **HSSCCH OFF** to set [HSSCCH power] to [Off] for Secondary Serving Cell.
3. **[Phone1]**Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
4. **[Phone2]** Execute **HSSCCH ON** to set [HSSCCH power] to [On] for Secondary Serving Cell.
5. **[Phone1]**Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
6. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
7. **[Phone1]**Execute **ILVL -10.0** to set [Input Level] to [–10.0] dBm.
8. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
9. **[Phone1]**Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
10. **[Phone2]**Execute **ILP_TPC A** to set [TPC Method] to [Step A].
11. **[Phone2]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
12. **[Phone2]**Execute **ILVL -10.0** to set [Input Level] to [–10.0] dBm.
13. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
14. **[Phone2]**Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
15. **[Phone1]**Execute **SNGLS** to perform measurement.
16. **[Phone2]**Execute **SNGLS** to perform measurement.
17. **[Phone1]**Repeat **MSTAT?** until the response becomes 0.
18. **[Phone2]**Repeat **MSTAT?** until the response becomes 0.
19. **[Phone1]**Execute **SLOT_PWR? ALL** to read the measurement result.
20. **[Phone2]**Execute **SLOT_PWR? ALL** to read the measurement result.
21. Confirm the difference in mean power between adjacent slots on each carrier shall be within the prescribed range for a TPC_cmd of 0, as given in 3GPP TS34.121 table 5.4.2A.5.1.
22. Confirm the change in mean power over 10 consecutive slots on each carrier shall be within the prescribed range for a TPC_cmd group of 0, as given in 3GPP TS34.121 table 5.4.2A.5.2

The interval of two SNGLS above should be less than 400ms.

[Step B]

1. **[Phone1]**Execute **ILP_TPC B** to set [TPC Method] to [Step B].
2. **[Phone1]**Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
3. **[Phone1]**Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
4. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
5. **[Phone1]**Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
6. **[Phone2]**Execute **ILP_TPC B** to set [TPC Method] to [Step B].
7. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
8. **[Phone2]**Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
9. **[Phone1]**Execute **SNGLS** to perform measurement.
10. **[Phone2]**Execute **SNGLS** to perform measurement.
11. **[Phone1]**Repeat **MSTAT?** until the response becomes 0.
12. **[Phone2]**Repeat **MSTAT?** until the response becomes 0.
13. **[Phone1]**Execute **SLOT_PWR? ALL** to read the measurement result.
14. **[Phone2]**Execute **SLOT_PWR? ALL** to read the measurement result.
15. Confirm the difference in mean power between adjacent slots on each carrier shall be within the prescribed range given in 3GPP TS34.121 table 5.4.2A.5.1, given that every 5th TPC_cmd should have the value +1, with a step size of 1 dB, and all other TPC_cmd should have the value 0.
16. Confirm the change in mean power over 50 consecutive slots on each carrier shall be within the prescribed range for a TPC_cmd group of {0,0,0,0,+1}, as given in 3GPP TS34.121 table 5.4.2A.5.2.

The interval of two SNGLS above should be less than 400ms.

[Step C]

1. **[Phone1]**Execute **ILP_TPC C** to set [TPC Method] to [Step C].
2. **[Phone1]**Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
3. **[Phone1]**Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
4. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
5. **[Phone1]**Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
6. **[Phone2]**Execute **ILP_TPC C** to set [TPC Method] to [Step C].
7. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
8. **[Phone2]**Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
9. **[Phone1]**Execute **SNGLS** to perform measurement.
10. **[Phone2]**Execute **SNGLS** to perform measurement.
11. **[Phone1]**Repeat **MSTAT?** until the response becomes 0.
12. **[Phone2]**Repeat **MSTAT?** until the response becomes 0.
13. **[Phone1]**Execute **SLOT_PWR? ALL** to read the measurement result.
14. **[Phone2]**Execute **SLOT_PWR? ALL** to read the measurement result.
15. Confirm the difference in mean power between adjacent slots on each carrier shall be within the prescribed range given in 3GPP TS34.121 table 5.4.2A.5.1, given that every 5th TPC_cmd should have the value −1, with a step size of 1 dB, and all other TPC_cmd should have the value 0.
16. Confirm the change in mean power over 50 consecutive slots on each carrier shall be within the prescribed range for a TPC_cmd group of {0,0,0,0,-1}, as given in 3GPP TS34.121 table 5.4.2A.5.2.

The interval of two SNGLS above should be less than 400ms.

[Step D]

1. **[Phone1]**Execute **ILP_TPC D** to set [TPC Method] to [Step D].
2. **[Phone2]** Execute **HSSCCH OFF** to set [HSSCCH power] to [Off] for Secondary Serving Cell.
3. **[Phone1]**Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
4. **[Phone2]** Execute **HSSCCH ON** to set [HSSCCH power] to [On] for Secondary Serving Cell.
5. **[Phone1]**Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
6. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
7. **[Phone1]**Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
8. **[Phone2]**Execute **ILP_TPC D** to set [TPC Method] to [Step D].
9. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
10. **[Phone2]**Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
11. **[Phone1]**Execute **SNGLS** to perform measurement.
12. **[Phone2]**Execute **SNGLS** to perform measurement.
13. **[Phone1]**Repeat **MSTAT?** until the response becomes 0.
14. **[Phone2]**Repeat **MSTAT?** until the response becomes 0.
15. **[Phone1]**Execute **SLOT_PWR? ALL** to read the measurement result.
16. **[Phone2]**Execute **SLOT_PWR? ALL** to read the measurement result.
17. Confirm the UE output power is above the maximum power threshold.

The interval of two SNGLS above should be less than 400ms.

[Step E 1]

1. **[Phone1]**Execute **ILP_TPC E** to set [TPC Method] to [Step E].
2. **[Phone1]**Execute **ILP_CMDSLOT E,40** to set [Length] of Test Step E to [40] Slot.
3. **[Phone1]**Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
4. **[Phone1]**Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
5. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
6. **[Phone1]**Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
7. **[Phone2]**Execute **ILP_TPC E** to set [TPC Method] to [Step E].
8. **[Phone2]**Execute **ILP_CMDSLOT E,40** to set [Length] of Test Step E to [40] Slot.
9. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
10. **[Phone2]**Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
11. **[Phone1]**Execute **SNGLS** to perform measurement.
12. **[Phone2]**Execute **SNGLS** to perform measurement.
13. **[Phone1]**Repeat **MSTAT?** until the response becomes 0.
14. **[Phone2]**Repeat **MSTAT?** until the response becomes 0.
15. **[Phone1]**Execute **SLOT_PWR? ALL** to read the measurement result.
16. **[Phone2]**Execute **SLOT_PWR? ALL** to read the measurement result.

The interval of two SNGLS above should be less than 400ms.

[Step E 2]

1. **[Phone1]**Execute **ILP_TPC E** to set [TPC Method] to [Step E].
2. **[Phone1]**Execute **ILP_CMDSLOT E,40** to set [Length] of Test Step E to [40] Slot.
3. **[Phone1]**Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
4. **[Phone1]**Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
5. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
6. **[Phone1]**Execute **ILVL -15.0** to set [Input Level] to [–15.0] dBm.
7. **[Phone2]**Execute **ILP_TPC E** to set [TPC Method] to [Step E].
8. **[Phone2]**Execute **ILP_CMDSLOT E,40** to set [Length] of Test Step E to [40] Slot.
9. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
10. **[Phone2]**Execute **ILVL -15.0** to set [Input Level] to [–15.0] dBm.
11. **[Phone1]**Execute **SNGLS** to perform measurement.
12. **[Phone2]**Execute **SNGLS** to perform measurement.
13. **[Phone1]**Repeat **MSTAT?** until the response becomes 0.
14. **[Phone2]**Repeat **MSTAT?** until the response becomes 0.
15. **[Phone1]**Execute **SLOT_PWR? ALL** to read the measurement result.
16. **[Phone2]**Execute **SLOT_PWR? ALL** to read the measurement result.
17. Combine segmentations at Step E1 and E2.
18. Confirm the difference in mean power between adjacent slots on each carrier shall be within the prescribed range given in 3GPP TS34.121 table 5.4.2A.5.1 for a TPC_cmd of −1 and step size of 1 dB. This applies when the original (reference) timeslot power and the target timeslot power are between the Min power threshold for test and the Max power threshold for test derived from the Measured Maximum output power in Step D. For the power step adjacent to the Min or Max power threshold for test, the lower step size requirement does not apply.
19. Confirm the change in mean power over 10 consecutive slots on each carrier shall be within the prescribed range for a TPC_cmd group of −1, and step size of 1 dB as given in 3GPP TS34.121 table 5.4.2A.5.2. This applies when the original (reference) timeslot power and the target timeslot power are between the Min power threshold for test and the Max power threshold for test derived from the Measured Maximum output power in Step D. The power step adjacent to the Min or Max power threshold for test should not be part of the 10 consecutive slots tested.

The interval of two SNGLS above should be less than 400ms.

[Step F 1]

1. **[Phone1]**Execute **ILP_TPC F** to set [TPC Method] to [Step F].
2. **[Phone1]**Execute **ILP_CMDSLOT F,40** to set [Length] of Test Step F to [40] Slot.
3. **[Phone1]**Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
4. **[Phone1]**Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
5. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
6. **[Phone1]**Execute **ILVL -15.0** to set [Input Level] to [–15.0] dBm.
7. **[Phone2]**Execute **ILP_TPC F** to set [TPC Method] to [Step F].
8. **[Phone2]**Execute **ILP_CMDSLOT F,40** to set [Length] of Test Step F to [40] Slot.
9. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
10. **[Phone2]**Execute **ILVL -15.0** to set [Input Level] to [–15.0] dBm.
11. **[Phone1]**Execute **SNGLS** to perform measurement.
12. **[Phone2]**Execute **SNGLS** to perform measurement.
13. **[Phone1]**Repeat **MSTAT?** until the response becomes 0.
14. **[Phone2]**Repeat **MSTAT?** until the response becomes 0.
15. **[Phone1]**Execute **SLOT_PWR? ALL** to read the measurement result.
16. **[Phone2]**Execute **SLOT_PWR? ALL** to read the measurement result.

The interval of two SNGLS above should be less than 400ms.

[Step F 2]

1. **[Phone1]**Execute **ILP_TPC F** to set [TPC Method] to [Step F].
2. **[Phone1]**Execute **ILP_CMDSLOT F,40** to set [Length] of Test Step F to [40] Slot.
3. **[Phone1]**Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
4. **[Phone1]**Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
5. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
6. **[Phone1]**Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
7. **[Phone2]**Execute **ILP_TPC F** to set [TPC Method] to [Step F].
8. **[Phone2]**Execute **ILP_CMDSLOT F,40** to set [Length] of Test Step F to [40] Slot.
9. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
10. **[Phone2]**Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
11. **[Phone1]**Execute **SNGLS** to perform measurement.
12. **[Phone2]**Execute **SNGLS** to perform measurement.
13. **[Phone1]**Repeat **MSTAT?** until the response becomes 0.
14. **[Phone2]**Repeat **MSTAT?** until the response becomes 0.
15. **[Phone1]**Execute **SLOT_PWR? ALL** to read the measurement result.
16. **[Phone2]**Execute **SLOT_PWR? ALL** to read the measurement result.
17. Combine segmentations at Step F1 and F2.
18. Confirm the difference in mean power between adjacent slots on each carrier shall be within the prescribed range given in 3GPP TS34.121 table 5.4.2A.5.1 for a TPC_cmd of +1 and step size of 1 dB. This applies when the original (reference) timeslot power and the target timeslot power are between the Min power threshold for test and the Max power threshold for test derived from the Measured Maximum output power in Step F. For the power step adjacent to the Min or Max power threshold for test, the lower step size requirement does not apply.
19. Confirm the change in mean power over 10 consecutive slots on each carrier shall be within the prescribed range for a TPC_cmd group of +1, and step size of 1 dB as given in 3GPP TS34.121 table 5.4.2A.5.2. This applies when the original (reference) timeslot power and the target timeslot power are between the Min power threshold for test and the Max power threshold for test derived from the Measured Maximum output power in Step F. The power step adjacent to the Min or Max power threshold for test should not be part of the 10 consecutive slots tested.

The interval of two SNGLS above should be less than 400ms.

[Step G 1]

1. **[Phone1]**Execute **ILP_TPC G** to set [TPC Method] to [Step G].
2. **[Phone1]**Execute **ILP_CMDSLOT G,20** to set [Length] of Test Step G to [20] Slot.
3. **[Phone1]**Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
4. **[Phone2]** Execute **HSSCCH OFF** to set [HSSCCH power] to [Off] for Secondary Serving Cell.
5. **[Phone1]**Execute **TPCSTEP 2** to set [TPC Step Size] to [2 dB].
6. **[Phone2]** Execute **HSSCCH ON** to set [HSSCCH power] to [On] for Secondary Serving Cell.
7. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
8. **[Phone1]**Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
9. **[Phone2]**Execute **ILP_TPC G** to set [TPC Method] to [Step G].
10. **[Phone2]**Execute **ILP_CMDSLOT G,20** to set [Length] of Test Step G to [20] Slot.
11. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
12. **[Phone2]**Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
13. **[Phone1]**Execute **SNGLS** to perform measurement.
14. **[Phone2]**Execute **SNGLS** to perform measurement.
15. **[Phone1]**Repeat **MSTAT?** until the response becomes 0.
16. **[Phone2]**Repeat **MSTAT?** until the response becomes 0.
17. **[Phone1]**Execute **SLOT_PWR? ALL** to read the measurement result.
18. **[Phone2]**Execute **SLOT_PWR? ALL** to read the measurement result.

The interval of two SNGLS above should be less than 400ms.

[Step G 2]

1. **[Phone1]**Execute **ILP_TPC G** to set [TPC Method] to [Step G].
2. **[Phone1]**Execute **ILP_CMDSLOT G,20** to set [Length] of Test Step G to [20] Slot.
3. **[Phone1]**Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
4. **[Phone1]**Execute **TPCSTEP 2** to set [TPC Step Size] to [2 dB].
5. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
6. **[Phone1]**Execute **ILVL -15.0** to set [Input Level] to [–15.0] dBm.
7. **[Phone2]**Execute **ILP_TPC G** to set [TPC Method] to [Step G].
8. **[Phone2]**Execute **ILP_CMDSLOT G,20** to set [Length] of Test Step G to [20] Slot.
9. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
10. **[Phone2]**Execute **ILVL -15.0** to set [Input Level] to [–15.0] dBm.
11. **[Phone1]**Execute **SNGLS** to perform measurement.
12. **[Phone2]**Execute **SNGLS** to perform measurement.
13. **[Phone1]**Repeat **MSTAT?** until the response becomes 0.
14. **[Phone2]**Repeat **MSTAT?** until the response becomes 0.
15. **[Phone1]**Execute **SLOT_PWR? ALL** to read the measurement result.
16. **[Phone2]**Execute **SLOT_PWR? ALL** to read the measurement result.
17. Combine segmentations at Step G1 and G2.
18. Confirm the difference in mean power between adjacent slots on each carrier shall be within the prescribed range given in 3GPP TS34.121 table 5.4.2A.5.1 for a TPC_cmd of −1 and step size of 2 dB. This applies when the original (reference) timeslot power and the target timeslot power are between the Min power threshold for test and the Max power threshold for test derived from the Measured Maximum output power in Step F. For the power step adjacent to the Min or Max power threshold for test, the lower step size requirement does not apply.
19. Confirm the change in mean power over 10 consecutive slots on each carrier shall be within the prescribed range for a TPC_cmd group of −1, and step size of 2 dB as given in 3GPP TS34.121 table 5.4.2A.5.2. This applies when the original (reference) timeslot power and the target timeslot power are between the Min power threshold for test and the Max power threshold for test derived from the Measured Maximum output power in Step F. The power step adjacent to the Min or Max power threshold for test should not be part of the 10 consecutive slots.

The interval of two SNGLS above should be less than 400ms.

[Step H 1]

1. **[Phone1]**Execute **ILP_TPC H** to set [TPC Method] to [Step H].
2. **[Phone1]**Execute **ILP_CMDSLOT H,20** to set [Length] of Test Step H to [20] Slot.
3. **[Phone1]**Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
4. **[Phone1]**Execute **TPCSTEP 2** to set [TPC Step Size] to [2 dB].
5. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
6. **[Phone1]**Execute **ILVL -10.0** to set [Input Level] to [–10.0] dBm.
7. **[Phone2]**Execute **ILP_TPC H** to set [TPC Method] to [Step H].
8. **[Phone2]**Execute **ILP_CMDSLOT H,20** to set [Length] of Test Step H to [20] Slot.
9. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
10. **[Phone2]**Execute **ILVL -10.0** to set [Input Level] to [–10.0] dBm.
11. **[Phone1]**Execute **SNGLS** to perform measurement.
12. **[Phone2]**Execute **SNGLS** to perform measurement.
13. **[Phone1]**Repeat **MSTAT?** until the response becomes 0.
14. **[Phone2]**Repeat **MSTAT?** until the response becomes 0.
15. **[Phone1]**Execute **SLOT_PWR? ALL** to read the measurement result.
16. **[Phone2]**Execute **SLOT_PWR? ALL** to read the measurement result.

The interval of two SNGLS above should be less than 400ms.

[Step H 2]

1. **[Phone1]**Execute **ILP_TPC H** to set [TPC Method] to [Step H].
2. **[Phone1]**Execute **ILP_CMDSLOT H,20** to set [Length] of Test Step H to [20] Slot.
3. **[Phone1]**Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
4. **[Phone1]**Execute **TPCSTEP 2** to set [TPC Step Size] to [2 dB].
5. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
6. **[Phone1]**Execute **ILVL 30.0** to set [Input Level] to [+30.0] dBm.
7. **[Phone2]**Execute **ILP_TPC H** to set [TPC Method] to [Step H].
8. **[Phone2]**Execute **ILP_CMDSLOT H,20** to set [Length] of Test Step H to [20] Slot.
9. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
10. **[Phone2]**Execute **ILVL 30.0** to set [Input Level] to [+30.0] dBm.
11. **[Phone1]**Execute **SNGLS** to perform measurement.
12. **[Phone2]**Execute **SNGLS** to perform measurement.
13. **[Phone1]**Repeat **MSTAT?** until the response becomes 0.
14. **[Phone2]**Repeat **MSTAT?** until the response becomes 0.
15. **[Phone1]**Execute **SLOT_PWR? ALL** to read the measurement result.
16. **[Phone2]**Execute **SLOT_PWR? ALL** to read the measurement result.
17. Combine segmentations at Step H1 and H2.
18. Confirm the difference in mean power between adjacent slots on each carrier shall be within the prescribed range given in 3GPP TS34.121 table 5.4.2A.5.1 for a TPC_cmd of +1 and step size of 2 dB. This applies when the original (reference) timeslot power and the target timeslot power are between the Min power threshold for test and the Max power threshold for test derived from the Measured Maximum output power in Step H. For the power step adjacent to the Min or Max power threshold for test, the lower step size requirement does not apply.
19. Confirm the change in mean power over 10 consecutive slots on each carrier shall be within the prescribed range for a TPC_cmd group of +1, and step size of 2 dB as given in 3GPP TS34.121 table 5.4.2A.5.2. This applies when the original (reference) timeslot power and the target timeslot power are between the Min power threshold for test and the Max power threshold for test derived from the Measured Maximum output power in Step H. The power step adjacent to the Min or Max power threshold for test should not be part of the 10 consecutive slots tested.

The interval of two SNGLS above should be less than 400ms.

20. Confirm the measurement results above with the following table.

3GPP TS 34.121 Table 5.4.2A.5.1: Transmitter power control range

TPC_cmd	Transmitter power control range (all units are in dB)					
	1 dB step size		2 dB step size		3 dB step size	
	Lower	Upper	Lower	Upper	Lower	Upper
+1	+0,4	+1,6	+0,85	+3,15	+1,3	+4,7
0	–0,6	+0,6	–0,6	+0,6	–0,6	+0,6
–1	–0,4	–1,6	–0,85	–3,15	–1,3	–4,7

3GPP TS 34.121 Table 5.4.2A.5.2: Transmitter aggregate power control tolerance

TPC_cmd group	Transmitter power control range after 10 equal TPC_cmd group (all units are in dB)				Transmitter power control range after 7 equal TPC_cmd groups (all units are in dB)	
	1 dB step size		2 dB step size		3 dB step size	
	Lower	Upper	Lower	Upper	Lower	Upper
+1	+7,7	+12,3	+15,7	+24,3	+15,7	+26,3
0	–1,1	+1,1	–1,1	+1,1	–1,1	+1,1
–1	–7,7	–12,3	–15,7	–24,3	–15,7	–26,3
0,0,0,0,+1	+5,7	+14,3	N/A	N/A	N/A	N/A
0,0,0,0,–1	–5,7	–14,3	N/A	N/A	N/A	N/A

1.16.17.3. How to Combine Segmentations at Step E, F, G, H of Inner Loop Power Control

Due to dynamic range limits, each Test Step E, F, G and H must be performed twice at different Input Levels. See the following explanations to combine the first and second Slot List.

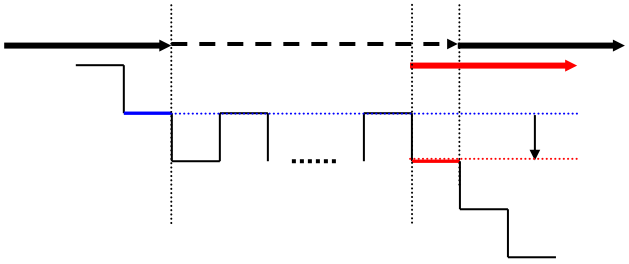
Before the first measurement, set [Power Control Bit Pattern] to [Alternate], so the [Power Control Bit Pattern] is [Alternate] also after the measurement.

Because the first and last bits are not fixed, there are four Alternate Patterns sent between combined segmentation {0,1, …,1,0},{0,1,…,0,1},{1,0,…,1,0},{1,0,…,0,1}.

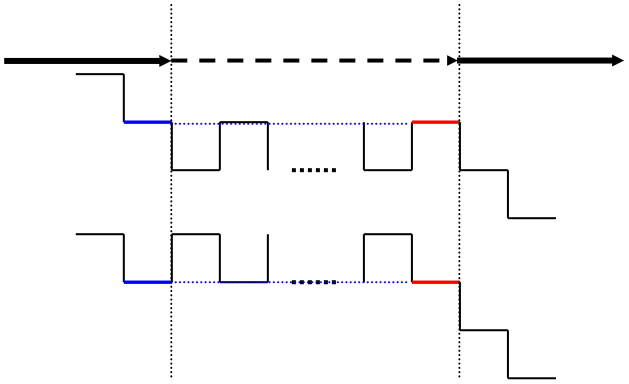
Combination must be performed by considering “the sum of Bit number 0 is larger than Bit number 1,” “the sum of Bit number 0 and 1 are equal,” “the sum of Bit number 0 is smaller than Bit number 1.”

An example of Test StepE is shown below.

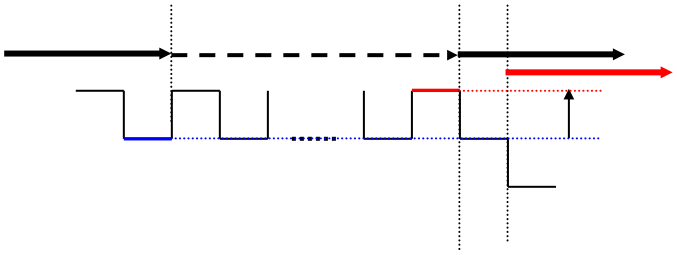
(1) When the sum of Bit number 0 is larger than Bit number 1 {0,1, …,1,0}
The head Slot No. of StepE2 becomes –1, because it starts with the level that is 1 dB lower than the last Slot of StepE1.



(2) When the sum of Bit number 0 and 1 are equal {0,1,…,0,1}, {1,0,…,1,0}
The head Slot No. of StepE2 becomes 0, because it starts with the same level as the last Slot of StepE1.



(3) When the sum of Bit number 0 is smaller than Bit number 1 {1,0,…,0,1}
The head Slot No of StepE2 becomes 1, because it starts with the level that is 1 dB higher than the last Slot of StepE1.



[Step E]

1. Execute [Step E 1] (see 5.4.2A Inner Loop Power Control in the Uplink for DC-HSUPA.)
2. Execute **REGSLOTLIST -1** to register Slot(-1) in slot list.
3. Execute **TRGDELAY -0.7MS** to set [Trigger Delay] to [–0.7] ms (1Slot length).
4. Execute [Step E 2]. (see 5.4.2A Inner Loop Power Control in the Uplink for DC-HSUPA.)
5. Check the Power difference between the first Slot of Step E 2 and the last Slot of Step E 1.
   - When the difference is <–0.5 dB, the head Slot of Step E 2 becomes –1.
   - When the difference is within ±0.5 dB, the head Slot of Step E 2 becomes 0.
   - When the difference is >0.5 dB, the head Slot of Step E 2 becomes 1.

[Step F]

1. Execute [Step F 1]. (see 5.4.2A Inner Loop Power Control in the Uplink for DC-HSUPA.)
2. Execute **REGSLOTLIST -1** to register Slot(-1) in slot list.
3. Execute **TRGDELAY -0.7MS** to set [Trigger Delay] to [–0.7] ms (1Slot length).
4. Execute [Step F 2]. (see 5.4.2A Inner Loop Power Control in the Uplink for DC-HSUPA.)
5. Check the Power difference between the first Slot of Step F 2 and the last Slot of Step F 1.
   - When the difference is <–0.5 dB, the head Slot of Step F 2 becomes 1.
   - When the difference is within ±0.5 dB, the head Slot of Step F 2 becomes 0.
   - When the difference is >0.5 dB, the head Slot of Step F 2 becomes –1.

[Step G]

1. Execute [Step G 1]. (see 5.4.2A Inner Loop Power Control in the Uplink for DC-HSUPA.)
2. Execute **REGSLOTLIST -1** to register Slot(-1) in slot list.
3. Execute **TRGDELAY -0.7MS** to set [Trigger Delay] to [–0.7] ms (1Slot length).
4. Execute [Step G 2]. (see 5.4.2A Inner Loop Power Control in the Uplink for DC-HSUPA.)
5. Check the Power difference between the first Slot of Step G 2 and the last Slot of Step G 1.
   - When the difference is <–1 dB, the head Slot of Step G 2 becomes –1.
   - When the difference is within ±1 dB, the head Slot of Step G 2 becomes 0.
   - When the difference is >1 dB, the head Slot of Step G 2 becomes 1.

[Step H]

1. Execute [Step H 1]. (see 5.4.2A Inner Loop Power Control in the Uplink for DC-HSUPA.)
2. Execute **REGSLOTLIST -1** to register Slot(-1) in slot list.
3. Execute **TRGDELAY -0.7MS** to set [Trigger Delay] to [–0.7] ms (1Slot length).
4. Execute [Step H 2]. (see 5.4.2A Inner Loop Power Control in the Uplink for DC-HSUPA.)
5. Check the Power difference between the first Slot of Step H 2 and the last Slot of Step H 1.
   - When the difference is <–1 dB, the head Slot of Step H 2 becomes 1.
   - When the difference is within ±1 dB, the head Slot of Step H 2 becomes 0.
   - When the difference is >1 dB, the head Slot of Step H 2 becomes –1.

1.16.18. 5.4.3A Minimum Output Power for DC-HSUPA

To connect with DC-HSUPA(QPSK), see 1.16.3 Connection with DC-HSUPA(QPSK).

1. **[Phone1]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. **[Phone1]**Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. **[Phone1]**Execute **TPCALGO 1** to set [TPC Algorithm] to [2].
4. **[Phone1]**Connect with DC-HSUPA(QPSK).
5. **[Phone1]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
6. **[Phone1]**Execute **OBW_MEAS OFF** to set [Occupied Bandwidth measurement] to [Off].
7. **[Phone1]**Execute **SMASK_MEAS OFF** to set [Spectrum Emission Mask measurement] to [Off].
8. **[Phone1]**Execute **ADJ_MEAS OFF** to set [Adjacent Channel Power measurement] to [Off].
9. **[Phone1]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
10. **[Phone1]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
11. **[Phone2]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
12. **[Phone2]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
13. **[Phone2]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
14. **[Phone2]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
15. **[Phone1]**Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
16. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
17. **[Phone2]**Execute **SCRSEL FMEAS** to display the Fundamental Measurement screen.
18. **[Phone2]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
19. **[Phone1]**Execute **ILVL -30.0** to set [Input Level] to [-30.0] dBm.
20. **[Phone2]**Execute **ILVL -30.0** to set [Input Level] to [-30.0] dBm.
21. **[Phone1]**Execute **TPCPAT ALL0** to set [Power Control Bit Pattern] to [All0].
22. **[Phone1]**Execute **SWP** to perform Power measurement.
23. **[Phone2]**Execute **TPCPAT ALL0** to set [Power Control Bit Pattern] to [All0].
24. **[Phone1]** Execute **AVG_POWER?** to read the power measurement result.
25. **[Phone1]**Execute **AVG_POWER_S?** to read the Power measurement result as Power2.
26. **[Phone1]** Confirm the measurement result is lower than -49 dBm.

To measure Power, OBW,SEM and ACLR measurement items should be turned off.

1.16.19. 5.8A Occupied Bandwidth (OBW) for DC-HSUPA

To connect with DC-HSUPA(QPSK), see 1.16.3 Connection with DC-HSUPA(QPSK).

1. **[Phone1]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. **[Phone1]**Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. **[Phone1]**Execute **TPCALGO 1** to set [TPC Algorithm] to [1].
4. **[Phone1]**Connect with DC-HSUPA(QPSK).
5. **[Phone1]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
6. **[Phone1]**Execute **ALLMEASITEMS_OFF** to set all measurement items to [Off].
7. **[Phone1]**Execute **OBW_MEAS ON** to set [Occupied Bandwidth measurement] to [On].
8. **[Phone1]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
9. **[Phone1]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
10. **[Phone2]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
11. **[Phone2]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
12. **[Phone2]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
13. **[Phone2]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
14. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
15. **[Phone1]**Execute **ILVL 10.0** to set [Input Level] to [+10.0] dBm.
16. **[Phone2]**Execute **ILVL 10.0** to set [Input Level] to [+10.0] dBm.
17. Wait 150ms until the UE power becomes 10.0 dBm.
18. **[Phone1]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
19. **[Phone2]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
20. **[Phone1]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
21. **[Phone2]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
22. **[Phone1]**Execute **SWP** to perform Occupied Bandwidth measurement.
23. **[Phone1]**Execute **OBW?** to read the Occupied Bandwidth measurement result.
24. **[Phone1]**Confirm the measurement result is lower than 10 MHz.

To measure OBW or SEM or ACLR, other measurement items should be turned off.

1.16.20. 5.9C Additional Spectrum Emission Mask for DC-HSUPA(QPSK)

1. **[Phone1]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. **[Phone1]**Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. **[Phone1]**Execute **TPCALGO 1** to set [TPC Algorithm] to [1].
4. **[Phone1]**Connect with DC-HSUPA(QPSK).
5. **[Phone1]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
6. **[Phone1]**Execute **ALLMEASITEMS_OFF** to set all measurement items to [Off].
7. **[Phone1]**Execute **SMASK_MEAS ON** to set [Spectrum Emission Mask measurement] to [On].
8. **[Phone1]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
9. **[Phone1]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
10. **[Phone2]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
11. **[Phone2]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
12. **[Phone2]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
13. **[Phone2]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
14. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
15. **[Phone1]**Execute **ILVL 10.0** to set [Input Level] to [+10.0] dBm.
16. **[Phone2]**Execute **ILVL 10.0** to set [Input Level] to [+10.0] dBm.
17. Wait 150ms until the UE power becomes 10.0 dBm.
18. **[Phone1]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
19. **[Phone2]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
20. **[Phone1]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
21. **[Phone2]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
22. Wait 150ms until the UE power reaches Maximum Power.
23. **[Phone1]**Execute **SWP** to perform Spectrum Emission Mask measurement.
24. **[Phone1]** Execute **SMASKPASS?** to read the Spectrum Emission Mask measurement result.
25. **[Phone1]**Confirm the measurement result is PASS.

To measure OBW or SEM or ACLR, other measurement items should be turned off.

1.16.21. 5.9D Additional Spectrum Emission Mask for DC-HSUPA(16QAM)

1. **[Phone1]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. **[Phone1]**Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. **[Phone1]**Execute **TPCALGO 1** to set [TPC Algorithm] to [1].
4. **[Phone1]**Connect with DC-HSUPA(16QAM).
5. **[Phone1]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
6. **[Phone1]**Execute **ALLMEASITEMS_OFF** to set all measurement items to [Off].
7. **[Phone1]**Execute **SMASK_MEAS ON** to set [Spectrum Emission Mask measurement] to [On].
8. **[Phone1]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
9. **[Phone1]**Execute **ABSGNTVAL 24** to set [Absolute Grant Value] to [6].
10. **[Phone2]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
11. **[Phone2]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
12. **[Phone2]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
13. **[Phone2]**Execute **ABSGNTVAL 24** to set [Absolute Grant Value] to [6].
14. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
15. **[Phone1]**Execute **ILVL 10.0** to set [Input Level] to [+10.0] dBm.
16. **[Phone2]**Execute **ILVL 10.0** to set [Input Level] to [+10.0] dBm.
17. Wait 150ms until the UE power becomes 10.0 dBm.
18. **[Phone1]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
19. **[Phone2]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
20. **[Phone1]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
21. **[Phone2]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
22. Wait 150ms until the UE power reaches Maximum Power.
23. **[Phone1]**Execute **SWP** to perform Spectrum Emission Mask measurement.
24. **[Phone1]** Execute **SMASKPASS?** to read the Spectrum Emission Mask measurement result.
25. **[Phone1]**Confirm the measurement result is PASS.

To measure OBW or SEM or ACLR, other measurement items should be turned off.

1.16.22. 5.10C Adjacent Channel Leakage Power Ratio (ACLR) with E-DCH for DC-HSUPA(QPSK)

1. **[Phone1]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. **[Phone1]**Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. **[Phone1]**Execute **TPCALGO 1** to set [TPC Algorithm] to [1].
4. **[Phone1]**Connect with DC-HSUPA(QPSK).
5. **[Phone1]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
6. **[Phone1]**Execute **ALLMEASITEMS_OFF** to set all measurement items to [Off].
7. **[Phone1]**Execute **ADJ_MEAS ON** to set [Adjacent Channel Power measurement] to [On].
8. **[Phone1]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
9. **[Phone1]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
10. **[Phone2]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
11. **[Phone2]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
12. **[Phone2]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
13. **[Phone2]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
14. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
15. **[Phone1]**Execute **ILVL 10.0** to set [Input Level] to [+10.0] dBm.
16. **[Phone2]**Execute **ILVL 10.0** to set [Input Level] to [+10.0] dBm.
17. Wait 150ms until the UE power becomes 10.0 dBm.
18. **[Phone1]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
19. **[Phone2]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
20. **[Phone1]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
21. **[Phone2]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
22. Wait 150ms until the UE power reaches Maximum Power.
23. **[Phone1]**Execute **SWP** to perform Adjacent Channel Power measurement.
24. **[Phone1]**Execute **AVG_MODPWR? LOW12.5** to read the Adjacent Channel Power measurement result.
25. **[Phone1]**Confirm the measurement result is lower than -35.2 dB.
26. **[Phone1]**Execute **AVG_MODPWR? LOW7.5** to read the Adjacent Channel Power measurement result.
27. **[Phone1]**Confirm the measurement result is lower than -32.2 dB.
28. **[Phone1]**Execute **AVG_MODPWR? UP7.5** to read the Adjacent Channel Power measurement result.
29. **[Phone1]**Confirm the measurement result is lower than -32.2 dB.
30. **[Phone1]**Execute **AVG_MODPWR? UP12.5** to read the Adjacent Channel Power measurement result.
31. **[Phone1]**Confirm the measurement result is lower than -35.2 dB.

To measure OBW or SEM or ACLR, other measurement items should be turned off.

1.16.23. 5.10D Adjacent Channel Leakage Power Ratio (ACLR) with E-DCH for DC-HSUPA(16QAM)

1. **[Phone1]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. **[Phone1]**Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. **[Phone1]**Execute **TPCALGO 1** to set [TPC Algorithm] to [1].
4. **[Phone1]**Connect with DC-HSUPA(16QAM).
5. **[Phone1]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
6. **[Phone1]**Execute **ALLMEASITEMS_OFF** to set all measurement items to [Off].
7. **[Phone1]**Execute **ADJ_MEAS ON** to set [Adjacent Channel Power measurement] to [On].
8. **[Phone1]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
9. **[Phone1]**Execute **ABSGNTVAL 24** to set [Absolute Grant Value] to [24].
10. **[Phone2]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
11. **[Phone2]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
12. **[Phone2]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
13. **[Phone2]**Execute **ABSGNTVAL 24** to set [Absolute Grant Value] to [24].
14. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
15. **[Phone1]**Execute **ILVL 10.0** to set [Input Level] to [+10.0] dBm.
16. **[Phone2]**Execute **ILVL 10.0** to set [Input Level] to [+10.0] dBm.
17. Wait 150ms until the UE power becomes 10.0 dBm.

18. **[Phone1]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
19. **[Phone2]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
20. **[Phone1]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
21. **[Phone2]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
22. Wait 150ms until the UE power reaches Maximum Power.
23. **[Phone1]**Execute **SWP** to perform Adjacent Channel Power measurement.
24. **[Phone1]**Execute **AVG_MODPWR? LOW12.5** to read the Adjacent Channel Power measurement result.
25. **[Phone1]**Confirm the measurement result is lower than -35.2 dB.
26. **[Phone1]**Execute **AVG_MODPWR? LOW7.5** to read the Adjacent Channel Power measurement result.
27. **[Phone1]**Confirm the measurement result is lower than -32.2 dB.
28. **[Phone1]**Execute **AVG_MODPWR? UP7.5** to read the Adjacent Channel Power measurement result.
29. **[Phone1]**Confirm the measurement result is lower than -32.2 dB.
30. **[Phone1]**Execute **AVG_MODPWR? UP12.5** to read the Adjacent Channel Power measurement result.
31. **[Phone1]**Confirm the measurement result is lower than -35.2 dB.

To measure OBW or SEM or ACLR, other measurement items should be turned off.

1.16.24. 5.13.2BA Relative Code Domain Error with HS-DPCCH and E-DCH for DC-HSUPA

To connect with DC-HSUPA(QPSK), see 1.16.3 Connection with DC-HSUPA(QPSK).

1. **[Phone1]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. **[Phone1]**Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. **[Phone1]**Execute **TPCALGO 2** to set [TPC Algorithm] to [2].
4. **[Phone1]**Connect with DC-HSUPA(QPSK).
5. **[Phone1]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
6. **[Phone1]**Execute **OBW_MEAS OFF** to set [Occupied Bandwidth measurement] to [Off].
7. **[Phone1]**Execute **SMASK_MEAS OFF** to set [Spectrum Emission Mask measurement] to [Off].
8. **[Phone1]**Execute **ADJ_MEAS OFF** to set [Adjacent Channel Power measurement] to [Off].
9. **[Phone1]**Execute **RCDE_MEAS ON** to set [RCDE measurement] to [On].
10. **[Phone1]**Execute **RCDE_AVG 20** to set [Average Count] of RCDE measurement to [20] times.
11. **[Phone1]**Execute **TPUTU_MEAS ON** to set [HSUPA Throughput] measurement to [On].
12. **[Phone1]**Execute **TPUTU_SAMPLE 15** to set [HSUPA Throughput - Number of Sample] to [15].
13. **[Phone1]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
14. **[Phone1]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
15. **[Phone2]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
16. **[Phone2]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
17. **[Phone2]**Execute **OBW_MEAS OFF** to set [Occupied Bandwidth measurement] to [Off].
18. **[Phone2]**Execute **SMASK_MEAS OFF** to set [Spectrum Emission Mask measurement] to [Off].
19. **[Phone2]**Execute **ADJ_MEAS OFF** to set [Adjacent Channel Power measurement] to [Off].
20. **[Phone2]**Execute **RCDE_MEAS ON** to set [RCDE measurement] to [On].
21. **[Phone2]**Execute **RCDE_AVG 20** to set [Average Count] of RCDE measurement to [20] times.
22. **[Phone2]**Execute **TPUTU_MEAS ON** to set [HSUPA Throughput] measurement to [On].
23. **[Phone2]**Execute **TPUTU_SAMPLE 15** to set [HSUPA Throughput - Number of Sample] to [15].
24. **[Phone2]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
25. **[Phone2]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
26. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
27. **[Phone2]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
28. **[Phone1]**Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
29. **[Phone2]**Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
30. Wait 150ms until the UE power becomes 15.0 dBm.
31. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
32. **[Phone1]**Execute **SWP** to perform HSUPA Throughput measurement and RCDE measurement.
33. **[Phone1]**Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 1.
34. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
35. **[Phone2]**Execute **SWP** to perform HSUPA Throughput measurement and RCDE measurement.
36. **[Phone2]**Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 1.
37. **[Phone1]**Execute **AVG_DPCCHECDP?** to read the ECDP - DPCCH measurement result.

38. **[Phone1]**Execute **AVG_HSDPCCHECDP?** to read the ECDP - HS-DPCCH measurement result.
39. **[Phone1]**Execute **AVG_EDPCCHECDP?** to read the ECDP - E-DPCCH measurement result.
40. **[Phone1]**Execute **AVG_EDPDCH1ECDP?** to read the ECDP - E-DPDCH1 measurement result.
41. **[Phone1]**Execute **AVG_DPCCHRCDE?** to read the Relative Code Domain Error - DPCCH measurement result.
42. **[Phone1]**Execute **AVG_HSDPCCHRCDE?** to read the Relative Code Domain Error - HS-DPCCH measurement result.
43. **[Phone1]**Execute **AVG_EDPCCHRCDE?** to read the Relative Code Domain Error - E-DPCCH measurement result.
44. **[Phone1]**Execute **AVG_EDPDCH1RCDE?** to read the Relative Code Domain Error - E-DPDCH1 measurement result.
45. **[Phone1]**Confirm the Relative Code Domain Error is as follows.
    Relative Code Domain Error ≤ –15.5 dB, when –21 dB < ECDP and
    Relative Code Domain Error ≤ –36.5 – ECDP, when –30 dB ≤ ECDP ≤ –21 dB.
46. **[Phone2]**Execute **AVG_DPCCHECDP?** to read the ECDP - DPCCH measurement result.
47. **[Phone2]**Execute **AVG_HSDPCCHECDP?** to read the ECDP - HS-DPCCH measurement result.
48. **[Phone2]**Execute **AVG_EDPCCHECDP?** to read the ECDP - E-DPCCH measurement result.
49. **[Phone2]**Execute **AVG_EDPDCH1ECDP?** to read the ECDP - E-DPDCH1 measurement result.
50. **[Phone2]**Execute **AVG_DPCCHRCDE?** to read the Relative Code Domain Error - DPCCH measurement result.
51. **[Phone2]**Execute **AVG_HSDPCCHRCDE?** to read the Relative Code Domain Error - HS-DPCCH measurement result.
52. **[Phone2]**Execute **AVG_EDPCCHRCDE?** to read the Relative Code Domain Error - E-DPCCH measurement result.
53. **[Phone2]**Execute **AVG_EDPDCH1RCDE?** to read the Relative Code Domain Error - E-DPDCH1 measurement result.
54. **[Phone2]**Confirm the Relative Code Domain Error is as follows.
    Relative Code Domain Error ≤ –15.5 dB, when –21 dB < ECDP and
    Relative Code Domain Error ≤ –36.5 – ECDP, when –30 dB ≤ ECDP ≤ –21 dB.
55. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
56. **[Phone2]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
57. **[Phone1]**Execute **ILVL -18.0** to set [Input Level] to [-18.0] dBm.
58. **[Phone2]**Execute **ILVL -18.0** to set [Input Level] to [-18.0] dBm.
59. Wait 150ms until the UE power becomes -18.0 dBm.
60. Repeat procedures 31to 54.

To measure Power/ HSUPA Throughput, OBW,SEM and ACLR measurement items should be turned off.

1.16.25. 5.13.2CA Relative Code Domain Error with HS-DPCCH and E-DCH with 16QAM for DC-HSUPA

1. **[Phone1]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. **[Phone1]**Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. **[Phone1]**Execute **TPCALGO 2** to set [TPC Algorithm] to [2].
4. **[Phone1]**Connect with DC-HSUPA(16QAM).
5. **[Phone1]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
6. **[Phone1]**Execute **OBW_MEAS OFF** to set [Occupied Bandwidth measurement] to [Off].
7. **[Phone1]**Execute **SMASK_MEAS OFF** to set [Spectrum Emission Mask measurement] to [Off].
8. **[Phone1]**Execute **ADJ_MEAS OFF** to set [Adjacent Channel Power measurement] to [Off].
9. **[Phone1]**Execute **RCDE_MEAS ON** to set [RCDE measurement] to [On].
10. **[Phone1]**Execute **RCDE_AVG 20** to set [Average Count] of RCDE measurement to [20] times.
11. **[Phone1]**Execute **TPUTU_MEAS ON** to set [HSUPA Throughput] measurement to [On].
12. **[Phone1]**Execute **TPUTU_SAMPLE 15** to set [HSUPA Throughput - Number of Sample] to [15].
13. **[Phone1]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
14. **[Phone1]**Execute **ABSGNTVAL 24** to set [Absolute Grant Value] to [24].
15. **[Phone2]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
16. **[Phone2]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
17. **[Phone2]**Execute **OBW_MEAS OFF** to set [Occupied Bandwidth measurement] to [Off].
18. **[Phone2]**Execute **SMASK_MEAS OFF** to set [Spectrum Emission Mask measurement] to [Off].
19. **[Phone2]**Execute **ADJ_MEAS OFF** to set [Adjacent Channel Power measurement] to [Off].

20. **[Phone2]**Execute **RCDE_MEAS ON** to set [RCDE measurement] to [On].
21. **[Phone2]**Execute **RCDE_AVG 20** to set [Average Count] of RCDE measurement to [20] times.
22. **[Phone2]**Execute **TPUTU_MEAS ON** to set [HSUPA Throughput] measurement to [On].
23. **[Phone2]**Execute **TPUTU_SAMPLE 15** to set [HSUPA Throughput - Number of Sample] to [15].
24. **[Phone2]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
25. **[Phone2]**Execute **ABSGNTVAL 24** to set [Absolute Grant Value] to [24].
26. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
27. **[Phone2]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
28. **[Phone1]**Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
29. **[Phone2]**Execute **ILVL 15.0** to set [Input Level] to [+15.0] dBm.
30. Wait 150ms until the UE power becomes 15.0 dBm.
31. **[Phone1]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
32. **[Phone1]**Execute **SWP** to perform HSUPA Throughput measurement and RCDE measurement.
33. **[Phone1]**Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 67.
34. **[Phone2]**Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
35. **[Phone2]**Execute **SWP** to perform HSUPA Throughput measurement and RCDE measurement.
36. **[Phone2]**Execute **AVG_ETFCI?** to read the E-TFCI measurement result, and confirm it is 67.
37. **[Phone1]**Execute **AVG_DPCCHECDP?** to read the ECDP - DPCCH measurement result.
38. **[Phone1]**Execute **AVG_HSDPCCHECDP?** to read the ECDP - HS-DPCCH measurement result.
39. **[Phone1]**Execute **AVG_EDPCCHECDP?** to read the ECDP - E-DPCCH measurement result.
40. **[Phone1]**Execute **AVG_EDPDCH1ECDP?** to read the ECDP - E-DPDCH1 measurement result.
41. **[Phone1]**Execute **AVG_DPCCHRCDE?** to read the Relative Code Domain Error - DPCCH measurement result.
42. **[Phone1]**Execute **AVG_HSDPCCHRCDE?** to read the Relative Code Domain Error - HS-DPCCH measurement result.
43. **[Phone1]**Execute **AVG_EDPCCHRCDE?** to read the Relative Code Domain Error - E-DPCCH measurement result.
44. **[Phone1]**Execute **AVG_EDPDCH1RCDE?** to read the Relative Code Domain Error - E-DPDCH1 measurement result.
45. **[Phone1]**Confirm the Relative Code Domain Error is as follows.
    Relative Code Domain Error ≤ –17.5 dB, when –25.5 dB < ECDP and
    Relative Code Domain Error ≤ –43.0 – ECDP, when –30 dB ≤ ECDP ≤ –25.5 dB.
46. **[Phone2]**Execute **AVG_DPCCHECDP?** to read the ECDP - DPCCH measurement result.
47. **[Phone2]**Execute **AVG_HSDPCCHECDP?** to read the ECDP - HS-DPCCH measurement result.
48. **[Phone2]**Execute **AVG_EDPCCHECDP?** to read the ECDP - E-DPCCH measurement result.
49. **[Phone2]**Execute **AVG_EDPDCH1ECDP?** to read the ECDP - E-DPDCH1 measurement result.
50. **[Phone2]**Execute **AVG_DPCCHRCDE?** to read the Relative Code Domain Error - DPCCH measurement result.
51. **[Phone2]**Execute **AVG_HSDPCCHRCDE?** to read the Relative Code Domain Error - HS-DPCCH measurement result.
52. **[Phone2]**Execute **AVG_EDPCCHRCDE?** to read the Relative Code Domain Error - E-DPCCH measurement result.
53. **[Phone2]**Execute **AVG_EDPDCH1RCDE?** to read the Relative Code Domain Error - E-DPDCH1 measurement result.

54. **[Phone2]**Confirm the Relative Code Domain Error is as follows.
    Relative Code Domain Error ≤ –17.5 dB, when –25.5 dB < ECDP and
    Relative Code Domain Error ≤ –43.0 – ECDP, when –30 dB ≤ ECDP ≤ –25.5 dB.
55. **[Phone1]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
56. **[Phone2]**Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
57. **[Phone1]**Execute **ILVL -18.0** to set [Input Level] to [-18.0] dBm.
58. **[Phone2]**Execute **ILVL -18.0** to set [Input Level] to [-18.0] dBm.
59. Wait 150ms until the UE power becomes -18.0 dBm.
60. Repeat procedures 31to 54.

To measure Power/ HSUPA Throughput, OBW,SEM and ACLR measurement items should be turned off.

3GPP TS 34.121 Table 5.13.2C.7: Nominal ECDP ratios

Sub-Test in Table C.11.1.4	Code	Nominal Code Domain Power	Spreading Factor	Nominal ECDP
1	DPCCH	-13.4	256	-13.4
	HS-DPCCH	-7.4	256	-7.4
	E-DPCCH	-7.4	256	-7.4
	E-DPDCH1	-7.4	2	-28.5
	E-DPDCH2	-7.4	2	-28.5
	E-DPDCH3	-9.4	4	-27.5
	E-DPDCH4	-9.4	4	-27.5

3GPP TS34.121 Table 5.13.2C.8: Relative Code Domain Error test requirement, codes not using 16QAM

ECDP dB	Average Relative Code Domain Error dB
-22 < ECDP	≤ -17.5
-30 ≤ ECDP ≤ -22	≤ -39.5 - ECDP
ECDP < -30	No requirement

3GPP TS34.121 Table 5.13.2C.9: Relative Code Domain Error test requirement, with 16QAM used

ECDP dB	Average Relative Code Domain Error dB
-25.5 < ECDP	≤ -17.5
-30 ≤ ECDP ≤ -25.5	≤ -43.0 - ECDP
ECDP < -30	No requirement

1.16.26. 5.13.5 In-band emission for DC-HSUPA

To connect with DC-HSUPA(QPSK), see 1.16.2 Connection with DC-HSUPA(QPSK).

[Sub-test 1]

1. **[Phone1]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. **[Phone1]**Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. **[Phone1]**Execute **TPCALGO 1** to set [TPC Algorithm] to [1].
4. **[Phone1]**Connect with DC-HSUPA(QPSK).
5. **[Phone1]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
6. **[Phone1]**Execute **OBW_MEAS OFF** to set [Occupied Bandwidth measurement] to [Off].
7. **[Phone1]**Execute **SMASK_MEAS OFF** to set [Spectrum Emission Mask measurement] to [Off].
8. **[Phone1]**Execute **ADJ_MEAS OFF** to set [Adjacent Channel Power measurement] to [Off].
9. **[Phone1]**Execute **PWR_MEAS ON** to set [Power measurement] to [On].
10. **[Phone1]**Execute **PWR_AVG 20** to set [Average Count] of Power measurement to [20] times.
11. **[Phone1]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
12. **[Phone1]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
13. **[Phone2]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
14. **[Phone2]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
15. **[Phone2]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
16. **[Phone2]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
17. **[Phone1]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
18. **[Phone2]**Execute **ILVL -30.0** to set [Input Level] to [-30.0] dBm.
19. **[Phone1]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
20. **[Phone2]**Execute **TPCPAT ALL0** to set [Power Control Bit Pattern] to [All0].
21. Wait 150ms until each uplink power reaches Maximum Power and Minimum Power.
22. **[Phone1]**Execute **SWP** to perform Power measurement.
23. **[Phone1]**Execute **AVG_FILTPWR?** to read the Power measurement result as Power1.
24. **[Phone1]**Execute **AVG_FILTPWR_S?** to read the Power measurement result as Power2.
    Confirm the measurement result (above Power2-Power1) is lower than -23.2 dB.

[Sub-test 2]

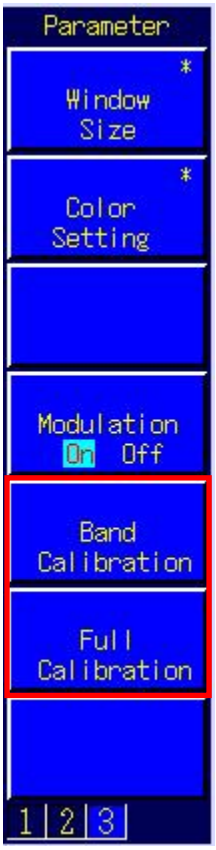
1. **[Phone1]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
2. **[Phone1]**Execute **MAXULPWR 21** to set [Maximum Allowed UL TX Power] to [21.0] dBm.
3. **[Phone1]**Execute **TPCALGO 1** to set [TPC Algorithm] to [1].
4. **[Phone1]**Connect with DC-HSUPA(QPSK).
5. **[Phone1]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
6. **[Phone1]**Execute **OBW_MEAS OFF** to set [Occupied Bandwidth measurement] to [Off].
7. **[Phone1]**Execute **SMASK_MEAS OFF** to set [Spectrum Emission Mask measurement] to [Off].
8. **[Phone1]**Execute **ADJ_MEAS OFF** to set [Adjacent Channel Power measurement] to [Off].
9. **[Phone1]**Execute **PWR_MEAS ON** to set [Power measurement] to [On].
10. **[Phone1]**Execute **PWR_AVG 20** to set [Average Count] of Power measurement to [20] times.
11. **[Phone1]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
12. **[Phone1]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
13. **[Phone2]**Execute **DDPCHTOFS 6** to set [DPCH Timing Offset] to [6].
14. **[Phone2]**Execute **OLVL -86.0** to set [Output Level] to [-86.0dBm].
15. **[Phone2]**Execute **EHICHPAT ACK** to set [E-HICH Pattern] to [ACK].
16. **[Phone2]**Execute **ABSGNTVAL 6** to set [Absolute Grant Value] to [6].
17. **[Phone1]**Execute **ILVL -30.0** to set [Input Level] to [-30.0] dBm.
18. **[Phone2]**Execute **ILVL 35.0** to set [Input Level] to [+35.0] dBm.
19. **[Phone1]**Execute **TPCPAT ALL0** to set [Power Control Bit Pattern] to [All0].
20. **[Phone2]**Execute **TPCPAT ALL1** to set [Power Control Bit Pattern] to [All1].
21. Wait 150 ms until each uplink power reaches Maximum Power and Minimum Power.
22. **[Phone1]**Execute **SWP** to perform Power measurement.
23. **[Phone1]**Execute **AVG_FILTPWR_S?** to read the Power measurement result as Power1.
24. **[Phone1]**Execute **AVG_FILTPWR?** to read the Power measurement result as Power2.
    Confirm the measurement result (above Power2-Power1) is lower than -23.2 dB.

To measure Power, OBW,SEM and ACLR measurement items should be turned off.

1.17. Others

1.17.1. Calibration

By using this function, level accuracy frequency between input level and output level can be set flat, and the level gap caused by internal temperature change can be calibrated.
A single equipment supports both Band Calibration (**BANDCAL**) and Full Calibration (**FULLCAL**).
Band Calibration is performed at W-CDMA band (UL: 824~849 MHz, 1710~1910 MHz, 1920~1980 MHz, DL: 869~894 MHz, 1805~1990 MHz, 2110~2170 MHz).
Full Calibration is performed at the input/output band of the equipment (30~2700 MHz).
Although Full Calibration includes the contents of the Band Calibration, it takes time. Full Calibration should be executed when the seasonal temperature changes greatly or software version is upgraded. In this case, aging must be executed for about 1 hour before calibration.
Band Calibration should be executed so that calibration is performed without temperature change.

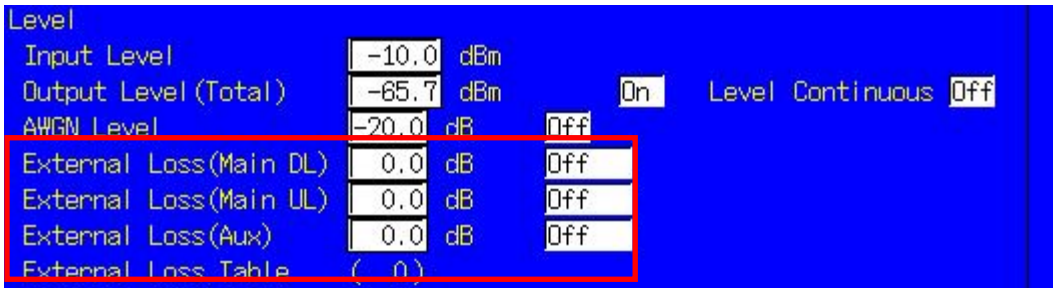


1.17.2. Dynamic Range

The equipment guarantees the measurement performance (linearity) from Input Level to –40 dB.
To prevent input of excess levels (over +10 dB from Input Level), Input Level must be set according to each measurement so the measured power value is +5 to -40 dB from Input Level.

1.17.3. External Loss

The equipment supports setting of External Loss (such as cable loss) as offset values.
External Loss is set at Main DL, Main UL and Aux.



An example of how to set Main DL Loss to 3.0 dB and Main UL Loss to 5.0 dB is shown below.

1. Execute **DLEXTLOSSSW ON** to set [External Loss(Main DL)] to [On].
2. Execute **ULEXTLOSSW ON** to set [External Loss(Main UL)] to [On].
3. Execute **DLEXTLOSS 3.0** to set [External Loss(Main DL)] to [3.0] dB.
4. Execute **ULEXTLOSS 5.0** to set [External Loss(Main UL)] to [5.0] dB.

Although the above commands can set only one loss value for all frequencies, up to 100 loss values can be set by using the GPIB and by setting an External Loss Table, which supports both W-CDMA and GSM. In this case, a frequency without a loss value is the table is compensated with next loss value.

An example of how to set a 3.0 dB loss value for the 2140 MHz frequency, and a 5.0 dB loss value for the 1950 MHz frequency is shown below.

1. Execute **DLEXTLOSSW COMMON** to use the Main DL External Loss common table.
2. Execute **ULEXTLOSSW COMMON** to use the Main UL External Loss common table.
3. Execute **LOSSTBLVAL 1950MHz, 0.0, 5.0, 0.0** to set the 1950 MHz Main UL Loss value to 5.0 dB.
4. Execute **LOSSTBLVAL 2140MHz, 3.0, 0.0, 0.0** to set the 2140 MHz Main DL Loss value to 3.0 dB.

The number of frequency points specified in the table is displayed either in the on-screen External Loss Table, or can be read by executing **LOSSTBLSAMPLE?.**
All loss values can be deleted by executing **DELLOSSTBL.**

*The operation when setting External Loss differs according to the version.
Sometimes, the I/O level may be changed unexpectedly when setting parameters at tracking operation.
After setting the measurement conditions (external loss, frequency, etc.), always set the I/O level before starting measurement (W/G, TDS only)
The specifications have been changed for version V20.00 and later so the I/O level does not change when changing the external loss and frequency settings.

1.17.4. Synchronization of Control PC and the equipment

Sometimes, when sending continuous GPIB commands from the PC controller to the equipment, commands are buffered and time is required to execute them. In this case, the command process can be checked at the equipment by executing a query (such as **ESR?**).

Using the example of RSSI measurement at calibration, the RSSI value is read at the UE after changing the equipment Output Level. In this case, the equipment control and measurement value reading must be synchronized as follows.

1. Set channel etc.
2. Execute **OLVL -90.0** to set [Output Level] to [–90.0] dBm.
3. Execute **ESR?** and wait the response.
4. Wait until RSSI measurement ends.
5. Obtain the RSSI value from the UE.

When controlling Phone 1 and Phone 2 simultaneously using Parallelphone, the processing of one phone might be kept waiting by processing for the other phone. Therefore, a query should be sent after sending commands and then waiting for a response.

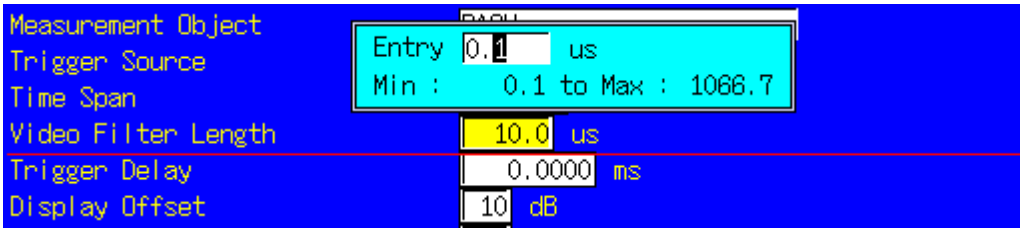
1.17.5. Speeding-up Control Software

1. Screen Off

The easiest way to speed up the control software is to turn off the equipment screen. The screen can be turned off by executing **SCREEN OFF**.

2. Setting Video Filter Length

When measuring at the Time Domain Measurement screen, the control software can be speeded up by setting the Video Filter Length to the minimum value (0.1 µs (**VFILTLEN 0.1US**)). The Video Filter Length setting only affects waveforms, not the Slot list measurement result.



3. Band Calibration based on change of internal temperature

The equipment evaluates whether to perform Band Calibration by checking the internal temperature.
Band calibration is performed when the internal temperature change exceeds the specified temperature.

When executing **BANDCAL_TEMP 2.0**, band calibration is performed when the internal temperature changes more than 2.0°C compared to the previous temperature.
In addition, band calibration is always performed when the equipment is first turned on.

2. GSM Measurement Software

2.1. Specification

2.1.1. MT8820B/20C software specification

Table 2.1.1-1 Specifications for MX882001C GSM Measurement Software

Item	Specifications	
Electrical characteristics	Typical values (typ.) are only for reference and are not guaranteed.	
Frequency/ Modulation measurement	Frequency	300 to 2700 MHz
	Input level	–30 to +40 dBm (Average power in bursts, Main connector)
	Carrier frequency accuracy	±(Set frequency × Reference oscillator accuracy + 10 Hz), (when measuring Normal Burst) ±(Set frequency × Reference oscillator accuracy + 20 Hz), (when measuring RACH)
	Residual phase error	≤0.5° (rms), 2° (peak)
	Measurement object	Normal Burst, RACH
Amplitude measurement	Frequency	300 to 2700 MHz
	Input level	–30 to +40 dBm (Average power in bursts, Main connector)
	Measurement accuracy	MT8820B/15B ±0.5 dB (–20 to +40 dBm), ±0.7 dB (–30 to –20 dBm), after calibration MT8820C ±0.5 dB (–20 to +40 dBm), typ. ±0.3 dB (–20 to +40 dBm), ±0.7 dB (–30 to –20 dBm) after calibration, 10 to 40°C
	Linearity	±0.2 dB (–40 to 0 dB, ≥–30 dBm)
	Measurement range of power when Carrier off	≥65 dB (≥–10 dBm), ≥45 dB (≥–30 to –10 dBm)
	Burst wave view	Rise, Fall, Slot, On-interval
	Measurement object	Normal Burst, RACH

Table 2.1.1-1 Specifications for MX882001C GSM Measurement Software (Cont'd)

Item	Specifications	
Output Spectrum measurement (Output RF Spectrum)	Frequency	300 to 2700 MHz
	Input level	–10 to +40 dBm (Average power in bursts, Main connector)
	Measurement point	±100 kHz, ±200 kHz, ±250 kHz, ±400 kHz, ±600 kHz, ±800 kHz, ±1000 kHz, ±1200 kHz, ±1400 kHz, ±1600 kHz, ±1800 kHz, ±2000 kHz
	Measurement range of modulation	Averaged over 10 measurements ≤–55 dB (≤250 kHz offset) ≤–66 dB (≥400 kHz offset)
	Measurement range of transient	≤–57 dB (≥400 kHz offset)
	Measurement object	Normal Burst
RF signal generator	Output frequency	300 to 2700 MHz, 1 Hz steps
	Output pattern	CCH, TCH, CCH+TCH
	Channel coding	FS, EFS, HS0, HS1, AFS, AHS0, AHS1, CS-1, CS-2, CS-3, CS-4
	TCH data	PN9, PN15, All0, All1 Fixed Pattern (PAT0 to PAT9)
	USF	0 to 7(GPRS)
Error rate measurement	Function	Measures error rate of frame, bit, and CRC
	Measurement object	• Loopback data on uplink TCH • Serial data input from the Call Proc. I/O connector on the rear panel • Number of received blocks by terminal on uplink TCH via GPRS • Number of received USF blocks by terminal via GPRS
Call processing	Call control	Location registration, call origination, call termination, network-side termination, UE-side termination connection, termination, and data transfer via GPRS
	UE control	Output level, time slot, timing advance, loopback on/off, GPRS test mode
	Channel coding	FS, EFS, HS0, HS1, AFS, AHS0, AHS1, CS-1, CS-2, CS-3, CS-4
	Frequency band	GSM450, GSM480, GSM850, P-GSM, E-GSM, R-GSM, GSM710, T-GSM810, GSM750, DCS1800, PCS1900

Table 2.1.1-2 Specifications for MX882001C-001 GSM Voice Codec

Item	Specifications	
Function	End-to-end communications test between a handset connected to the MT8820C and UE. Encode the voice from Audio Input, Output the decoded voice to AF Output. Encode the tone signal and Output the tone signal to AF Output. Measure the voice signal from AF Input and decoded voice signal.	
Voice codec	GSM_EFR, GSM_AMR	
Codec level control	Encoder input gain	–3.00 to +3.00 dB, 0.01 dB steps
	Handset microphone volume	0, 1, 2, 3, 4, 5
	Handset speaker volume	0, 1, 2, 3, 4, 5
AF output	Frequency range	30 Hz to 10 kHz, Resolution 1 Hz
	Accuracy	±(Set frequency × Reference oscillator accuracy + 0.1 Hz)
	Level setting range	0 to 5 V peak (AF Output connector)
	Setting resolution	1 mV (≤5 V peak), 100 μV (≤500 mV peak), 10 μV (≤50 mV peak)
	Accuracy	±0.2 dB (≥10 mV peak, ≥50 Hz), ±0.3 dB (≥10 mV peak, <50 Hz)
	Waveform distortion	≤–60 dB (≥500 mV peak, ≤5 kHz), ≤–54 dB (≥70 mV peak)
	Output impedance	≤1 Ω
	Max. output current	100 mA
AF input	Frequency range	50 Hz to 10 kHz
	Input level range	1 mV peak to 5 V peak (AF Input connector)
	Maximum input level	30 V rms
	Input impedance	100 kΩ
	Frequency measurement accuracy	± (Reference oscillator accuracy + 0.5 Hz)
	Level measurement accuracy	±0.2 dB (≥10 mV peak), ±0.4 dB (≥1 mV peak, ≥1 kHz)
	SINAD measurement	Frequency at 1 kHz ≥60 dB (≥1000 mV peak), ≥54 dB (>50 mV peak), ≥46 dB (≥10 mV peak)
	Distortion measurement	Frequency at 1 kHz ≤–60 dB (≥1000 mV peak), ≤–54 dB (>50 mV peak), ≤–46 dB (≥10 mV peak)

Table 2.1.1-3 Specifications for MX882001C-002 GSM External Packet Data

Item	Specifications
Function	Transferring the packet data between UE and a server connecting to Ethernet port (10BT) on the MT8820C.
Channel coding	CS-1, CS-2, CS-3, CS-4

Table 2.1.1-4 Specifications for MX882001C-005 GSM A-GPS

Item	Specifications
Function	A-GPS tests defined in the 3GPP specifications

Table 2.1.1-5 Specifications for MX882001C-011 EGPRS Measurement Software

Item	Specifications
Function	This can be used to measure the performance (Tx, Rx) of UE for EGPRS.
Electrical characteristics	Typical values (typ.) are only for reference and are not guaranteed.
Frequency/Modulation measurement	Frequency Same as MX882001C Input level Same as MX882001C Carrier frequency accuracy Same as MX882001C Residual phase error Same as MX882001C Residual EVM (8PSK) ≤1.5% (rms) Measurement object Normal Burst (GMSK, 8PSK), RACH
Amplitude measurement	Frequency Same as MX882001C Input level Same as MX882001C Measurement accuracy Same as MX882001C Linearity Same as MX882001C Measurement range of power when Carrier off Same as MX882001C Burst wave view Same as MX882001C Measurement object Normal Burst (GMSK, 8PSK), RACH
Output Spectrum measurement (Output RF Spectrum)	Frequency Same as MX882001C Input level Same as MX882001C Measurement point Same as MX882001C Measurement range of modulation Same as MX882001C Measurement range of transient Same as MX882001C Measurement object Normal Burst (GMSK, 8PSK)

Table 2.1.1-5 Specifications for MX882001C-011 EGPRS Measurement Software (Cont'd)

Item	Specifications	
RF signal generator	Output frequency	Same as MX882001C
	Phase error (GMSK)	Same as MX882001C
	Modulation accuracy (8PSK)	≤3% (rms)
	Output pattern	CCH, TCH, CCH+TCH
	Coding scheme	MCS-1, MCS-2, MCS-3, MCS-4, MCS-5, MCS-6, MCS-7, MCS-8, MCS-9
	Puncturing scheme	P1, P2, P3
	TCH data	PN9, PN15, All0, All1 Fixed pattern (PAT0 to PAT9)
Error rate measurement	Function	Measures bit error rate.
	Measurement object	• Loopback data on uplink TCH(GMSK, 8PSK) • Number of received blocks by terminal on uplink TCH via EGPRS • Number of received USF blocks by terminal via EGPRS
Call processing	Call control	Location registration, connection, termination, and data transfer via EGPRS
	UE control	Output level, time slot, timing advance, EGPRS test mode
	Coding scheme	MCS-1, MCS-2, MCS-3, MCS-4, MCS-5, MCS-6, MCS-7, MCS-8, MCS-9
	Puncturing scheme	P1, P2, P3

2.1.2. MT8821C software specification

Table 2.1.2-1 Specifications for MX882101C GSM Measurement Software

Item	Specifications	
Electrical characteristics	Typical values (typ.) are only for reference and are not guaranteed.	
Frequency/Modulation measurement	Frequency	350 to 2700 MHz For the frequencies below 500 MHz, only the following range meets the specifications: 380.2 to 389.8 MHz (Band T-GSM380) 410.2 to 419.8 MHz (Band T-GSM410) 450.4 to 457.6 MHz (Band GSM450) 478.8 to 486 MHz (Band GSM480)
	Input level	–30 to +40 dBm (Average power in bursts, Main connector)
	Carrier frequency accuracy	±(Set frequency × Reference oscillator accuracy + 10 Hz), (when measuring Normal Burst) ±(Set frequency × Reference oscillator accuracy + 20 Hz), (when measuring RACH)
	Residual phase error	≤0.5° (rms), 2° (peak)
	Measurement object	Normal Burst, RACH
Amplitude measurement	Frequency	350 to 2700 MHz For the frequencies below 500 MHz, only the following range meets the specifications: 380.2 to 389.8 MHz (Band T-GSM380) 410.2 to 419.8 MHz (Band T-GSM410) 450.4 to 457.6 MHz (Band GSM450) 478.8 to 486 MHz (Band GSM480)
	Input level	–30 to +40 dBm (Average power in bursts, Main connector)
	Measurement accuracy	±0.5 dB (–30 to +40 dBm), typ. ±0.3 dB (–30 to +40 dBm) after calibration, 10 to 40°C
	Linearity	±0.2 dB (–40 to 0 dB, ≥–30 dBm)
	Measurement range of power when Carrier off	≥65 dB (≥–10 dBm), ≥45 dB (≥–30 to –10 dBm)
	Burst wave view	Rise, Fall, Slot, On-interval
	Measurement object	Normal Burst, RACH

Table 2.1.2-1 Specifications for MX882101C GSM Measurement Software (Cont'd)

Item	Specifications	
Output Spectrum measurement (Output RF Spectrum)	Frequency	350 to 2700 MHz For the frequencies below 500 MHz, only the following range meets the specifications: 380.2 to 389.8 MHz (Band T-GSM380) 410.2 to 419.8 MHz (Band T-GSM410) 450.4 to 457.6 MHz (Band GSM450) 478.8 to 486 MHz (Band GSM480)
	Input level	–10 to +40 dBm (Average power in bursts, Main connector)
	Measurement point	±100 kHz, ±200 kHz, ±250 kHz, ±400 kHz, ±600 kHz, ±800 kHz, ±1000 kHz, ±1200 kHz, ±1400 kHz, ±1600 kHz, ±1800 kHz, ±2000 kHz
	Measurement range of modulation	Averaged over 10 measurements ≤–55 dB (≤250 kHz offset) ≤–66 dB (≥400 kHz offset)
	Measurement range of transient	≤–57 dB (≥400 kHz offset)
	Measurement object	Normal Burst
RF signal generator	Output frequency	350 to 2700 MHz, 1 Hz steps
	Output pattern	CCH, TCH, CCH+TCH
	Channel coding	FS, EFS, HS0, HS1, AFS, AHS0, AHS1, CS-1, CS-2, CS-3, CS-4
	TCH data	PN9, PN15, All0, All1 Fixed Pattern (PAT0 to PAT9)
	USF	0 to 7 (GPRS)
Error rate measurement	Function	Measures error rate of frame, bit, and CRC
	Measurement object	• Loopback data on uplink TCH • Serial data input from the Call Proc. I/O connector on the rear panel • Number of received blocks by terminal on uplink TCH via GPRS • Number of received USF blocks by terminal via GPRS
Call processing	Call control	Location registration, call origination, call termination, network-side termination, UE-side termination connection, termination, and data transfer via GPRS
	UE control	Output level, time slot, timing advance, loopback on/off, GPRS test mode
	Channel coding	FS, EFS, HS0, HS1, AFS, AHS, CS-1, CS-2, CS-3, CS-4
	Frequency band	GSM450, GSM480, GSM850, P-GSM, E-GSM, R-GSM, GSM710, T-GSM810, GSM750, DCS1800, PCS1900

Table 2.1.2-2 Specifications for MX882101C-001 GSM Voice Codec

Item	Specifications	
Function	End-to-end communications test between a handset connected to the MT8821C and UE. Encode the voice from Audio Input, Output the decoded voice to AF Output. Encode the tone signal and Output the tone signal to AF Output. Measure the voice signal from AF Input and decoded voice signal.	
Voice codec	GSM_EFR, GSM_AMR	
Codec level control	Encoder input gain	–3.00 to +3.00 dB, 0.01 dB steps
	Handset microphone volume	0, 1, 2, 3, 4, 5
	Handset speaker volume	0, 1, 2, 3, 4, 5
AF output	Frequency range	30 Hz to 10 kHz, Resolution 1 Hz
	Accuracy	±(Setting Frequency × Reference oscillator accuracy + 0.1 Hz)
	Level setting range	0 to 5 V peak (AF Output connector)
	Setting resolution	1 mV (≤5 V peak), 100 μV (≤500 mV peak), 10 μV (≤50 mV peak)
	Accuracy	±0.2 dB (≥10 mV peak, ≥50 Hz), ±0.3 dB (≥10 mV peak, <50 Hz)
	Waveform distortion	≤–60 dB (≥500 mV peak, ≤5 kHz), ≤–54 dB (≥70 mV peak)
	Output impedance	≤1 Ω
	Max. output current	100 mA
AF input	Frequency range	50 Hz to 10 kHz
	Input level range	1 mV peak to 5 V peak (AF Input connector)
	Maximum input level	30 V rms
	Input impedance	100 kΩ
	Frequency measurement accuracy	± (Reference oscillator accuracy + 0.5 Hz)
	Level measurement accuracy	±0.2 dB (≥10 mV peak), ±0.4 dB (≥1 mV peak, ≥1 kHz)
	SINAD measurement	Frequency at 1 kHz ≥60 dB (≥1000 mV peak), ≥54 dB (>50 mV peak), ≥46 dB (≥10 mV peak)
	Distortion measurement	Frequency at 1 kHz ≤–60 dB (≥1000 mV peak), ≤–54 dB (>50 mV peak), ≤–46 dB (≥10 mV peak)

Table 2.1.2-3 Specifications for MX882101C-002 GSM External Packet Data

Item	Specifications
Function	Transferring the packet data between UE and a server connecting to Ethernet port (10BT) on the MT8821C.
Channel coding	CS-1, CS-2, CS-3, CS-4

Table 2.1.2-4 Specifications for MX882101C-005 GSM A-GPS

Item	Specifications
Function	A-GPS tests defined in the 3GPP specifications

Table 2.1.2-5 Specifications for MX882101C-011 EGPRS Measurement Software

Item	Specifications	
Function	This can be used to measure the performance (Tx, Rx) of UE for EGPRS.	
Electrical characteristics	Typical values (typ.) are only for reference and are not guaranteed.	
Frequency/Modulation measurement	Frequency	Same as MX882101C
	Input level	Same as MX882101C
	Carrier frequency accuracy	Same as MX882101C
	Residual phase error	Same as MX882101C
	Residual EVM (8PSK)	≤1.5% (rms)
	Measurement object	Normal Burst (GMSK, 8PSK), RACH
Amplitude measurement	Frequency	Same as MX882101C
	Input level	Same as MX882101C
	Measurement accuracy	Same as MX882101C
	Linearity	Same as MX882101C
	Measurement range of power when Carrier off	Same as MX882101C
	Burst wave view	Same as MX882101C
	Measurement object	Normal Burst (GMSK, 8PSK), RACH
Output Spectrum measurement (Output RF Spectrum)	Frequency	Same as MX882101C
	Input level	Same as MX882101C
	Measurement point	Same as MX882101C
	Measurement range of modulation	Same as MX882101C
	Measurement range of transient	Same as MX882101C
	Measurement object	Normal Burst (GMSK, 8PSK)

Table 2.1.2-5 Specifications for MX882101C-011 EGPRS Measurement Software (Cont'd)

Item	Specifications	
RF signal generator	Output frequency	Same as MX882101C
	Phase error (GMSK)	Same as MX882101C
	Modulation accuracy (8PSK)	≤3% (rms)
	Output pattern	CCH, TCH, CCH+TCH
	Coding scheme	MCS-1, MCS-2, MCS-3, MCS-4, MCS-5, MCS-6, MCS-7, MCS-8, MCS-9
	Puncturing scheme	P1, P2, P3
	TCH data	PN9, PN15, All0, All1 Fixed pattern (PAT0 to PAT9)
Error rate measurement	Function	Measures bit error rate.
	Measurement object	• Loopback data on uplink TCH(GMSK, 8PSK) • Number of received blocks by terminal on uplink TCH via EGPRS • Number of received USF blocks by terminal via EGPRS
Call processing	Call control	Location registration, connection, termination, and data transfer via EGPRS
	UE control	Output level, time slot, timing advance, EGPRS test mode
	Coding scheme	MCS-1, MCS-2, MCS-3, MCS-4, MCS-5, MCS-6, MCS-7, MCS-8, MCS-9
	Puncturing scheme	P1, P2, P3
	Frequency band	GSM450, GSM480, GSM850, P-GSM, E-GSM, R-GSM, GSM710, T-GSM810, GSM750, DCS1800, PCS1900

2.2. 3GPP Measurement Specification Table

	Item	Comment	
12	**Transceiver**		
12.1	Conducted spurious emissions	Requires SPA	√
12.2	Radiated spurious emissions	Requires SPA	√
12.3	Conducted spurious emissions for MS supporting R-GSM frequency band	Requires SPA	√
12.4	Radiated spurious emissions for MS supporting R-GSM frequency band	Requires SPA	√
13	**Transmitter**		
13.1	Frequency error and phase error		√√
13.2	Frequency error under multipath and interference conditions	Requires Fading Simulator	√
13.3	Transmitter output power and burst timing		√√
13.4	Output RF spectrum		√√
13.6	Frequency error and phase error in HSCSD multi-slot configurations		–
13.7	Transmitter output power and burst timing in HSCSD configurations		–
13.8	Output RF spectrum in HSCSD multislot configuration		–
13.9	Output RF spectrum for MS supporting the R-GSM band		√√
13.16	**GPRS Transmitter tests**		
13.16.1	Frequency error and phase error in GPRS multi-slot configuration		√√
13.16.2	Transmitter output power in GPRS multi-slot configuration	up to 2UL	√√
13.16.3	Output RF spectrum in GPRS multi-slot configuration	1UL only	√√
13.17	**EGPRS Transmitter tests**	without Call Processing	
13.17.1	Frequency error and modulation accuracy in EGPRS configuration		√√
13.17.2	Frequency error under multipath and interference conditions	Requires Fading Simulator	√
13.17.3	EGPRS Transmitter output power	up to 2UL	√√
13.17.4	Output RF spectrum in EGPRS configuration	1UL only	√√

√√: Supported (except Frequency Hopping) | √: Requires external equipment (SPA or SG) | F: Future Support | –: Not Supported

	Item	Comment	
14	**Receiver**		
14.1	**Bad frame indication**		
14.1.1	Bad frame indication - TCH/FS		–
14.1.2	Bad frame indication - TCH/HS		–
14.1.3	Bad frame indication - TCH/FS – Frequency hopping and downlink DTX - Phase 2 MS in a phase 1 network		–
14.1.4	Bad frame indication - TCH/HS – Frequency hopping and downlink DTX - Phase 2 MS in phase 1 network		–
14.1.5	Bad frame indication - TCH/AFS (Speech frame)		–
14.1.6	Bad frame indication - TCH/AHS		–
14.1.6.1	Bad frame indication - TCH/AHS - Random RF input		–
14.2	**Reference sensitivity**		
14.2.1	Reference sensitivity - TCH/FS	Static conditions	√√
		Propagation conditions (Requires Fading Simulator)	√
14.2.2	Reference sensitivity - TCH/HS (Speech frames)	Propagation conditions (Requires Fading Simulator)	√
14.2.3	Reference sensitivity - FACCH/F		–
14.2.4	Reference sensitivity - FACCH/H		–
14.2.5	Reference sensitivity - full rate data channels		–
14.2.6	Reference sensitivity - half rate data channels		–
14.2.7	Reference sensitivity - TCH/EFS	Static conditions	√√
		Propagation conditions (Requires Fading Simulator)	√
14.2.8	Reference sensitivity - full rate data channels in multi-slot configuration		–
14.2.9	Reference sensitivity - TCH/FS for MS supporting the R-GSM band	Static conditions	√√
		Propagation conditions (Requires Fading Simulator)	√
14.2.10	Reference sensitivity - TCH/AFS	Static conditions	√√
		Propagation conditions (Requires Fading Simulator)	√
14.2.18	Reference sensitivity - TCH/AHS	Static conditions	√√
		Propagation conditions (Requires Fading Simulator)	√
14.2.19	Reference sensitivity - TCH/AFS-INB		–
14.2.20	Reference sensitivity - TCH/AHS-INB		–
14.3	**Usable receiver input level range**	Static conditions	√√
		Propagation conditions (Requires Fading Simulator)	√

√√: Supported (except Frequency Hopping) | √: Requires external equipment (SPA or SG) | F: Future Support | –: Not Supported

	Item	Comment	
14.4	**Co-channel rejection**		
14.4.1	Co-channel rejection - TCH/FS	Requires Fading Simulator Requires SG	√
14.4.2	Co-channel rejection - TCH/HS	Requires Fading Simulator Requires SG	√
14.4.3	Co-channel rejection - TCH/HS (SID frames)		–
14.4.4	Co-channel rejection – FACCH/F		–
14.4.5	Co-channel rejection – FACCH/H		–
14.4.6	Co-channel rejection - TCH/EFS	Requires Fading Simulator Requires SG	√
14.4.7	Receiver performance for frequency hopping and co-channel interference on one carrier		–
14.4.8	Co-channel rejection - TCH/AFS	Requires Fading Simulator Requires SG	√
14.4.16	Co-channel rejection - TCH/AHS	Requires Fading Simulator Requires SG	√
14.4.17	Co-channel rejection - TCH/AFS-INB		–
14.4.18	Co-channel rejection - TCH/AHS-INB		–
14.5	**Adjacent channel rejection**		
14.5.1	Adjacent channel rejection – speech channels	Requires Fading Simulator Requires SG	√
14.5.2	Adjacent channel rejection – control channels		–
14.6	**Intermodulation rejection** (+800 kHz unwanted CW signals transmit) (+1600 kHz unwanted modulation signals transmit)		
14.6.1	Intermodulation rejection – speech channels	Requires SG	√
14.6.2	Intermodulation rejection – control channels		–
14.7	**Blocking and spurious response**		
14.7.1	Blocking and spurious response – speech channels	Requires SG	√
14.7.2	Blocking and spurious response – control channels		–
14.7.3	Blocking and spurious response – speech channels for MS supporting R-GSM band	Requires SG	√
14.7.4	Blocking and spurious response – control channels for MS supporting R-GSM band		–
14.8	**AM Suppression**		
14.8.1	AM suppression - speech channels	Requires External SG	√
14.8.2	AM suppression - control channels		–
14.9	Paging performance at high input levels		–
14.10	**Performance of Codec Mode Request Generation for Adaptive Multi-Rate Codecs**		
14.10.1	Performance of Codec Mode Request Generation – TCH/AFS		–
14.10.2	Performance of Codec Mode Request Generation – TCH/AHS		–
14.16	**GPRS Receiver tests**		
14.16.1	Minimum Input level for reference performance	Static conditions	√√
		Propagation conditions (Requires Fading Simulator)	√
14.16.2	**Co-channel rejection**		
14.16.2.1	Co-channel rejection for packet channels	Static conditions	√√
		Propagation conditions (Requires Fading Simulator)	√
14.16.3	Acknowledged mode/Downlink TBF/I_LEVEL measurement report		–

√√: Supported (except Frequency Hopping) | √: Requires external equipment (SPA or SG) | F: Future Support | –: Not Supported

	Item	Comment	
14.18	**EGPRS Receiver tests**		
14.18.1	Minimum input level for reference performance	Static conditions	√√
		Propagation conditions (Requires Fading Simulator)	√
14.18.2	Co-channel rejection	Static conditions (Requires SG)	√
		Propagation conditions (Requires SG and Fading Simulator)	√
14.18.3	Adjacent channel rejection	Static conditions (Requires SG)	√
		Propagation conditions (Requires SG and Fading Simulator)	√
14.18.4	Intermodulation rejection	Static conditions (Requires SG)	√
		Propagation conditions (Requires SG and Fading Simulator)	√
14.18.5	Blocking and spurious response	Requires SG	√
14.18.6	EGPRS Usable receiver input level range	Static conditions	√√
		Propagation conditions (Requires Fading Simulator)	√
14.18.7	Incremental redundancy performance		–

√√: Supported (except Frequency Hopping) | √:Requires external equipment (SPA or SG) | F: Future Support | –: Not Supported

2.3. TRX Measurement (GSM)

2.3.1. Connection with GSM

Measurement is executed after connecting UE in the loopback state.

The UE location registration can be stopped by turning on Auto Registration inside the registered network.
If location registration is unnecessary, turn on Auto Registration (**AUTOREG ON**) before turning on the UE power.

1. Execute **PRESET** to preset parameter.
2. Turn on the UE.
3. Execute **CALLRSLT? 4** and wait until it becomes 1,0 (Registration Execute).
4. Execute **CALLSTAT?** and wait until it becomes1 (= Idle(Regist).
5. Execute **CALLSA** to connect with Voice Call.
6. Execute **CALLSTAT?** and wait until it becomes 7 (= Communication).
7. Execute **LOOPBACK ON** to make UE in Loopback state.

2.3.2. Disconnection from GSM

1. Execute **LOOPBACK OFF** to set UE to normal connection state.
2. Execute **CALLSO** to disconnect from Voice Call.
3. Execute **CALLSTAT?** and wait until it becomes1 (= Idle(Regist)).

2.3.3. Changing TCH Channel and MS Power Level at Handover

Usually, Tx/Rx measurement is performed at three frequency points, and Tx measurement is performed with three power levels (L, M, H). In this case, the channel can be quickly switched without reconnection by switching it at handover with a higher output level. When a GPIB command is sent during handover, it waits until handover ends.

1. Execute **CHMSPWR 1,5** to change [TCH Channel] to [1] CH, [MS Power Level] to [5].
2. Perform TRX measurement.
3. Execute **CHMSPWR 1,12** to change [TCH Channel] to [1] CH, [MS Power Level] to [12].
4. Perform TX measurement.
5. Execute **CHMSPWR 1,19** to change [TCH Channel] to [1] CH, [MS Power Level] to [19].
6. Perform TX measurement.
7. Execute **CHMSPWR 63,5** to change [TCH Channel] to [63] CH, [MS Power Level] to [5].
8. Perform TRX measurement.
9. Execute **CHMSPWR 63,12** to change [TCH Channel] to [63] CH, [MS Power Level] to [12].
10. Perform TX measurement.
11. Execute **CHMSPWR 127,19** to change [TCH Channel] to [63] CH, [MS Power Level] to [19].
12. Perform TX measurement.
13. Execute **CHMSPWR 127,5** to change [TCH Channel] to [127] CH, [MS Power Level] to [5].
14. Perform TRX measurement.
15. Execute **CHMSPWR 127,12** to change [TCH Channel] to [127] CH, [MS Power Level] to [12].
16. Perform TX measurement.
17. Execute **CHMSPWR 127,19** to change [TCH Channel] to [127] CH, [MS Power Level] to [19].
18. Perform TX measurement.

2.3.4. Band Indicator

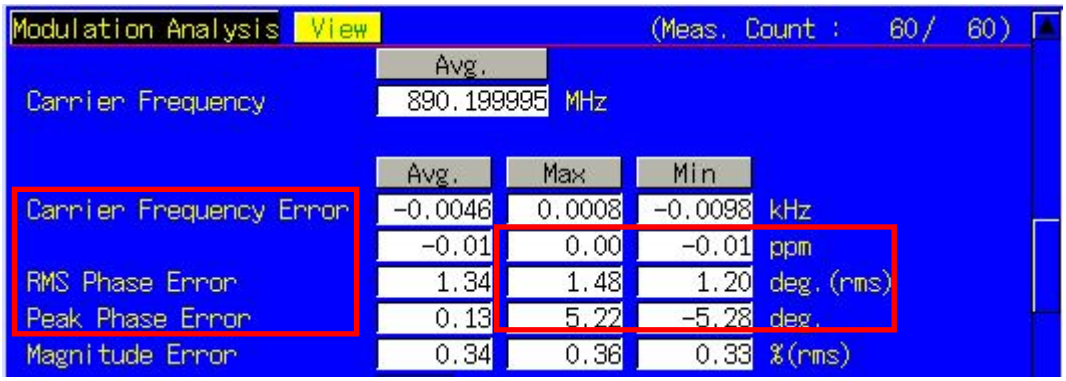
The Band Indicator setting is required to separate ARFCN duplication.
Set DCS1800 or PCS1900 at handover.

1. Execute **BAND GSM850** to change TCH [Band] to [GSM850].
2. Connect the UE.
3. Execute **BANDIND DCS1800** to change [Band Indicator] to [DCS1800].
   (This information report parameter takes time to reflect the change at the UE).
4. Execute **SYSCMB DCS1800** to change [System Combination] to [GSM/DCS1800].
5. Execute **BAND DCS1800** to change TCH [Band] to [DCS1800].

2.3.5. 13.1 Frequency error and phase error

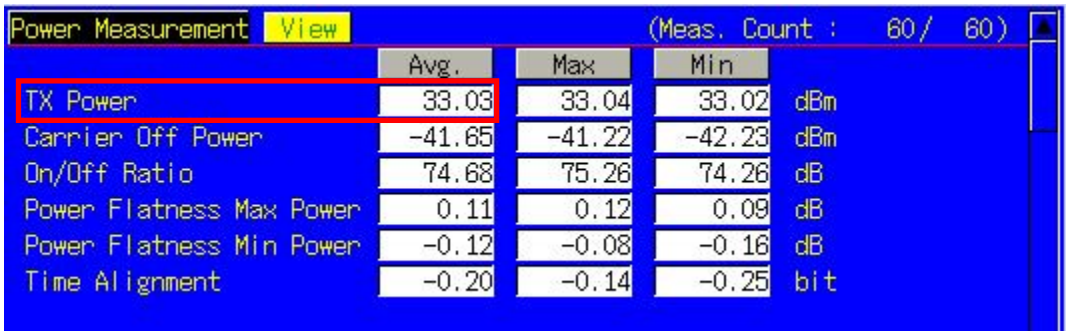
1. Connect using Loopback.
2. Execute **MOD_MEAS ON** to set [Modulation Analysis] measurement to [On].
3. Execute **MOD_COUNT 60** to set [Average Count] of Modulation Analysis measurement to [60] times.
4. Execute **SWP** to perform Modulation Analysis measurement.
5. Execute **MAX_CARRFERR? PPM** to read the Maximum Frequency Error measurement result.
6. Execute **MIN_CARRFERR? PPM** to read the Minimum Frequency Error measurement result.
7. Confirm the measurement result is lower than 0.1 ppm.
8. Execute **MAX_PHASEERR?** to read the RMS Phase Error measurement result.
9. Confirm the measurement result is lower than 5 deg.
10. Execute **MAX_PPHASEERR?** to read the Peak Phase Error measurement result.
11. Execute **MIN_PPHASEERR?** to read the Peak Phase Error measurement result.
12. Confirm the measurement result is lower than 20 deg.

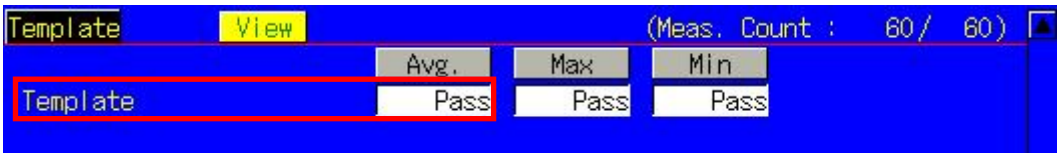
Use the Max and Min measurement result for measurement with symbols (such as Frequency Error).



2.3.6. 13.3 Transmitter output power and burst timing

1. Connect using Loopback.
2. Execute **PWR_MEAS ON** to set [Power Measurement] to [On].
3. Execute **TEMP_MEAS ON** to set [Template] measurement to [On].
4. Execute **PWR_COUNT 60** to set [Average Count] of Power Measurement to [60] times.
5. Execute **PWR_TEMPSTD** to set Template Judgment Lines to the standard matching the Channel and MS Power Level.
6. Execute **SWP** to perform Power measurement.
7. Execute **AVG_TXPWR?** to read the Power measurement result.
8. Execute **AVG_PWRTEMP?** to read the Template measurement result.
9. Confirm the measurement result is PASS.





2.3.7. 13.4 Output RF spectrum

1. Connect using Loopback.
2. Execute **ORFSMD_MEAS ON** to set [Output RF Spectrum - Modulation] measurement to [On].
3. Execute **ORFSSW_MEAS ON** to set [Output RF Spectrum - Switching] measurement to [On].
4. Execute **ORFSMD_COUNT 60** to set [Average Count] of Output RF Spectrum - Modulation measurement to [60] times.
5. Execute **ORFSSW_COUNT 60** to set [Average Count] of Output RF Spectrum - Switching measurement to [60] times.
6. Execute **SWP** to perform Output RF Spectrum measurement.
7. Execute **ORFSMD_JUDGE?** to read the Output RF Spectrum - Modulation measurement results.
8. Confirm the measurement result is PASS.
9. Execute **AVG_LMODPWR? OF1800** to read the Output RF Spectrum - Modulation(Frequency Offset +1800 kHz) measurement result.
10. Execute **AVG_UMODPWR? OF1800** to read the Output RF Spectrum - Modulation(Frequency Offset –1800 kHz) measurement result.

*The PASS/FAIL criterion for ORFS Switching measurement is different between the MT8820C/MT8821C and 3GPP TS 51.010-1.
The MT8820C/MT8821C evaluates from all points of 0 to 2000 kHz, whereas 3GPP TS 51.010-1 evaluates from points 400, 600, 1200, and 1800 kHz.
When using the MT8820C/MT8821C judgment result, go to section 2.3.7.1 ORFS Switching measurement: When using MT8820C/MT8821C judgment result. When using the 3GPP measurement procedure, go to section 2.3.7.2 ORFS Switching measurement: When using 3GPP TS 51.010-1.

2.3.7.1 ORFS Switching measurement: When using MT8820C/MT8821C judgment result

11. Execute **ORFSSW_JUDGE?** to read the Output RF Spectrum - Switching measurement result.
12. Confirm the measurement result is PASS.
13. Execute **MAX_LSWPWR? OF1800** to read the Output RF Spectrum - Switching (Frequency Offset –1800 kHz) measurement result.
14. Execute **MAX_USWPWR? OF1800** to read the Output RF Spectrum - Switching (Frequency Offset +1800 kHz) measurement result.

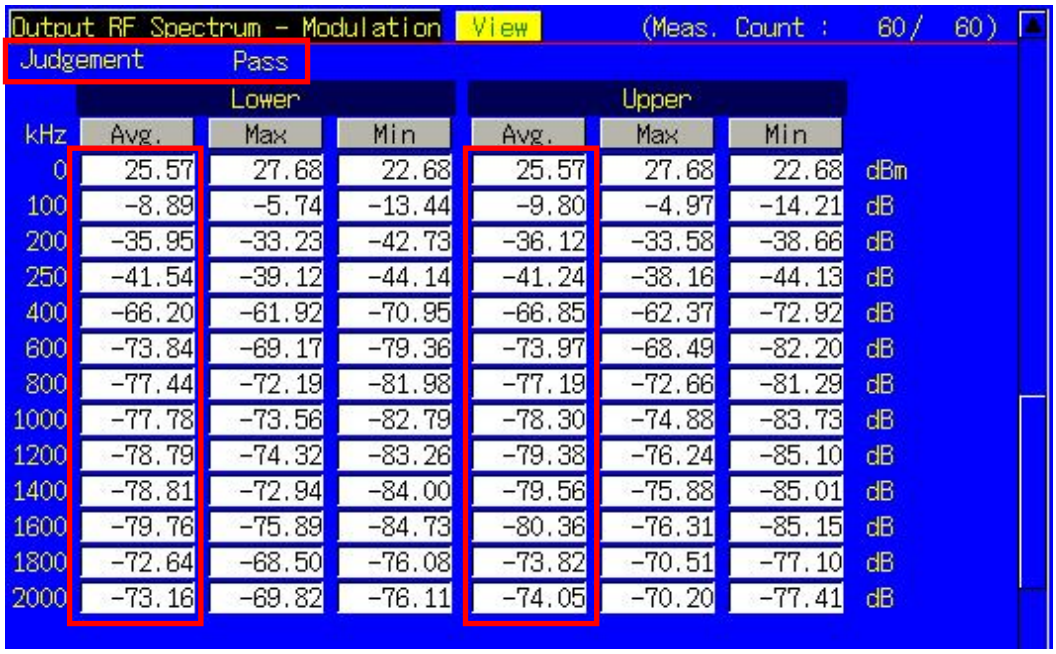
2.3.7.2 ORFS Switching measurement: When using 3GPP TS 51.010-1 measurement procedure

The 3GPP TS51.010-1 measurement procedure is as follows. Evaluate from the measurement result for 400, 600, 1200, and 1800 kHz (Table 2.3.7.2-1).
The reference value differs with Power level. This section describes an example when Power level = 31 dBm.
*The reference value is different when the operating band is DCS1800 or PCS1900. Refer to TS51.010-1 13.4 Output RF spectrum.

11. Execute **MAX_LSWPWR? OF400** to read the Output RF Spectrum - Switching (Frequency Offset –400 kHz) measurement result.
12. Confirm the measurement result is less than -21 dBm.
13. Execute **MAX_USWPWR? OF400** to read the Output RF Spectrum - Switching (Frequency Offset +400 kHz) measurement result.
14. Confirm the measurement result is less than -21 dBm.
15. Execute **MAX_LSWPWR? OF600** to read the Output RF Spectrum - Switching (Frequency Offset –600 kHz) measurement result.
16. Confirm the measurement result is less than -23 dBm.
17. Execute **MAX_USWPWR? OF600** to read the Output RF Spectrum - Switching (Frequency Offset +600 kHz) measurement result.
18. Confirm the measurement result is less than -23 dBm.
19. Execute **MAX_LSWPWR? OF1200** to read the Output RF Spectrum - Switching (Frequency Offset –1200 kHz) measurement result.
20. Confirm the measurement result is less than -23 dBm.
21. Execute **MAX_USWPWR? OF1200** to read the Output RF Spectrum - Switching (Frequency Offset +1200 kHz)

measurement result.

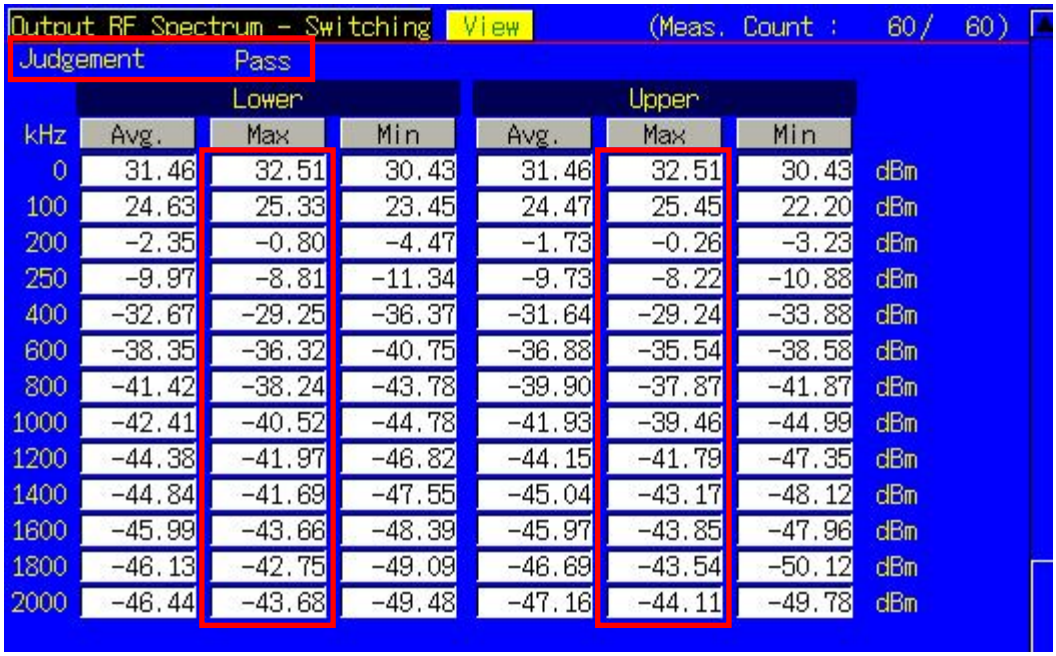
22. Confirm the measurement result is less than -23 dBm.
23. Execute **MAX_LSWPWR? OF1800** to read the Output RF Spectrum - Switching (Frequency Offset –1800 kHz) measurement result.
24. Confirm the measurement result is less than -26 dBm.
25. Execute **MAX_USWPWR? OF1800** to read the Output RF Spectrum - Switching (Frequency Offset +1800 kHz) measurement result.
26. Confirm the measurement result is less than -26 dBm.
27. If the procedure 11 to 26 are satisfied, the measurement result can be regarded as PASS.



Output RF Spectrum - Modulation View (Meas. Count : 60/ 60)

Judgement Pass

kHz	Lower Avg.	Lower Max	Lower Min	Upper Avg.	Upper Max	Upper Min	
0	25.57	27.68	22.68	25.57	27.68	22.68	dBm
100	-8.89	-5.74	-13.44	-9.80	-4.97	-14.21	dB
200	-35.95	-33.23	-42.73	-36.12	-33.58	-38.66	dB
250	-41.54	-39.12	-44.14	-41.24	-38.16	-44.13	dB
400	-66.20	-61.92	-70.95	-66.85	-62.37	-72.92	dB
600	-73.84	-69.17	-79.36	-73.97	-68.49	-82.20	dB
800	-77.44	-72.19	-81.98	-77.19	-72.66	-81.29	dB
1000	-77.78	-73.56	-82.79	-78.30	-74.88	-83.73	dB
1200	-78.79	-74.32	-83.26	-79.38	-76.24	-85.10	dB
1400	-78.81	-72.94	-84.00	-79.56	-75.88	-85.01	dB
1600	-79.76	-75.89	-84.73	-80.36	-76.31	-85.15	dB
1800	-72.64	-68.50	-76.08	-73.82	-70.51	-77.10	dB
2000	-73.16	-69.82	-76.11	-74.05	-70.20	-77.41	dB



Output RF Spectrum - Switching View (Meas. Count : 60/ 60)

Judgement Pass

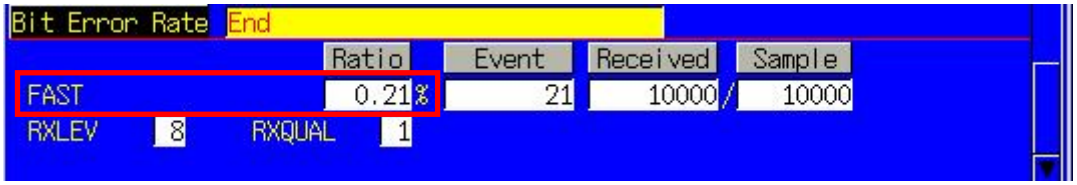
kHz	Lower Avg.	Lower Max	Lower Min	Upper Avg.	Upper Max	Upper Min	
0	31.46	32.51	30.43	31.46	32.51	30.43	dBm
100	24.63	25.33	23.45	24.47	25.45	22.20	dBm
200	-2.35	-0.80	-4.47	-1.73	-0.26	-3.23	dBm
250	-9.97	-8.81	-11.34	-9.73	-8.22	-10.88	dBm
400	-32.67	-29.25	-36.37	-31.64	-29.24	-33.88	dBm
600	-38.35	-36.32	-40.75	-36.88	-35.54	-38.58	dBm
800	-41.42	-38.24	-43.78	-39.90	-37.87	-41.87	dBm
1000	-42.41	-40.52	-44.78	-41.93	-39.46	-44.99	dBm
1200	-44.38	-41.97	-46.82	-44.15	-41.79	-47.35	dBm
1400	-44.84	-41.69	-47.55	-45.04	-43.17	-48.12	dBm
1600	-45.99	-43.66	-48.39	-45.97	-43.85	-47.96	dBm
1800	-46.13	-42.75	-49.09	-46.69	-43.54	-50.12	dBm
2000	-46.44	-43.68	-49.48	-47.16	-44.11	-49.78	dBm

Table 2.3.7.2-1 3GPP TS51.010-1 Table 13-11:GSM Spectrum due to switching transients

Power level	Maximum level for various offsets from carrier frequency			
	400 kHz	600 kHz	1 200 kHz	1 800 kHz
39 dBm	-13 dBm	-21 dBm	-21 dBm	-24 dBm
37 dBm	-15 dBm	-21 dBm	-21 dBm	-24 dBm
35 dBm	-17 dBm	-21 dBm	-21 dBm	-24 dBm
33 dBm	-19 dBm	-21 dBm	-21 dBm	-24 dBm
31 dBm	-21 dBm	-23 dBm	-23 dBm	-26 dBm
29 dBm	-23 dBm	-25 dBm	-25 dBm	-28 dBm
27 dBm	-23 dBm	-26 dBm	-27 dBm	-30 dBm
25 dBm	-23 dBm	-26 dBm	-29 dBm	-32 dBm
23 dBm	-23 dBm	-26 dBm	-31 dBm	-34 dBm
<= +21 dBm	-23 dBm	-26 dBm	-32 dBm	-36 dBm

2.3.8. 14.2.1 Reference sensitivity – TCH/FS

1. Connect using Loopback.
2. Execute **LBTYPE FASTSPEECH** to set [Loop Back Type] to [C(FAST, Speech)].
3. Execute **BER_MEAS ON** to set [Bit Error Rate] measurement to [On].
4. Execute **BER_SAMPLE FAST,10000** to set Number of Sample - [FAST] to [10000].
5. Execute **OLVL -104.0** to set [Output Level] to [–104.0] dBm.
6. Execute **SWP** to perform BER measurement.
7. Execute **BER? FAST** to read the BER measurement result.



This procedure does not follow the 3GPP specified procedure.

2.3.9. Measurement Time Reduction using Batch Process

The above Tx/Rx test items can be measured under the same measurement conditions, so measurement time can be cut by measuring all items simultaneously.

1. Connect using Loopback.
2. Execute **LBTYPE FASTSPEECH** to set [Loop Back Type] to [C(FAST, Speech)].
3. Execute **PWR_TEMPSTD** to set Template Judgment Lines to the standard matching Channel and MS Power Level.
4. Execute **ALLMEASITEMS ON,OFF,60,ON,OFF,ON,OFF,ON,OFF,60,ON,OFF,60,ON,OFF,60,ON,OFF** to set all items to [On] and to set [Average Count] to [60] times.
5. Execute **BER_SAMPLE FAST,10000** to set Number of Sample - [FAST] to [10000].
6. Execute **OLVL -104.0** to set [Output Level] to [–104.0] dBm.
7. Execute **SWP** to perform measurement.
8. Execute **AVG_TXPWR?** to read the measurement results.

2.4. Connection with GPRS

Attach (location registration) must be executed with GPRS to test with GPRS.
When Attach is completed, the Call Processing state changes to Attached.

2.4.1. Attach procedures

1. Execute **PRESET** to preset parameter.
2. Execute **OPEMODE GPRS** to set [Operating Mode] to [GPRS].
3. Turn on the UE.
4. Execute **CALLSTAT?** and wait until it becomes 13 (= Attached).
   (*) Some UEs do not execute Attach at power-on. In this case, check the UE settings.

2.4.2. Connection Type

Select one of following methods to execute Tx/Rx measurement with GPRS.

TX measurement: Test Mode A or Test Mode B (3GPP recommends TestModeA.)
RX measurement: BLER

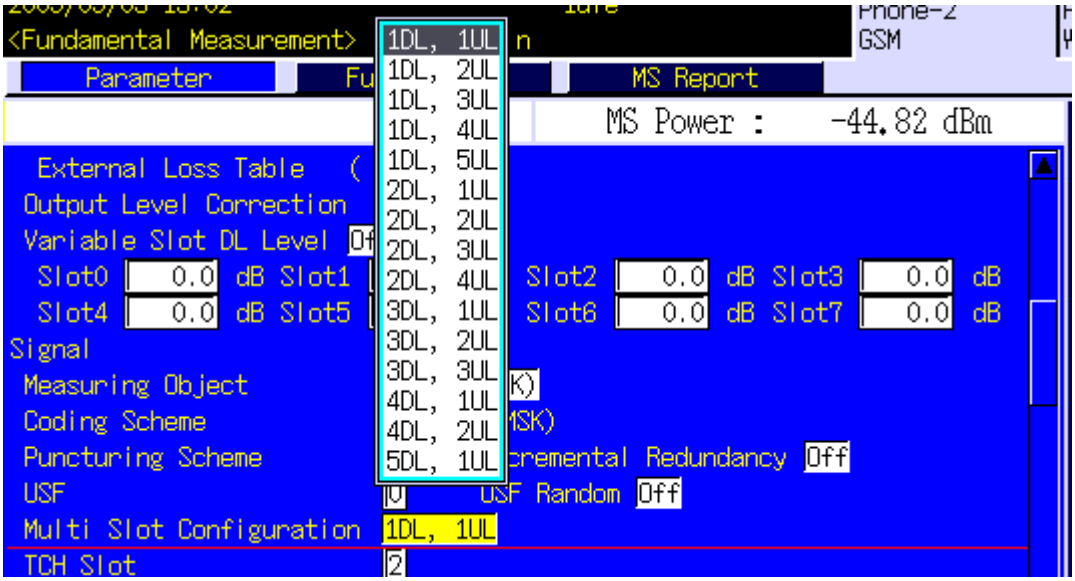
2.4.3. Multi-slot setting

To use Multi Slot, set the Multi-slot Configuration parameter.
The slot number is limited by each Multi-slot Class. See Table 2.4-1 for the slot number.
This instrument supports Class 1 to 12 and 30 to 33.
The Multi-slot Class can be checked at the Report screen after the Attach process (2.4.1).

Table 2.4-1

Multi-slot Class	Maximum number of slots		
	Rx	Tx	Sum
1	1	1	2
2	2	1	3
3	2	2	3
4	3	1	4
5	2	2	4
6	3	2	4
7	3	3	4
8	4	1	5
9	3	2	5
10	4	2	5
11	4	3	5
12	4	4	5
30	5	1	6
31	5	2	6
32	5	3	6
33	5	4	6
34	5	5	6

Rx: Maximum slot number that UE can receive in 1 frame (This instrument uses DL display.)
Tx: Maximum slot number that UE can send in 1 frame (This instrument uses UL display.)
SUM: Maximum slot number that can be transmitted/received simultaneously by combining Rx and Tx slot number.



TX measurement is performed using the maximum slot number setting.
RX measurement is performed using the maximum slot number setting.

2.4.4. Change of TCH Channel, MS Power Level and CS (Coding Scheme) at Handover

Usually, Tx/Rx measurement is performed at three frequency points (L, M, H). Tx measurement is performed by changing the Slot power level, and Rx measurement is performed by changing the coding scheme (CS).
In this case, measurement can be performed quickly without reconnection by switching the TCH Channel, MS Power Level, and CS at handover with a higher output level. When a GPIB command is sent during handover, it waits until handover ends.

[TX Measurement]

1. Execute **CHMSPWR 1,5,5** to change [TCH Channel] to [1] CH, MS Power Level - [1st Slot] to [5], MS Power Level - [2nd Slot] to [5].
2. Perform TX measurement.
3. Execute **CHMSPWR 1,19,5** to change [TCH Channel] to [1] CH, MS Power Level - [1st Slot] to [19], MS Power Level - [2nd Slot] to [5].
4. Perform TX measurement.
5. Execute **CHMSPWR 1,5,19** to change [TCH Channel] to [1] CH, MS Power Level - [1st Slot] to [5], MS Power Level - [2nd Slot] to [19].
6. Perform TX measurement.
7. Execute **CHMSPWR 63,5,5** to change [TCH Channel] to [63] CH, MS Power Level - [1st Slot] to [5], MS Power Level - [2nd Slot] to [5].
8. Perform TX measurement.
9. Execute **CHMSPWR 63,19,5** to change [TCH Channel] to [63] CH, MS Power Level - [1st Slot] to [19], MS Power Level - [2nd Slot] o [5].
10. Perform TX measurement.
11. Execute **CHMSPWR 63,5,19** to change [TCH Channel] to [63] CH, MS Power Level - [1st Slot] to [5], MS Power Level - [2nd Slot] to [19].
12. Perform TX measurement.
13. Execute **CHMSPWR 127,5,5** to change [TCH Channel] to [127] CH, MS Power Level - [1st Slot] to [5], MS Power Level - [2nd Slot] to [5].
14. Perform TX measurement.
15. Execute **CHMSPWR 127,19,5** to change [TCH Channel] to [127] CH, MS Power Level - [1st Slot] to [19], MS Power Level - [2nd Slot] to [5].
16. Perform TX measurement.
17. Execute **CHMSPWR 127,5,19** to change [TCH Channel] to [127] CH, MS Power Level - [1st Slot] to [5], MS Power Level - [2nd Slot] to [19].
18. Perform TX measurement.

[RX Measurement]

1. Execute **CHMSPWR 1,5** to change [TCH Channel] to [1] CH, [MS Power Level] to [5].
2. Execute **CS CS3** to change [Coding Scheme] to [CS-3].
3. Perform RX measurement.
4. Execute **CS CS4** to change [Coding Scheme] to [CS-4].
5. Perform RX measurement.
6. Execute **CHMSPWR 63,5** to change [TCH Channel] to [63] CH, [MS Power Level] to [5].
7. Execute **CS CS3** to change [Coding Scheme] to [CS-3].
8. Perform RX measurement.
9. Execute **CS CS4** to change [Coding Scheme] to [CS-4].
10. Perform RX measurement.
11. Execute **CHMSPWR 127,5** to change [TCH Channel] to [127] CH, [MS Power Level] to [5].
12. Execute **CS CS3** to change [Coding Scheme] to [CS-3].
13. Perform RX measurement.
14. Execute **CS CS4** to change [Coding Scheme] to [CS-4].
15. Perform RX measurement.

2.5. TX Measurement (GPRS)

Measurement of Tx 2 slot is performed by connecting using Test Mode A. The connection procedures are shown below.

2.5.1. Connection with Test Mode A

The following procedures are performed after Attach (section 2.4.1).

1. Execute **CONNTYPE MODEA** to set [Connection Type] to [Test Mode A].
2. Execute **MLTSLTCFG 2DL2UL** to set [Multi Slot Configuration] to [2DL, 2UL], meaning 2Slot for Downlink and Uplink.
3. Execute **CALLSA** to connect with Test Mode A.
4. Execute **CALLSTAT?** and wait until the response returns 14 (= Transfer).

2.5.2. Disconnection from Test Mode A

At connection of Test Mode A and Test Mode B, communication is disconnected automatically from the UE side when the data transmission set at [Number of PDUs for Test Mode] is completed. Therefore, the connection state must be confirmed before disconnection.

1. Execute **CALLSTAT?** and confirm it is 14 (= Transfer). If it is 13 (= Attached), it is already disconnected.
2. Execute **CALLSO** to disconnect Test Mode.
3. Execute **CALLSTAT?** and wait until the response returns 13 (= Attached).

2.5.3. 13.16.1 Frequency error and phase error in GPRS multi-slot configuration

1. Connect with Test Mode A.
2. Execute **MOD_MEAS ON** to set [Modulation Analysis] measurement to [On].
3. Execute **MOD_COUNT 60** to set [Average Count] of Modulation Analysis measurement to [60] times.

[1st slot measurement]

4. Execute **ILVLCTRL_REF TCH** to set Input Level Control - [Reference] to [TCH_1st].
5. Execute **MEASSLOT 2** to set [Measurement Slot] to [2].
6. Execute **SWP** to perform Modulation Analysis measurement.
7. Execute **MAX_CARRFERR? PPM**, **MIN_CARRFERR? PPM** to read the Frequency Error measurement result.
8. Confirm the absolute value of the measurement result is lower than 0.1 ppm.
9. Execute **MAX_PHASEERR?** to read the RMS Phase Error measurement result.
10. Confirm the measurement result is lower than 5deg.
11. Execute **MAX_PPHASEERR?**, **MIN_PPHASEERR?** to read the Peak Phase Error measurement result.
12. Confirm the absolute value of measurement result is lower than 20deg.

[2nd slot measurement]

13. Execute **ILVLCTRL_REF TCH_2ND** to set Input Level Control - [Reference] to [TCH_2nd].
14. Execute **MEASSLOT 3** to set [Measurement Slot] to [3].
15. Repeat procedures 6 to 12.

2.5.4. 13.16.2 Transmitter Output Power in GPRS Multi-slot Configuration

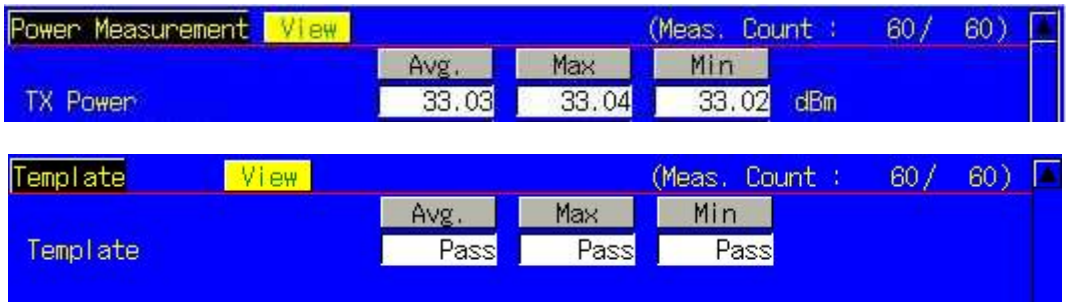
1. Connect using Test Mode A.
2. Execute **PWR_MEAS ON** to set [Power Measurement] to [On].
3. Execute **TEMP_MEAS ON** to set [Template] measurement to [On].
4. Execute **PWR_COUNT 60** to set [Average Count] of Power Measurement to [60] times.

[1st slot measurement]

5. Execute **ILVLCTRL_REF TCH** to set Input Level Control - [Reference] to [TCH_1st].
6. Execute **MEASSLOT 2** to set [Measurement Slot] to [2].
7. Execute **PWR_TEMPSTD** to set Template Judgment Lines to the standard matching Channel and MS Power Level.
8. Execute **SWP** to perform Power measurement.
9. Execute **AVG_TXPWR?** to read the Power measurement result.
10. Execute **AVG_PWRTEMP?** to read the Template measurement result.
11. Confirm the measurement result is PASS.

[2nd slot measurement]

12. Execute **ILVLCTRL_REF TCH_2ND** to set Input Level Control - [Reference] to [TCH_2nd].
13. Execute **MEASSLOT 3** to set [Measurement Slot] to [3].
14. Repeat procedures 7 to 11.



2.5.5. 13.16.3 Output RF Spectrum in GPRS Multi-slot Configuration

1. Connect using Test Mode A.
2. Execute **ORFSMD_MEAS ON** to set [Output RF Spectrum - Modulation] measurement to [On].
3. Execute **ORFSSW_MEAS ON** to set [Output RF Spectrum - Switching] measurement to [On].
4. Execute **ORFSMD_COUNT 60** to set [Average Count] of Output RF Spectrum - Modulation measurement to [60] times.
5. Execute **ORFSSW_COUNT 60** to set [Average Count] of Output RF Spectrum - Switching measurement to [60] times.

[1st slot measurement]

6. Execute **ILVLCTRL_REF TCH** to set Input Level Control - [Reference] to [TCH_1st].
7. Execute **MEASSLOT 2** to set [Measurement Slot] to [2].
8. Execute **SWP** to perform ORFS measurements.
9. Execute **ORFSMD_JUDGE?** to read the Output RF Spectrum - Modulation measurement result.
10. Confirm the measurement result is PASS.

*The PASS/FAIL criterion for ORFS Switching measurement is different between the MT8820C/MT8821C and 3GPP TS 51.010-1.
The MT8820C/MT8821C evaluates from all points of 0 to 2000 kHz. The 3GPP TS 51.010-1 evaluates from points 400, 600, 1200, and 1800 kHz.
When using the MT8820C/MT8821C judgment result, go to section 2.5.5.1 ORFS Switching measurement in GPRS multi-slot configuration: When using MT8820C/MT8821C judgment result. When using the 3GPP measurement procedure, go to section 2.5.5.2 ORFS Switching measurement in GPRS multi-slot configuration: When using 3GPP TS 51.010-1.

2.5.5.1 ORFS Switching measurement in GPRS multislot configuration: : When using MT8820C/MT8821C judgment result

11. Execute **ORFSSW_JUDGE?** to read the Output RF Spectrum - Switching measurement result.
12. Confirm the measurement result is PASS.

[2nd slot measurement]

13. Execute **ILVLCTRL_REF TCH_2ND** to set Input Level Control - [Reference] to [TCH_2nd].
14. Execute **MEASSLOT 3** to set [Measurement Slot] to [3].
15. Repeat procedures 8 to 12.

2.5.5.2 ORFS Switching measurement in GPRS multislot configuration: When using 3GPP TS 51.010-1 measurement procedure

The 3GPP TS51.010-1 measurement procedure is as follows. Evaluate from the measurement result for 400, 600, 1200, and 1800 kHz (Table 2.5.5.2-1).
The reference value differs with the Power level. This section describes an example when Power level = 31 dBm.
*The reference value is different when the operating band is DCS1800 or PCS1900. Refer to TS51.010-1 13.16.3 Output RF spectrum in GPRS multi-slot configuration.

11. Execute **MAX_LSWPWR? OF400** to read the Output RF Spectrum - Switching (Frequency Offset –400 kHz) measurement result.
12. Confirm the measurement result is less than -21dBm.
13. Execute **MAX_USWPWR? OF400** to read the Output RF Spectrum - Switching (Frequency Offset +400 kHz) measurement result.
14. Confirm the measurement result is less than -21dBm.
15. Execute **MAX_LSWPWR? OF600** to read the Output RF Spectrum - Switching (Frequency Offset –600 kHz) measurement result.
16. Confirm the measurement result is less than -23 dBm.
17. Execute **MAX_USWPWR? OF600** to read the Output RF Spectrum - Switching (Frequency Offset +600 kHz) measurement result.

18. Confirm the measurement result is less than -23 dBm.
19. Execute **MAX_LSWPWR? OF1200** to read the Output RF Spectrum - Switching (Frequency Offset –1200 kHz) measurement result.
20. Confirm the measurement result is less than -23 dBm.
21. Execute **MAX_USWPWR? OF1200** to read the Output RF Spectrum - Switching (Frequency Offset +1200 kHz) measurement result.
22. Confirm the measurement result is less than -23 dBm.
23. Execute **MAX_LSWPWR? OF1800** to read the Output RF Spectrum - Switching (Frequency Offset –1800 kHz) measurement result.
24. Confirm the measurement result is less than -26 dBm.
25. Execute **MAX_USWPWR? OF1800** to read the Output RF Spectrum - Switching (Frequency Offset +1800 kHz) measurement result.
26. Confirm the measurement result is less than -26 dBm.
27. If the procedure 11 to 26 are satisfied, the measurement result can be regarded as PASS.

[2nd slot measurement]

28. Execute **ILVLCTRL_REF TCH_2ND** to set Input Level Control - [Reference] to [TCH_2nd].
29. Execute **MEASSLOT 3** to set [Measurement Slot] to [3].
30. Repeat procedures 8 to 27.

Table 2.5.5.2-1 3GPP TS51.010-1 Table 13.16.3-6:GSM Spectrum due to switching transients

Power level	Maximum level for various offsets from carrier frequency			
	400 kHz	600 kHz	1200 kHz	1 800 kHz
39 dBm	-13 dBm	-21 dBm	-21 dBm	-24 dBm
37 dBm	-15 dBm	-21 dBm	-21 dBm	-24 dBm
35 dBm	-17 dBm	-21 dBm	-21 dBm	-24 dBm
33 dBm	-19 dBm	-21 dBm	-21 dBm	-24 dBm
31 dBm	-21 dBm	-23 dBm	-23 dBm	-26 dBm
29 dBm	-23 dBm	-25 dBm	-25 dBm	-28 dBm
27 dBm	-23 dBm	-26 dBm	-27 dBm	-30 dBm
25 dBm	-23 dBm	-26 dBm	-29 dBm	-32 dBm
23 dBm	-23 dBm	-26 dBm	-31 dBm	-34 dBm
<= +21 dBm	-23 dBm	-26 dBm	-32 dBm	-36 dBm

2.6. RX Measurement (GPRS)

The procedures explaining how to measure RX 4 slot with BLER connection are shown below.

2.6.1. Connection with BLER

The following procedures are performed after Attach (section 2.4.1).

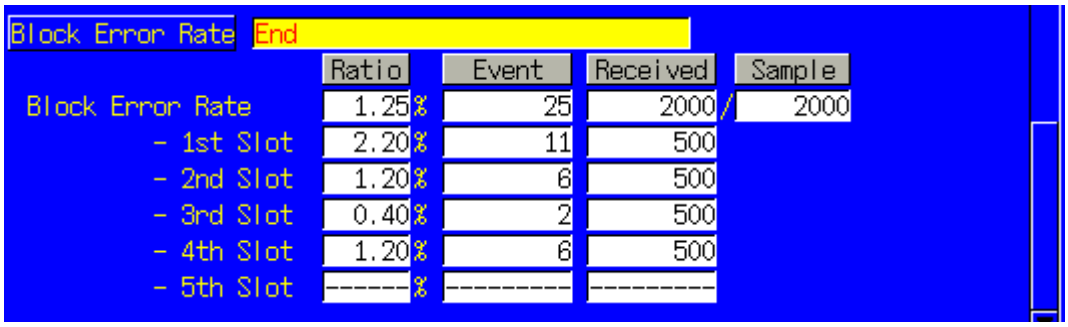
1. Execute **CONNTYPE BLER** to set [Connection Type] to [BLER].
2. Execute **MLTSLTCFG 4DL1UL** to set [Multi Slot Configuration] to [4DL, 1UL] that means 4Slots for Downlink and 1 Slot for Uplink.
3. Execute **CALLSA** to connect with BLER.
4. Execute **CALLSTAT?** and wait until it becomes 14 (= Transfer).

2.6.2. Disconnection from BLER

1. Execute **CALLSO** to disconnect from Test Mode.
2. Execute **CALLSTAT?** and wait until it becomes 13 (= Attached).

2.6.3. 14.16.1 Minimum Input level for Reference Performance

1. Connect with BLER.
2. Execute **BLER_MEAS ON** to set [Block Error Rate](BLER) measurement to [On].
3. Execute **BLER_SAMPLE 2000** to set Number of Sample - [BLER] to [2000] blocks.
4. Execute **OLVL -104.0** to set [Output Level] to [–104.0] dBm.
5. Execute **SWP** to perform BLER measurement.
6. Execute **BLER?** to read the BLER measurement results.



2.7. Connection with EGPRS

Measurement with EGPRS is executed after Attach (location registration).

2.7.1. Attach Procedure

1. Execute **PRESET** to preset the parameters.
2. Execute **OPEMODE EGPRS** to set [Operating Mode] to [EGPRS].
3. Turn on the UE power.
4. Execute **CALLSTAT?** and wait until it becomes 13 (= Attached).
   (*) Some UE do not execute Attach at power-on. In this case, check the UE setting.

2.7.2. Connection Type

Select one of following methods to execute TX/RX measurement with EGPRS.

TX measurement: Test Mode A
RX measurement: BLER, SRB Loopback

2.7.3. Multi-slot Setting

See item 2.4.3.

2.7.4. Change of TCH Channel, MS Power Level, CS (Coding Scheme) by Handover

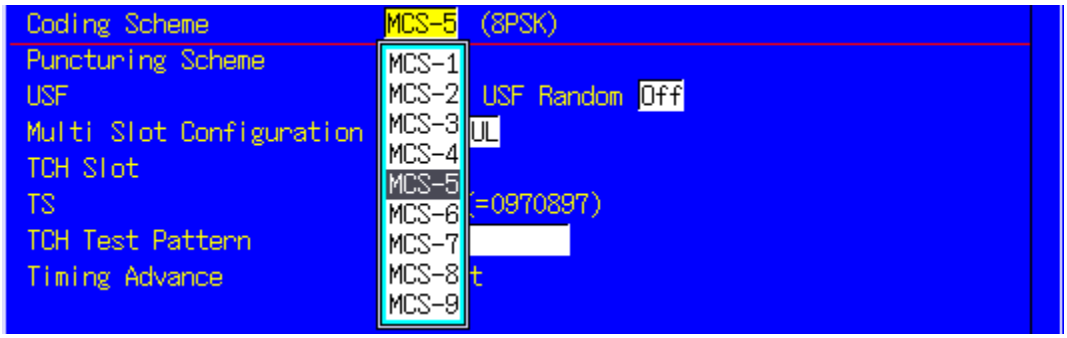
See item 2.4.4.

2.7.5. GMSK and 8PSK Modulations

At EGPRS, the modulation system is changed using the Coding Scheme method.

Table 2.7-1: Modulation method for Coding Scheme

Coding Scheme	Modulation
MCS-9	8PSK
MCS-8	
MCS-7	
MCS-6	
MCS-5	
MCS-4	GMSK
MCS-3	
MCS-2	
MCS-1	



When performing Tx measurement, the measured target must be either 8PSK or GMSK, matching the modulation system.

2.8. TX Measurement (EGPRS)

The procedures below explain how to measure MCS-5 and TX 2 slot by connecting using Test Mode A and using Coding Scheme (CS).

2.8.1. Connection with Test Mode A

Perform the following procedures after Attach (section 2.7.1).

1. Execute **CONNTYPE MODEA** to set [Connection Type] to [Test Mode A].
2. Execute **MLTSLTCFG 2DL2UL** to set [Multi-slot Configuration] to [2DL, 2UL] that means 2Slots for Downlink and 2 Slot for Uplink.
3. Execute **CS MCS5** to set [Coding Scheme] to [MCS-5].
4. Execute **CALLSA** to connect using Test Mode A.
5. Execute **CALLSTAT?** and wait until it becomes 14 (= Transfer).

2.8.2. Disconnection from Test Mode A

When connecting using Test Mode A, disconnection is performed automatically from the UE side when sending of (Number of PDUs for Test Mode) is completed. Therefore, check the connection state before disconnecting.

1. Execute **CALLSTAT?** and confirm it is 14 (= Transfer). If it is 13 (= Attached), it is already disconnected.
2. Execute **CALLSO** to disconnect Test Mode A.
3. Execute **CALLSTAT?** and wait until it becomes 13 (= Attached).

2.8.3. 13.17.1 Frequency Error and Modulation Accuracy in EGPRS Configuration

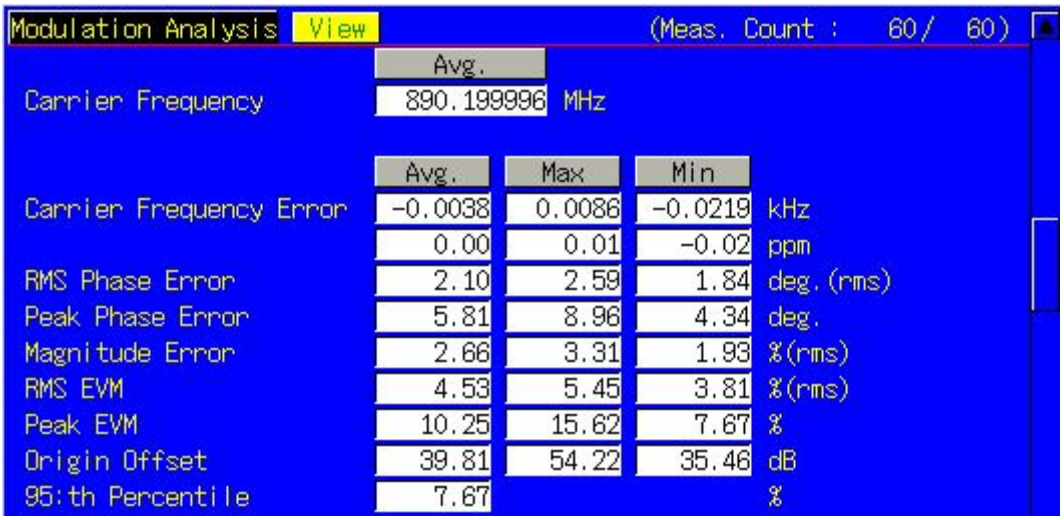
1. Connect using Test Mode A.
2. Execute **MEASOBJ 8PSK** to set [Measuring Object] to [8PSK].
3. Execute **MOD_MEAS ON** to set [Modulation Analysis] measurement to [On].
4. Execute **MOD_COUNT 60** to set [Average Count] of Modulation Analysis measurement to [60] times.

[1st slot measurement]

5. Execute **ILVLCTRL_REF TCH** to set Input Level Control - [Reference] to [TCH_1st].
6. Execute **MEASSLOT 2** to set [Measurement Slot] to [2].
7. Execute **SWP** to perform Modulation Analysis measurement.
8. Execute **MAX_CARRFERR? PPM**, **MIN_CARRFERR? PPM** to read the Frequency Error measurement result.
9. Confirm the absolute value of the measurement result is lower than 0.1ppm.
10. Execute **MAX_EVM?** to read the RMS EVM measurement result.
11. Confirm the measurement result is lower than 9%.
12. Execute **MAX_PEVM?** to read the Peak EVM measurement result.
13. Confirm the measurement result is lower than 30%.
14. Execute **EVM95PCT?** to read the 95:th-percentile measurement result.
15. Confirm the measurement result is lower than 15%.
16. Execute **MAX_ORGNOFS?** to read the Origin Offset measurement result.
17. Confirm the measurement result is higher than 30 dB.

[2nd slot measurement]

18. Execute **ILVLCTRL_REF TCH_2ND** to set Input Level Control - [Reference] to [TCH_2nd].
19. Execute **MEASSLOT 3** to set [Measurement Slot] to [3].
20. Repeat procedures 7 to 16.



2.8.4. 13.17.3 EGPRS Transmitter Output Power

1. Connect using Test Mode A.
2. Execute **MEASOBJ 8PSK** to set [Measuring Object] to [8PSK].
3. Execute **PWR_MEAS ON** to set [Power Measurement] to [On].
4. Execute **TEMP_MEAS ON** to set [Template] measurement to [On].
5. Execute **PWR_COUNT 60** to set [Average Count] of Power measurement to [60] times.

[1st slot measurement]

6. Execute **ILVLCTRL_REF TCH** to set Input Level Control - [Reference] to [TCH_1st].
7. Execute **MEASSLOT 2** to set [Measurement Slot] to [2].
8. Execute **PWR_TEMPSTD** to set Template Judgment Lines to the standard matching the Channel and MS Power Level.
9. Execute **SWP** to perform Power measurement.
10. Execute **AVG_TXPWR?** to read the Power measurement result.
11. Execute **EST8PSKPWR?** to read the Estimated 8PSK Power measurement result.
12. Execute **AVG_PWRTEMP?** to read the Template measurement result.
13. Confirm the measurement result is PASS.

Estimated 8PSK Power measurement calculates the long-term average Power.

[2nd slot measurement]

14. Execute **ILVLCTRL_REF TCH_2ND** to set Input Level Control - [Reference] to [TCH_2nd].
15. Execute **MEASSLOT 3** to set [Measurement Slot] to [3].
16. Repeat procedures 8 to 13.

2.8.5. 13.17.3 Output RF Spectrum in EGPRS Configuration

1. Connect using Test Mode A.
2. Execute **MEASOBJ 8PSK** to set [Measuring Object] to [8PSK].
3. Execute **ORFSMD_MEAS ON** to set [Output RF Spectrum - Modulation] measurement to [On].
4. Execute **ORFSSW_MEAS ON** to set [Output RF Spectrum - Switching] measurement to [On].
5. Execute **ORFSMD_COUNT 60** to set [Average Count] of Output RF Spectrum - Modulation measurement to [60] times.
6. Execute **ORFSSW_COUNT 60** to set [Average Count] of Output RF Spectrum - Switching measurement to [60] times.

[1st slot measurement]

7. Execute **ILVLCTRL_REF TCH** to set Input Level Control - [Reference] to [TCH_1st].
8. Execute **MEASSLOT 2** to set [Measurement Slot] to [2].
9. Execute **SWP** to perform ORFS measurements.
10. Execute **ORFSMD_JUDGE?** to read the Output RF Spectrum - Modulation measurement result.
11. Confirm the measurement result is PASS.

*The PASS/FAIL criterion for ORFS Switching measurement is different between the MT8820C/MT8821C and 3GPP TS 51.010-1.
The MT8820C/MT8821C evaluates from all points of 0 to 2000 kHz. The 3GPP TS 51.010-1 evaluates from points 400, 600, 1200, and 1800 kHz.
When using the MT8820C/MT8821C judgment result, go to section 2.8.5.1 ORFS Switching measurement in EGPRS configuration: When using MT8820C/MT8821C judgment result. When using the 3GPP measurement procedure, go to section 2.8.5.2 ORFS Switching measurement in EGPRS configuration: When using 3GPP TS 51.010-1 measurement procedure.

2.8.5.1 ORFS Switching measurement in EGPRS configuration: When using a judgment result of MT8820C/MT8821C

12. Execute **ORFSSW_JUDGE?** to read the Output RF Spectrum - Switching measurement result.
13. Confirm the measurement result is PASS.

[2nd slot measurement]

14. Execute **ILVLCTRL_REF TCH_2ND** to set Input Level Control - [Reference] to TCH_2nd].
15. Execute **MEASSLOT 3** to set [Measurement Slot] to [3].
16. Repeat procedures 9 to 13.

2.8.5.2 ORFS Switching measurement in EGPRS configuration: When using 3GPP TS 51.010-1 measurement procedure

The 3GPP TS51.010-1 measurement procedure is as follows. Evaluate from the measurement results for 400, 600, 1200, and 1800 kHz (Table 2.8.5.2-1).
The reference value differs with Power level. This section describes an example when Power level = 31 dBm.
*The reference value is different when the operating band is DCS1800 or PCS1900. Refer to TS51.010-1 13.17.4 Output RF spectrum in EGPRS configuration.

12. Execute **MAX_LSWPWR? OF400** to read the Output RF Spectrum - Switching (Frequency Offset –400 kHz) measurement result.
13. Confirm the measurement result is less than -21dBm.
14. Execute **MAX_USWPWR? OF400** to read the Output RF Spectrum - Switching (Frequency Offset +400 kHz) measurement result.
15. Confirm the measurement result is less than -21dBm.
16. Execute **MAX_LSWPWR? OF600** to read the Output RF Spectrum - Switching (Frequency Offset –600 kHz) measurement result.
17. Confirm the measurement result is less than -23 dBm.
18. Execute **MAX_USWPWR? OF600** to read the Output RF Spectrum - Switching (Frequency Offset +600 kHz) measurement result.
19. Confirm the measurement result is less than -23 dBm.
20. Execute **MAX_LSWPWR? OF1200** to read the Output RF Spectrum - Switching (Frequency Offset –1200 kHz) measurement result.
21. Confirm the measurement result is less than -23 dBm.
22. Execute **MAX_USWPWR? OF1200** to read the Output RF Spectrum - Switching (Frequency Offset +1200 kHz) measurement result.
23. Confirm the measurement result is less than -23 dBm.
24. Execute **MAX_LSWPWR? OF1800** to read the Output RF Spectrum - Switching (Frequency Offset –1800 kHz) measurement result.
25. Confirm the measurement result is less than -26 dBm.
26. Execute **MAX_USWPWR? OF1800** to read the Output RF Spectrum - Switching (Frequency Offset +1800 kHz) measurement result.
27. Confirm the measurement result is less than -26 dBm.
28. If the procedure 12 to 27 are satisfied, the measurement result can be regarded as PASS.

[2nd slot measurement]

29. Execute **ILVLCTRL_REF TCH_2ND** to set Input Level Control - [Reference] to [TCH_2nd].
30. Execute **MEASSLOT 3** to set [Measurement Slot] to [3].
31. Repeat procedures 9 to 28.

Table 2.8.5.2-1 3GPP TS51.010-1 Table 13.17.4-5:GSM700, GSM850 and GSM900 Spectrum due to switching transients

Power level	Maximum level for various offsets from carrier frequency			
	400 kHz	600 kHz	1 200 kHz	1 800 kHz
39 dBm	-13 dBm	-21 dBm	-21 dBm	-24 dBm
37 dBm	-15 dBm	-21 dBm	-21 dBm	-24 dBm
35 dBm	-17 dBm	-21 dBm	-21 dBm	-24 dBm
33 dBm	-19 dBm	-21 dBm	-21 dBm	-24 dBm
31 dBm	-21 dBm	-23 dBm	-23 dBm	-26 dBm
29 dBm	-23 dBm	-25 dBm	-25 dBm	-28 dBm
27 dBm	-23 dBm	-26 dBm	-27 dBm	-30 dBm
25 dBm	-23 dBm	-26 dBm	-29 dBm	-32 dBm
23 dBm	-23 dBm	-26 dBm	-31 dBm	-34 dBm
<= +21 dBm	-23 dBm	-26 dBm	-32 dBm	-36 dBm

2.9. RX Measurement (EGPRS)

The procedures explaining how to measure RX 4 slot with BLER connection are shown below.

2.9.1. Connection with BLER

The following procedures are performed after Attach (section 2.7.1).

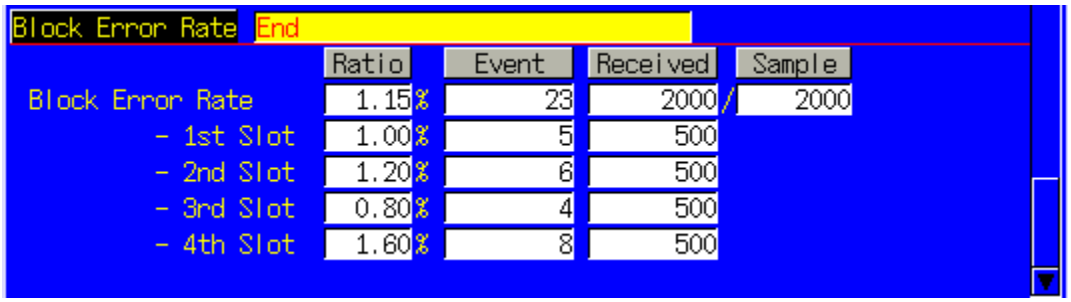
1. Execute **CONNTYPE BLER** to set [Connection Type] to [BLER].
2. Execute **MLTSLTCFG 4DL1UL** to set [Multi Slot Configuration] to [4DL, 1UL] that means 4Slots for Downlink and 1 Slot for Uplink.
3. Execute **CALLSA** to connect with BLER.
4. Execute **CALLSTAT?** and wait until the status becomes 14 (= Transfer).

2.9.2. Disconnection from BLER

1. Execute **CALLSO** to disconnect from Test Mode.
2. Execute **CALLSTAT?** and wait until the status becomes 13 (= Attached).

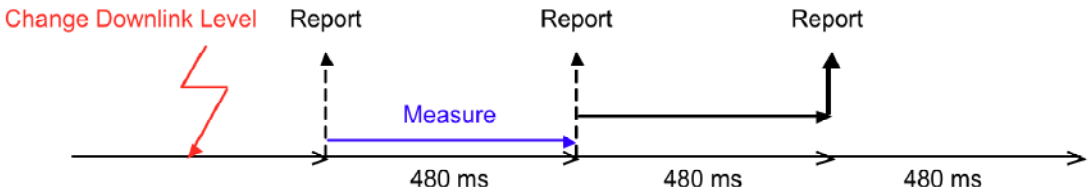
2.9.3. 14.18.1 Minimum Input level for Reference Performance

1. Connect using **BLER.**
2. Execute **BLER_MEAS ON** to set [Block Error Rate] (BLER) measurement to [On].
3. Execute **BLER_SAMPLE 2000** to set Number of Sample - [BLER] to [2000] blocks.
4. Execute **OLVL -104.0** to set [Output Level] to [–104.0] dBm.
5. Execute **SWP** to perform BLER measurement.
6. Execute **BLER?** to read the BLER measurement results.



2.10. MS Report

This function reads the Measurement Report provided regularly (every 480 ms) from the UE.
Note: After changing the Downlink Level, two reports are measured using the level before the change.



2. Execute **OLVL -104.0** to set [Output Level] to [–104.0] dBm.
3. Execute **CALLRFR** to preset Flag.
4. Execute **CALLREP?** and wait until Flag becomes 1 (first).
5. Execute **CALLRFR** to preset Flag.
6. Execute **CALLREP?** and wait until Flag becomes 1 (second).
7. Execute **CALLRFR** to preset Flag.
8. Execute **CALLREP?** and wait until Flag becomes 1 (third), and read RX Level and RX Quality.

2.11. Functional Test

2.11.1. Voice Call

For GSM, the Call Processing function supports Voice Call tests with each speech channel.
This measuring instrument supports the speech channels shown below.

2.11-1: Speech Channel Support Chart

FS	13.0 kbps
EFS	12.2 kbps
HS	11.4 kbps
AFS	12.2 kbps
	10.2 kbps
	7.95 kbps
	7.40 kbps
	6.70 kbps
	5.90 kbps
	5.15 kbps
	4.75 kbps
AHS	7.95 kbps
	7.40 kbps
	6.70 kbps
	5.90 kbps
	5.15 kbps
	4.75 kbps

An example of how to perform the origination test using the AFS 7.95 kbps voice Codec is shown below.

1. Execute **CALLPROC ON** to set [Call Processing] to [On].
2. Execute **CODEC AFS** to set [Codec] to [AFS].
3. Execute **NBRATE 7.95** to set [Net Bit Rate] to [7.95 kbps].
4. Call from a UE with any telephone number.
   Call Process turns on Origination. The telephone number can be checked on the MS Report screen.
5. Execute **CALLSTAT?** and wait until it becomes 7 (= Communication).
   Call Processing turns on Communication and the instrument and UE can now communicate.
6. Execute **TESTPAT ECHO** to set [TCH Test Pattern] to [Echo] to perform the voice communication test using echo-back.
7. Execute **CALLSO** to disconnect from the equipment, or from the UE after on-hooking.
   Call Processing turns on MS Release or NW Release.

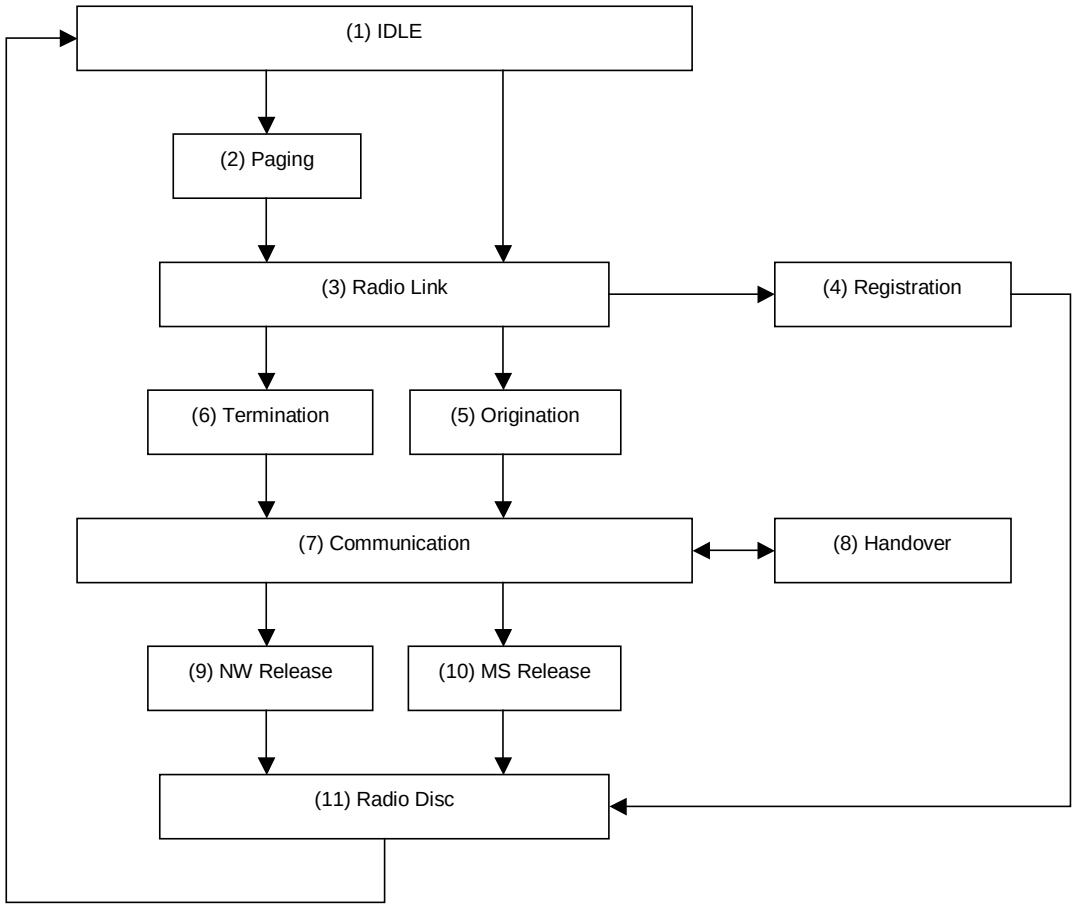


Fig. 2.11-1: Connection Sequence

Check each state using the CALLRSLT? command.

An example of how to check completion of Registration and Origination is shown below.

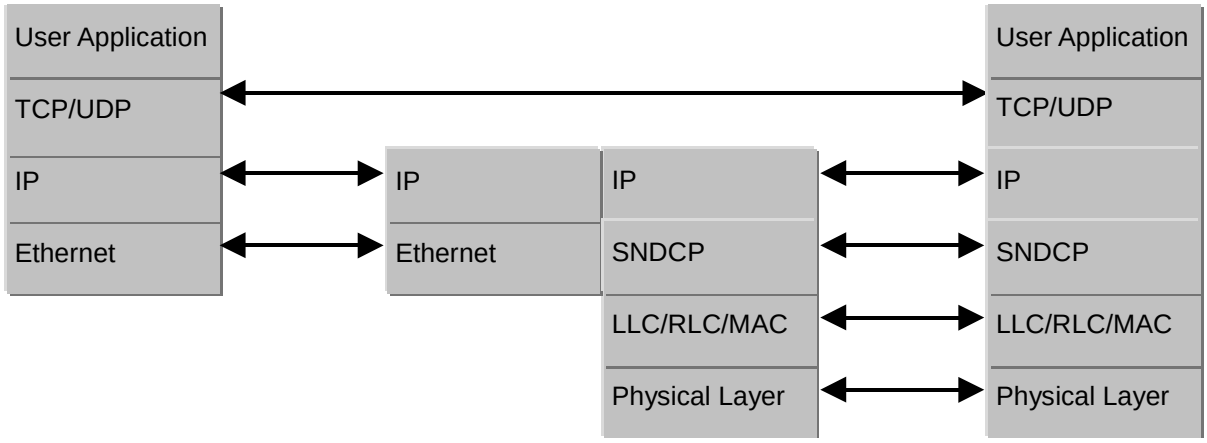
1. Execute CALLRSLT? 4 and confirm Registration is 1,0 (= executed, no errors).
2. Execute CALLRSLT? 5 and confirm the Origination status is 1,0 (= executed, no errors).

Each connection sequence can be preset using **CALLRFR command**

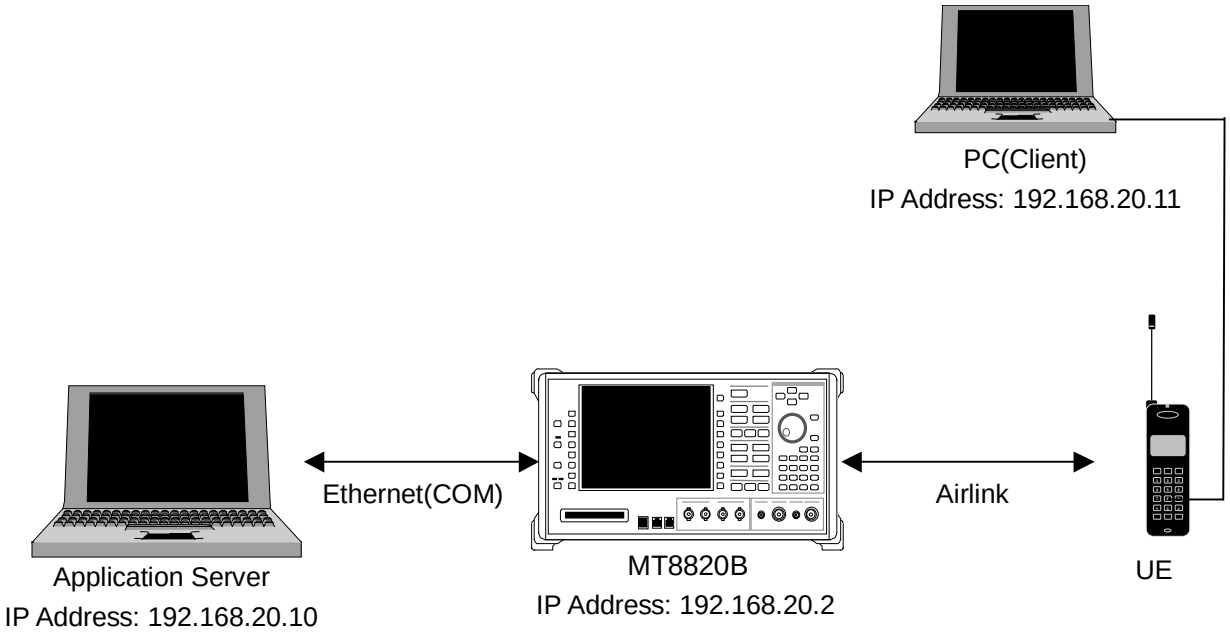
2.11.2. External Packet Data (Option MX882001C-002)

For GSM, GPRS packet connection can be tested using the MX882001C-002GSM External Packet Data option and Call Processing function. The connection system supports IP connections.

The equipment supports communications between the Server PC and Client PC by supporting the IP protocol over wireless interface and UE.



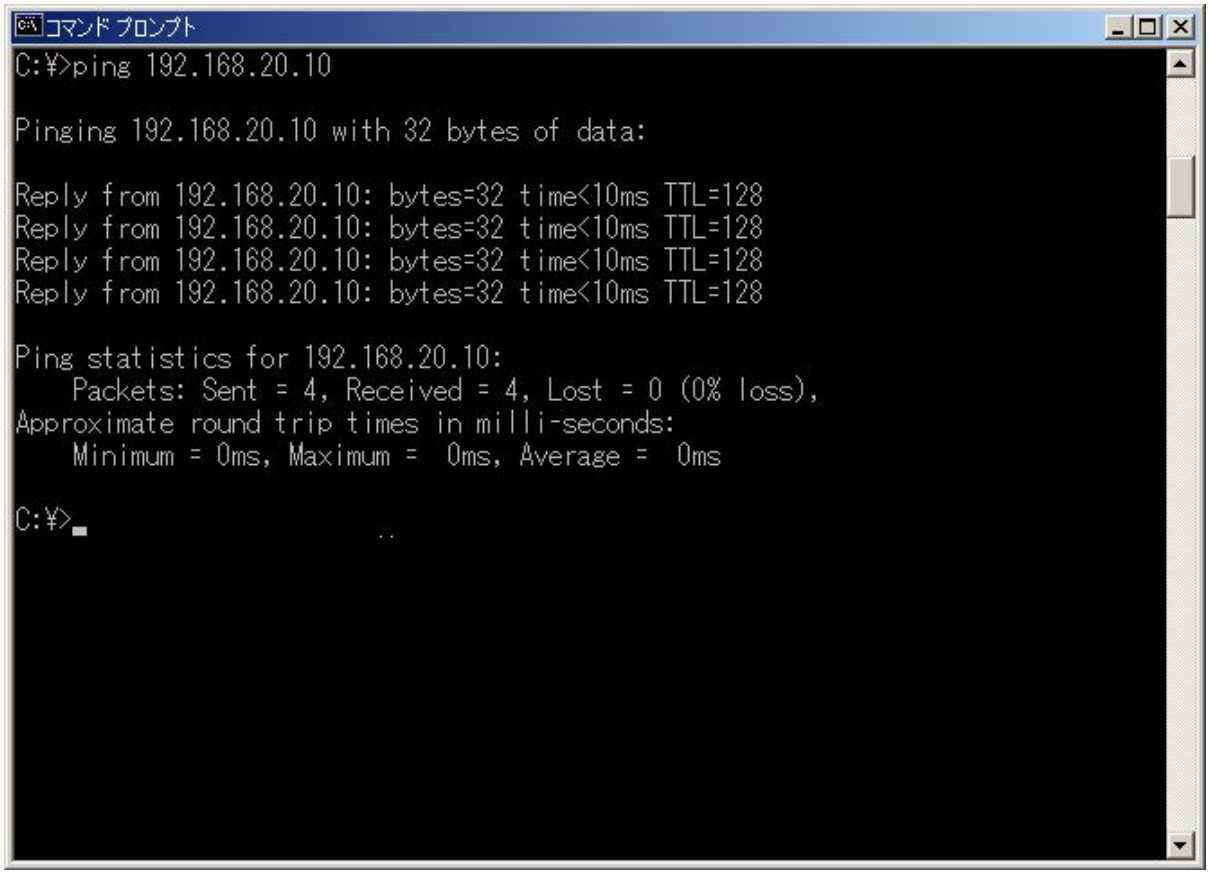
1. Connection without Gateway



<Items to prepare>
GSM UE with GPRS function
Server PC (Application Server)
Client PC (Client)
Crossover cable for connection between the equipment and Server PC

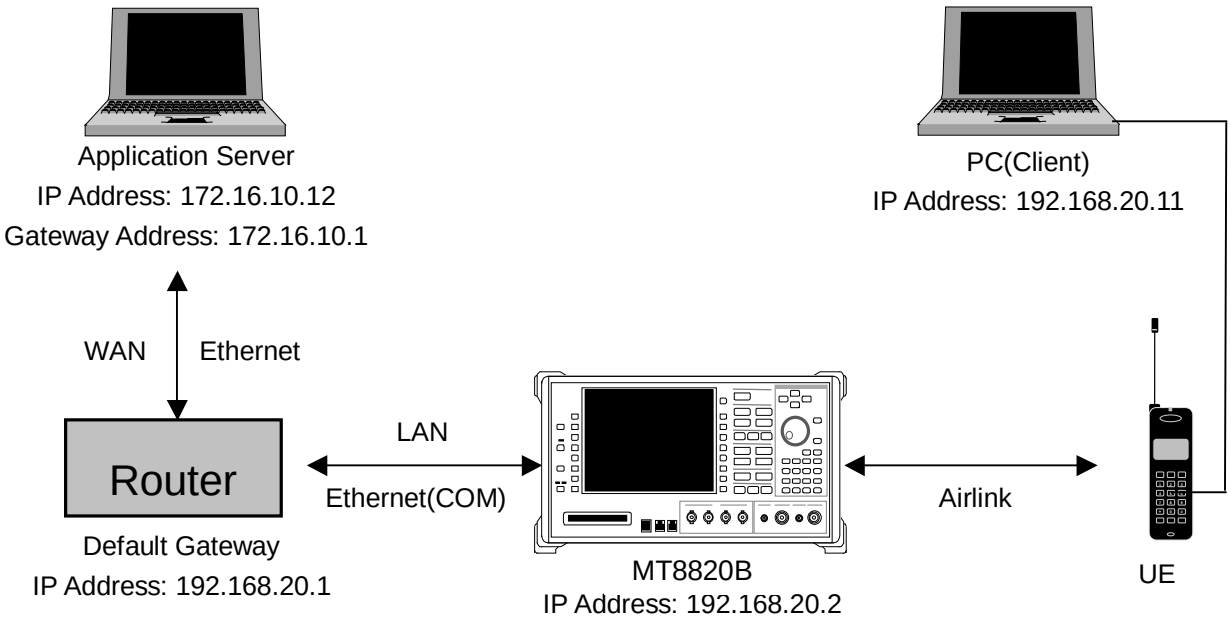
1. Set 10Base-T [IP Address] to the same segment on the System Config screen.
2. Set 10 Base-T[Subnet Mask] on System Config screen (Example: 255.255.255.0).

3. Set 10Base-T [Default Gateway] to the same IP address as the Application Server PC at the System Config screen.
   (If the IP packet has no address, the measuring instrument will search the address, taking more time. The equipment sends all IP packets of the Client PC to the Server PC to avoid delay. The setting is unnecessary if the Client PC only sends the Application Server IP Address).
4. Reload the GSM application at the Standard Load screen.
5. Set [Call Processing] of Common Parameter to [On].
6. Set [Operating Mode] of Common Parameter to [GPRS].
7. Set [Connection Type] of Common Parameter to [Ext. Packet Data].
8. Confirm that the DHCP setting of the Client PC is on.
9. Set [MS IP Address] of Call Processing Parameter. This IP address will be allocated to the Client PC.
10. Turn-on the UE to perform Attach.
    (Check the UE setting if the UE doesn't perform Attach at power-on.)
11. Execute dial-up connection after setting a password and user name for the Client PC.
    (Setting of the user name and password is not required for the measuring instrument.)
12. Call Processing turns on Activate and the equipment and UE can perform GPRS communications.
    (IP packet communications between the Server and Client is possible.)
13. The connection can be checked by executing the ping command from the Server PC or Client PC.
14. Data throughput can be measured by setting up an FTP server in the Server PC.
15. Dial-up connection is terminated by the Client PC.
16. Call Processing changes from Activated to Attached.



2. Connection with Gateway

Packet communications between different segments can be verified by connecting a gateway between the equipment and Server PC.



<Items to prepare>
GSM UE with GPRS function
Server PC (Application Server)
Client PC (Client)
Gateway
Straight-through cable for connection between equipment and Gateway and between Server PC and Gateway.

1. Set 10Base-T [IP Address] (main frame IP address) to the same segment as Gateway at the System Config screen.
2. Set 10Base-T [Default Gateway] and [Subnet Mask] at the System Config screen. At this time, the Default Gateway IP address is set to the same IP address on the LAN side of Router. (For example, if the Default Gateway address is 192.168.20.1, set the LAN IP address to 192.168.20.1).
3. Reload the GSM application at the Standard Load screen.
4. Set [Call Processing] of Common Parameter to [On]
5. Set [Operating Mode] of Common Parameter to [GPRS].
6. Set [Connection Type] of Common Parameter to [Ext. Packet Data].
7. Confirm that the Client PC DHCP setting is on.
8. Set [MS IP Address] of Call Processing. This address is allocated to the Client PC at connection.
9. Turn-on the UE to perform Attach.
   (Check the UE setting if the UE does not perform Attach at power-on.).
10. Execute dial-up connection after setting a password and user name for the Client PC .
    (Setting of the user name and password is not required for the measuring instrument.)
11. Call Processing turns on Activate and the equipment and UE can perform GPRS communications.
    (IP packet communications between Server and Client is possible.)
12. The connection can be checked by executing the ping command from the Server or Client PC.
13. Data throughput can be measured by setting up an FTP server in the Server PC.
14. The dial-up connection is terminated at the Client PC.
15. Call Processing changes from Activated to Attached.

2.12. Calibration Measurement Function

Refer to the Application Note for UE Calibration about the Calibration Measurement Function.

2.12.1. Adjustment of Orthogonal Modulator by TXIQ Measurement

When adjusting the orthogonal modulator of a GSM UE, the carrier frequency and ±67.708 kHz (symbol rate/4) offset power are measured by outputting a rotating pattern from the UE. The TXIQ function measures the power of frequency points to adjust the orthogonal modulator. Measurement is performed with RBW = 30 kHz.
Although TXIQ measurement is performed as a part of modulation analysis by the equipment, the measurement results are not displayed on-screen and can only be acquired by remote command.

[Measurement parameter]
TXIQ measurement is executed after setting the parameters shown in Table 2.8.2-1.
TXIQ measurement is performed as part of modulation analysis. Therefore, ON/OFF setting and average number of measurements follow the modulation analysis parameters.

Table 2.8.2-1: TXIQ Measurement Parameter Setting

No	Parameter	Setting
1	Call Processing	OFF
2	Measuring Object	Continuous
3	Modulation Analysis	ON
4	Average Count of Modulation Analysis	Also Average Count of TXIQ measurement

[Remote command]
TXIQ measurement is executed simultaneously by setting the parameters shown in Table 2.8.2-1 and performing Fundamental measurement. However, the measurement result is not displayed on-screen and must be acquired by remote command. Commands for reading the TXIQ measurement result are shown in Table 2.8.2-2.

Table 2.8.2-2: Query commands of TXIQ measurement result

No	Command	Function
1	AVG_TXIQ?	Queries average value of TXIQ measurement result
2	MAX_TXIQ?	Queries maximum value of TXIQ measurement result
3	MIN_TXIQ?	Queries minimum value of TXIQ measurement result

The responses to read commands are shown below.

p1, p2, p3, p4, p5, p6, p7, p8, p9

frequency offset
Each frequency offset power is mentioned from p1 to p9 in dBm units.
Offset frequencies are –270.833 kHz, –203.125 kHz, –135.417 kHz, –67.708 kHz, 0 kHz (carrier frequency), +67.708 kHz, +135.417 kHz, +203.125 kHz, and +270.833 kHz.

[Example of remote control]
Performing TXIQ measurement with Average Count 10 and read maximum value.

```
send( “CALLPROC OFF” );        /* Call Processing OFF */
send( “MEASOBJ CONT” );        /* Set Measuring Object to Continuous */
send( “MOD_MEAS ON” );         /* Turn on modulation analysis */
send( “MOD_COUNT 10” );        /* Set Average Count of modulation analysis to 10 */
-- Start UE Signal Output --
send( “SWP” );                 /* Start Measurement */
send( “MSTAT?” );              /* Measurement Status Reading Command */
read( status );                /* Measurement Status Reading Command */
send( “MAX_TXIQ?” );           /* TXIQ Measurement Result Reading Command */
read( result );                /* TXIQ Measurement Result Reading Command */
```

2.13. Others

2.13.1. External Loss

The equipment supports setting of external loss, such as cable loss, as offset values.
There are two methods for setting external loss:

- ・Setting external loss for GSM only
- ・Setting common external loss for other standards (See 1.13.3 External Loss for details.)

An example of how to set external loss for GSM is shown below.
External loss values can be set for Main DL, Main UL, and Aux of each three Bands.

The relationship between band and frequency is shown in Table 2.13-1.

Table 2.13-1: External Loss Band and Freq. Relationship

	Band 1	Band 2	Band 3
Frequency range	30.000000 MHz to 799.999999 MHz	800.000000 MHz to 1599.999999 MHz	1600.000000 MHz to 2700.000000 MHz
GSM Band	GSM450 GSM480 GSM710 GSM750	P-GSM900 E-GSM900 R-GSM900 GSM850 T-GSM810	DCS1800 PCS1900

Examples of how to set the Band 2 Main DL loss to 0.12, the Band 2 Main UL loss to 0.34, the Band 3 Main DL loss to 0.98, and the Band 3 Main UL loss to 0.76 are shown below.

1. Execute **DLEXTLOSS BAND2,0.12** to set [Main DL Band 2] to [0.12] dB.
2. Execute **ULEXTLOSS BAND2,0.34** to set [Main UL Band 2] to [0.34] dB.
3. Execute **DLEXTLOSS BAND3,0.98** to set [Main DL Band 3] to [0.98] dB.
4. Execute **ULEXTLOSS BAND3,0.76** to set [Main UL Band 3] to [0.76] dB.
5. Execute **EXTLOSSW ON** to set [External Loss] to [On].

*The operation when setting External Loss differs according to the version.
Sometimes, the I/O level may be changed unexpectedly when setting parameters at tracking operation.
After setting the measurement conditions (external loss, frequency, etc.), always set the I/O level before starting measurement (W/G, TDS only)
The specifications have been changed for version V20.00 and later so the I/O level does not change when changing the external loss and frequency settings.

2.13.2. Power Control (SACCH Channel)

When using SACCH Channels to change PCL (Power Control Level), the signal level from the UE changes 2 dB every 60 ms (13TDMA Frame).

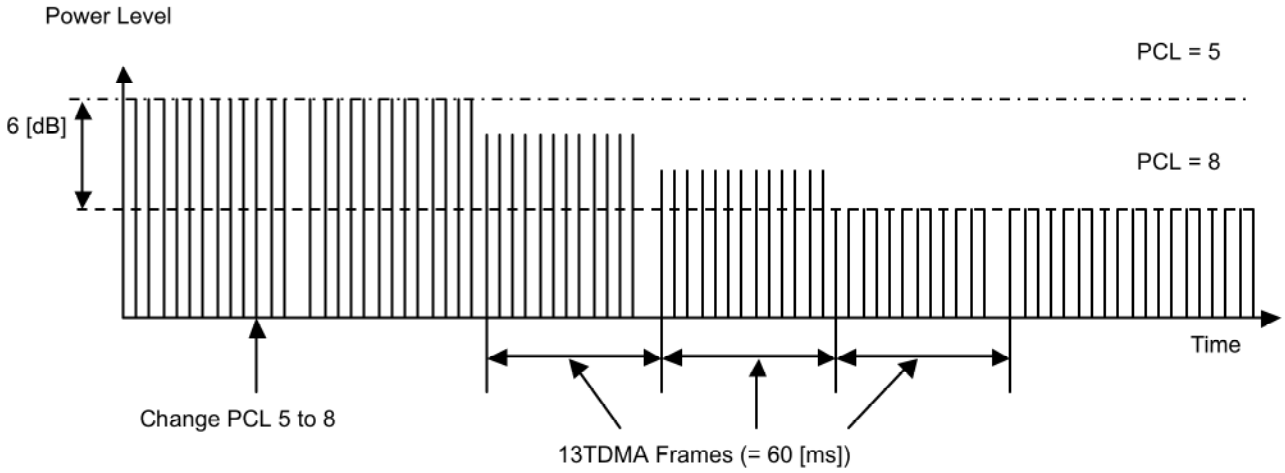


Fig. 2.13-1: Power Control using SACCH Channel (changing from PCL 5 to 8)

The procedures explaining how to measure each PCL signal level using this operation are shown below.

1. Connect using UE. (Refer to 2.3.1 to see the connection with GSM.)
2. Execute **ALLMEASITEMS ON,OFF,1,OFF,OFF,OFF,OFF,OFF,OFF,1,OFF,OFF,1,OFF,OFF,1,OFF,OFF**, to set only [Power Measurement] to [On] and to set [Average Count] to [1] time.
3. Execute **MEASMODE FAST** to set [Measurement Mode] to [FAST] (no graphical display, numeric data only).
4. Execute **MSPWR 5** to set [MS Power Level](PCL) to [5].
5. Execute **ILVLCTRL MANUAL** to set [Input Level Control] to [Manual] in order to fix INPUT LEVEL to the setting at PCL 5.
6. Execute **MSPWRCTRL SACCH** to set the channel to notify change of Power Control Level to SACCH.
   (This can be changed only by GPIB command. It cannot be changed on-screen.)
7. Execute **MSPWR 15** to change [MS Power Level](PCL) to [15].
8. Execute **SWP;TXPWR?** and repeat the measurement until PCL changes.
   (If PCL is changed from 5 to 15, at least 1.6 s should be allowed, because the time to change power will be 600 ms and there is also delay between the UE and PC (960 ms max.). Therefore, repeat measurement.)
9. Execute **MSPWRCTRL FACCH to set** the channel to notify the change of Power Control Level to FACCH.

Detect each PCL Power Level from the result of procedure 8.

[Example]

MSPWR 15 0		Change [MS Power Level](PCL) from [5] to [15].
SWP;TXPWR?	33.12	Repeat measurement execution (SWP) and read measurement result.
SWP;TXPWR?	33.12	PCL=5
SWP;TXPWR?	33.12	PCL=5
SWP;TXPWR?	33.12	PCL=5
SWP;TXPWR?	33.13	PCL=5
SWP;TXPWR?	33.13	PCL=5
SWP;TXPWR?	33.12	PCL=5
SWP;TXPWR?	33.12	PCL=5
SWP;TXPWR?	33.12	PCL=5
SWP;TXPWR?	33.12	PCL=5
SWP;TXPWR?	33.12	PCL=5
SWP;TXPWR?	30.73	PCL=6
SWP;TXPWR?	29.20	PCL=7

SWP;TXPWR?	27.05	PCL=8
SWP;TXPWR?	24.90	PCL=9
SWP;TXPWR?	22.90	PCL=10
SWP;TXPWR?	20.81	PCL=11
SWP;TXPWR?	18.68	PCL=12
SWP;TXPWR?	16.75	PCL=13
SWP;TXPWR?	14.71	PCL=14
SWP;TXPWR?	12.81	PCL=15
SWP;TXPWR?	12.80	PCL=15
SWP;TXPWR?	12.80	PCL=15
SWP;TXPWR?	12.80	PCL=15
SWP;TXPWR?	12.79	PCL=15
SWP;TXPWR?	12.80	PCL=15

Because the SWP; TXPWR? speed depends on the performance of the PC controller, sometimes the PCL timing changes and the measurement result is captured more than twice. In this case, either adjust the actual speed or estimate from the measurement result.

2.13.3. MS-TXPWR-MAX-CCH

At measurement of 3GPP TS51.010, when MS-TXPWR-MAX-CCH is not specified, the setting of MS-TXPWR-MAX-CCH is set to the maximum Tx power.
MS-TXPWR-MAX-CCH is used as Cell Selection Parameter to evaluate whether the UE holds the connection when the BS power is low.
Therefore when the setting is high, the connection is easier to disconnect at BER measurement at Reference Sensitivity level.

Table 2.13-3: Maximum Output Power and Power Class Relationship at GMSK Modulation

Power class	GSM 400 & GSM 900 & GSM 850 & GSM 700 Nominal maximum output power	DCS 1 800 Nominal maximum output power	PCS 1 900 Nominal maximum output power
1	- - - - - -	1 W (30 dBm)	1 W (30 dBm)
2	8 W (39 dBm)	0, 25 W (24 dBm)	0, 25 W (24 dBm)
3	5 W (37 dBm)	4 W (36 dBm)	2 W (33 dBm)
4	2 W (33 dBm)		
5	0, 8 W (29 dBm)		

Table 2.13-4: Maximum Output Power and Power Class Relationship at 8PSK Modulation

Power class	GSM 400 and GSM 900 & GSM 850 & GSM 700 Nominal maximum output power	DCS 1 800 Nominal maximum output power	PCS 1 900 Nominal maximum output power
E1	33 dBm	30 dBm	30 dBm
E2	27 dBm	26 dBm	26 dBm
E3	23 dBm	22 dBm	22 dBm

When measuring using a GSM UE of Power Class 4 (33 dBm max. Tx power), set ms_TXPWR_MAX_CCH to 5.
The ms_TXPWR_MAX_CCH setting is the same Power Control Level as the MS Power Level (section 2.13-5).

An example of how to set ms_TXPWR_MAX_CCH to 5 is shown below.
1. Execute **MSPWR_CCH 5** to set [MS_TXPWR_MAX_CCH] to [5].

Table 2.13-5: PCL Setting and Output Power Relationship

GSM 400, GSM 900, GSM 850 and GSM 700

Power control level	Nominal output power (dBm)
0 to 2	39
3	37
4	35
5	33
6	31
7	29
8	27
9	25
10	23
11	21
12	19
13	17
14	15
15	13
16	11
17	9
18	7
19 to 31	5

DCS 1 800

Power control level	Nominal output power (dBm)
29	36
30	34
31	32
0	30
1	28
2	26
3	24
4	22
5	20
6	18
7	16
8	14
9	12
10	10
11	8
12	6
13	4
14	2
15-28	0

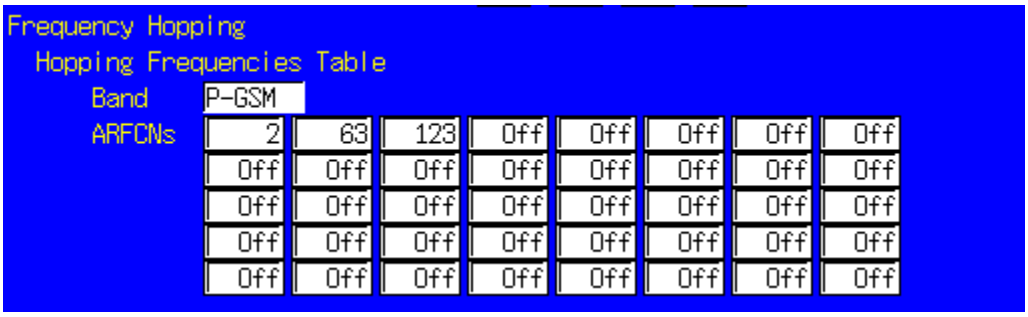
PCS 1 900	
Power control level	Output power (dBm)
22 to 29	Reserved
30	33
31	32
0	30
1	28
2	26
3	24
4	22
5	20
6	18
7	16
8	14
9	12
10	10
11	8
12	6
13	4
14	2
15	0
16 to 21	Reserved

2.13.4. Frequency Hopping

Frequency hopping changes the communication channel between the base station and UE using a communication frame in the same band.
Six hopping bands (P-GSM, E-GSM, R-GSM, GSM850, DCS1800, PCS1900) are supported. Also, up to 40 hopping channels can be set in one hopping band.
Frequency hopping is performed to measure ARFCN set in Measure Channel & Frequency.

A measurement example for 63CH is show below.

1. Execute **PRESET** to preset the parameters.
2. Execute **FREQSETMODE BAND** to set [Setting Mode] to [Band and Channel].
3. Execute **HOPFREQ P-GSM,2,63,123** to set [ARFCNs] to [2, 63, 123] for the Hopping Frequency Table P-GSM Band.
4. Execute **FREQHOP ON** to set [Frequency Hopping] to [On].
5. Execute **BAND P-GSM** to set [Hopping Band] to [P-GSM].
6. Execute **CHAN 2** to set [Measure Channel & Frequency] to [2].
7. Connect using GSM.
8. Perform measurement.
9. Execute **CHAN 63** to set [Measure Channel & Frequency] to [63].
10. Perform measurement.



2.13.5. Multislot Power vs. Time Measurement

The Multislot Power vs. Time Measurement measures the TX Power and Power vs. Time for multislot output from the mobile station (MS).
Up to four slots can be measured according to the Uplink setting at the Multislot Configuration.
This function can only be executed by remote command.

1. Execute **MLTSLTCFG 2DL2UL** to set [Multi Slot Configuration] to [2DL, 2UL], meaning 2 slot each for Downlink and Uplink.
2. Execute **CS MCS5** to set [Coding Scheme] to [MCS-5].
3. Connect at Test Mode A.
4. Execute **CHMSPWR ,15,5** to change MS Power Level - [1st Slot] to [15], MS Power Level - [2nd Slot] to [5].
5. Execute **MPWR_REF** to optimize the input level of the measurement slot.
6. Execute **MEASOBJ 8PSK** to set [Measuring Object] to [8PSK] (**MEASOBJ MSNB** when modulation method is GMSK).
7. Execute **MLTSLTVSTIME_MEAS ON** to set [Multislot Power vs. time Measurement] to [On].
8. Execute **MLTSLTVSTIME_COUNT 60** to set [Multislot Power vs. time Measurement Count] to [60].
9. Execute **MPWR_LEADTM 1,1,-28.0** to set 1st slot - [Multislot Power vs. Time Offset (Leading Time 1)] to [-28.0] µs.
10. Execute **MPWR_TRAILTM 1,1,542.8** to set 1st slot - [Multislot Power vs. Time Offset (Trailing Time 1)] to [-542.8] µs.
11. Execute **MPWR_LEADTM 2,1,-28.0** to set 2nd slot - [Multislot Power vs. Time Offset (Leading Time 1)] to [-28.0] µs.
12. Execute **MPWR_TRAILTM 2,1,542.8** to set 2nd slot - [Multislot Power vs. Time Offset (Trailing Time 1)] to [-542.8] µs.
13. Execute **SWP** to perform BLER measurement.
14. Execute **MSTAT?** to read measurement status. (0 is Normal termination.)

[1st slot measurement]

15. Execute **AVG_MTXPWR? 1,DBM** to read the 1st slot - Power measurement result.
16. Execute **MAX_MPTLEAD? 1,1** to read the 1st slot - Leading Time 1 measurement result.
17. Execute **MAX_MPTTRAIL? 1,1** to read the 1st slot - Trailing Time 1 measurement result.

[2nd slot measurement]

18. Execute **AVG_MTXPWR? 2,DBM** to read the 2nd slot - Power measurement result.
19. Execute **MAX_MPTLEAD? 2,1** to read the 2nd slot - Leading Time 1 measurement result.
20. Execute **MAX_MPTTRAIL? 2,1** to read the 2nd slot - Trailing Time 1 measurement result.

3. Audio Measurement

3.1. Specifications

Table 3.1-1: W-CDMA/GSM Voice Codec Option Specification

Item	Specification
Voice codec	W-CDMA: AMR 12.2 kbps GSM: EFR, AMR
Codec level adjustment	Encoder input gain: –3.00 to 3.00 dB, 0.01-dB steps Handset microphone volume: 0, 1, 2, 3, 4, 5 Handset speaker volume: 0, 1, 2, 3, 4, 5
AF Output	Frequency range: 30 Hz to 10 kHz, 1 Hz resolution Setting range: 0 to 5 Vpeak (AF Output connector) Setting resolution: 1 mV (≤5 Vpeak), 100 μV (≤500 mVpeak), 10 μV (≤50 mVpeak) Accuracy: ±0.2 dB (≥10 mVpeak, ≥50 Hz), ±0.3 dB (≥10 mVpeak, <50 Hz) Waveform distortion: ≤30 kHz band ≤–60 dB (≥500 mVpeak, ≤5 kHz), ≤–54 dB (≥70 mVpeak) Output impedance: ≤1 Ω Maximum output current: 100 mA
AF Input	Frequency range: 50 Hz to 10 kHz Input voltage range: 1 mVpeak to 5 Vpeak (AF Input connector) Maximum allowable input voltage: 30 Vrms Input impedance: 100 kΩ
Frequency measurement	Accuracy: ±(Reference oscillator accuracy +0.5 Hz)
Level measurement	Accuracy: ±0.2 dB (≥10 mVpeak, ≥50 Hz) ±0.4 dB (≥1 mVpeak, ≥1 kHz)
SINAD Measurement	Frequency: 1 kHz in ≤30 kHz band ≥60 dB (≥1000 mVpeak), ≥54 dB (>50 mVpeak), ≥46 dB (≥10 mVpeak)
Distortion measurement	Frequency: 1 kHz in ≤30 kHz band ≤–60 dB (≥1000 mVpeak), ≤–54 dB (>50 mVpeak), ≤–46 dB (≥10 mVpeak)

3.2. How to Use Voice Codec in W-CDMA

For W-CDMA, the Voice Codec can be used to connect with AMR12.2 kbps.
The MX882000C-001 option is required.

1. Execute **CALLPROC ON** to set [Call Processing] to [On].
2. Execute **TESTMODE OFF** to set [Test Loop Mode] to [Off].
3. Execute **CHCODING VOICE** to set [Channel Coding] to [Voice].
4. Execute **DTCHPAT VOICE** to set [DTCH Data Pattern] to [Voice CODEC].
5. When a connection is made, the Voice Codec function can be used.

3.3. How to Use Voice Codec in GSM

For GSM, the Voice Codec can be used for EFS, AFS, and AHS connection.
The MX882001A-01 option is required.

1. Execute **CODEC EFS** to set [Codec] to [EFS].
2. Execute **TESTPAT VOICE** to set [TCH Test Pattern] to [Voice CODEC].
3. When a connection is made, the Voice Codec function can be used.

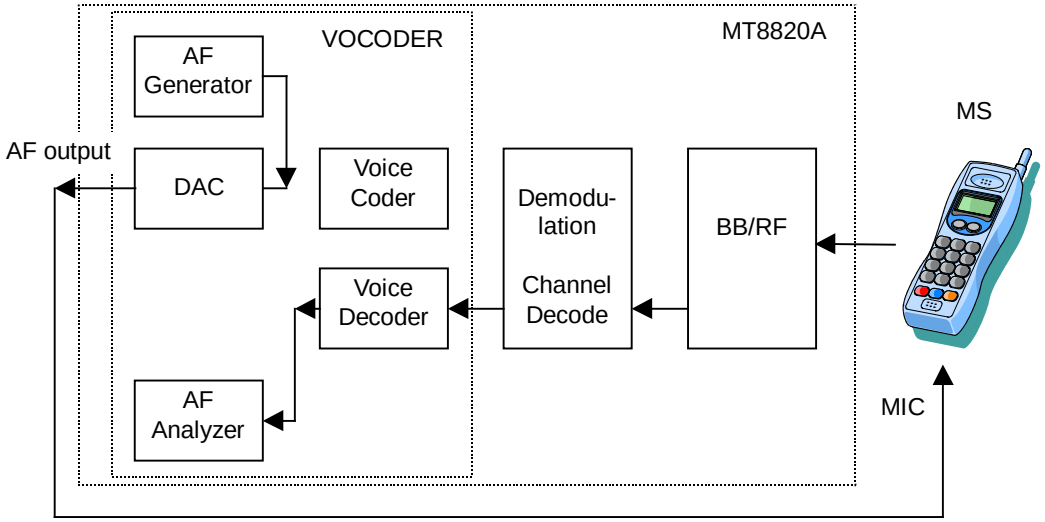
3.4. Communications Test

Communication tests can be performed by connecting a handset to the equipment.

1. Execute call processing with the Voice Codec setting.
2. Execute **AF_MODE VOICE** to set Audio Parameter [Mode] to [Voice CODEC].
3. Execute **AINOUT HANDSET** to set [Audio Input/Output] to [Handset].

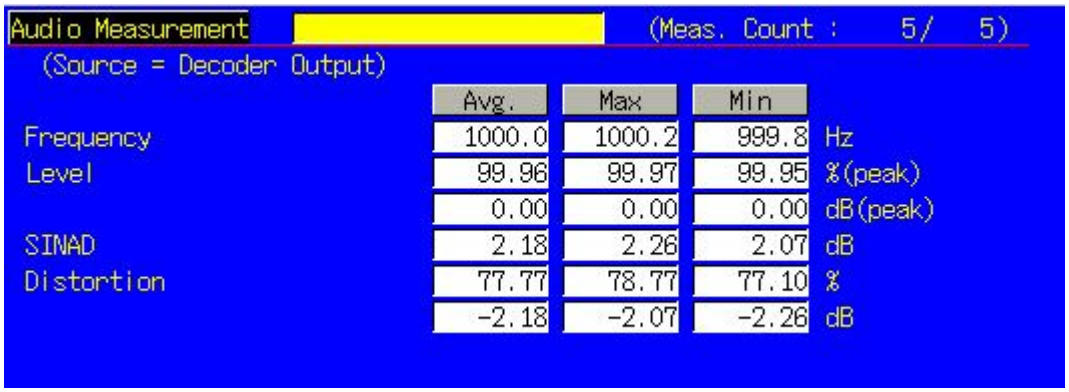
3.5. Tx Audio Measurement

When a tone signal from the equipment AF Output is input to MIC (microphone), the UE encodes the voice signal and transmits it as the uplink signal.
The equipment receives the uplink signal and inputs the decoded voice signal to the AF Analyzer to measure frequency, level and distortion rate.



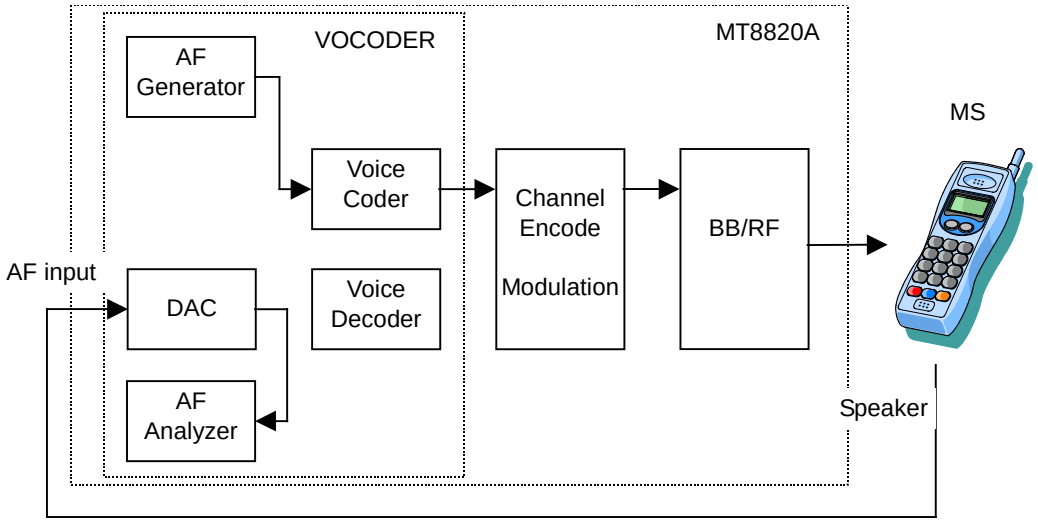
1. Execute call processing with the Voice Codec setting.
2. Execute **AF_MODE TXAUDIO** to set Audio [Mode] to [TX Audio].
3. Execute **AF_FREQ 1000** to set Tone Generator (AF Output) - [Frequency] to [1000] Hz.
4. Execute **AF_TGLVL 100** to set Tone Generator (AF Output) - [Level] to [100] mV (peak).
5. Execute **AF_MEAS ON** to set [Audio Measurement] to [On].
6. Execute **AF_AVG 5** to set [Average Count] of Audio Measurement to [5] times.
7. Execute **SWP** to perform Audio Measurement to Decoder Output signal.
8. Execute **AVG_AFFREQ?** to read the Frequency measurement result.
9. Execute **AVG_TAFLVL?** to read the Level measurement result.
10. Execute **AVG_AFDSTN_DB?** to read the distortion rate measurement result.

When changing the system, set AF Mode to Voice Codec.



3.6. Rx Audio Measurement

The equipment encodes the tone signal generated by the AF Generator and sends it as the downlink signal.
The UE decodes the received downlink signal and outputs the voice signal from the speaker.
The voice signal is input to the equipment AF Input and the AF Analyzer measures the frequency, level and distortion rate.



1. Execute call processing with the Voice Codec setting.
2. Execute **AF_MODE RXAUDIO** to set Audio Parameter [Mode] to [RX Audio].
3. Execute **AF_FREQ 1000** to set Tone Generator (Encoder Input) - [Frequency] to [1000] Hz.
4. Execute **AF_EILVL -6** to set [Tone Generator (Encoder Input) - [Encoder Input Level] to [–6] dB.
5. Execute **AF_IRANGE 500** to set Audio Analyzer (AF Input) - [Input Level Range] to [500 mV(peak)].
6. Execute **AF_MEAS ON** to set [Audio Measurement] to [On].
7. Execute **AF_AVG 5** to set [Average Count] of Audio Measurement to [5] times.
8. Execute **SWP** to perform Audio Measurement of the AF Input signal.
9. Execute **AVG_AFFREQ?** to read the Frequency measurement result.
10. Execute **AVG_RAFLVL?** to read the Level measurement result.
11. Execute **AVG_AFDSTN_DB?** to read the distortion rate measurement result.

When changing the system, set AF Mode to Voice Codec.

3.7. General-purpose Audio Generator/Analyzer

The equipment can be used as a general-purpose audio generator/analyzer.

1. Execute **AF_MODE GENERAL** to set Audio Parameter [Mode] to [General Audio].

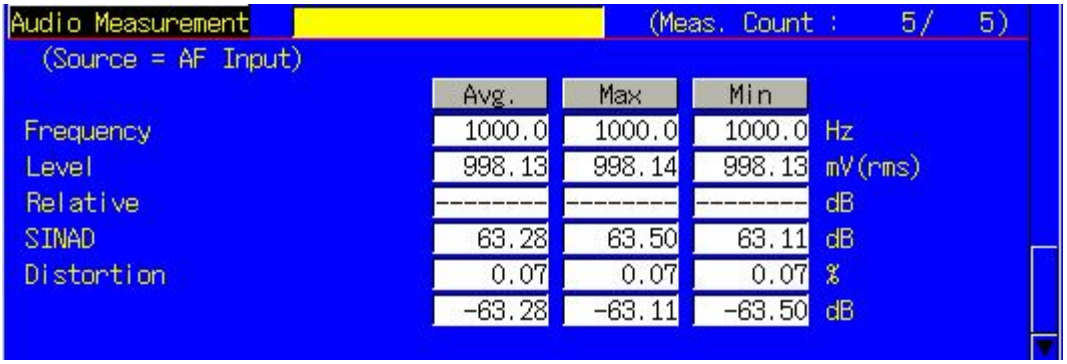
Audio Generator Function

2. Execute **AF_FREQ 1000** to set Tone Generator - [Frequency] to [1000] Hz.
3. Execute **AF_TGLVL 1000** to set Tone Generator - [Level] to [–1000] mV/(peak).
4. The AF Output outputs a 1 kHz/1000 mV tone signal.

Audio Analyzer Function

5. Execute **AF_MEAS ON** to set [Audio Measurement] to [On].
6. Execute **AF_AVG 5** to set [Average Count] of Audio Measurement to [5] times.
7. Execute **SWP** to perform Audio Measurement of the AF Input signal.
8. Execute **AVG_AFFREQ?** to read the Frequency measurement result.
9. Execute **AVG_RAFLVL?** to read the Level measurement result.
10. Execute **AVG_AFDSTN_DB?** to read the distortion rate measurement result.

When changing the system, set AF Mode to Voice Codec.

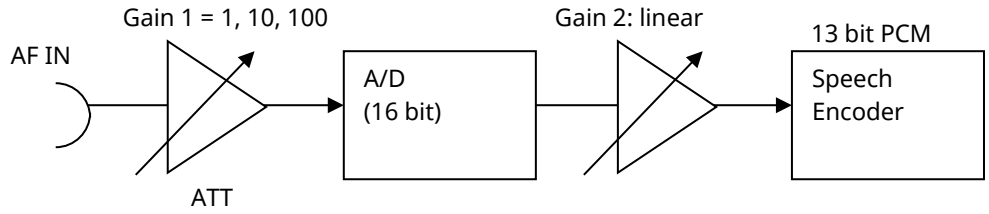


3.8. Full Scale of AF Input/Output when Using Voice Codec

The following shows an example of Full Scale when the AF Mode is Voice Codec and AF Input/Output is AF.

3.8.1. AF Input

Full Scale and Gain Adjust are parameters related to AF Input.
Full Scale is the AF input level corresponding to the full scale of the speech encoder.
The equipment selects the range from 5 V to 500 mV, 500 to 50 mV, 50 to 1 mV using the ATT, and lower resolutions are executed by digital Gain Adjust.
In addition, the Full Scale offset can be input to Gain Adjust.

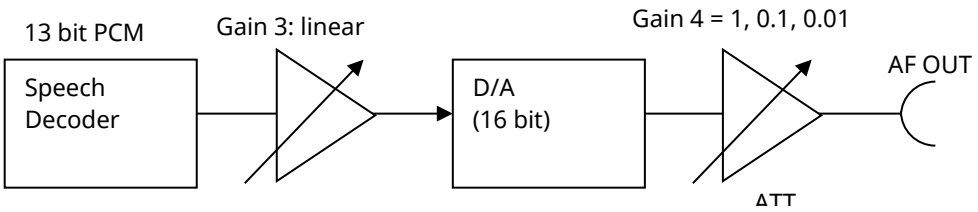


A/D Full Scale = 10 Vp

AF Input Parameter		Internal Gain	
Full Scale (1 mV to 5 Vpeak)	Gain Adjust [dB] (–3.0 to +3.0 dB)	Gain 1	Gain 2
5 Vpeak	0.0	1	10/5/8 = 0.25
500 mVpeak	0.0	10	10/(0.5*10)/8 = 0.25
51 mVpeak	0.0	10	10/(0.051*10)/8 = 2.45
50 mVpeak	0.0	100	10/(0.05*100)/8 = 0.25
x (0.5 V to 5 Vpeak)	y	1	10/x/8*10^(y/20)
x (50 mV to 0.5 Vpeak)	y	10	10/(x*10)/8*10^(y/20)
x (to 50 mVpeak)	y	100	10/(x*100)/8*10^(y/20)

3.8.2. AF Output

Full Scale is a parameter related to AF Output
Full Scale is the AF output level corresponding to the full scale of the speech decoder.
The equipment selects the range from 5 V to 500 mV, 500 to 50 mV, +50 mV, using the ATT, and lower resolutions are executed by digital Gain Adjust.



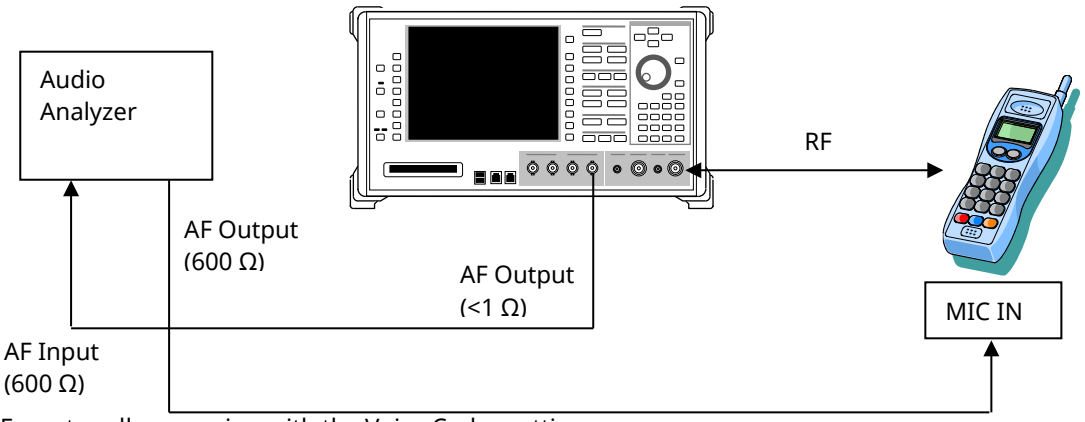
D/A Full Scale = 10 Vp

AF Output Parameter	Internal Gain	
Full Scale (to 5 Vpeak)	Gain 3	Gain 4
5 Vpeak	5/10*8 = 4	1
500 mVpeak	0.5/(10*0.1)*8 = 4	0.1
51 mVpeak	0.051/(10*0.1)*8 = 0.4	0.1
50 mVpeak	0.05/(10*0.01)*8 = 4	0.01
x (0.5 V to 5 Vpeak)	x/10*8	1
x (50 mV to 0.5 Vpeak)	x/(10*0.1)*8	0.1
x (to 50 mVpeak)	x/(10*0.01)*8	0.01

3.9. Audio Measurement

An example of how to measure audio in compliance with 3GPP TS 26.131 and 26.132 is shown below.
An external audio generator/analyzer are required for this measurement.

3.9.1. Tx Measurement



1. Execute call processing with the Voice Codec setting.
2. Execute **AF_MODE VOICE** to set Audio Parameter [Mode] to [Voice CODEC].
3. Execute **AINOUT AF** to set [Audio Input/Output] to [AF].
4. Execute **AOFLSCL 1110** to set AF Output [Full Scale] to [1110] mV (peak).
5. Transmit an audio signal from Audio Generator and perform audio measurement using the Audio Analyzer.

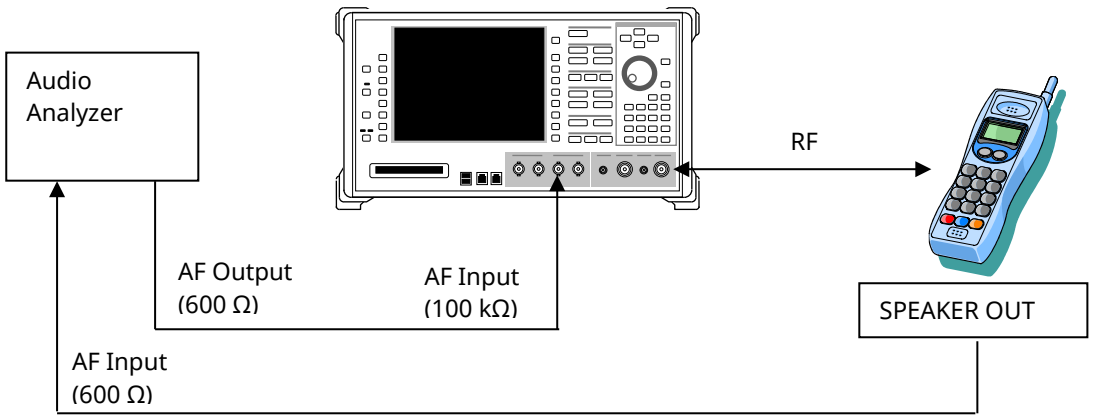
The AF Output Full Scale is calculated as shown in <Calculation> below, based on the following D/A converter <Condition> described in 3GPP TS 26.132 5.2.1 Codec Approach and Specification.
<Condition>

D/A converter - a Digital Test Sequence (DTS) representing the codec equivalent of an analogue sinusoidal signal whose r ms value is 3,14 dB below the maximum full load capacity of the codec shall generate 0 dBm across a 600 ohm load;

<Calculation>

For 0 dBm, if the impedance is 600 Ω, the voltage will be 774.6 mV.
If a 0-dBm sinusoidal signal of less than 3.14 dB is output at the full load capacity of the codec, it can satisfy the condition. Therefore, the AF Output Full Scale becomes 774.6*10^(3.14/20) = 1110 mV.

3.9.2. Rx Test



1. Execute call processing with the Voice Codec setting.
2. Execute **AF_MODE VOICE** to set Audio Parameter [Mode] to [Voice CODEC].
3. Execute **AINOUT AF** to set [Audio Input/Output] to [AF].
4. Execute **AIFLSCL 2210** to set AF Input [Full Scale] to [2210] mV (peak).
5. Send an audio signal from the Audio Generator and perform audio measurement using the Audio Analyzer.

The AF Input Full Scale is calculated as shown in <Calculation> below, based on following A/D converter <Condition> described in 3GPP TS 26.132 5.2.1 Codec Approach and Specification.

<Condition>

A/D converter - a 0 dBm signal generated from a 600 Ω source shall give the digital test sequence (DTS) representing the codec equivalent of an analogue sinusoidal signal whose R MS value is 3.14 dB below the maximum full-load capacity of the codec.

<Calculation>

Regarding 0 dBm, if the impedance is 600 Ω, the voltage will be 774.6 mV. However, the input impedance of the MT8820A is 100 kΩ, so the input voltage will be 774.6*2 = 1549 mV.

To meet the condition, the 0-dBm sinusoidal signal shall be 3.14 dB below the full load capacity of the codec. Therefore, the AF Input Full Scale becomes 1549*10^(3.14/20) = 2220 mV.

Appendix A Inner Loop Power Control Measurement(Previous procedure)

The following measurement uses Inner Loop Power Control measurement on Time Domain Measurement screen. Due to limits on the equipment dynamic range (40 dB), Test Steps E, F, G, and H cannot be measured simultaneously, so measurement must be performed twice by changing the Input Level.

1. Execute **SCRSEL TDMEAS** to display the Time Domain Measurement screen.
2. Execute **MEASOBJ ILPC** to set [Measurement Object] to [Inner Loop Power Control].
3. Execute **SLOTLIST ON** to display the slot list.
4. Execute **REGSLOTLIST 0-59** to register Slot0~Slot59 for the slot list.
5. Execute **TIMSPAN 40.0MS** to set [Time Span] of Time Domain measurement to [40.0] ms.
6. Execute **OLVL -93** to set [Output Level] to [–93] dBm.
7. Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
8. Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
9. Execute **TDM_RRC OFF** to set [RRC Filter] to [Off].
10. Execute **VFILTLEN 0.1US** to set [Video Filter Length] to [0.1] µs.
11. Connect using Test Loop Mode1.

A.1 Inner Loop Power Control Parameter

Inner Loop Power Control Parameter of Call Processing Parameter is the steady-state setting of the TPC command. When Power Control Bit Pattern is set to [Inner Loop Power Control], the TPC command is sent automatically to adjust UE output power to Input Level.

In the case of Inner Loop Power Control Parameter of Time Domain Parameter, the TPC command between Slot 0 and the specified Slot is set only when Measurement Object of Time Domain Measurement is measured using Inner Loop Power Control. After sending the specified number of slots, the TPC command set at Call Processing Parameter is sent.

Sometimes, at Inner Loop Power Control measurement, the UE output power must be set lower (or higher) than [Input Level] before measurement.
Examples of how to set Input Level to +30 dBm and UE output power to -10 dBm are shown below.

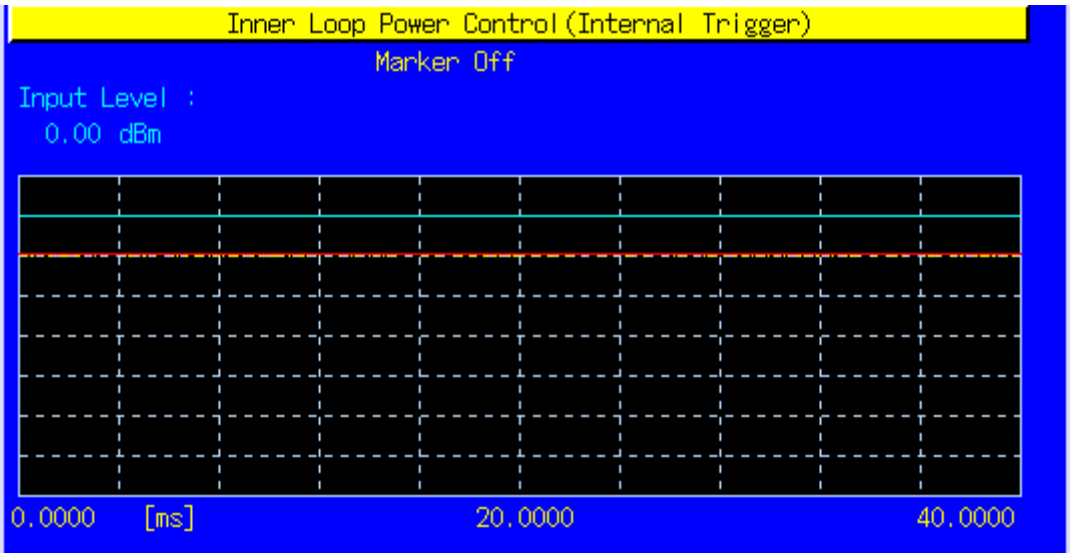
1. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
2. Execute **ILVL -10.0** to set [Input Level] to [–10.0] dBm.
3. Wait until the UE power is –10.0 dBm.
4. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
5. Execute **ILVL 30.0** to set [Input Level] to [+30.0] dBm.

Function		Command	Query	Response	Remarks
Call Processing Parameter - Inner Loop Power Control					
Power Control Algorithm	Algorithm 1	TPCALGO 1	TPCALGO?	1	
	Algorithm 2	TPCALGO 2		2	
TPC Step Size	1 dB	TPCSTEP 1	TPCSTEP?	1	
	2 dB	TPCSTEP 2		2	
Power Control Bit Pattern	All 0	TPCPAT ALL0	TPCPAT?	ALL0	
	All 1	TPCPAT ALL1		ALL1	
	Alternate	TPCPAT ALT		ALT	
	Inner Loop Power Control	TPCPAT ILPC		ILPC	
Time Domain Parameter - Inner Loop Power Control					
ILPC TPC Method	Step A	ILP_TPC A	ILP_TPC?	A	
	...	...		...	
	Step H	ILP_TPC H		H	
ILPC TPC Command Slot Length		ILP_CMDSLOT method, length	ILP_CMDSLOT? method	length	method =B to H length = 1 to 450 slot

A.2 5.4.2 Inner Loop Power Control in Uplink

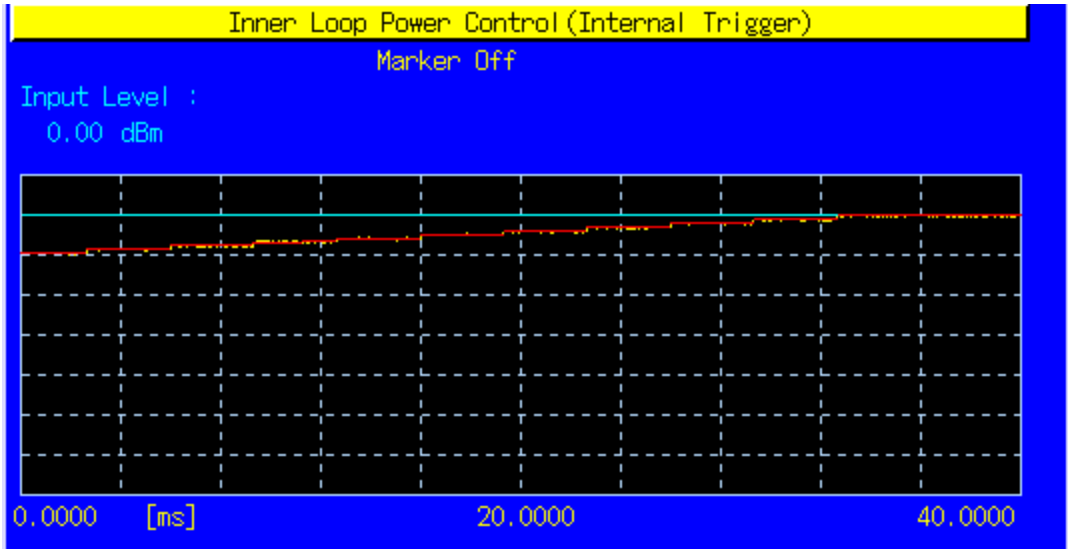
[Step A]

23. Execute **ILP_TPC A** to set [TPC Method] to [Step A].
24. Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
25. Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
26. Execute **TPCPAT ILPC** to set [Power Control Bit Pattern] to [Inner Loop Power Control].
27. Execute **ILVL -10.0** to set [Input Level] to [–10.0] dBm.
28. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
29. Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
30. Execute **SWP** to perform measurement.
31. Execute **SLOT_PWR? ALL** to read the measurement result.



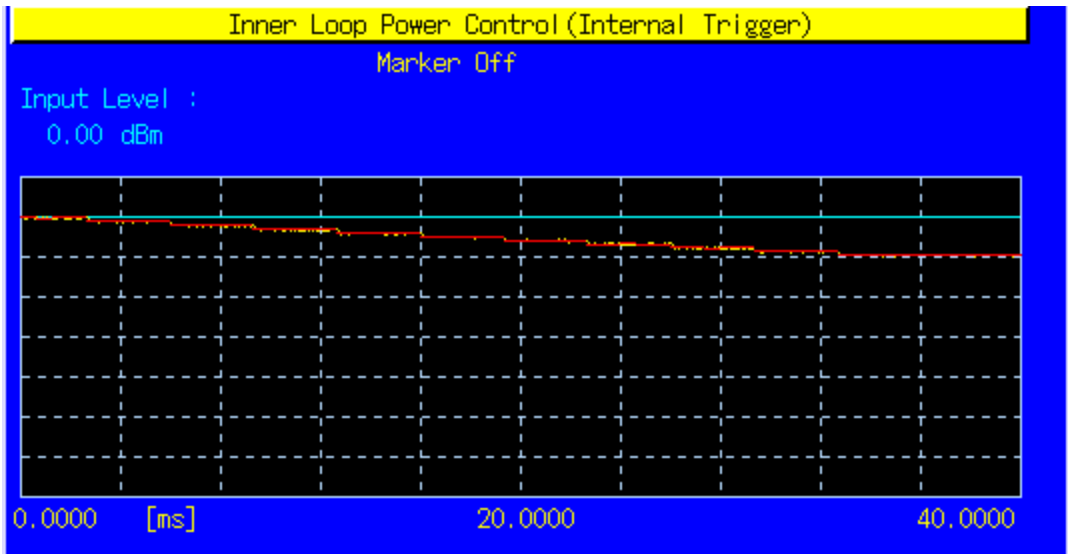
[Step B]

32. Execute **ILP_TPC B** to set [TPC Method] to [Step B].
33. Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
34. Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
35. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
36. Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
37. Execute **SWP** to perform measurement.
38. Execute **SLOT_PWR? ALL** to read the measurement result.



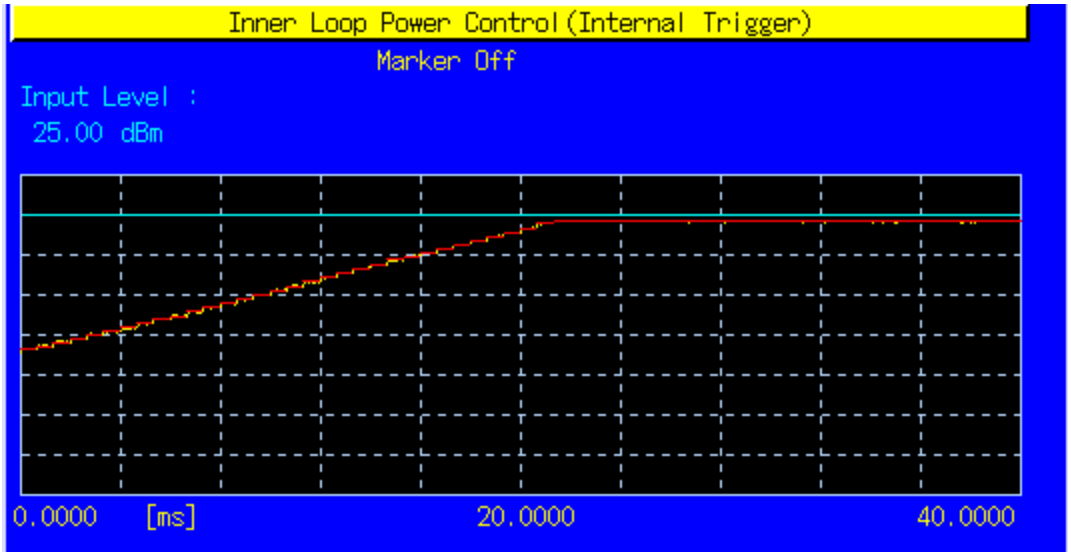
[Step C]

39. Execute **ILP_TPC C** to set [TPC Method] to [Step C].
40. Execute **TPCALGO 2** to set [Power Control Algorithm] to [Algorithm 2].
41. Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
42. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
43. Execute **ILVL 0.0** to set [Input Level] to [0.0] dBm.
44. Execute **SWP** to perform measurement.
45. Execute **SLOT_PWR? ALL** to read the measurement result.



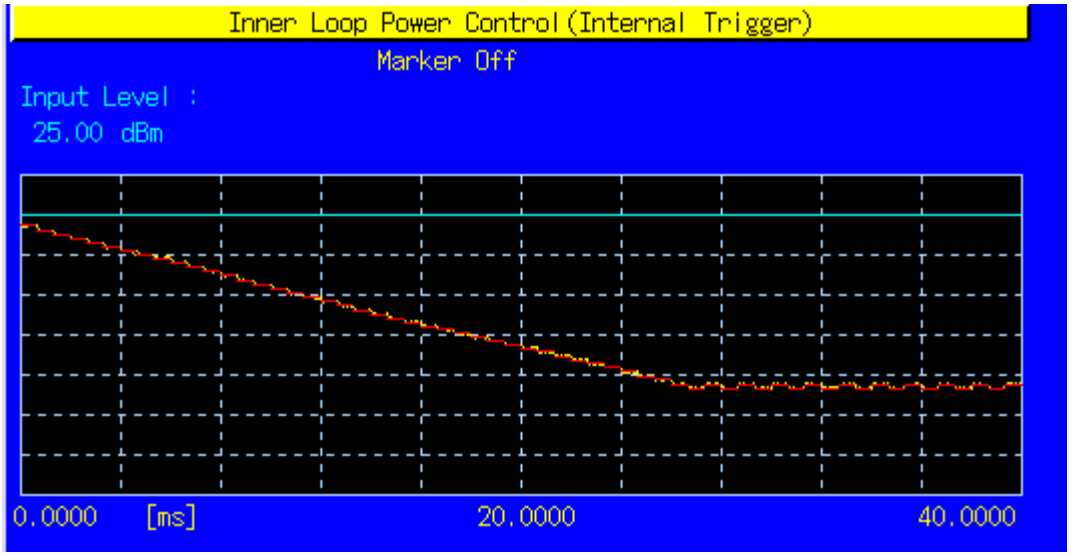
[Step D]

46. Execute **ILP_TPC D** to set [TPC Method] to [Step D].
47. Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
48. Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
49. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
50. Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
51. Execute **SWP** to perform the measurement.
52. Execute **SLOT_PWR? ALL** to read the measurement result.



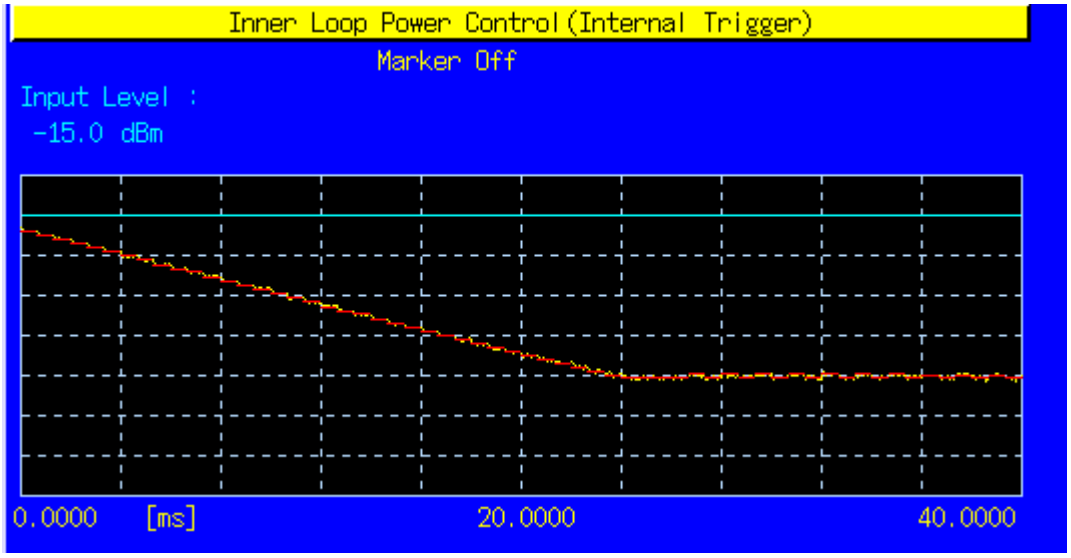
[Step E 1]

53. Execute **ILP_TPC E** to set [TPC Method] to [Step E].
54. Execute **ILP_CMDSLOT E,40** to set [Length] of Test Step E to [40] Slot.
55. Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
56. Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
57. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
58. Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
59. Execute **SWP** to perform measurement.
60. Execute **SLOT_PWR? ALL** to read the measurement result.



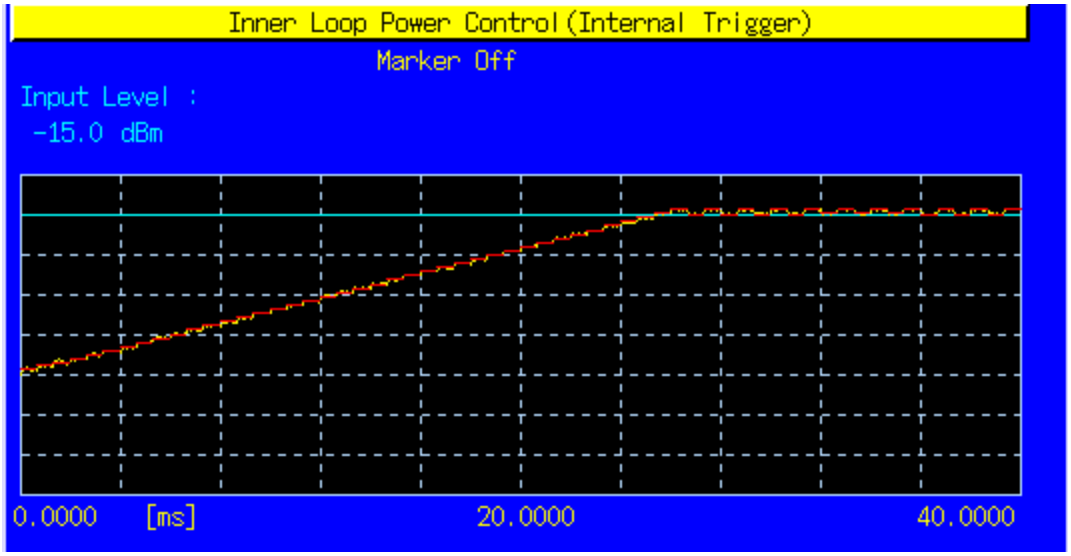
[Step E 2]

61. Execute **ILP_TPC E** to set [TPC Method] to [Step E].
62. Execute **ILP_CMDSLOT E,40** to set [Length] of Test Step E to [40] Slot.
63. Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
64. Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
65. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
66. Execute **ILVL -15.0** to set [Input Level] to [–15.0] dBm.
67. Execute **SWP** to perform measurement.
68. Execute **SLOT_PWR? ALL** to read the measurement result.



[Step F 1]

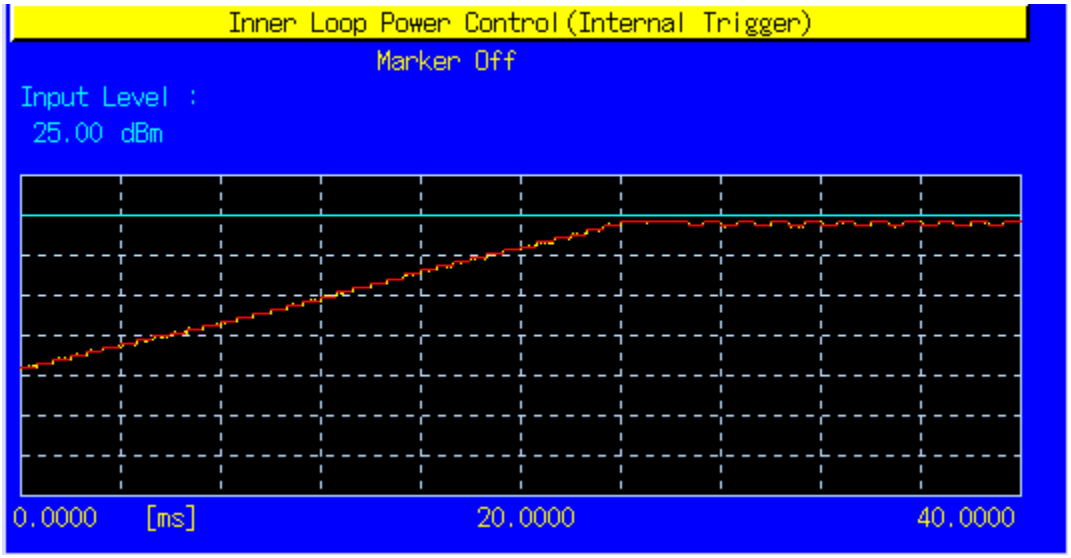
69. Execute **ILP_TPC F** to set [TPC Method] to [Step F].
70. Execute **ILP_CMDSLOT F,40** to set [Length] of Test Step F to [40] Slot.
71. Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
72. Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
73. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
74. Execute **ILVL -15.0** to set [Input Level] to [–15.0] dBm.
75. Execute **SWP** to perform measurement.
76. Execute **SLOT_PWR? ALL** to read the measurement result.



[Step F 2]

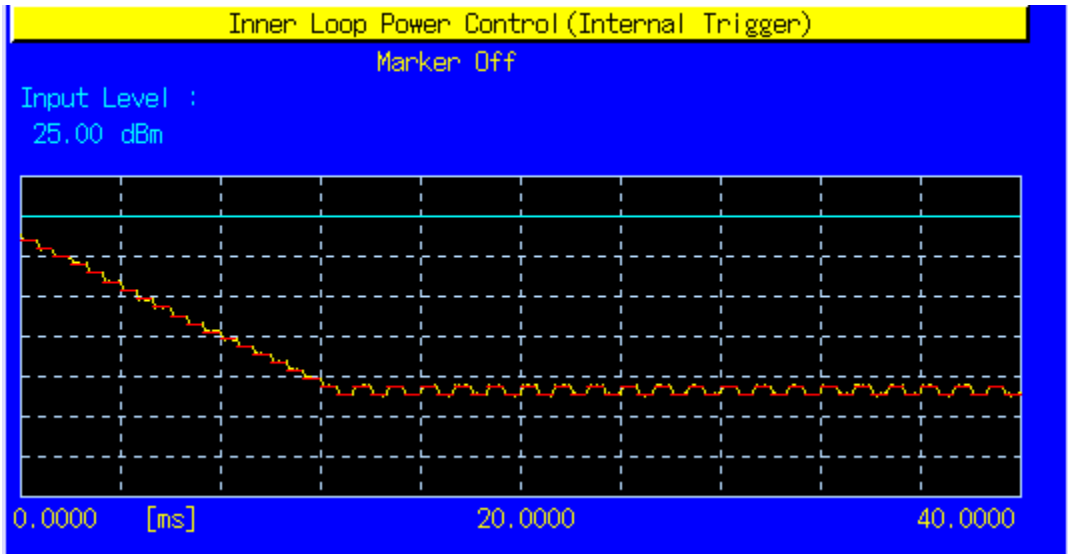
77. Execute **ILP_TPC F** to set [TPC Method] to [Step F].
78. Execute **ILP_CMDSLOT F,40** to set [Length] of Test Step F to [40] Slot.
79. Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].

80. Execute **TPCSTEP 1** to set [TPC Step Size] to [1 dB].
81. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
82. Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
83. Execute **SWP** to perform measurement.
84. Execute **SLOT_PWR? ALL** to read the measurement result.



[Step G 1]

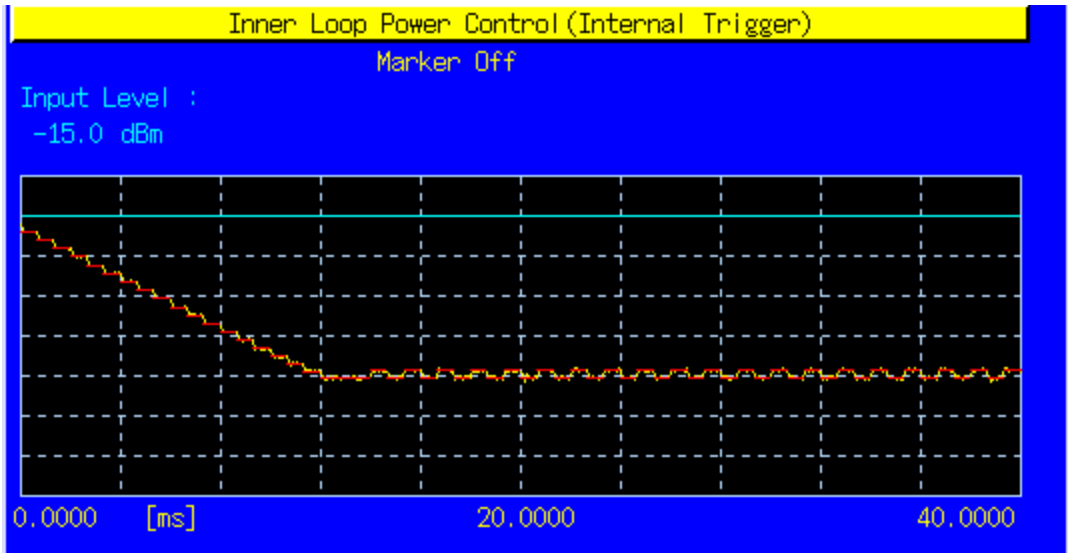
85. Execute **ILP_TPC G** to set [TPC Method] to [Step G].
86. Execute **ILP_CMDSLOT G,20** to set [Length] of Test Step G to [20] Slot.
87. Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
88. Execute **TPCSTEP 2** to set [TPC Step Size] to [2 dB].
89. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
90. Execute **ILVL 25.0** to set [Input Level] to [+25.0] dBm.
91. Execute **SWP** to perform measurement.
92. Execute **SLOT_PWR? ALL** to read the measurement result.



[Step G 2]

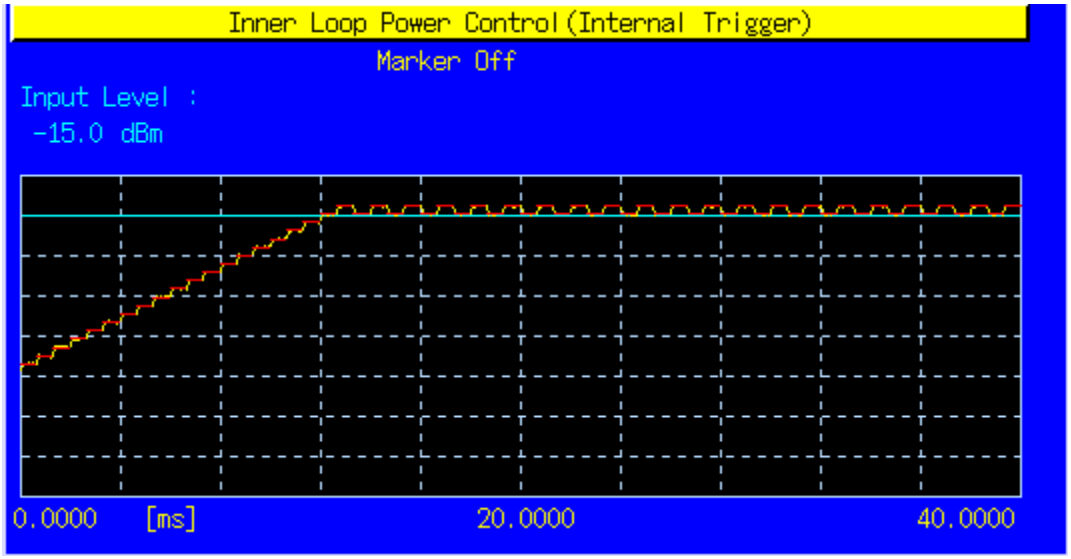
93. Execute **ILP_TPC G** to set [TPC Method] to [Step G].
94. Execute **ILP_CMDSLOT G,20** to set [Length] of Test Step G to [20] Slot.
95. Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
96. Execute **TPCSTEP 2** to set [TPC Step Size] to [2 dB].
97. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
98. Execute **ILVL -15.0** to set [Input Level] to [–15.0] dBm.
99. Execute **SWP** to perform measurement.

100. Execute **SLOT_PWR? ALL** to read the measurement result.



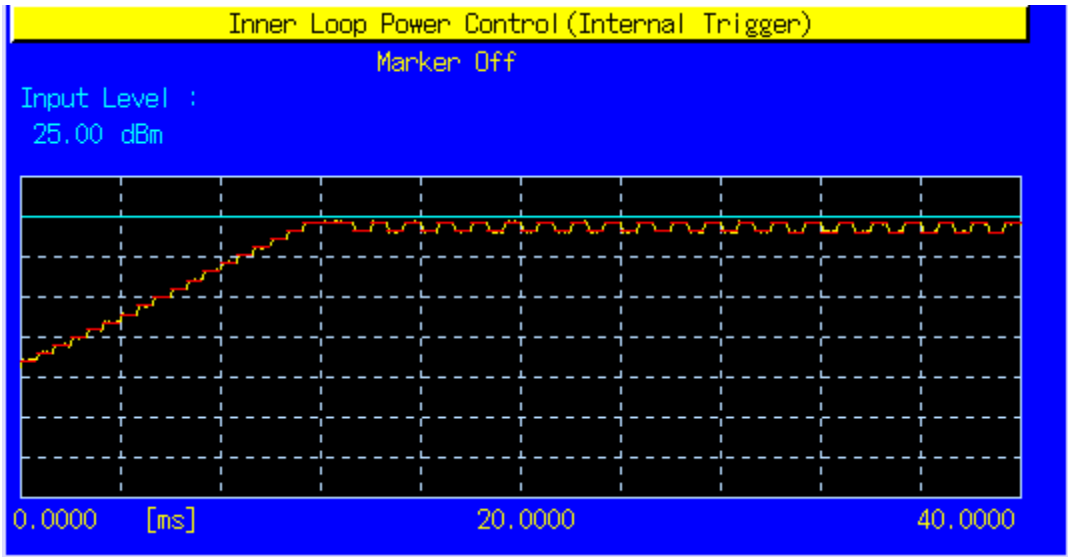
[Step H 1]

101. Execute **ILP_TPC H** to set [TPC Method] to [Step H].
102. Execute **ILP_CMDSLOT H,20** to set [Length] of Test Step H to [20] Slot.
103. Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
104. Execute **TPCSTEP 2** to set [TPC Step Size] to [2 dB].
105. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
106. Execute **ILVL -10.0** to set [Input Level] to [–10.0] dBm.
107. Execute **SWP** to perform measurement.
108. Execute **SLOT_PWR? ALL** to read the measurement result.



[Step H 2]

109. Execute **ILP_TPC H** to set [TPC Method] to [Step H].
110. Execute **ILP_CMDSLOT H,20** to set [Length] of Test Step H to [20] Slot.
111. Execute **TPCALGO 1** to set [Power Control Algorithm] to [Algorithm 1].
112. Execute **TPCSTEP 2** to set [TPC Step Size] to [2 dB].
113. Execute **TPCPAT ALT** to set [Power Control Bit Pattern] to [Alternate].
114. Execute **ILVL 30.0** to set [Input Level] to [+30.0] dBm.
115. Execute **SWP** to perform measurement.
116. Execute **SLOT_PWR? ALL** to read the measurement result.


Inner Loop Power Control(Internal Trigger)
Marker Off
Input Level :
25.00 dBm
0.0000 [ms]
20.0000
40.0000

117. Compare the measurement results with the table below.

3GPP TS 34.121 Table 5.4.2.5.1: Transmitter power control range

TPC_cmd	Transmitter Power Control Range (all units in dB)					
	1-dB steps		2-dB steps		3-dB steps	
	Lower	Upper	Lower	Upper	Lower	Upper
+1	+0,4	+1,6	+0,85	+3,15	+1,3	+4,7
0	–0,6	+0,6	–0,6	+0,6	–0,6	+0,6
–1	–0,4	–1,6	–0,85	–3,15	–1,3	–4,7

3GPP TS 34.121 Table 5.4.2.5.2: Transmitter aggregate power control tolerance

TPC_cmd group	Transmitter Power Control Range after 10 Equal TPC_cmd Groups (all units in dB)				Transmitter Power Control Range after 7 Equal TPC_cmd Groups (all units in dB)	
	1-dB steps		2-dB steps		3-dB steps	
	Lower	Upper	Lower	Upper	Lower	Upper
+1	+7,7	+12,3	+15,7	+24,3	+15,7	+26,3
0	–1,1	+1,1	–1,1	+1,1	–1,1	+1,1
–1	–7,7	–12,3	–15,7	–24,3	–15,7	–26,3
0,0,0,0,+1	+5,7	+14,3	N/A	N/A	N/A	N/A
0,0,0,0,–1	–5,7	–14,3	N/A	N/A	N/A	N/A

A.3 How to Combine Segmentations at Step E, F, G, H of Inner Loop Power Control

Due to dynamic range limits, each Test Step E, F, G and H must be performed twice at different Input Levels. See the following explanations to combine the first and second Slot List.

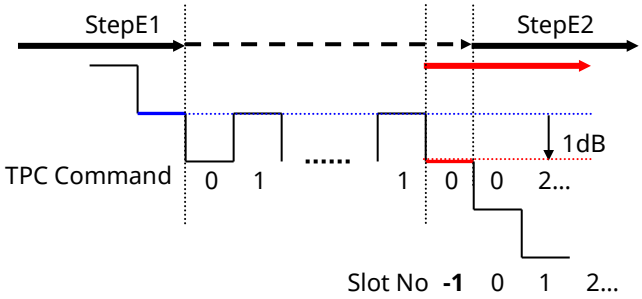
Before the first measurement, set [Power Control Bit Pattern] to [Alternate], so the [Power Control Bit Pattern] is [Alternate] also after the measurement.

Because the first and last bits are not fixed, there are four Alternate Patterns sent between combined segmentation {0,1, ...,1,0},{0,1,...,0,1},{1,0,...,1,0},{1,0,...,0,1}.

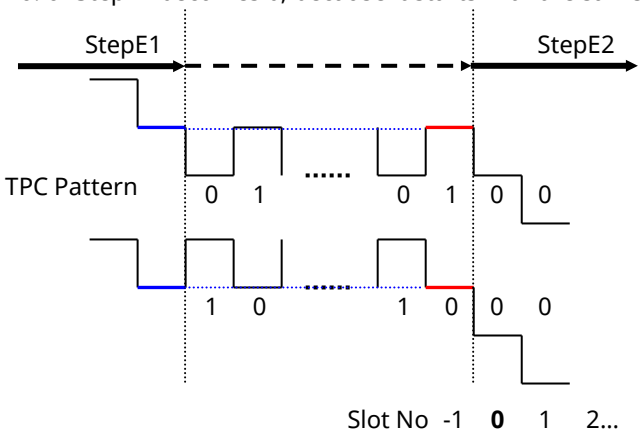
Combination must be performed by considering “the sum of Bit number 0 is larger than Bit number 1,” “the sum of Bit number 0 and 1 are equal,” “the sum of Bit number 0 is smaller than Bit number 1.”

An example of Test StepE is shown below.

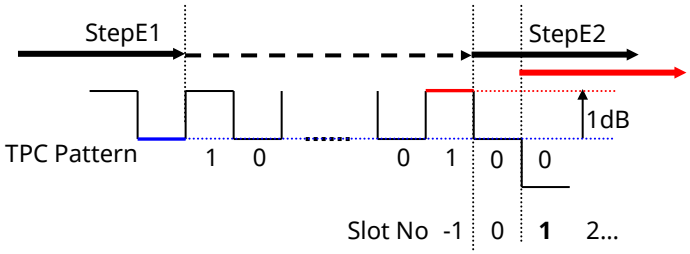
(4) When the sum of Bit number 0 is larger than Bit number 1 {0,1, …,1,0}
The head Slot No. of StepE2 becomes –1, because it starts with the level that is 1 dB lower than the last Slot of StepE1.



(5) When the sum of Bit number 0 and 1 are equal {0,1,…,0,1}, {1,0,…,1,0}
The head Slot No. of StepE2 becomes 0, because it starts with the same level as the last Slot of StepE1.



(6) When the sum of Bit number 0 is smaller than Bit number 1 {1,0,…,0,1}
The head Slot No of StepE2 becomes 1, because it starts with the level that is 1 dB higher than the last Slot of StepE1.



[Step E]

6. Execute [Step E 1] (see 5.4.2 Inner Loop Power Control in the Uplink).
7. Execute **REGSLOTLIST -1** to register Slot(-1) in slot list.
8. Execute **TRGDELAY -0.7MS** to set [Trigger Delay] to [–0.7] ms (1Slot length).
9. Execute [Step E 2]. (See 5.4.2 Inner Loop Power Control in Uplink.)
10. Check the Power difference between the first Slot of Step E 2 and the last Slot of Step E 1.
    - When the difference is <–0.5 dB, the head Slot of Step E 2 becomes –1.
    - When the difference is within ±0.5 dB, the head Slot of Step E 2 becomes 0.
    - When the difference is >0.5 dB, the head Slot of Step E 2 becomes 1.

[Step F]

6. Execute [Step F 1]. (See 5.4.2 Inner Loop Power Control in the Uplink.)
7. Execute **REGSLOTLIST -1** to register Slot(-1) in slot list.
8. Execute **TRGDELAY -0.7MS** to set [Trigger Delay] to [–0.7] ms (1Slot length).
9. Execute [Step F 2]. (See 5.4.2 Inner Loop Power Control in Uplink.)
10. Check the Power difference between the first Slot of Step F 2 and the last Slot of Step F 1.
    - When the difference is <–0.5 dB, the head Slot of Step F 2 becomes 1.
    - When the difference is within ±0.5 dB, the head Slot of Step F 2 becomes 0.
    - When the difference is >0.5 dB, the head Slot of Step F 2 becomes –1.

[Step G]

6. Execute [Step G 1]. (See 5.4.2 Inner Loop Power Control in Uplink.).
7. Execute **REGSLOTLIST -1** to register Slot(-1) in slot list.
8. Execute **TRGDELAY -0.7MS** to set [Trigger Delay] to [–0.7] ms (1Slot length).
9. Execute [Step G 2]. (See 5.4.2 Inner Loop Power Control in Uplink.)
10. Check the Power difference between the first Slot of Step G 2 and the last Slot of Step G 1.
    - When the difference is <–1 dB, the head Slot of Step G 2 becomes –1.
    - When the difference is within ±1 dB, the head Slot of Step G 2 becomes 0.
    - When the difference is >1 dB, the head Slot of Step G 2 becomes 1.

[Step H]

6. Execute [Step H 1]. (See 5.4.2 Inner Loop Power Control in Uplink.)
7. Execute **REGSLOTLIST -1** to register Slot(-1) in slot list.
8. Execute **TRGDELAY -0.7MS** to set [Trigger Delay] to [–0.7] ms (1Slot length).
9. Execute [Step H 2]. (See 5.4.2 Inner Loop Power Control in Uplink.)
10. Check the Power difference between the first Slot of Step H 2 and the last Slot of Step H 1.
    - When the difference is <–1 dB, the head Slot of Step H 2 becomes 1.
    - When the difference is within ±1 dB, the head Slot of Step H 2 becomes 0.
    - When the difference is >1 dB, the head Slot of Step H 2 becomes –1.

Note

Anritsu envision : ensure

Specifications are subject to change without notice.

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