

Supplement



Digital Standard XM Radio

R&S[®] AMU-K56
1402.9905.02

R&S[®] SMATE-K56
1404.7751.02

R&S[®] SMJ-K56
1404.1806.02

R&S[®] SMU-K56
1161.1162.02

R&S[®] AFQ-K256
1401.6002.02

R&S[®] SMJ-K256
1409.2606.02

R&S[®] SMU-K256
1161.1240.02



Dear Customer,

The Signal Generator includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (<http://www.openssl.org/>).

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Trade names are trademarks of the owners.

Grouped Safety Messages









Make sure to read through and observe the following safety instructions!







All plants and locations of the Rohde & Schwarz group of companies make every effort to keep the safety standard of our products up to date and to offer our 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. The product described here 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, the Rohde & Schwarz group of companies 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, if expressly permitted, also 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 product documentation and within its performance limits (see data sheet, documentation, the following safety instructions). Using the product requires technical skills and a basic knowledge of English. It is therefore essential that only skilled and specialized staff or thoroughly trained personnel with the required skills be allowed to use the product. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation. Keep the basic safety instructions and the product documentation in a safe place and pass them on to the subsequent users.

Symbols and safety labels

							
Observe product documentation	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 relevant parts of the product documentation. In these safety instructions, the word "product" refers to all merchandise sold and distributed by the Rohde & Schwarz group of companies, including instruments, systems and all accessories.

Tags and their meaning

DANGER	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	NOTICE indicates a property damage message. In the product documentation, the word ATTENTION is used synonymously.

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 in other economic areas or military applications. It is therefore essential to make sure that the tags described here are always used only in connection with the related product documentation and the related product. The use of tags in connection with unrelated products or documentation can result in misinterpretation 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 2000 m above sea level, max. transport altitude 4500 m above sea level.
A tolerance of $\pm 10\%$ shall apply to the nominal voltage and of $\pm 5\%$ to the nominal frequency.
2. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed. The product may be opened only by authorized, specially trained personnel. Prior to performing any work on the product or opening the product, the product must be disconnected from the supply network. Any adjustments, replacements of parts, maintenance or repair must be carried out only by technical personnel authorized by Rohde & Schwarz. Only original parts may be used for replacing parts relevant to safety (e.g. power switches, power transformers, fuses). A safety test must always be performed after parts relevant to safety have been replaced (visual inspection, PE conductor test, insulation resistance measurement, leakage current measurement, functional test).
3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens, e.g. nickel) such as aluminum cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties), consult a physician immediately to determine the cause.
4. If products/components are mechanically and/or thermally processed in a manner that goes beyond their intended use, hazardous substances (heavy-metal dust such as lead, beryllium, nickel) may be released. For this reason, the product may only be disassembled, e.g. for disposal purposes, by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed.

5. If handling the product yields hazardous substances or fuels that must be disposed of in a special way, e.g. coolants or engine oils that must be replenished regularly, the safety instructions of the manufacturer of the hazardous substances or fuels and the applicable regional waste disposal regulations must be observed. Also observe the relevant safety instructions in the product documentation.
6. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn life requires increased protection, pregnant women should be protected by appropriate measures. Persons with pacemakers may also be endangered by electromagnetic radiation. The employer/operator 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 (corresponding to the 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. Check the power cable on a regular basis to ensure that it is in proper operating condition. 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 (higher fuse only after consulting with the Rohde & Schwarz group of companies).
14. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise, this can result in sparks, fire and/or injuries.
15. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.
16. For measurements in circuits with voltages $V_{\text{rms}} > 30 \text{ V}$, suitable measures (e.g. appropriate measuring equipment, fusing, current limiting, electrical separation, insulation) should be taken to avoid any hazards.
17. Ensure that the connections with information technology equipment comply with IEC 950/EN 60950.
18. Unless expressly permitted, never remove the cover or any part of the housing while the product is in operation. Doing so 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 license electrician.

Grouped Safety Messages

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 liquids, unless otherwise specified (see also safety instruction 1.). If this is not taken into account, there exists the danger of electric shock for the user 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. Do not short-circuit batteries and storage batteries.
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 must be recycled and kept separate from residual waste. Batteries and storage batteries that contain lead, mercury or cadmium are hazardous waste. Observe the national regulations regarding waste disposal and recycling.
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. The product can be very heavy. Be careful when moving it to avoid back or other physical injuries.
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 product 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.
34. Prior to cleaning, disconnect the product from the AC supply. Use a soft, non-linting cloth to clean the product. Never use chemical cleaning agents such as alcohol, acetone or diluent for cellulose lacquers.

Informaciones elementales de seguridad

¡Es imprescindible leer y observar las siguientes instrucciones e informaciones de seguridad!







El principio del grupo de empresas Rohde & Schwarz consiste en tener nuestros productos siempre al día con los estándares de seguridad y de ofrecer a nuestros 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. El presente producto ha sido fabricado y examinado según el comprobante de conformidad adjunto según las normas de la CE y ha salido de nuestra planta en estado impecable según los estándares técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, el usuario deberá atenerse a todas las indicaciones, informaciones de seguridad y notas de alerta. El grupo de empresas 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 está destinado exclusivamente al uso en la industria y el laboratorio o, si ha sido expresamente autorizado, para aplicaciones de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda sufrir daño. 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 mal uso del producto.

Se parte del uso correcto del producto para los fines definidos si el producto es utilizado dentro de las instrucciones de la correspondiente documentación de producto y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso del producto hace necesarios conocimientos profundos y conocimientos básicas del idioma inglés. Por eso se debe tener en cuenta que el producto sólo pueda ser operado por personal especializado o personas minuciosamente instruidas con las capacidades correspondientes. 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. Guarde bien las informaciones de seguridad elementales, así como la documentación del producto y entréguela a usuarios posteriores.

Símbolos y definiciones de seguridad

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

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

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 el capítulo correspondiente de la documentación de producto y que también son obligatorias de seguir. En las informaciones de seguridad actuales hemos juntado todos los objetos vendidos por el grupo de empresas 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	Identifica un peligro directo con riesgo elevado de provocar muerte o lesiones de gravedad si no se toman las medidas oportunas.
ADVERTENCIA	Identifica un posible peligro con riesgo medio de provocar muerte o lesiones (de gravedad) si no se toman las medidas oportunas.
ATENCIÓN	Identifica un peligro con riesgo reducido de provocar lesiones de gravedad media o leve si no se toman las medidas oportunas.
AVISO	Indica la posibilidad de utilizar mal el producto y a consecuencia dañarlo.

En la documentación del producto se emplea de forma sinónima el término CUIDADO.

Las palabras de señal corresponden a la definición habitual para aplicaciones civiles en el área económica europea. Pueden existir definiciones diferentes a esta definición en otras áreas económicas o en aplicaciones militares. Por eso se deberá tener en cuenta que las palabras de señal aquí descritas sean utilizadas siempre solamente en combinación con la correspondiente documentación de producto 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 por principio 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, transporte hasta 4.500 m sobre el nivel del mar.
Se aplicará una tolerancia de $\pm 10\%$ sobre el voltaje nominal y de $\pm 5\%$ sobre la frecuencia nominal.
2. En todos los trabajos deberán ser tenidas en cuenta las normas locales de seguridad de trabajo y de prevención de accidentes. El producto solamente debe de ser abierto por personal especializado 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. Después 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 la corriente conductora, control de funcionamiento).

3. Como en todo producto de fabricación industrial no puede ser excluido en general de que se produzcan al usarlo elementos que puedan generar alergias, los llamados elementos alergénicos (por ejemplo el níquel). Si se produjeran en el trato con productos R&S reacciones alérgicas, como por ejemplo urticaria, estornudos frecuentes, irritación de la conjuntiva o dificultades al respirar, se deberá consultar inmediatamente a un médico para averiguar los motivos de estas reacciones.
 4. Si productos / elementos de construcción son tratados fuera del funcionamiento definido de forma mecánica o térmica, pueden generarse elementos peligrosos (polvos de sustancia de metales pesados como por ejemplo plomo, berilio, níquel). La partición elemental del producto, como por ejemplo sucede en el tratamiento de materias residuales, debe de ser efectuada solamente por personal especializado para estos tratamientos. La partición elemental efectuada inadecuadamente puede generar daños para la salud. Se deben tener en cuenta las directivas nacionales referentes al tratamiento de materias residuales.
 5. En el caso de que se produjeran agentes de peligro o combustibles en la aplicación del producto que debieran de ser transferidos a un tratamiento de materias residuales, como por ejemplo agentes refrigerantes que deben ser repuestos en periodos definidos, o aceites para motores, deberán ser tenidas en cuenta las prescripciones de seguridad del fabricante de estos agentes de peligro o combustibles y las regulaciones regionales para el tratamiento de materias residuales. Cuiden también de tener en cuenta en caso dado las prescripciones de seguridad especiales en la descripción del producto.
 6. Ciertos productos, como por ejemplo las instalaciones de radiocomunicación RF, 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/usuario está comprometido a valorar y señalar áreas de trabajo en las que se corra un riesgo aumentado de exposición a radiaciones para evitar riesgos.
7. La utilización de los productos requiere instrucciones especiales y una alta concentración en el manejo. Debe de ponerse por seguro de que las personas que manejen los productos estén a la altura de los requerimientos necesarios referente a sus aptitudes físicas, psíquicas y emocionales, ya que de otra manera no se pueden excluir lesiones o daños de objetos. El empresario lleva la responsabilidad de seleccionar el personal usuario apto para el manejo de los productos.
 8. Antes de la puesta en marcha del producto se deberá tener por seguro de que la tensión preseleccionada en el producto equivalga a la del la red de distribución. Si es necesario cambiar la preselección de la tensión también se deberán en caso dabo cambiar los fusibles correspondientes del producto.
 9. Productos de la clase de seguridad I con alimentación móvil y enchufe individual de producto solamente deberán ser conectados para el funcionamiento a tomas de corriente de contacto de seguridad y con conductor protector conectado.
 10. Queda prohibida toda clase de interrupción intencionada del conductor protector, tanto en la toma de corriente como en el mismo producto. 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 (según la 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 bastidores o instalaciones, se deberá instalar el interruptor al nivel de la instalación.

12. No utilice nunca el producto si está dañado el cable eléctrico. Compruebe regularmente el correcto estado de los cables de conexión a red. 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 (utilización de fusibles de mayor amperaje sólo previa consulta con el grupo de empresas Rohde & Schwarz).
14. Nunca conecte el enchufe en tomas de corriente sucias o llenas de polvo. Introduzca el enchufe por completo y fuertemente en la toma de corriente. Si no tiene en consideración estas indicaciones se arriesga a que se originen chispas, fuego y/o heridas.
15. No sobrecargue las tomas de corriente, los cables de extensión o los enchufes de extensión ya que esto pudiera causar fuego o golpes de corriente.
16. En las mediciones en circuitos de corriente con una tensión de entrada de $U_{eff} > 30$ 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 del estándar IEC950/EN60950.
18. A menos que esté permitido expresamente, no retire nunca la tapa ni componentes de la carcasa mientras el producto esté en servicio. Esto pone a descubierto los cables y componentes eléctricos y puede causar heridas, fuego o daños en el producto.
19. Si un producto es instalado fijamente en un lugar, se deberá primero conectar el conductor protector fijo con el conductor protector del aparato antes de hacer cualquier otra conexión. La instalación y la conexión deberán ser efectuadas por un electricista especializado.
20. En caso de que los productos que son instalados fijamente en un lugar sean sin protector implementado, autointerruptor o similares objetos de protección, el circuito de suministro de corriente deberá estar protegido de manera que usuarios y productos 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 cortocircuitos 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 líquidos 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 para el usuario 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. No cortocircuitar baterías ni acumuladores. Si las baterías o los acumuladores no son cambiados con la debida atención existirá peligro de explosión (atención células de litio). Cambiar las baterías o los acumuladores solamente por los del tipo R&S correspondiente (ver lista de piezas de recambio). Las baterías y acumuladores deben reutilizarse y no deben acceder a los vertederos. Las baterías y acumuladores que contienen plomo, mercurio o cadmio deben tratarse como residuos especiales. Respete en esta relación las normas nacionales de evacuación y reciclaje.
28. 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.
29. El producto puede poseer un peso elevado. Muévelo con cuidado para evitar lesiones en la espalda u otras partes corporales.
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 sujeción 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 observadas. 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. El fabricante no asumirá ninguna clase de responsabilidad por accidentes o colisiones.
33. Dado el caso de que esté integrado un producto de láser en un producto R&S (por ejemplo CD/DVD-ROM) no utilice otras instalaciones o funciones que las descritas en la documentación de producto. De otra manera pondrá en peligro su salud, ya que el rayo láser puede dañar irreversiblemente sus ojos. Nunca trate de descomponer estos productos. Nunca mire dentro del rayo láser.
34. Antes de proceder a la limpieza, desconecte el producto de la red. Realice la limpieza con un paño suave, que no se deshilache. No utilice de ninguna manera agentes limpiadores químicos como, por ejemplo, alcohol, acetona o nitrodiluyente.

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Digital Standard XM-RADIO

Introduction - XM-RADIO

The R&S Signal Generator enables you to generate signals in accordance with the XM-Radio standard. The equipment layout for generating XM-Radio signals includes the options Baseband Main Module (B13), Baseband Generator (B9/B10/B11) and XM-Radio (K56).

Per baseband, one satellite signal or one terrestrial signal can be generated.

In the case of two-path instruments, at least one further option R&S B9/B10/B11 (Baseband Generator) is needed for generating a XM-Radio signal in the second path.

Modulation System XM-RADIO

The XM-Radio signal consists of ensemble A and ensemble B.

Within an ensemble, the XM-Radio signal is transmitted via two satellites (QPSK-modulation) and additionally via one terrestrial repeater (COFDM-modulation).

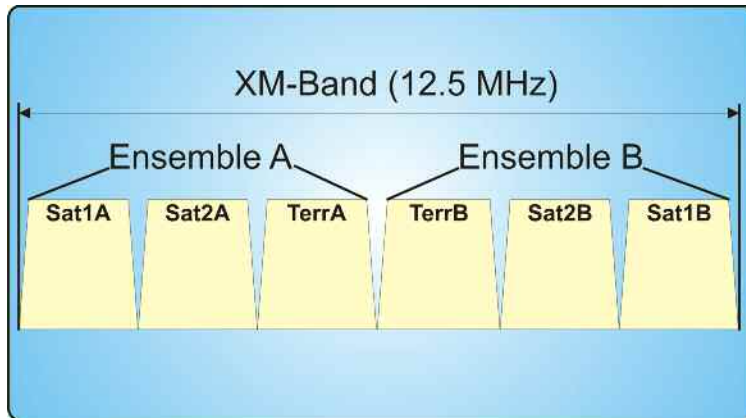


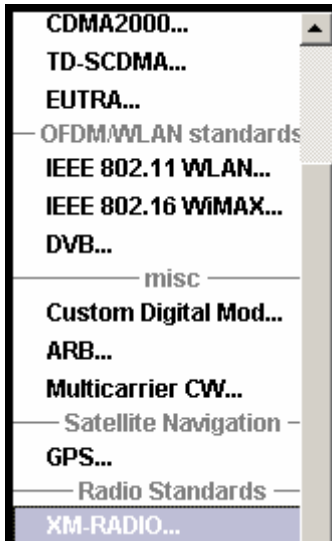
Fig. 1 XM-Radio Frequency Band

The following table shows the carrier frequencies for the corresponding channels:

Ensemble	Channel	Frequency [MHz]	Polarization
A	Satellite 1 (Sat1A)	2333.465	LHCP
	Satellite 2 (Sat2A)	2335.305	LHCP
	Terrestrial (TerraA)	2337.490	vertically
B	Terrestrial (TerraB)	2340.020	vertically
	Satellite 2 (Sat2B)	2342.205	LHCP
	Satellite 1 (Sat1B)	2344.045	LHCP

XM-RADIO Menu

The menu for setting the XM-RADIO digital standard is either called from the baseband block or from the menu tree under **Baseband**.



Main Menu for XM-RADIO Signals

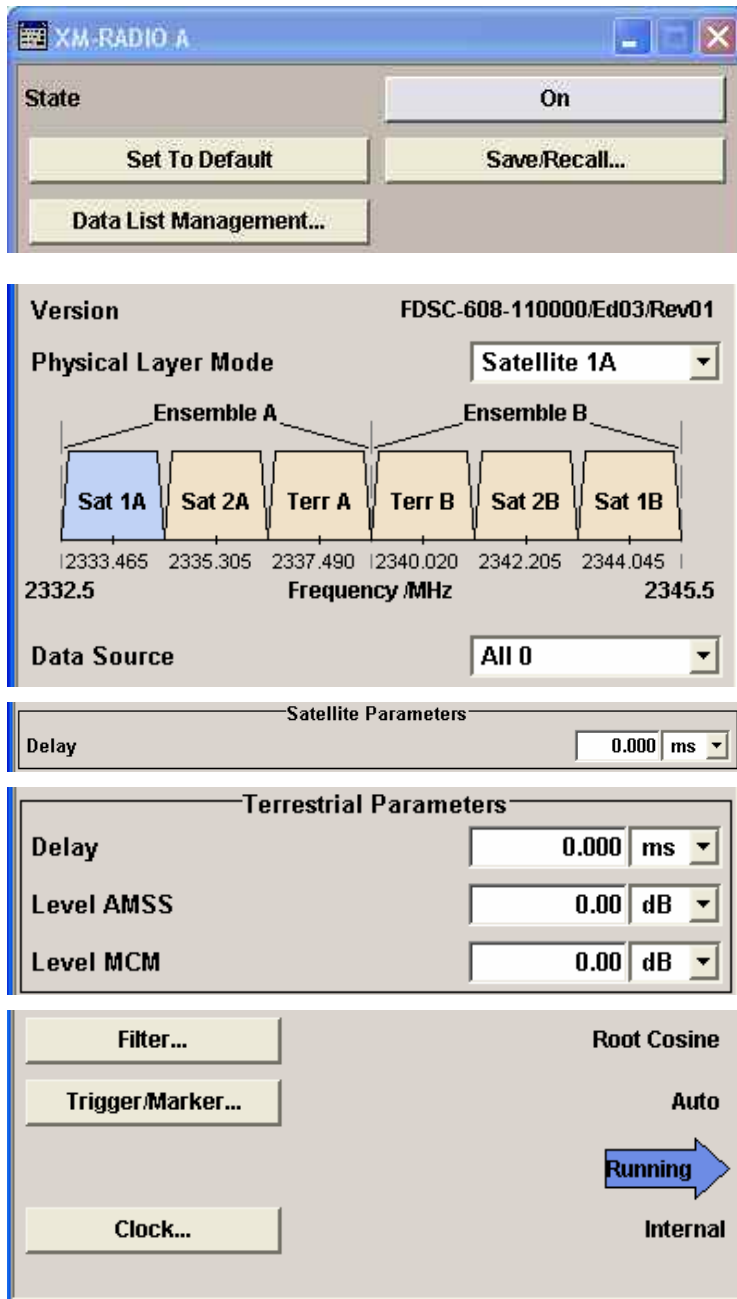
The menu is split into several sections for configuring the standard.

The upper menu section is where the XM-RADIO digital standard is activated and deactivated. Configuration settings can be stored and already stored configuration settings can be loaded.

In the next section, the physical layer mode and the data source are selected.

In the **Satellite Parameters** section, the parameter for the delay is set.

In the **Terrestrial Parameters** section, the parameters for the terrestrial transponder are set. The buttons in the lower menu section lead to submenus for setting the filter, trigger, and clock parameters.



The upper menu section is where the XM-RADIO digital standard is selected, enabled, and reset.

State – XM-RADIO

Activates or deactivates the XM-RADIO standard. Activating this standard deactivates all the other digital standards and digital modulation modes (in case of two-path instruments, this affects the same path). The XM-RADIO signal is generated according to the performed settings.

Remote-control command:
 SOUR:BB:XMR:STAT ON

Set To Default - XM-RADIO Calls the default settings.
 Remote-control command:
 SOUR:BB:XMR:PRES

Parameter	Value
State	Remains unchanged
Physical Layer Mode	Satellite 1A
Data Source	PN9
Delay	0.000 ms
Filter	Root Cosine
Roll Off Factor	0.15
Symbol Rate Variation	1.64 Msym/s

Save/Recall... - XM-RADIO Calls the **Save/Recall** menu.

From the **Save/Recall** menu, the **File Select** windows for saving and recalling XM-RADIO configurations and the **File Manager** is called.



XM-RADIO configurations are stored as files with the predefined file extension ***.xmradio**. The file name and the directory they are stored in are user-definable.

The complete settings in the **XM-RADIO** menu are saved and recalled.

Recall XM-RADIO Setting Opens the **File Select** window for loading a saved XM-RADIO configuration.

The configuration of the selected (highlighted) file is loaded by pressing the **Select** button.

Remote-control command:

MMEM:CDIR 'F:\gen_list\xmradio'

SOUR:BB:XMR:SETT:CAT?

Response: 'xmradio_1', 'xmradio_2'

SOUR:BB:XMR:SETT:LOAD "xmradio_1"

Save XM-RADIO Setting Opens the **File Select** window for saving the current XM-RADIO signal configuration.

The name of the file is specified in the **File Name** entry field. The file is saved by pressing the **Save** button.

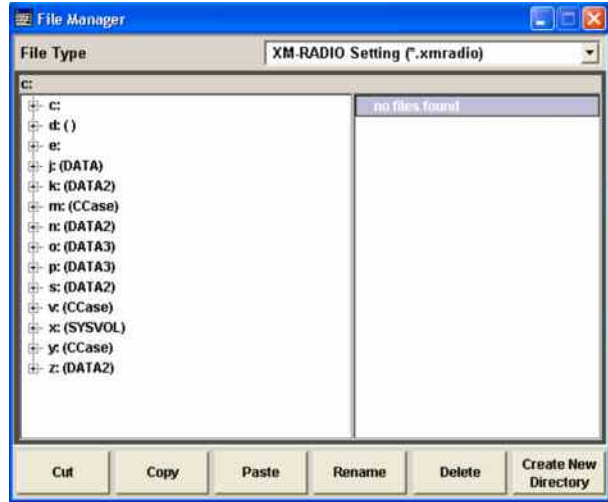
Remote-control command:

MMEM:CDIR 'F:\gen_list\xmradio'

SOUR:BB:XMR:SETT:STOR "xmradio_1"

File Manager Calls the **File Manager**.

The **File Manager** is used to copy, delete, and rename files and to create new directories.



Remote-control command:

```
MMEM:CDIR 'F:\gen_list\xmradio'
```

```
SOUR:BB:XMR:SETT:DEL "xmradio_1"
```

**Data List Management
- XM-RADIO**

Calls the **Data List Management** menu. This menu is used to create and edit a data list.



All data lists are stored as files with the predefined file extension ***.dm_iqd**. The file name and the directory they are stored in are user-definable.

The data lists must be selected as a data source from the submenus under the individual function, e.g. in the channel table of the base stations.

Remote-control commands:

Note:

*All data lists are generated and edited by means of the SOURce:BB:DM subsystem commands. Files containing data lists usually end with *.dm_iqd. The data lists are selected as a data source for a specific function in the individual subsystems of the digital standard.*

Creating and editing the data list:

```
SOUR:BB:DM:DLIS:SEL "xm_radio"
SOUR:BB:DM:DLIS:DATA 1,1,0,1,0,1,0,1,1,1,1,0,0,0
SOUR:BB:DM:DLIS:DATA:APP 1,1,0,1,0,1,0,1,1,1,1,0,0,0
```

Selecting the data list:

```
SOUR:BB:XMR:DATA DLIS
SOUR:BB:XMR:DATA:DSEL "xm_radio"
```

Version - XM-Radio

Displays the current version of the XM-RADIO standard depending on the selected physical layer mode.

The default settings and parameters provided are oriented towards the specifications of the version displayed.

Remote-control command:

```
SOUR:BB:XMR:VERS?
```

Response: FDSC-608-110000/Ed03/Rev01

Physical Layer Mode - XM-RADIO

Selects the physical layer mode.

Satellite

Transmits the QPSK-modulated signal by means of a satellite.

Remote-control command:

```
SOUR:BB:XMR:LAY SAT1A
```

Terrestrial

Transmits the COFDM-modulated signal by means of a repeater.

Remote-control command:

```
SOUR:BB:XMR:LAY TERRA
```

Data Source - XM-RADIO

Selects the data source for the XM-Radio signal.

The following data sources are available for selection:

ALL0

0 data and 1 data is generated internally.

ALL1

Remote-control command:

```
Sour:BB:XMR:DATA ONE | ZERO
```

PNxx

PRBS data as per CCITT with period length between 2^9-1 and $2^{23}-1$ is generated internally.

Remote-control command:

```
SOUR:BB:XMR:DATA PN9 | PN11 | PN15 |
PN16 | PN20 | PN21 | PN23
```

Pattern	<p>A user-definable bit pattern with a maximum length of 64 bits is generated internally.</p> <p>The bit pattern is defined in the Pattern entry field.</p> <p>Remote-control command: SOUR:BB:XMR:DATA PATT SOUR:BB:XMR:DATA:PATT #HA,4</p>
Data List	<p>Internal data from a programmable data list is used. The data list can be generated by the Data Editor or generated externally.</p> <p>Data lists are selected in the Select Data List field.</p> <p>Remote-control command: SOUR:BB:XMR:DATA DLIS SOUR:BB:XMR:DATA:DSEL 'F:\gen_list\xmradio\xmradio_1</p>
Frame Counter - XM-RADIO	<p>The parameter is available for Data List only.</p> <p>Displays the number of frames.</p> <p>Remote-control command: SOUR:BB:XMR:FCO? Response: 10</p>
Delay (Satellite) - XM-RADIO	<p>Sets the signal delay in physical layer mode satellite.</p> <p>Remote-control command: SOUR:BB:XMR:SAT:DEL 5.0MS</p>
Delay (Terrestrial) - XM-RADIO	<p>Sets the signal delay in physical layer mode terrestrial.</p> <p>Remote-control command: SOUR:BB:XMR:TERR:DEL 5.0MS</p>
Level AMSS - XM-RADIO	<p>Sets the level for the amplitude modulated synchronization symbol (AMSS).</p> <p>Remote-control command: SOUR:BB:XMR:TERR:POW:AMSS 10dB</p>
Level MCM - XM-RADIO	<p>Sets the level for the multicarrier modulation (MCM).</p> <p>Remote-control command: SOUR:BB:XMR:TERR:POW:MCM 5dB</p>

The buttons in the lower menu section lead to submenus to configure the system and setting the filter, trigger, and clock parameters.

Filter... - XM-RADIO

Calls the menu for setting baseband filtering. The current filter is displayed next to the button.

The menu is described in section "[Filter Settings - XM-RADIO](#)", page 9.

Remote-control command: n.a.

Trigger - Marker - XM-RADIO

Calls the menu for selecting the trigger mode and trigger source, for configuring the marker signals, and for setting the time delay of an external trigger signal.

This menu is described in section "[Trigger/Marker/Clock - XM-RADIO](#)", page 11.

The currently selected trigger mode and trigger source are displayed next to the button.

Remote-control command: n.a.

Execute Trigger - XM-RADIO

Executes the trigger manually.

A manual trigger can be executed only if an internal trigger source and a trigger mode other than **Auto** have been selected.

Remote-control command:

SOUR:BB:XMR:SAT:TRIG:EXEC
 SOUR:BB:XMR:TERR:TRIG:EXEC

Arm - XM-RADIO

Stops signal generation manually.

The **Arm** button is displayed only if the trigger modes **Armed Retrigger** or **Armed Auto** have been selected.

Remote-control command:

SOUR:BB:XMR:SAT:TRIG:ARM:EXEC
 SOUR:BB:XMR:TERR:TRIG:ARM:EXEC

Clock - XM-RADIO

Calls the menu for selecting the clock source and for setting a delay.

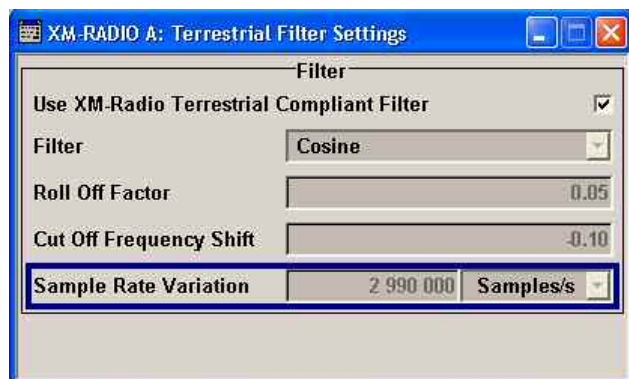
This menu is described in section "[Trigger/Marker/Clock - XM-RADIO](#)", page 11.

Remote-control command: n.a.

Filter Settings - XM-RADIO

The **Filter** menu is reached via the XM-RADIO main menu.

The baseband filter, roll-off factor, cut-off frequency shift, and symbol rate variation are defined in this menu.



Use XM-Radio Terrestrial Compliant Filter - XM-RADIO

Activates or deactivates the usage of the filter which is in compliance with the spectral mask of the terrestrial standard.

Remote-control command:

```
SOUR:BB:XMR:TERR:FILT:TCF:STAT ON
```

Filter - XM-RADIO

Sets the baseband filter.

Remote-control command:

```
SOUR:BB:XMR:SAT:FILT:TYPE COS
SOUR:BB:XMR:TERR:FILT:TYPE COS
```

Roll Off Factor - XM-RADIO

Sets the filter parameter.

For the default cosine filter, a roll-off factor of 0.05 is used.

Remote-control command:

```
SOUR:BB:XMR:SAT:FILT:PAR:APCO25 0.05
SOUR:BB:XMR:TERR:FILT:PAR:APCO25 0.05
SOUR:BB:XMR:SAT:FILT:PAR:COS 0.05
SOUR:BB:XMR:TERR:FILT:PAR:COS 0.05
SOUR:BB:XMR:SAT:FILT:PAR:PGA 0.15
SOUR:BB:XMR:TERR:FILT:PAR:PGA 0.15
SOUR:BB:XMR:SAT:FILT:PAR:GAUS 0.15
SOUR:BB:XMR:TERR:FILT:PAR:GAUS 0.15
SOUR:BB:XMR:SAT:FILT:PAR:RCOS 0.05
SOUR:BB:XMR:TERR:FILT:PAR:RCOS 0.05
SOUR:BB:XMR:SAT:FILT:PAR:SPH 0.05
SOUR:BB:XMR:TERR:FILT:PAR:SPH 0.05
```

Cut Off Frequency Shift - XM-RADIO

(This feature is available for filter parameter Cosine and physical layer mode Terrestrial only.)

Sets the value for the cut off frequency shift. The cut off frequency of the cosine filter can be adjusted to reach spectrum mask requirements.

The value range is -0.1 to 1.0.

Remote-control command:

SOUR:BB:XMR:TERR:FILT:PAR:COS:COFS 1.0

Cut Off Frequency Factor - XM-Radio

(This feature is available for filter parameter Lowpass only.)

Sets the value for the cut off frequency factor. The cut off frequency of the lowpass filter can be adjusted to reach spectrum mask requirements.

Remote-control command:

SOUR:BB:XMR:SAT:FILT:PAR:LPAS 0.5

SOUR:BB:XMR:TERR:FILT:PAR:LPAS 0.5

Symbol Rate Variation - XM-RADIO

(This feature is available for physical layer mode Satellite only).

Sets the symbol rate of the signal.

Remote-control command:

SOUR:BB:XMR:SAT:SRAT:VAR 1000000

Sample Rate Variation - XM-RADIO

(This feature is available for physical layer mode Terrestrial only).

Displays the terrestrial sample rate variation.

Remote-control command:

SOUR:BB:XMR:TERR:SRAT:VAR?

Trigger/Marker/Clock - XM-RADIO

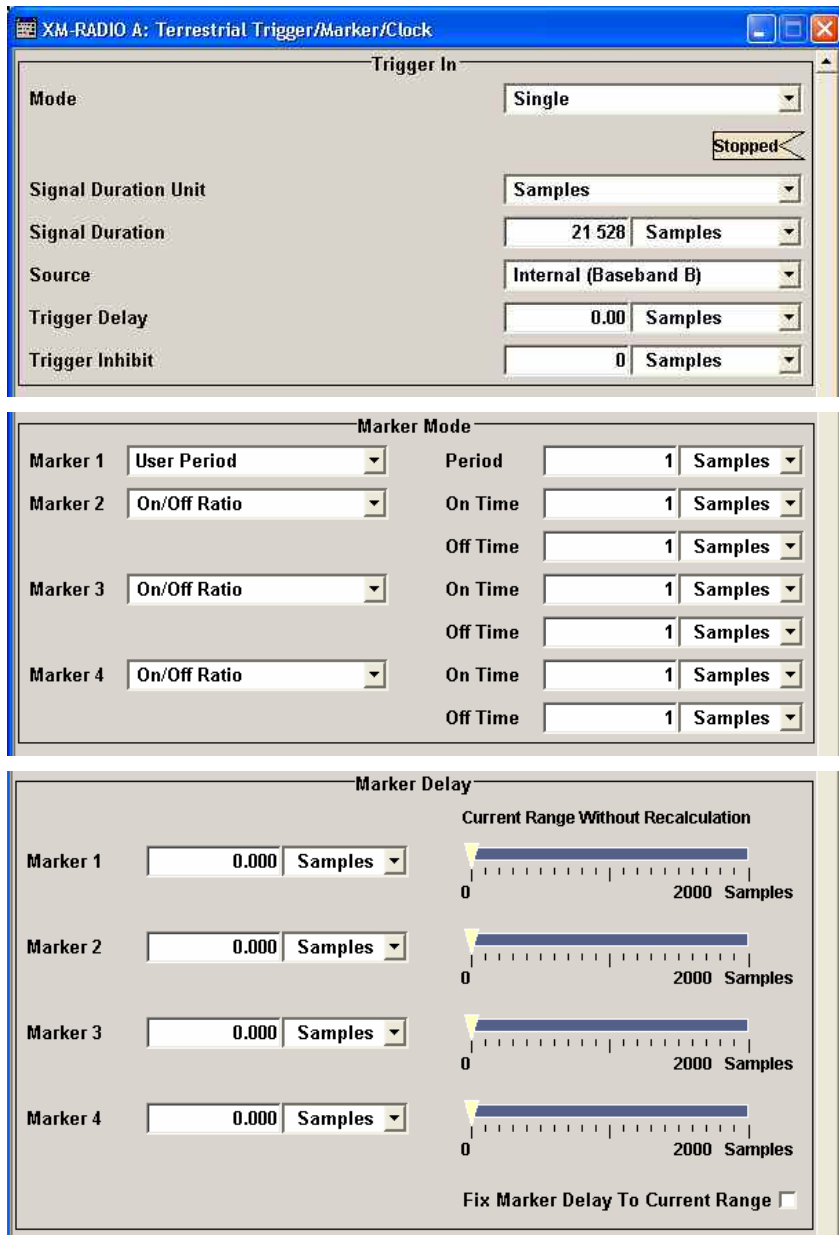
The **Trigger/Marker/Clock** menu can be reached via the IEEE 802.16 XM-RADIO main menu. The **Trigger In** section is where the trigger for the XM-RADIO signal is set. Various parameters will be provided for the settings, depending on which trigger source - internal or external - is selected. The current status of signal generation (**Running** or **Stopped**) is indicated for all trigger modes.

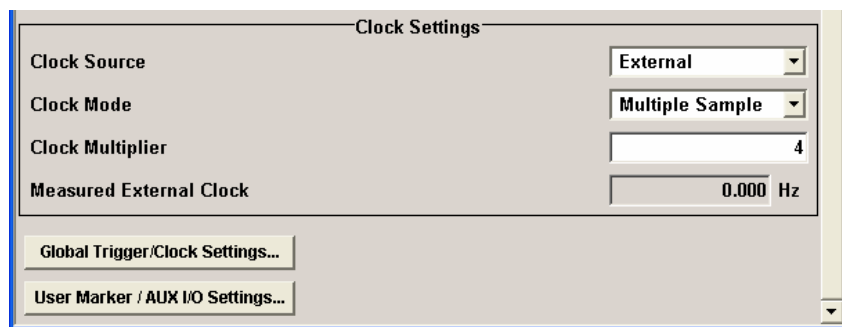
The **Marker Mode** section is where the marker signals at the MARKER output connectors are configured.

The **Marker Delay** section is where a marker signal delay can be defined, either without restriction or restricted to the dynamic section, i.e., the section in which it is possible to make settings without restarting signal and marker generation.

The **Clock Settings** section is where the clock source is selected and - in the case of an external source - the clock type.

The **Global Trigger/Clock Settings** button leads to a submenu for general trigger and clock settings.





The **Trigger In** section is where the trigger for the XM-RADIO signal is set. The current status of the signal generation is displayed for all trigger modes.

Trigger Mode - XM-RADIO Selects the trigger mode.

The trigger mode determines the effect of a trigger on the signal generation.

Auto The XM-RADIO signal is generated continuously.

Remote-control command:

SOUR:BB:XMR:SAT:SEQ AUTO
 SOUR:BB:XMR:TERR:SEQ AUTO

Retrigger The XM-RADIO signal is generated continuously. A trigger event (internal or external) causes a restart.

Remote-control command:

SOUR:BB:XMR:SAT:SEQ RETR
 SOUR:BB:XMR:TERR:SEQ RETR

Armed_Auto The IEEE 802.16 XM-RADIO-signal is generated only when a trigger event occurs. Then the signal is generated continuously.

The button **Arm** stops the signal generation. A subsequent trigger event (internal with **Execute Trigger** or external) causes a restart.

Remote-control command:

SOUR:BB:XMR:SAT:SEQ AAUT
 SOUR:BB:XMR:TERR:SEQ AAUT

Armed_Retrigger The XM-RADIO-Signal signal is generated only when a trigger event occurs. Then the signal is generated continuously. Every subsequent trigger event causes a restart.

The button **Arm** stops the signal generation. A subsequent trigger event (internal with **Execute Trigger** or external) causes a restart.

Remote-control command:

SOUR:BB:XMR:SAT:SEQ ARET
 SOUR:BB:XMR:TERR:SEQ ARET

Single The XM-RADIO signal is generated only when a trigger event occurs. Then the signal is generated once to the length specified in the **Signal Duration** field. Every subsequent trigger event (internal with **Execute Trigger** or external) causes a restart.

Remote-control command:

```
SOUR:BB:XMR:SAT:SEQ SING
SOUR:BB:XMR:TERR:SEQ SING
```

Signal Duration Unit - XM-RADIO

(This feature is available for physical layer mode Terrestrial only)

Defines the unit for the entry of the length of the signal sequence to be output in the Single trigger mode. Available units are samples, MCM symbols, and TPL frames.

Remote-control commands:

```
SOUR:BB:XMR:TERR:TRIG:SLUN TPL
```

Signal Duration - XM-RADIO

Defines the length of the signal sequence to be output in the **Single** trigger mode. The input is to be expressed in symbols (for physical layer mode Satellite) or in samples (for physical layer mode Terrestrial). It is then possible to output deliberately just part of the signal, an exact sequence of the signal, or a defined number of repetitions of the signal.

Remote-control commands:

```
SOUR:BB:XMR:SAT:TRIG:SLEN 2000
SOUR:BB:XMR:TERR:TRIG:SLEN 2000
```

Running - Stopped - XM-RADIO

Displays the status of signal generation for all trigger modes. This display appears only when XM-RADIO is enabled (**State On**).

Remote-control command:

```
SOUR:BB:XMR:SAT:TRIG:RMOD?
SOUR:BB:XMR:TERR:TRIG:RMOD?
```

Response: RUN or STOP

Running The XM-RADIO modulation signal is generated; a trigger was (internally or externally) initiated in triggered mode.

If **Armed_Auto** and **Armed_Retrigger** have been selected, generation of signals can be stopped with the Arm button. A new trigger (internally with **Execute Trigger** or externally) causes a restart.

Stopped The signal is not generated, and the instrument waits for a trigger event (internal or external).

Arm - XM-RADIO

Stops the signal generation. This button appears only with **Running** signal generation in the **Armed_Auto** and **Armed_Retrigger** trigger modes.

Signal generation can be restarted by a new trigger (internally with **Execute Trigger** or externally).

Remote-control command:

```
SOUR:BB:XMR:SAT:TRIG:ARM:EXEC
SOUR:BB:XMR:TERR:TRIG:ARM:EXEC
```

Execute Trigger - XM-RADIO

Executes the trigger manually. A manual trigger can be executed only when an internal trigger source and a trigger mode other than **Auto** have been selected.

Remote-control commands:

```
SOUR:BB:XMR:SAT|TERR:TRIG:SOUR INT
SOUR:BB:XMR:SAT|TERR:SEQ RETR
SOUR:BB:XMR:SAT:TRIG:EXEC
SOUR:BB:XMR:TERR:TRIG:EXEC
```

Source - XM-RADIO

Selects the trigger source. This setting is effective only when a trigger mode other than **Auto** has been selected.

Internal

The trigger event is executed by **Execute Trigger**.

Remote-control command:

```
SOUR:BB:XMR:SAT:TRIG:SOUR INT
SOUR:BB:XMR:TERR:TRIG:SOUR INT
```

Internal (Baseband A/B)

The trigger event is executed by the trigger signal from the second path (two-path instruments only).

Remote-control command:

```
SOUR:BB:XMR:SAT:TRIG:SOUR OBAS
SOUR:BB:XMR:TERR:TRIG:SOUR INT
```

External (TRIGGER 1/2)

The trigger event is executed with the aid of the active edge of an external trigger signal. The trigger signal is supplied via the TRIGGER 1 or TRIGGER 2 connector.

The polarity, the trigger threshold, and the input impedance of the TRIGGER input can be set in the **Global Trigger/Clock Settings** menu.

Remote-control command:

```
SOUR:BB:XMR:SAT:TRIG:SOUR EXT|BEXT
SOUR:BB:XMR:TERR:TRIG:SOUR INT
```

**External / Trigger Delay
- XM-RADIO**

Sets the trigger signal delay in samples (for physical layer mode Terrestrial) or in symbols (for physical layer mode Satellite) on external triggering or, in case of two-path instruments, on internal triggering via the second path.

This enables the R&S Signal Generator to be synchronized with the device under test or other external devices.

Note:

For two-path instruments, the delay can be set separately for each of the two paths.

Remote-control command::

```
SOUR:BB:XMR:TERR:TRIG:EXT1:DEL 5
SOUR:BB:XMR:TERR:TRIG:OBAS:DEL 5
SOUR:BB:XMR:SAT:TRIG:EXT1:DEL 5
SOUR:BB:XMR:SAT:TRIG:OBAS:DEL 5
```

**External / Trigger Inhibit
- XM-RADIO**

Sets the duration for inhibiting a new trigger event subsequent to triggering. The input is to be expressed in samples (for physical layer mode Terrestrial) or in symbols (for physical layer mode Satellite).

In the **Retrigger** mode every trigger signal causes signal generation to restart. This restart is inhibited for the specified number of samples.

This parameter is only available on external triggering or, in case of two-path instruments, on internal triggering via the second path.

Note:

For two-path instruments, the trigger inhibit can be set separately for each of the two paths.

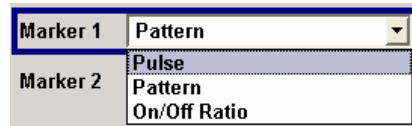
Remote-control command:

```
SOUR:BB:XMR:TERR:TRIG:EXT1:INH 5
SOUR:BB:XMR:TERR:TRIG:OBAS:INH 5
SOUR:BB:XMR:SAT:TRIG:EXT1:INH 5
SOUR:BB:XMR:SAT:TRIG:OBAS:INH 5
```

The marker output signal for synchronizing external instruments is configured in the **Marker Settings** section **Marker Mode**.

Marker Mode - XM-RADIO

Selects a marker signal for the associated MARKER output.



ON/OFF ratio

A regular marker signal that is defined by an ON/OFF ratio is generated. A period lasts one ON and OFF cycle.

The ON time and OFF time are each expressed as a number of symbols (for physical layer mode Satellite) or as samples (for physical layer mode Terrestrial) and are set in an input field which opens when ON/OFF ratio is selected.

On Time	2	Sym
Off Time	3	Sym

Remote-control commands:

```
SOUR:BB:XMR:TERR:TRIG:OUTP1:MODE RAT
SOUR:BB:XMR:TERR:TRIG:OUTP1:OFFT 20
SOUR:BB:XMR:TERR:TRIG:OUTP1:ONT 20
```

```
SOUR:BB:XMR:SAT:TRIG:OUTP1:MODE RAT
SOUR:BB:XMR:SAT:TRIG:OUTP1:OFFT 20
SOUR:BB:XMR:SAT:TRIG:OUTP1:ONT 20
```

TPL Frame (available for Physical Layer Mode Terrestrial only)

A marker signal is generated at the beginning of each TPL (Terrestrial Physical Layer) frame.

Remote-control commands:

```
SOUR:BB:XMR:TERR:TRIG:OUTP1:MODE TPL
```

MCM Symbol (available for Physical Layer Mode Terrestrial only)

A marker signal is generated at the beginning of each MCM (Multicarrier Modulation) symbol.

Remote-control commands:

```
SOUR:BB:XMR:TERR:TRIG:OUTP1:MODE MCM
```

User Period A marker signal is generated at the beginning of every user-defined period. The period is defined in **Period**.

Remote-control commands:

```
SOUR:BB:XMR:TERR:TRIG:OUTP1:MODE USER
SOUR:BB:XMR:TERR:TRIG:OUTP1:PER 5000
```

```
SOUR:BB:XMR:SAT:TRIG:OUTP1:MODE USER
SOUR:BB:XMR:SAT:TRIG:OUTP1:PER 5000
```

Pulse (available for Physical Layer Mode Satellite only)

A regular marker signal is generated. The clock frequency is defined by entering a divider. The frequency is derived by dividing the sample rate by the divider. The input box for the divider opens when **Pulse** is selected, and the resulting pulse frequency is displayed below it.

Divider	8.00
Frequency	33.854 17 kHz

Remote-control commands:

```
SOUR:BB:XMR:SAT:TRIG:OUTP1:MODE PULS
SOUR:BB:XMR:SAT:TRIG:OUTP1:PULS:DIV 4
SOUR:BB:XMR:TRIG:OUTP1:PULS:FREQ?
```

Pattern (available for Physical Layer Mode Satellite only)

A marker signal that is defined by a bit pattern is generated. The pattern has a maximum length of 32 bits and is defined in an input field which opens when **pattern** is selected.

0000 0000

Remote-control commands:
 SOUR:BB:XMR:SAT:TRIG:OUTP1:MODE PATT
 SOUR:BB:XMR:SAT:TRIG:OUTP1:PATT
 #B1111,4

The **Marker Delay** section can be used to set a delay for the markers.

Marker x Delay - XM-RADIO Enters the delay between the marker signal at the marker outputs and the start of the signal.

The input is expressed as a number of samples (for physical layer mode Terrestrial) or in symbols (for physical layer mode Satellite).

If the setting "**Fix marker delay to dynamic range**" is enabled, the setting range is restricted to the dynamic range. In this range the delay of the marker signals can be set without restarting the marker and signal.

The allocation of marker signals to the outputs is described in the section "[Marker Output Signals](#)".

Remote-control command:
 SOUR:BB:XMR:SAT:TRIG:OUTP2:DEL 20
 SOUR:BB:XMR:TERR:TRIG:OUTP2:DEL 20

Current Range without Calculation - XM-RADIO

Displays the dynamic range within which the delay of the marker signals can be set without restarting the marker and signal.

The delay can be defined by moving the setting mark.

Remote-control command:
 SOUR:BB:XMR:TERR:TRIG:OUTP2:DEL:MAX?
 SOUR:BB:XMR:TERR:TRIG:OUTP2:DEL:MIN?

SOUR:BB:XMR:SAT:TRIG:OUTP2:DEL:MAX?
 SOUR:BB:XMR:SAT:TRIG:OUTP2:DEL:MIN?

Fix marker delay to current range - XM-RADIO

Restricts the marker delay setting range to the dynamic range. In this range the delay can be set without restarting the marker and signal.

Remote-control command:
 SOUR:BB:XMR:SAT:TRIG:OUTP:DEL:FIX ON
 SOUR:BB:XMR:TERR:TRIG:OUTP:DEL:FIX ON

The clock source is selected in the **Clock Settings** section.

Clock Source - XM-RADIO Selects the clock source (also see section "[Clock Signals](#)").

- Intern** The internal clock reference is used to generate the sample clock.

Remote-control command:
`SOUR:BB:XMR:SAT:CLOC:SOUR INT`
`SOUR:BB:XMR:TERR:CLOC:SOUR INT`

- Extern** The external clock reference is fed in as the sample clock or multiple thereof via the CLOCK connector.

The sample rate must be correctly set to an accuracy of $\pm 2\%$ (see data sheet).

The polarity of the clock input can be changed with the aid of **Global Trigger/Clock Settings**.

In the case of two-path instruments, this selection applies to path A.

Remote-control command:
`SOUR:BB:XMR:SAT:CLOC:SOUR EXT`
`SOUR:BB:XMR:TERR:CLOC:SOUR EXT`

Clock Mode - XM-RADIO Enters the type of externally supplied clock.

- Sample/Symbol** A sample clock (for physical layer mode Terrestrial) or a symbol clock (for physical layer mode Satellite) is supplied via the CLOCK connector.

Remote-control command:
`SOUR:BB:XMR:SAT:CLOC:MODE SYMB`
`SOUR:BB:XMR:TERR:CLOC:MODE SAMP`

- Multiple Sample/Symbol** A multiple of the sample clock (for physical layer mode Terrestrial) or a multiple of the symbol clock (for physical layer mode Satellite) is supplied via the CLOCK connector; the sample clock is derived internally from this.

The **Clock Multiplier** window provided allows the multiplication factor to be entered.

Remote-control command:
`SOUR:BB:XMR:SAT:CLOC:MODE MSYM`
`SOUR:BB:XMR:TERR:CLOC:MODE MSAM`

**Clock Multiplier
- XM-RADIO**

Enters the multiplication factor for clock type **Multiple Sample** (for physical layer mode Terrestrial) or **Multiple Symbol** (for physical layer mode Satellite).

Remote-control command:

```
SOUR:BB:XMR:TERR:CLOC:MULT 4
```

```
SOUR:BB:XMR:SAT:CLOC:MULT 4
```

**Measured External Clock
- XM-RADIO**

Displays the measured frequency of the external clock signal. This enables the user to permanently monitor the frequency of the externally introduced clock.

This information is displayed only if the external clock source has been selected.

Remote-control command:

```
:CLOC:INP:FREQ?
```

**Global Trigger/Clock
Settings - XM-RADIO**

Calls the **Global Trigger/Clock/Input Settings** menu. This menu is used among other things for setting the trigger threshold, the input impedance and the polarity of the clock and trigger inputs

In the case of two-path instruments, these settings are valid for both paths.

The parameters in this menu affect all digital modulations and standards, and are described in the section "[Global Trigger/Clock/Input Settings – Setup -Environment](#)".

**User Marker / AUX I/O
Settings - XM-RADIO**

Calls the **User Marker AUX I/O Settings** menu. This menu is used to map the connector on the rear of the instruments see section "[User Marker - AUX IO - Setup-Environment-Global...Settings](#)".

SOURce:BB:XM-Radio Subsystem Remote-Control Commands

The commands in the Source:BB:XMR subsystem are described in the following section.

XM-Radio - Remote-Control Commands

This subsystem contains commands for the XM-Radio standard. These settings concern activation and deactivation of the standard, filter, clock, and trigger settings, defining satellite parameters and the terrestrial parameters.

For two-path instruments, the numerical suffix at SOURce distinguishes between path A and path B:

SOURce<1> = path A

SOURce<2> = path B

The keyword SOURce is optional with commands for path A and can be omitted. For path B, the command must include the keyword with the suffix 2.

Command Table - XM-Radio

Command	Parameters	Default unit	Comments
[SOURce<[1] 2>:]BB:XMRadio:DATA	ZERO ONE PATTern PN9 PN11 PN15 PN16 PN20 PN21 PN23 DLISt		
[SOURce<[1] 2>:]BB:XMRadio:DATA:DSElect	<date list>		
[SOURce<[1] 2>:]BB:XMRadio:DATA:PATTern	<bit pattern>		
[SOURce<[1] 2>:]BB:XMRadio:FCOunter			Query only
[SOURce<[1] 2>:]BB:XMRadio:LAYer	SAT1A SAT2A TERRA TERRB SAT2B SAT1B		
[SOURce<[1] 2>:]BB:XMRadio:PRESet			No query
[SOURce<[1] 2>:]BB:XMRadio:SATellite:CLOCK:MODE	SYMBOL MSYMBOL		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:CLOCK:MULTIplier	1...64	symbol s	
[SOURce<[1] 2>:]BB:XMRadio:SATellite:CLOCK:SOURce	EXTERNAL INTERNAL AINTERNAL		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:DELAy	0.000 - 63	ms	
[SOURce<[1] 2>:]BB:XMRadio:SATellite:FILTer:PARAmeter:APCO25	0.05...0.99		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:FILTer:PARAmeter:COSine	0.05...0.99		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:FILTer:PARAmeter:GAUSS	0.15...2.50		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:FILTer:PARAmeter:PGAuss	0.15...2.5		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:FILTer:PARAmeter:LPASS	0.05...2.0		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:FILTer:PARAmeter:RCOSine	0.05...0.99		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:FILTer:PARAmeter:SPHase	0.15...2.50		

Command	Parameters	Default unit	Comments
[SOURce<[1] 2>:]BB:XMRadio:SATellite:FILTER:TYPE	RCOSine COSine GAUSSs LGAuss CONE COF705 COEQualizer LPASS COFequalizer C2K3x APCO25 SPHase ENPShape RECTangle DIRac PGAuss EWPSshape		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:SEQUence	AUTO RETRigger AAUTO AREtrigger SINGLE		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:SRATE:VARIation	1000000...2000000	symbol s/s	
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:ARM:EXECute			No query
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:EXECute			No query
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger[:EXTernal<[1] 2>]:DELAy	0...(2^32 - 1) symbols		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger[:EXTernal<[1] 2>]:INHibit	0...(2^32 - 1) samples		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:OBASeband:DELAy	0...(2^32 - 1) symbols		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:OBASeband:INHibit	0...(2^32 - 1) symbols		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:OUTPut:DELAy:FIXed	ON OFF	Hz	
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:OUTPut<[1]...4>:DELAy	0...(2^32 - 1) symbols		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:OUTPut<[1]...4>:DELAy: MAXimum			Query only
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:OUTPut<[1]...4>:DELAy: MINimum			Query only
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:OUTPut<[1]...4>:MODE	PATTErn PULSe RATio USER		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:OUTPut<[1]...4>:OFFTim e	2...(2^24 - 1) symbols		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:OUTPut<[1]...4>:ONTIme	2...(2^24 - 1) symbols		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:OUTPut<[1]...4>:PATTErn	<bit pattern>		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:OUTPut<[1]...4>:PERiod	1...(1^24 - 1) symbols		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:OUTPut<[1]...4>:PULSe: DIVider	2...1024		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:OUTPut<[1]...4>:PULSe: FREQuency			Query only
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:RMODE			Query only
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:SLENgth	1...MAX		
[SOURce<[1] 2>:]BB:XMRadio:SATellite:TRIGger:SOURce	EXTernal INTernal BEXTernal OBASeband		
[SOURce<[1] 2>:]BB:XMRadio:SETTing:CATalog			Query only
[SOURce<[1] 2>:]BB:XMRadio:SETTing:DELeTe	<file_name>		
[SOURce<[1] 2>:]BB:XMRadio:SETTing:LOAD	<file_name>		
[SOURce<[1] 2>:]BB:XMRadio:SETTing:STORE	<file_name>		

Command	Parameters	Default unit	Comments
[SOURce<[1] 2>:]BB:XMRadio:STATe	ON OFF		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:CLOCK:MODE	SAMPlE MSAMPlE		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:CLOCK:MULTiplier	1...64	sample s	
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:CLOCK:SOURce	EXTernal INTernal AINTernal		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:DELay	0.000 - 63	ms	
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:FILTer:PARAmeter:APCO25	0.05...0.99		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:FILTer:PARAmeter:COsine	0.05...0.99		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:FILTer:PARAmeter:COsine:COFS	-1.0...+1.0		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:FILTer:PARAmeter:GAUSSs	0.15...2.50		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:FILTer:PARAmeter:LPASs	0.05...2.0		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:FILTer:PARAmeter:PGAuss	0.15...2.50		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:FILTer:PARAmeter:RCOSine	0.05...0.99		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:FILTer:PARAmeter:SPHase	0.15...2.50		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:FILTer:TCFilter[:STATe]	ON OFF		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:FILTer:TYPE	RCOSine COSine GAUSS LGAuss CONE COF705 COEqualizer LPASs COFequalizer C2K3x APCO25 SPHase ENPShape RECTangle DIRac PGAuss EWPSHape		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:POW:AMSS	-12.00 dB - 12.00 dB	dB	
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:POW:MCM	-12.00 dB - 12.00 dB	dB	
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:SEQUence	AUTO RETRigger AAUTO ARETrigger SINGle		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:SRATe:VARiation			Query only
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:TRIGger:ARM:EXECute			No query
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:TRIGger:EXECute			No query
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:TRIGger[:EXTernal<[1] 2>]:DELay	0...(2^32 - 1) samples		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:TRIGger[:EXTernal<[1] 2>]:INHibit	0...(2^32 - 1) samples		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:TRIGger:OBASeband:DELay	0...(2^32 - 1) samples		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:TRIGger:OBASeband:INHibit	0...(2^32 - 1) samples		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:TRIGger:OUTPut:DELay:FIXed	ON OFF	Hz	
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:TRIGger:OUTPut<[1]...4>:DELay	0...(2^32 - 1) samples		
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:TRIGger:OUTPut<[1]...4>:DELay:MAXimum			Query only
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:TRIGger:OUTPut<[1]...4>:DELay:MINimum			Query only
[SOURce<[1] 2>:]BB:XMRadio:TERRestrial:TRIGger:OUTPut<[1]...4>:MODE	TPL MCM USER RATio		

Command	Parameters	Default unit	Comments
[SOURce<[1]>:]BB:XMRadio:TERRestrial:TRIGger:OUTPut<[1]...4>:OFFTime	2...(2^24 - 1) samples		
[SOURce<[1]>:]BB:XMRadio:TERRestrial:TRIGger:OUTPut<[1]...4>:ONTIme	2...(2^24 - 1) samples		
[SOURce<[1]>:]BB:XMRadio:TERRestrial:TRIGger:OUTPut<[1]...4>:PERiod	1...(1^24 - 1) samples		
[SOURce<[1]>:]BB:XMRadio:TERRestrial:TRIGger:RMODE			Query only
[SOURce<[1]>:]BB:XMRadio:TERRestrial:TRIGger:SLENGth	1...MAX		
[SOURce<[1]>:]BB:XMRadio:TERRestrial:TRIGger:SLUNit	TPL MCM SAMPLE		
[SOURce<[1]>:]BB:XMRadio:TERR:TRIGger:SOURce	EXTernal INTernal BEXTernal OBASeband		
[SOURce<[1]>:]BB:XMRadio:VERSion			Query only

SOURce-XM-Radio - Primary Commands

[SOURce<[1]>:]BB:XMRadio:DATA PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | PATTERN | DLIST | ZERO | ONE

This command selects the data source for the XM-Radio signal.

Example: "BB:XMRadio:DATA PN9"
 'PN9 is the data source for the XM-Radio signal.'

*RST value	Resolution	SCPI
PN9	-	Device-specific

[SOURce<[1]>:]BB:XMRadio:DATA:DSElect <data file>

The command selects the data list for the DLIS data source selection.

The lists are stored as files with the fixed file extensions *.dm_iqd in a directory of the user's choice. The directory applicable to the following commands is defined with the command MMEemory:CDIR. To access the files in this directory, you only have to give the file name without the path and the file extension.

Example: "BB:XMRadio:DATA DLIS"
 'selects Data Lists as data source.'

"MMEemory:CDIR 'D:\Lists\DM\IqData'"
 'selects the directory for the data lists.'

"BB:XMRadio:DATA:DSElect 'XMRadio_list1'"
 'selects file 'XMRadio_list1' as the data source. This file must be in the directory D:\Lists\DM\IqData and have the file extension *.dm_iqd.'

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:DATA:PATTERN <bit pattern>

The command selects the bit pattern for the Data selection. The maximum length is 64 bits.

Example: "BB:XMR:DATA:PATT #B10"
'defines the bit pattern.

*RST value	Resolution	SCPI
#B10	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:FCOUNTER?

Queries the number of frames.

Example: "BB:XMR:FCO?"
'queries the number of frames.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:LAYER SAT1A | SAT2A | TERRA | TERRB | SAT2B | SAT1B

The command selects the physical layer mode for the transmission of the XM-Radio signal.

Parameter: SAT1A/SAT2A/SAT2B/SAT1B
Transmits the QPSK-modulated signal via up to two satellites.

TERRA/TERRB
Transmits the COFDM-modulated signal by means of a repeater.

Example: "BB:XMR:LAY SAT1A"
'selects SAT1A as physical layer mode.

*RST value	Resolution	SCPI
SAT1A	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:PRESET

The command produces a standardized default for the XM-RADIO standard. The settings correspond to the *RST values specified for the commands.

This command triggers an action and therefore has no *RST value and no query form.

Example: "BB:XMR:PRES"
'resets all the XM-RADIO settings to default values.

*RST value	Resolution	Dependencies	SCPI
-	-	All XM-RADIO settings are preset.	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:SATellite:CLOCK:MODE SYMBol | MSYMBol

The command enters the type of externally supplied clock (:BB:XMRadio:CLOCK:SOURce EXTernal).

When MSYMBol is used, a multiple of the symbol clock is supplied via the CLOCK connector and the symbol clock is derived internally from this. The multiplier is entered with the command :BB:XMRadio:SATellite:CLOCK:MULTiplier.

For two-path instruments, this command the only numerical suffix allowed for SOURce is 1, since the external clock source is permanently allocated to path A.

Example: "BB:XMR:SAT:CLOC:MODE SYMB"
'selects clock type **Symbol**, i.e. the supplied clock is a symbol clock.

*RST value	Resolution	SCPI
SYMBol	-	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:SATellite:CLOCK:MULTiplier 1...64

The command specifies the multiplier for clock mode **Multiple Symbol** (:BB:XMRadio:SATellite:CLOCK:MODE MSYMBol) in the case of an external clock source.

For two-path instruments, the only numerical suffix allowed for SOURce is 1, since the external clock source is permanently allocated to path A.

Example: "BB:XMR:SAT:CLOC:SOUR EXT"
'selects the external clock source. The clock is supplied via the CLOCK connector.
"BB:XMR:SAT:CLOC:MODE MSYM"
'selects clock mode **Multiple Symbol**, i.e. the supplied clock has a rate which is a multiple of the symbol rate.
"BB:XMR:SAT:CLOC:MULT 12"
'the multiplier for the external clock rate is 12.

*RST value	Resolution	SCPI
4	1	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:SATellite:CLOCK:SOURce INTernal | EXTernal | AINTernal

The command selects the clock source.

For two-path instruments, selecting EXTernal is only possible for path A, since the external clock source is permanently allocated to path A; selecting AINTernal is only possible for path B.

Parameter: **INTernal** The internal clock reference is used.
EXTernal The external clock reference is supplied to the CLOCK connector

Example: "BB:XMR:SAT:CLOC:SOUR EXT"
'selects an external clock reference. The clock is supplied via the CLOCK connector.
"BB:XMR:SAT:CLOC:MODE SAMP"
'specifies that a sample clock is supplied via the CLOCK connector.

*RST value	Resolution	SCPI
INTernal	-	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:SATellite:DELay 0.000 ms...63 ms

This command sets the signal delay in physical layer mode satellite.

Example: "BB:XM:RADIO:SAT:DEL 5.0MS"
'sets a signal delay of 5 ms.

*RST value	Resolution	SCPI
0	0.001	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:SATellite:FILTer:PARAmeter:APCO25 0.05 to 0.99

The command sets the roll-off factor for the APCO25 filter type.

Example: "BB:XM:RADIO:SAT:FILT:PAR:APCO25 0.05"
'the roll-off factor is set to 0.05.

*RST value	Resolution	SCPI
0.20	0.05	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:SATellite:FILTer:PARAmeter:COSine 0.05 to 0.99

The command sets the roll-off factor for the cosine filter type.

Example: "BB:XM:RADIO:SAT:FILT:PAR:COS 0.05"
'the roll-off factor is set to 0.05.

*RST value	Resolution	SCPI
0.20	0.05	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:SATellite:FILTer:PARAmeter:GAUSs 0.15 to 2.50

The command sets the BxT for the gauss filter type.

Example: "BB:XM:RADIO:SAT:FILT:PAR:GAUS 0.15"
'the BxT is set to 0.15.

*RST value	Resolution	SCPI
0.20	0.01	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:SATellite:FILTer:PARAmeter:LPASs 0.05 to 2.0

The command sets the cut off frequency factor for the Lowpass filter type.

Example: "BB:XM:RADIO:SAT:FILT:PAR:LPAS 0.15"
'the cut of frequency factor is set to 0.15.

*RST value	Resolution	SCPI
0.50	0.01	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:SATellite:FILTer:PARAmeter:PGAuss 0.15 to 2.50

The command sets the BxT for the pure gauss filter type.

Example: "BB:XMRadio:SATellite:FILTer:PARAmeter:PGAuss 0.15"
'the BxT is set to 0.15.

*RST value	Resolution	SCPI
0.20	0.01	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:SATellite:FILTer:PARAmeter:RCOSine 0.05 to 0.99

The command sets the roll-off factor for the root cosine filter type.

Example: "BB:XMRadio:SATellite:FILTer:PARAmeter:RCOSine 0.15"
'the roll-off factor is set to 0.15.

*RST value	Resolution	SCPI
0.20	0.01	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:SATellite:FILTer:PARAmeter:SPHase 0.15 to 2.50

The command sets the BxT for the split phase filter type.

Example: "BB:XMRadio:SATellite:FILTer:PARAmeter:SPHase 0.15"
'the BxT is set to 0.15.

*RST value	Resolution	SCPI
0.20	0.01	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:SATellite:FILTer:TYPE RCOSine | COSine | GAUSSs | LGAuss | CONE | COF705 | COEqualizer | COFequalizer | C2K3x | APCO25 | SPHase | RECTangle | PGAuss | LPASs | DIRac | ENPShape | EWPSshape

The command selects the baseband filter type for the satellite physical layer mode.

Example: "BB:XMRadio:SATellite:FILTer:TYPE COS"
'sets the cosine filter type.

*RST value	Resolution	SCPI
COSine		Device-specific

[SOURce<[1]]2>:JBB:XMRadio:SATellite:SEQuence AUTO | RETRigger | AAUTo | ARETrigger | SINGle

The command selects the trigger mode.

- Parameter: AUTO**
The modulation signal is generated continuously.
- RETRigger**
The modulation signal is generated continuously. A trigger event (internal or external) causes a restart.
- AAUTo**
The modulation signal is generated only when a trigger event occurs. After the trigger event the signal is generated continuously. Signal generation is stopped with command SOUR:BB:XM:TRIG:ARM:EXEC and started again when a trigger event occurs.
- ARETrigger**
The modulation signal is generated only when a trigger event occurs. The device automatically toggles to RETRIG mode. Every subsequent trigger event causes a restart. Signal generation is stopped with command SOUR:BB:XM:TRIG:ARM:EXEC and started again when a trigger event occurs.
- SINGle**
The modulation signal is generated only when a trigger event occurs. Then the signal is generated once to the length specified with command SOUR:BB:XM:SAT:TRIG:SLen. Every subsequent trigger event causes a restart.

Example: "BB:XM:RADIO:SAT:SEQ AAUT"
'sets the **Armed_auto** trigger mode; the device waits for the first trigger (e.g. with *TRG) and then generates the signal continuously.

*RST value	Resolution	SCPI
AUTO	-	Device-specific

[SOURce<[1]]2>:JBB:XMRadio:SATellite:SRATe:VARiation 1000000 symbols/s...2000000 symbols/s

The command enters the output symbol rate.

Example: "BB:XM:RADIO:SAT:SRAT:VAR 4000000"
'sets the output sample rate to 4000000 symbols/s.

*RST value	Resolution	SCPI
1640000	1.0	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:SATellite:TRIGGER:ARM:EXECute

The command stops the signal generation for trigger modes **Armed_Auto** and **Armed_Retrigger**. A subsequent internal or external trigger event restart the signal generation.

This command triggers an event and therefore has no *RST value and no query form.

Example: "BB:XMR:SAT:TRIG:SOUR INT"
 'sets internal triggering.
 "BB:XMR:SAT:SEQ ARET"
 'sets Armed_Retrigger mode, i.e. every trigger event causes the signal generation to restart.
 "BB:XMR:SAT:TRIG:EXEC"
 'executes a trigger, the signal generation is started.
 "BB:XMR:SAT:TRIG:ARM:EXEC"
 'the signal generation is stopped.
 "BB:XMR:SAT:TRIG:EXEC"
 'executes a trigger, the signal generation is started again.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:SATellite:TRIGGER:EXECute

The command executes a trigger. The internal trigger source must be selected using the command :BB:XMR:SAT:TRIG:SOUR INT and a trigger mode other than AUTO must be selected using the command :BB:XMR:SAT:SEQ.

This command triggers an event and therefore has no *RST value and no query form.

Example: "BB:XMR:SAT:TRIG:SOUR INT"
 'sets internal triggering.
 "BB:XMR:SAT:SEQ RETR"
 'sets Retrigger mode, i.e. every trigger event causes signal generation to restart.
 "BB:XMR:SAT:TRIG:EXEC"
 'executes a trigger.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:SATellite:TRIGGER[:EXTernal<[1]|2>]:DELay 0..2^32-1

The command specifies the trigger delay (expressed as a number of symbols) for external triggering. The numeric suffix to EXTernal distinguishes between the external trigger via the TRIGGER 1 (suffix 1) and TRIGGER 2 (suffix 2) connector.

Example: "BB:XMR:SAT:TRIG:SOUR EXT"
 'sets an external trigger via the TRIGGER 1 connector.
 "BB:XMR:SAT:TRIG:DEL 50"
 'sets a delay of 50 symbols for the trigger.

*RST value	Resolution	SCPI
0 symbols	1 symbol	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:SATellite:TRIGGER[:EXTERNAL<[1]|2>]:INHIBIT 0...2^32-1

The command specifies the number of symbols by which a restart is to be inhibited following a trigger event. This command applies only in the case of external triggering. The numeric suffix to EXTERNAL distinguishes between the external trigger via the TRIGGER 1 (suffix 1) and TRIGGER 2 (suffix 2) connector.

Example: "BB:XMR:SAT:TRIG:SOUR EXT"
 'selects an external trigger via the TRIGGER 1 connector.
 "BB:XMR:SAT:TRIG:INH 200"
 'sets a restart inhibit for 200 symbols following a trigger event.

*RST value	Resolution	SCPI
0 symbol	1 symbol	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:SATellite:TRIGGER:OBASband:DELAY 0...2^32-1

Note:
 This command is available for R&S SMx and R&S AMU two-path instruments only.

The command specifies the trigger delay (expressed as a number of symbols) for triggering by the trigger signal from the second path.

Example: "BB:XMR:SAT:TRIG:SOUR OBAS"
 'sets for path A the internal trigger executed by the trigger signal from the second path (path B).
 "BB:XMR:SAT:TRIG:OBAS:DEL 50"
 'sets a delay of 50 symbols for the trigger.

RST value	Resolution	SCPI
0 symbols	1 symbol	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:SATellite:TRIGGER:OBASband:INHIBIT 0...2^32-1

Note:
 This command is available for R&S SMx and R&S AMU two-path instruments only.

The command specifies the number of symbols by which a restart is to be inhibited following a trigger event. This command applies only for triggering by the second path.

Example: "BB:XMR:SAT:TRIG:SOUR OBAS"
 'sets for path A the internal trigger executed by the trigger signal from the second path (path B).
 "BB:XMR:SAT:TRIG:INH 200"
 'sets a restart inhibit for 200 symbols following a trigger event.

*RST value	Resolution	SCPI
0 symbols	1 symbol	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:SATellite:TRIGGER:OUTPUT:DELAY:FIXED ON | OFF

The command restricts the marker delay setting range to the dynamic range. In this range the delay can be set without restarting the marker and signal. If a delay is entered in setting ON but is outside this range, the maximum possible delay is set and an error message is generated.

Example: "BB:XMR:SAT:TRIG:OUTP:DEL:FIX ON"
 'restricts the marker signal delay setting range to the dynamic range.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:SATellite:TRIGGER:OUTPUT<[1]...4>:DELAY 0...2^32 - 1 Symbols

The command defines the delay between the signal on the marker outputs and the start of the signal, expressed in terms of symbols. Command :BB:XMRadio:SATellite:TRIGGER:OUTPUT:DELAY:FIXED can be used to restrict the range of values to the dynamic range, i.e. the range within which a delay of the marker signals can be set without restarting the marker and signal.

Example: "BB:XMR:SAT:TRIG:OUTP2:DEL 1600"
 'sets a delay of 1600 symbols for the signal on connector MARKER 2.

*RST value	Resolution	SCPI
0	1 symbol	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:SATellite:TRIGGER:OUTPUT<[1]...4>:DELAY:MAXIMUM?

The command queries the maximum marker delay for setting :BB:XMRadio:SAT:TRIG:OUTP:DEL:FIX ON.

The command is a query only and therefore has no *RST value.

Example: "BB:XMR:TRIG:OUTP:DEL:FIX ON"
 'restricts the marker signal delay setting range to the dynamic range.
 "BB:XMR:TRIG:OUTP:DEL:MAX?"
 'queries the maximum of the dynamic range.
 Response: "2000"
 'the maximum for the marker delay setting is 2000 symbols.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:SATellite:TRIGger:OUTPut<[1]...4>:DELay:MINimum?

The command queries the minimum marker delay for setting
:BB:XMRadio:SATellite:TRIGger:OUTPut: DELay:FIXed ON.

The command is a query only and therefore has no *RST value.

Example: "BB:XM:R:SAT:TRIG:OUTP:DEL:FIX ON"
'restricts the marker signal delay setting range to the dynamic range.

"BB:XM:R:SAT:TRIG:OUTP:DEL:MIN?"
'queries the minimum of the dynamic range.

Response: "0"
'the minimum for the marker delay setting is 0 symbols.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:SATellite:TRIGger:OUTPut<[1]...4>:MODE PATTern | PULSe | RATio | USER

The command defines the signal for the selected marker output.

Parameter: PATTern
A marker signal is generated according to the user defined pattern (command SOURce:BB:XMRadio:SATellite:TRIGger:OUTPut:PATTern).

PULSe
A pulsed marker signal is generated. The pulse frequency (= symbol rate/divider) is defined with the SOUR:BB:XMRadio:SATellite:TRIG:OUTP:PULSe:DIVider command and can be queried with the SOUR:BB:XMRadio:SATellite:TRIG:OUTP:PULSe:FREQuency? command.

RATio
A marker signal corresponding to the Time Off / Time On specifications in the commands SOURce:BB:XMRadio:SATellite:TRIGger:OUTPut:OFFT and SOURce:BB:XMRadio:SATellite:TRIGger:OUTPut:ONT is generated.

USER
A marker signal is generated at the beginning of every user-defined period. The period is defined in Period.

Example: "BB:XM:R:SAT:TRIG:OUTP2:MODE RAT"
'a marker signal is generated according to the user defined pattern.

*RST value	Resolution	SCPI
RATio	-	Device-specific

[SOURCE<[1]>:]BB:XMRadio:SATellite:TRIGGER:OUTPUT<[1]...4>:PERIOD 1 ... (1²⁴-1) symbols

The command sets the repetition rate for the signal at the marker outputs, expressed in terms of symbols. The setting is only valid for selection **USER** in

SOURCE:BB:XMRadio:TERR:TRIG:OUTP:MODE.

Example: "BB:XMRadio:SAT:TRIG:OUTP2:MODE USER"
 'selects the user marker for the signal on connector MARKER 2.

"BB:XMRadio:SAT:TRIG:OUTP2:PER 1600"
 'sets a period of 1600 symbols, i.e. the marker signal is repeated every 1600th symbol.

*RST value	Resolution	SCPI
1	1 symbol	Device-specific

[SOURCE<[1]>:]BB:XMRadio:SATellite:TRIGGER:OUTPUT<[1]...4>:OFFTIME 1.. 2²⁴ - 1 (1..16 777 215) symbols

The command sets the number of symbols in a period (ON time + OFF time) during which the marker signal in setting SOURCE:BB:XMRadio:SATellite:TRIGGER:OUTPUT:MODE RATIO on the marker outputs is OFF.

Example: "BB:XMRadio:SAT:TRIG:OUTP2:OFFT 200"
 'sets an OFF time of 200 symbols for marker signal 2.

*RST value	Resolution	SCPI
1 symbol	1 symbol	Device-specific

[SOURCE<[1]>:]BB:XMRadio:SATellite:TRIGGER:OUTPUT<[1]...4>:ONTIME 1.. 2²⁴ - 1 (1..16 777 215) symbols

The command sets the number of symbols in a period (ON time + OFF time) during which the marker signal in setting SOURCE:BB:XMRadio:SATellite:TRIGGER:OUTPUT:MODE RATIO on the marker outputs is ON.

Example: "BB:XMRadio:SAT:TRIG:OUTP2:ONT 200"
 'sets an ON time of 200 symbols for marker 2.

*RST value	Resolution	SCPI
1 symbol	1 symbol	Device-specific

[SOURCE<[1]>:]BB:XMRadio:SATellite:TRIGGER:OUTPUT<[1]...4>:PATTERN #B0,1...#B111...1, 2

The command defines the bit pattern used to generate the marker signal in the setting SOURCE:BB:XMRadio:SATellite:TRIGGER:OUTPUT:MODE PATTERN. 0 is marker off, 1 is marker on.

Example: "BB:XM:RADIO:SAT:TRIG:OUTP2:PATT #B000000011111111,15"
 'sets a bit pattern.
 "BB:XM:RADIO:SAT:TRIG:OUTP2:MODE PATT"
 'activates the marker signal according to a bit pattern on output MARKER 2.

*RST value	Resolution	SCPI
#B,1	-	Device-specific

[SOURCE<[1]>:]BB:XMRadio:SATellite:TRIGGER:OUTPUT<[1]...4>:PULSE:DIVIDER 2...2^10

The command sets the divider for Pulse marker mode (SOURCE:BB:XM:RADIO:SAT:TRIG:OUTP:MODE PULSE). The resulting pulse frequency is derived by dividing the symbol rate by the divider.

Example: "BB:XM:RADIO:SAT:TRIG:OUTP2:PULS:DIV 2"
 'sets the divider to 2 for the marker signal on output MARKER 2.
 "BB:XM:RADIO:SAT:TRIG:OUTP2:FREQ?"
 'queries the resulting pulse frequency of the marker signal.
 Response: "66 000"
 'the resulting pulse frequency is 66 kHz.

*RST value	Resolution	SCPI
2	1	Device-specific

[SOURCE<[1]>:]BB:XMRadio:SATellite:TRIGGER:OUTPUT<[1]...4>:PULSE:FREQUENCY?

The command queries the pulse frequency of the pulsed marker signal in the setting SOURCE:BB:XM:RADIO:SAT:TRIG:OUTP:MODE PULSE. The pulse frequency is derived by dividing the symbol rate by the divider.

The command is a query command and therefore has no *RST value.

Example: "BB:XM:RADIO:SAT:TRIG:OUTP2:PULS:DIV 2"
 'sets the divider marker signal on output MARKER 2 to the value 2.
 "BB:XM:RADIO:SAT:TRIG:OUTP2:MODE PULS"
 'enables the pulsed marker signal.
 "BB:XM:RADIO:SAT:TRIG:OUTP2:PULS:FREQ?"
 'queries the pulse frequency of the marker signal.
 Response: "33 000"
 'the resulting pulse frequency is 33 kHz.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:SATellite:TRIGGER:RMODE

The command queries the current status of signal generation for all trigger modes with XM-Radio modulation on.

The command is a query command and therefore has no *RST value.

Parameter: **RUN**

The signal is generated. A trigger event occurred in the triggered mode.

STOP

The signal is not generated. A trigger event did not occur in the triggered modes, or signal generation was stopped by the command :BB:XM:R:SAT:TRIG:ARM:EXECute (armed trigger modes only).

Example:

"BB:XM:R:SAT:TRIG:SOUR EXT"
'sets external triggering via the TRIGGER 1 connector.

"BB:XM:R:SAT:SEQ ARET"
'selects the Armed_Retrigger mode.

"BB:XM:R:SAT:TRIG:RMODE?"
'queries the current status of signal generation.

Response: "RUN"
'the signal is generated, an external trigger was executed.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:SATellite:TRIGGER:SLENGTH 1...max

The command sets the sequence length of the signal in symbols.

Example: "BB:XM:R:SAT:TRIG:SLEN 5000"
'selects the generation of 5000 symbols.

*RST value	Resolution	SCPI
1	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:SATellite:TRIGGER:SOURCE INTERNAL | EXTERNAL | BEXTERNAL | OBASeband

The command selects the trigger source.

Parameter: **INTERNAL**

Triggering is executed by means of the Trigger command :BB:XM:R:SATellite:TRIGGER:EXECute or *TRG in the case of remote control and by means of **Execute Trigger** in the case of manual operation.

EXTERNAL

Triggering is executed by means of the signal on the TRIGGER 1 connector.

BEXTERNAL

Triggering is executed by means of the signal on the TRIGGER 2 connector.

OBASeband

Triggering is executed by means of the trigger signal from the second path (two-path instruments only).

Example: "BB:XM:R:SAT:TRIG:SOUR EXT"
 'sets external triggering via the TRIGGER 1 connector.

*RST value	Resolution	SCPI
INTERNAL	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:SETTING:CATALOG?

This command reads out the files with XM-RADIO settings in the default directory. The default directory is set using command MMEM:CDIRECTory. A path can also be specified, in which case the files in the specified directory are read. Only files with the file extension *.xmradio will be listed.

The command is a query command and therefore has no *RST value.

Example: "MMEM:CDIR 'D:\user\XMRADIO'"
 'sets the default directory to D:\user\XMRADIO.

 "BB:XM:R:SETT:CAT?"
 'reads out all the files with XM-RADIO settings in the default directory.

 Response: "'xmradio_1', 'xmradio_1'"
 'the files 'xmradio1' and 'xmradio2' are available.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:SETTING:DELETE <file_name>

This command deletes the selected file with XM-RADIO settings. The directory is set using command `MMEM:CDIRECTORY`. A path can also be specified, in which case the files in the specified directory are read. The file extension may be omitted. Only files with the file extension `*.xmradio` will be deleted.

This command triggers an event and therefore has no `*RST` value and no query form.

Example: `"BB:XMR:SETT:DEL 'xmradio_1'"`
 'deletes file 'xmradio_1'.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:SETTING:LOAD <file_name>

This command loads the selected file with XM-RADIO settings. The directory is set using command `MMEM:CDIRECTORY`. A path can also be specified, in which case the files in the specified directory are read. The file extension may be omitted. Only files with the file extension `*.xmradio` will be loaded.

This command triggers an event and therefore has no `*RST` value and no query form.

Example: `"BB:XMR:SETT:LOAD 'xmradio_1'"`
 'loads file 'xmradio_1'.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:SETTING:STORE <file_name>

This command stores the current XM-RADIO settings into the selected file. The directory is set using command `MMEM:CDIRECTORY`. A path can also be specified, in which case the files in the specified directory are read. Only the file name has to be entered. XM-RADIO settings are stored as files with the specific file extensions `*.xmradio`.

This command triggers an event and therefore has no `*RST` value and no query form.

Example: `"BB:XMR:SETT:STOR 'xmradio_1'"`
 'stores the current settings into file 'xmradio_1'.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:STATE ON | OFF

The command activates modulation in accordance with the XM-RADIO standard. Activating this standard deactivates all the other digital standards and digital modulation modes (in case of two-path instruments, this affects the same path).

Example: `"BB:XMR:STAT ON"`
 'activates modulation in accordance with the XM-RADIO standard.

*RST value	Resolution	Dependencies	SCPI
ON	-	BB:XMR:STAT ON deactivates the other standards and digital modulation.	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:TERRestrial:CLOCK:MODE SAMPLE | MSAMPLE

The command enters the type of externally supplied clock
(SOURCE:BB:XMRadio:TERRestrial:CLOCK:SOURCE EXTernal).

When MSAMPLE is used, a multiple of the sample clock is supplied via the CLOCK connector and the sample clock is derived internally from this. The multiplier is entered with the command SOURCE:BB:XMRadio:TERRestrial:CLOCK:MULTIPLIER.

For two-path instruments, the only numerical suffix allowed for SOURCE is 1, since the external clock source is permanently allocated to path A.

Example: "BB:XMR:TERR:CLOC:MODE SAMP"
'selects clock type **Sample**, i.e. the supplied clock is a sample clock.

*RST value	Resolution	SCPI
SAMPLE	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:TERRestrial:CLOCK:MULTIPLIER 1...64

The command specifies the multiplier for clock mode **Multiple Sample**
(:BB:XMRadio:TERRestrial:CLOCK:MODE MSAMPLE) in the case of an external clock source.

For two-path instruments, the only numerical suffix allowed for SOURCE is 1, since the external clock source is permanently allocated to path A.

Example: "BB:XMR:TERR:CLOC:SOUR EXT"
'selects the external clock source. The clock is supplied via the CLOCK connector.

"BB:XMR:TERR:CLOC:MODE MSAM"
'selects clock mode **Multiple Sample**, i.e. the supplied clock has a rate which is a multiple of the sample rate.

"BB:XMR:TERR:CLOC:MULT 12"
'the multiplier for the external clock rate is 12.

*RST value	Resolution	SCPI
4	1	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:TERRestrial:CLOCK:SOURce INTernal | EXTernal | AINTernal

The command selects the clock source.

For two-path instruments, selecting EXTernal is only possible for path A, since the external clock source is permanently allocated to path A; selecting AINTernal is only possible for path B.

Parameter: **INTernal**

The internal clock reference is used.

EXTernal

The external clock reference is supplied to the CLOCK connector.

Example: "BB:XMR:TERR:CLOC:SOUR EXT"

'selects an external clock reference. The clock is supplied via the CLOCK connector.

"BB:XMR:TERR:CLOCK:MODE SAMP"

'specifies that a sample clock is supplied via the CLOCK connector.

*RST value	Resolution	SCPI
INTernal	-	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:TERRestrial:DELay 0.000 ms...63 ms

This command sets the signal delay in physical layer mode terrestrial.

Example: "BB:XMR:TERR:DEL 5.0MS"

'sets a signal delay of 5 ms.

*RST value	Resolution	SCPI
0	0.001	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:TERRestrial:FILTer:PARAMeter:APCO25 0.05...0.99

The command sets the roll-off factor for the APCO25 filter type.

Example: "BB:XMR:TERR:FILT:PAR:APCO25 0.05"

'the roll-off factor is set to 0.05.

*RST value	Resolution	SCPI
0.20	0.05	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:TERRestrial:FILTer:PARAMeter:COSine 0.05...0.99

The command sets the roll-off factor for the cosine filter type.

Example: "BB:XMR:TERR:FILT:PAR:COS 0.05"

'the roll-off factor is set to 0.05.

*RST value	Resolution	SCPI
0.20	0.05	Device-specific

[SOURCE<[1]>:]BB:XMRadio:TERRestrial:FILTer:PARAmeter:COsine:COFS -0.1...1.0

The command sets the 'cut of frequency shift' value for the Cosine filter type.

Example: "BB:XMR:TERR:FILT:PAR:COS:COFS 0.04"
 'the 'cut of frequency shift' value is set to 0.04.

*RST value	Resolution	SCPI
0	0.01	Device-specific

[SOURCE<[1]>:]BB:XMRadio:TERRestrial:FILTer:PARAmeter:GAUSs 0.15...2.50

The command sets the BxT for the gauss filter type.

Example: "BB:XMR:TERR:FILT:PAR:GAUS 0.15"
 'the BxT is set to 0.15.

*RST value	Resolution	SCPI
0.20	0.01	Device-specific

[SOURCE<[1]>:]BB:XMRadio:TERRestrial:FILTer:PARAmeter:LPASs 0.05...2.0

The command sets the cut off frequency factor for the Lowpass filter type.

Example: "BB:XMR:TERR:FILT:PAR:LPAS 0.15"
 'the cut of frequency factor is set to 0.15.

*RST value	Resolution	SCPI
0.50	0.01	Device-specific

[SOURCE<[1]>:]BB:XMRadio:TERRestrial:FILTer:PARAmeter:PGAuss 0.15...2.50

The command sets the BxT for the pure gauss filter type.

Example: "BB:XMR:TERR:FILT:PAR:PGA 0.15"
 'the BxT is set to 0.15.

*RST value	Resolution	SCPI
0.20	0.01	Device-specific

[SOURCE<[1]>:]BB:XMRadio:TERRestrial:FILTer:PARAmeter:RCOSine 0.05...0.99

The command sets the roll-off factor for the root cosine filter type.

Example: "BB:XMR:TERR:FILT:PAR:RCOS 0.15"
 'the roll-off factor is set to 0.15.

*RST value	Resolution	SCPI
0.20	0.01	Device-specific

[SOURCE<[1]>:]BB:XMRadio:TERRestrial:FILTer:PARAmeter:SPHase 0.15...2.50

The command sets the BxT for the split phase filter type.

Example: "BB: XMR: TERR: FILT: PAR: SPH 0.15"
'the BxT is set to 0.15.

*RST value	Resolution	SCPI
0.20	0.01	Device-specific

[SOURCE<[1]>:]BB:XMRadio:TERRestrial:FILTer:TCFilter[:STATE] ON | OFF

The command activates or deactivates the XM-Radio filter which is in compliance with the spectral mask of the terrestrial standard.

Example: "BB: XMR: TERR: FILT: TCF: STAT ON"
'activates the XM-Radio terrestrial compliant filter.

*RST value	Resolution	SCPI
ON	-	Device-specific

[SOURCE<[1]>:]BB:XMRadio:TERRestrial:FILTer:TYPE RCOSine | COSine | GAUSSs | LGAuss | CONE | COF705 | COEqualizer | COFequalizer | C2K3x | APCO25 | SPHase | RECTangle | PGAuss | LPASs | DIRac | ENPShape | EWPSHape

The command selects the baseband filter type for the terrestrial physical layer mode.

Example: "BB: XMR: TERR: FILT: TYPE COS"
'sets the cosine filter type.

*RST value	Resolution	SCPI
COSine		Device-specific

[SOURCE<[1]>:]BB:XMRadio:TERRestrial:POW:AMSS -12 dB...12 dB

This command sets the level for the amplitude modulated synchronization symbol (AMSS).

Example: "BB: XMR: TERR: POW: AMSS 12dB"
'sets the AMSS level to 12 dB.

*RST value	Resolution	SCPI
0	0.01	Device-specific

[SOURCE<[1]>:]BB:XMRadio:TERRestrial:POW:MCM -12 dB...12 dB

This command sets the level for the multicarrier modulation(MCM).

Example: "BB: XMR: TERR: POW: MCM 12dB"
'sets the MCM to 12 dB.

*RST value	Resolution	SCPI
0	0.01	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:Terrestrial:SEquence AUTO | RETRigger | AAUTo | ARETrigger | SINGle

The command selects the trigger mode.

- Parameter: AUTO**
The modulation signal is generated continuously.
- RETRigger**
The modulation signal is generated continuously. A trigger event (internal or external) causes a restart.
- AAUTo**
The modulation signal is generated only when a trigger event occurs. After the trigger event the signal is generated continuously. Signal generation is stopped with command `SOUR:BB:XM:TRIG:ARM:EXEC` and started again when a trigger event occurs.
- ARETrigger**
The modulation signal is generated only when a trigger event occurs. The device automatically toggles to RETRIG mode. Every subsequent trigger event causes a restart. Signal generation is stopped with command `SOUR:BB:XM:TRIG:ARM:EXEC` and started again when a trigger event occurs.
- SINGle**
The modulation signal is generated only when a trigger event occurs. Then the signal is generated once to the length specified with command `SOUR:BB:XM:TERR:TRIG:SLen`. Every subsequent trigger event causes a restart.

Example: `"BB:XM:TERR:SEQ AAUT"`
'sets the **Armed_auto** trigger mode; the device waits for the first trigger (e.g. with `*TRG`) and then generates the signal continuously.

*RST value	Resolution	SCPI
AUTO	-	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:TERRestrial:SRATe:VARiation?

The command queries the output sample rate.

The command is a query only and therefore has no *RST value.

Example: `"BB:XM:TERR:SRAT:VAR?"`
'queries the output sample rate.

Response: `"2990000"`
'the output sample rate is 2990000 samples/s.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:TERRestrial:TRIGger:ARM:EXECute

The command stops signal generation for trigger modes **Armed_Auto** and **Armed_Retrigger**. A subsequent internal or external trigger event restart the signal generation.

This command triggers an event and therefore has no *RST value and no query form.

Example: "BB:XMR:TERR:TRIG:SOUR INT"
'sets internal triggering.

"BB:XMR:TERR:SEQ ARET"
'sets Armed_Retrigger mode, i.e. every trigger event causes the signal generation to restart.

"BB:XMR:TERR:TRIG:EXEC"
'executes a trigger, the signal generation is started.

"BB:XMR:TERR:TRIG:ARM:EXEC"
'the signal generation is stopped.

"BB:XMR:TERR:TRIG:EXEC"
'executes a trigger, the signal generation is started again.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:TERRestrial:TRIGger:EXECute

The command executes a trigger. The internal trigger source must be selected using the command :BB:XMR:TERR:TRIG:SOUR INT and a trigger mode other than AUTO must be selected using the command :BB:XMR:TERR:SEQ.

This command triggers an event and therefore has no *RST value and no query form.

Example: "BB:XMR:TERR:TRIG:SOUR INT"
'sets internal triggering.

"BB:XMR:TERR:SEQ RETR"
'sets Retrigger mode, i.e. every trigger event causes signal generation to restart.

"BB:XMR:TERR:TRIG:EXEC"
'executes a trigger.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:TERRestrial:TRIGger[:EXTernal<[1]|2>]:DELay 0...2^32-1

The command specifies the trigger delay (expressed as a number of samples) for external triggering. The numeric suffix to EXTERNAL distinguishes between the external trigger via the TRIGGER 1 (suffix 1) and TRIGGER 2 (suffix 2) connector.

Example: "BB:XMR:TERR:TRIG:SOUR EXT"
'sets an external trigger via the TRIGGER 1 connector.

"BB:XMR:TERR:TRIG:DEL 50"
'sets a delay of 50 samples for the trigger.

*RST value	Resolution	SCPI
0 samples	1 sample	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:TERRestrial:TRIGger[:EXTernal<[1]|2>]:INHibit 0...2^32-1

The command specifies the number of samples by which a restart is to be inhibited following a trigger event. This command applies only in the case of external triggering. The numeric suffix to EXTernal distinguishes between the external trigger via the TRIGGER 1 (suffix 1) and TRIGGER 2 (suffix 2) connector.

Example: "BB:XMR:TERR:TRIG:SOUR EXT"
 'selects an external trigger via the TRIGGER 1 connector.
 "BB:XMR:TERR:TRIG:INH 200"
 'sets a restart inhibit for 200 samples following a trigger event.

*RST value	Resolution	SCPI
0 samples	1 sample	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:TERRestrial:TRIGger:OBASband:DELay 0...2^32-1

Note:
 This command is available for R&S SMx and R&S AMU two-path instruments only.

The command specifies the trigger delay (expressed as a number of samples) for triggering by the trigger signal from the second path.

Example: "BB:XMR:TERR:TRIG:SOUR OBAS"
 'sets for path A the internal trigger executed by the trigger signal from the second path (path B).
 "BB:XMR:TERR:TRIG:OBAS:DEL 50"
 'sets a delay of 50 samples for the trigger.

RST value	Resolution	SCPI
0 samples	1 samples	Device-specific

[SOURCE<[1]|2>:]BB:XMRadio:TERRestrial:TRIGger:OBASband:INHibit 0...2^32-1

Note:
 This command is available for R&S SMx and R&S AMU two-path instruments only.

The command specifies the number of samples by which a restart is to be inhibited following a trigger event. This command applies only for triggering by the second path.

Example: "BB:XMR:TERR:TRIG:SOUR OBAS"
 'sets for path A the internal trigger executed by the trigger signal from the second path (path B).
 "BB:XMR:TERR:TRIG:INH 200"
 'sets a restart inhibit for 200 samples following a trigger event.

*RST value	Resolution	SCPI
0 samples	1 sample	Device-specific

[SOURCE<[1]2>:]BB:XMRadio:TERRestrial:TRIGger:OUTPut:DELay:FIXed ON | OFF

The command restricts the marker delay setting range to the dynamic range. In this range the delay can be set without restarting the marker and signal. If a delay is entered in setting ON but is outside this range, the maximum possible delay is set and an error message is generated.

Example: "BB:XM:R:TERR:TRIG:OUTP:DEL:FIX ON"
 'restricts the marker signal delay setting range to the dynamic range.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURCE<[1]2>:]BB:XMRadio:TERRestrial:TRIGger:OUTPut<[1]...4>:DELay 0...2^32 - 1 Samples

The command defines the delay between the signal on the marker outputs and the start of the signal, expressed in terms of samples. Command :BB:XMRadio:TERRestrial:TRIGger:OUTPut:DELay:FIXed can be used to restrict the range of values to the dynamic range, i.e. the range within which a delay of the marker signals can be set without restarting the marker and signal.

Example: "BB:XM:R:TERR:TRIG:OUTP2:DEL 1600"
 'sets a delay of 1600 samples for the signal on connector MARKER 2.

*RST value	Resolution	SCPI
0	1 sample	Device-specific

[SOURCE<[1]2>:]BB:XMRadio:TERRestrial:TRIGger:OUTPut<[1]...4>:DELay:MAXimum?

The command queries the maximum marker delay for setting
 SOURCE:BB:XMRadio:TERR:TRIG:OUTP:DEL:FIX ON.

The command is a query only and therefore has no *RST value.

Example: "BB:XM:R:TERR:TRIG:OUTP:DEL:FIX ON"
 'restricts the marker signal delay setting range to the dynamic range.

"BB:XM:R:TERR:TRIG:OUTP:DEL:MAX?"
 'queries the maximum of the dynamic range.

Response: "2000"
 'the maximum for the marker delay setting is 2000 samples.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURCE<[1]>:]BB:XMRadio:TERRestrial:TRIGger:OUTPut<[1]...4>:DELay:MINimum

The command queries the minimum marker delay for setting
 SOURCE:BB:XMRadio:TERRestrial:TRIGger:OUTPut:DELay:FIXed ON.

The command is a query only and therefore has no *RST value.

Example: "BB:XM:TER:TRIG:OUTP:DEL:FIX ON"
 'restricts the marker signal delay setting range to the dynamic range.
 "BB:XM:TER:TRIG:OUTP:DEL:MIN"
 'queries the minimum of the dynamic range.
 Response: "0"
 'the minimum for the marker delay setting is 0 samples.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURCE<[1]>:]BB:XMRadio:TERRestrial:TRIGger:OUTPut<[1]...4>:MODE TPL | MCM | USER | RATio

The command defines the signal for the selected marker output.

Parameter:

- TPL** A marker signal is generated at the beginning of each TPL (Terrestrial Physical Layer) frame.
- MCM** A marker signal is generated at the beginning of each MCM (Multicarrier Modulation) symbol
- USER** A marker signal is generated at the beginning of every user-defined period. The period is defined in Period.
- RATio** A marker signal corresponding to the Time Off / Time On specifications in the commands SOURCE:BB:XMRadio:TRIGger:OUTPut:OFFT and SOURCE:BB:XMRadio:TRIGger:OUTPut:ONT is generated.

Example: "BB:XM:TER:TRIG:OUTP2:MODE TPL"
 'a marker signal is generated at the beginning of each TPL frame.

*RST value	Resolution	SCPI
RATio	-	Device-specific

[SOURCE<[1]>:]BB:XMRadio:TERRestrial:TRIGger:OUTPut<[1]...4>:OFFTime 1.. 2^24 - 1 (1..16 777 215) samples

The command sets the number of samples in a period (ON time + OFF time) during which the marker signal in setting SOURCE:BB:XMRadio:TERRestrial:TRIGger:OUTPut:MODE RATio on the marker outputs is OFF.

Example: "BB:XM:TER:TRIG:OUTP2:OFFT 200"
 'sets an OFF time of 200 samples for marker signal 2.

*RST value	Resolution	SCPI
1 sample	1 sample	Device-specific

[SOURCE<[1]2>:]BB:XMRadio:TERRestrial:TRIGger:OUTPut<[1]...4>:ONTime 1.. 2^24 - 1 (1..16 777 215) samples

The command sets the number of samples in a period (ON time + OFF time) during which the marker signal in setting SOURCE:BB:XMR:TERRestrial:TRIGger:OUTPut:MODE RATIO on the marker outputs is ON.

Example: "BB:XMR:TERR:TRIG:OUTP2:ONT 200"
'sets an ON time of 200 samples for marker 2.

*RST value	Resolution	SCPI
1 sample	1 sample	Device-specific

[SOURCE<[1]2>:]BB:XMRadio:TERRestrial:TRIGger:OUTPut<[1]...4>:PERiod 1 ... (1^24-1) samples

The command sets the repetition rate for the signal at the marker outputs, expressed in terms of samples. The setting is only valid for selection USER in SOURCE:BB:XMR:TERR:TRIG:OUTP:MODE.

Example: "BB:XMR:TERR:TRIG:OUTP2:MODE USER"
'selects the user marker for the signal on connector MARKER 2.
"BB:XMR:TERR:TRIG:OUTP2:PER 1600"
'sets a period of 1600 samples, i.e. the marker signal is repeated every 1600th sample.

*RST value	Resolution	SCPI
1	1 sample	Device-specific

[SOURCE<[1]2>:]BB:XMRadio:TERRestrial:TRIGger:RMODE

The command queries the current status of signal generation for all trigger modes with XM-Radio modulation on.

The command is a query command and therefore has no *RST value.

Parameter: **RUN** the signal is generated. A trigger event occurred in the triggered mode.
STOP the signal is not generated. A trigger event did not occur in the triggered modes, or signal generation was stopped by the command SOURCE:BB:XMR:TERR:TRIG:ARM:EXEC (armed trigger modes only).

Example: "BB:XMR:TERR:TRIG:SOUR EXT"
'sets external triggering via the TRIGGER 1 connector.
"BB:XMR:TERR:SEQ ARET"
'selects the Armed_Retrigger mode.
"BB:XMR:TERR:TRIG:RMODE?"
'queries the current status of signal generation.
Response: "RUN"
'the signal is generated, an external trigger was executed.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURCE<[1]>:]BB:XMRadio:TERRestrial:TRIGger:SLENgth 1...max

The command sets the sequence length of the signal in number of samples.

Example: "BB:XMRadio:TERRestrial:TRIG:SLEN 5000"
'selects the generation of 5000 samples.

*RST value	Resolution	SCPI
1	-	Device-specific

[SOURCE<[1]>:]BB:XMRadio:TERRestrial:TRIGger:SLUNit TPL | MCM | SAMPlE

The command defines the unit for the entry of the length of the signal sequence (SOURCE:BB:XMRadio:TERRestrial:TRIG:SLEN) to be output in the **Single** trigger mode (SOURCE:BB:XMRadio:TERRestrial:SEQ SING).

Parameter: TPL The signal sequence is entered in TPL frames.

MCM The signal sequence is entered in MCM symbols.

SAMPlE The signal sequence is entered in samples.

Example: "SOURCE:BB:XMRadio:TERRestrial:SEQ SING"
'sets trigger mode Single.
"SOURCE:BB:XMRadio:TERRestrial:TRIG:SLUN TPL"
'sets unit TPL frame for the entry of sequence length.
"SOURCE:BB:XMRadio:TERRestrial:TRIG:SLEN 2"
'sets a sequence length of 2 TPL frames. Two TPL frames will be output after the next trigger event.

*RST value	Resolution	SCPI
SAMPlE	-	Device-specific

[SOURCE<[1]>:]BB:XMRadio:TERRestrial:TRIGger:SOURce INTernal | EXTernal | BEXTernal | OBASeband

The command selects the trigger source.

Parameter: INTernal Triggering is executed by means of the Trigger command SOURCE:BB:XMRadio:TERRestrial:TRIGger:EXECute or *TRG in the case of remote control and by means of **Execute Trigger** in the case of manual operation.

EXTernal Triggering is executed by means of the signal on the TRIGGER 1 connector.

BEXTernal Triggering is executed by means of the signal on the TRIGGER 2 connector.

OBASeband Triggering is executed by means of the trigger signal from the second path (two-path instruments only).

Example: "BB:XMR:TERR:TRIG:SOUR EXT"
 'sets external triggering via the TRIGGER 1 connector.

*RST value	Resolution	SCPI
INTernal	-	Device-specific

[SOURce<[1]|2>:]BB:XMRadio:VERSion?

The command queries the version of the XM-RADIO standard underlying the definitions. The displayed version is depends on the selected physical layer mode.

The command is a query command and therefore does not have an *RST value.

Example: "BB:XMR:VERS?"
 'queries the XM-RADIO version.

Response: "FDSC-608-110000/Ed03/Rev01"

*RST value	Resolution	SCPI
-	-	Device-specific

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