



ROHDE & SCHWARZ

Test and Measurement
Division

Operating Manual

Option SMIQB43

Digital Standard W-CDMA

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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.

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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 $V_{\text{rms}} > 30 \text{ V}$, 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 standards 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 standards 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 de la red de distribución. Si es necesario cambiar la preselección de la tensión también se deberán en caso de cambio 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 asegurarse 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.

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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.

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Technical Information

Option SMIQB43

Digital Standard W-CDMA

Specifications

Digital Standard W-CDMA

To ARIB Standard 0.0 and experimental WCDMA System

Frequency Standard Range	1800 to 2000 MHz same as SMIQ
Modulation	QPSK, OQPSK
Chip rate Standard Range	4.096 Mchip/s 100 chip/s to 7 Mchip/s
Baseband filter Standard	$\sqrt{\cos}$, $\alpha = 0.22$
Other filters	$\sqrt{\cos}$ ($\alpha = 0.1$ to 0.7), \cos ($\alpha = 0.1$ to 0.7)
Code channels and spreading Number	mode 4: 4 channels of different power mode 8: 8 channels, 1 channel of different power and 7 channels of equal power mode 15: 15 channels of equal power
Multicode operation	yes
Code channel power	0.0 to -30 dB
Short code	selectable for each code channel
Range	0 to 127
LMS	1 to FF hex
Long code	selectable for each code channel
Initial value, uplink	0 to 1FFFFFFFFF hex
Initial value, downlink	0 to 3FFFF hex
Time offset	0 to 40959 chips (1 radio frame)
Physical channels with frame structure	
Link direction	downlink, uplink, uplink IQ multiplexed to ARIB Standard 0.0
Downlink channels	perch 1, common control 64 ksymb/s, dedicated channel with 32, 64, 128, 256, 512, 1024 ksymb/s
Uplink channels	common control 64 ksymb/s, dedicated channel with 32, 64, 128, 256, 512, 1024 ksymb/s
Uplink channels (ARIB)	dedicated control channel with 16 ksymb/s, dedicated data channel with 16, 32, 64, 128, 256, 512, 1024 ksymb/s
Data offset	time offset, selectable for each code channel
Offset range	0 to 1 radio frame
Offset resolution	1 symbol




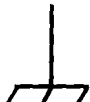




Internal modulation data	
DATA field	PRBS, 2^9-1 , $2^{11}-1$, $2^{15}-1$, $2^{16}-1$, programmable data memory
TPC field	00, 11 alternating, programmable data memory
Synchronization signals:	chip clock, input and output; outputs for slot clock, frame clock or marker for repetition of chip sequence; trigger input
Error vector, rms (SMIQ02B/03B) (standard, level < 8 dBm PEP) with SMIQB47, IQ filter 2.5 MHz	<2%, typ. 1.5% < 3%, typ. 1.8%
Error vector, rms (SMIQ04B/06B) (standard, level < 5 dBm PEP) with SMIQB47, IQ filter 2.5 MHz	<2%, typ. 1.5% < 3%, typ. 1.8%
Adjacent-channel power (SMIQ02B/03B) (standard, level < 8 dBm PEP, 1 code channel) with SMIQB47, IQ filter 2.5 MHz	
Offset 5 MHz	< -64 dBc, typ. -68 dBc
Offset 10 MHz	< -69 dBc, typ. -73 dBc
Adjacent-channel power (SMIQ04B/06B) (standard, level < 5 dBm PEP, 1 code channel) with SMIQB47, IQ filter 2.5 MHz	
Offset 5 MHz	< -64 dBc, typ. -67 dBc
Offset 10 MHz	< -67 dBc, typ. -71 dBc

Safety Instructions

This unit 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, the user must observe all instructions and warnings given in this operating manual.

Safety-related symbols used on equipment and documentation from R&S:

							
Observe operating instructions	Weight indication for units >18 kg	PE terminal	Ground terminal	Danger! Shock hazard	Warning! Hot surfaces	Ground	Attention! Electrostatic sensitive devices require special care

1. The unit may be used only in the operating conditions and positions specified by the manufacturer. Unless otherwise agreed, the following applies to R&S products:
IP degree of protection 2X, Pollution severity 2, overvoltage category 2, altitude max. 2000 m.
The unit may be operated only from supply networks fused with max. 16 A.
2. For measurements in circuits with voltages $V_{rms} > 30 V$, suitable measures should be taken to avoid any hazards.
(using, for example, appropriate measuring equipment, fusing, current limiting, electrical separation, insulation).
3. If the unit is to be permanently wired, the PE terminal of the unit must first be connected to the PE conductor on site before any other connections are made. Installation and cabling of the unit to be performed only by qualified technical personnel.
4. For permanently installed units without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fused such as to provide suitable protection for the users and equipment.
5. Prior to switching on the unit, it must be ensured that the nominal voltage set on the unit matches the nominal voltage of the AC supply network.
If a different voltage is to be set, the power fuse of the unit may have to be changed accordingly.
6. Units of protection class I with disconnectible AC supply cable and appliance connector may be operated only from a power socket with earthing contact and with the PE conductor connected.
7. It is not permissible to interrupt the PE conductor intentionally, neither in the incoming cable nor on the unit itself as this may cause the unit to become electrically hazardous.
Any extension lines or multiple socket outlets used must be checked for compliance with relevant safety standards at regular intervals.
8. If the unit 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 units without power switches are integrated in racks or systems, a disconnecting device must be provided at system level.
9. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed.
Prior to performing any work on the unit or opening the unit, the latter must be disconnected from the supply network.
Any adjustments, replacements of parts, maintenance or repair may be carried out only by authorized R&S technical personnel.
Only original parts may be used for replacing parts relevant to safety (eg power switches, power transformers, fuses). A safety test must be performed after each replacement of parts relevant to safety.
(visual inspection, PE conductor test, insulation-resistance, leakage-current measurement, functional test).

continued overleaf

Safety Instructions

10. Ensure that the connections with information technology equipment comply with IEC950 / EN60950.
11. Lithium batteries must not be exposed to high temperatures or fire.
Keep batteries away from children.
If the battery is replaced improperly, there is danger of explosion. Only replace the battery by R&S type (see spare part list).
Lithium batteries are suitable for environmentally-friendly disposal or specialized recycling. Dispose them into appropriate containers, only.
Do not short-circuit the battery.
12. Equipment returned or sent in for repair must be packed in the original packing or in packing with electrostatic and mechanical protection.
13. Electrostatics via the connectors may damage the equipment. For the safe handling and operation of the equipment, appropriate measures against electrostatics should be implemented.
14. Any additional safety instructions given in this manual are also to be observed.

1 Installation

You have acquired software option SMIQB43 to go with your Signal Generator SMIQ from Rohde & Schwarz. This option must be enabled by an installation keyword. Please affix the enclosed option label including the installation keyword to the rear panel of the SMIQ since it is required for service and repair. Prerequisites for the installation are hardware options SMIQB10/SMIQB20 (modulation coder) and SMIQB11 (data generator).

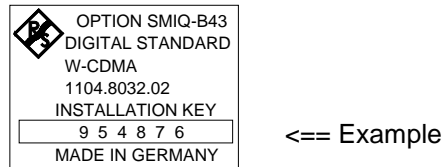


Fig. 1-1 Enclosed option label with a typical keyword

Enabling option:

(see Fig. 1-2)

- Switch on SMIQ.
- Call up menu UTILITIES. (Select it by means of the rollkey, confirm with [SELECT] key).
- Call up menu INSTALL ==> [SELECT].
- Call up menu OPTION TO INSTALL ==> [SELECT].
- Select option SMIQB43 WCDMA ==> [SELECT].
- Read the 6-digit keyword on the option label and enter it into the corresponding field in the INSTALLATION KEY line. Then press the [ENTER] key.
- A message will then be issued to the effect that the keyword has been checked and that the option is being installed.
- For the option to be available the unit has to be switched off and then on again.
- With the installation completed, the wideband CDMA standard can be selected with WCDMA in the DIGITAL STD menu.

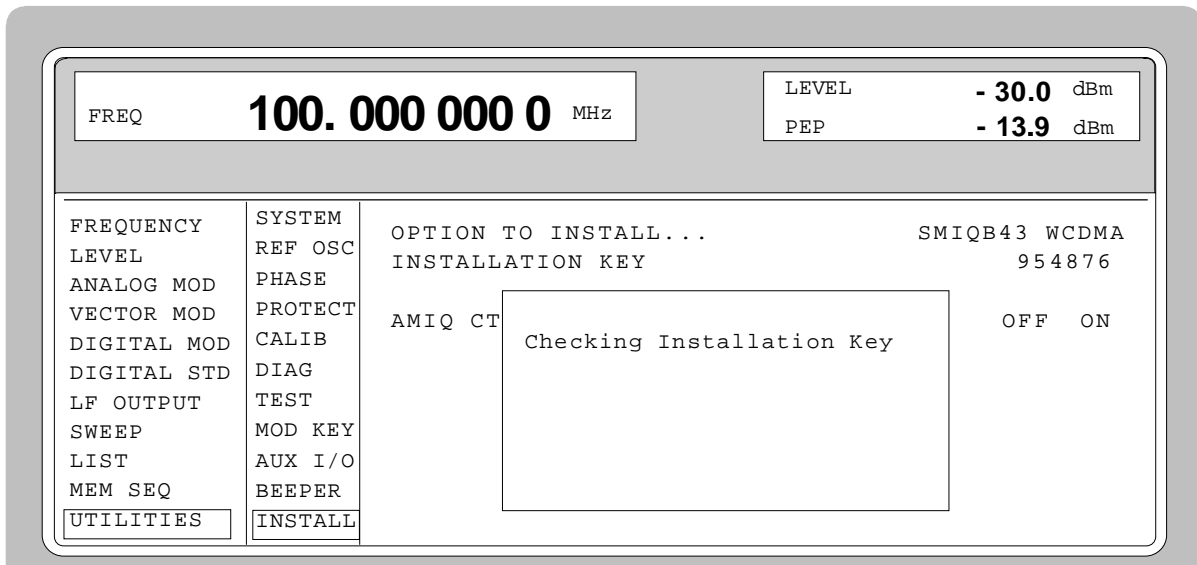


Fig. 1-2 Enabling Option SMIQB43

After installation, the new option can be checked in the module list of the UTILITIES-DIAG-CONFIG menu. In case of any problems contact your Rohde&Schwarz service center.

2 Manual Operation

With the options Modulation Coder (SMIQB10/SMIQB20), Data Generator (SMIQB11) and option Digital Standard W-CDMA (SMIQB43) provided, W-CDMA signals can be generated according to Japanese specifications, especially according to ARIB standard¹.

SMIQ can simulate both the transmit signal of a base station (Downlink), and the transmit signal of a mobile station (Uplink) with up to 15 code channels.

Different physical channel types such as Perch, Common Control or Dedicated Physical Channel can be selected. For this purpose, SMIQ generates modulation data with the frame structure specified in the standard (framed data). Data fields with pilot symbols, TPC symbols (Traffic Power Control) or LMS symbols (Long Code Mask) are automatically generated. Freely programmable data lists or pseudo-random bit sequences (PRBS) can be used for the modulation symbols in the DATA fields. These modulation data are not subjected to any channel coding (convolution coding, interleaving). The user can, however, store channel-coded modulation data in a data list to generate a logic channel, eg a Dedicated Traffic Channel.

The following figure shows the schematic of forward link signal generation.

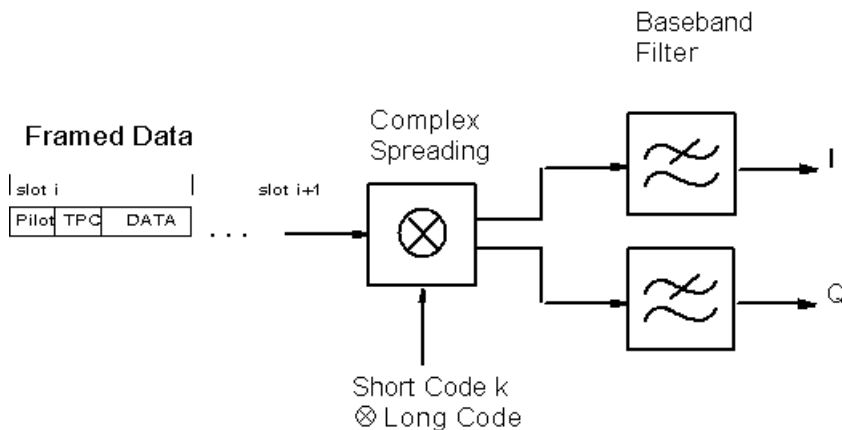


Fig. 2-1 Downlink DPCH signal generation for a code channel

The Perch Channel, DPCH (Dedicated Physical Channel) and CCPCH (Common Control Physical Channel) are available as channel types in the downlink. The data rate for modulation data (framed data) of the DPCH can be selected (32, 64, to 1024 ksymbol/s). The type of modulation is QPSK, but O-QPSK can also be set. A root cosine filter with roll-off factor 0.22 is preset for baseband filtering. Other filters can also be set (MODULATION FILTER). The chip rate is preset to 4.096 Mcps but can be modified within wide limits.

Two modes (LINK DIRECTION/MULTIPLEX) are available to generate an uplink signal. A mobile station transmitter of the Japanese W-CDMA experimental system is simulated in the UP mode. The frame structure of data corresponds to that of the downlink. DPCH and CCPCH are available as channel types.

¹ Association of Radio Industries and Businesses (ARIB), Specifications of Air-Interface for a 3 G Mobile System

A mobile station transmitter in line with the ARIB standard is simulated in the UP_IQ_MULT mode. Separate channel types and data sources for I and Q are available in the multiplex mode.

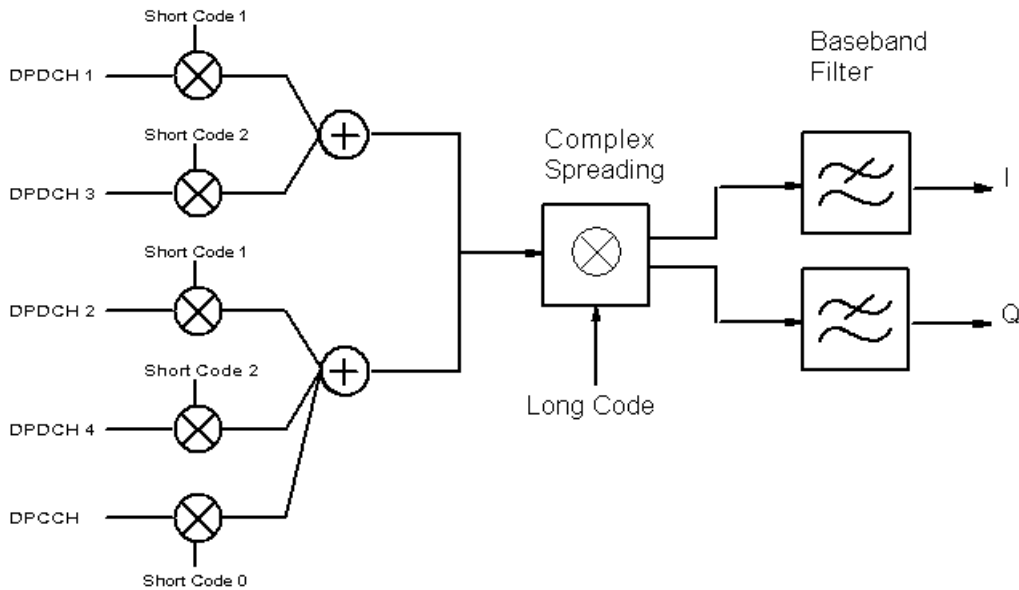


Fig. 2-2 Uplink signal generation with IQ multiplex and several code channels

According to ARIB, DPDCH (Dedicated Physical Data Channel) and DCPCH (Dedicated Control Physical Channel) are available as channel types in the uplink. The data rate for modulation data (framed data) of the DPDCH can be selected (16, 32, 64, to 1024 ksymbol/s).

The modulation data are not calculated in real time in SMIQ. On the user request, a W-CDMA chip sequence is calculated (STATE = ON) and then stored in the data memory of the data generator (option SMIQ B11). The sequence length is settable (SEQUENCE LENGTH [FRAMES]), the maximum possible length depends on the memory capacity of the data generator.

A special multicode mode is available (MULTICODE) for LINK DIRECTION/MULTIPLEX DOWN and UP modes. The data fields Pilot and TPC have the same settings and are spread with the same spreading codes of the MASTER CHANNEL.

2.1 Sync and Trigger Signals

A chip sequence is calculated for the generation of W-CDMA signals and stored in the memory of the data generator (option SMIQB11). This chip sequence can be run repetitively (TRIGGER MODE AUTO). Trigger signals can be used for synchronized measurements on receivers (TRIGGER MODE RETRIG, ARMED_AUTO or ARMED_RETRIG).

A trigger signal can be fed via the TRIGIN input at connector PAR DATA of SMIQ. The chip sequence either starts immediately after the active slope of the trigger signal or after a settable number of chips (EXT TRIGGER DELAY). Retriggering (RETRIG) can be inhibited for a settable number of chips (EXT RETRIGGER INHIBIT).

A trigger event can be executed manually or via the IEC/IEEE bus using EXECUTE TRIGGER. When a trigger event is executed, a trigger signal is output at the TRIGOUT 3 output of SMIQ.

SMIQ generates the following sync signals:

- a 0.625 ms slot clock
- a 10 ms radio frame clock
- a marker signal for identifying the periodic repetition of the generated chip sequence

SMIQ can output two of the three signals via pins TRIGOUT 1 and 2 of connector PAR DATA.

A clock synthesizer on the modulation coder generates the chip clock in the SMIQ. All the clock signals are synchronized to the 10-MHz reference of the SMIQ. The chip clock is available at connector SYMBOL CLOCK. If required, the clock synthesizer in the SMIQ can be synchronized to an external chip clock which is fed in at connector SYMBOL CLOCK.

To allow for a trouble-free synchronization of the clock synthesizer first apply the external clock and set the correct chip rate at SMIQ (MODULATION - CHIPRATE VARIATION). Then switch CLOCK SOURCE from INT to EXT.

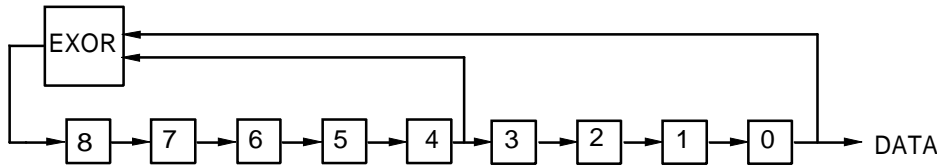
Note: *The set symbol rate should not differ by more than 1% from the symbol rate of the external signal.*

2.2 PN Generators as Internal Data Source

Different PN (Pseudo Noise) generators can be selected as data source for DATA fields. These PN generators provide pseudo random bit sequences of different lengths or periods which is why they are also called PRBS generators (Pseudo Random Binary Sequence).

The data sequences are so-called sequences of maximum lengths that are generated by means of feedback shift registers.

The following schematic shows the 9 bit generator with feedback to registers 4 and 0 (output).



The pseudo random sequence of a PRBS generator is determined by the number of registers and the feedback. The following table describes all available PRBS generators:

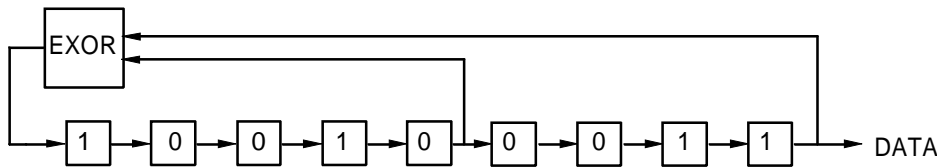
Table 2-1 PN generators

PRBS generator	Length in bits	Feedback to	Start value (*)
9 bits	$2^9 - 1 = 511$	Register 4, 0	Channel 0: 0000 0100 1 Channel 1: 1000 0100 1 Channel 2: 0100 0100 1 Channel 3: 1100 0100 1 ... Channel 15: 1111 0100 1
11 bits	$2^{11} - 1 = 2047$	Register 2, 0	Channel 0: 0000 0100 100 ... Channel 15: 1111 0100 100
15 bits	$2^{15} - 1 = 32767$	Register 1, 0	Channel 0: 0000 0100 1000 000 ... Channel 15: 1111 0100 1000 000
16 bits	$2^{16} - 1 = 65535$	Register 5, 3, 2, 0	Channel 0: 0000 0100 1000 0000 ... Channel 15: 1111 0100 1000 0000

*) the 5th start value bit of channels in Q phase is 1 (for example: channel 3: 1100 1100 1...)

PN generators PN9,11 and PN15 are designed according to CCITT Rec. 0.151/152/153. The output sequence is inverted for generator PN15.

Example: PN9 generator in channel 3 with start value 110001001 (binary)



The resulting output sequence is 110001001100010001000 etc.

2.3 Lists as an Internal Data Source

A freely programmable memory can be used as a data source for DATA or TPC fields. The data are managed in lists. A list editor enables the data lists (DATA LIST) to be selected, copied, modified and erased. The list editor can be accessed via the menu DIGITAL MOD SOURCE...

2.4 Menu W-CDMA Standard

2.4.1 Downlink and Uplink Signals without IQ Multiplex

Menu DIGITAL STD - W-CDMA provides access to settings for W-CDMA signal generation. The figure below shows an example of the menu for generating the downlink signal (transmit signal of the base station) in the 8CHAN mode. The menus for generating uplink signals without IQ multiplex have nearly the same structure. A menu for generating uplink signals with IQ multiplex is shown in the next section. Parameters that are identical for all modes are explained in this section.

Menu selection: DIGITAL STD - WCDMA - MODE - 8CHAN, -LINK DIRECTION/MULTIPLEX DOWN

The screenshot displays the menu for generating a downlink signal in 8CHAN mode. The top section shows the frequency (100.000000 MHz) and power levels (LEVEL: -30.0 dBm, PEP: -14.9 dBm). The WCDMA mode is selected, and the menu is set to DIGITAL STD. The main menu options include FREQUENCY, LEVEL, ANALOG MOD, VECTOR MOD, DIGITAL MOD, DIGITAL STD, LF OUTPUT, SWEEP, LIST, MEM SEQ, and UTILITIES. The DIGITAL STD menu is expanded to show options like PHS IS-95, NADC, PDC, GSM, and DECT. The STATE menu is also expanded to show options like MODE (4CHAN, 8CHAN, 15CHAN), SET DEFAULT, CHIP RATE (4.096 Mcps), LINK DIRECTION/MULTIPLEX (DOWN), MODULATION (QPSK), TRIGGER MODE (RETRIG), EXECUTE TRIGGER, TRIGGER, CLOCK (INT, EXT), TOTAL POWER (-30 dBm), ADJUST TOTAL POWER, SAVE/RECALL SETTINGS (COMING SOON), MULTICODE (OFF), and SEQUENCE LENGTH (FRAMES) (1).

CHNO	TYPE	SYMB RATE [ks/s]	SPREAD CODE	POWER [dB]	DATA	STATE
0	PERCH	16	0	-9.0	PN15	ON
1	DPCH	32	10	-9.0	PN15	ON
2	DPCH	32	11	-9.0	PN15	ON
3	DPCH	32	12	-9.0	PN15	ON
4	DPCH	32	13	-9.0	PN15	ON
5	DPCH	32	14	-9.0	PN15	ON
6	DPCH	32	15	-9.0	PN15	ON
7	DPCH	32	16	-9.0	PN15	ON

Fig. 2-3 Menu DIGITAL STD - WCDMA - MODE - 8CHAN, LINK DIRECTION/MULTIPLEX - DOWN, equipped with options modulation coder, data generator and SMIQB43

STATE	<p>Switch on/off of modulation Digital Standard W-CDMA. Vector modulation and digital modulation will be switched off automatically.</p> <p>STATE = ON starts the calculation of a chip sequence based on the current settings. The length of the chip sequence and therefore the duration of calculation are determined by parameter SEQUENCE LENGTH.</p> <p>IEC/IEEE-bus command : SOUR:WCDM:STAT ON</p>
MODE...	<p>Opens a window for selecting from the different modes to determine the number of code channels.</p> <p>The physical channel type (TYPE), the symbol rate, some spreading parameters (SPREAD CODE) and the source for modulation data (DATA) can be separately defined for each channel. Each channel can be switched on or off (STATE).</p>
4CHAN	<p>Activates the generation of a signal with up to 4 code channels (channel No. 0 to 3). The relative power (POWER) of the channels can be freely determined in range -30 dB to 0 dB.</p> <p>IEC/IEEE-bus : SOUR:WCDM:MODE CHAN4</p>
8CHAN	<p>Activates the generation of a signal with up to 8 code channels (channel No. 0 to 7). The relative power (POWER) of channel 0 can be freely determined in range -30 dB to 0 dB. The power setting of channel 1 also determines the power setting of channels 2 to 7. This means that channels 1 to 7 all have the same power provided when the channels are switched on.</p> <p>IEC/IEEE-bus : SOUR:WCDM:MODE CHAN8</p>
15CHAN	<p>Activates the generation of a signal with up to 15 code channels (channel No. 0 to 14). The relative power of channels cannot be freely defined since all activated code channels have the same power. The relative power is displayed (POWER).</p> <p>IEC/IEEE-bus : SOUR:WCDM:MODE CHAN15</p>

SET DEFAULT ►

Provides the default setting for W-CDMA.

For LINK DIRECTION/MULTIPLEX DOWN

- in mode 8, channel 0 is a Perch channel, it is switched on and its symbol rate is 16 ksymbol/s
- all other channels are also switched on (STATE ON), channel type (TYPE) is DPCH, symbol rate is 32 ksymbol/s
- the channels have the same relative power (POWER)
- the data are pseudo random (PN15), except for Perch channel, a data offset of three times the channel number ($3 \cdot \text{CHNO}$) is set.

For LINK DIRECTION/MULTIPLEX UP

- only channel 0 is switched on, channel type is DPCH, symbol rate is 32 ksymbol/s
- the data are pseudo random (PN15), no data offset is set.

For LINK DIRECTION/MULTIPLEX UP_IQ_MULT

- all channels are switched on except I-channel 0 in mode 8
- Q-channel 0 is configured as DPCCH, all the other channels are configured as DPDCH with a symbol rate of 16 ksymbol/s
- all channels have the same relative power (POWER)
- the data are pseudo random (PN15), no data offset is set.

IEC/IEEE-bus : SOUR : WCDM : PRES

CHIP RATE

Selection between 4.096 Mcps and 8.192 Mcps. Selecting 8.192 Mcps depends on the hardware configuration of the unit and is not offered yet. Selecting CHIP RATE has an effect on the generation of spreading codes and thus on the calculated chip sequence.

IEC/IEEE-bus : SOUR : WCDM : CRAT R4M

**LINK DIRECTION/
MULTIPLEX**

Opens a window for selecting the type of transmit signal from the different modes.

DOWN

Activates the generation of a downlink signal. In this mode, the transmit signal of a base station can be generated in line with the Japanese ARIB standard or according to NTTDoCoMo specifications for an experimental system.

IEC/IEEE-bus : SOUR : WCDM : LINK DOWN

UP

Activates the generation of an uplink signal. In this mode, the transmit signal of a mobile station can be generated in line with the NTTDoCoMo specifications for an experimental system.

IEC/IEEE-bus : SOUR : WCDM : LINK UP

UP_IQ_MULT

Activates the generation of an uplink signal with a multiplex mode for the I and Q channel. Separate channel types and data sources are available for I and Q. In this mode, the transmit signal of a mobile station can be generated in line with the Japanese ARIB standard.

IEC/IEEE-bus : SOUR : WCDMA : LINK UPM

MODULATION... Opens a window for setting the modulation parameters.

Menu selection: DIGITAL STD - WCDMA - MODULATION...

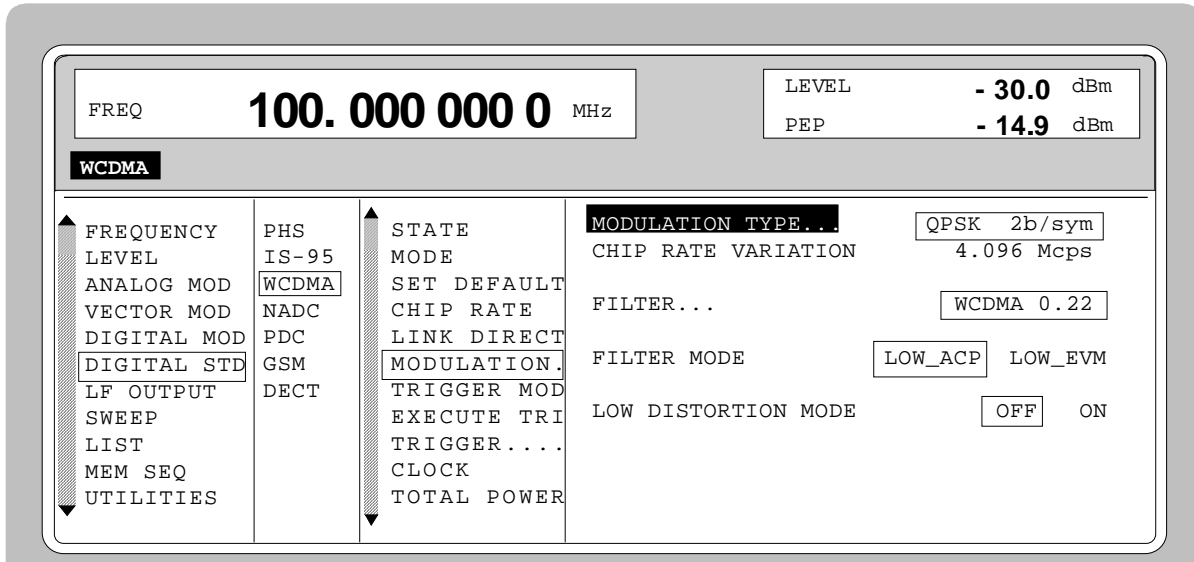


Fig. 2-4 Menu DIGITAL STD - WCDMA - MODULATION..., equipped with options modulation coder, data generator and SMIQB43

MODULATION...	MODULATION TYPE	Selection between the types of modulation QPSK and offset QPSK. IEC/IEEE-bus : SOUR:WCDM:FORM QPSK
	CHIP RATE VARIATION	Setting value for the chip clock frequency. The value for CHIPRATE from the main menu is preset. CHIP RATE VARIATION modifies the output clock and the modulation bandwidth as well as the output synchronization signals. It has no effect on the calculated chip sequence. IEC/IEEE-bus : SOUR:WCDM:CRAT:VAR 4096001
	FILTER...	Opens a window for selecting the baseband filter. Selection can be made between a filter optimized for W-CDMA and the standard Nyquist filters COS and SQRCOS. The optimized root cosine filter WCDMA 0.22 is preset. Its roll-off factor is fixed to 0.22. IEC/IEEE-bus : SOUR:WCDM:FILT:TYPE WCDM
	ROLL OFF FACTOR	Setting value of roll-off factor. The setting is only possible provided that a COS or SQRCOS filter is selected under FILTER. IEC/IEEE-bus : SOUR:WCDM:FILT:PAR 0.22

(MODULATION...)	FILTER MODE	<p>Selection of filter mode.</p> <p>LOW_ACP Filter for minimum <u>A</u>djacent <u>C</u>hannel <u>P</u>ower.</p> <p>IEC/IEEE-bus command : SOUR:WCDM:FILT:MODE LACP</p> <p>LOW_EVM Filter for minimum vector error.</p> <p>IEC/IEEE-bus command : SOUR:WCDM:FILT:MODE LEVM</p>
	LOW DISTORTION MODE	<p>Switch on/off of low-distortion mode. After switch-on, the level of the IQ baseband signals is reduced by 3 dB. In some cases, this might reduce undesired intermodulation products. OFF is normally the more favourable setting.</p> <p>IEC/IEEE-bus : SOUR:WCDM:LDIS:STAT OFF</p>
TRIGGER MODE	Opens a window for selecting the W-CDMA sequence.	
	AUTO	<p>The calculated W-CDMA chip sequence is cyclically repeated.</p> <p>IEC/IEEE-bus command : SOUR:WCDM:SEQ AUTO</p>
	RETRIG	<p>The W-CDMA chip sequence is continuously repeated. A trigger event causes a restart from frame 1.</p> <p>IEC/IEEE-bus command : SOUR:WCDM:SEQ RETR</p>
	ARMED_AUTO	<p>The W-CDMA chip sequence cannot be started from frame 1 until a trigger event has occurred. The unit then automatically switches over to the AUTO mode and can no longer be triggered.</p> <p>IEC/IEEE-bus command : SOUR:WCDM:SEQ AAUT</p>
	ARMED_RETRIG	<p>The W-CDMA chip sequence cannot be started from frame 1 until a trigger event has occurred. each new trigger event causes a restart.</p> <p>IEC/IEEE-bus command : SOUR:WCDM:SEQ ARET</p>
EXECUTE TRIGGER ►	Executes a trigger event to start the W-CDMA chip sequence.	
		IEC/IEEE-bus command : TRIG:DM:IMM
TRIGGER...	Opens a window for selecting the trigger source, for configuring the trigger output signals and for setting the time delay of an external trigger signal.	

Menu selection: DIGITAL STD - WCDMA - TRIGGER...

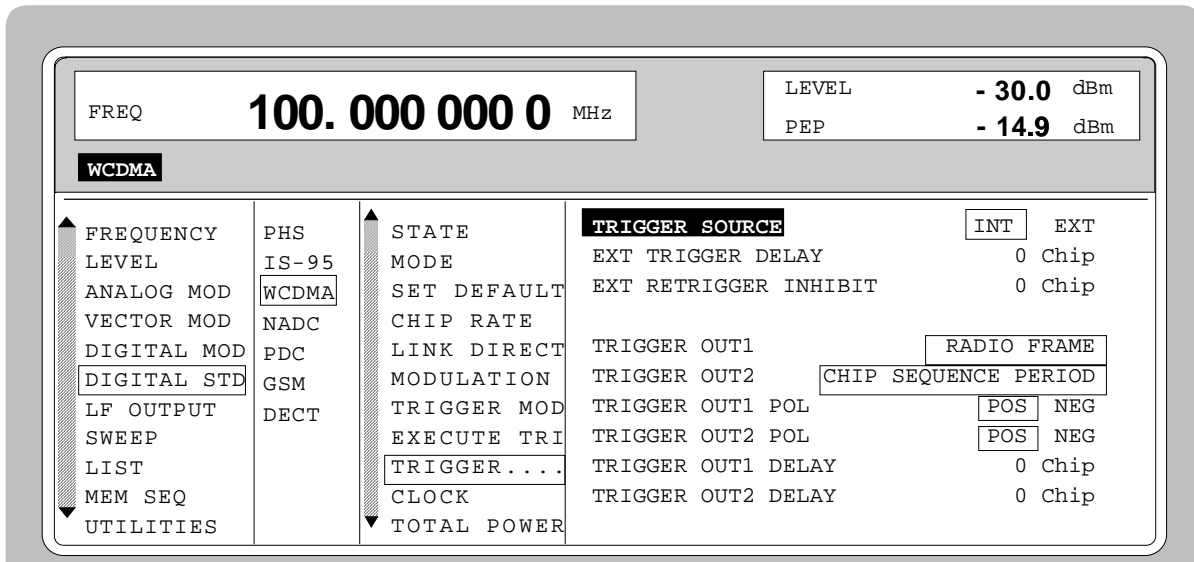


Fig. 2-5 Menu DIGITAL STD - WCDMA - TRIGGER..., equipped with options modulation coder, data generator and SMIQB43

TRIGGER...	TRIGGER SOURCE	<p>Selection of trigger source.</p> <p>EXT The W-CDMA chip sequence is started from frame 1 by means of the active slope of an external trigger signal. The polarity, the trigger threshold and the input resistance of the TRIGIN input can be modified in menu DIGITAL MOD - EXT INPUTS.</p> <p>INT A trigger event is manually executed by EXECUTE TRIGGER.</p> <p>IEC/IEEE-bus : SOUR:WCDM:TRIG:SOUR EXT</p>
	EXT TRIGGER DELAY	<p>Setting the number of chips by which an external trigger signal is delayed before it starts the W-CDMA chip sequence. This is used for setting the time synchronicity between the DUT and other units.</p> <p>IEC/IEEE-bus : SOUR:WCDM:TRIG:DEL 3</p>
	EXT RETRIGGER INHIBIT	<p>Setting the number of chips for which a restart is inhibited after a trigger event. With TRIGGER MODE RETRIG selected, each new trigger signal restarts the W-CDMA chip sequence. This restart can be inhibited for the entered number of chips.</p> <p>Example: The entry of 82000 chips, for example, causes new trigger signals to be ignored for the duration of 82000 chips after a trigger event.</p> <p>IEC/IEEE-bus : SOUR:WCDM:TRIG:INH 82000</p>

(TRIGGER...)	TRIGGER OUT 1/2	<p>Selection of signals for outputs TRIGOUT 1 and TRIGOUT 2 of connector PARDATA. The time specifications are valid only if the frequency of the internal clock generation is not modified with the parameter CHIP RATE VARIATION.</p>
		<p>SLOT 0.625 ms time slot clock IEC/IEEE-bus : : SOUR:WCDM:TRIG:OUTP1 SLOT</p>
		<p>RADIO FRAME 10 ms frame clock IEC/IEEE-bus : : SOUR:WCDM:TRIG:OUTP1 RFR</p>
		<p>CHIP SEQUENCE PERIOD Marker signal for identifying the periodic repetition of the generated chip sequence IEC/IEEE-bus : : SOUR:WCDM:TRIG:OUTP1 CSP</p>
	TRIGGER OUT 1/2 POL	<p>Selection of signal polarity at outputs TRIGOUT 1 and TRIGOUT 2 of the PARDATA connector. IEC/IEEE-bus : SOUR:WCDM:OUTP2:POL POS</p>
	TRIGGER OUT 1/2 DELAY	<p>Setting the number of chips by which the selected trigger signal is delayed. IEC/IEEE-bus : SOUR:WCDM:OUTP2:DEL 0</p>
CLOCK...		<p>Enables the selection of the clock source of the chip clock.</p> <p>INT SMIQ uses internally generated clock signals.</p> <p>EXT A chip clock should externally be applied to connector SYMBOL CLOCK. Parameter CHIP RATE should be correctly set with a precision of ± 1 %. The polarity, the trigger threshold and the input resistance of the SYMBOL CLOCK input can be modified in menu DIGITAL MOD - EXT INPUTS.</p> <p>IEC/IEEE-bus : SOUR:WCDM:CLOC: SOUR INT</p>
TOTAL POWER		<p>Display of the total power of all active code channels. The TOTAL POWER is calculated when the modulation is active (STATE = ON). It is the sum of the channel power of all active channels. If the value is not equal 0 dB then all active channel power were internally adjusted so that the total power equals 0 dB (the power relation between single code channels is not affected!) This is necessary to keep the setted output power (LEVEL) constant. In addition to this average power (LEVEL) the peak envelope power (PEP) is also indicated in the header of the display. The value for PEP is calculated based on a worst case. The actual peak powers are mostly smaller.</p> <p>IEC/IEEE-bus command : SOUR:WCDM:POW?</p>

ADJUST TOTAL POWER ► Changes the power values of all activated code channels. After this adjustment the total power is 0 dB. The power relation between single active code channels is not affected.

IEC/IEEE-bus command : SOUR:WCDM:POW:ADJ

Menu selection: DIGITAL STD - WCDMA - MULTICODE...

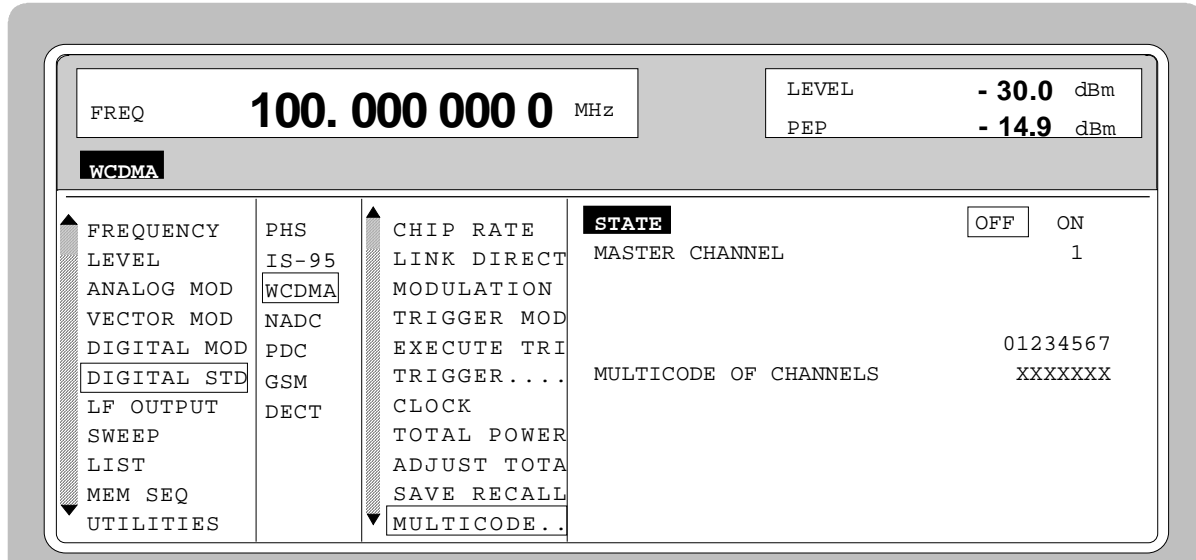


Fig. 2-6 Menu DIGITAL STD - WCDMA - MULTICODE..., equipped with options modulation coder, data generator and SMIQB43

MULTICODE... Opens a window for selecting multicode settings. The multicode mode cannot be activated in the LINK DIRECTION/MULTIPLEX UP-IQ_MULT mode. In the multicode mode, the data fields Pilot and TPC have the same settings and are spread with the same spread codes of the MASTER CHANNEL for all selected code channels.

STATE Switch on/off the multicode mode.
IEC/IEEE-bus : SOUR:WCDM:MULT:STAT ON

MASTER CHANNEL Selection of the master channel. This channel defines spread code and contents for data fields Pilot and TPC in all multicode channels. The selection also causes that parameters LONG CODE INIT, LONG CODE OFFSET, SYMBOL RATE and DATA OFFSET of the selected multicode channels are set to the same values as the master channel.
IEC/IEEE-bus : SOUR:WCDM:MULT:MAST 1

MULTICODE OF CHANNELS Selection of the channels for multicode transmission. The selected channels are marked with an X.
IEC/IEEE-bus : SOUR:WCDM:MULT:CHAN #H1ED3

SEQUENCE LENGTH [FRAMES] Defines the length of the calculated chip sequence in number of frames.
IEC/IEEE-bus command : SOUR : WCDM : SLEN 4

CHNO Column title for the display of the number of the channel for which the settings of the corresponding line are valid. The other columns can be selected with "=>" and "<=".

TYPE Opens a window for selecting the channel type.

PERCH Perch 1-channel with Pilot, DATA and LMS data field. Selection is possible with LINK DIRECTION - DOWN.

CCPCH Common Control Physical Channel with Pilot and DATA field. Selection is possible with LINK DIRECTION - DOWN and UP.

DPCH Dedicated Control Physical Channel with Pilot, TPC and DATA field. Selection is possible with LINK DIRECTION - DOWN and UP.

ALLD All data channel type only with DATA field. Selection is possible with LINK DIRECTION - DOWN and UP.

IEC/IEEE-bus command : SOUR : WCDM : CHAN4 : DPCH

SYMBOL RATE Opens a window for selecting the symbol rate. The admissible selection depends on the channel type selected (TYPE). The possible values are represented in the following table:

TYPE	SYMBOL RATE kS/s
PERCH	16
CCPCH	64
DPCH	32, 64, 128, 256, 512, 1024
DPDCH	16, 32, 64, 128, 256, 512, 1024
DPCCH	16
ALLD	16, 32, 64, 128, 256, 512, 1024

IEC/IEEE-bus command : SOUR : WCDM : CHAN4 : SRAT D64

Menu selection: DIGITAL STD - WCDMA - SPREAD CODE

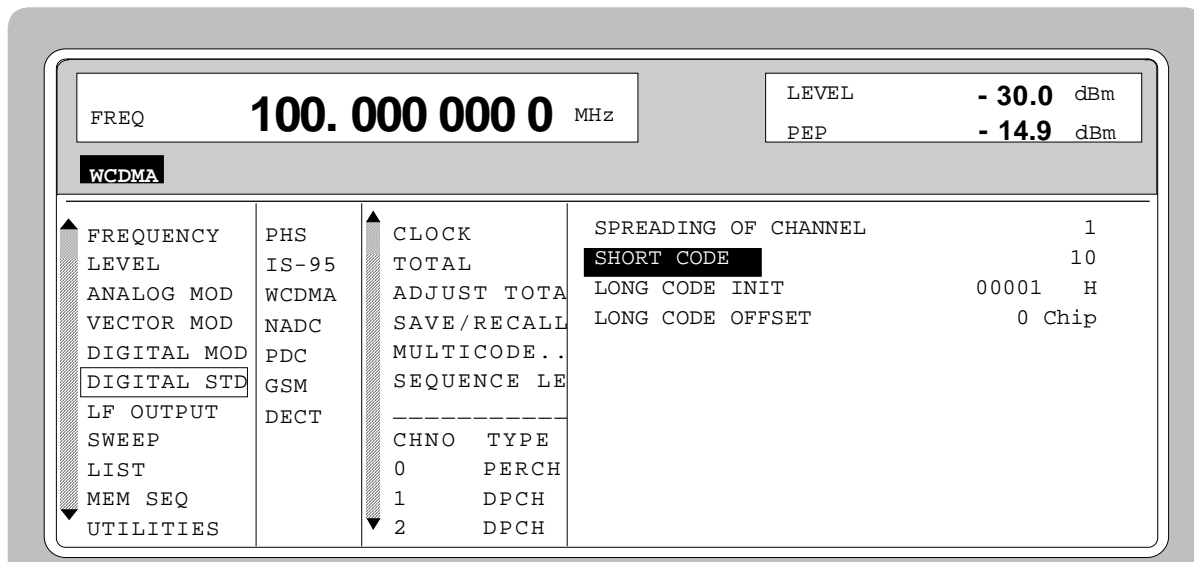


Fig. 2-7 Menu DIGITAL STD - WCDMA - SPREAD CODE; equipped with options modulation coder, data generator and SMIQB43

SPREAD CODE

Opens a window for the spread code settings. The first line of the window indicates the code channel for which the settings are done (SPREADING OF CHANNEL NO).

SHORT CODE

Entry value for the short code index. The upper limit depends on parameters CHIP RATE, SYMBOL RATE as well as on the channel type.

IEC/IEEE : SOUR:WCDM:CHAN4:SCOD 12

LONG CODE INIT

Entry value for initializing the long code generator in hexadecimal notation.

IEC/IEEE : SOUR: WCDM:CHAN4:LCOD #HFFF

LONG CODE OFFSET

Entry value for a time shift of the long code with respect to the data symbols in units of chip duration.

IEC/IEEE : SOUR:WCDM:CHAN4:LCOD:OFFS 1

LMS SHORT CODE

Entry value for the short code index used for spreading the long code mask symbols (LMS) of the Perch channel.

IEC/IEEE : SOUR:WCDM:CHAN4:SCOD:LMS #HFF

POWER

Input value for channel power.

POWER indicates the average power of the code channel relative to the power indicated in LEVEL display (code domain power).

For MODE - 4CHAN

- the power of channels 0, 1, 2 and 3 is set separately.

For MODE - 8CHAN

- the power of channel 0 is set separately.
- the other channels have the same power. The power for all the channels is set, for instant, in channel 1.

For MODE - 15CHAN

- Since all channels have the same power, they cannot be set. POWER is only a display parameter in this case.

When this value is modified, the value of TOTAL POWER is automatically adapted.

IEC/IEEE-bus command : SOUR:WCDM:CHAN4:POW -3

Menu selection: DIGITAL STD - WCDMA - DATA

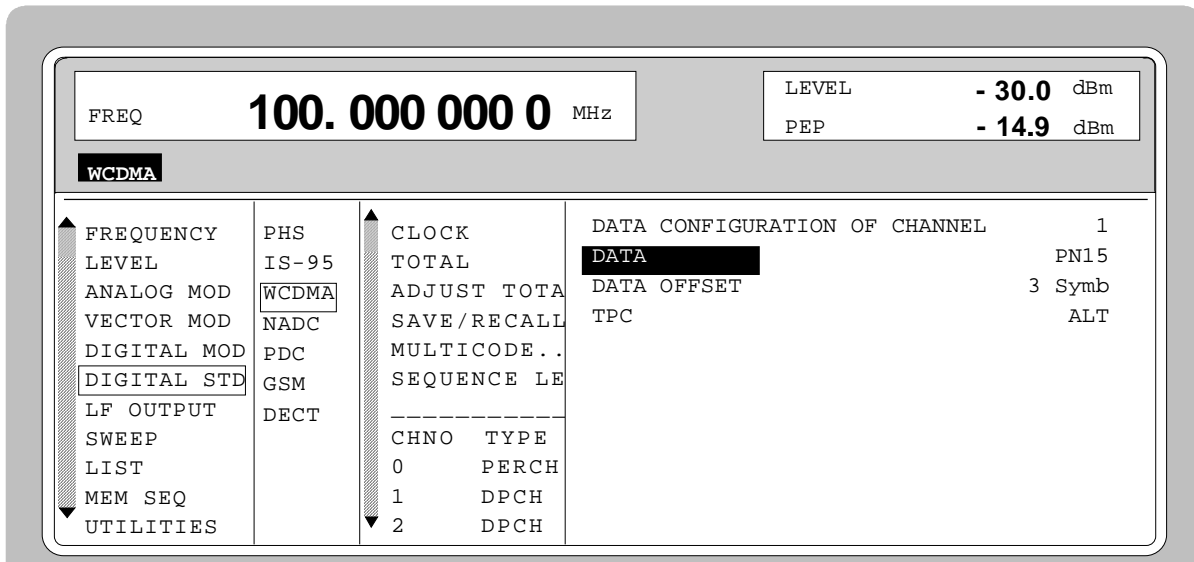


Fig. 2-8 Menu DIGITAL STD - WCDMA - DATA; equipped with options modulation coder, data generator and SMIQB43

DATA...

Opens a window for selecting data sources and setting a data offset. The first line of the window indicates the code channel for which the settings are done (DATA CONFIGURATION OF CHANNEL NO).

(DATA...)	DATA	<p>Selection of the data source for the DATA field of the selected channel type. The data from the selected data source are permanently continued from slot to slot in the data field.</p> <p>PN.. PRBS data to CCITT with period lengths between 29-1 and 216-1.</p> <p>DLIST Data from a list previously programmed and stored. Programming is performed in the menu DIGITAL MOD - SOURCE - EDIT DATA LIST</p> <p>IEC/IEEE-bus : SOUR:WCDM:CHAN4:DATA PN9</p>
	DATA OFFSET	<p>Entry value for a data offset in units of symbol duration. The admissible range is as large as the length of a radio frame. The entry of a data offset shifts in time the modulation data with respect to the spread code.</p> <p>IEC/IEEE-bus : SOUR:WCDM:CHAN4:DATA:OFFS 3</p>
	TPC	<p>Selection of the data source for the TPC field in channel types DPCH and DPCCh.</p> <p>0 0 data are continuously generated</p> <p>1 1 data are continuously generated</p> <p>ALT The TPC field is alternately assigned with 1 or 0 from slot to slot. (The first slot contains 1 data).</p> <p>DLIST Data from a list previously programmed and stored. Programming is performed in the menu DIGITAL MOD - SOURCE - EDIT DATA LIST</p> <p>IEC/IEEE-bus : SOUR:WCDM:CHAN4:TPC ZERO</p>
STATE		<p>Switch on/off of assigned code channel.</p> <p>IEC/IEEE-bus command : SOUR:WCDM:CHAN4:STAT ON</p>

2.4.2 Uplink Signals with IQ Multiplex

The settings for generating W-CDMA signals can be accessed via the menu DIGITAL STD - W-CDMA. The figure below shows the menu for generating the uplink signal with multiplex mode for the I and Q channel in the 8CHAN mode. The previous section shows the menu for generating the up and downlink signals without IQ multiplex as well as the parameters which are identical for all modes.

Selection: DIGITAL STD - WCDMA- MODE -8CHAN, -LINK DIRECTION/MULTIPLEX - UP_IQ_MULT

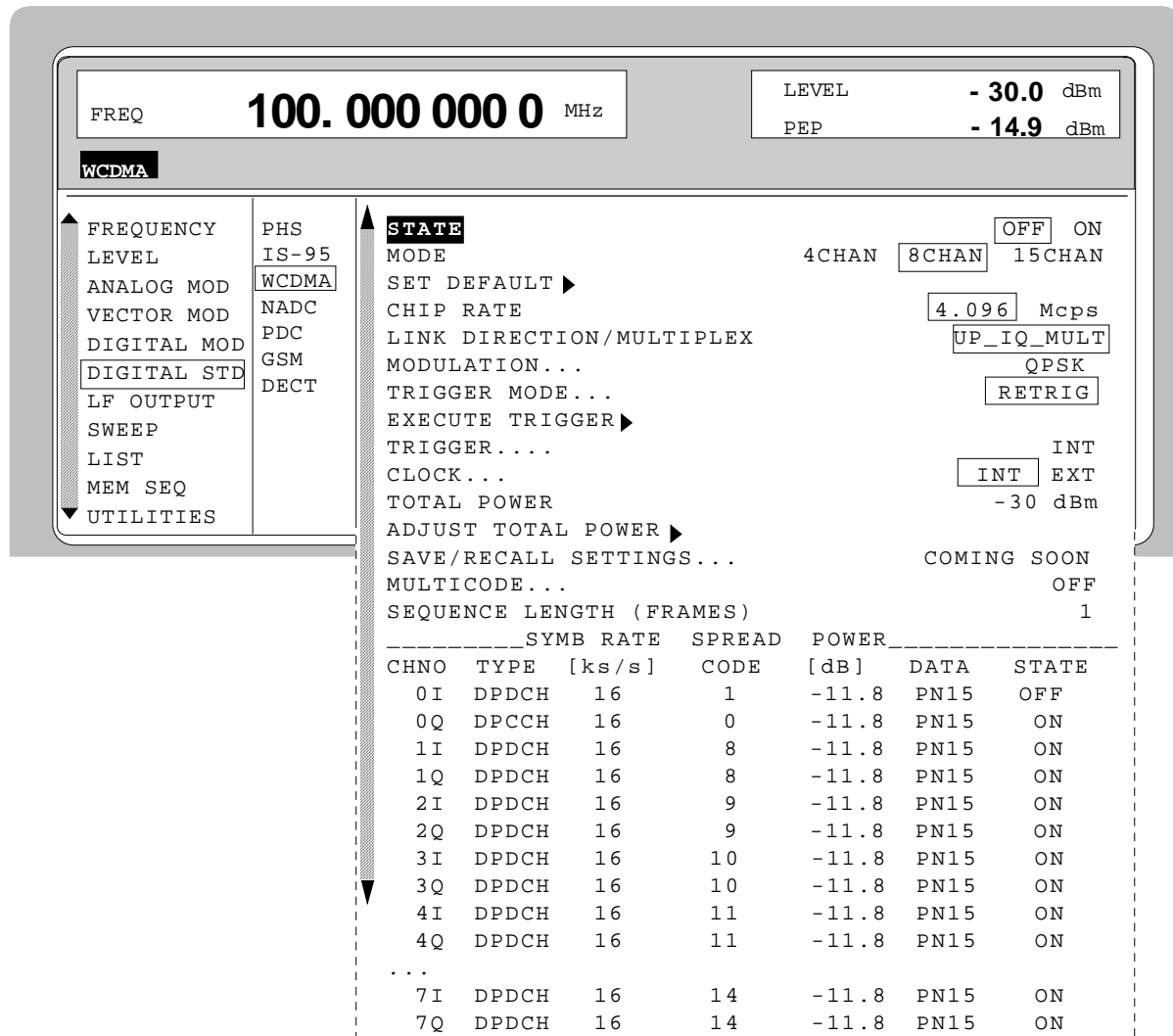


Fig. 2-9 Menu DIGITAL STD - WCDMA - MODE - 8CHAN, -LINK DIRECTION/MULTIPLEX - UP_IQ_MULT, equipped with options modulation coder, data generator and SMIQB43

Parameters STATE to SEQUENCE LENGTH see section "Downlink and Uplink Signals without IQ Multiplex"

- CHNO**
- I Column title for the display of channel numbers.
 - I Line for the parameters of the I channel
 - Q Line for the parameters of the Q channel

TYPE	<p>Opens a window for selecting the channel type. The channel type can be separately set for the I and Q channel.</p> <p>DPDCH Dedicated Physical Data Channel with data field DATA</p> <p>DPCCH Dedicated Physical Control Channel with data field Pilot and TPC</p> <p>IEC/IEEE-bus command : SOUR:WCDM:CHAN4:I:TYPE DPCC</p>
SYMBOL RATE	<p>Opens a window for selecting the symbol rate. The admissible selection depends on the channel type selected (TYPE). Possible values for DPDCH are 16, 32, 64, 128, 256, 512 and 1024 ksymbol/s (ksymbols per second). The DPDCH type has a fixed symbol rate of 16 ksymbol/s. The symbol rate can be separately set for the I and Q channel.</p> <p>IEC/IEEE-bus command : SOUR:WCDM:CHAN4:I:SRAT D16</p>
SPREAD CODE	<p>Opens a window for the spread code settings. The first line of the window indicates the code channel for which the settings are done (SPREADING OF CHANNEL NO).</p> <p>The long code settings are valid in common for the I and Q channel. For the short code of I and Q separate settings are possible within a channel number line.</p> <p>SHORT CODE Entry value for the short code index. The upper limit depends on parameters CHIP RATE, SYMBOL RATE. IEC/IEEE : SOUR:WCDM:CHAN4:I:SCOD 9</p> <p>LONG CODE INIT Entry value for initializing the long code generator in hexadecimal notation. IEC/IEEE : SOUR:WCDM:CHAN4:I:LCOD #H1</p> <p>LONG CODE OFFSET Entry value for a time shift of the long code with respect to the data symbols in units of chip duration. IEC/IEEE : SOUR:WCDM:CHAN4:I:LCOD:OFFS 5</p>
POWER	<p>Input value for channel power.</p> <p>POWER indicates the average power of the I or Q code channel component in relation to the power indicated in the LEVEL display (Code Domain Power).</p> <p>The setting values for the I and Q code channels having the same channel number should always be identical.</p> <p>For MODE - 4CHAN</p> <ul style="list-style-type: none"> - the power of channels 0, 1, 2 and 3 is set separately. <p>For MODE - 8CHAN</p> <ul style="list-style-type: none"> - the power of channel 0 is set separately. - the other channels have the same power. The power for all the channels is set, for instant, in channel 1. <p>For MODE - 15CHAN</p> <ul style="list-style-type: none"> - Since all channels have the same power, they cannot be set. POWER is only a display parameter in this case. <p>When this value is modified, the value of TOTAL POWER is automatically adapted if STATE = ON.</p> <p>IEC/IEEE-bus command : SOUR:WCDM:CHAN4:I:POW -6</p>

DATA... Opens a window for selecting data sources and setting a data offset. The first line of the window indicates the code channel for which the settings are done (DATA CONFIGURATION OF CHANNEL NO). The data source, the data offset and TPC can be separately set for the I and Q channel.

DATA Selection of the data source for the DATA field of a DPDCH channel.

PN.. PRBS data to CCITT with period lengths between 2^9-1 and $2^{16}-1$.

DLIST Data from a list previously programmed and stored. Programming is performed in the menu DIGITAL MOD - SOURCE - EDIT DATA LIST

IEC/IEEE-bus : SOUR : WCDM : CHAN4 : I : DATA PN15

DATA OFFSET Entry value for a data offset in units of symbol duration. The admissible range is as large as the length of a radio frame. The entry of a data offset shifts in time the modulation data with respect to the spread code.

IEC/IEEE-bus : SOUR : WCDM : CHAN4 : I : DATA : OFFS 2

TPC Selection of the data source for the TPC field of a DPDCH channel.

0 0 data are continuously generated

1 1 data are continuously generated

ALT The TPC field is alternately assigned with 1 or 0 from slot to slot. (The first slot contains 1 data).

DLIST Data from a list previously programmed and stored. Programming is performed in the menu DIGITAL MOD - SOURCE - EDIT DATA LIST

IEC/IEEE-bus : SOUR : WCDM : CHAN4 : I : TPC ZERO

STATE Activation or deactivation of the I or Q component of the assigned code channel. The I or Q component of channels with common power-up should always have the same state ON or OFF.

IEC/IEEE-bus command : SOUR : WCDM : CHAN4 : I : STAT ON

3 Remote Control

3.1 Description of IEC/IEEE-Bus Commands

3.1.1 SOURce:WCDMA Subsystem

Note: #H0 to #HF are numerals which are entered in alphanumerical hex syntax in manual operation. SCPI (and IEEE 488.2) allow the octal and binary entry for non-decimal numbers in the following form

#H|h <0...9, A|a...F|f>,

#Q|q <0...7> and

#B|b <0|1>.

However, the hex format is always used for the output generated by a query.

Command	Parameter	Default Unit	Remark
[:SOURce]			
:WCDMA			
:STATe	ON OFF		
:MODE	CHAN4 CHAN8 CHAN15		
:PRESet	(without)		
:CRATe	R4M R8M		
:LINK	DOWN UP UPMulti		
:FORMat	QPSK OQPSK		
:CRATe			
:VARIation	100cps to 7.5Mcps		
:FILTer			
:TYPE	SCOSine COSine WCDMA		
:PARAmeter	0.1 to 0.7		
:MODE	LACP LEVM		
:LDISortion			
[:STATe]	ON OFF		
:SEQUence	AUTO RETRigger AAUTo ARETrigger		
:TRIGger			
:SOURce	EXTernal INTernal		
:INHibit	0 to 67108863		
:DELay	0 to 65535		
:OUTPut[1] 2	SLOT RFRame CSPeriod		
:DELay	0 to 40959 (81919)		
:POLarity	POSitive NEGative		
:CLOCK			
:SOURce	INTernal EXTernal		
:POWER?		dBm	query only
:ADJust	(without)		

Command	Parameter	Default Unit	Remark
:MULTicode :STATe :MASTer :CHANnels :SLENgth :CHANnel<0..14> [:I] :Q :TYPE :SRATe :SCODe :LCODe :OFFSet :SCODe :LMS [:I] :Q :POWer :DATA :DLISt :OFFSet :TPC :DLISt :STATe	ON OFF 0 to 3 #H0 to #H7FFF 1 to 256 PERCh CCPCh DPCh DPDCh DPCCh ALLD D16 D32 D64 D128 D256 D512 D1024 0 to 511 #H0 to #H3FFFF (#H1FFFFFFFF) 0 to 40959 (81919) #H0 to #HFF	dB	

Note: The calculation of the W-CDMA sequences is rather time-consuming and should be re-started for any new setting. The WCDMA modulation is therefore switched off for each command (autom. WCDM:STAT OFF performed). The user can then perform several settings without any delay and has to switch on again the WCDMA modulation (with WCDM:STAT ON). The calculations are performed and the previous settings are effective after the command is given.

[:SOURce]:WCDMa:STATe ON | OFF

The command switches on the modulation in line with the W-CDMA procedure (ARIB standard). Option SMIQB43 is required for this purpose. All other standards that are switched on or the digital modulation are automatically switched to off state.

Caution: The command with ON should be used after any :WCDM command or after a series of WCDM commands in order to activate the previous settings.

Example: :SOUR:WCDM:STAT ON

*RST value is OFF

[:SOURce]:WCDMa:MODE CHAN4 | CHAN8 | CHAN15

The command selects the number of code channels. The limitations for setting the power of different channels thus become effective.

Example: :SOUR:WCDM:MODE CHAN4

*RST value is CHAN8

[[:SOURce]:WCDMa:PRESet

The command sets all the following settings to a defined initial state (as after *RST). This ensures that a signal is actually generated and that it is in line with the standard. This command triggers an event and hence has no *RST value and no query.

Example: :SOUR:WCDM:PRES

[[:SOURce]:WCDMa:CRATe R4M | R8M

The command sets the chip rate (4.096M or 8.192Mcps). R8M is possible only with a certain hardware configuration.

Example: :SOUR:WCDM:CRAT R4M *RST value is R4M

[[:SOURce]:WCDMa:LINK DOWN | UP | UPMulti

The command selects the mode of the transmitted signal.

Example: :SOUR:WCDM:LINK UPM *RST value is DOWN

[[:SOURce]:WCDMa:FORMat QPSK | OQPSK

The command selects the type of modulation (OQPSK: Offset QPSK).

Example: :SOUR:WCDM:FORM OQPSK *RST value is QPSK

[[:SOURce]:WCDMa:CRATe:VARiation 100cps to 7.5Mcps

The command selects the modification of the chip-clock frequency set with :WCDM:CRAT R4M | R8M.

Example: :SOUR:WCDM:CRAT:VAR 1.2M *RST value is 4.096M

[[:SOURce]:WCDMa:FILTer

The commands for selecting the baseband filter are under this node.

[[:SOURce]:WCDMa:FILTer:TYPE SCOSine | COSine | WCDMa

The command selects the type of filter.

SCOSine Square root cosine (root Nyquist) filter

COSine Cosinus (Nyquist) filter

WCDMa Root Nyquist filter with fixed roll-off factor 0.22

Example: :SOUR:WCDM:FILT:TYP COS *RST value is WCDM

[[:SOURce]:WCDMa:FILTer:PARAmeter 0.1 to 0.7

The command sets the roll-off factor for the COS filters.

Example: :SOUR:WCDMa:FILT:PAR 0.5 *RST value is 0.22

[[:SOURce]:WCDMa:FILTer:MODE LACP | LEVM

This command selects one of the "L"ow filter modes.

Example: :SOUR:WCDM:FILT:MODE LEVM *RST value is LACP

[[:SOURce]:WCDMa:LDISortion[:STATe] ON | OFF

The command sets the reduced level for the low-distortion mode.

ON Low-distortion mode
OFF Normal level

Example: :SOUR:WCDM:LDIS ON

*RST value is OFF

[[:SOURce]:WCDMa:SEQuence AUTO | RETRigger | AAUTo | ARETrigger

The command selects the trigger mode for the W-CDMA sequence.

AUTO Continuously repeated
RETRigger Continuously repeated; new start after a trigger
AAUTo ARMED AUTO; waits for trigger, then switches over to AUTO and can no longer be triggered
ARETrigger ARMED RETRIG; a trigger event is required to start, each new trigger causes a restart

Example: :SOUR:WCDM:SEQ AAUT

*RST value is RETR

[[:SOURce]:WCDMa:TRIGger:SOURce EXTernal | INTernal

The command selects the trigger source. With INT selected, triggering is via remote control using the trigger command or via EXECUTE TRIGGER in case of manual control.

EXT The trigger signal is fed in via input TRIGIN

INT A start is only possible manually or via the remote control command TRIG:DM:IMM

Example: :SOUR:WCDM:TRIG:SOUR EXT

*RST value is INT

[[:SOURce]:WCDMa:TRIGger:INHibit 0 to 67108863

The command sets the retrigger inhibit duration (in number of chips).

Example: :SOUR:WCDM:TRIG:INH 1000

*RST value is 0

[[:SOURce]:WCDMa:TRIGger:DELay 0 to 40959

The command defines the trigger delay (in number of chips).

Example: :SOUR:WCDM:TRIG:DEL 200

*RST value is 0

[[:SOURce]:WCDMa:TRIGger:OUTPut[1]2 SLOT | RFRame | CSPeriod

The command defines the output signal at trigger output 1 or 2. The following times can be selected:

SLOT Timeslot clock
RFRame Radio Frame (frame clock)
CSPeriod Chip Sequence Period

Example: :SOUR:WCDM:TRIG:OUTP1 RFR

*RST value is: for OUTPut 1: RFR
for OUTPut 2: CSP

[[:SOURce]:WCDMa:TRIGger:OUTPut[1]2:POLarity POSitive | NEGative

The commands defines the polarity of the signals at the trigger outputs.

Example: :SOUR:WCDM:TRIG:OUTP2:POL NEG

*RST value is POS

[[:SOURce]:WCDMa:TRIGger:OUTPut[1]]2:DELay 0 to 40959 (81919)

The command defines the delay of trigger signals in chips.

Example: `:SOUR:WCDM:TRIG:OUTP2:DEL 50`

*RST value is 0

[[:SOURce]:WCDMa:CLOCK:SOURce INTERNAL | EXTERNAL

The command selects the clock source.

INTERNAL The internal clock generator is used.

EXTERNAL The clock is fed externally via connector SYMBOL CLOCK.

Example: `:SOUR:WCDM:CLOC:SOUR EXT`

*RST value is INT

[[:SOURce]:WCDMa:POWER?

The command queries the total power for the W-CDMA signal.

Example: `:SOUR:WCDM:POW?`

[[:SOURce]:WCDMa:POWER:ADJust

The command modifies the power of each active code channel. This means that the total power is set equal to the power in the level display. The command triggers an action and hence has no *RST value assigned.

Example: `:SOUR:WCDM:POW:ADJ`

[[:SOURce]:WCDMa:MULTicode

The commands for selecting multicode settings (not available with `:WCDM:LINK UPMulti`) are under this node.

[[:SOURce]:WCDMa:MULTicode:STATe ON | OFF

The command permits to switch on or off the multicode mode.

Example: `:SOUR:WCDM:MULT:STAT OFF`

[[:SOURce]:WCDMa:MULTicode:MASTer 0 to 3

The command selects the master channel for the spread code.

Example: `:SOUR:WCDM:MULT:MAST 3`

[[:SOURce]:WCDMa:MULTicode:CHANnels #H0 to #H7FFF

The command permits to select the channels for the multicode transmission. Each set bit in the 15-bit hex figure corresponds to a set channel. The figure 9, for example, switches on channel 0 (binary significance) and channel 3 (significance 8).

Example: `:SOUR:WCDM:MULT:CHAN #H3A`

[[:SOURce]:WCDMa:SLENgth 1 to 256

The command determines the length of the calculated chip sequence in number of frames.

Example: `:SOUR:WCDM:SLEN 8`

[[:SOURce]:WCDMa:CHANnel<0...14>[:I]]:Q

The commands for determining the channel configuration are under this node. For the sense of transmission DOWN (:WCDM:LINK DOWN) the settings cannot be separately set to I and Q component; :I and :Q need not be specified.

Example: :WCDM:CHAN2:TYPE PERC

For UP, however, there is the multiplex setting (UPMulti) with which settings are distinguished between I and Q. :I is optional, :I is used if no indication is made.

Example: :WCDM:CHAN2:I:TYPE PERC

has the same meaning as :WCDM:CHAN2:TYPE PERC

Example for Q-component setting: :WCDM:CHAN2:Q:TYPE PERC

There are some commands which do not make a distinction between I and Q:

:WCDM:CHAN<0...14>:LCOD

:WCDM:CHAN<0...14>:LCOD OFFS

:WCDM:CHAN<0...14>:SCOD:LMS

[[:SOURce]:WCDMa:CHANnel<0...14>[:I]]:Q:TYPE PERCh | CCPCh | DPCH | DPDCh | DPCCh | ALLD

The command selects the channel type.

PERCh Perch Channel (only for :WCDM:LINK DOWN)

CCPCh Common Control Physical Channel (not for :WCDM:LINK UPM)

DPCH Dedicated Physical Channel (not for :WCDM:LINK UPM)

ALLD All Data (not for :WCDM:LINK UPM)

DPDCh Dedicated Physical Data Channel (only for :WCDM:LINK UPM)

DPCCh Dedicated Physical Control Channel (only for :WCDM:LINK UPM)

Example: :SOUR:WCDM:CHAN2:I:TYPE PERC *RST value is DPCH

*RST value is PERC for channel 0, mode 8, downlink

[[:SOURce]:WCDMa:CHANnel<0...14>[:I]]:Q:SRATe D16 | D32 | D64 | D128 | D256 | D512 | D1024

The command determines the symbol rate. The values depend on the channel type.

Example: :SOUR:WCDM:CHAN2:I:SRAT D64 *RST value is D32

*RST value is 16 for channel 0, mode 8, downlink

[[:SOURce]:WCDMa:CHANnel<0...14>[:I]]:Q:SCODE 0 to 511

The command is used to set the short code of the spread code. The upper limit depends on :WCDM:CRAT, :WCDM:SRAT and :WCDM:CHAN:TYPE.

Example: :SOUR:WCDM:CHAN2:I:SCOD 123 *RST value is (<chan>+9)

*RST value is 0 for channel 0, mode 8, downlink

:SOURce]:WCDMa:CHANnel<0...14>:LCODE #H0 to #H3FFFF (#H1FFFFFFFFFFFF)

The command determines the long code of the spread code.

Example: :SOUR:WCDM:CHAN2:I:LCOD #H3FFF *RST value is #H1

[[:SOURce]:WCDMa:CHANnel<0...14>:LCODE:OFFSet 0 to 40959 (81919)

The command is used to set the long code offset of the spread code.

Example: :SOUR:WCDM:CHAN2:I:LCOD:OFFS 345 *RST value is 0

[[:SOURce]:WCDMa:CHANnel<0...14>:SCODE:LMS #H0 to #HFF

The command determines the short code index used for the spreading of the long code mask symbols (LMS).

Example: :SOUR:WCDM:CHAN2:I:SCOD:LMS #H3F *RST value is #H1

[[:SOURce]:WCDMa:CHANnel<0...14>[:I]]:Q:POWer -30dB to 0dB

The command determines the power of a channel in relation to the power indication on the level display. Setting limitations are to be observed with respect to :WCDM:MODE CHANx.

Example: :SOUR:WCDM:CHAN2:I:POW -22 DB *RST value is -9

[[:SOURce]:WCDMa:CHANnel<0...14>[:I]]:Q:DATA PN9 | PN11 | PN15 | PN16 | DLIS

The command is used to determine the data source for the data field. PNx are PRBS data and DLIS data from a list previously defined. It is selected with the following command.

Example: :SOUR:WCDM:CHAN2:I:DATA DLIS *RST value is PN15

[[:SOURce]:WCDMa:CHANnel<0...14>[:I]]:Q:DATA:DLIS 'name'

The command selects the data list used with :WCDM:CHAN:DATA DLIS. The command has no *RST value.

Example: :SOUR:WCDM:CHAN2:I:DATA:DLIS 'test2'

[[:SOURce]:WCDMa:CHANnel<0...14>[:I]]:Q:DATA:OFFSet 0 to 10239

The command is used to set the data offset (unit symbol duration). It shifts the modulation data with respect to the spread code.

Example: :SOUR:WCDM:CHAN2:I:DATA:OFFS 345 *RST value is (<chan> * 3)
*RST value is 0 for channel 0, mode 8, downlink

[[:SOURce]:WCDMa:CHANnel<1...14>:TPC ZERO | ONE | ALTerNate | DLIS

The command determines the data source for the TPC field in channel types DPCH and DPCCh.

ZERO 0000..., sequence of zeros

ONE 1111..., sequence of ones

ALT alternating sequence

DLIS Data from a list previously defined.

Example: :SOUR:WCDM:CHAN2:TPC DLIS *RST value is ALT

[[:SOURce]:WCDMa:CHANnel<1...14>:TPC:DLIS 'name'

The command selects the data list used with :WCDM:CHAN:TPC DLIS. The command has no *RST value.

Example: :SOUR:WCDM:CHAN2:TPC DLIS 'test1'

[[:SOURce]:WCDMa:CHANnel<0...14>:STATe ON | OFF

Switches the assigned code channel on or off.

Example: :SOUR:WCDM:CHAN12:STAT ON *RST value is ON

4 Performance Test

4.1 Test Instructions

4.1.1 Adjacent-Channel Power with Digital Standard W-CDMA

Test equipment	RF spectrum analyzer (SMIQ manual, Table 5-1, item 2)
Measurement	<ul style="list-style-type: none">➤ Settings on SMIQ:<ul style="list-style-type: none">- Level (PEP) 0.2 and -0.2 dBm- RF 1800/2000/2200 MHz- Select digital standard W-CDMA with the following settings:<ul style="list-style-type: none">- SET DEFAULT- MODE 4CHAN- LINK DIR DOWN- SEQUENCE LENGTH 10 frames- MODULATION FILTER MODE LOW_ACP- CHNO 1 TYPE DPCH, SYMBOL RATE 32, SHO CO 9, POWER 0, DATA PN 9, TPC ALT- Switch the other channels off (STATE OFF). ➤ Settings on spectrum analyzer:<ul style="list-style-type: none">- LEVEL REF -10 dBm- Determine the channel power and the adjacent-channel power at a bandwidth of 4.096 MHz and spacings of 5 MHz and 10 MHz in accordance with the section "Adjacent-Channel Power Measurement with Higher Resolution" in the SMIQ manual.

4.1.2 Error Vector for Digital Standard W-CDMA

Test equipment Demodulator for digital modulation (Table 5-1, item 23)

- Measurement
- Settings on SMIQ:
 - Level -10 dBm
 - RF 1800/2000/2200 MHz
 - Select digital standard W-CDMA with the following settings:
 - SET DEFAULT
 - MODE 4CHAN
 - CHIP RATE 4.096 M
 - LINK DIR DOWN
 - SEQUENCE LENGTH 10 frames
 - MODULATION FILTER MODE LOW_EVM
 - CHNO 0 TYPE DPCH, SYMBOL RATE 32, SHO CO 9, POWER 0, DATA PN9, TPC ALT
 - Switch the other channels off (STATE OFF).
 - Settings on demodulator:
 - REF LEVEL -5 dBm
 - DIGITAL STANDARDS W-CDMA FWD CH
 - Evaluation over 600 symbols

4.2 Performance Test Report

For nominal data and limit values refer to the data sheet supplied with the instrument.

Characteristic	Min.	Actual	Max.	Unit
Adjacent-channel power for digital standard W-CDMA				dB
Error vector for digital standard W-CDMA				%