ROHDE&SCHWARZ

Test and Measurement
Division

Software Manual

EDGE Base Station Tests

Application Firmware Extension

FSE-K21

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

Safety Instructions

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

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 ±10% shall apply to the nominal voltage and of ±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.

4. If products/components are mechanically and/or thermically 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.

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 estandards 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 estandards 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 indústria 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 uns 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 construción con peligro de carga electroestática

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

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 ususario.Punto de peligro que puede llevar hasta la muerte o graves heridas.
ADVERTENCIA	Indica un punto de peligro con un protencial 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 protencial 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 debera 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 principialmente 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 ±10% sobre el voltaje nominal y de ±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

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 producieran 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 averigurar 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, deberan 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 areas 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 prodcuto.
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 construciones o instalaciones, se deberá instalar el interruptor al nivel de la instalación.

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 Ueff > 30 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 efecutadas 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.

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 fín. 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.

1 General Information on Application Firmware FSE-K21, EDGE (8PSK) Measurements

The FSE-K21 is an extension to FSE-K11.
This extension enables the measurement of 8-PSK-modulated EDGE signals according to the standards.
The full range of functions of the FSE-K11 is thus also available for EDGE signals.

A Brief Explanation of GSM/EDGE

The GSM standard (Global System for Mobile communication) describes the GSM mobile radio network that is in widespread use today. As an extension to this network, 8PSK has been defined as a new mode of modulation in addition to the existing mode of modulation GMSK. The mode of the mobile or base station based thereupon is called EDGE (Enhanced Data rates for GSM Evolution).

The term GSM thus combines two different modes: GMSK and EDGE. In the following, the term EDGE will be used only if there are significant differences between the two modes. In all other cases, the term GSM will be used.

There are two different standards, distinguished primarily by their frequency bands: ETSI (for GSM900, GSM1800) and J-STD-007 (PCS 1900 , primarily in the USA).

The physical layer – the layer of the GSM network on which modulation, transmission of RF signals, reception of RF signals, and demodulation take place – is defined in the standards.

- GSM 05.04 — Modulation
- GSM 05.05 (ETS 300 910) — General measurement specifications and limit values
- GSM 11.10 (ETS 300 607-1) — Detailed measurement specifications and limit values for mobiles
- GSM 11.21 (ETS 300 609-1) and — Detailed measurement specifications and limit values for base stations
- J-STD 007 — Detailed measurement specifications and limit values for mobiles and base stations in the 1900-MHz band

As technological development progresses, J-STD 007 is now being integrated into the other GSM standards.

A T&FDMA method is used to transfer data in the GSM network. This means that the digital information is transmitted discretely in the time domain as well as in the frequency domain.

The time domain is divided logically into frames of different length, the smallest unit being known as a timeslot. A multiframe consists of 26 frames, and a frame has 8 timeslots (see GSM 05.01 for details).

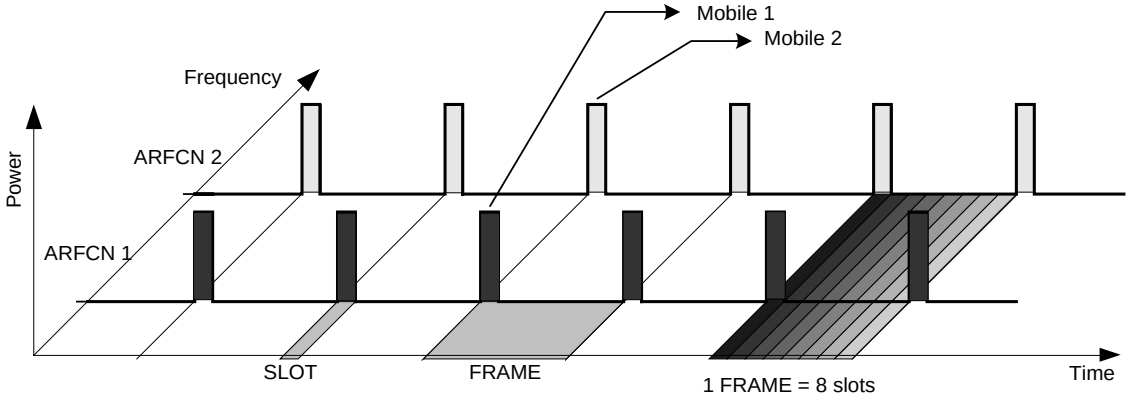
A mobile, therefore, does not communicate continuously with the base station; instead, it communicates discretely in individual timeslots. In the simplest case, 8 mobiles share the 8 timeslots of a frame (TDMA - Time Division Multiple Access).

The base station is able to transmit on all the 8 timeslots of a frame.

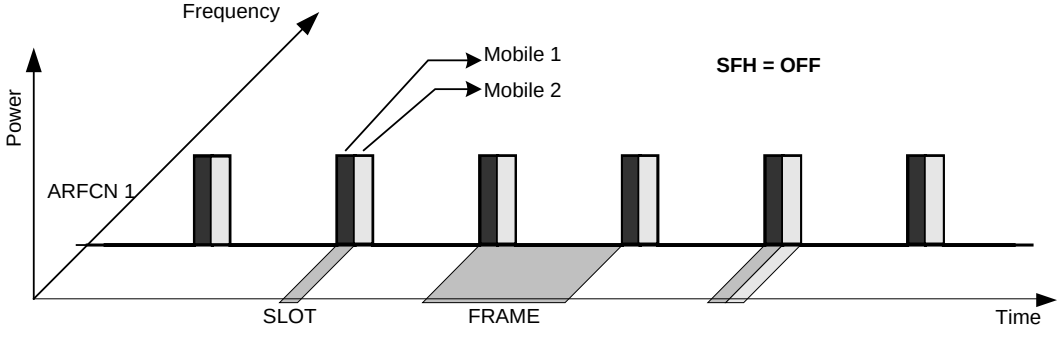
The frequency domain is divided into frequency bands, and each band, in turn, is subdivided into channels.
Each frequency channel is identified by its center frequency and a number, known as the ARFCN, which is a non-band-specific identifier (ARFCN - absolute radio frequency channel number). A bandwidth of 200 kHz is defined for each frequency channel.

Communication between a mobile and the base station can be either frequency-continuous or frequency-discrete – distributed across various frequency channels (FDMA – Frequency Division Multiple Access). In the standards, the abbreviation "SFH" (slow frequency hopping) is used to designate this mode of communication.

Mobiles transmitting simultaneously on different frequencies: FDMA



Mobiles transmitting on the same frequency at different times: TDMA



Mobile 1 transmitting on same frequency, mobile 2 transmitting on different frequencies

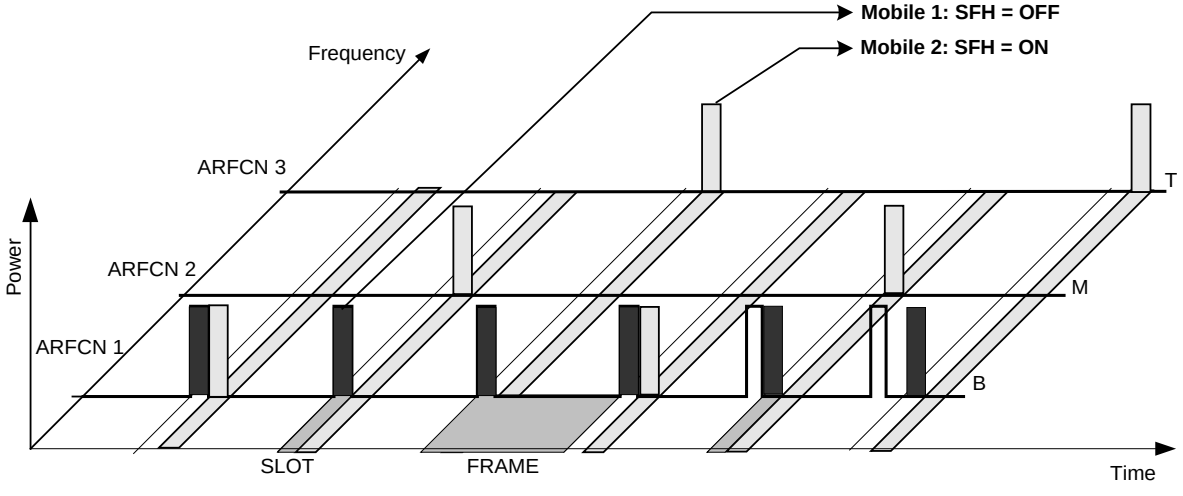


Fig. 1-1 Data transmission in GSM network - T&FDMA communication

Base station and mobile communicate in different frequency ranges. The mobile sends in the “uplink“ and the base station in the "downlink“.

The frequencies specified in the standards plus their channel numbers are listed in the tables below.

Table 1-1 Downlink – base station transmitting to mobile

P-GSM 900	935.2MHz					959.8MHz	FREQ
	1					124	ARFCN
E-GSM 900	925.2MHz	934.8	935	935.2		959.8MHz	FREQ
	975	1023	0	1		124	ARFCN
R-GSM 900	921.2MHz	934.8	935	935.2		959.8MHz	FREQ
	955	1023	0	1		124	ARFCN
DCS 1800	1805.2MHz					1879.8MHz	FREQ
	512					885	ARFCN
PCS 1900	1930.2MHz					1989.8MHz	FREQ
	512					810	ARFCN

Table 1-2 Uplink - mobile transmitting to base station

P-GSM 900	890.2MHz					914.8MHz	FREQ
	1					124	ARFCN
E-GSM 900	880.2MHz	889.8	890	890.2		914.8MHz	FREQ
	975	1023	0	1		124	ARFCN
R-GSM 900	876.2MHz	889.8	890	890.2		914.8MHz	FREQ
	955	1023	0	1		124	ARFCN
DCS 1800	1710.2MHz					1784.8MHz	FREQ
	512					885	ARFCN
PCS 1900	1850.2MHz					1909.8MHz	FREQ
	512					810	ARFCN

At this time, two different modes of modulation are used in the GSM mobile radio network. The original GMSK method has now been joined by an 8PSK method (EDGE).

The GMSK symbol rate is 1/T = 1625/6 ksymb/s (in other words, approx. 270.833 ksymb/s). This corresponds to 1625/6 kbit/s (in other words approx. 270.833 kbit/s). In this method, a bit change represents a symbol. The details are laid down in ETSI standard GSM 05.04.

The 8PSK (EDGE) symbol rate is 1/T = 1625/6 ksymb/s (in other words, approx. 270.833 ksymb/s). This corresponds to 3 x 1625/6 kbit/s (in other words approx. 812.5 kbit/s).
In this method, three bits represent a symbol. The details are laid down in ETSI standard GSM 05.04.

In both cases, however, the channel bandwidth is restricted to 200 kHz. As these figures show, the EDGE bit rate is approx. three times higher than that of the GMSK method.

The increasing demand for more bandwidth is the reason for the constant development of the GSM standard, as evidenced by the recent introduction of the EDGE specification and the GPRS and HSCSD modes.

So far, each mobile has been able to use only one timeslot per frame, but the new HSCSD and GPRS methods will allow permanent assignment of more than one timeslot per mobile, plus dynamic utilisation of multiple timeslots.

The concept behind GPRS (General Packet Radio Service) is dynamic assignment of up to 8 timeslots to each mobile for data transmission, depending on demand (and availability in the network). Again both modes of modulation (GMSK and 8PSK) can be used.

HSCSD (High Speed Circuit Switched Data) allows permanent assignment of up to 4 timeslots to a mobile. Again both modes of modulation (GMSK and 8PSK) can be used.

Firmware Application FSE-K21

The characteristics of the EDGE systems as outlined above have to be measured in development and production and checked against limit values. The characteristics belonging to the physical layer that have to be checked include:

The characteristics of 8PSK modulation:	Modulation accuracy
Carrier power versus time:	Power, time characteristic of power and timing offset of power within a timeslot are checked.
The spectral characteristics:	The spectral distribution of the energy is measured in the frequency channel, in the transmit band and outside the transmit band. A distinction is made between two causes for the form of spectral distribution: 1) The spectrum caused by GMSK or 8PSK (EDGE) modulation (measurement is performed only in that part of the timeslot in which power is virtually constant, in other words the switching ramps are ignored). 2) The spectrum caused by switching of the power in a timeslot.

In accordance with these requirements, the standards define the six measurements supported in this firmware application.

The FS-K21 application provides a convenient means of performing the measurements listed below for GSM900 (P-GSM, E-GSM and R-GSM), DCS1800 or PCS1900 base stations (according to the standards GSM 05.05, GSM 11.21, J-STD-007 Air Interface):

Characteristics of 8PSK modulation:

- MAC Modulation Accuracy — Measurement of EVM of 95:th-percentile value, of origin offset suppression and frequency error with synchronization to midamble

Carrier power versus time

- CPW Carrier Power — Measurement of carrier power with synchronization to midamble
- PVT Power versus Time — Measurement of carrier power versus time with synchronization to midamble

Spectral characteristics

- MOD Spectrum due to Modulation — Measurement of spectrum due to modulation
- TRA Spectrum due to Transients — Measurement of spectrum due to transients
- SPU Spurious Emissions — Measurement of spurious emissions

The limit values predefined in the standards are automatically set on selection of the standard and can be changed or supplemented.

Extra limit values can be specified for each measurement.

The sections below contain basic information on the main procedures, settings and messages of the device. The descriptions of the measurements in Chapter 2 contain more detailed information specific to the various modes of measurement. The background information in the sections entitled “Additional information” in Chapter 2 is supplementary in nature and not necessary for normal operation. This information merely explains in more detail the internal settings and procedures. Chapter 3 describes the remote-control commands of the application. The relevant commands also accompany each description of a softkey.

Installing the FS-K21 Firmware Application

When shipped ex works, the FS-K21 firmware application is preinstalled and enabled and can be used right away.

When shipped separately, the FSE-K21 firmware application is accompanied by the latest version of the instructions for installation and enabling.

The installation of the FSE-K21 assumes that a firmware version ≥ 1.95/2.10 and Option FSE-K11 have been installed.

Starting the Application

The Application FSE-K21 is an extension to the FSE-K11. Based on the K11, it supports the measurement of EDGE signals. Within the K11, the SETTINGS menu permits to change the mode of modulation to EDGE in the right-hand side menu. Thus, the operating mode EDGE and all limit values and test procedures are preselected according to the standard.

Default Settings of the Application

The basic settings of the parameters required for the measurement are done in the *SETTINGS* menu as with the K11.

For a detailed menu description refer to the FSE-K11 manual.

Measuring with the Application

The measurement procedures as well as the operation are identical to those of the FSE-K11.
As to the range of functions offered, the FSE-K21 differs in that the measurement of the modulation accuracy is performed instead of the phase-frequency-error measurement.

The FSE-K21 also permits to perform reference measurements for correct level setting (to avoid out-of-range values) and for automatic or manual selection of limit lines according to the standard.

Aborting a Measurement

The FSE-K21 provides the same functions as the FSE-K11.

Results of Measurements

Table 1-3 Results of measurements

Measurement	**Single value**	**Limit Line**	**Table**
MAC	EVM peak value EVM RMS value origin offset suppression values 95:th percentile values Frequency error	none	Instantaneous value, Max Hold value, average value, limit value, status of each single value

All other measurements provide the same results as with the FSE-K11.

Exiting the Application

You can exit the application FSE-K21 by calling another operating mode using the Mode key.
The functions offered are the same as with the FSE-K11.

Trigger Options

The trigger options are identical to those offered by the FSE-K11.

Trigger and Time References

The trigger and time references of the FSE-K21 are identical to those of the FSE-K11.

Possible Errors and Difficulties During the Measurement

The three main sources of error in GSM measurement are described below:

- **No carrier signal**

Causes:	Wrong working frequency (ARFCN), slow frequency hopping active, test line defective or wrong attenuation, wrong reference level	
Effects:	Reference measurement:	Inadequate power is measured (e.g. average measurement with slow frequency hopping), measurement issues warning.
		Sweep stops (measurements with midamble synchronization), warning message: Sync not found / Burst not found
		Sweep stops (measurements with RF Power trigger)
	Main measurement:	Sweep stops with midamble synchronization active (PFE, CPW, PVT) or RF Power trigger in use. Sweep resumes when signal is restored.
Remedy:	- Set correct frequency - Deactivate slow frequency hopping (see "Measurements with Slow Frequency Hopping" in the descriptions of the individual measurements) or switch on SFH in the secondary menu of a measurement (only with TRA and SPU) - Set correct external attenuation (*SETTINGS\EXTERNAL ATTEN)* - Set correct reference level (*SETTINGS \POWER SETTINGS* ...)	

- **No trigger**

Effects:	All triggered measurements:sweep stops. This can be seen from the fact that the trigger LED is not illuminated and does not flash either.
Remedy:	- Change trigger - RF Power trigger: reduce external attenuation increase signal level

- **Burst not found/Sync not found**

Causes:	Dummy burst, slow frequency hopping active, wrong midamble
Effects:	Sweep stops (measurements with midamble synchronization)
Remedy:	Necessary only if measurement does not run, otherwise measurement is possible - Check the midamble - Deactivate slow frequency hopping

2 Measurements with the Application Firmware FSE-K21

Introduction

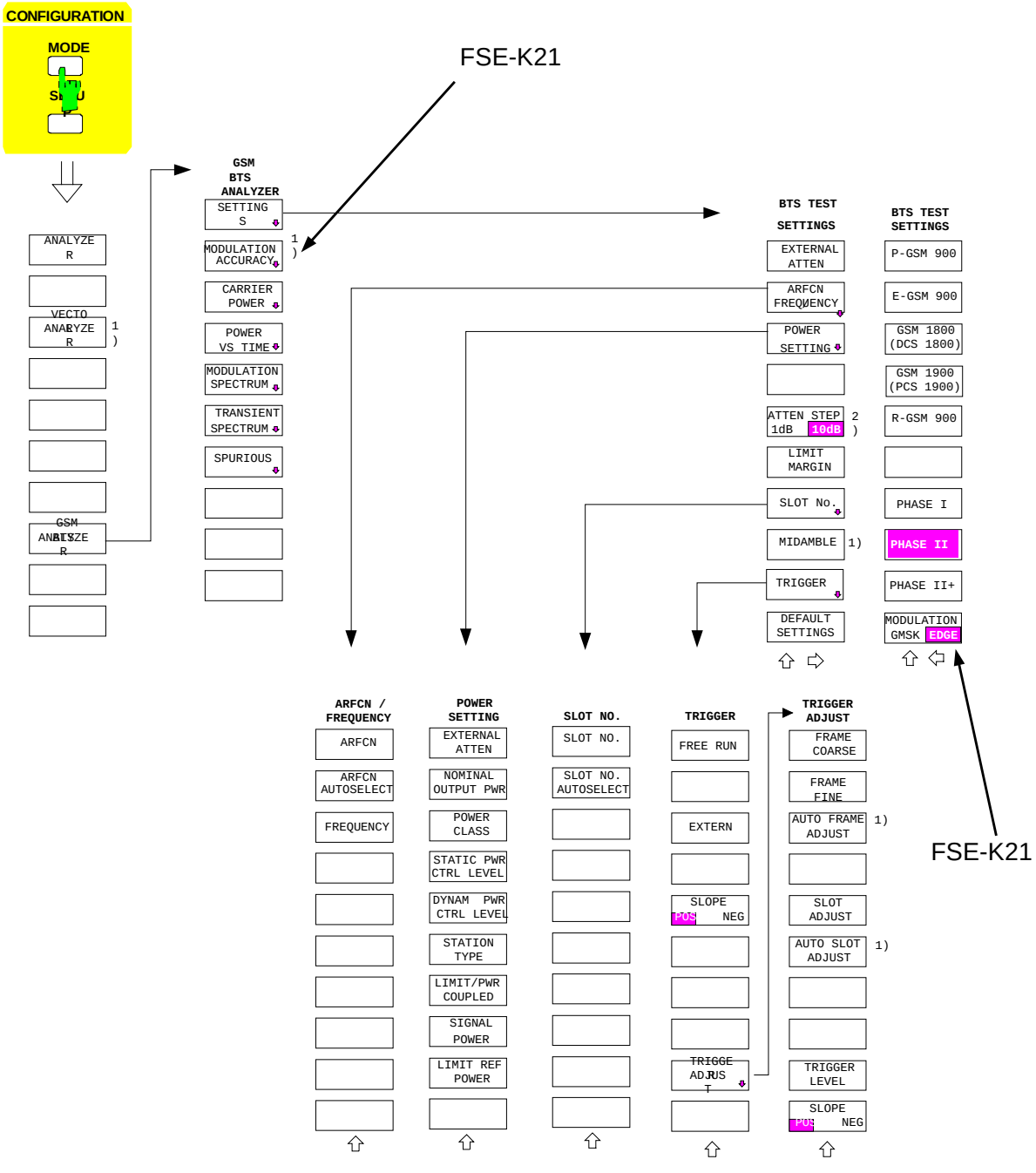
This section describes the specific differences between the FSE-K21 and the FSE-K11 as to their basic functions. The measurements, settings, menus and procedures not mentioned here are identical to those of the FSE-K11 and described in the FSE-K11 manual.

The following measurements are possible using the application FSE-K21:

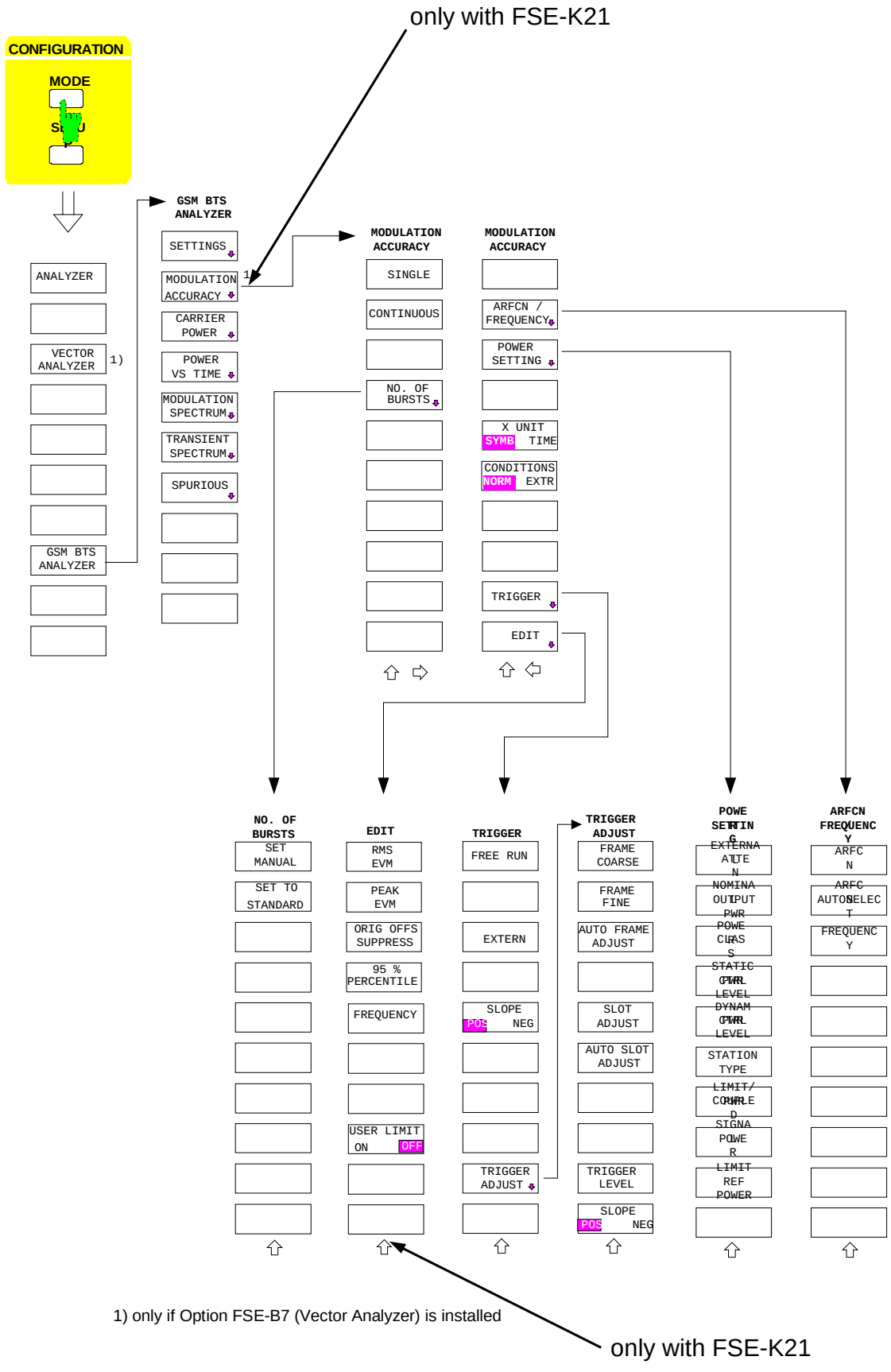
- MAC Modulation Accuracy — Measurement of EVM, 95:th percentile, origin offset suppression and frequency error with midamble synchronization
- CPW Carrier Power — Measurement of carrier power with midamble synchronization
- PVT Power versus Time — Measurement of carrier power versus time with midamble synchronization
- MOD Modulation Spectrum — Measurement of modulation spectrum
- TRA Transient Spectrum — Measurement of transient spectrum
- SPU Spurious Emissions — Measurement of spurious emissions

Operation of the FSE-K21 is only possible if the FSE-K11 is installed.

Menu Overview



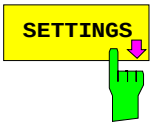
1) only if Option FSE-B7 (Vector Analyzer) is installed
2) only if Option 1-dB Attenuator is installed



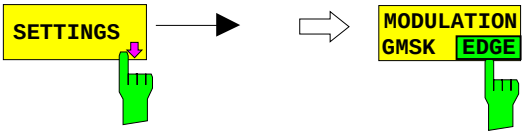
1) only if Option FSE-B7 (Vector Analyzer) is installed

All other menus are identical to those of the FSE-K11.

Switching On the FSE-K21 (EDGE Modes)



The *SETTINGS* softkey calls the submenu for changing the mode of modulation and predefining the test parameters. The associated side menu permits to select the transmission system and the mode of modulation. The parameters to be changed more often like channel, power, midamble etc. are to be found in the main part of the submenu to allow for easy access.



The MODULATION GMSK/EDGE softkey switches the mode of modulation between GMSK and EDGE (8-PSK).

When the standard and the mode of modulation are selected, the FSE/FSIQ uses the settings and limit values specified for the standard for each measurement.

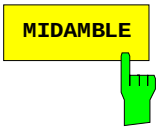
In particular, it is taken into account that in the case of the MAC, CPW, PVT and MOD measurement, the limit values differ depending on the mode of modulation.

For the standards P-GSM 900/Phase 1 the measurement is made to GSM11.20, for DCS 1800 Phase 1 to the ETSI standard GSM 11.20-DCS, for P-GSM 900 and DCS 1800 (Phase 2 each) as well as for E-GSM 900 to the ETSI standard GSM 11.21 and for standard PCS 1900 to US standard J-STD-007 Air Interface. For Phase II+ (in the case of R-GSM and EDGE) the measurement is also made to standards GSM 05.05 and GSM11.21 (also PCS 1900).

Switchover of the phases is identical to that in the FSE-K11. The softkey is disabled for Phase I.

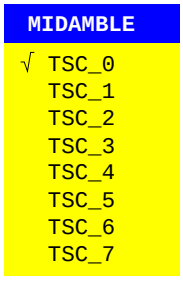
IEC-bus command: `CONF:MTYP EDGE`

Selecting the Midamble



The *MIDAMBLE* softkey opens a table where the EDGE midamble used by the mobile can be selected. The midamble is required for determination of the time reference only if the Option Vector Signal Analysis FSE-B7 is installed. If the option is not installed, the softkey is disabled.

The softkey opens a table which offers all available EDGE midambles for selection.



TSC_0 to TSC_7 (Training Sequence Code) represent the training sequences for the normal burst.

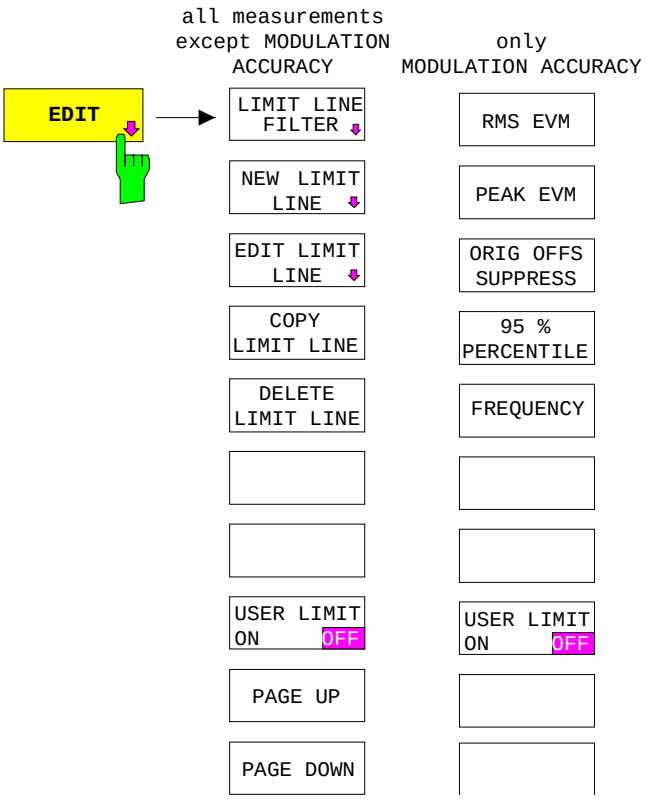
The desired midamble can be selected using the cursor keys or the rotary knob and activated using one of the unit keys. The selected midamble is marked by a tick.

IEC-bus command: `CONF[:BTS]:CHAN:TSC 0...7`
`CONF[:BTS]:CHAN:TSC:AUTO ON | OFF`

EDGE midambles:

TSC0	001001	111001001111	001111111111	001001001001	111001001001	111001001111	001111111111
TSC1	001001	111001111111	001111111111	001111111111	111001001001	111001111111	001111111111
TSC2	001111	001001001001	111111111001	111111111001	111001001111	001001001001	111111111001
TSC3	001111	001001001111	111111111001	111111001111	001001001111	001001001111	111111111001
TSC4	001001	001111111001	111001111111	111001001111	001001001001	001111111001	111001111111
TSC5	001111	001001111111	111001111001	111111001001	001001001111	001001111111	111001111001
TSC6	111001	111001001111	111111111111	001111111001	001001111001	111001001111	111111111111
TSC7	111111	111001111111	111111001001	001111001001	111001111111	111001111111	111111001001

Selecting and Editing the Limit Lines



The EDIT softkey opens a submenu for definition and activation of specific limit lines.

The limit lines are edited via the limit-line editor (a function of the basic instrument).

For the modulation accuracy measurement, only the values for RMS EVM, PEAK EVM, ORIG OFFSET SUPPRESSION, 95:th PERCENTILE and FREQUENCY are entered instead of limit lines. Extra softkeys are provided for this purpose.

All the limit lines of the EDGE software FSE-K21 form an integral part of it and are available when the option is enabled. The line names are indicated at the line itself.

To be able to edit the available limit lines, they must be copied from the CD-ROM supplied with the Option FSE-K11 to the device (see supplement to CD-ROM).

A few characteristics of the limit lines of the GSM option cannot be changed manually. These include the exceptions and clipping lines or sockets defined in the standards (... whichever is the highest ...).

These special characteristics are only available in the GSM software.

In the case of limit lines in the time domain, the center of the screen is assigned to the time 0. For defining limit values to the left of the center of the screen negative time values must therefore be entered.

If oblique limit lines are defined by the user, they will be converted into steps in List mode for the measurements Spurious, Spurious Sgl Step, Modulation and Transient as shown by the following illustration:

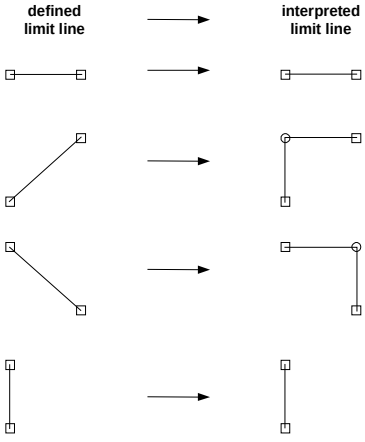
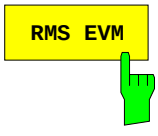


Fig. 2-1 Conversion of user-defined limit lines

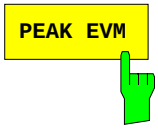


The *RMS EVM* softkey is only provided in the menu for modulation accuracy measurement.

It opens a window in which the limit value for the maximum permissible RMS PEAK value can be entered in percent.

The value entered is indicated in the evaluation table of the modulation accuracy measurement in the LIMIT column when the user-specific limit lines are switched on (*USER LIMIT ON*).

IEC-bus command: `:CONF<1|2>[:BTS]:LIMit:EVMR`

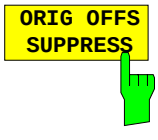


The *PEAK EVM* softkey is only provided in the menu for modulation accuracy measurement.

It opens a window where the limit line for the maximum permissible EVM PEAK value can be entered in percent.

The value entered is indicated in the evaluation table of the modulation accuracy measurement in the LIMIT column when the user-specific limit values are switched on (*USER LIMIT ON*).

IEC-bus command: `:CONF<1|2>[:BTS]:LIMit:EVMP`

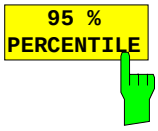


The *ORIG OFFS SUPPRESS* softkey is only provided in the menu for modulation accuracy measurement.

It opens a window where the limit value for the maximum permissible ORIGIN OFFSET SUPPRESSION value can be entered in dB.

The value entered is indicated in the evaluation table of the modulation accuracy measurement in the LIMIT column when the user-specific limit values are switched on (*USER LIMIT ON*).

IEC-bus command: `:CONF<1|2>[:BTS]:LIM:OSUP`

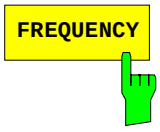


The *95 % PERCENTILE* softkey is only provided in the menu for modulation accuracy measurement.

It opens a window where the limit value for the maximum permissible 95:th percentile value can be entered in percent.

The value entered is indicated in the evaluation table of the modulation accuracy measurement in the LIMIT column when the user-specific limit values are switched on (*USER LIMIT ON)*.

IEC-bus command: `:CONF<1|2>[:BTS]:LIM:PERC`



The *FREQUENCY* softkey is only provided in the menu for modulation accuracy measurement.

It opens a window where the limit value for the permissible frequency error (determined over 142 useful symbols) can be entered in ppm.

The value entered is indicated in the evaluation table of the modulation accuracy measurement in the LIMIT column when the user-specific limit values are switched on (*USER LIMIT ON*).

IEC-bus command: `:CONF<1|2>[:BTS]:LIM:FREQ`

All other functions of this menu are identical to those of the FSE-K11.

Measurement of Modulation Accuracy with 8PSK Signals

Note: *Measurement of the modulation accuracy of 8PSK-modulated signals is only possible if the Option FSE-B7 is installed. Otherwise, the softkey will not be offered.*

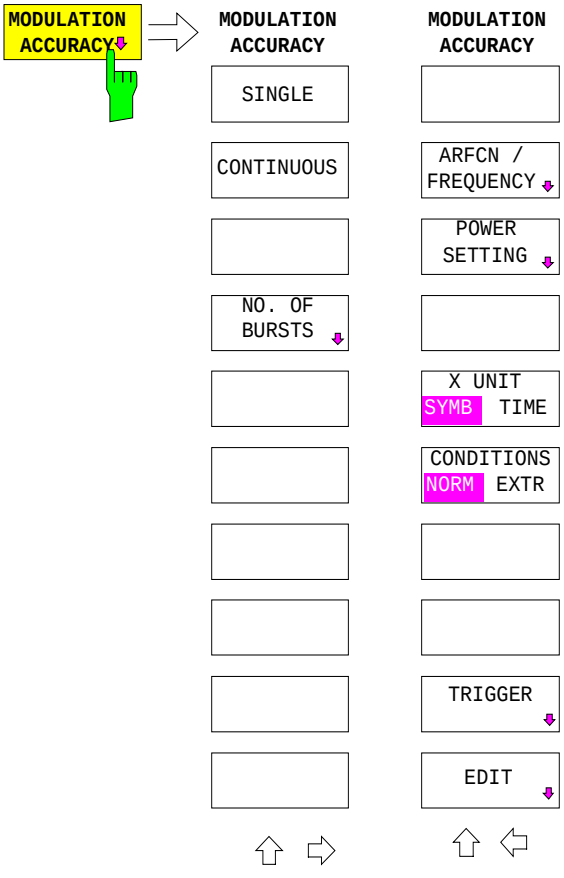
The modulation accuracy of 8PSK-modulated signals is indicated by the magnitude of the error vector (EVM error vector magnitude).
The error vector EVM is the magnitude of the error vector that connects the measured I and Q value at the complex layer with the ideal I and Q value at the decision points.

The measurement is performed to GSM 05.05 and GSM 11.21, the EVM of each of the 142 specified symbols of a normal burst being determined individually, indicated and compared with the limit values. The RMS value and the peak value of the EVM are evaluated.

The origin offset suppression or the IQ offset are indicated as a measure of carrier suppression. This value is indicated in dB according to the standard.

The 95:th percentile value is a statistical value that indicates the number of EVM values lying below a particular EVM limit value.

The frequency error is calculated from the phase position of the symbols according to the standard and displayed as well.



The *MODULATION ACCURACY* softkey opens a submenu for configuration of the measurement of the 8-PSK modulation accuracy according to the selected standard.

The right-hand side menu of this submenu permits to do the main settings – without the need for changing into the *SETTINGS* menu.

Besides, the limit values used can be changed in this submenu (*EDIT* softkey). The settings made using the *EDIT* softkey are local in the respective measurement.

After termination of (and during) the measurement, measuring window A provides a summary of the numerical modulation errors. The error calculation is performed over the 147 useful symbols without tail bits (i.e. over 142 symbols).

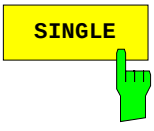
- Instantaneous value, Max Hold value and average value of EVM peak value
- Instantaneous value, Max Hold value and average value of EVM RMS value
- Instantaneous value, Max Hold value and average value of origin offset suppression value
- Instantaneous value, Max Hold value and average value of 95:th percentile value
- Max Hold value and average value of frequency error

Measuring window B indicates the EVM versus time, i.e. over the 147 useful symbols of the normal burst. In addition, the range of the 142 symbols is marked by two markers. 3 traces are used for the display:

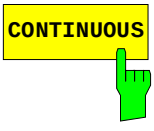
- Trace No. 1:Clear Write
- Trace No. 2: Max Hold
- Trace No. 3: Min Hold.

The midamble selected in the *SETTING* menu is used for synchronization. For the measurement on DUTs that transmit no midamble refer to the hints below the softkey *NO. OF BURSTS*.

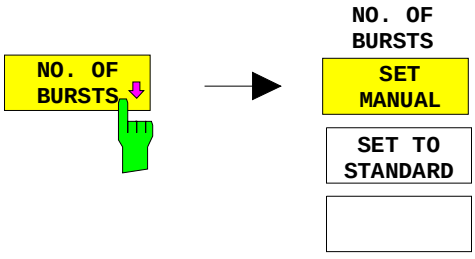
In addition to the values required according to the standard, the value *TRIG TO SYNC START* is displayed. This is the time that passes from the trigger to the first bit of the first symbol of the midamble.



The *SINGLE* softkey triggers a single measurement over the number of bursts entered.



Der Softkey *CONTINUOUS* löst eine ununterbrochene Messung aus, bis eine andere Meßfunktion aufgerufen wird.



The *NO. OF BURSTS* softkey calls a submenu that permits to determine the number of bursts to be taken into account in the measurement.

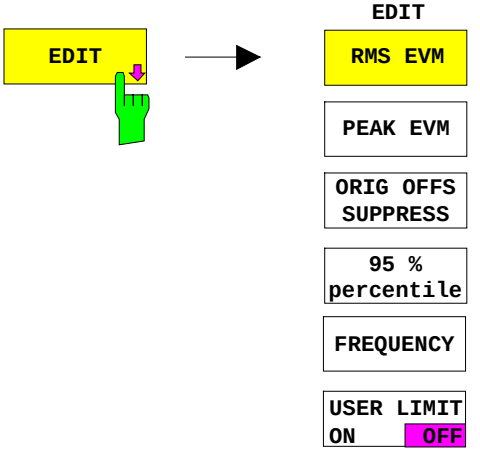
The *SET MANUAL* softkey permits to set a user-specific number of bursts.
Default setting is 1 burst.

The *SET TO STANDARD* softkey permits to set the number of bursts to the value specified for the currently selected standard.
This is 200 for all standards for the modulation accuracy measurement.

Caution: *With NO OF BURST =1, 142 symbols are always measured and the result displayed in the table after the trigger event has occurred (taking into account the delay set under TRIGGER ADJUST).*

Even measurements for which no midamble or no burst could be found are thus taken into account.

With NO OF BURST>1, errors are determined in those bursts only in which the midamble has been detected correctly



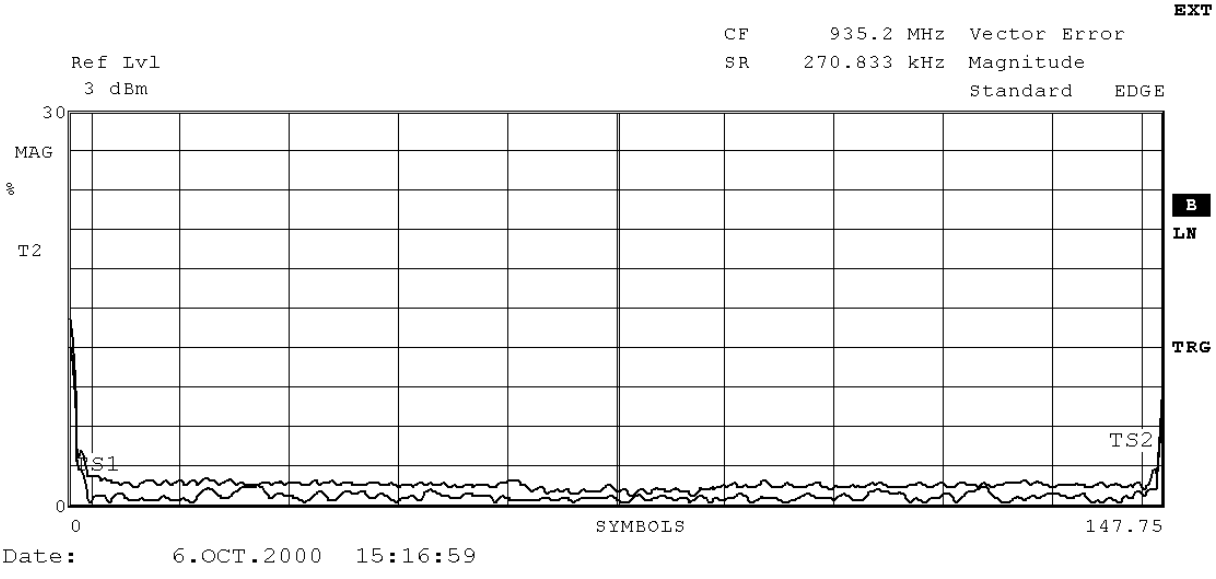
The *EDIT* softkey opens a submenu which permits to specify the limit values to be used in the measurement.

In the input window, the limit values for measurement of the modulation accuracy can be changed via the numeric keypad or the rotary knob of the FSE/FSIQ. The frequency error is entered in "ppm" (parts per million).

Modulation Accuracy

ARFCN: 1 Status: PASSED
Frequency: 935.20000 MHz
Carrier Power: 0.00 dBm Trg to Sync Start: 266.0 µs
Ext. Att/Gain: 0.00 dB
Slot Nr. 0 No. of Bursts: 200

ERRORS	CURRENT	MAX HOLD	AVG	LIMIT	STATUS
RMS EVM	0.58 %	0.85 %	0.57 %	7.00 %	PASSED
PEAK EVM	1.33 %	2.06 %	1.41 %	22.00 %	PASSED
OO SUPPR	51.62 dB	50.45 dB	53.35 dB	35.00 dB	PASSED
95% PERC	1.74 %	1.74 %	1.70 %	11.00 %	PASSED
FREQ	-1.94 Hz	-2.52 Hz	-879.98 mHz	± 46.76 Hz	PASSED
				0.05 ppm	



Date: 6.OCT.2000 15:16:59

Fig. 2-4 Measurement of modulation accuracy

Additional Hints

Abbreviations used:	SigPwr	(Expected) signal power, predefined by the current settings for power class and power level.		
	F(ARFCN)	Working frequency, determined by frequency setting		
	ExtAtt	External attenuation		
	NOB	Number Of Bursts – value for the number of sweeps set by the user		
Reference measurement:		None		
Main measurement:		Split Screen, trace at bottom, result display at top; vector mode (i.e.: IQ mode). SingleSweep, ZeroSpan; Center = F(ARFCN);		
		Result: Max. and average EVM Origin offset suppression 95:th percentile as well as max. frequency error incl. limit values		
		Ttsvr: EVM over burst characteristic		
	InpAtt	Auto Low Noise (at least -20dBm at mixer)		
	RefLvl	3.0 + SigPwr		
	Display:	Y-Unit PERCENT, 3 %/Div X-Unit SYMBOLS, 148 FullScale Display lines for restriction of the range to be measured with 3 and 145 symbols,		
	VA-Settings:	Memory Size	2048	
		ResultLength	148	
		FrameLength	300	
		Points/Symbol	4	
		SyncOffset	61	
		Find	Sync/Burst	ON/ON
		Meas only if sync'd	OFF/ON	NoOfBursts=1/ NoOfBursts>1
	Trace 1:	MAX/HOLD		
	Trace 2:	Result display		
	Trace 3:	CLEAR/WRITE		
	Trace 4:	MIN/HOLD		
	Triggerdelay:	-100 µs		
	NOB	200		

Limits:

RMS EVM	9 %
PEAK EVM	30 %
ORIGIN OFFSET SUPPR.	30 dB
95 % percentile	15 %

Frequency error	0.0ppm with PICO- BTS 0.5ppm with all other BTS types

3 Description of Commands

CONFigure[:BTS]:MTYPe GMSK | EDGE

This command selects the modulation type (GMSK or EDGE (8PSK)).

Example: "CONF:MTYP EDGE"

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

Mode: BTS

CONFigure:BURSt:MACCuracy:COUNt 1 to 1000

This command sets the number of bursts used for the determination of average and maximum value.

Example: "CONF:BURS:MACC:COUN 100"

Features: *RST value: 500 (GSM/DCS1800 Phase I)
200 otherwise
SCPI: device-specific

Modes: BTS, MS

It is available only in conjunction with option GSM BTS Analyzer FSE-K11 or option GSM MS Analyzer, FSE-K10, and Vector Signal Analysis, FSE-B7.

CONFigure:BURSt:MACCuracy:CONDition NORMal | EXTReme

This command defines the conditions for modulation accuracy measurement.

Example: ":CONF:BURS:MACC:COND EXTR"

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

Modes: BTS, MS

CONFigure:BURSt:POWer[:IMMediate]

This command selects measurement of the average carrier power of the base station or mobile.

Example: "CONF:BURS:POW"

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

Modes: BTS, MS

This command is an event and thus has no query and no *RST value assigned.

CONFigure[:BTS]:LIMit:FREQuency <numeric_value>

This command determines the frequency error limits in ppm for the phase/frequency measurement.

Example: ":CONF:LIM:FREQ 36"

Feature: *RST value: depending on standard
SCPI: device-specific

Mode: BTS

CONFigure[:BTS]:LIMit:EVMRms<numeric_value>

This command determines the value in percent for the error limits of error vector magnitude measurement with RMS weighting.

Example: "CONF:LIM:EVMR 40"

Features: *RST value depending on the standard
SCPI: device-specific

Mode: BTS

CONFigure[:BTS]:LIMit:EVMPeak<numeric_value>

This command determines the value in percent for the error limits of error vector magnitude measurement with PEAK weighting.

Example: "CONF:LIM:EVMP 30"

Features: *RST value depending on the standard
SCPI: device-specific

Mode: BTS

CONFigure[:BTS]:LIMit:OSUPpress<numeric_value>

This command defines the limit for the origin offset suppression.

Example: "CONF:LIM:OSUP 30"

Features: *RST value depending on the standard
SCPI: device-specific

Mode: BTS

CONFigure[:BTS]:LIMit:PERCentile<numeric_value>

This command determines the 95% percentile limits. The percentile defines the value which the EVM may exceed 5% of all symbols at maximum.

Example: "CONF:LIM:PERC 30"

Features: *RST value depending on the standard
SCPI: device-specific

Mode: BTS

FETCh:BURSt:MACCuracy:RMS:STATus?

This command reads out the status of the RMS measurement of the modulation accuracy taken over the selected number of bursts.

0: failed, 1: passed

Example: "FETC:BURS:MACC:RMS:STAT?"

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

Modes: BTS, MS

If no measurement has been performed yet, a query error results.
This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see CONFigure:BURSt:MACCuracy).

FETCh:BURSt:MACCuracy:RMS:AVERage?

This command reads out the average of the RMS measurement of the modulation accuracy taken over the selected number of bursts.

Example: "FETC:BURS:MACC:RMS:AVER?"

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

Modes: BTS, MS

If no measurement has been performed yet, a query error results.
This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see CONFigure:BURSt:MACCuracy).

FETCh:BURSt:MACCuracy:RMS:MAXimum?

This command reads out the maximum of the RMS measurement of the modulation accuracy taken over the selected number of bursts.

Example: "FETC:BURS:MACC:RMS:MAX?"

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

Modes: BTS, MS

If no measurement has been performed yet, a query error results.
This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see CONFigure:BURSt:MACCuracy).

FETCh:BURSt:MACCuracy:PEAK:STATus?

This command reads out the status of the PEAK measurement of the modulation accuracy taken over the selected number of bursts.

0: failed, 1: passed

Example: "FETC:BURS:MACC:PEAK:STAT?"

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

Modes: BTS, MS

If no measurement has been performed yet, a query error results.
This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see `CONFigure:BURSt:MACCuracy`).

FETCh:BURSt:MACCuracy:PEAK:AVERage?

This command reads out the average of the PEAK measurement of the modulation accuracy taken over the selected number of bursts.

Example: "`FETC:BURS:MACC:PEAK:AVER?`"

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

Modes: BTS, MS

If no measurement has been performed yet, a query error results.
This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see `CONFigure:BURSt:MACCuracy`).

FETCh:BURSt:MACCuracy:PEAK:MAXimum?

This command reads out the maximum of the PEAK measurement of the modulation accuracy taken over the selected number of bursts.

Example: "`FETC:BURS:MACC:PEAK:MAX?`"

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

Modes: BTS, MS

If no measurement has been performed yet, a query error results.
This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see `CONFigure:BURSt:MACCuracy`).

FETCh:BURSt:MACCuracy:OSUPpress:STATus?

This command reads out the status of the original offset supression measurement of the modulation accuracy taken over the selected number of bursts.

0: failed, 1: passed

Example: "`FETC:BURS:MACC:OSUP:STAT?`"

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

Modes: BTS, MS

If no measurement has been performed yet, a query error results.
This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see `CONFigure:BURSt:MACCuracy`).

FETCh:BURSt:MACCuracy:OSUPpress:AVERage?

This command reads out the average of the original offset supression measurement of the modulation accuracy taken over the selected number of bursts.

Example: "FETC:BURS:MACC:OSUP:AVER?"

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

Modes: BTS, MS

If no measurement has been performed yet, a query error results.
This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see CONFigure:BURSt:MACCuracy).

FETCh:BURSt:MACCuracy:OSUPpress:MAXimum?

This command reads out the maximum of the original offset supression measurement of the modulation accuracy taken over the selected number of bursts.

Example: "FETC:BURS:MACC:OSUP:MAX?"

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

Modes: BTS, MS

If no measurement has been performed yet, a query error results.
This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see CONFigure:BURSt:MACCuracy).

FETCh:BURSt:MACCuracy:PERCentile:STATus?

This command reads out the status of the 95% percentile measurement of the modulation accuracy taken over the selected number of bursts.

0: failed, 1: passed

Example: "FETC:BURS:MACC:PERC:STAT?"

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

Modes: BTS, MS

If no measurement has been performed yet, a query error results.
This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see CONFigure:BURSt:MACCuracy).

FETCh:BURSt:MACCuracy:PERCentile:AVERage?

This command reads out the average of the 95% percentile measurement of the modulation accuracy taken over the selected number of bursts.

Example: "FETC:BURS:MACC:PERC:AVER?"

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

Modes: BTS, MS

If no measurement has been performed yet, a query error results.
This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see CONFigure:BURSt:MACCuracy).

FETCh:BURSt:MACCuracy:PERCentile:MAXimum?

This command reads out the maximum of the 95% percentile measurement of the modulation accuracy taken over the selected number of bursts.

Example: "FETC:BURS:MACC:PERC:MAX?"

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

Modes: BTS, MS

If no measurement has been performed yet, a query error results.
This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see CONFigure:BURSt:MACCuracy).

FETCh:BURSt:MACCuracy:FREQuency:STATus?

This command reads out the status of the frequency error measurement of the modulation accuracy taken over the selected number of bursts.

0: failed, 1: passed

Example: "FETC:BURS:MACC:FREQ:STAT?"

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

Modes: BTS, MS

If no measurement has been performed yet, a query error results.
This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see CONFigure:BURSt:MACCuracy).

FETCh:BURSt:MACCuracy:FREQuency:AVERage?

This command reads out the average of the frequency error measurement of the modulation accuracy taken over the selected number of bursts.

Example: "FETC:BURS:MACC:FREQ:AVER?"

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

Modes: BTS, MS

If no measurement has been performed yet, a query error results.
This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see CONFigure:BURSt:MACCuracy).

FETCh:BURSt:MACCuracy:FREQuency:MAXimum?

This command reads out the maximum of the frequency error measurement of the modulation accuracy taken over the selected number of bursts.

Example: "FETC:BURS:MACC:FREQ:MAX?"

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

Modes: BTS, MS

If no measurement has been performed yet, a query error results.
This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see CONFigure:BURSt:MACCuracy).

READ:BURSt:MACCuracy:RMS:STATus?

This command reads out the status of the RMS measurement of the modulation accuracy taken over the selected number of bursts.

0: failed, 1: passed

Example: "FETC:BURS:MACC:RMS:STAT?"

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

Modes: BTS, MS

If no measurement has been performed yet, a query error results.
This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see CONFigure:BURSt:MACCuracy).

READ:BURSt:MACCuracy:RMS:AVERage?

This command starts the measurement of the modulation accuracy of the base station or mobile and reads out the average of the RMS-measurement taken over the selected number of bursts.

Example: ":READ:BURS:MACC:RMS:AVER?"

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

Modes: BTS, MS

When the measurement is started the instrument automatically assumes the SINGLE mode.

An ongoing measurement can be aborted via the command ABORt. Further results of the modulation accuracy measurement can be then queried without restart of the measurement via the :FETCh:BURSt-subsystem.

This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see :CONFigure:BURSt:MACCuracy).

READ:BURSt:MACCuracy:RMS:MAXimum?

This command starts the measurement of the modulation accuracy of the base station or mobile and reads out the maximum of the RMS-measurement for the selected number of bursts.

Example: ":READ:BURS:MACC:RMS:MAX?"

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

Modes: BTS, MS

When the measurement is started the instrument automatically assumes the SINGLE mode.

An ongoing measurement can be aborted via the command ABORt. Further results of the modulation accuracy measurement can be then queried without restart of the measurement via the :FETCh:BURSt-subsystem.

This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see :CONFigure:BURSt:MACCuracy).

READ:BURSt:MACCuracy:PEAK:STATus?

This command starts the measurement of the modulation accuracy of the base station or mobile and reads out the status of the PEAK-measurement taken over the selected number of bursts.

0: failed, 1: passed

Example: ":READ:BURS:MACC:PEAK:STAT?"

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

Modes: BTS, MS

When the measurement is started the instrument automatically assumes the SINGLE mode.

An ongoing measurement can be aborted via the command ABORt. Further results of the modulation accuracy measurement can be then queried without restart of the measurement via the :FETCh:BURSt-subsystem.

This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see :CONFigure:BURSt:MACCuracy).

READ:BURSt:MACCuracy:PEAK:AVERage?

This command starts the measurement of the modulation accuracy of the base station or mobile and reads out the average of the PEAK-measurement taken over the selected number of bursts.

Example: ":READ:BURS:MACC:PEAK:AVER?"

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

Modes: BTS, MS

When the measurement is started the instrument automatically assumes the SINGLE mode.

An ongoing measurement can be aborted via the command ABORt. Further results of the modulation accuracy measurement can be then queried without restart of the measurement via the :FETCh:BURSt-subsystem.

This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see :CONFigure:BURSt:MACCuracy).

READ:BURSt:MACCuracy:PEAK:MAXimum?

This command starts the measurement of the modulation accuracy of the base station or mobile and reads out the maximum of the PEAK-measurement for the selected number of bursts.

Example: ":READ:BURS:MACC:PEAK:MAX?"

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

Modes: BTS, MS

When the measurement is started the instrument automatically assumes the SINGLE mode.

An ongoing measurement can be aborted via the command ABORt. Further results of the modulation accuracy measurement can be then queried without restart of the measurement via the :FETCh:BURSt-subsystem.

This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see :CONFigure:BURSt:MACCuracy).

:READ:BURSt:MACCuracy:OSUPpress:STATus?

This command starts the measurement of the modulation accuracy of the base station or mobile and reads out the status of the original offset suppression measurement taken over the selected number of bursts.

0: failed, 1: passed

Example: ":READ:BURS:MACC:OSUP:STAT?"

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

Modes: BTS, MS

When the measurement is started the instrument automatically assumes the SINGLE mode.

An ongoing measurement can be aborted via the command ABORt. Further results of the modulation accuracy measurement can be then queried without restart of the measurement via the :FETCh:BURSt-subsystem.

This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see :CONFigure:BURSt:MACCuracy).

READ:BURSt:MACCuracy:OSUPpress:AVERage?

This command starts the measurement of the modulation accuracy of the base station or mobile and reads out the average of the original offset suppression measurement taken over the selected number of bursts.

Example: ":READ:BURS:MACC:OSUP:AVER?"

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

Modes: BTS, MS

When the measurement is started the instrument automatically assumes the SINGLE mode.

An ongoing measurement can be aborted via the command ABORt. Further results of the modulation accuracy measurement can be then queried without restart of the measurement via the :FETCh:BURSt-subsystem.

This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see :CONFigure:BURSt:MACCuracy).

READ:BURSt:MACCuracy:OSUPpress:MAXimum?

This command starts the measurement of the modulation accuracy of the base station or mobile and reads out the maximum of the original offset suppression measurement for the selected number of bursts.

Example: ":READ:BURS:MACC:OSUP:MAX?"

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

Modes: BTS, MS

When the measurement is started the instrument automatically assumes the SINGLE mode.

An ongoing measurement can be aborted via the command ABORt. Further results of the modulation accuracy measurement can be then queried without restart of the measurement via the :FETCh:BURSt-subsystem.

This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see :CONFigure:BURSt:MACCuracy).

READ:BURSt:MACCuracy:PERCentile:STATus?

This command starts the measurement of the modulation accuracy of the base station or mobile and reads out the status of the 95% percentile measurement taken over the selected number of bursts.

0: failed, 1: passed

Example: ":READ:BURS:MACC:PERC:STAT?"

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

Modes: BTS, MS

When the measurement is started the instrument automatically assumes the SINGLE mode.

An ongoing measurement can be aborted via the command ABORt. Further results of the modulation accuracy measurement can be then queried without restart of the measurement via the :FETCh:BURSt-subsystem.

This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see :CONFigure:BURSt:MACCuracy).

READ:BURSt:MACCuracy:PERCentile:AVERage?

This command starts the measurement of the modulation accuracy of the base station or mobile and reads out the average of the 95% percentile measurement taken over the selected number of bursts.

Example: ":READ:BURS:MACC:PERC:AVER?"

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

Modes: BTS, MS

When the measurement is started the instrument automatically assumes the SINGLE mode.

An ongoing measurement can be aborted via the command ABORt. Further results of the modulation accuracy measurement can be then queried without restart of the measurement via the :FETCh:BURSt-subsystem.

This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see :CONFigure:BURSt:MACCuracy).

READ:BURSt:MACCuracy:PERCentile:MAXimum?

This command starts the measurement of the modulation accuracy of the base station or mobile and reads out the maximum of the 95% percentile measurement for the selected number of bursts.

Example: ":READ:BURS:MACC:PERC:MAX?"

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

Modes: BTS, MS

When the measurement is started the instrument automatically assumes the SINGLE mode.

An ongoing measurement can be aborted via the command ABORt. Further results of the modulation accuracy measurement can be then queried without restart of the measurement via the :FETCh:BURSt-subsystem.

This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see :CONFigure:BURSt:MACCuracy).

READ:BURSt:MACCuracy:FREQuency:STATus?

This command starts the measurement of the modulation accuracy of the base station or mobile and reads out the status of the frequency error measurement taken over the selected number of bursts.

0: failed, 1: passed

Example: ":READ:BURS:MACC:FREQ:STAT?"

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

Modes: BTS, MS

When the measurement is started the instrument automatically assumes the SINGLE mode.

An ongoing measurement can be aborted via the command ABORt. Further results of the modulation accuracy measurement can be then queried without restart of the measurement via the :FETCh:BURSt-subsystem.

This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see :CONFigure:BURSt:MACCuracy).

READ:BURSt:MACCuracy:FREQuency:AVERage?

This command starts the measurement of the modulation accuracy of the base station or mobile and reads out the average of the frequency error measurement taken over the selected number of bursts.

Example: ":READ:BURS:MACC:FREQ:AVER?"

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

Modes: BTS, MS

When the measurement is started the instrument automatically assumes the SINGLE mode.

An ongoing measurement can be aborted via the command ABORt. Further results of the modulation accuracy measurement can be then queried without restart of the measurement via the :FETCh:BURSt-subsystem.

This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see :CONFigure:BURSt:MACCuracy).

READ:BURSt:MACCuracy:FREQuency:MAXimum?

This command starts the measurement of the modulation accuracy of the base station or mobile and reads out the maximum of the frequency error measurement for the selected number of bursts.

Example: ":READ:BURS:MACC:FREQ:MAX?"

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

Modes: BTS, MS

When the measurement is started the instrument automatically assumes the SINGLE mode.

An ongoing measurement can be aborted via the command ABORt. Further results of the modulation accuracy measurement can be then queried without restart of the measurement via the :FETCh:BURSt-subsystem.

This command is a query only and therefore has no *RST value assigned. It is available only if measurement of the modulation accuracy is selected (see :CONFigure:BURSt:MACCuracy).

Table of Softkeys with IEC/IEEE Comman Assigment

MODULATION GMSK EDGE	*:CONFigure<1|2>[:MS]:MTYPe GMSK | EDGE*
POWER SETTINGS	*--*
OUTPUT MS POWER	*:CONFigure<1|2>[:MS]:POWer:EXPected <num_value> | EG1 | EG2| EG3* *EG1, EG1, EG3 nur bei EDGE mit Option K20*
MODULATION ACCURACY	*:CONFigure<1|2>:BURSt:MACCuracy[:IMMediate]* *only with Option K20*
SINGLE	*:INITiate<1|2>:CONTinuous OFF; :INITiate<1|2>[:IMMediate]* *:READ:BURSt:MACCuracy:RMS:STATus* *:READ:BURSt:MACCuracy:RMS:AVERage* *:READ:BURSt:MACCuracy:RMS:MAXimum* *:READ:BURSt:MACCuracy:PEAK:STATus* *:READ:BURSt:MACCuracy:PEAK:AVERage* *:READ:BURSt:MACCuracy:PEAK:MAXimum* *:READ:BURSt:MACCuracy:OSUPpress:STATus* *:READ:BURSt:MACCuracy:OSUPpress:AVERage* *:READ:BURSt:MACCuracy:OSUPpress:MAXimum* *:READ:BURSt:MACCuracy:PERCentile:STATus* *:READ:BURSt:MACCuracy:PERCentile:AVERage* *:READ:BURSt:MACCuracy:PERCentile:MAXimum* *:READ:BURSt:MACCuracy:FREQuency:STATus* *:READ:BURSt:MACCuracy:FREQuency:AVERage* *:READ:BURSt:MACCuracy:FREQuency:MAXimum*
CONTINUOUS	*:INITiate<1|2>:CONTinuous ON; :INITiate<1|2>[:IMMediate]* *:FETCh:BURSt:MACCuracy:RMS:STATus* *:FETCh:BURSt:MACCuracy:RMS:AVERage* *:FETCh:BURSt:MACCuracy:RMS:MAXimum* *:FETCh:BURSt:MACCuracy:PEAK:STATus* *:FETCh:BURSt:MACCuracy:PEAK:AVERage* *:FETCh:BURSt:MACCuracy:PEAK:MAXimum* *:FETCh:BURSt:MACCuracy:OSUPpress:STATus* *:FETCh:BURSt:MACCuracy:OSUPpress:AVERage* *:FETCh:BURSt:MACCuracy:OSUPpress:MAXimum* *:FETCh:BURSt:MACCuracy:PERCentile:STATus* *:FETCh:BURSt:MACCuracy:PERCentile:AVERage* *:FETCh:BURSt:MACCuracy:PERCentile:MAXimum* *:FETCh:BURSt:MACCuracy:FREQuency:STATus* *:FETCh:BURSt:MACCuracy:FREQuency:AVERage* *:FETCh:BURSt:MACCuracy:FREQuency:MAXimum*
NO. OF BURSTS	
SET MANUAL	*:CONFigure<1|2>:BURSt:MACCuracy:COUNt <num_value>*
SET TO STANDARD	*--*
ARFCN / FREQUENCY	*s. sub menu SETTINGS*

POWER SETTINGS	*s. sub menu SETTINGS*
X UNIT SYMB TIME	*:CALCulate<1|2>::X:UNIT:TIME S|SYM*
CONDITIONS NORM EXTR	*:CONFigure<1|2>:BURSt:MACCuracy:CONDitions NORMal | EXTReme*
TRIGGER	*s. sub menu SETTINGS*
EDIT	*--*
RMS EVM	*:CONFigure<1|2>[:MS]:LIMit:EVMRms <num_value>*
PEAK EVM	*:CONFigure<1|2>[:MS]:LIMit:EVMPeak <num_value>*
ORIG OFFS SUPPRESS	*:CONFigure<1|2>[:MS]:LIMit:OSUPpress <num_value>*
95% PERCENTILE	*:CONFigure<1|2>[:MS]:LIMit:PERCentile <num_value>*
FREQUENCY	*:CONFigure<1|2>[:MS]:LIMit:FREQuency <num_value>*
USER LIMIT ON OFF	*:CONFigure<1|2>[:MS]:LIMit:STANdard ON | OFF*

CONFIGURATION Key Group

MODE

- GSM BTS ANALYZER — *:INSTrument<1|2>[:SELect] BGSM*
  - SETTINGS — --
    - EXTERNAL ATTEN — *:[SENSe<1|2>:]CORRection:LOSS:INPut[:MAGNitude] <num_value>*
    - ARFCN / FREQUENCY — --
      - ARFCN — *CONFigure[:BTS]:ARFCn <num_value>*
      - ARFCN AUTOSELECT — *CONFigure[:BTS]:ARFCn:AUTO ONCE*
      - FREQUENCY — *SENSe<1|2>:FREQuency:CENTer <num_value>*
    - POWER SETTINGS — --
      - EXTERNAL ATTEN — *SENSe<1|2>:CORRection:LOSS:INPut[:MAGNitude] <num_value>*
      - NOMINAL OUTPUT PWR — *CONFigure[:BTS]:POWer:EXPected <num_value>*
      - POWER CLASS — *CONFigure[:BTS]:POWer:CLASs <num_value> | M1 | M2 | M3 | P1*
      - STATIC PWR CTRL LEVEL — *CONFigure[:BTS]:POWer:STATic <num_value>*
      - DYNAM PWR CTRL LEVEL — *CONFigure[:BTS]:POWer:DYNamic <num_value>*
      - STATION TYPE — *CONFigure[:BTS]:STYPe NORMal | MICRo | PICO*
      - LIMIT/PWR COUPLED — *CONFigure[:BTS]:POWer:COUPled ON | OFF*
      - SIGNAL POWER — *CONFigure[:BTS]:POWer:EXPected <num_value>*
      - LIMIT LINE REF POWER — *CONFigure[:BTS]:POWer:LIMit <num_value>*
    - LIMIT MARGIN — *:CALCulate<1|2>:LIMit<1...8>:MARGin <num_value>*
    - SLOT NO. — --
      - SLOT NO. — *CONFigure[:BTS]:CHANnel:SLOT 0...7*
      - SLOT NO. AUTOSELECT — *CONFigure[:BTS]:CHANnel:SLOT:AUTO ONCE*

MIDAMBLE	*CONFigure[:BTS]:CHANnel:TSC 0...7* *CONFigure[:BTS]:CHANnel:TSC:AUTO ON | OFF*
TRIGGER	--
FREE RUN	*:TRIGger<1|2>[:SEQuence]:SOURce IMMediate*
EXTERN	*:TRIGger<1|2>[:SEQuence]:SOURce EXTernal* *:TRIGger<1|2>[:SEQuence]:LEVel[:EXTernal] -5.0...+5.0V*
SLOPE POS NEG	*:TRIGger<1|2>[:SEQuence]:SLOPe POSitive|NEGative*
TRIGGER ADJUST	--
FRAME COARSE	*:TRIGger<1|2>[:SEQuence]:SYNChronize:ADJust:FRAMe <num_value>*
FRAME FINE	*:TRIGger<1|2>[:SEQuence]:SYNChronize:ADJust:FRAMe <num_value>*
AUTO FRAME ADJUST	*:TRIGger<1|2>[:SEQuence]:SYNChronize:ADJust:FRAMe:AUTO ONCE*
SLOT ADJUST	*:TRIGger<1|2>[:SEQuence]:SYNChronize:ADJust:SLOT <num_value>*
AUTO SLOT ADJUST	*:TRIGger<1|2>[:SEQuence]:SYNChronize:ADJust:SLOT:AUTO ONCE*
TRIGGER LEVEL	*:TRIGger<1|2>[:SEQuence]:LEVel[:EXTernal] <num_value>*
SLOPE POS NEG	*:TRIGger<1|2>[:SEQuence]:SLOPe POSitive|NEGative*
DEFAULT SETTINGS	*CONFigure[:BTS]:PRESet*
P-GSM 900	*CONFigure[:BTS]:NETWork[:TYPE] PGSM | PGSM900*
GSM 1800 (DCS 1800)	*CONFigure[:BTS]:NETWork[:TYPE] DCS | GSM1800*
GSM 1900 (PCS 1900)	*CONFigure[:BTS]:NETWork[:TYPE] PCS | GSM1900*
R-GSM 900	*CONFigure[:BTS]:NETWork[:TYPE] RGSM | RGSM900*
R-GSM 900	*CONFigure[:BTS]:NETWork[:TYPE] RGSM*
PHASE I	*CONFigure[:BTS]:NETWork:PHASe 1*
PHASE II	*CONFigure[:BTS]:NETWork:PHASe 2*
PHASE II+	*CONFigure[:BTS]:NETWork:PHASe 2,PLUS*
MODULATION GMSK EDGE	*:CONFigure<1|2>[:MS]:MTYPe GMSK | EDGE* *only with Option K21*

PHASE/FREQ ERROR	*CONFigure:BURSt:PFERror[:IMMediate]*
SINGLE	*:INITiate<1|2>:CONTinuous OFF; :INITiate<1|2>[:IMMediate]* *:READ:BURSt:PERRor:RMS:STATus?* *:READ:BURSt:PERRor:RMS:AVERage?* *:READ:BURSt:PERRor:RMS:MAXimum?* *:READ:BURSt:PERRor:PEAK:STATus?* *:READ:BURSt:PERRor:PEAK:AVERage?* *:READ:BURSt:PERRor:PEAK:MAXimum?* *:READ:BURSt:FERRor:STATus?* *:READ:BURSt:FERRor:AVERage?* *:READ:BURSt:FERRor:MAXimum?*
CONTINUOUS	*:INITiate<1|2>:CONTinuous ON; :INITiate<1|2>[:IMMediate]* *:FETCh:BURSt:PERRor:RMS:STATus?* *:FETCh:BURSt:PERRor:RMS:AVERage?* *:FETCh:BURSt:PERRor:RMS:MAXimum?* *:FETCh:BURSt:PERRor:PEAK:STATus?* *:FETCh:BURSt:PERRor:PEAK:AVERage?* *:FETCh:BURSt:PERRor:PEAK:MAXimum?* *:FETCh:BURSt:FERRor:STATus?* *:FETCh:BURSt:FERRor:AVERage?* *:FETCh:BURSt:FERRor:MAXimum?*
NO. OF BURSTS	*--*
SET MANUAL	*:CONFigure<1|2>:BURSt:PFERror:COUNt <num_value>*
SET TO STANDARD	*--*
ARFCN / FREQUENCY	*s. sub menu SETTINGS*
POWER SETTINGS	*s. sub menu SETTINGS*
X UNIT SYMB TIME	*:CALCulate<1|2>:X:UNIT:TIME S|SYM*
CONDITIONS NORM EXTR	*:CONFigure<1|2>:BURSt:PFERror:CONDitions NORMal | EXTReme*
TRIGGER	*s. sub menu SETTINGS*
EDIT	*--*
PHASE PEAK	*:CONFigure<1|2>[:BTS]:LIMit:PPEak <num_value>*
PHASE RMS	*:CONFigure<1|2>[:BTS]:LIMit:PRMS <num_value>*
FREQUENCY	*:CONFigure<1|2>[:BTS]:LIMit:FREQuency <num_value>*
USER LIMIT ON OFF	*:CONFigure<1|2>[:BTS]:LIMit:STANdard ON | OFF*
MODULATION ACCURACY	*:CONFigure<1|2>:BURSt:MACCuracy[:IMMediate]* *only with Option K14*

SINGLE	*:INITiate<1|2>:CONTinuous OFF; :INITiate<1|2>[:IMMediate]* *:READ:BURSt:MACCuracy:RMS:STATus* *:READ:BURSt:MACCuracy:RMS:AVERage* *:READ:BURSt:MACCuracy:RMS:MAXimum* *:READ:BURSt:MACCuracy:PEAK:STATus* *:READ:BURSt:MACCuracy:PEAK:AVERage* *:READ:BURSt:MACCuracy:PEAK:MAXimum* *:READ:BURSt:MACCuracy:OSUPpress:STATus* *:READ:BURSt:MACCuracy:OSUPpress:AVERage* *:READ:BURSt:MACCuracy:OSUPpress:MAXimum* *:READ:BURSt:MACCuracy:PERCentile:STATus* *:READ:BURSt:MACCuracy:PERCentile:AVERage* *:READ:BURSt:MACCuracy:PERCentile:MAXimum* *:READ:BURSt:MACCuracy:FREQuency:STATus* *:READ:BURSt:MACCuracy:FREQuency:AVERage* *:READ:BURSt:MACCuracy:FREQuency:MAXimum*
CONTINUOUS	*:INITiate<1|2>:CONTinuous ON; :INITiate<1|2>[:IMMediate]* *:FETCh:BURSt:MACCuracy:RMS:STATus* *:FETCh:BURSt:MACCuracy:RMS:AVERage* *:FETCh:BURSt:MACCuracy:RMS:MAXimum* *:FETCh:BURSt:MACCuracy:PEAK:STATus* *:FETCh:BURSt:MACCuracy:PEAK:AVERage* *:FETCh:BURSt:MACCuracy:PEAK:MAXimum* *:FETCh:BURSt:MACCuracy:OSUPpress:STATus* *:FETCh:BURSt:MACCuracy:OSUPpress:AVERage* *:FETCh:BURSt:MACCuracy:OSUPpress:MAXimum* *:FETCh:BURSt:MACCuracy:PERCentile:STATus* *:FETCh:BURSt:MACCuracy:PERCentile:AVERage* *:FETCh:BURSt:MACCuracy:PERCentile:MAXimum* *:FETCh:BURSt:MACCuracy:FREQuency:STATus* *:FETCh:BURSt:MACCuracy:FREQuency:AVERage* *:FETCh:BURSt:MACCuracy:FREQuency:MAXimum*
NO. OF BURSTS	
SET MANUAL	*:CONFigure<1|2>:BURSt:MACCuracy:COUNt <num_value>*
SET TO STANDARD	*--*
ARFCN / FREQUENCY	*s. sub menu SETTINGS*
POWER SETTINGS	*s. sub menu SETTINGS*
X UNIT SYMB TIME	*:CALCulate<1|2>::X:UNIT:TIME S|SYM*
CONDITIONS NORM EXTR	*:CONFigure<1|2>:BURSt:MACCuracy:CONDitions NORMal | EXTReme*
TRIGGER	*s. sub menu SETTINGS*
EDIT	*--*
RMS EVM	*:CONFigure<1|2>[:BTS]:LIMit:EVMRms <num_value>*

PEAK EVM	*:CONFigure<1|2>[:BTS]:LIMit:EVMPeak <num_value>*
ORIG OFFS SUPPRESS	*:CONFigure<1|2>[:BTS]:LIMit:OSUPpress <num_value>*
95% PERCENTILE	*:CONFigure<1|2>[:BTS]:LIMit:PERCentile <num_value>*
FREQUENCY	*:CONFigure<1|2>[:BTS]:LIMit:FREQuency <num_value>*
USER LIMIT ON OFF	*:CONFigure<1|2>[:BTS]:LIMit:STANdard ON | OFF*
CARRIER POWER	*:CONFigure<1|2>:BURSt:POWer[:IMMediate]* *:CALCulate<1|2>:LIMit:BURSt:POWer?*
MEAS MAX OUTPUT PWR	*:READ:BURSt:POWer?*
INC STATIC PWR CTRL	*:READ:BURSt:POWer:STATic?*
INC DYNAM PWR CTRL	*:READ:BURSt:POWer:DYNamic?*
NO. OF BURSTS	--
SET MANUAL	*:CONFigure<1|2>:BURSt:POWer:COUNt <num_value>*
SET TO STANDARD	--
SGL MEAS ON OFF	*:CONFigure<1|2>[:BTS]:POWer:SINGle[:STATe] ON | OFF*
MEAS SGL PWR LEVEL	*:READ:BURSt:POWer?*
STATIC PWR CTRL LEVEL	*:CONFigure<1|2>[:BTS]:POWer:STATic <num_value>*
DYNAM PWR CTRL LEVEL	*:CONFigure<1|2>[:BTS]:POWer:DYNamic <num_value>*
CLEAR SGL RESULT TAB	*:CONFigure<1|2>[:BTS]:POWer:SINGle:CLEar*
SIGNAL POWER	*:CONFigure<1|2>[:BTS]:POWer:EXPected <num_value>*
ARFCN / FREQUENCY	*s. sub menu SETTINGS*
POWER SETTINGS	*s. sub menu SETTINGS*
CONDITIONS NORM EXTR	*:CONFigure<1|2>:BURSt:POWer:CONDition NORMal | EXTReme*
MEAS BANDWIDTH	*:[SENSe<1|2>:]BANDwidth|BWIDth[:RESolution] DEF | 300kHz | 1MHz*
SYNC TO MIDAMBLE	*:TRIGger<1|2>[:SEQuence]:SYNChronize:SOURce FRAMe | TSC*

TRIGGER	*s. sub menu SETTINGS*
POWER VS TIME	*:CONFigure<1|2>:BURSt:PTEMplate[:IMMediate]* *:CALCulate<1|2>:LIMit:BURSt:PTEMplate?*
SINGLE	*:INITiate<1|2>:CONTinuous OFF; :INITiate<1|2>[:IMMediate]*
CONTINUOUS	*:INITiate<1|2>:CONTinuous ON; :INITiate<1|2>[:IMMediate]*
BURST HIGH RESOLUTION	*:CONFigure<1|2>:BURSt:PTEMplate:SELect TOP*
NO. OF BURSTS	--
SET MANUAL	*:CONFigure<1|2>:BURSt:PTEMplate:COUNt <num_value>*
SET TO STANDARD	--
FULL BURST	*:CONFigure<1|2>:BURSt:PTEMplate:SELect FULL*
RISING EDGE	*:CONFigure<1|2>:BURSt:PTEMplate:SELect RISing*
FALLING EDGE	*:CONFigure<1|2>:BURSt:PTEMplate:SELect FALLing*
START REF MEAS	*:READ:BURSt:REFerence[:IMMediate]?*
REF MEAS AUTO USER	*:CONFigure<1|2>:BURSt:REFerence:AUTO ON | OFF*
ARFCN / FREQUENCY	*s. sub menu SETTINGS*
POWER SETTINGS	*s. sub menu SETTINGS*
X UNIT SYMB TIME	*CALCulate:X:UNIT:TIME S|SYM*
MEAS BANDWIDTH	*:[SENSe<1|2>:]BANDwidth|BWIDth[:RESolution] DEF | 300 kHz | 1 MHz*
SYNC TO MIDAMBLE	*:TRIGger<1|2>[:SEQuence]:SYNChronize:SOURce FRAMe | TSC*
TRIGGER	*s. sub menu SETTINGS*
EDIT	--
LIMIT LINE FILTER	--
NEW LIMIT LINE	*s. basic instrument*
EDIT LIMIT LINE	*s. basic instrument*

COPY LIMIT LINE	*s. basic instrument*
DELETE LIMIT LINE	*s. basic instrument*
USER LIMIT ON OFF	*:CONFigure<1|2>[:BTS]:LIMit:STANdard ON | OFF*
PAGE UP	*--*
PAGE DOWN	*--*
MODULATION SPECTRUM	*:CONFigure<1|2>:SPECtrum:MODulation[:IMMediate]* *:CALCulate<1|2>:LIMit:SPECtrum:MODulation?* *ARFCn|TXBand|RXBand|COMBined* *:CALCulate<1|2>:LIMit:SPECtrum:MODulation:FAILs?* *:CALCulate<1|2>:LIMit:SPECtrum:MODulation:EXCeptions?*
SINGLE FREQ SWEEP	*:INITiate<1|2>:CONTinuous OFF; :INITiate<1|2>[:IMMediate]*
CONTINUOUS FREQ SWEEP	*:INITiate<1|2>:CONTinuous ON; :INITiate<1|2>[:IMMediate]*
START LIST	*:READ:SPECtrum:MODulation[:ALL]?*
NO. OF BURSTS	*--*
SET MANUAL	*:CONFigure<1|2>:SPECtrum:MODulation:COUNt <num_value>*
SET TO STANDARD	*--*
ARFCN ±1.8 MHZ	*:CONFigure<1|2>:SPECtrum:MODulation:RANGe ARFCn*
TX BAND	*:CONFigure<1|2>:SPECtrum:MODulation:RANGe TXBand*
±1.8 MHZ / TX BAND	*:CONFigure<1|2>:SPECtrum:MODulation:RANGe COMBined*
RX BAND	*:CONFigure<1|2>:SPECtrum:MODulation:RANGe RXBand*
ARFCN / FREQUENCY	*s. sub menu SETTINGS*
POWER SETTINGS	*s. sub menu SETTINGS*
RX BAND GAIN	*:[SENSe<1|2>:]CORRection:RXGain:INPut[:MAGNitude] <num_value>*
TX GATE ON OFF	*:CONFigure<1|2>:SPECtrum:MODulation:TGATe ON | OFF*
TRIGGER	*s. sub menu SETTINGS*

EDIT	--
LIMIT LINE FILTER	--
NEW LIMIT LINE	*s. basic instrument*
EDIT LIMIT LINE	*s. basic instrument*
COPY LIMIT LINE	*s. basic instrument*
DELETE LIMIT LINE	*s. basic instrument*
USER LIMIT ON OFF	*:CONFigure<1|2>[:BTS]:LIMit:STANdard ON | OFF*
PAGE UP	--
PAGE DOWN	--
TRANSIENT SPECTRUM	*:CONFigure<1|2>:SPECtrum:SWITching[:IMMediate]* *:CALCulate<1|2>:LIMit:SPECtrum:SWITching?* *:CALCulate<1|2>:LIMit:SPECtrum:SWITching:FAILs?*
SINGLE FREQ SWEEP	*:INITiate<1|2>:CONTinuous OFF; :INITiate<1|2>[:IMMediate]*
CONTINUOUS FREQ SWEEP	*:INITiate<1|2>:CONTinuous ON; :INITiate<1|2>[:IMMediate]*
START LIST	*:READ:SPECtrum:SWITching[:ALL]?*
NO. OF BURSTS	--
SET MANUAL	*:CONFigure<1|2>:SPECtrum:SWITching:COUNt <num_value>*
SET TO STANDARD	--
ARFCN / FREQUENCY	*s. sub menu SETTINGS*
POWER SETTINGS	*s. sub menu SETTINGS*
BTS SFH ON OFF	*:CONFigure<1|2>[:BTS]:CHANnel:SFH ON | OFF*
MEAS BANDWIDTH	*:[SENSe<1|2>:]BANDwidth|BWIDth[:RESolution] DEF | 300kHz | 1MHz*
TRIGGER	*s. sub menu SETTINGS*
EDIT	--
LIMIT LINE FILTER	--

NEW LIMIT LINE	*s. basic instrument*
EDIT LIMIT LINE	*s. basic instrument*
COPY LIMIT LINE	*s. basic instrument*
DELETE LIMIT LINE	*s. basic instrument*
USER LIMIT ON OFF	*:CONFigure<1|2>[:BTS]:LIMit:STANdard ON | OFF*
PAGE UP	*--*
PAGE DOWN	*--*
SPURIOUS	*:CONFigure<1|2>:SPURious[:IMMediate]* *:CALCulate<1|2>:LIMit:SPURious? TXBand | OTXBand | RXBand* *:CALCulate<1|2>:LIMit:SPURious:FAILs? TXBand | OTXBand | RXBand*
START LIST SGL STEP	*ABORT;:READ:SPURious:STEP?*
CONT LIST SGL STEP	*:READ:SPURious:STEP?*
START LIST	*:READ:SPURious [:ALL]?*
SWEEP COUNT	*--*
SWP COUNT TX / <> TX	*:CONFigure<1|2>:SPURious:COUNt <num_value>*
SWP COUNT RX BAND	*:CONFigure<1|2>:SPURious:COUNt:RXBand <num_value>*
SET TO STANDARD	*--*
TX BAND	*:CONFigure<1|2>:SPURious:RANGe TXBand*
<> TX BAND	*:CONFigure<1|2>:SPURious:RANGe OTXBand*
RX BAND	*:CONFigure<1|2>:SPURious:RANGe RXBand*
TX BAND ±2.MHZ	*:CONFigure<1|2>:SPURious:RANGe COMBined*
SELECT STEP	*:CONFigure<1|2>:SPURious:STEP:COUNT?* *:CONFigure<1|2>:SPURious:STEP<1..26> ON | OFF*
ARFCN / FREQUENCY	*s. sub menu SETTINGS*
POWER SETTINGS	*s. sub menu SETTINGS*

BTS SFH ON OFF	*:CONFigure<1|2>[:BTS]:CHANnel:SFH ON | OFF*
TX SUPPR ON OFF	*:CONFigure<1|2>[:BTS]:TXSupp ON | OFF*
RX BAND GAIN	*:[SENSe<1|2>:]CORRection:RXGain:INPut[:MAGNitude] <num_value>*
COSITING	*:CONFigure<1|2>[:BTS]:COSiting ON | OFF*
SWEEPTIME STD AUTO	*:CONFigure<1|2>[:BTS]:SWEeptime STANdard|AUTO*
TRIGGER	*s. sub menu SETTINGS*
EDIT	--
LIMIT LINE FILTER	--
NEW LIMIT LINE	*s. basic instrument*
EDIT LIMIT LINE	*s. basic instrument (units DB | DBM)*
COPY LIMIT LINE	*s. basic instrument*
DELETE LIMIT LINE	*s. basic instrument*
USER LIMIT ON OFF	*:CONFigure<1|2>[:BTS]:LIMit:STANdard ON | OFF*
PAGE UP	--
PAGE DOWN	--

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