



ROHDE & SCHWARZ

Test and Measurement
Division

Operating Manual

3GPP WCDMA Mobile Station Test

Application Firmware Module FSIQK73

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Before putting the product into operation for the first time, make sure to read the following



S a f e t y I n s t r u c t i o n s

Rohde & Schwarz makes every effort to keep the safety standard of its products up to date and to offer its customers the highest possible degree of safety. Our products and the auxiliary equipment required for them are designed and tested in accordance with the relevant safety standards. Compliance with these standards is continuously monitored by our quality assurance system. This product has been designed and tested in accordance with the EC Certificate of Conformity and has left the manufacturer's plant in a condition fully complying with safety standards. To maintain this condition and to ensure safe operation, observe all instructions and warnings provided in this manual. If you have any questions regarding these safety instructions, Rohde & Schwarz will be happy to answer them.

Furthermore, it is your responsibility to use the product in an appropriate manner. This product is designed for use solely in industrial and laboratory environments or in the field and must not be used in any way that may cause personal injury or property damage. You are responsible if the product is used for an intention other than its designated purpose or in disregard of the manufacturer's instructions. The manufacturer shall assume no responsibility for such use of the product.

The product is used for its designated purpose if it is used in accordance with its operating manual and within its performance limits (see data sheet, documentation, the following safety instructions). Using the products requires technical skills and knowledge of English. It is therefore essential that the products be used exclusively by skilled and specialized staff or thoroughly trained personnel with the required skills. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation.

Symbols and safety labels

| | | | | | | | |
|--------------------------------|------------------------------------|--------------------------|----------------------|-------------|--------|-----------------|--|
| | | | | | | | |
| Observe operating instructions | Weight indication for units >18 kg | Danger of electric shock | Warning! Hot surface | PE terminal | Ground | Ground terminal | Attention! Electrostatic sensitive devices |

| | | | | | |
|-----------------------|--------------------|---------------------|--------------------------|------------------------------------|--|
| | | | | | |
| Supply voltage ON/OFF | Standby indication | Direct current (DC) | Alternating current (AC) | Direct/alternating current (DC/AC) | Device fully protected by double/reinforced insulation |

Safety Instructions

Observing the safety instructions will help prevent personal injury or damage of any kind caused by dangerous situations. Therefore, carefully read through and adhere to the following safety instructions before putting the product into operation. It is also absolutely essential to observe the additional safety instructions on personal safety that appear in other parts of the documentation. In these safety instructions, the word "product" refers to all merchandise sold and distributed by Rohde & Schwarz, including instruments, systems and all accessories.

Tags and their meaning

| | |
|-----------|--|
| DANGER | This tag indicates a safety hazard with a high potential of risk for the user that can result in death or serious injuries. |
| WARNING | This tag indicates a safety hazard with a medium potential of risk for the user that can result in death or serious injuries. |
| CAUTION | This tag indicates a safety hazard with a low potential of risk for the user that can result in slight or minor injuries. |
| ATTENTION | This tag indicates the possibility of incorrect use that can cause damage to the product. |
| NOTE | This tag indicates a situation where the user should pay special attention to operating the product but which does not lead to damage. |

These tags are in accordance with the standard definition for civil applications in the European Economic Area. Definitions that deviate from the standard definition may also exist. It is therefore essential to make sure that the tags described here are always used only in connection with the associated documentation and the associated product. The use of tags in connection with unassociated products or unassociated documentation can result in misinterpretations and thus contribute to personal injury or material damage.

Basic safety instructions

1. The product may be operated only under the operating conditions and in the positions specified by the manufacturer. Its ventilation must not be obstructed during operation. Unless otherwise specified, the following requirements apply to Rohde & Schwarz products:
prescribed operating position is always with the housing floor facing down, IP protection 2X, pollution severity 2, overvoltage category 2, use only in enclosed spaces, max. operation altitude max. 2000 m. Unless specified otherwise in the data sheet, a tolerance of $\pm 10\%$ shall apply to the nominal voltage and of $\pm 5\%$ to the nominal frequency.
2. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed. The product may be opened only by authorized, specially trained personnel. Prior to performing any work on the product or opening the product, the product must be disconnected from the supply network. Any adjustments, replacements of parts, maintenance or repair must be carried out only by technical personnel authorized by Rohde & Schwarz. Only original parts may be used for replacing parts relevant to safety (e.g. power switches, power transformers, fuses). A safety test must always be performed after parts relevant to safety have been replaced (visual inspection, PE conductor test, insulation resistance measurement, leakage current measurement, functional test).
3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens, e.g. nickel) such as aluminum cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties), consult a physician immediately to determine the cause.

Safety Instructions

4. If products/components are mechanically and/or thermally processed in a manner that goes beyond their intended use, hazardous substances (heavy-metal dust such as lead, beryllium, nickel) may be released. For this reason, the product may only be disassembled, e.g. for disposal purposes, by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed.
5. If handling the product yields hazardous substances or fuels that must be disposed of in a special way, e.g. coolants or engine oils that must be replenished regularly, the safety instructions of the manufacturer of the hazardous substances or fuels and the applicable regional waste disposal regulations must be observed. Also observe the relevant safety instructions in the product documentation.
6. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn life requires increased protection, pregnant women should be protected by appropriate measures. Persons with pacemakers may also be endangered by electromagnetic radiation. The employer is required to assess workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the danger.
7. Operating the products requires special training and intense concentration. Make certain that persons who use the products are physically, mentally and emotionally fit enough to handle operating the products; otherwise injuries or material damage may occur. It is the responsibility of the employer to select suitable personnel for operating the products.
8. Prior to switching on the product, it must be ensured that the nominal voltage setting on the product matches the nominal voltage of the AC supply network. If a different voltage is to be set, the power fuse of the product may have to be changed accordingly.
9. In the case of products of safety class I with movable power cord and connector, operation is permitted only on sockets with earthing contact and protective earth connection.
10. Intentionally breaking the protective earth connection either in the feed line or in the product itself is not permitted. Doing so can result in the danger of an electric shock from the product. If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.
11. If the product has no power switch for disconnection from the AC supply, the plug of the connecting cable is regarded as the disconnecting device. In such cases, it must be ensured that the power plug is easily reachable and accessible at all times (length of connecting cable approx. 2 m). Functional or electronic switches are not suitable for providing disconnection from the AC supply. If products without power switches are integrated in racks or systems, a disconnecting device must be provided at the system level.
12. Never use the product if the power cable is damaged. By taking appropriate safety measures and carefully laying the power cable, ensure that the cable cannot be damaged and that no one can be hurt by e.g. tripping over the cable or suffering an electric shock.
13. The product may be operated only from TN/TT supply networks fused with max. 16 A.
14. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise this can result in sparks, fire and/or injuries.
15. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.
16. For measurements in circuits with voltages $V_{rms} > 30 V$, suitable measures (e.g. appropriate measuring equipment, fusing, current limiting, electrical separation, insulation) should be taken to avoid any hazards.
17. Ensure that the connections with information technology equipment comply with IEC 950/EN 60950.
18. Never remove the cover or part of the housing while you are operating the product. This will expose circuits and components and can lead to injuries, fire or damage to the product.

Safety Instructions

19. If a product is to be permanently installed, the connection between the PE terminal on site and the product's PE conductor must be made first before any other connection is made. The product may be installed and connected only by a skilled electrician.
20. For permanently installed equipment without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fused in such a way that suitable protection is provided for users and products.
21. Do not insert any objects into the openings in the housing that are not designed for this purpose. Never pour any liquids onto or into the housing. This can cause short circuits inside the product and/or electric shocks, fire or injuries.
22. Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a thunderstorm) can reach the product. Otherwise the operating personnel will be endangered by electric shocks.
23. Rohde & Schwarz products are not protected against penetration of water, unless otherwise specified (see also safety instruction 1.). If this is not taken into account, there exists the danger of electric shock or damage to the product, which can also lead to personal injury.
24. Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product was moved from a cold to a warm environment.
25. Do not close any slots or openings on the product, since they are necessary for ventilation and prevent the product from overheating. Do not place the product on soft surfaces such as sofas or rugs or inside a closed housing, unless this is well ventilated.
26. Do not place the product on heat-generating devices such as radiators or fan heaters. The temperature of the environment must not exceed the maximum temperature specified in the data sheet.
27. Batteries and storage batteries must not be exposed to high temperatures or fire. Keep batteries and storage batteries away from children. If batteries or storage batteries are improperly replaced, this can cause an explosion (warning: lithium cells). Replace the battery or storage battery only with the matching Rohde & Schwarz type (see spare parts list). Batteries and storage batteries are hazardous waste. Dispose of them only in specially marked containers. Observe local regulations regarding waste disposal. Do not short-circuit batteries or storage batteries.
28. Please be aware that in the event of a fire, toxic substances (gases, liquids etc.) that may be hazardous to your health may escape from the product.
29. Please be aware of the weight of the product. Be careful when moving it; otherwise you may injure your back or other parts of your body.
30. Do not place the product on surfaces, vehicles, cabinets or tables that for reasons of weight or stability are unsuitable for this purpose. Always follow the manufacturer's installation instructions when installing the product and fastening it to objects or structures (e.g. walls and shelves).
31. Handles on the products are designed exclusively for personnel to hold or carry the product. It is therefore not permissible to use handles for fastening the product to or on means of transport such as cranes, fork lifts, wagons, etc. The user is responsible for securely fastening the products to or on the means of transport and for observing the safety regulations of the manufacturer of the means of transport. Noncompliance can result in personal injury or material damage.
32. If you use the product in a vehicle, it is the sole responsibility of the driver to drive the vehicle safely. Adequately secure the product in the vehicle to prevent injuries or other damage in the event of an accident. Never use the product in a moving vehicle if doing so could distract the driver of the vehicle. The driver is always responsible for the safety of the vehicle; the manufacturer assumes no responsibility for accidents or collisions.
33. If a laser product (e.g. a CD/DVD drive) is integrated in a Rohde & Schwarz product, do not use any other settings or functions than those described in the documentation. Otherwise this may be hazardous to your health, since the laser beam can cause irreversible damage to your eyes. Never try to take such products apart, and never look into the laser beam.



Por favor lea imprescindiblemente antes de la primera puesta en funcionamiento las siguientes informaciones de seguridad



Informaciones de seguridad

Es el principio de Rohde & Schwarz de tener a sus productos siempre al día con los estándares de seguridad y de ofrecer a sus clientes el máximo grado de seguridad. Nuestros productos y todos los equipos adicionales son siempre fabricados y examinados según las normas de seguridad vigentes. Nuestra sección de gestión de la seguridad de calidad controla constantemente que sean cumplidas estas normas. Este producto ha sido fabricado y examinado según el comprobante de conformidad adjunto según las normas de la CE y ha salido de nuestra planta en estado impecable según los estándares técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, deberá el usuario atenerse a todas las informaciones, informaciones de seguridad y notas de alerta. Rohde&Schwarz está siempre a su disposición en caso de que tengan preguntas referentes a estas informaciones de seguridad.

Además queda en la responsabilidad del usuario utilizar el producto en la forma debida. Este producto solamente fue elaborado para ser utilizado en la industria y el laboratorio o para fines de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda ser dañada. El uso del producto fuera de sus fines definidos o despreciando las informaciones de seguridad del fabricante queda en la responsabilidad del usuario. El fabricante no se hace en ninguna forma responsable de consecuencias a causa del maluso del producto.

Se parte del uso correcto del producto para los fines definidos si el producto es utilizado dentro de las instrucciones del correspondiente manual del uso y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso de los productos hace necesarios conocimientos profundos y el conocimiento del idioma inglés. Por eso se deberá tener en cuenta de exclusivamente autorizar para el uso de los productos a personas péritas o debidamente minuciosamente instruidas con los conocimientos citados. Si fuera necesaria indumentaria de seguridad para el uso de productos de R&S, encontrará la información debida en la documentación del producto en el capítulo correspondiente.

Símbolos y definiciones de seguridad

| | | | | | | | |
|-------------------------------------|---|-------------------------------|-----------------------------------|--------------------------------|-------------------|----------------------------|---|
| | | | | | | | |
| Ver manual de instrucciones del uso | Informaciones para maquinaria con un peso de > 18kg | Peligro de golpe de corriente | ¡Advertencia! Superficie caliente | Conexión a conductor protector | Conexión a tierra | Conexión a masa conductora | ¡Cuidado! Elementos de construcción con peligro de carga electrostática |

| | | | | | |
|---------------------------|---------------------|-----------------------|----------------------|----------------------------------|--|
| | | | | | |
| potencia EN MARCHA/PARADA | Indicación Stand-by | Corriente continua DC | Corriente alterna AC | Corriente continua/alterna DC/AC | El aparato está protegido en su totalidad por un aislamiento de doble refuerzo |

Informaciones de seguridad

Tener en cuenta las informaciones de seguridad sirve para tratar de evitar daños y peligros de toda clase. Es necesario de que se lean las siguientes informaciones de seguridad concienzudamente y se tengan en cuenta debidamente antes de la puesta en funcionamiento del producto. También deberán ser tenidas en cuenta las informaciones para la protección de personas que encontrarán en otro capítulo de esta documentación y que también son obligatorias de seguir. En las informaciones de seguridad actuales hemos juntado todos los objetos vendidos por Rohde&Schwarz bajo la denominación de „producto“, entre ellos también aparatos, instalaciones así como toda clase de accesorios.

Palabras de señal y su significado

| | |
|-------------|--|
| PELIGRO | Indica un punto de peligro con gran potencial de riesgo para el usuario. Punto de peligro que puede llevar hasta la muerte o graves heridas. |
| ADVERTENCIA | Indica un punto de peligro con un potencial de riesgo mediano para el usuario. Punto de peligro que puede llevar hasta la muerte o graves heridas . |
| ATENCIÓN | Indica un punto de peligro con un potencial de riesgo pequeño para el usuario. Punto de peligro que puede llevar hasta heridas leves o pequeñas |
| CUIDADO | Indica la posibilidad de utilizar mal el producto y a consecuencia dañarlo. |
| INFORMACIÓN | Indica una situación en la que deberían seguirse las instrucciones en el uso del producto, pero que no consecuentemente deben de llevar a un daño del mismo. |

Las palabras de señal corresponden a la definición habitual para aplicaciones civiles en el ámbito de la comunidad económica europea. Pueden existir definiciones diferentes a esta definición. Por eso se debiera tener en cuenta que las palabras de señal aquí descritas sean utilizadas siempre solamente en combinación con la correspondiente documentación y solamente en combinación con el producto correspondiente. La utilización de las palabras de señal en combinación con productos o documentaciones que no les correspondan puede llevar a malinterpretaciones y tener por consecuencia daños en personas u objetos.

Informaciones de seguridad elementales

1. El producto solamente debe ser utilizado según lo indicado por el fabricante referente a la situación y posición de funcionamiento sin que se obstruya la ventilación. Si no se convino de otra manera, es para los productos R&S válido lo que sigue: como posición de funcionamiento se define principalmente la posición con el suelo de la caja para abajo , modo de protección IP 2X, grado de suciedad 2, categoría de sobrecarga eléctrica 2, utilizar solamente en estancias interiores, utilización hasta 2000 m sobre el nivel del mar.
A menos que se especifique otra cosa en la hoja de datos, se aplicará una tolerancia de $\pm 10\%$ sobre el voltaje nominal y de $\pm 5\%$ sobre la frecuencia nominal.
2. En todos los trabajos deberán ser tenidas en cuenta las normas locales de seguridad de trabajo y de prevención de accidentes. El producto solamente debe de ser abierto por personal périto autorizado. Antes de efectuar trabajos en el producto o abrirlo deberá este ser desconectado de la corriente. El ajuste, el cambio de partes, la manutención y la reparación deberán ser solamente efectuadas por electricistas autorizados por R&S. Si se reponen partes con importancia para los aspectos de seguridad (por ejemplo el enchufe, los transformadores o los fusibles), solamente podrán ser sustituidos por partes originales. Despues de cada recambio de partes elementales para la seguridad deberá ser efectuado un control de

Informaciones de seguridad

- seguridad (control a primera vista, control de conductor protector, medición de resistencia de aislamiento, medición de medición de la corriente conductora, control de funcionamiento).
3. Como en todo producto de fabricación industrial no puede ser excluido en general de que se produzcan al usarlo elementos que puedan generar alergias, los llamados elementos alergénicos (por ejemplo el níquel). Si se produjeran en el trato con productos R&S reacciones alérgicas, como por ejemplo urticaria, estornudos frecuentes, irritación de la conjuntiva o dificultades al respirar, se deberá consultar inmediatamente a un médico para averiguar los motivos de estas reacciones.
 4. Si productos / elementos de construcción son tratados fuera del funcionamiento definido de forma mecánica o térmica, pueden generarse elementos peligrosos (polvos de sustancia de metales pesados como por ejemplo plomo, berilio, níquel). La partición elemental del producto, como por ejemplo sucede en el tratamiento de materias residuales, debe de ser efectuada solamente por personal especializado para estos tratamientos. La partición elemental efectuada inadecuadamente puede generar daños para la salud. Se deben tener en cuenta las directivas nacionales referentes al tratamiento de materias residuales.
 5. En el caso de que se produjeran agentes de peligro o combustibles en la aplicación del producto que debieran de ser transferidos a un tratamiento de materias residuales, como por ejemplo agentes refrigerantes que deben ser repuestos en periodos definidos, o aceites para motores, deberán ser tenidas en cuenta las prescripciones de seguridad del fabricante de estos agentes de peligro o combustibles y las regulaciones regionales para el tratamiento de materias residuales. Cuiden también de tener en cuenta en caso dado las prescripciones de seguridad especiales en la descripción del producto.
 6. Ciertos productos, como por ejemplo las instalaciones de radiación HF, pueden a causa de su función natural, emitir una radiación electromagnética aumentada. En vista a la protección de la vida en desarrollo deberían ser protegidas personas embarazadas debidamente. También las personas con un bypass pueden correr peligro a causa de la radiación electromagnética. El empresario está comprometido a valorar y señalar áreas de trabajo en las que se corra un riesgo de exposición a radiaciones aumentadas de riesgo aumentado para evitar riesgos.
 7. La utilización de los productos requiere instrucciones especiales y una alta concentración en el manejo. Debe de ponerse por seguro de que las personas que manejen los productos estén a la altura de los requerimientos necesarios referente a sus aptitudes físicas, psíquicas y emocionales, ya que de otra manera no se pueden excluir lesiones o daños de objetos. El empresario lleva la responsabilidad de seleccionar el personal usuario apto para el manejo de los productos.
 8. Antes de la puesta en marcha del producto se deberá tener por seguro de que la tensión preseleccionada en el producto equivalga a la del la red de distribución. Si es necesario cambiar la preselección de la tensión también se deberán en caso dabo cambiar los fusibles correspondientes del producto.
 9. Productos de la clase de seguridad I con alimentación móvil y enchufe individual de producto solamente deberán ser conectados para el funcionamiento a tomas de corriente de contacto de seguridad y con conductor protector conectado.
 10. Queda prohibida toda clase de interrupción intencionada del conductor protector, tanto en la toma de corriente como en el mismo producto ya que puede tener como consecuencia el peligro de golpe de corriente por el producto. Si se utilizaran cables o enchufes de extensión se deberá poner al seguro, que es controlado su estado técnico de seguridad.
 11. Si el producto no está equipado con un interruptor para desconectarlo de la red, se deberá considerar el enchufe del cable de distribución como interruptor. En estos casos deberá asegurar de que el enchufe sea de fácil acceso y nabejo (medida del cable de distribución aproximadamente 2 m). Los interruptores de función o electrónicos no son aptos para el corte de la red eléctrica. Si los productos sin interruptor están integrados en construcciones o instalaciones, se deberá instalar el interruptor al nivel de la instalación.

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12. No utilice nunca el producto si está dañado el cable eléctrico. Asegure a través de las medidas de protección y de instalación adecuadas de que el cable de eléctrico no pueda ser dañado o de que nadie pueda ser dañado por él, por ejemplo al tropezar o por un golpe de corriente.
13. Solamente está permitido el funcionamiento en redes de distribución TN/TT aseguradas con fusibles de como máximo 16 A.
14. Nunca conecte el enchufe en tomas de corriente sucias o llenas de polvo. Introduzca el enchufe por completo y fuertemente en la toma de corriente. Si no tiene en consideración estas indicaciones se arriesga a que se originen chispas, fuego y/o heridas.
15. No sobrecargue las tomas de corriente, los cables de extensión o los enchufes de extensión ya que esto pudiera causar fuego o golpes de corriente.
16. En las mediciones en circuitos de corriente con una tensión de entrada de $U_{eff} > 30 \text{ V}$ se deberá tomar las precauciones debidas para impedir cualquier peligro (por ejemplo medios de medición adecuados, seguros, limitación de tensión, corte protector, aislamiento etc.).
17. En caso de conexión con aparatos de la técnica informática se deberá tener en cuenta que estos cumplan los requisitos de la EC950/EN60950.
18. Nunca abra la tapa o parte de ella si el producto está en funcionamiento. Esto pone a descubierto los cables y componentes eléctricos y puede causar heridas, fuego o daños en el producto.
19. Si un producto es instalado fijamente en un lugar, se deberá primero conectar el conductor protector fijo con el conductor protector del aparato antes de hacer cualquier otra conexión. La instalación y la conexión deberán ser efectuadas por un electricista especializado.
20. En caso de que los productos que son instalados fijamente en un lugar sean sin protector implementado, autointerruptor o similares objetos de protección, deberá la toma de corriente estar protegida de manera que los productos o los usuarios estén suficientemente protegidos.
21. Por favor, no introduzca ningún objeto que no esté destinado a ello en los orificios de la caja del aparato. No vierta nunca ninguna clase de líquidos sobre o en la caja. Esto puede producir corto circuitos en el producto y/o puede causar golpes de corriente, fuego o heridas.
22. Asegúrese con la protección adecuada de que no pueda originarse en el producto una sobrecarga por ejemplo a causa de una tormenta. Si no se verá el personal que lo utilice expuesto al peligro de un golpe de corriente.
23. Los productos R&S no están protegidos contra el agua si no es que exista otra indicación, ver también punto 1. Si no se tiene en cuenta esto se arriesga el peligro de golpe de corriente o de daños en el producto lo cual también puede llevar al peligro de personas.
24. No utilice el producto bajo condiciones en las que pueda producirse y se hayan producido líquidos de condensación en o dentro del producto como por ejemplo cuando se desplaza el producto de un lugar frío a un lugar caliente.
25. Por favor no cierre ninguna ranura u orificio del producto, ya que estas son necesarias para la ventilación e impiden que el producto se caliente demasiado. No pongan el producto encima de materiales blandos como por ejemplo sofás o alfombras o dentro de una caja cerrada, si esta no está suficientemente ventilada.
26. No ponga el producto sobre aparatos que produzcan calor, como por ejemplo radiadores o calentadores. La temperatura ambiental no debe superar la temperatura máxima especificada en la hoja de datos.

Informaciones de seguridad

27. Baterías y acumuladores no deben de ser expuestos a temperaturas altas o al fuego. Guardar baterías y acumuladores fuera del alcance de los niños. Si las baterías o los acumuladores no son cambiados con la debida atención existirá peligro de explosión (atención celulas de Litio). Cambiar las baterías o los acumuladores solamente por los del tipo R&S correspondiente (ver lista de piezas de recambio). Baterías y acumuladores son deshechos problemáticos. Por favor tirenlos en los recipientes especiales para este fin. Por favor tengan en cuenta las prescripciones nacionales de cada país referente al tratamiento de deshechos. Nunca sometan las baterías o acumuladores a un corto circuito.
28. Tengan en consideración de que en caso de un incendio pueden escaparse gases tóxicos del producto, que pueden causar daños a la salud.
29. Por favor tengan en cuenta que en caso de un incendio pueden desprenderse del producto agentes venenosos (gases, líquidos etc.) que pueden generar daños a la salud.
30. No sitúe el producto encima de superficies, vehículos, estantes o mesas, que por sus características de peso o de estabilidad no sean aptas para él. Siga siempre las instrucciones de instalación del fabricante cuando instale y asegure el producto en objetos o estructuras (por ejemplo paredes y estantes).
31. Las asas instaladas en los productos sirven solamente de ayuda para el manejo que solamente está previsto para personas. Por eso no está permitido utilizar las asas para la sujecion en o sobre medios de transporte como por ejemplo grúas, carretillas elevadoras de horquilla, carros etc. El usuario es responsable de que los productos sean sujetados de forma segura a los medios de transporte y de que las prescripciones de seguridad del fabricante de los medios de transporte sean tenidas en cuenta. En caso de que no se tengan en cuenta pueden causarse daños en personas y objetos.
32. Si llega a utilizar el producto dentro de un vehículo, queda en la responsabilidad absoluta del conductor que conducir el vehículo de manera segura. Asegure el producto dentro del vehículo debidamente para evitar en caso de un accidente las lesiones u otra clase de daños. No utilice nunca el producto dentro de un vehículo en movimiento si esto pudiera distraer al conductor. Siempre queda en la responsabilidad absoluta del conductor la seguridad del vehículo y el fabricante no asumirá ninguna clase de responsabilidad por accidentes o colisiones.
33. Dado el caso de que esté integrado un producto de laser en un producto R&S (por ejemplo CD/DVD-ROM) no utilice otras instalaciones o funciones que las descritas en la documentación. De otra manera pondrá en peligro su salud, ya que el rayo laser puede dañar irreversiblemente sus ojos. Nunca trate de descomponer estos productos. Nunca mire dentro del rayo laser.

Contents of Manual for Application Firmware FSIQK73

This manual contains all information on the operation of FSIQ equipped with Application Firmware FSIQK73. It includes operation via menus and the remote-control commands for the 3GPP WCDMA mobile station test.

The manual comprises the data sheet and 10 chapters:

- The data sheet** informs on the guaranteed specifications and the firmware characteristics.
- Chapter 1** describes how to enable the application firmware module.
- Chapter 2** describes typical examples of measurements by means of tests.
- Chapter 3** describes the measurement setup for mobile station tests.
- Chapter 4** describes possible channel configurations for the mobile station signal.
- Chapter 5** gives a schematic overview of the WCDMA control menus.
- Chapter 6** contains a detailed description of the possible mobile station test measurements as a reference for manual operation. The chapter also presents a list of remote-control commands associated with each function.
- Chapter 7** describes all remote-control commands defined for the code domain measurement. An alphabetic list of all remote-control commands and a table of softkeys with the assignment of commands are given at the end of this chapter.
- Chapter 8** contains the performance test.
- Chapter 9** contains the glossary.
- Chapter 10** contains the index of this operating manual.

This manual is a supplement to the FSIQ operating manual. It includes exclusively functions of Application Firmware FSIQK73. For all other descriptions, please refer to the FSIQ operating manual.

3GPP WCDMA Mobile Station Test - Application Firmware FSIQK73

Signal Analyzer FSIQ equipped with Application Firmware FSIQK73 performs code domain power measurements on uplink signals according to standard 3GPP (FDD mode). The application firmware is in line with standard 3GPP (Third Generation Partnership Project) with version release 99. In addition to the code domain measurements prescribed by the standard 3GPP, the application offers measurements with predefined settings in the frequency domain, e.g. power and ACLR measurement.

The following hardware is required for using FSIQ in combination with option FSIQK73:

- Option FSIQB70 – Extended I/Q memory and DSP module
- Module I/Q Demodulator: model index 05 (Order No.: 1066.2520.05)

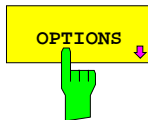
Notes: - *The code domain power measurements can be performed for units fitted with IQ demodulators other than model 05. However, the linearity of the FSIQK73 level values can only be guaranteed with an IQ demodulator of model 05 or higher.*

- *The model index of the I/Q Demodulator is indicated in table “Installed Components” (SYSTEM-INFO HARDWARE+OPTIONS menu)*

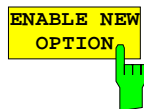
1 Enabling the Firmware Option

Firmware Option FSIQK73 is enabled in the *CONFIGURATION SETUP* menu by entering a keyword. The keyword is delivered with the option. If the option is factory-installed, it is already enabled.

CONFIGURATION SETUP menu:



The *OPTIONS* softkey opens a submenu where keywords for new firmware options (application firmware modules) can be entered. Available options are displayed in a table which is opened when entering the submenu.



The *ENABLE NEW OPTION* softkey activates the entry of the keyword for a firmware option.

One or several keywords can be entered in the entry field. On entering a valid keyword, *OPTION KEY OK* is displayed on the message line and the option is entered in the *FIRMWARE OPTIONS* table.

The *FIRMWARE OPTIONS* table can be displayed in the *FIRMWARE OPTIONS* softkey in the *INFO* menu.

In case of invalid keywords, *OPTION KEY INVALID* is displayed on the message line.

2 Getting Started

The following chapter explains basic WCDMA mobile station tests by means of a setup with Signal Generator SMIQ. It describes how operating and measurement errors can be avoided using correct presetting.

The measurement screen is presented in chapter 6 for each measurement.

Key settings are shown as examples to avoid measurement errors. Following the correct setting, the effect of an incorrect setting is shown. The following measurements are performed:

- Measurement 1: Measurement of signal power
- Measurement 2: Measurement of DPCCH (Dedicated Physical Common Control Channel) in vector analyzer mode
 - Setting: Synchronization of reference frequencies
- Measurement 3: Measurement of relative code domain power
 - Setting: Setting the analyzer center frequency to the DUT frequency
 - Setting: Scrambling code of signal
- Measurement 4: Triggered measurement of relative code domain power
 - Setting: Trigger offset
- Measurement 5: Measurement of modulation accuracy
- Measurement 6: Measurement of peak code domain error

The measurements are performed using the following units and accessories:

- Signal Analyzer FSIQ with Application Firmware FSIQK73 WCDMA mobile station test (option FSIQB70 required)
- Vector Signal Generator SMIQ with option SMIQB43: digital standard WCDMA (options SMIQB20 and SMIQB11 required)
- 1 coaxial cable, 50 Ω , approx. 1 m, N connector
- 1 coaxial cable, 50 Ω , approx. 1 m, BNC connector

Conventions for displaying settings on FSIQ:

- [<KEY>] Press a key on the front panel, e.g. [**SPAN**]
- [<SOFTKEY>] Press a softkey, e.g. [**MARKER -> PEAK**]
- [<nn unit>] Enter a value and terminate by entering the unit, e.g. [**12 kHz**]

Conventions for displaying settings on SMIQ:

- [<KEY>] Press a key on the front panel, e.g. [**FREQ**]
- <MENU> Select a menu, parameter or a setting, e.g. *DIGITAL STD.*
The menu level is marked by an indentation.
- <nn unit> Enter a value and terminate by entering the unit, e.g. *12 kHz*

Basic Settings in Code Domain Measurement Mode

In the default setting after PRESET, FSIQ is in the analyzer mode. The following default settings of the code domain measurement are activated, provided the code domain measurement mode is selected.

Table 2-1 Default settings of the code domain measurement

| Parameter | Einstellung |
|----------------------|---|
| Digitaler Standard | W-CDMA 3GPP REV |
| Sweep | CONTINUOUS |
| CDP-Modus | CODE CHAN AUTOSEARCH |
| Triggereinstellung | FREE RUN |
| Triggeroffset | 0.0 s |
| Scrambling Code | 0 |
| Scrambling Code Type | LONG |
| Threshold value | -10 dB |
| Symbol-Rate | 15 ksps |
| Code-Nummer | 0 |
| Branch | I |
| Slot-Nummer | 0 |
| Darstellart | Screen A: CODE PWR RELATIVE Screen B: RESULT SUMMARY |

Measurement 1: Measuring the Signal Power

The measurement of the spectrum gives an overview of the WCDMA signal and the spurious emissions close to the carrier.

Test setup ➤ Connect the RF output of SMIQ to the RF input of FSIQ (coaxial cable with N connectors).

Settings on SMIQ: **[PRESET]**
[LEVEL: 0 dBm]
[FREQ: 2.1175 GHz]
 DIGITAL STD
 WCDMA/3GPP
 SET DEFAULT
 LINK DIRECTION UP/REVERSE
 SELECT BS/MS
 MS 1 ON
 OVERALL SYMBOL RATE OFF
 STATE: ON

Settings on FSIQ: **[PRESET]**
[CENTER: 2.1175 GHz]
[REF: 0 dBm]
[MODE: 3GPP MS MS ANALYZER: POWER]

Measurement on FSIQ: The following is displayed:

- The spectrum of the WCDMA signal (DPCCH only) on the trace
- The signal channel power within the 3.84 MHz channel bandwidth (in the marker info field)

Measurement 2: Measurement of DPCCH in Vector Signal Analyzer Mode

When the WCDMA signal only contains one channel, the signal can be measured in the vector analyzer mode of the analyzer. Since each channel is QPSK-modulated after scrambling the total signal is QPSK-modulated also if only one channel is transmitted.

The measurement of the QPSK signal allows, for instance, to determine the frequency offset between DUT and analyzer.

This may be useful for troubleshooting, e.g. if synchronization is not possible during the code domain power measurement.

Test setup *As for measurement 1*

Settings on SMIQ: *As for measurement 1*

Settings on FSIQ: **[PRESET]**
[CENTER: *2.1175 GHz]*
[REF: *0 dBm]*
[MODE: *VECTOR ANALYZER*
DIGITAL STANDARDS W-CDMA 3GPP REV]

Measurement on FSIQ: The following is displayed:

- Screen A: Constellation diagram of signal (QPSK)
- Screen B: Numeric results of demodulation

Frequency error The frequency error display denotes the frequency offset between the DUT and the analyzer. For a high frequency offset (> 1 kHz), the CDP measurements are inaccurate and a synchronization of the analyzer and the measurement signal is no longer possible. The frequency offset can be corrected by tuning the transmitter or center frequency of the analyzer. It is recommended to synchronize the analyzer and the DUT via the reference input of the analyzer.

Setting: Synchronizing the reference frequencies

The synchronization of the reference oscillators both of the DUT and analyzer strongly reduces the measured frequency error.

Test setup ➤ Connect the reference input (EXT REF IN/OUT) on the rear panel of the analyzer to the reference output (REF) on the rear panel of SMIQ (coaxial cable with BNC connectors).

Settings on SMIQ: *As for measurement 2*

Settings on FSIQ: *As for measurement 2, plus*
[SETUP: *REFERENCE EXT]*

Measurement on FSIQ: Frequency error The displayed frequency error should be < 10 Hz.

The reference frequencies of the analyzer and of the DUT should be synchronized

Measurement 3: Measurement of Relative Code Domain Power

A code domain power measurement with one of the possible channel configurations is shown in the following. To demonstrate the effects the basic parameters of CDP measurements which allow an analysis of the signal are changed one after the other from values adapted to the measurement signal to non-adapted values.

Test setup

- Connect the RF output of SMIQ to the input of FSIQ
- Connect the reference input (EXT REF IN/OUT) on the rear panel of the analyzer to the reference input (REF) on the rear panel of SMIQ (coaxial cable with BNC connectors).

Settings on SMIQ:

```

[PRESET]
[LEVEL:                0 dBm]
[FREQ:                2.1175 GHz]
DIGITAL STD
  WCDMA 3GPP
    LINK DIRECTION  UP / REVERSE
    TEST MODELS (NOT STANDARDIZED)...
      C+D960K
    SELECT BS/MS
      MS 1 ON
    OVERALL SYMBOL RATE... 6*960
  STATE: ON
  
```

Settings on FSIQ:

```

[PRESET]
[CENTER:            2.1175 GHz]
[REF:              10 dBm]
[MODE:            3GPP MS ANALYZER: CODE DOM POWER
MEAS SETTINGS      SCRAMBLING CODE 0]
  
```

Measurement on FSIQ: The following is displayed:

Screen A: Code domain power of signal, I component
(channel configuration with 3 data channels in the I branch)

Screen B: Numeric results of CDP measurement

Setting: Behaviour with Deviating Center Frequency Setting

In the following, the behaviour of the DUT and the analyzer with deviating center frequency setting is shown.

Settings on SMIQ: ➤ Tune the center frequency of the signal generator in 1 kHz steps and watch the analyzer screen:

Measurement on FSIQ:

- A CDP measurement on the analyzer is still possible with a frequency error of up to approx. 3 kHz. Up to 3 kHz, a frequency error causes no apparent difference in measurement accuracy of the code domain power measurement.
- Above a frequency error of 3 kHz, the probability of an impaired synchronization increases. With continuous measurements, at times all channels are displayed in blue with almost the same level.
- Above a frequency error of approx. 4 kHz, a CDP measurement cannot be performed. FSIQ displays all possible codes in blue with a similar level.

Settings on SMIQ: ➤ Set the signal generator center frequency again to 2.1175 GHz:
[FREQ: 2.1175 GHz]

The analyzer center frequency should not differ from the DUT frequency by more than 3 kHz.

Setting: Behaviour with Incorrect Scrambling Code

A valid CDP measurement can only be carried out if the scrambling code set on the analyzer is identical to the one of the transmitted signal.

Test setup

```

SELECT BS/MS
MS 1: ON
SCRAMBLING CODE: 0001
(the scrambling code is set to 0000 on the analyzer)

```

Settings on SMIQ: The CDP display shows all possible codes with approximately the same level.

Settings on FSIQ: Set scrambling code to new value:
[MODE: 3GPP MS ANALYZER: CODE DOM POWER
MEAS SETTINGS SCRAMBLING CODE 1]

Measurement on FSIQ: The CDP display again shows the channel configuration.

The scrambling code setting of the analyzer must be identical to that of the measured signal.

Measurement 5: Measurement of Modulation Accuracy

The modulation accuracy measurement defined by the 3GPP specifications represents a measurement of the RMS-averaged deviation of the test signal from the ideal signal.

An ideal reference signal is generated from the demodulated data. The test signal and the reference signal are compared with each other. The square deviation yields the modulation accuracy.

- Test setup
- Connect the RF output of SMIQ to the input of FSIQ
 - Connect the reference input (EXT REF IN/OUT) on the rear panel of FSIQ to the reference input (REF) on the rear panel of SMIQ (coaxial cable with BNC connectors).
 - Connect the external trigger input on the rear panel of FSIQ (EXT TRIG GATE) to the external trigger output on the rear panel of SMIQ (TRIGOUT1 of PAR DATA).

Settings on SMIQ:

```
[PRESET]
[LEVEL:                0 dBm]
[FREQ:                2.1175 GHz]
DIGITAL STD
  WCDMA 3GPP
    LINK DIRECTION  UP / REVERSE
    TEST MODELS (NOT STANDARDIZED)...
      C+D960K
    SELECT BS/MS
      MS 1 ON
    OVERALL SYMBOL RATE... 6*960
  STATE: ON
```

Settings on FSIQ:

```
[PRESET]
[CENTER:              2.1175 GHz]
[REF:                 10 dBm]
[MODE:                3GPP MS ANALYZER: CODE DOM POWER
MEAS SETTINGS          SCRAMBLING CODE  0
                        SCR TYPE        LONG
                        INACT CHAN THRESHOLD -10
                        TRIGGER EXT
[menu change key UP]
RESULT DISPLAY          MODULATION ACCURACY]
```

Measurement on FSIQ:

The following is displayed:

- Screen A: Code domain power of signal, I component
(channel configuration with 3 active channels in the I branch)
- Screen B: Modulation accuracy (EVM for total signal)

Measurement 6: Measurement of Peak Code Domain Errors

The peak code domain error measurement is defined in the 3GPP specification for WCDMA signals. An ideal reference signal is generated from the demodulated data. The test signal and the reference signal are compared with each other. The difference of the two signals is projected onto the classes of the different spreading factors. The peak code domain error measurement is obtained by summing up the symbols of each difference signal slot.

- Test setup
- Connect the RF output of SMIQ to the input of FSIQ
 - Connect the reference input (EXT REF IN/OUT) on the rear panel of FSIQ to the reference input (REF) on the rear panel of SMIQ (coaxial cable with BNC connectors).
 - Connect the external trigger input on the rear panel of FSIQ (EXT TRIG GATE) to the external trigger output on the rear panel of SMIQ (TRIGOUT1 of PAR DATA).

Settings on SMIQ:

```
[PRESET]
[LEVEL:                0 dBm]
[FREQ:                2.1175 GHz]
DIGITAL STD
  WCDMA 3GPP
    LINK DIRECTION  UP / REVERSE
    TEST MODELS (NOT STANDARDIZED)...
      C+D960K
    SELECT BS/MS
      MS 1 ON
    OVERALL SYMBOL RATE... 6*960
  STATE: ON
```

Settings on FSIQ:

```
[PRESET]
[CENTER:            2.1175 GHz]
[REF:              0 dBm]
[MODE:            3GPP MS ANALYZER: CODE DOM POWER
MEAS SETTINGS      SCRAMBLING CODE 0
                   SCR TYPE      LONG
                   INACT CHAN THRESHOLD -20
                   TRIGGER EXT
```

[menu change key UP]

```
RESULT DISPLAY    PEAK CODE DOMAIN ERR
                  SELECT PCDE SF 256]
```

Measurement on FSIQ:

The following is displayed:

- Screen A: Code domain power of signal, I component
(channel configuration with 3 active channels in the I branch)
- Screen B: Peak code domain error (projection of the error onto the class
with spreading factor 256)

3 Setup for Mobile Station Tests



Caution:

Before turning the instrument on, the following conditions must be fulfilled:

- Instrument covers are in place and all fasteners are tightened.,
- Fan openings are free from obstructions.
- Signal levels at the input connectors are all below specified maximum values. The level at the FSIQ RF input of +20 dBm with a 0 dB input attenuator must under no circumstances be exceeded.
- Signal outputs are correctly connected and not overloaded.

Non-compliance with these instructions may cause damage to the instrument .

This section describes how to set up the analyzer for WCDMA mobile station tests. As a prerequisite for starting the test, the instrument must be correctly set up and connected to the AC power supply as described in chapter 1 of the operating manual for the analyzer. Furthermore, the application firmware module must be properly installed following the instructions given in chapter 1 of the present manual.

Standard Test Setup

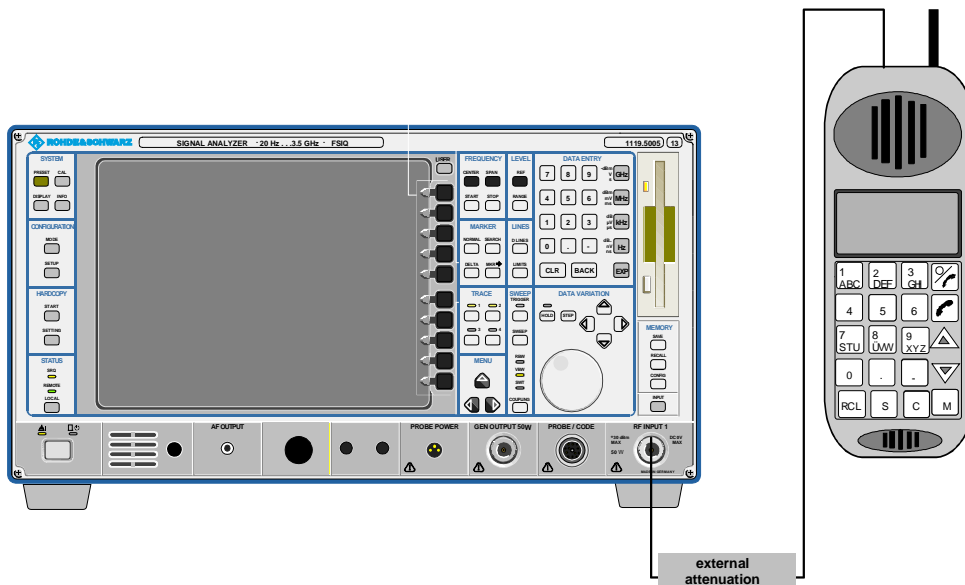


Fig. 3-1 MS test setup

- Connect antenna output of MS to RF input of the analyzer via a power attenuator of suitable attenuation.

The following values are recommended for the external attenuator to ensure that the RF input of the analyzer is protected and the sensitivity of the analyzer is not reduced too much.

| Max. power | Recommended ext. attenuation |
|----------------|------------------------------|
| ≥ 35 to 40 dBm | 15 to 20 dB |
| ≥ 30 to 35 dBm | 10 to 15 dB |
| ≥ 25 to 30 dBm | 5 to 10 dB |
| ≥ 20 to 25 dBm | 0 to 5 dB |
| < 20 dBm | 0 dB |

Presetting

- Enter external attenuation (reference level offset)
- Enter reference level
- Enter center frequency
- Select standard and measurement

4 Channel Configuration

The possible channel configurations for the mobile station signal are limited by 3GPP. Only two different configurations are permissible according to the specification. For this reason, the FSIQK73 checks for these two channel configurations only once during the automatic channel search. Therefore, channels whose parameters do not correspond to one of these configurations are not automatically detected as active channels.

The two possible channel configurations are summarized below:

Table 4-1 Channel configuration 1: DPCCH and 1 DPDCH

| Channel type | Number of channels | Symbol rate | Spreading code(s) | Mapping to component |
|--------------|--------------------|--------------------|------------------------|----------------------|
| DPCCH | 1 | 15 ksps | 0 | Q |
| DPDCH | 1 | 15 ksps – 960 ksps | [Spreading-Faktor / 4] | I |

Table 4-2 Channel configuration 2: DPCCH to 6 DPDCH

| Channel type | Number of channels | Symbol rate | Spreading code(s) | Mapping to component |
|--------------|--------------------|-------------|-------------------|----------------------|
| DPCCH | 1 | 15 ksps | 0 | Q |
| DPDCH | 1 | 960 ksps | 1 | I |
| DPDCH | 1 | 960 ksps | 1 | Q |
| DPDCH | 1 | 960 ksps | 3 | I |
| DPDCH | 1 | 960 ksps | 3 | Q |
| DPDCH | 1 | 960 ksps | 2 | I |
| DPDCH | 1 | 960 ksps | 2 | Q |

5 Menu Overview

Application Firmware Module FSIQK73 (WCDMA mobile station test) extends the analyzer by the code domain measurement mode for 3GPP WCDMA standard. Additional softkeys are available which allow overview measurements in the analyzer and vector analyzer modes.

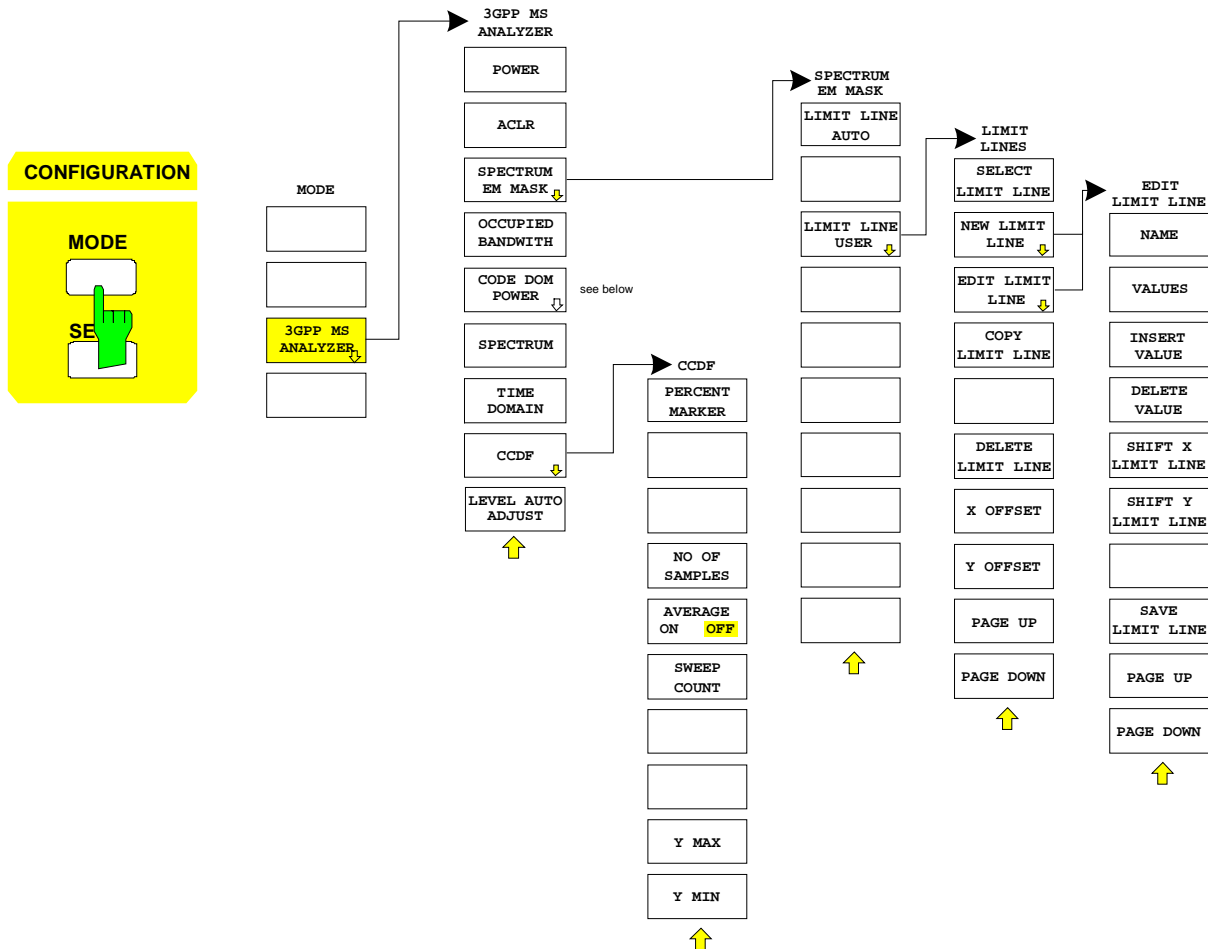


Fig. 5-1 Overview of menus

6 Configuration of WCDMA Measurements

The most important parameters for the 3GPP WCDMA mobile station tests are summarized in the menu *cdmaOne MS* (*CONFIGURATION* key group, *Mode* key) and are explained below using the softkey functions.

The *CDP MEAS* softkey activates the code domain measurement mode and opens the submenus for setting the measurement.

The softkeys *POWER*, *ACLR*, *SPECTRUM EM MASK*, *OCCUPIED BANDWIDTH*, *SPECTRUM* and *TIME DOMAIN* and *CCDF* activate mobile station tests in the analyzer or vector analyzer mode. The settings required by 3GPP specifications are performed by pressing the associated softkey, a subsequent modification of settings is possible. The other menus of FSIQ correspond to the menus of these modes and are described in the operating manual of FSIQ.

CONFIGURATION MODE menu

3GPP MS
ANALYZER ↓

POWER

ACLR

SPECTRUM
EM MASK ↓

OCCUPIED
BANDWIDTH

CODE DOM
POWER ↓

SPECTRUM

TIME
DOMAIN

CCDF ↓

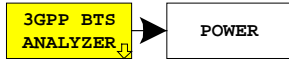
LEVEL AUTO
ADJUST

The *3GPP MS ANALYZER* softkey opens a submenu for setting the various measurement modes of option FSIQK73:

- *POWER* activates the channel power measurement with defined settings in the analyzer mode.
- *ACLR* activates the adjacent channel power measurement with defined settings in the analyzer mode.
- *SPECTRUM EM MASK* compares the signal power in different carrier offset ranges with the maximum values specified by 3GPP.
- *OCCUPIED BANDWIDTH* activates the measurement of the occupied bandwidth (analyzer mode).
- *CODE DOM POWER* activates the code domain measurement mode and opens another submenu for selecting and configuring the parameters. All other menus of FSIQ are adapted to the functions of the code domain measurement mode.
- *SPECTRUM* activates an overview measurement with defined settings in the analyzer mode.
- *TIME DOMAIN* activates the measurement of the WCDMA signal CREST factor in the time domain display mode (analyzer mode).
- *CCDF* evaluates the signal with regard to its statistical characteristics (distribution function of the signal amplitudes).

Measurement of Channel Power

Submenu: CONFIGURATION- MODE – 3GPP MS ANALYZER – POWER



The *POWER* softkey activates the measurement of the WCDMA signal channel power.

FSIQ measures the RF signal power in the 3.84 MHz bandwidth. The power is calculated by summing up the values at the trace points. The individual trace points are weighted with the root raised cosine function as specified by the 3GPP standard. The bandwidth is displayed numerically in the marker info field at the top right edge of the screen.

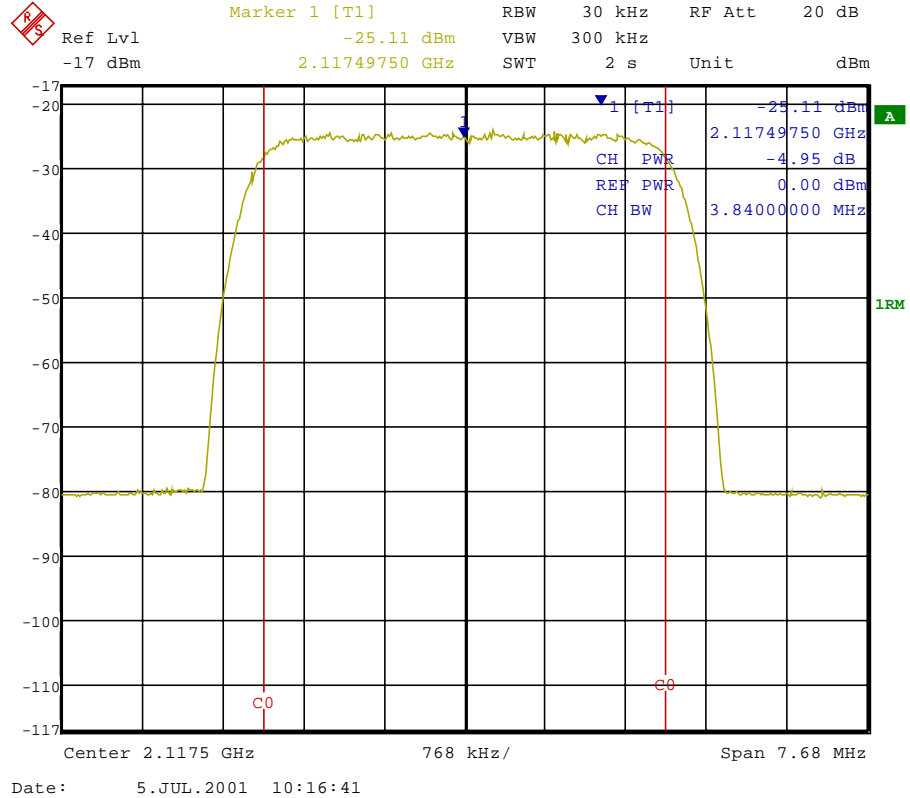


Fig. 6-1 Power measurement in the 3.84 MHz transmission channel

Pressing the softkey activates the analyzer mode with defined settings:

| | | |
|--|--|--------------------|
| SYSTEM PRESET | | |
| After Preset the following user-specific settings are restored and so the adaptation to the DUT is maintained: | Reference Level , Reference Level Offset Center Frequency, Frequency Offset Input Attenuation, Mixer Level All trigger settings | |
| MARKER NORMAL | CHANNEL POWER | |
| MARKER NORMAL | POWER MEAS SETTINGS - ACP STANDARD | W-CDMA 3GPP REV |

Starting from these settings, FSIQ can be operated in all functions available in the analyzer mode, i.e. all test parameters can be adapted to the requirements of the specific measurement.

IEC/IEEE-bus command: :CONFigure:WCDPower:MS:MEASurement Power

Query of results: :CALCulate:MARKer:FUNCTion:POWer:RESult? CPOwer

Signal Power Check – SPECTRUM EM MASK

CONFIGURATION - MODE - 3GPP MS ANALYZER submenu

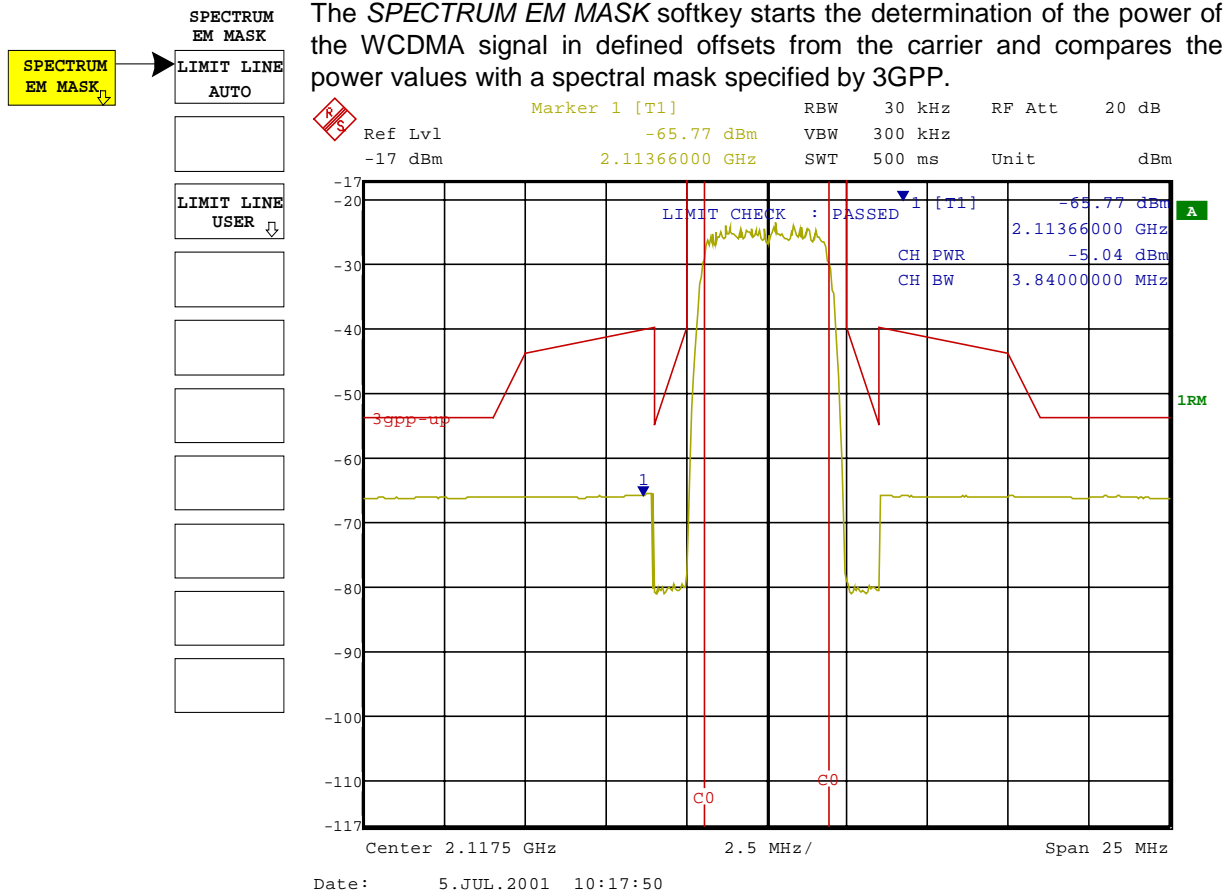


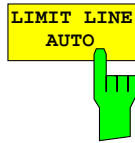
Fig. 6-3 Measurement of spectrum emission mask.

Pressing the softkey activates the analyzer mode with defined settings:

| | | |
|--|--|--------------------|
| SYSTEM PRESET | | |
| After Preset the following user-specific settings are restored and so the adaptation to the DUT is maintained: | Reference Level , Reference Level Offset Center Frequency, Frequency Offset Input Attenuation, Mixer Level All trigger settings | |
| MARKER NORMAL | CHANNEL POWER | |
| MARKER NORMAL | POWER MEAS SETTINGS - ACP STANDARD | W-CDMA 3GPP REV |
| | SET NO OF ADJ CHAN'S | 0 |

IEC/IEEE-bus command: :CONFigure:WCDPower:MS:MEASurement ESpectrum

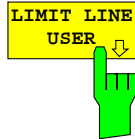
Query of results: :CALCulate:LIMit:FAIL? and visual evaluation



The *LIMIT LINE AUTO* softkey automatically selects the limit line to be checked according to power determined in the useful channel. If the measurement is carried out in *CONTINUOUS SWEEP* and the channel power changes from sweep to sweep, this can result in the limit line being continuously redrawn.

The softkey is activated when the spectrum emission mask measurement is entered.

IEC/IEEE-bus command: `:CALC:LIM:ESP:MODE AUTO`



The *LIMIT LINE USER* softkey activates the input of user-defined limit lines. The softkey opens the menus of the limit line editor that are known from the basic unit. The limit lines created by the user are included in the table for *LIMIT LINE MANUAL*.

The following limit line settings are useful for mobile station tests:

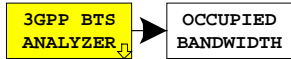
Trace 1, Domain Frequency, X-Scaling relative, Y-Scaling absolute, Spacing linear, Unit dBm

In contrast to the predefined limit lines supplied with the FSIQ which correspond to the standard specifications, the user-defined limit line can be specified for the entire frequency range (± 12.5 MHz from carrier) either relatively (referred to the channel power) or absolutely.

IEC/IEEE-bus command: see Table of Softkeys with Assignment of IEC/IEEE Commands

Measurement of Occupied Bandwidth - OCCUPIED BANDWIDTH

Submenu: CONFIGURATION - MODE - 3GPP MS ANALYZER



The OCCUPIED BANDWIDTH activates the measurement of the bandwidth which the signal occupies.

The occupied bandwidth is defined as the bandwidth in which 99% of the total transmitter power is contained.

The occupied bandwidth and the frequency markers are output in the marker info field at the top right edge of the screen.

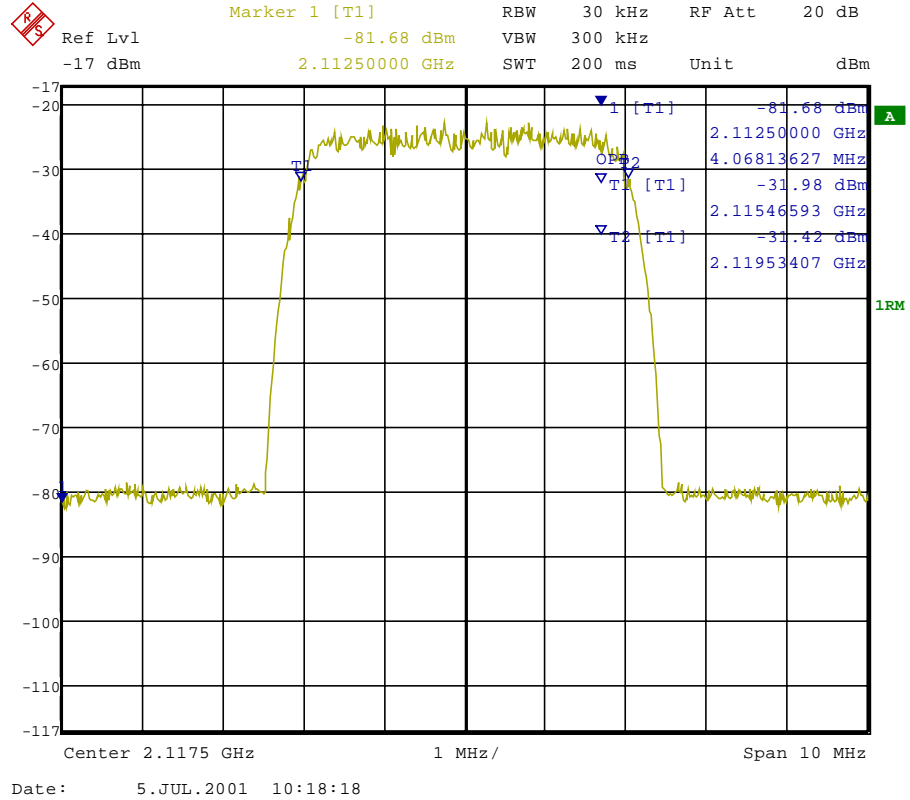


Fig. 6-4 Measurement of occupied bandwidth.

Pressing the softkey activates the analyzer mode with defined settings:

| | | |
|--|--|---------|
| SYSTEM PRESET | | |
| After Preset the following user-specific settings are restored and so the adaptation to the DUT is maintained: | Reference Level , Reference Level Offset Center Frequency, Frequency Offset Input Attenuation, Mixer Level All trigger settings | |
| MARKER NORMAL | OCCUPIED PWR BANDW | |
| FREQUENCY SPAN | CENTER FIXED | 10 MHz |
| SWEEP SWEEP | SWEEP TIME MANUAL | 0.2 sec |
| SWEEP COUPLING | RBW MANUAL | 30 kHz |
| TRACE 1 | DETECTOR | RMS |

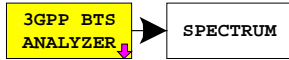
Starting from these settings, FSIQ can be operated in all functions available in the analyzer mode, i.e. all test parameters can be adapted to the requirements of the specific measurement.

IEC/IEEE-bus command: :CONFigure:WCDPower:MS:MEASurement OBANdwidth

Query of results: :CALCulate:MARKer:FUNction:POWER:RESUlt? OBANdwidth

Spectrum Measurement - SPECTRUM

Submenu: CONFIGURATION- MODE - 3GPP MS ANALYZER



The *SPECTRUM* softkey displays the spectrum of the WCDMA MS signal with a span of 25 MHz in the analyzer mode.

This measurement gives an overview of the W-CDMA signal spectrum so that interfering signals in the immediate vicinity can be identified. Measurement settings, e.g. the span, can be modified as required for further signal measurements.

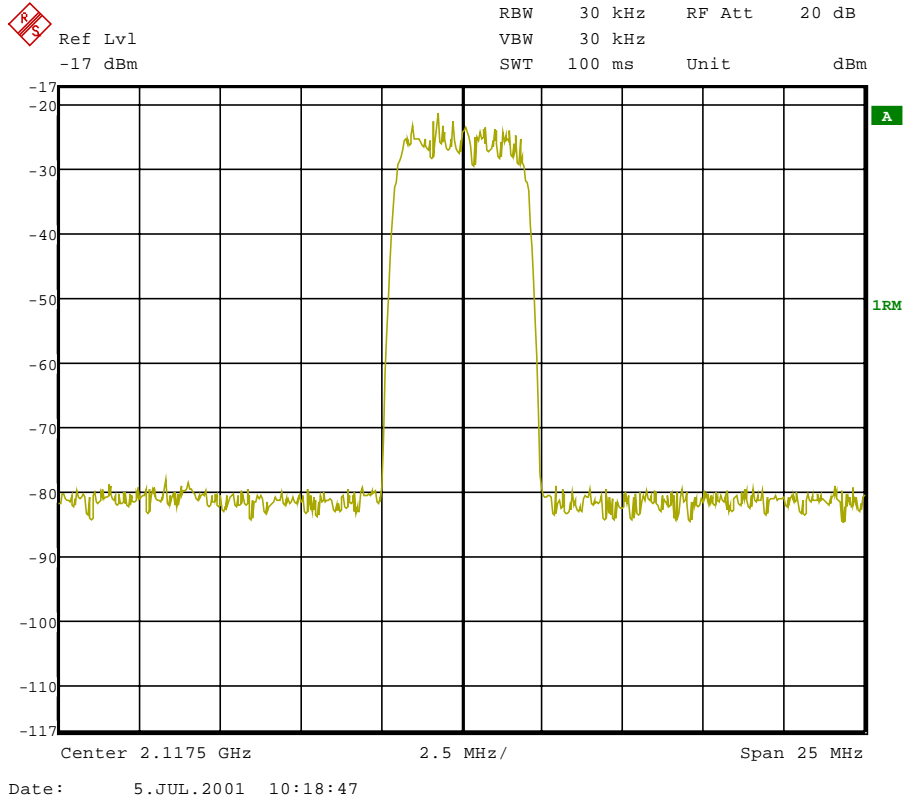


Fig. 6-5 Spectrum display of WCDMA signal at a 25 MHz span.

Pressing the softkey activates the analyzer mode with defined settings:

| | | |
|--|-------------------|---------|
| SYSTEM PRESET | | |
| After Preset the following user-specific settings are restored and so the adaptation to the DUT is maintained: | | |
| Reference Level , Reference Level Offset Center Frequency, Frequency Offset Input Attenuation, Mixer Level All trigger settings | | |
| FREQUENCY SPAN | | 25 MHz |
| SWEEP SWEEP | SWEEP TIME MANUAL | 0.1 sec |
| SWEEP COUPLING | RES BW MANUAL | 30 kHz |
| TRACE 1 | DETECTOR | RMS |

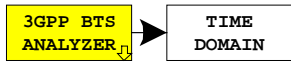
Starting from these settings, FSIQ can be operated in all functions available in the analyzer mode, i.e. all test parameters can be adapted to the requirements of the specific measurement.

IEC/IEEE-bus command: :CONFigure:WCDPower:MS:MEASurement FDOMain

Query of results: -- (visual evaluation)

Measurement of Crest Factor - TIME DOMAIN

Submenu: CONFIGURATION - MODE - 3GPP MS ANALYZER



The *TIME DOMAIN* softkey displays the CREST factor of the WCDMA MS signal in the analyzer mode.

For this measurement, a signal section is continuously recorded. The W-CDMA signal is measured in the zero span in the time domain. The result is displayed in two traces.

Trace 1 is measured with the sample detector. The analyzer calculates the average power from the displayed trace points.

Trace 2 is measured with the peak detector in the max. hold mode, i.e. the peak value of the signal is displayed.

The analyzer calculates the crest factor from the difference between the peak and the average power and displays it in the Marker Info field.

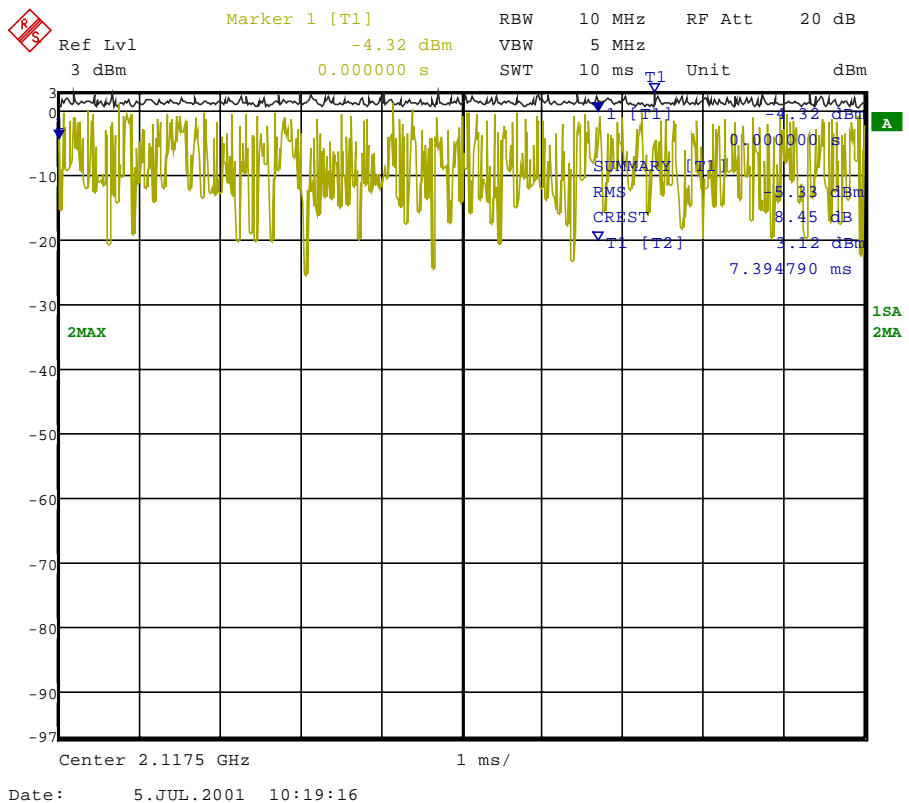


Fig. 6-6 Time domain display of WCDMA signal.

Pressing the softkey activates the analyzer mode with defined settings:

| | | |
|--|-------------------|-----------|
| SYSTEM PRESET | | |
| After Preset the following user-specific settings are restored and so the adaptation to the DUT is maintained: Reference Level , Reference Level Offset Center Frequency, Frequency Offset Input Attenuation, Mixer Level All trigger settings | | |
| FREQUENCY SPAN | | ZERO SPAN |
| SWEEP SWEEP | SWEEP TIME MANUAL | 0.1 sec |
| SWEEP COUPLING | RES BW MANUAL | 10 MHz |
| | VIDEO BW MANUAL | 5 MHz |
| TRACE 1 | DETECTOR | SAMPLE |
| MARKER NORMAL | | MARKER 1 |
| TRACE 2 | | MAX HOLD |
| TRACE 2 | DETECTOR | MAX PEAK |
| MARKER SEARCH | SUMMARY MARKER | ON |
| MARKER SEARCH | SUMMARY MARKER | RMS |
| MARKER NORMAL | MARKER INFO | ON |

Starting from these settings, FSIQ can be operated in all functions available in the analyzer mode, i.e. all test parameters can be adapted to the requirements of the specific measurement.

IEC/IEEE-bus command: :CONFigure:WCDPower:MS:MEASurement TDOMain

Query of results:
:CALCulate:MARKer:FUNCTion:CRESt?
:CALCulate:MARKer:FUNCTion:SUMMary:RMS:RESult?
:CALCulate:MARKer:FUNCTion:SUMMary:STATe ON

Signal Statistics - CCDF

CONFIGURATION - MODE - 3GPP MS ANALYZER submenu

CCDF

PERCENT MARKER

NO OF SAMPLES

AVERAGE ON OFF

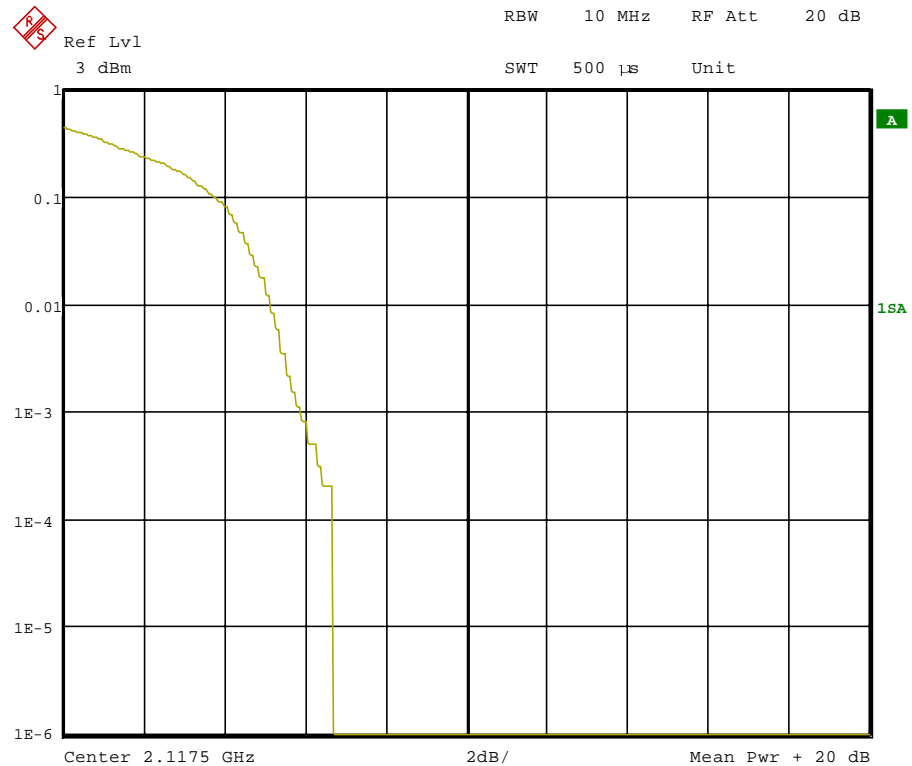
SWEEP COUNT

Y MAX

Y MIN

The CCDF softkey starts a measurement of the distribution function of the signal amplitudes (complementary cumulative distribution function).

For the purposes of this measurement, a signal section of settable length is recorded continuously in the zero span, and the distribution of the signal amplitudes is evaluated. The record length and display range of the CCDF can be set using the softkeys of the menu. The amplitude distribution is displayed logarithmically as a percentage of the amount by which a particular level is exceeded, beginning with the average value of the signal amplitudes.



Date: 5.JUL.2001 10:19:41

Fig. 6-7 CCDF of WCDMA signal

Pressing the softkey activates the analyzer mode with defined settings:

| | | |
|--|-----------------|-----------|
| SYSTEM PRESET | | |
| After Preset the following user-specific settings are restored and so the adaptation to the DUT is maintained: | | |
| Reference Level , Reference Level Offset | | |
| Center Frequency, Frequency Offset | | |
| Input Attenuation, Mixer Level | | |
| All trigger settings | | |
| FREQUENCY SPAN | | ZERO SPAN |
| TRACE1 | DETECTOR | SAMPLE |
| SWEEP COUPLING | RES BW MANUAL | 10 MHz |
| | VIDEO BW MANUAL | 5 MHz |

Starting from these settings, FSIQ can be operated in all functions available in the analyzer mode, i.e. all test parameters can be adapted to the requirements of the specific measurement.

IEC/IEEE-bus command: :CONFigure:WCDPower:MS:MEASurement CCDF
or
 :CALCulate:STATistics:MS:CCDF ON

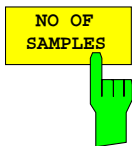
Query of results: :CALCulate:MARKer:X?



The *PERCENT MARKER* softkey sets the marker to the specified percentage of the Y axis. The step width of the marker movement depends on the current marker value.

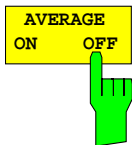
In addition to this marker, the normal markers of the analyzer can be activated for the display mode.

IEC/IEEE-bus command: :CALC:MARK:Y:PERC 5



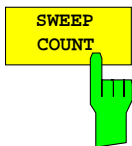
The *NO OF SAMPLES* softkey specifies the number of samples used to create the CCDF.

IEC/IEEE-bus command: CALC:STAT:NSAM 5000



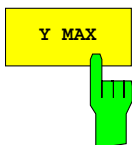
The *AVERAGE ON / OFF* softkey specifies whether or not the results of continuous measurements (in conjunction with *SWEEP COUNT*) are averaged. The default setting of the softkey is *OFF*.

IEC/IEEE-bus command: :DISP:TRAC1:MODE AVER | VIEW



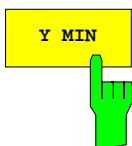
The *SWEEP COUNT* softkey determines the number of signal sections across which averaging is carried out (in the case of *AVERAGE ON*). Using *SWEEP COUNT* >1 and *AVERAGE ON*, the number of samples used to evaluate the statistical characteristics of the signal can be increased.

IEC/IEEE-bus command: :SWE:COUN 6



The *Y MAX* softkey specifies the upper limit of the display range of the CCDF. Since probabilities are specified on the Y axis, the entered numerical values are dimensionless. The maximum value of the softkey is 1.

IEC/IEEE-bus command: CALC:STAT:SCAL:Y:UPP 0.01



The *Y MIN* softkey specifies the lower limit of the display range of the CCDF. The minimum value of the softkey is 1E-6.

IEC/IEEE-bus command: CALC:STAT:SCAL:Y:LOW 0.001

Code Domain Measurements on WCDMA Signals

Application Firmware FSIQK73 provides the peak code domain error measurement, an EVM measurement of the total signal (modulation accuracy), prescribed by the 3GPP standard as well as the code domain power measurement of assigned and unassigned codes. In addition, the symbols demodulated in a slot, the decided bits or the EVM symbol can be displayed for an active channel.

A signal section of approx. 20 ms is recorded for analysis and searched for the start of a WCDMA frame. If a frame start is found in the signal, the CDP analysis is performed for a complete frame starting from slot 0.

Application firmware FSIQK73 offers two different ways of representing the code domain power measurement:

- Representation of all code channels

Option FSIQK73 displays the power of all occupied code channels in a bargraph. Since, in the uplink, the channels are handled separately for the I and Q component, the display always applies to one of the two components. The x axis is scaled for the highest code class or the highest spreading factor (256). Code channels with a lower spreading factor occupy correspondingly more channels of the highest code class. The power of the code channel is always correctly measured in accordance with the actual power of the code channel. Unused code channels are assumed to belong to the highest code class and displayed accordingly. The displayed power of an unused code channel therefore corresponds to the power of a channel with the spreading factor 256 at the respective code position.

To simplify identification, used and unused channels are displayed in different colours. Used channels are yellow, unused channels are blue.

The measured power always refers to one slot. The start of slot 0 coincides with the beginning of the analyzed WCDMA frame.

- Representation of channel power versus slots of a WCDMA signal frame

In this case the power of a selectable code channel is indicated versus a frame. The power is always measured within one slot of the selected channel. The start of slot 0 coincides with the beginning of the analyzed WCDMA frame.

The measurements symbol constellation, symbol EVM and bit stream are each referred to one slot of the selected channel.

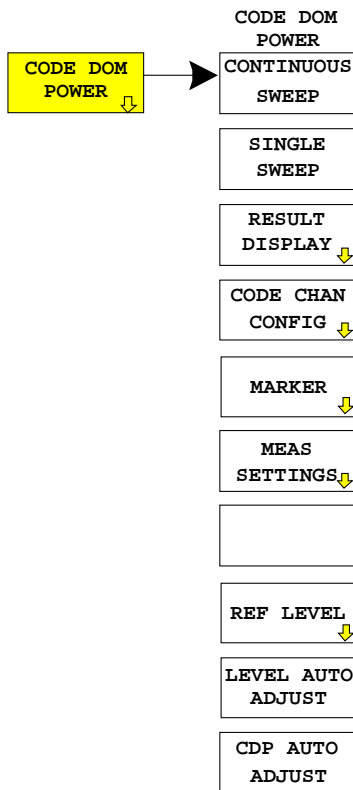
The modulation accuracy and peak code domain error measurements are always referred to the total signal.

For code domain power (CDP) measurements, the display is operated in the *SPLIT SCREEN* mode. In the upper section of the display, only CDP representations are permissible; in the lower section of the display, all other representations are permissible. An exception is the *CDP OVERVIEW* display mode in which CDP representations appear in both sections.

For code domain power measurements, the FSIQK73 expects that the Dedicated Physical Common Control Channel (DPCCH) is contained in the signal to be measured.

There are two modes for the CDP analysis. In the *CODE CHAN AUTOSEARCH* mode, FSIQK73 performs an automatic search for active channels in the whole code domain. The channel search is based on the power of the channels and on a signal/noise ratio that should not be exceeded within the channel. In the *CODE CHAN PREDEFINED* mode, the user can define the active channels contained in the signal via tables that can be selected and edited.

Submenu: *CONFIGURATION - MODE - 3GPP MS ANALYZER*



The *CODE DOM POWER* softkey activates the code domain measurement mode and opens a submenu for configuring the measurements.

All settings can be performed in these submenus.

IEC/IEEE-bus command:

```
:CONFigure:WCDPower:MS:MEASurement WCDPower
```

or:

```
:INSTrument:SElect MWCDpower
```

Query of results:

```
:TRACe:DATA? TRACE1 | TRACE2 | ABITstream
```

or

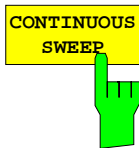
```
:CALCulate<1|2>:MARKer<1>:FUNctIon:WCDP:MS:RESult?
PTOTal | FERRor | TFRame | MACCuracy |
PCDError | EVMRms | EVMPeak | CERRor |
SRATe | CHANnel | CDPabsolute | CDPRelative |
IQOffset | IQIMbalance | CMAPPing | PSYMBOL
```

or

Marker functions (see *MARKER* submenu)

Continuous Measurement - Continuous Sweep

Submenu: *CONFIGURATION - MODE - 3GPP MS ANALYZER - CODE DOM POWER*

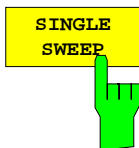


The *CONTINUOUS SWEEP* softkey sets a continuous measurement mode. The start of the actual measurement, however, may depend on an external trigger. (see section Trigger Settings - *TRIGGER* Menu)

IEC/IEEE-bus command: `:INITiate:CONTinuous ON;`
`:INITiate:IMMediate`

Single Measurement - Single Sweep

Submenu: *CONFIGURATION - MODE - 3GPP MS ANALYZER - CODE DOM POWER*

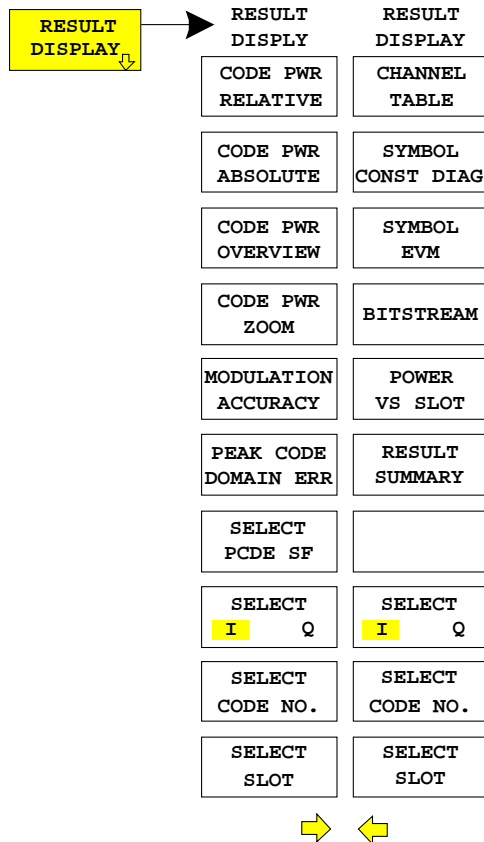


The *SINGLE SWEEP* softkey sets the single measurement mode. A single sweep is performed upon pressing the softkey. The start of the actual measurement, however, may depend on an external trigger (see section Key group *SWEEP*).

IEC/IEEE-bus command: `:INITiate:CONTinuous OFF;`
`:INITiate:IMMediate`

Display Mode - RESULT DISPLAY

Submenu: CONFIGURATION - MODE - 3GPP MS ANALYZER - CODE DOM POWER



The *RESULT DISPLAY* softkey opens a submenu for setting the display mode. The main menu contains the most important display modes as well as the measurements specified by the 3GPP standard for a fast access, whereas the side menu contains more detailed display modes.

The following display modes are available:

CODE PWR RELATIVE

Code domain power with relative scaling (I or Q component)

CODE PWR ABSOLUTE

Code domain power with absolute scaling (I or Q component)

CODE PWR OVERVIEW

Code domain power with relative scaling (I and Q component simultaneously)

CODE PWR ZOOM

Selection of 32 codes out of the 256 possible codes

MODULATION ACCURACY

Square difference between test signal and ideal reference signal

PEAK CODE DOMAIN ERROR

Projection of the error between the test signal and the ideal reference signal onto the various spreading factors and subsequent summation using the symbols of each difference signal slot

POWER VS SLOT

Power of the selected channel versus all slots of a WCDMA signal frame

RESULT SUMMARY

Tabular result display

CHANNEL TABLE

Display of channel occupation table

SYMBOL CONST DIAG

Display of constellation diagram

SYMBOL EVM

Display of error vector magnitude diagram

BITSTREAM

Display of decided bits

For the display modes *CODE PWR RELATIVE / ABSOLUTE / OVERVIEW / ZOOM, POWER VS SLOT, SYMBOL CONST DIAG / EVM and BITSTREAM*, the displayed component can be selected via the *SELECT I / Q* softkey.

By entering a code number (*SELECT CODE NO:* softkey) in the modes *CODE PWR RELATIVE / ABSOLUTE / ZOOM, POWER VS SLOT, SYMBOL CONST DIAG / EVM, BITSTREAM* it is possible to mark a channel for more detailed display modes.

The desired spreading factor can be selected with the *SELECT PCDE SF* softkey in the *PEAK CODE DOMAIN* display mode.

In the *POWER VS SLOT, SYMBOL CONST DIAG* and *SYMBOL EVM* display modes a slot can be marked by entering a slot number using the *SELECT SLOT* softkey.

Above the diagram, the most important measurement settings which form the basis if the display modes are summarized:

| | | | |
|-------------------|------------|-----------|----------|
| CF | 2.1175 GHz | SR | 960 ksps |
| Code Pwr Relative | | Chan Code | 1 |
| Slot Number | 5 | Mapping | Q |

Fig. 6-8 Indication of measurement parameters

The different elements are:

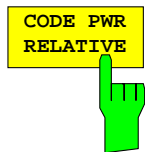
1st column:

| | |
|--------------------|--|
| CF 2.1175 GHz: | Center frequency of signal |
| Code Pwr Relative: | Name of selected display mode |
| Slot Number 5: | Slot number (value of SELECT SLOT softkey) |

2nd column:

| | |
|--------------|--|
| SR 960 ksps: | Symbol rate of selected channel |
| Chan Code 1: | Spreading code of selected channel |
| Mapping Q | I/Q component onto which the channel is mapped |

Note: For the peak code domain error display mode, the indication of the symbol rate is replaced by the indication of the spreading factor onto which the error is projected (see *PEAK CODE DOMAIN ERR* softkey)



The *CODE PWR RELATIVE* softkey selects the code domain power display mode with relative scaling.

The channel power refers to the total power of the signal.

The measurement interval for determining the channel power equals one slot. The reference value for the start of slot 0 is the beginning of the analyzed WCDMA frame.

The powers of the active channels and of the unassigned codes are shown in different colours:

- yellow: active channels
- blue: unassigned codes

In the *CODE CHAN AUTOSEARCH* mode, a data channel is designated as active if its power is increased by a minimum value (see softkey *INACT CHAN THRESH*) compared to the noise and if the a minimum signal/noise ratio is maintained within the channel.

In *CODE CHAN PREDEFINED* mode, each data channel that is included in the user defined channel table is considered to be active.

By entering a code channel number (see *SELECT CODE NO* softkey) it is possible to mark a channel for more detailed display modes. The marked channel is shown in red. The whole channel is marked if it is an assigned channels, and only the entered code is marked in the case of an unassigned code.

The display mode for the path of representation and the slot can be varied using the *SELECT I/Q* and *SELECT SLOT* softkeys.

Selecting other display modes (e.g. *SYMBOL CONSTELLATION*) for unassigned codes is possible but not useful since the results are not valid.

The figure shows the relative CDP representation of the Q path for 2 data channels that are active in this path.

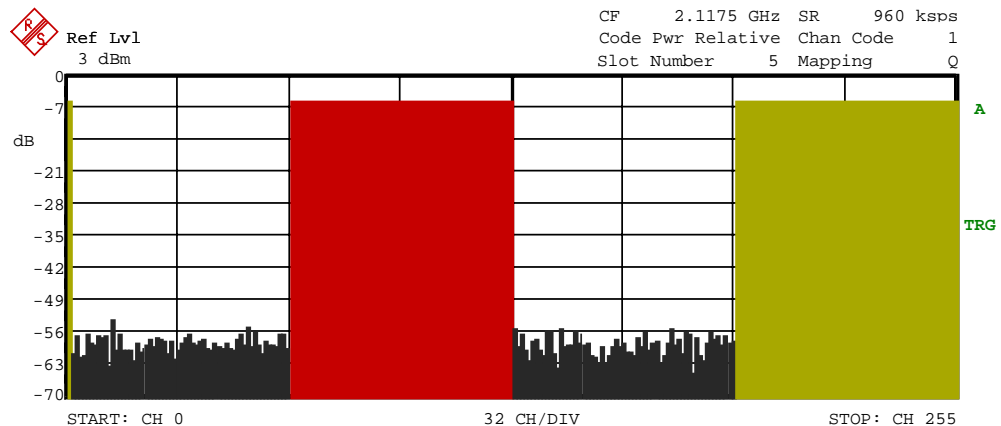
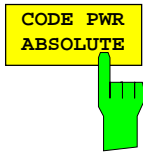


Fig. 6-9 CDP diagram (relative scaling)

IEC/IEEE-bus command: :CALCulate<1>:FEED "XPOW:CDP:RAT"



The *CODE PWR ABSOLUTE* softkey selects the code domain power display mode with absolute scaling.

The powers of the active channels and of the unassigned codes are shown in different colours:

- yellow: active channels
- blue: unassigned codes

After entering a code number (*SELECT CODE NO* softkey) it is possible to mark a channel for other display modes. The marked channel is shown in red.

The display mode for the path of representation and the slot can be varied using the *SELECT I/Q* and *SELECT SLOT* softkeys.

The measurement interval for determining the power of the channels is a slot. The reference value for the start of slot 0 is the beginning of the analyzed WCDMA frame.

For the recognition of the active code channels, the conditions are the same as those described for *CODE PWR RELATIVE*.

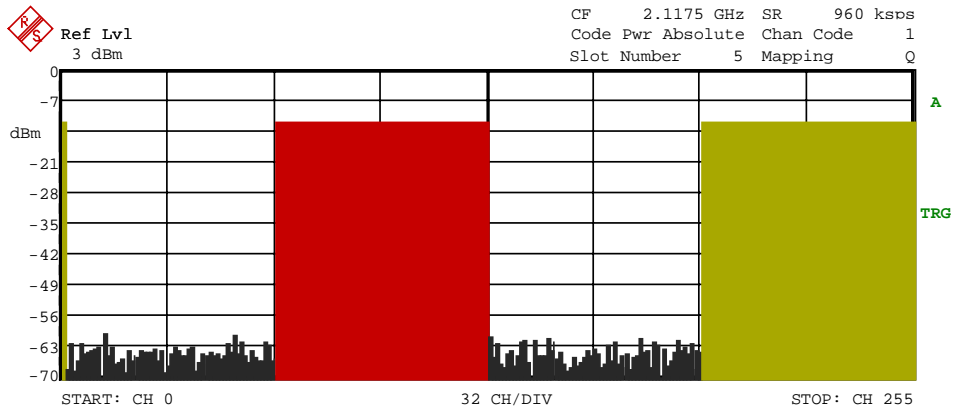
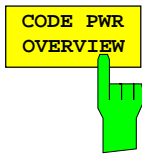


Fig. 6-10 Code domain power display mode with absolute scaling

IEC/IEEE-bus command: :CALCulate<1>:FEED "XPOW:CDP"



The *CODE PWR OVERVIEW* softkey displays the code domain power of the two components of the I/Q plane simultaneously. This display provides an overview of the channels contained in the signal. The display mode can be varied for different slots of the signal using the *SELECT SLOT* softkey.

The conditions described under *CODE PWR RELATIVE* apply to the identification of active code channels.

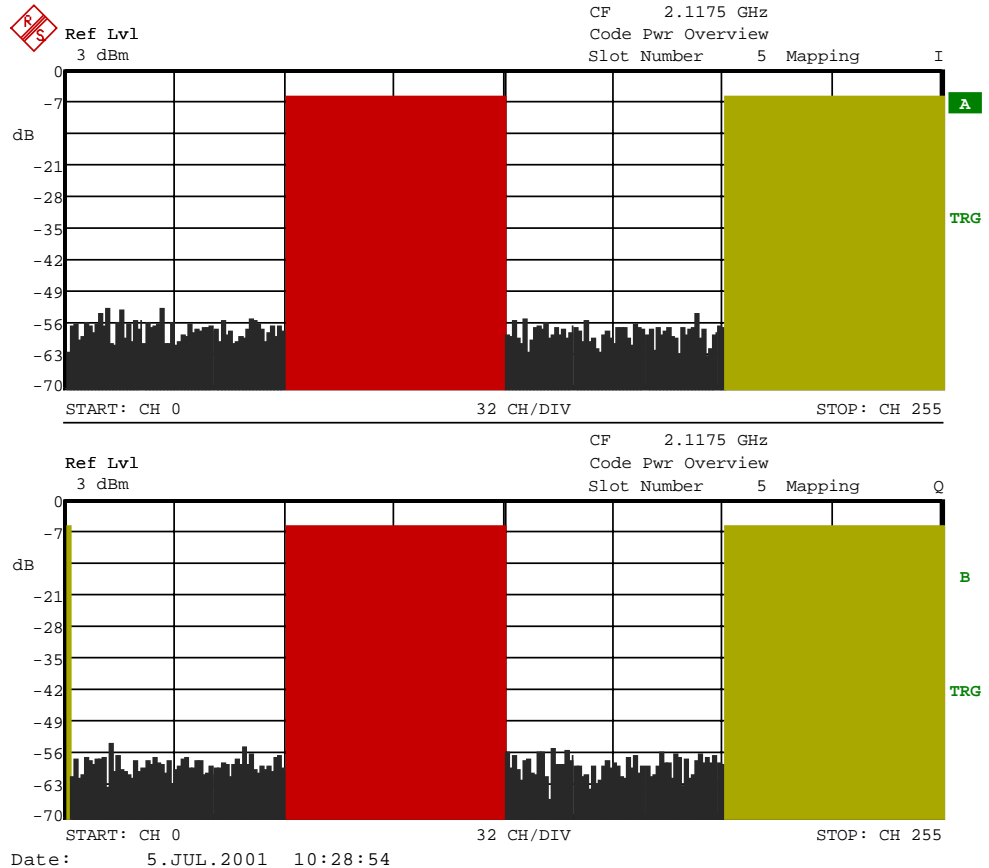
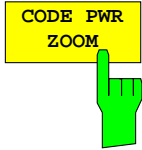


Fig. 6-11 Overview display

IEC/IEEE-bus command: :CALCulate<1>:FEED "XPOW:CDP:OVERview"



The *CODE PWR ZOOM* softkey zooms the x- axis of the code domain power display. The analyzer displays a window of 32 codes out of the 256 possible codes.

The representation is referred to the position of an activated marker. If no marker is active, the zoomed representation starts from code 0.

The powers of the active channels and of the unassigned codes are shown in different colours:

- yellow: active channels
- blue: unassigned codes

By entering a code channel number (see *SELECT CODE NO* softkey) it is possible to mark a channel for more detailed display modes. The marked channel is shown in red.

In the zoomed representation, the marked channel need not be contained in the displayed picture section. The display does not scroll depending on the marked channel.

The display mode for the path of representation or for the slot can be varied using the *SELECT I/Q* and *SELECT SLOT* softkeys.

The measurement interval for determining the channel power equals one slot. The reference value for the start of slot 0 is the beginning of the analyzed WCDMA frame.

For the recognition of the active code channels, the conditions are the same as those described for *CODE PWR RELATIVE*.

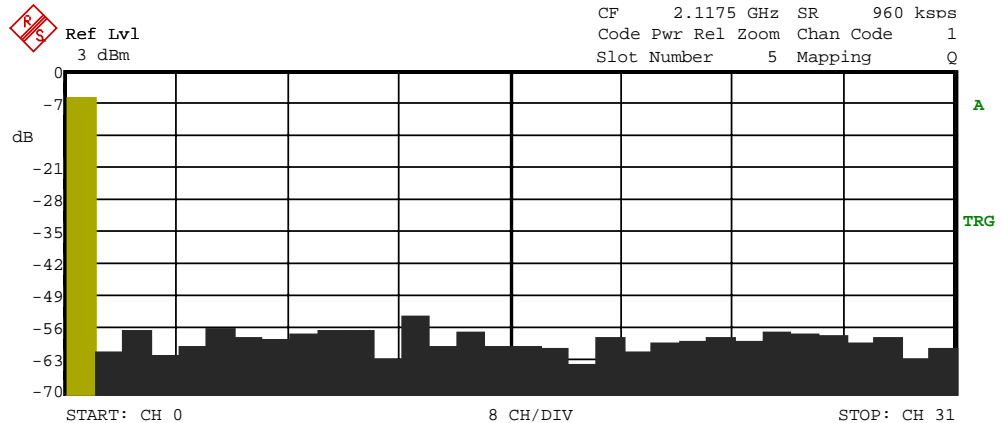
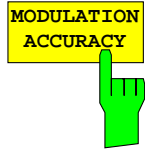


Fig. 6-12 Zoomed representation of the CDP diagram

IEC/IEEE-bus command: --



The *MODULATION ACCURACY* softkey selects the modulation accuracy display mode.

During the modulation accuracy measurement, the square root of the squared errors between the real and imaginary components of the test signal and an ideal reference signal (EVM referred to the total signal) is determined

Only the channels recognized as active are used to generate the ideal reference signal. If an assigned channel is not recognized as active, the difference between the measurement and reference signal, and the modulation accuracy is very high .

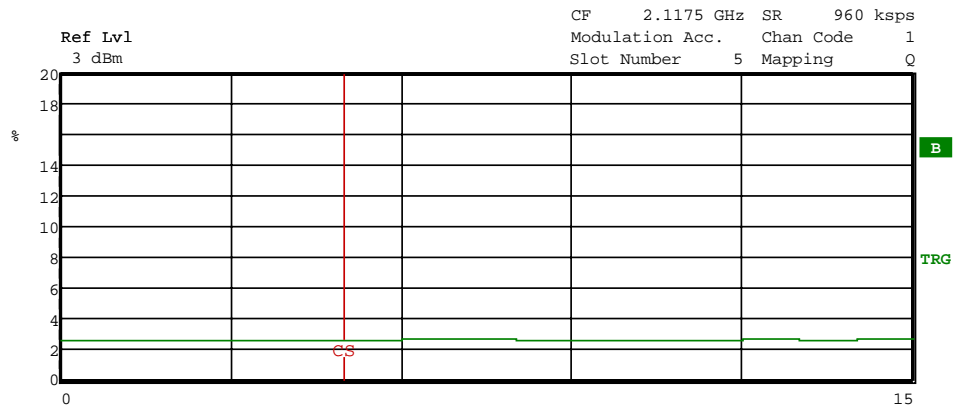
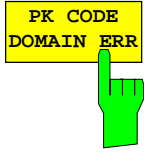


Fig. 6-13 Modulation Accuracy

IEC/IEEE-bus command: :CALCulate2:FEED "XTIM:CDP:MACCuracy"



The *PEAK CODE DOMAIN ERROR* softkey selects the peak code domain error display mode.

In line with the 3GPP specifications, the error between the measurement signal and the ideal reference signal is projected onto the various spreading factors. The desired spreading factor is selected by means of the *SELECT PCDE SF* softkey.

The measurement interval for determining the channel power equals one slot. The reference value for the start of slot 0 is the beginning of the analyzed WCDMA frame.

Only the channels recognized as active are used to generate the ideal reference signal for the peak code domain error. If an assigned channel is not recognized as active, the difference between the measurement and reference signal is very high. FSIQK73 consequently indicates a peak code domain error that is too high.

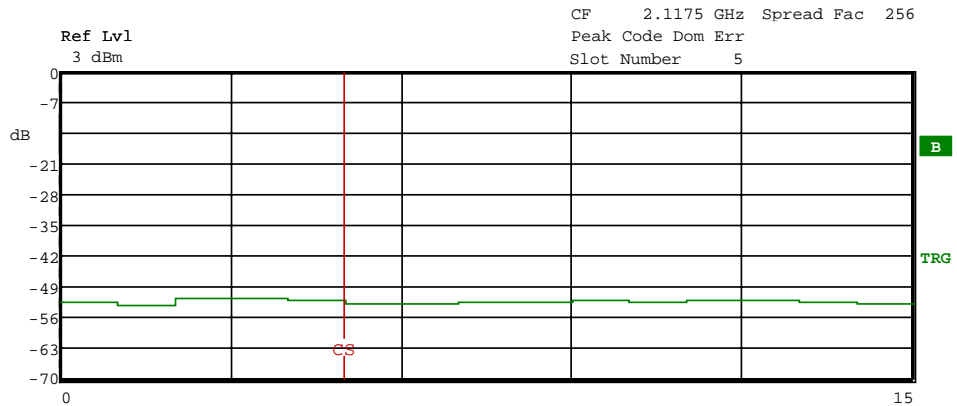
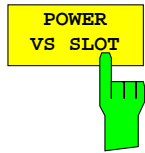


Fig. 6-14 Peak Code Domain Error

IEC/IEEE-bus command: :CALCulate2:FEED "XTIM:CDP:ERR:PCDomain"



The *POWER VS SLOT* softkey selects the indication of the power of the selected code channel depending on the slot number. The power of the selected channel (marked red in the CDP diagram) is displayed versus all slots of a frame of the WCDMA signal.

Beginning with the start slot of the analysis, the power of 15 consecutive slots (corresponds to one WCDMA frame) of the signal is displayed. The representation is absolute.

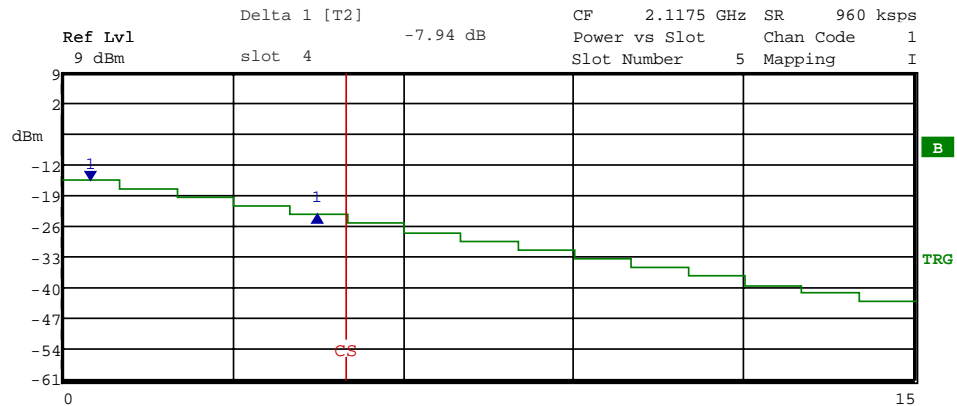


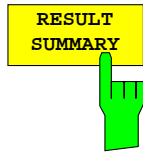
Fig. 6-15 Power versus Slot measurement for a channel with power control

It is not only possible to select a code channel in the CDP diagram, but also to mark a slot in the power-versus-slot diagram. Marking is done by entering the slot number (see *SELECT SLOT* softkey) and the selected slot is marked in red. The red marking is always on the starting point of a slot and can be varied only with the slot spacing (see vertical line CS in the figures above).

Modifying a slot number has the following effects:

- The CDP diagram in the upper half of the display is updated referred to the entered slot number.
- Starting from the slot, all dependent results are calculated for the selected channel. The relevant graphics are updated.

IEC/IEEE-bus command: :CALCulate2:FEED "XTIM:CDP:PVSLOT"



The *RESULT SUMMARY* softkey selects the numerical display of all results. The display is subdivided as follows:

| RESULT SUMMARY | | | |
|-------------------|------------|------------------------|---------------|
| GLOBAL RESULTS | | Carr Freq Err 99.01 Hz | |
| Total PWR | -6.28 dBm | Trg to Frame | -90.61 ns |
| Chip Rate Err | -0.05 ppm | IQ Imbalance | 0.10 % |
| IQ Offset | 0.56 % | Pk Code Dom Err | -52.58 dB rms |
| Modulation Acc | 2.54 % rms | | (15 ksp/s) |
| No. of Pilot Symb | 8 | | |
| CHANNEL RESULTS | | Slot Number 5 | |
| Symb Rate | 960 ksp/s | Chan Mapping | Q |
| Channel Code | 1 | Chan Pow abs. | -11.84 dBm |
| Chan Pow rel. | -5.56 dB | Error Vector Mag | 6.08 % Pk |
| Error Vector Mag | 1.93 % rms | | |

Fig. 6-16 Result Summary

The upper part contains the results relating to the total signal:

- Total PWR:** Outputs the total signal power (average power of total evaluated WCDMA frame).
- Carr Freq Err:** Outputs the frequency error referred to the center frequency of the analyzer. The absolute frequency error is the sum of the analyzer and DUT frequency error. Differences of more than 3 kHz between transmitter and receiver frequency impair the synchronization of the CDP measurement. For this reason, the transmitter and receiver should be synchronized (see chapter Getting Started).
- Chip Rate Err:** Outputs the chip rate error (3.84 Mcps) in ppm. As a result of a high chip rate error symbol errors arise and the CDP measurement is possibly not synchronized to the WCDMA signal. The result is valid even if the synchronization of analyzer and W-CDMA signal failed.
- Trg to Frame:** This result outputs the timing offset from the beginning of the recorded signal section to the start of the analyzed WCDMA frame. In the case of triggered data collection, this timing offset is identical with the timing offset of frame trigger (+ trigger offset) – frame start. In the case of failure of the synchronization of analyzer and W-CDMA signal, the value of Trg to Frame is not significant.

IQ Offset: DC offset of signals in %

IQ Imbalance: IQ imbalance of signal in %

Modulation Acc: The modulation accuracy is the difference between the test signal and the ideal reference signal (see *MODULATION ACCURACY* softkey). The rms average (of the analyzed frame) of the measurement results for each slot is given in the RESULT SUMMARY.

Pk Code Dom Err:
The *PEAK CODE DOMAIN ERROR* measurement specifies a projection of the difference between the test signal and the ideal reference signal onto the selected spreading factor (see *PEAK CODE DOMAIN ERR* and *SELECT PCDE SF* softkeys). The average (of the analyzed frame) of the measurement results for each slot is indicated in the RESULT SUMMARY as an overview. The spreading factor onto which projection is made is shown below the measurement result.

The results of measurements on the selected channel (red in the diagram) are displayed in the lower part of the RESULT SUMMARY.

Symb Rate: Symbol rate at which the channel is transmitted.

Slot Number: Number of slot for which the measurement is made (see *SELECT SLOT* softkey)

Channel Code: Number of the spreading code of the selected channel .

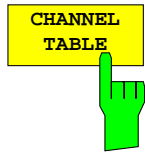
Chan Mapping: Component onto which the channel is mapped (I or Q)

Chan Pow rel. / abs.:
Channel relative (referred to CPICH) and absolute.

Error Vector Mag rms / Pk:
Average or peak of the results of the error vector magnitude measurement (see *SYMBOL EVM* softkey).

IEC/IEEE-bus command:

```
:CALCulate2:FEED "XTIM:CDP:ERR:SUMM"
:CALCulate<1|2>:MARKer<1>:FUNctio:n:WCDPower:MS:RESult?
PTOTal | FERRor | TFRame | MACCuracy |
PCDError | EVMRms | EVMPeak | CERRor |
SRATe | CHANnel | CDPabsolute | CDPRelative |
IQOFFset | IQIMbalance | CMAPPing | PSYMBOL
```

The *CHANNEL TABLE* softkey selects the display of the channel assignment table. The channel assignment table can contain a maximum of 256 entries, corresponding to the 256 assignable codes of the class with spreading factor 256.

The upper part of the table indicates the DPCCH that has to be present in the signal to be analyzed in the CDP measurement.

The lower part of the table indicates the data channels (DPDCH) contained in the signal. In accordance with the two channel configuration models stipulated by the standard, this list contains up to 6 data channels. The channels are listed in ascending order according to code numbers. Within a code number, the channel mapped onto the I component is entered first, followed by the channel mapped onto the Q component.

Ref Lvl 3 dBm
 CF 2.1175 GHz SR 960 ksp/s
 Channel Table Chan Code 1
 Slot Number 5 Mapping I

| CHANNEL TABLE | | | | | | |
|---------------|-----------|--------|--------|---------|---------|---------|
| Type | Symb R. | Code # | Status | Mapping | PWR ABS | PWR REL |
| DPCCH | 15 ksp/s | 0 | active | Q | -11.78 | -5.58 |
| DPDCH | 960 ksp/s | 1 | active | I | -11.77 | -5.56 |
| DPDCH | 960 ksp/s | 1 | active | Q | -11.77 | -5.57 |
| DPDCH | 960 ksp/s | 3 | active | I | -11.79 | -5.58 |
| DPDCH | 960 ksp/s | 3 | active | Q | -11.77 | -5.57 |
| ??? | 15 ksp/s | 0 | inactv | I | -68.79 | -62.58 |
| ??? | 15 ksp/s | 1 | inactv | I | -67.10 | -60.89 |
| ??? | 15 ksp/s | 1 | inactv | Q | -64.27 | -58.07 |
| ??? | 15 ksp/s | 2 | inactv | I | -63.22 | -57.02 |
| ??? | 15 ksp/s | 2 | inactv | Q | -62.55 | -56.34 |
| ??? | 15 ksp/s | 3 | inactv | I | -67.38 | -61.17 |

Fig. 6-17 Channel Table

The following parameters of these channels are determined by the CDP measurement:

Symbol Rate: Symbol rate at which the channel is transmitted (15 ksp/s to 960 ksp/s).

Code #: Number of channel spreading code (0 to [spreading factor - 1])

Status: Indication of status. All channels identified as active by the CDP analysis are entered in the table along with the symbol rate and the channel number. All other channels are inactive.

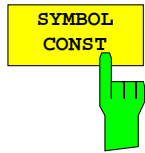
Mapping: Component onto which the channel is mapped (I or Q). The entry is not editable, since the standard specifies the channel assignment for each channel.

PWR ABS / PWR REL: Indication of the absolute and relative channel power (referred to total power of signal).

In the *CODE CHAN AUTOSEARCH* mode, a data channel is designated as active if its power is increased by a minimum value (see softkey *INACT CHAN THRESH*) compared to the noise and if the a minimum signal/noise ratio is maintained within the channel.

In *CODE CHAN PREDEFINED* mode, each data channel that is included in the user defined channel table is considered to be active. In *CODE CHAN PREDEFINED* mode, all channels that are included in the user defined channel table are marked as active.

IEC/IEEE-bus command: :CALCulate<1>:FEED "XTIM:CDP:ERR:CTable"



The *SYMBOL CONST DIAG* softkey selects the display of symbol constellation diagram .

The symbols are displayed for the selected channel (red marking in the CDP diagram) and the selected slot (red marking in the power-versus-slot diagram).

In order to provide a better illustration of the constellation, the channel is entered in the diagram as if its constellation points would lie in the I/Q plane, i.e. channels that are mapped onto the I component have points on the real axis and channels mapped onto the Q component have points on the imaginary axis.

It is possible to display the symbol constellation for unassigned codes (red marking in the CDP diagram on a code represented in blue), but the results are not meaningful, as the unassigned code channel does not contain data.

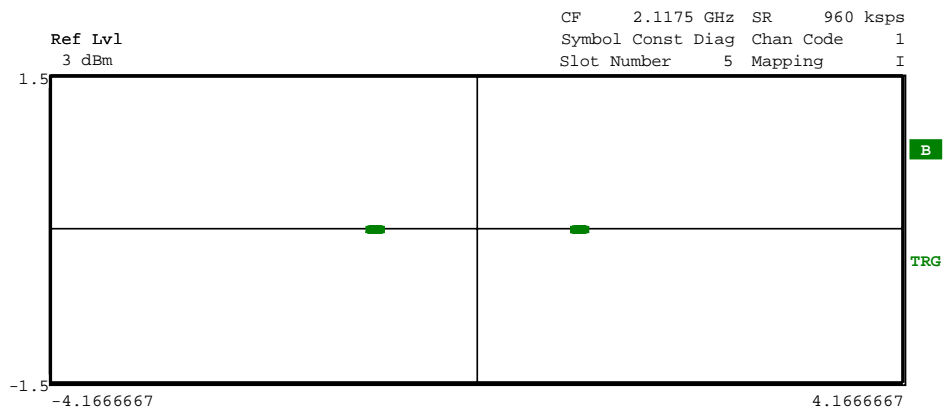


Fig. 6-18 Symbol Constellation Diagram, I mapping

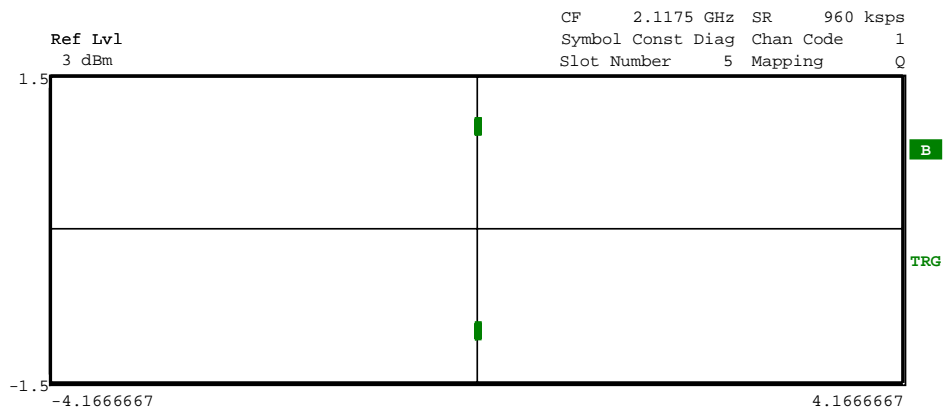
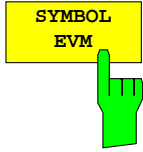


Fig. 6-19 Symbol Constellation Diagram, Q mapping

IEC/IEEE-bus command: :CALCulate2:FEED "XTIM:CDP:SYMB:CONS"



The *SYMBOL EVM* softkey activates the symbol error vector magnitude display. The EVM is displayed for the selected channel (red marking in the CDP diagram) and the selected slot (red marking in the power-versus-slot diagram).

It is possible to display the symbol error vector magnitude for unassigned codes (red marking in the CDP diagram on a code represented in blue), but the results are not valid.

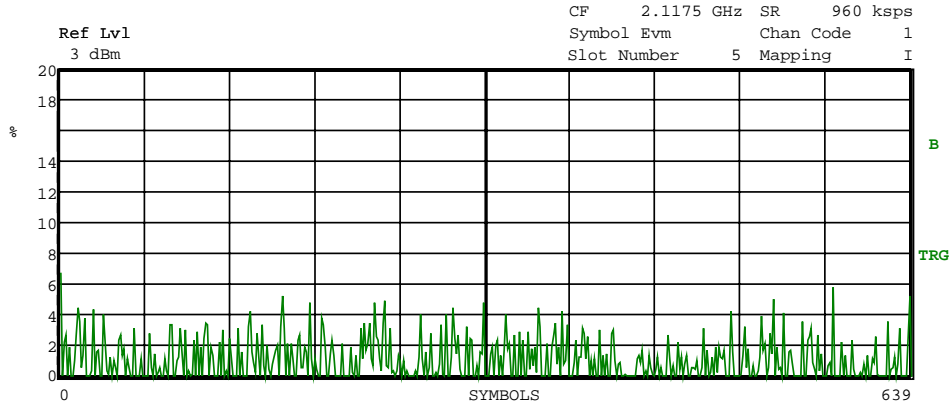
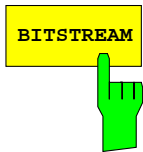


Fig. 6-20 Error Vector Magnitude for the selected slot of the selected channel

IEC/IEEE-bus command: :CALCulate2:FEED "XTIM:CDP:SYMB:EVM"



The *BITSTREAM* softkey activates the bitstream display. The decided bits are displayed for the selected channel (red marking in the CDP diagram) and the selected slot (red marking in the power-versus-slot diagram).

For unassigned codes, the representation of BITSTREAM can be selected. However, since the codes contain no data, the bits are characterized as invalid by a minus sign "-".

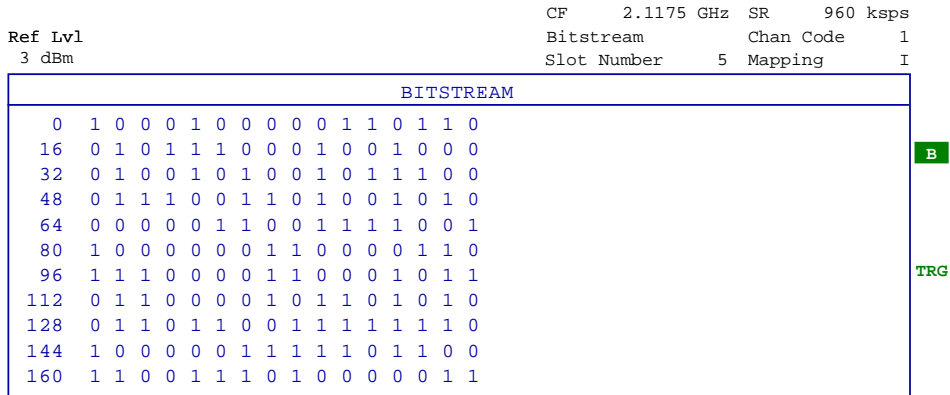
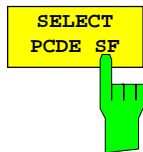


Fig. 6-21 Demodulated bits for the selected slot of the selected channel

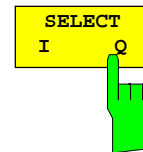
IEC/IEEE-bus command: :CALCulate2:FEED "XTIM:CDP:BSTReam"



The *SELECT PCDE SF* softkey activates the entry of the class of codes onto which the error vector is to be projected for the *PEAK CODE DOMAIN ERROR* display. The entry of the spreading factor is only possible for this display mode, it has no effect on any other display mode.

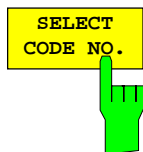
IEC/IEEE-bus command:

: [SENSe:]CDPower:SFACTOR 4|8|16|32|64|128|256



The *SELECT I/Q* softkey switches the display modes *CDP PWR RELATIVE /ABSOLUTE*, *CODE PWR ZOOM*, *POWER VS SLOT*, *SYMBOL CONST*, *SYMBOL EVM* between indication of I and Q component. Only channels that are mapped onto the corresponding component are taken into account by the respective display modes.

IEC/IEEE-bus command: : [SENSe:]CDPower:MAPPING Q



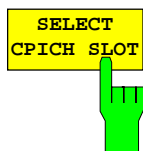
The *SELECT CODE NO* softkey activates the selection of a channel for the display modes *CDP PWR RELATIVE/ABSOLUTE*, *CODE PWR ZOOM*, *POWER VS SLOT*, *SYMBOL CONST*, *SYMBOL EVM*.

The entry is made on the basis of the code class with spreading factor 256. The number of the spreading code which the required channel has at its actual transmission rate has to be converted into spreading factor 256. The entered code correlates with the channel marked in red in the CDP diagram.

If the entered code corresponds to an active channel, the whole associated channel is marked. If it corresponds to a gap between the channels, only the entered code is marked.

If the code number is modified using the rollkey, the red marking changes its position in the diagram only if the code number no longer belongs to the marked channel.

IEC/IEEE-bus command: : [SENSe:]CDPower:CODE 0 to 255



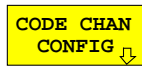
The *SELECT SLOT* softkey activates the selection of the slot number for the display modes *POWER VS SLOT*, *SYMBOL CONST*, *SYMBOL EVM*.

When the slot number is entered, the red marking in the power-versus-slot diagram changes its position in steps of 2560 chips.

IEC/IEEE-bus command: : [SENSe:]CDPower:SLOT 0 to 14

Measurement Configuration

CONFIGURATION - MODE - 3GPP MS ANALYZER - CODE CHAN CONFIG sub menu



CODE CHAN
CONFIG

CODE CHAN
AUTOSEARCH

CODE CHAN
PREDEFINED



EDIT CHAN
CONF TABLE



DEL CHAN
CONF TABLE

COPY CHAN
CONF TABLE



PAGE UP

PAGE DOWN

The *CODE CHAN CONFIG* softkey opens a submenu with different configurations for measurements. In this submenu, predefined channel tables can be selected and edited as a basis for code domain measurements.

When the softkey is selected, a table including the channel tables stored on the measuring instrument's hard disk is opened. The table provides just an overview and a table for the measurement can only be selected after actuating the *CODE CHAN PREDEFINED* softkey.

IEC-Bus-Befehl:

```
:CONFigure:WCDPower:MS:CTABLE:CATalog?
```

CODE CHAN
AUTOSEARCH



The *CODE CHAN AUTOSEARCH* softkey allows code domain power measurements in the automatic search mode. In this mode, the whole code domain (all permissible symbol rates and channel numbers) is searched for active channels. Detecting an active channel is performed by a comparison of the channel power with the total power of the signal.

The *CODE CHAN AUTOSEARCH* mode is the preset search mode starting the CDP analysis. It is mainly intended for giving the user an overview of the channels contained in the signal. If the signal contains channels that are not detected as being active in the automatic search mode, the CDP analysis can be performed with the channel configurations predefined by the user by switching to the *CODE CHAN PREDEFINED* mode.

IEC/IEEE-bus command:

```
CONFigure:WCDPower:MS:CTABLE[:STATE] OFF
```

CODE CHAN
PREDEFINED



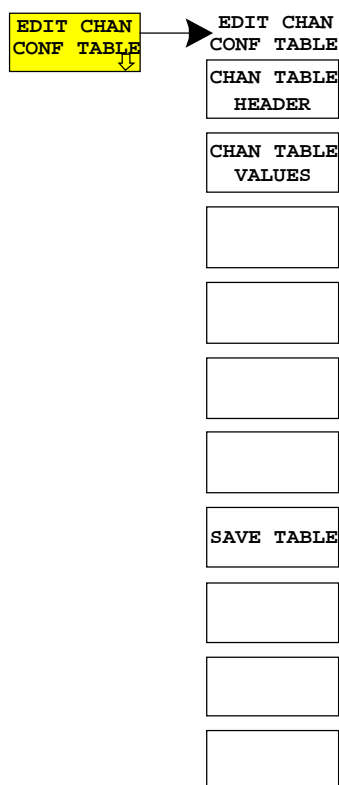
The *CODE CHAN PREDEFINED* softkey activates the predefined channel table mode. No search for active channels in the code domain is performed in this mode, but the channels contained in a channel table defined prior to the measurement are assumed to be active. The code domain power measurement and all further evaluations are carried out for these channels.

On selecting the softkey, a table containing all channel tables stored in the measuring instrument is opened. The CDP analysis is switched to the predefined channel table. When the next measurement is started, the power is measured according to this mode. The last table of the automatic search mode is first taken as a basis for the measurement. This table is available under the *RECENT* entry.

Switching to one of the predefined channel tables is done by selecting the corresponding table entry and pressing one of the unit keys. From the next measurement onwards, the selected channel table is taken as a basis for the sweep. The selected channel table is marked by a tick.

IEC/IEEE-bus command:

```
CONFigure:WCDPower:MS:CTable[:STATe] ON
CONFigure:WCDPower:MS:CTable:SElect "TEST"
```



The *EDIT CHAN CONF TABLE* softkey opens a submenu giving access to the softkeys required for editing the channel table. The channel table is opened simultaneously for editing. The user can modify the channel configuration in the selected channel table

| EDIT CHANNEL TABLE | | | | |
|-----------------------|---|---------------------|---------------|----------|
| NAME: | UL_1Chan | | | |
| COMMENT: | Table scanned on July 02 2001 at 14:30:02 | | | |
| DPCCH ACTIVE @15 ksps | | PILOT LENGTH [bits] | | |
| | | 8 | | |
| SYMB RATE [ksps] | CHAN# | MAPPING | CDP REL. [dB] | STATUS |
| 960.0 | 1 | I | -6.9 | ACTIVE |
| 960.0 | 1 | Q | -7.0 | INACTIVE |
| 960.0 | 2 | I | -6.9 | INACTIVE |
| 960.0 | 2 | Q | -6.9 | INACTIVE |
| 960.0 | 3 | I | -6.9 | INACTIVE |
| 960.0 | 3 | Q | -6.9 | INACTIVE |

Fig. 6-22 Table for editing a channel configuration

It is possible to modify any of the channel tables stored in the instrument. The edited table is not stored automatically on the instrument hard disk but only after the *SAVE TABLE* softkey is activated. This prevents inadvertent overwriting of a table (e.g. one of the channel models).

If the table is edited that is currently taken as a basis for the CDP analysis, this table is used for the next measurement immediately after storage. The effects of modifications in the table are therefore visible at once. The edited table is stored on the instrument hard disk only after the *SAVE TABLE* softkey has been activated.

If the a table is edited that is stored on the instrument hard disk but currently not activated, the modifications are visible after storage (*SAVE TABLE* softkey) and subsequent activation.

The table structure for editing the channel configuration is based on the 3GPP specifications:

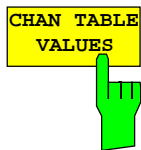
The FSIQK73 software distinguishes between the one data channel and multi-data channel configurations. The activation of a second data channel switches from the single-channel model to the multichannel model and vice versa. For the one data channel configuration, the entry *SYMBOL RATE* can be edited in the table. This editing function is not possible for several data channels. For several data channels, the numbering sequence of channel codes is prescribed. Therefore, the configuration is automatically adapted by the software when activating/deactivating the channels.



The *CHAN TABLE HEADER* softkey enables the user to edit the table header. The table name can be changed to prevent overwriting stored tables. The name of a table may not contain more than 8 characters. The table header also includes editable entry *PILOT LENGTH*, which is globally processed for the total signal in the FSIQK73.

IEC/IEEE command:

```
:CONFIgure:WCDPower:MS:CTABLE:NAME "NEW_TAB"
```



The *CHAN TABLE VALUES* softkey enables the user to edit the entries in the channel table. The following entries are available for each channel contained in the table (entry is confirmed using the unit hardkeys):

SYMBOL RATE: Symbol rate at which the channel is transmitted. This entry can only be edited for channel configuration 1 with 1 data channel.

CHAN NO: Number of the channel in the associated transmission class. This entry can neither be edited for channels configuration 1 nor for channel configuration 2, as the channel numbers are defined in the standard for single channel and multi channel mode. In the case of single channel, the entry is adapted to the selected symbol rate

MAPPING: Component onto which the channel is mapped (I or Q). The entry is not editable, since the standard specifies the channel assignment for each channel.

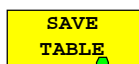
CDP REL.: Information about the relative channel power. This entry cannot be edited and is only available for the *RECENT* table, it is used for detecting low-power channels.

STATUS: channel status (active/inactive). Modifying the channel status blanks out a channel entered in the table from the CDP analysis without the user having to clear the associated entry from the table. Only channels with an active channel status are used for the CDP analysis. Activating/deactivating channels switches between the single-channel model and the multiple-channel model. In case of several channels, activating/deactivating channels automatically adapts the channel configuration according to the 3GPP specifications.

IEC/IEEE commands:

```
:CONFigure:WCDPower:MS:CTABLE:DATA 8,4,1
```

```
:CONFigure:WCDPower:MS:CTABLE:COMMENT "Comment for new table"
```

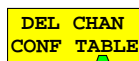


SAVE
TABLE



The *SAVE TABLE* softkey saves the table under the specified name.

IEC/IEEE command: -- (automatically executed in remote control)



DEL CHAN
CONF TABLE

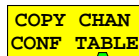


The *DEL CHAN CONF TABLE* softkey deletes the selected table. In *CODE CHAN PREDEFINED* mode, the currently active table can not be deleted.

IEC/IEEE command:

```
:CONFigure:WCDPower:MS:CTABLE:SElect "CTAB2"
```

```
:CONFigure:WCDPower:MS:CTABLE:DElete
```



COPY CHAN
CONF TABLE

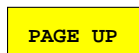


The *COPY CHAN CONF TABLE* softkey copies the selected table. The name for the copy is requested.

IEC/IEEE command:

```
:CONFigure:WCDPower:MS:CTABLE:SElect "CTAB2"
```

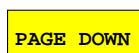
```
:CONFigure:WCDPower:MS:CTABLE:COPY "NEW_CTAB"
```



PAGE UP



The *PAGE UP* softkey is used to scroll through the selection table.



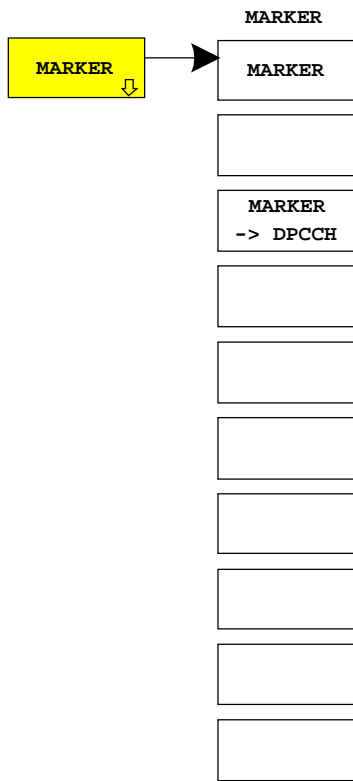
PAGE DOWN



The *PAGE DOWN* softkey is used to scroll through the selection table.

MARKER Functions

Submenu: CONFIGURATION - MODE - 3GPP MS ANALYZER - CODE DOM POWER



The *MARKER* softkey opens a submenu with the marker settings.

Markers are not available in the tabulated display modes *RESULT SUMMARY* and *CHANNEL TABLE*.

The parameters concerning an activated marker are output at the top of the diagram:

```
Marker 1 [T1]
                                -5.00 dB
slot 10 SR  30 ksps chan  23
```

Fig. 6-23 Parameters of the marker info field

For the channel assigned to the marker, the following channel parameters are indicated:

- dB Channel power referred to the total power of the signal
- Slot: Slot number of the channel (unassigned codes have a timing offset of 0 chip referred to beginning of the frame)
- SR: Symbol rate of the channel (for unassigned codes 15 ksps)
- Chan: Number of the spreading code of the channel



The *MARKER* softkey switches the marker on or off.

IEC/IEEE-bus commands:

```
:CALCulate<1|2>:MARKer<1>:STATe ON
:CALCulate<1|2>:MARKer<1>:X <channel_number>
:CALCulate<1|2>:MARKer<1>:Y?
```



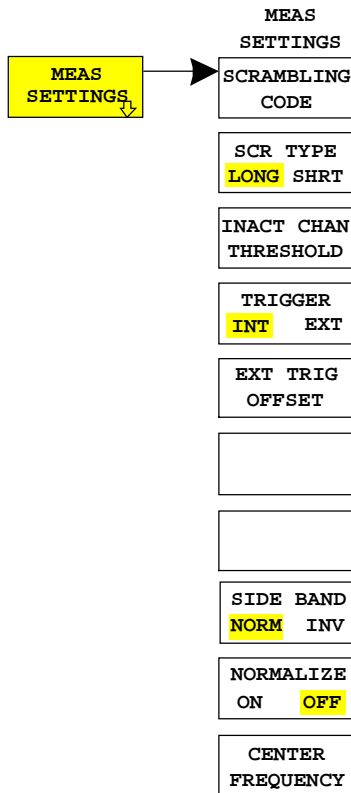
The *MARKER -> DPCCH* sets the marker to the Dedicated Physical Common Control Channel (code number 0 for component Q and spreading factor 256). This marker function is only available for CDP measurements of the Q component.

IEC/IEEE-bus commands:

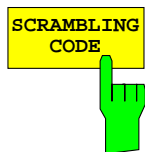
```
:CALCulate<1|2>:MARKer<1>:FUNctioN:DPCCh
:CALCulate<1|2>:MARKer<1>:Y?
```

Configuration of CDP Measurement – MEAS SETTINGS

Submenu: CONFIGURATION - MODE - 3GPP MS ANALYZER - CODE DOM POWER



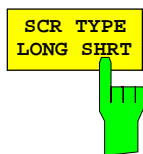
The *MEAS SETTINGS* softkey opens a submenu with setting parameters for the CDP measurement.



The *SCRAMBLING CODE* softkey opens a window for entering the scrambling code. The scrambling code is input in hex format.

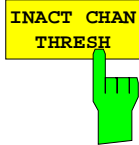
The entered scrambling code has to coincide with that of the signal. Otherwise a CDP measurement of the signal is not possible.

IEC/IEEE-bus command: `:[SENSe:]CDPower:LCODE[:VALue] #H2`



The *SCR TYPE LONG/SHRT* softkey determines whether the scrambling code entered (see softkey *SCRAMBLING CODE*) is to be handled as long or short scrambling code.

IEC/IEEE-bus command: `:[SENSe:]CDPower:LCODE:TYPE SHORT`



The *INACT CHAN THRESH* softkey activates the entry of the minimum power which a single channel should have as compared to the total signal in order to be considered an active channel.

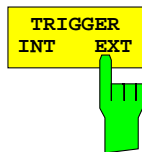
Channels which are below the specified threshold are considered to be not active. Channels that are not active appear in blue colour in the CDP diagram.

The two measurements *MODULATION ACCURACY* and *PEAK CODE DOMAIN ERROR*, specified as measurements on the total signal, are performed with the aid of the list of active channels. These two measurements are falsified whenever active channels are recognized as not active (see above example) or if unassigned codes get the status "assigned channel". *INACT CHAN THRESHOLD* is therefore used to influence the results of the two measurements.

The default value is -10 dB. If not all channels in the signal are automatically detected with this setting, *INACT CHAN THRES* has to be incremented.

IEC/IEEE-bus command:

```
: [SENSe:]CDPower:ICTReshold -50dB to +10dB
```



The *TRIGGER INT EXT* softkey switches between internal (*FREE RUN*) and external triggering.

For internal triggering, at the beginning of the measurement a section (approx. 20 ms) of the signal, which must contain at least one frame of the WCDMA signal, is recorded and analyzed at a moment which cannot be determined by the user. The start of the next complete WCDMA frame is searched for in the recorded signal section and the signal is measured from this point.

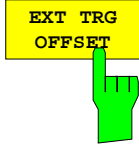
In case of external triggering, FSIQK73 expects a trigger at the beginning of the WCDMA frame (frame trigger). There is no search for the beginning of the frame in the recorded signal section. The start of the WCDMA frame is only searched for within the first 2560 chips after the trigger event.

For external triggering the trigger output of the mobile station has to be connected to the FSIQ trigger input at the rear panel of the instrument.

Since with internal triggering the start of the next complete WCDMA frame is located in the middle of the recorded signal section (after approx. 10 ms) in the worst case, an external frame trigger reduces the search time for the frame start and consequently the computing time for the overall measurement.

IEC/IEEE-bus command:

```
:TRIGger[:SEquence]:SOURce IMMEDIATE|EXTERNAL
```



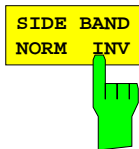
The *EXT TRG OFFSET* softkey activates the entry of the offset for external triggering (step width 40 ns).

The trigger offset can compensate for the shift of the frame trigger at the actual start of a frame. In the *RESULT DISPLAY* mode, the interval between the trigger event and the start of the WCDMA frame is indicated under "Trg to Frame". An offset of the trigger event influences the interval specified there.

If the trigger offset is set inadequately, the measurement may not be able to detect the start of a WCDMA frame in the search range. In this case, the measurement results are invalid and the code power of each channel is displayed in blue with almost the same level.

A modification of the trigger offset can influence the search range of FSIQK73 and thus secure the feasibility of the measurement.

IEC/IEEE-bus command: `:TRIGger:SEquence:HOLDoff <num_value>`



The *SIDE BAND NORM / INV* softkey is used to perform the measurement both in the normal (NORM) and inverted position (INV).

NORM The normal position allows the measurement of RF signals from the mobile station.

INV The inverted position is useful for measurements on IF modules or components in case of spectral inversion.

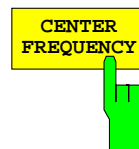
The default setting is INV.

IEC/IEEE-bus command: `: [SENSe:]CDPower:SBANd NORMal | INVers`



The *NORMALIZE ON / OFF* softkey eliminates the DC offset of the signal. Default setting is OFF.

IEC/IEEE-bus command : `[SENSe:]CDPower:NORMAlize OFF`

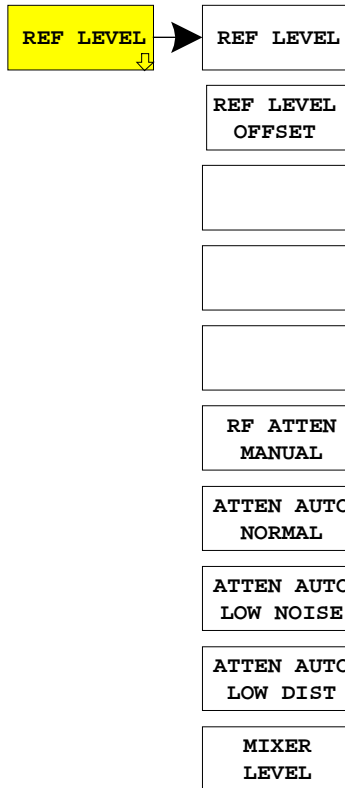


The *CENTER FREQUENCY* activates the input of the center frequency of the WCDMA signal.

IEC/IEEE-bus command: `: [SENSe:]FREQuency:CENTer 870.03 MHz`

Level Settings – REV LEVEL

Submenu: CONFIGURATION - MODE - 3GPP MS ANALYZER - CODE DOM POWER

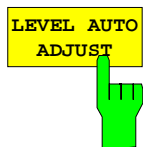


The *REF LEVEL* softkey opens a submenu for level setting.

The softkeys and their function are identical to the *REF LEVEL* menu in the basic unit and are described in the operating manual of the basic instrument.

Automatic Adaptation to Input Level - LEVEL AUTO ADJUST

Submenu: CONFIGURATION- MODE – 3GPP MS ANALYZER – LEVEL AUTO ADJUST



The *LEVEL AUTO ADJUST* softkey is used for automatically setting the RF attenuation and reference level to the level of the applied signal. Manual re-adjustment is permissible with the *REF LEVEL* softkey.

The instrument is to be switched to the *ATTEN MANUAL* mode so as to set the RF attenuation and reference level to optimum values independently of each other. This mode is maintained after changing from code-domain power measurements to the spectrum analyzer or vector signal analyzer mode.

IEC/IEEE-bus command: :[SENSe:]CDPower:LEVel:ADJust

Automatic Setting of CDP Measurement Mode - CDP AUTO ADJUST

Submenu: *CONFIGURATION - MODE - 3GPP MS ANALYZER - CODE DOM POWER*



The *CDP AUTO ADJUST* softkey automatically adapts the settings of the CDP measurement in such a way that a valid measurement on the signal is possible with high probability. For this purpose

- the following measurement parameters are set to predefined values:

| | |
|------------------------|-----------------------------|
| Trigger: | FREE RUN |
| Marker / delta marker: | OFF |
| Code number: | 0 |
| Slot number: | 0 |
| Symbol rate: | 15 ksps (referred to DPCCH) |
- RF attenuation and reference level are set using *LEVEL AUTO ADJUST*
- a *SINGLE SWEEP* is carried out.

With these settings, the CDP measurement can be performed with high probability, provided a valid WCDMA signal to 3GPP is applied to the RF input of analyzer. The parameters *CENTER FREQUENCY*, *SCRAMBLING CODE*, *SCR TYPE LONG/SHORT* as well as an external reference for the measurement have to be manually adapted to the signal.

IEC/IEEE-bus command: : [SENSe:]CDPower:PRESet

TRACE Key Group

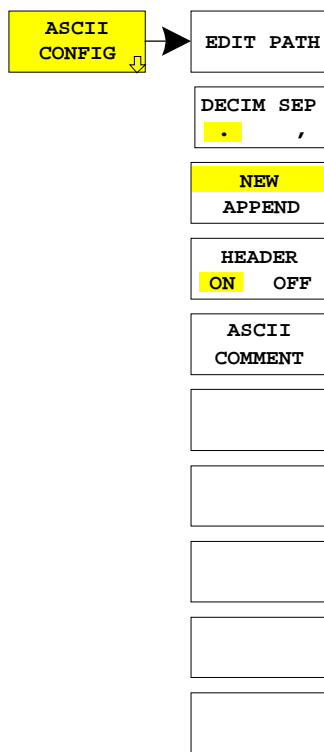
The *TRACE MATH* and *DETECTOR* settings are not available in the *TRACE* menu. The remaining softkeys are identical to those of the basic unit and are described in the FSIQ operating manual. The *DISPLAY MODE CDP* softkey opens the *RESULT DISPLAY* submenu of the CDP measurement mode.

Trace Settings - TRACE Key Group

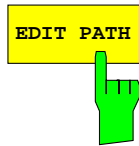
The *TRACE MATH* settings are not available in the *TRACE* menu. The remaining softkeys are identical to those of the basic unit and are described in the FSIQ operating manual. The *DISPLAY MODE CDP* softkey opens the *RESULT DISPLAY* submenu of the CDP measurement mode.

The *TRACE* side menu contains the softkeys for ASCII trace export. These softkeys are used to store traces in a file so that the traces are available in a form that can be processed with mathematical programs.

The *ASCII EXPORT* softkey stores the corresponding trace in a file with ASCII format. The export function can be configured in the *ASCII CONFIG* submenu.

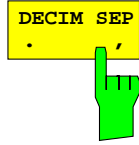


The *ASCII CONFIG* softkey calls a submenu for various settings for the *TRACE ASCII EXPORT* function.



The *EDIT PATH* softkey defines the directory in which the file is to be stored.

IEC/IEEE-bus command --

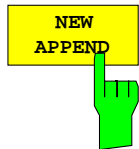


The *DECIM SEP* softkey selects the decimal separator for the ASCII file. The choice is '.' (decimal point) or ',' (comma).

This means that the decimal separator used in various language versions of evaluation programs (e.g. MS-Excel) can be selected so that the packages are supported. .

IEC/IEEE-bus command

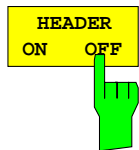
:FORMat:DEXPort:DSEParator POINT|COMMa



The *APPEND NEW* softkey defines whether output data are to be written to an existing file or a new file.

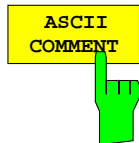
- With *APPEND*, the data are added to an existing file.
- With *NEW*, either a new file is generated or an existing file is overwritten by storage of the data.

IEC/IEEE-bus command :FORMat:DEXPort:APPend ON | OFF



The *HEADER ON/OFF* softkey defines whether important instrument settings should be stored at the beginning of the file. The general device settings entered in the file header allow test results to be reproduced. A file header may impair data processing by mathematical programs.

IEC/IEEE-bus command :FORMat:DEXPort:HEADer ON|OFF



The *ASCII COMMENT* softkey activates the entry of commentary concerning the current ASCII data set. A total of 60 characters are available for this purpose.

IEC/IEEE bus command :FORMat:DEXPort:COMMENT 'string'



In CDP measurement mode, the *ASCII EXPORT* softkey stores the corresponding trace in a file with ASCII format.

Upon pressing the *ASCII EXPORT* softkey, a file name can be entered. The default name is TRACE.DAT. Then the measured data of the trace are stored.

IEC-Bus-Befehl :MMEMory:STORE:TRACe 1..4,<Pfad mit
 Filenamem>

Structure of the ASCII file for CDPower measurements and measurements of signal spectrum:

The file consists of the header containing important scaling parameters and a data section containing the trace data. The data of the file header consist of three columns, each separated by a semicolon: parameter name; numeric value; basic unit

The data section starts with the keyword " Trace <n> " (<n> = number of stored trace), followed by the measured data in one or several columns (depending on measurement) which are also separated by a semicolon.

This format can be read in from spreadsheet calculation programs, eg MS-Excel. It is necessary to define ';' as a separator.

1) Format for CDP measurements

| | Content of file | Description |
|---|--|---|
| File header | Type;FSIQ 7; Version;4.107; Date;26.Mar 2001; Comment;ASCII-Darstellung; Mode;CDP; Measurement;Code Domain Power; Digital Standard;WCDMA 3GPP REV; Center Freq;2117500000.000000;Hz; Freq Offset;0.000000;Hz; Ref. Level;-6.000000;dBm; Level Offset;0.000000;dB; RF Att;10.000000;dB; y per div;2;dB; Ref Value y-Axis;0;dB; Ref Value Position;100.000000;%; Sweep Count;0; Spreading Factor;256; Reference Slot;0; Channel Slot;0; First Slot;0; Code Number;0; Scrambling Code;0000H; Scr Type;Long; Channel Threshold;10; Invert Sideband;OFF; Normalize;OFF; Invert Q;OFF; | Instrument model Firmware version Date record storage date Comment Instrument operating mode Display mode (CDP, bitstream, ...) Digital standard (3GPP REV, 3GPP FWD) Center frequency Frequency offset Reference level Level offset Input attenuation Scaling of y axis per division Scaling of y axis, reference value Scaling of y axis, position of reference value Number of sweeps set Spreading factor Slot of the reference channel (identical to channel slot) Channel slot First slot Code number: 0 to 255 Scrambling code: 0000 to 1FFFH Scrambling type: : Long, Short, N/A Channel threshold Sideband normal, inverted; ON, OFF; Normalize;ON, OFF; Invert Q;ON, OFF; N/A |
| Data section of the file (CDP abs / CDP rel / Channel Table) | TRACE 1: Trace Mode;CLR/WRITE; Values;238; 4,0;-13.643795;-3.643795;0;8;1; 8;32;-41.409958;-31.409958;0;8;0; 8;33;-43.137810;-33.137810;0;8;0; 8;34;-35.651539;-25.651539;0;8;1; 8;35;-41.930389;-31.930389;0;8;1; 8;36;-38.120872;-28.120872;0;8;1; ... | Trace Display mode of trace: (CLR/WRITE,AVERAGE,MAXHOLD,MINHOLD) Number of data blocks / measurement values <CodeClass>;<CodeNumber>;<yabs>;<yrel>; <TimingOffset>;<PilotLength>;<Mapping>; Values <TimingOffset> and <PilotLength> are not relevant for FSIQK73. |

| | | |
|--|--|---|
| Data section of the file (Result Summary) | <p>Trace 2: Trace Mode;CLR/WRITE;</p> <p>3.135467;%; -52.303844;dB; -9.127991;Hz; -5.221600;ppm; -7.365761;dBm; -122.502686;ms; 5.236792;%; 2.605927;%; 0.010436;%; 0.938106;%; 8; 0; -2.310928; 0.000000; 0.000000; 8; Q;</p> | <p>Trace</p> <p>Display mode of trace: (CLR/WRITE,AVERAGE,MAXHOLD,MINHOLD)</p> <p>Peak value Modulation Accuracy</p> <p>Peak value PCDE</p> <p>Frequency error (carrier deviation)</p> <p>Chip rate error</p> <p>Total power of signal</p> <p>Trigger offset to frame start</p> <p>Peak value EVM</p> <p>RMS value EVM</p> <p>IQ offset</p> <p>IQ imbalance</p> <p>Code class</p> <p>Code number</p> <p>Y absolute</p> <p>Y relative</p> <p>Timing offset (not relevant for FSIQK73, always 0)</p> <p>Pilot length</p> <p>Mapping</p> |
| Data section of the file (Power versus Slot / Peak Code Domain Error / Modulation Accuracy) | <p>TRACE 2: Trace Mode;CLR/WRITE;</p> <p>Values;15;</p> <p>0;16.843128; 1;0.554786; 2;11.818155; 3;15.885643;</p> | <p>Trace</p> <p>Display mode of trace: (CLR/WRITE,AVERAGE,MAXHOLD,MINHOLD)</p> <p>Number of data blocks / measurement values <Slot>; <LevelValue>;</p> |
| Data section of the file (Symbol Constellation) | <p>TRACE 2: Trace Mode;CLR/WRITE;</p> <p>Values;10;</p> <p>-0.293423;1.388842; 0.038587;-0.735293; 0.961711;-1.217144; 2.015055;-0.696284;</p> | <p>Trace</p> <p>Display mode of trace: (CLR/WRITE,AVERAGE,MAXHOLD,MINHOLD)</p> <p>Number of data blocks / measurement values <LevelValue Real>;<LevelValue Imag>;</p> |
| Data section of the file (Bitstream) | <p>TRACE 2: Trace Mode;CLR/WRITE;</p> <p>Values;160;</p> <p>1;0;1;0;0;1;1;0;1;0; 0;0;1;1;1;1;1;1;1;0; 1;0;1;0;0;0;0;0;1;1; 0;1;1;0;1;1;1;1;0;1;</p> | <p>Trace</p> <p>Display mode of trace: (CLR/WRITE,AVERAGE,MAXHOLD,MINHOLD)</p> <p>Number of data blocks / measurement values <Symbol>;</p> |

| | | |
|--|-----------------------|---|
| Data section of the file (Symbol EVM) | TRACE 2: | Trace |
| | Trace Mode;CLR/WRITE; | Display mode of trace: (CLR/WRITE,AVERAGE,MAXHOLD,MINHOLD) |
| | Values;10; | Number of data blocks / measurement values |
| | 5.288429; | <Level Value>; |
| | 1.950043; | |
| | 3.740749; | |
| | 2.073324; | |
| | | |

2) Format for Spectrum Emmission Mask measurements

| | Content of file | Description |
|---------------------------------|-----------------------------------|--|
| File header | Type;FSIQ 7; | Instrument model |
| | Version;4.107 | Firmware version |
| | Date;26.Mar 2001; | Date record storage date |
| | Comment;ASCII-Darstellung; | Comment |
| | Mode;SEM; | Instrument operating mode |
| | Start;0.000000;Hz | Start/stop of the display range. |
| | Stop;7000000000.000000;Hz | Unit: Hz for span > 0, s for span = 0, |
| | Center Freq; 2117500000.000000;Hz | Center frequency |
| | Span;7000000000.000000;Hz | Frequency range (0 Hz for zero span) |
| | Freq Offset;0.000000;Hz | Frequency offset |
| | x-Axis;LIN; | Scaling of x axis linear (LIN) or logarithmic (LOG) |
| | y-Axis;LOG; | Scaling of y axis linear (LIN) or logarithmic (LOG) |
| | Level Range;100.000000;dB | Display range in y direction. Unit: dB for x axis LOG, % for x axis LIN |
| | Ref. Level;-20.000000;dBm | Reference level |
| | Level Offset;0.000000;dBm | Level offset |
| | Max. Level;-20.000000;dBm | Maximum level |
| | RF Att;10.000000;dB | Input attenuation |
| | RBW;30000.000000;Hz | Resolution bandwidth |
| | VBW;300000.000000;Hz | Video bandwidth |
| | SWT;0.500000;s | Sweep time for one measurement |
| | Detector;RMS; | Detector set: AUTOPEAK, MAXPEAK, MINPEAK, AVERAGE, RMS, SAMPLE |
| | Sweep Count;0; | Number of sweeps set |
| | Channel Power; 0; | Channel power |
| | Limit Line; P>31; | Selected limit line |
| Data section of the file | TRACE 1: | Trace |
| | Trace Mode;CLR/WRITE; | Display mode of trace: CLR/WRITE,AVERAGE,MAXHOLD,MINHOLD |
| | x-Unit;Hz; | Unit of x values: Hz for span > 0; s for span = 0; dBm/dB for statistics measurements |
| | y-Unit;dBm; | Unit of y values: dB*V/AW depending on the selected unit for y axis LOG or % for y axis LIN |
| | Values;500; | Number of measurement points |
| | 6487500000.000000;-90.754356; | Measured values: |
| | 6487550100.200400;-90.956367; | <x value>, <y1>, <y2> |
| | 6487600200.400802;-90.655090; | <y2> being available only with AUTOPEAK |
| | 6487650300.601202;-91.537399; | detector and containing in this case the smaller of the two measured values for a measurement point. |
| | ... | |

2) Format for CCDF measurements

| | Content of file | Description |
|---------------------------------|--|--|
| File header | Type;FSIQ 7; Version;4.10; Date;26.Mar 2001; Comment;ASCII-Darstellung; Mode;CCDF; Center Freq;2117500000.000000;Hz Freq Offset;0.000000;Hz x-Axis;LIN; Ref. Level;-20.000000;dBm Level Offset;0.000000;dBm RF Att;10.000000;dB RBW;10000000.000000;Hz SWT;0.074000;s Detector;AUTOPEAK; Sweep Count;0; Sample Count;0; y max;0; y min;0; Averaging;OFF; | Instrument model Firmware version Date record storage date Comment Instrument operating mode Center frequency Frequency offset Scaling of x axis linear (LIN) or logarithmic (LOG) Reference level Level offset Input attenuation Resolution bandwidth Sweep time Detector set: AUTOPEAK, MAXPEAK, MINPEAK, AVERAGE, RMS, SAMPLE Number of sweeps set Number of samples set Maximum level Minimum level Averaging ON/OFF |
| Data section of the file | TRACE 1: Trace Mode;CLR/WRITE; x-Unit;dB; Values;500; 0.000000;-12.450729;-106.249130 26052104.208417;-74.768776;-108.954018 52104208.416834;-74.841995;-107.017891 78156312.625251;-74.569473;-103.686615 ... | Trace Display mode of trace: CLR/WRITE, AVERAGE, MAXHOLD, INHOLD Unit of x values: Mean Pwr + ... dB; Number of measurement points <x value>, <y1>, <y2> <y2> being available only with AUTOPEAK detector and containing in this case the smaller of the two measured values for a measurement point. |

Overview of Other Menus

SYSTEM Key Group

The *PRESET*; *CAL* and *INFO* menus in the code domain measurement mode are identical to the corresponding menus in the basic unit and are described in the FSIQ operating manual.

The parameters marked with grey are not available in the *DISPLAY* menu. The screen display is set to *SPLIT SCREEN* in the code domain measurement mode. The remaining softkeys are identical to those of the basic unit and are described in the FSIQ operating manual.

CONFIGURATION Key Group

The *MODE* menu enables selection of the mode. The analyzer, vector analyzer and tracking generator modes are described in the operating manual for the FSIQ basic unit. The code domain measurement mode is described in the present manual.

The *SETUP* menu in the code domain measurement mode is identical to the corresponding menu in the basic unit and is described in the FSIQ operating manual.

FREQUENCY Key Group

In the *CENTER* menu, the center frequency can be set for synchronization with the DUT and a frequency offset entered.

The *SPAN*, *START* and *STOP* keys have no function in the code domain measurement mode.

LEVEL Key Group, INPUT Key

The *REF*, *RANGE* and *INPUT* menus in the code domain measurement mode are identical to the corresponding menus in the basic unit and are described in the FSIQ operating manual.

MARKER Key Group

The *NORMAL* menu in the code domain measurement mode is identical to the *CONFIGURATION MODE – 3GPP MS ANALYZER – CODE DOM POWER* submenu.

The *DELTA* menu in the code domain measurement mode is identical to the corresponding menu in the vector analyzer mode and is described in the FSIQ operating manual.

The *SEARCH* and *MKR* → keys have no function in the code domain measurement mode.

LINES Key Group

The *LIMIT LINES* and *D-LINES* keys have no function in the code domain measurement mode.

SWEEP Key Group

The softkeys *FREE RUN*, *EXTERN*, *TRIGGER OFFSET* and *SLOPE POS/NEG* are available in the *TRIGGER* menu.

In the *SWEEP* menu only the parameters *SINGLE SWEEP* and *CONTINUOUS SWEEP* are available.

The *COUPLING* key has no function in the code domain measurement mode.

HCOPY and MEMORY Key Group

The *SETTINGS*, *RECALL* and *CONFIG* menus in the code-domain measurement mode are identical to the corresponding menus in the basic unit and are described in the FSIQ operating manual.

The *SAVE* menu offers the possibility to store the WCDMA channel tables. To this end, selection "WCDMA channel table" is included in the *ITEMS TO SAVE* selection list. The corresponding data set file has the extension *.ctm.

:CALCulate<1>:MARKer<1>:FUNCtion:WCDPower:MS:RESult? PTOTAL | FERRor | TFRame |
 MACCuracy | PCDerror |
 EVMRms | EVMPeak |
 CERR or | SRATe | CHANnel |
 CDPabsolute | CDPRelative |
 IQOFFset | IQIMbalance |
 CMAPping | PSYMBOL

This command queries the measured and calculated results of the WCDMA code domain power measurement.

Example: " :CALC:MARK:FUNC:WCDP:MS:RES? PTOT "

Features: *RST value: -
 SCPI: device-specific

| | |
|-------------|-----------------------------|
| PTOTAL | total power |
| FERRor | frequency error in Hz |
| TFRame | trigger to frame |
| MACCuracy | modulation accuracy |
| PCDerror | peak code domain error |
| EVMRms | error vector magnitude RMS |
| EVMPeak | error vector magnitude peak |
| CERRor | chip rate error |
| SRATe | symbol rate |
| CHANnel | channel number |
| CDPabsolute | channel power absolute |
| CDPRelative | channel power relative |
| IQOFFset | IQ offset |
| IQIMbalance | IQ imbalance |
| CMAPping | channel mapping |
| PSYMBOL | no of pilot symbols |

:CALCulate:MARKer:Y:PERCent 0 to 100%

This command positions the marker in CCDFmeasurements to the selected percent value of the y-axis scaling (probability)

Example: " :CALC:MARK:Y:PERC 40 "

Features: *RST value: -
 SCPI: device-specific

This command is an event which is why it is not assigned an *RST value and has no query.

CALCulate:STATistics - Subsystem

The CALCulate:STATistics subsystem controls the statistical measurement functions in the instrument. The measurement window cannot be selected with these functions. The numeric suffix in CALCulate is therefore ignored.

| BEFEHL | PARAMETER | EINHEIT | KOMMENTAR |
|-------------|-----------------|---------|-----------|
| :CALCulate | | | |
| :STATistics | | | |
| :MS | | | |
| :CCDF | | | |
| [:STATe] | <Boolean> | | |
| :NSAMples | <numeric_value> | -- | |
| :SCALe | | | |
| :Y | | | |
| :UPPer | <numeric_value> | -- | |
| :LOWer | <numeric_value> | -- | |

CALCulate:STATistics:MS:CCDF[:STATe] ON | OFF

This command switches on or off the measurement of the complementary cumulative distribution function (CCDF).

Example: "CALC:STAT:MS:CCDF ON"

Features: *RST value: OFF
SCPI: device-specific

CALCulate:STATistics:NSAMples 100 to 32768

This command sets the number of measurement points to be acquired for the statistical measurement functions

Example: "CALC:STAT:NSAM 5000"

Features: *RST value: 10000
SCPI: device-specific

CALCulate:STATistics:SCALe:Y:UPPer 1E-5 to 1.0

This command defines the upper limit for the Y-axis of the diagram in statistical measurements. Since probabilities are specified on the Y-axis, the entered numerical values are dimensionless.

Example: "CALC:STAT:SCAL:Y:UPP 0.01"

Features: *RST value: 1.0
SCPI: device-specific

CALCulate:STATistics:SCALe:Y:LOWer 1E-6 to 0.1

This command defines the lower limit for the Y-axis of the diagram in statistical measurements. Since probabilities are specified on the Y-axis, the entered numerical values are dimensionless.

Example: "CALC:STAT:SCAL:Y:LOW 0.001"

Features: *RST value: 1E-6
SCPI: device-specific

CONFigure:WCDPower Subsystem

This subsystem comprises the commands for configuring the code domain power measurements. Only the numeric suffix 1 is permissible in CONFigure.

CONFigure<1>:WCDPower:MS:MEASurement POWER | ACLR | ESPectrum | OBANdwith | OBWidth | WCDPower | FDOMain | TDOMain

This command selects the WCDMA mobile station tests. The settings of the predefined measurements are described for the associated softkey in chapter 6.

| | | |
|-------------------|---------------------|---|
| Parameter: | POWER | Channel power measurement (standard 3GPP WCDMA Forward) with predefined settings |
| | ACLR | Adjacent channel power measurement (standard 3GPP WCDMA Forward) with predefined settings |
| | ESPectrum | Measurement of spectrum emission mask |
| | OBANdwith OBWidth | Measurement of occupied power bandwidth |
| | WCDPower | Code domain power measurement. This selection has the same effect as command INSTRUMENT:SElect MWCDpower. |
| | FDOMain | Overview measurement in the frequency domain with predefined settings |
| | TDOMain | Measurement of crest factor in the time domain with predefined settings |
| | CCDF | Complementary Cumulative Distribution Function |

Example: "CONF:WCDP:MS:MEAS POW"

Features: *RST value: POWER
SCPI: device-specific

CONFigure:WCDPower:MS:CTABLE[:STATe] ON | OFF

This command switches the channel table on or off. On switching on, the measured channel table is stored under the name RECENT and switched on. After the RECENT channel table is switched on, another channel table can be selected with the command CONF:WCDP:MS:CTABLE:SElect. The RECENT channel table must always be switched on first with the command CONF:WCDP:MS:CTABLE:SElect and then the required channel table can be selected with the command CONF:WCDP:MS:CTABLE:SElect

Example: " :CONF:WCDP:MS:CTAB ON"

Features: *RST value: OFF
SCPI: device-specific

CONFigure:WCDPower:MS:CTABLE:SElect <string>

This command selects a predefined channel table file. Before using this command, the RECENT channel table must be switched on first with the command CONF:WCDP:MS:CTABLE.

Example: " :CONF:WCDP:MS:CTAB:SEL '3GB_1_32' "

Features: *RST value: "RECENT"
SCPI: device-specific

:CONFigure:WCDPower:MS:CTABLE:NAME <file_name>

This command selects an existing channel table or creates the name of a new channel table.

Example: " : CONF : WCDP : MS : CTAB : NAME 'NEW_TAB' "

Features: *RST value: "RECENT"
SCPI: device-specific

:CONFigure:WCDPower:MS:CTABLE:DATA <numeric_value> ,<numeric_value>...

This command defines the values of the selected channel table:

<pilot length>,<code class>,<number of active channels>

Pilot length: pilot length of channel DPCCH
Code class: code class of channel 1. I-mapped
Number of active channels: 0 to 6

Prior to this command, the name of the channel table has to be defined with command
CONF : WCDP : MS : CTAB : NAME.

The query **:CONFigure:WCDPower:MS:CTABLE:DATA?** retrieves the following values:

<pilot length>,<code class>,<number of active channels>,<CDP relative 1>,<CDP relative 2>,<CDP relative 3>,<CDP relative 4>,<CDP relative 5>,<CDP relative 6>

Pilot length: pilot length of channel DPCCH
Code class: code class of channel 1. I-mapped
Number of active channels: 0 to 6
CDP relative 1: measured value of channel 1, I-mapped,
CDP relative 2: measured value of channel 1, Q-mapped,
CDP relative 3: measured value of channel 3, I-mapped,
CDP relative 4: measured value of channel 3, Q-mapped,
CDP relative 5: measured value of channel 2, I-mapped,
CDP relative 6: measured value of channel 2, Q-mapped,

Example: " CONF : WCDP : MS : CTAB : DATA 8 , 4 , 1 "

Features: *RST value: -
SCPI: device-specific

:CONFigure:WCDPower:MS:CTABLE:COMMENT <string>

This command defines a comment for the selected channel table

Prior to this command, the name of the channel table has to be defined with command
CONF : WCDP : MS : CTAB : NAME and the values of the table have to be defined with command
CONF : WCDP : MS : CTAB : DATA.

Example: " : CONF : WCDP : MS : CTAB : COMM 'Comment for table 1' "

Features: *RST value: ""
SCPI: device-specific

:CONFigure:WCDPower:MS:CTABLE:COpy <file_name>

This command copies one channel table onto another one. The channel table to be copied is selected with command `CONF:WCDP:MS:CTAB:NAME`.

Parameter: <file_name> ::= name of the new channel table

Example: " : CONF : WCDP : MS : CTAB : COPY ' CTAB_2 ' "

Features: *RST value: --
SCPI: device-specific

The name of the channel table may contain a maximum of 8 characters. This command is an "event" which is why it is not assigned an *RST value and has no query.

:CONFigure:WCDPower:MS:CTABLE:DELeTe

This command deletes the selected channel table. The channel table to be deleted is selected with command `CONF:WCDP:MS:CTAB:NAME`.

Example: " : CONF : WCDP : MS : CTAB : DEL "

Features: *RST value: --
SCPI: device-specific

This command is an "event" which is why it is not assigned an *RST value and has no query.

:CONFigure:WCDPower:MS:CTABLE:CATalog?

This command reads out the names of all channel tables stored on the harddisk.

Syntax of output format:

<Sum of file lengths of all subsequent files>,<free memory on hard disk>,
<1st file name>,,<1st file length>,<2nd file name>,,<2nd file length>,,...,<nth file name>,
<nth file length>

Example: " : CONF : WCDP : MS : CTAB : CAT? "

Features: *RST value: --
SCPI: device-specific

INSTrument Subsystem

:INSTrument[:SElect] SANalyzer | DDEMod | ADEMod | BGSM | MSGM | CDPower |
BWCDpower|WCDPower | **MWCDpower**

This command switches between the operating modes by means of text parameters.

Selection MWCDpower presets the instrument as described in Chapter 2, Section "Basic Settings in Code Domain Measurement Mode".

Example: " : INST MWCD "

Features: *RST value: SANalyzer
SCPI: conforming

SENSe:CDPower Subsystem

This subsystem controls the parameters for the code domain mode. The numeric suffix in `SENSe<1|2>` is not significant in this subsystem.

:`SENSe`:`CDPower`:`SFACTor` 4 | 8 | 16 | 32 | 64 | 128 | 256

This command defines the spreading factor. The spreading factor is only significant for display mode PEAK CODE DOMAIN ERROR.

Example: `"CDP:SFACTor 16"`
Features: *`RST` value: 256
 `SCPI`: device-specific

:`SENSe`:`CDPower`:`CODE` 0 to 255

This command sets the code number. The code number refers to code class 8 (spreading factor 256).

Example: `" :CDP:CODE 30 "`
Features: *`RST` value: 0
 `SCPI`: device-specific

:`SENSe`:`CDPower`:`MAPPING` I | Q

This command defines the mapping of the CDP signal.

Example: `" :CDP:MAPP I "`
Features: *`RST` value: I
 `SCPI`: device-specific

:`SENSe`:`CDPower`:`NORMALize` ON | OFF

This command switches normalization of the unit circle with the IQ offset on or off.

Example: `" :CDP:NORM OFF "`
Features: *`RST` value: OFF
 `SCPI`: device-specific
Mode: WCDP

:`SENSe`:`CDPower`:`SLOT` 0 to 14

This command sets the slot number.

Example: `" :CDP:SLOT 3 "`
Features: *`RST` value: 0
 `SCPI`: device-specific

:[SENSe:]CDPower:PRESet

This command sets the parameters of the WCDMA measurement to predefined values (see softkey *CDP AUTO ADJUST* in chapter 6).

Example: " :CDP:PRES "
Features: *RST value: -
 SCPI: device-specific

This command is an <Event> and has therefore neither *RST value nor query.

:[SENSe:]CDPower:SBANd NORMal | INVers

This command is for interchanging the left and the right sideband.

Example: " :CDP:CDP:SBAN INV "
Features: *RST value: INV
 SCPI: device-specific
Mode: WCDP

:[SENSe:]CDPower:LCODE[:VALue] #H0 to #H1fff (hex)

This command defines the scrambling code in hexadecimal format.

Example: " :CDP:LCOD #H2 "
Features: *RST value: 0
 SCPI: device-specific

:[SENSe>:]CDPower:LCODE:TYPE LONG | SHORt

This command switches between long and short scrambling code.

Example: " :CDP:LCOD:TYPE SHOR "
Features: *RST value: LONG
 SCPI: device-specific

:[SENSe:]CDPower:ICTReshold -50 dB to + 10 dB

This command sets the threshold value from which a channel is treated as active. The level entered refers to the total signal power.

Example: " :CDP:ICTR -10DB "
Features: *RST value: -10 dB
 SCPI: device-specific

:[SENSe:]CDPower:LEVel:ADJust

This command is used for setting automatically the RF attenuation and IF gain to the level of the applied signal. The instrument is to be switched to the *ATTEN MANUAL* mode so as to set the RF attenuation and IF gain separately to optimum values. This mode is maintained after changing from code domain power measurements to the analyzer or vector analyzer modes.

Example: " :CDP:LEV:ADJ "
Features: *RST value: -
 SCPI: device-specific

This command is an <Event> and has therefore neither *RST value nor query.

TRACe Subsystem

TRACe[:DATA] TRACE1 | TRACE2 | ABITstream

This command transfers trace data from the controller to the instrument, the query reads trace data out of the instrument.

Example: ":TRAC TRACE1, "+A\$ (A\$: data list in current format)
 ":TRAC? TRACE1"

Features: *RST value: -
 SCPI: conforming

Only TRACE1, TRACE2 or ABITstream can be queried depending on the display mode.

ABITstream can be set only if `CALC2:FEED "XTIM:CDP:BSTReam"` is selected (in the lower bitstream window). This command returns the bitstreams of all 15 slots one after the other, the output format may be REAL, UINT or ASCII.

For TRACE1 or TRACE2 the following measured values are transferred depending on the display mode:

CODE PWR ABSOLUTE / RELATIVE (TRACE1) , CHANNEL TABLE (TRACE2)

Each channel is defined by the class, the channel number, the absolute level, the relative level and the I/Q mapping. The class denotes the spreading factor of the channel.

Class 8 corresponds to the highest spreading factor (256, symbol rate 15 ksp/s), class 2 to the lowest admissible spreading factor (4, symbol rate 960 ksp/s).

Five values are transmitted for each channel.

< class>, <channel number>, <absolute level>, <relative level>, <I/Q mapping>,

The units are:

Absolute level dBm,
Relative level dB referred to total power.
I/Q mapping 1 = I mapping; 0 = Q mapping

The example shows the results of a query for three assigned channels with the following configuration:

1st channel: spreading factor 256, channel number 0, Q-mapped
2nd channel: spreading factor 4, channel number 1, I-mapped
3rd channel: spreading factor 4, channel number 1, Q-mapped

This yields the following result: 8,0,-40,-20,0,0,2,1,-40,-20,1,2,7,1,-40,-20,0,0

The channels come in the same order as in the CDP diagram, i.e. depending on their position in the code domain of spreading factor 256.

RESULT SUMMARY (TRACE2)

The results of the RESULT SUMMARY are output in the following order:

<modulation accuracy>, <peak CDE>, <carr freq Error>, <chip rate error>,
<total power>, <trg to frame>, <EVM peak channel>, <EVM mean channel>, <class>,
<channel number>, <power abs. channel>, <power rel. channel>, <I/Q mapping>,
<number of pilot symbols>, <IQ offset>, <IQ imbalance>

The units are:

EVM peak channel/mean channel, modulation accuracy, IQ offset/imbalance : %,
Peak CDE, total power and power abs. channel dB.
Power rel. Channel dB referred to total signal power.
Carr freq error : Hz
Chip Rate Error ppm.
I/Q mapping 1 = I mapping; 0 = Q mapping
Pilot symbols absolute
Trg to Frame μs.

POWER VS SLOT (TRACE2)

15 pairs of slot and level values (for 15 slots) are always transferred.
 <slot number>, <level value in dB>,<slot number>,<level value in dB>.....

SYMBOL EVM (TRACE2)

The number of level values depends on the spreading factor:

| | |
|----------------------|------------|
| Spreading factor 256 | 10 values |
| Spreading factor 128 | 20 values |
| Spreading factor 64 | 40 values |
| Spreading factor 32 | 80 values |
| Spreading factor 16 | 160 values |
| Spreading factor 8 | 320 values |
| Spreading factor 4 | 640 values |

PEAK CODE DOMAIN ERR and MODULATION ACCURACY (TRACE2)

15 pairs of slot and level values are always transferred.
 PEAK CODE DOMAIN ERR: <slot number>, <level value in dB>.....
 MODULATION ACCURACY: <slot number>, <level value in %>,

SYMBOL CONST (TRACE2)

The real and the imaginary part are transferred as a pair. Depending on the I/Q mapping either the real or the imaginary component is 0:

<re 0>,<im 0>,<re 1>,<im 1>.....<re n>, <im n>

The number of level values depends on the spreading factor:

| | |
|----------------------|------------|
| Spreading factor 256 | 10 values |
| Spreading factor 128 | 20 values |
| Spreading factor 64 | 40 values |
| Spreading factor 32 | 80 values |
| Spreading factor 16 | 160 values |
| Spreading factor 8 | 320 values |
| Spreading factor 4 | 640 values |

BITSTREAM (TRACE2)

The bitstream of one slot is transferred. One value is transferred per symbol (range 0,1). The number of symbols is not constant and may vary for each sweep. Specific symbols in the bitstream may be invalid for unused channels. These invalid symbols are marked by "9".

Example for a bitstream trace: 0,1,0,0,1,1,0 (used channels) and 9,9,9,9,9,9,9,9,9 (unused channels).

Alphabetical List of Commands

| Command | Parameter | Page |
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| :CALCulate<1 2>:FEED | 'XPOW:CDP' 'XPOW:CDP:RAT' 'XPOW:CDP:OVERview' 'XTIM:CDP:MACCuracy' 'XTIM:CDP:PVSLOT' 'XTIM:CDP:BSTReam' 'XTIM:CDP:ERR:CTABLE' 'XTIM:CDP:ERR:SUMM' 'XTIM:CDP:ERR:PCDomain' 'XTIM:CDP:SYMB:CONStellation' 'XTIM:CDP:SYMB:EVM' | 61 |
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Table of Softkeys with Assignment of IEC/IEEE Commands

CONFIGURATION Key Group

| | |
|--------------------|--|
| MODE | :INSTrument:SElect MWCDpower |
| 3GPP MS ANALYZER | :CONFigure<1>:WCDPower:MS:MEASurement POWER Query of results: :CALCulate<1>:MARKer<1>:FUNction:POWER:RESult? CPOWER |
| POWER | :CONFigure<1>:WCDPower:MS:MEASurement ACLR Query of results: :CALCulate<1>:MARKer<1>:FUNction:POWER:RESult? ACPower |
| ACLR | :CONFigure:WCDPower:MS:MEASurement ESpectrum Query of results:: :CALCulate<1>:LIMit<1>:FAIL? |
| SPECTRUM EM MASK | :CALCulate<1>:LIMit<1>:ESpectrum:MODE AUTO |
| LIMIT LINE AUTO | :CALCulate:LIMit<1>:NAME <string> :CALCulate:LIMit<1>:UPPer:STATe ON OFF :CALCulate:LIMit<1>:UPPer:OFFset <num_value> :CALCulate:LIMit<1>:UPPer:MARGin <num_value> :CALCulate:LIMit<1>:UPPer:MODE ABSolute :CALCulate:LIMit<1>:UPPer:SPACing LINear :CALCulate:LIMit<1>:CONTRol[:DATA] <num_value>, <num_value>, ... :CALCulate:LIMit<1>:CONTRol:DOMain FREQuency :CALCulate:LIMit<1>:CONTRol:TRACe 1 :CALCulate:LIMit<1>:CONTRol:OFFset <num_value> :CALCulate:LIMit<1>:CONTRol:MODE RELative :CALCulate:LIMit<1>:UPPer[:DATA] <num_value>, <num_value>.. :CALCulate:LIMit<1>:UPPer:STATe ON OFF :CALCulate:LIMit<1>:UPPer:OFFset <num_value> :CALCulate:LIMit<1>:UPPer:MARGin <num_value> :CALCulate:LIMit<1>:UPPer:MODE ABSolute :CALCulate:LIMit<1>:UPPer:SPACing LINear |
| LIMIT LINE USER | Notes: - If the y values are entered using the command:CALCulate:LIMit<1>:LOWer[:DATA] the limit check yields "failed" if the values are below the limit line. - If a user-defined limit line is activated, it has priority over limit lines selected via AUTO. |
| OCCUPIED BANDWIDTH | :CONFigure<1>:WCDPower:MS:MEASurement OBANdwidth Query of results: :CALCulate<1>:MARKer<1>:FUNction:POWER:RESult? OBANdwidth |
| SPECTRUM | :CONFigure<1>:WCDPower:MS:MEASurement FDOMain Query of results: -- (visual evaluation) |
| TIME DOMAIN | :CONFigure<1>:WCDPower:MS:MEASurement TDOMain Query of results: :CALCulate<1>:MARKer<1>:FUNction:CRESt? :CALCulate<1>:MARKer<1>:FUNction:SUMMery:RMS:RESult? :CALCulate<1>:MARKer<1>:FUNction:SUMMery[:STATe] ON |
| CCDF | :CONFigure:WCDPower:MS:MEASurement CCDF or :CALCulate:STATistics:MS:CCDF[:STATe] ON Query of results: CALCulate:MARKer:X? |
| PERCENT MARKER | :CALCulate:MARKer:Y:PERCent 0 to 100% |

| | |
|-------------------------|--|
| NO OF SAMPLES | :CALCulate:STATistics:NSAMamples 1 to 32768 |
| AVERAGE ON OFF | :DISPlay[:WINDow]:TRACe1:MODE AVERAge VIEW |
| SWEEP COUNT | :[SENSe:]:SWEep:COUNT 6 |
| Y MAX | :CALCulate:STATistics:SCALE:Y:UPPer 1E-5 to 1 |
| Y MIN | :CALCulate:STATistics:SCALE:Y:LOWer 1E-6 to 0.1 |
| CODE DOM POWER | :INSTrument<1>[:SElect] MWCDpower or :CONFIgure:WCDPower:MS:MEASurement WCDPower |
| | Query of results: :TRACe:DATA? TRACE1 TRACE2 ABITstream or :CALCulate<1 2>:MARKer<1>:FUNctIon:WCDPower:MS:RESult? PTOTal FERRor TFramE MACCuracy PCDError VMRms EVMPeak CERRor SRATe CHANnel CDPabsolute CDPRelative IQOffset IQIMbalance CMApping PSYMBOL or Marker functions (see MARKER submenu) |
| CONTINUOUS SWEEP | :INITiate<1>:CONTInuous ON; INITiate<1>[:IMMediate] |
| SINGLE SWEEP | :INITiate<1>:CONTInuous OFF; INITiate<1>[:IMMediate] |
| RESULT DISPLAY | -- |
| CODE PWR RELATIVE | :CALCulate<1>:FEED `XPOW:CDP:RAT` |
| CODE PWR ABSOLUTE | :CALCulate<1>:FEED `XPOW:CDP` |
| CODE PWR OVERVIEW | :CALCulate<1>:FEED `XPOW:CDP:OVERview` |
| CODE PWR ZOOM | -- |
| MODULATION ACCURACY | :CALCulate2:FEED "XTIM:CDP:MACCuracy" |
| PEAK CODE DOMAIN ERR | :CALCulate2:FEED "XTIM:CDP:ERR:PCDomain" |
| SELECT PCDE SF | :[SENSe:]CDPower:SFACTor 4 8 16 32 64 128 256 |
| SELECT I Q | :[SENSe:]CDPower:MAPPing I Q |
| SELECT CODE NO. | :[SENSe:]CDPower:CODE 0 to 255 |

| | |
|-------------------------|---|
| SELECT SLOT | : [SENSe:]CDPower:SLOT 0 to 14 |
| CHANNEL TABLE | : CALCulate<1>:FEED "XTIM:CDP:ERR:CTable" |
| SYMBOL CONST DIAG | : CALCulate2:FEED "XTIM:CDP:SYMB:CONS" |
| SYMBOL EVM | : CALCulate2:FEED "XTIM:CDP:SYMB:EVM" |
| BITSTREAM | : CALCulate2:FEED "XTIM:CDP:SYMB:BITStream" |
| POWER VS SLOT | : CALCulate2:FEED "XTIM:CDP:PVSLot" |
| RESULT SUMMARY | : CALCulate2:FEED "XTIM:CDP:ERR:SUMM" |
| CODE CHAN CONFIG | -- |
| CODE CHAN AUTOSEARCH | : CONFIgure:WCDPower:MS:CTABLE[:STATE] OFF |
| CODE CHAN PREDEFINED | : CONFIgure:WCDPower:MS:CTABLE[:STATE] ON : CONFIgure:WCDPower:MS:CTABLE:SElect <string> |
| EDIT CHAN CONF TAB | -- |
| CHAN TABLE HEADER | : CONFIgure:WCDPower:MS:CTABLE:NAME "channel table name" : CONFIgure:WCDPower:MS:CTABLE:COMMENT "Comment for new table" |
| CHAN TABLE VALUES | : CONFIgure:WCDPower:MS:CTABLE:NAME "channel table name" : CONFIgure:WCDPower:MS:CTABLE:DATA <numeric_value> |
| SAVE TABLE | -- (automatically executed in remote control with command CONFIgure:WCDPower:CTABLE:DATA) |
| DEL CHAN CONF TABLE | : CONFIgure:WCDPower:MS:CTABLE:NAME "channel table name" : CONFIgure:WCDPower:MS:CTABLE:DElete |
| COPY CHAN CONF TABLE | : CONFIgure:WCDPower:MS:CTABLE:NAME "channel table name" : CONFIgure:WCDPower:MS:CTABLE:COpy "new channel table name" |
| MARKER | -- |
| MARKER | : CALCulate<1 2>:MARKer<1>[:STATE] ON OFF; : CALCulate<1 2>:MARKer<1>:X <channel_number>; : CALCulate<1 2>:MARKer<1>:Y? |
| MARKER -> DPCCH | : CALCulate<1 2>:MARKer<1>:FUNctIon:DPCCh; : CALCulate<1 2>:MARKer<1>:Y? |
| MEAS SETTINGS | -- |
| SCRAMBLING CODE | : [SENSe:]CDPower:LCODE[:VALue] #H0 to #H1fff (hex)> |
| SCR TYPE LONG SHRT | : [SENSe:]CDPower:LCODE:TYPE LONG SHORT |
| INACT CHAN THRESH | : [SENSe:]CDPower:ICTReshold -50 dB ... +10 dB |

| | |
|-------------------------|---|
| TRIGGER INT EXT | :TRIGger[:SEquence]:SOURce IMMEDIATE EXTERNAL |
| EXT TRG OFFSET | :TRIGger[:SEquence]:HOLDoff <num_value> |
| SIDE BAND NORM INV | :[SENSe:]CDPower:SBAND NORMAL INVERSE |
| NORMALIZE ON OFF | :[SENSe:]CDPower:NORMALize ON OFF |
| CENTER FREQUENCY | :[SENSe:]FREquency:CENTer <num_value> |
| REF LEVEL | -- |
| REF LEVEL | :DISPlay[:WINDow<1 2>]:TRACe<1 2>:Y[:SCALE]:RLEVEL <num_value> |
| REF LEVEL OFFSET | :DISPlay[:WINDow<1 2>]:TRACe<1 2>:Y[:SCALE]:RLEVEL:OFFSet <num_value> |
| RF ATTEN MANUAL | :INPut<1 2>:ATTenuation <num_value> |
| ATTEN AUTO NORMAL | :INPut<1 2>:ATTenuation:AUTO:MODE NORMAL; :INPut<1 2>:ATTenuation:AUTO ON |
| ATTEN AUTO LOW NOISE | :INPut<1 2>:ATTenuation:AUTO:MODE LNOise; :INPut<1 2>:ATTenuation:AUTO ON |
| ATTEN AUTO LOW DIST | :INPut<1 2>:ATTenuation:AUTO:MODE LDISTortion; :INPut<1 2>:ATTenuation:AUTO ON |
| MIXER LEVEL | :INPut<1 2>:MIXer <num_value> |
| LEVEL AUTO ADJUST | :[SENSe:]CDPower:LEVEL:ADJust |
| CDP AUTO ADJUST | :[SENSe:]CDPower:PRESet |

STATus QUESTionable:SYNC Register

This register comprises information about error status of the CDP measurements of application FSIQK72.

It can be queried with commands `STATus:QUESTionable:SYNC:CONDition?` and `"STATus:QUESTionable:SYNC[:EVENT]?"`.

Table 7-1 Meaning of bits in STATus:QUESTionable:SYNC register

| Bit No. | Meaning |
|----------|---|
| 0 to 6 | not used in FSIQK73 |
| 7 | K73 Invalid trigger offset This bit is set if a complete frame can not be processed due to the trigger settings. |
| 8 | K73 Evaluation Error This bit is set if an error that the subsequent bits do not describe in greater detail has occurred during the data evaluation for the code domain power analysis. |
| 9 | not used in FSIQK73 |
| 10 | K73 Frame sync failed This bit is set if the synchronization to a frame was not possible. |
| 11 to 14 | not used in FSIQK73 |
| 15 | This bit is always 0. |

8 Performance Test

- Switch off FSIQ before removing or inserting modules.
- Check the setting of the AC supply voltage selector (230 V) prior to switching on the unit.
- Measure the parameters after a warm-up time of at least 30 min. and the completion of system error correction of FSIQ and SMIQ. Only then is it ensured that the specifications are complied with.
- Unless specified otherwise all settings are made after a PRESET.
- Conventions for settings on FSIQ during the measurement:

[<Key>] Press a key on the front panel, eg [SPAN]
 [<SOFTKEY>] Press a softkey, eg [MARKER -> PEAK]
 [<nn unit>] Enter a value and terminate by entering the unit, eg [12 kHz]
 {<nn>} Enter values indicated in one of the following tables.

Successive entries are separated by [:], eg [**SPAN**: 15 kHz].

- The values stated hereinafter are not guaranteed values. Only the data sheet specifications are binding.

Required Measuring Equipment and Accessories

Table 8-1 Required Measuring Equipment and Accessories

| Item | Instrument type | Recommended characteristics | Recommended equipment | R&S Order No. | Use |
|------|------------------|--|--|--|-----|
| 1 | Signal generator | Vector signal generator for generating cdmaOne signals | SMIQ with options: SMIQB42 SMIQB20 SMIQB11 | 1125.5555.xx 1104.7936.02 1125.5190.02 1085.4502.04 | |

Test Procedure

The performance test refers exclusively to results of the code-domain power. It is not required to check the POWER-, ACLR- and SPECTRUM results since they are covered by the performance test of the basic unit.

Default settings on SMIQ:

```

[PRESET]
[LEVEL :            0 dBm]
[FREQ:             2.1175 GHz]
DIGITAL STD
  WCDMA 3GPP
    LINK DIRECTION  UP / REVERSE
    TEST MODELS (NOT STANDARDIZED)...
      C+D960K
    SELECT BS/MS
      MS 1 ON
        OVERALL SYMBOL RATE... 6*960
        POWER
    STATE: ON
Trigger output: RADIO FRAME
  
```


Check set channels against the following table:

| CHANNEL NUMBER | 1 | 2 | 3 | 4 | 5 | 6 |
|----------------|-------|-------|-------|-------|-------|-------|
| TYPE | DPDCH | DPDCH | DPDCH | DPDCH | DPDCH | DPDCH |
| SYMBOL RATE | 960 | 960 | 960 | 960 | 960 | 960 |
| CHAN CODE | 1 | 1 | 3 | 3 | 2 | 2 |
| DATA | PN15 | PN15 | PN15 | PN15 | PN15 | PN15 |

Default settings on FSIQ:

[PRESET]
[CENTER: 2.1175 GHz]
[REF: 10 dBm]
[MODE: 3GPP MS ANALYZER: CODE DOM POWER
MEAS SETTINGS SCRAMBLING CODE 0
 SCR TYPE LONG
 TRIGGER EXT
RESULT DISPLAY CHANNEL TABLE

Test setup and other settings

- Connect external trigger input of FSIQ to SMIQ

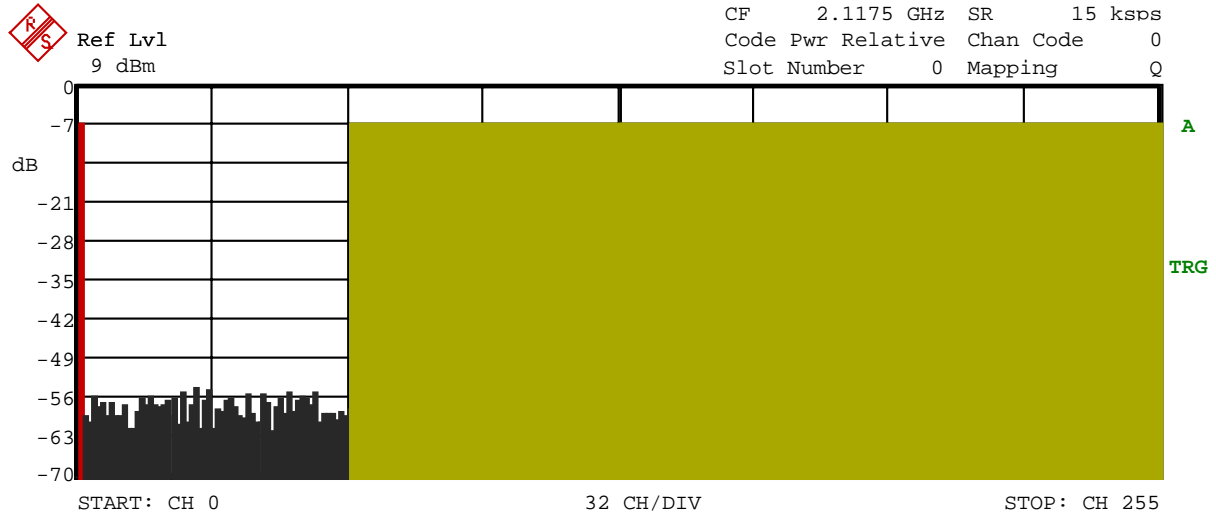
[TRIGGER: TRIGGER OFFSET: 0μs]

- Connect external reference output of FSIQ to SMIQ

SMIQ UTILITIES
 REF OSC
 SOURCE: EXT

FSIQ **[SETUP:** REFERENCE INT]

The display of the FSIQ should show the following:



Ref Lvl 9 dBm

CF 2.1175 GHz SR 15 kbps
Channel Table Chan Code 0
Slot Number 0 Mapping Q

| CHANNEL TABLE | | | | | | |
|---------------|----------|--------|--------|---------|---------|---------|
| Type | Symb R. | Code # | Status | Mapping | PWR ABS | PWR REL |
| DPCCH | 15 kbps | 0 | active | Q | -13.32 | -6.99 |
| DPDCH | 960 kbps | 1 | active | Q | -13.32 | -6.99 |
| DPDCH | 960 kbps | 1 | active | I | -13.33 | -7.00 |
| DPDCH | 960 kbps | 2 | active | Q | -13.32 | -7.00 |
| DPDCH | 960 kbps | 2 | active | I | -13.32 | -6.99 |
| DPDCH | 960 kbps | 3 | active | Q | -13.31 | -6.98 |
| DPDCH | 960 kbps | 3 | active | I | -13.32 | -6.99 |
| ??? | 15 kbps | 0 | inactv | I | -66.68 | -60.35 |
| ??? | 15 kbps | 1 | inactv | Q | -65.60 | -59.27 |
| ??? | 15 kbps | 1 | inactv | I | -66.55 | -60.22 |
| ??? | 15 kbps | 2 | inactv | Q | -66.98 | -60.66 |

Date: 5.JUL.2001 10:56:56

- Transfer the measurement results indicated in the channel table to the performance test protocol.

Performance Test Report

Note: The values specified in the data sheet are guaranteed limits. To these limits, the tolerances of the instruments used in the performance test must be added because of their measurement uncertainty.

Table 8-2 Performance Test Report

Number pilot symbols: 8

| Channel No.: | Type | Symbol rate | Channel No.: | Mapping |
|--------------|-------|-------------|--------------|---------|
| 1 | DPCCH | 15 | 0 | Q |
| 2 | DPDCH | 960 | 1 | I |
| 3 | DPDCH | 960 | 1 | Q |
| 4 | DPDCH | 960 | 3 | I |
| 5 | DPDCH | 960 | 3 | Q |
| 6 | DPDCH | 960 | 2 | I |
| 7 | DPDCH | 960 | 2 | Q |

9 Glossary

| | |
|----------------------------|--|
| Crest-Faktor | Ratio of peak to average value of the signal. |
| DPCCH | Dedicated Physical Control Channel, control channel. The channel is used in the FSIQK73 for the synchronization of the signal. |
| DPDCH | Dedicated physical data channel, data channel. The data channels which can be sent at different transmission rates are automatically recognized during the measurement. |
| Inactive Channel Threshold | Minimum power that a single channel must have as compared to the total signal to be recognized as an active channel |
| Modulation Accuracy | In accordance with the 3GPP specifications, the squared error between the real and imaginary parts of the test signal and an ideal reference signal is determined (EVM referred to the total signal) in a modulation accuracy measurement. |
| Peak Code Domain Error | In accordance with the 3GPP specifications, the error between the test signal and the ideal reference signal is projected onto the classes of the different spreading factors in the case of a peak code domain measurement. |

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