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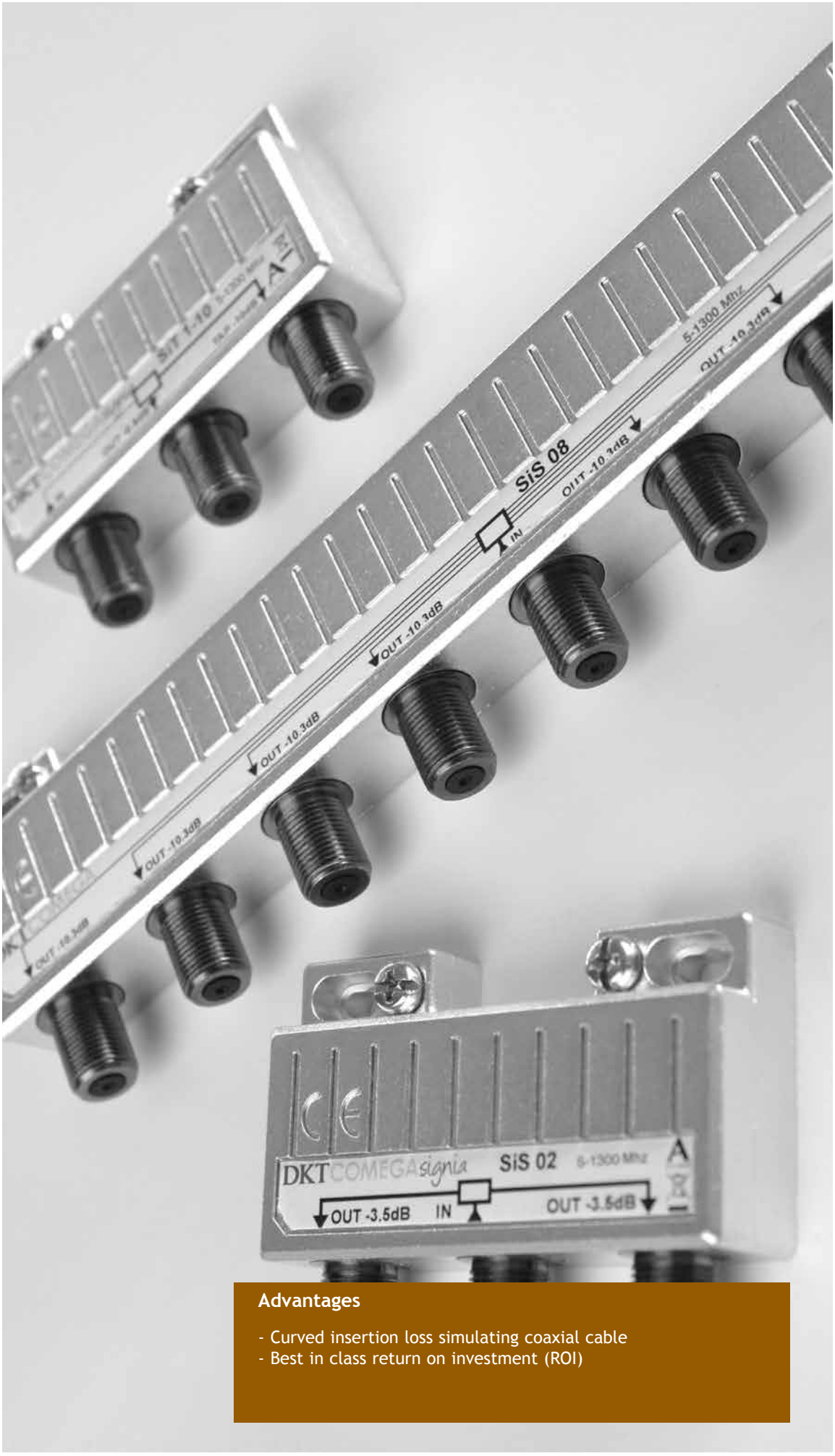


Advantages

- Curved insertion loss simulating coaxial cable
- Best in class return on investment (ROI)

signia splitters

Product information

The Signia splitter series follows the tradition of the Master series. With reliable performance and superb specifications, this superior and comprehensive series includes 2-way through to 8-way splitters. This optimizes network design options and efficiency.

A lightweight design allows easy handling. Mounting spacers that are easily snapped on and off provide a choice for spacing underneath the taps, thereby allowing a more flexible installation. There is easy access to F-connectors, which are all mounted on the same side. A unique construction of the female F-connector ensures secure connection to the inner conductor of the male connector, and furthermore, the plating ensures minimal corrosion. This dramatically reduces the likelihood of signal dropout and the subsequent need for network troubleshooting.

The splitter name, frequency range and all ports are clearly marked with rugged labels.

Technical features

- ✓ Class A (page 16)
- ✓ AC Block (page 16)
- ✓ Resistant to passive intermodulation (page 16)
- ✓ Surge pulse protection (page 16)
- ✓ Protected against dust & humidity (page 17)
- ✓ Corrosion-free (page 17)

Model overview

Type	Product name	Splitter loss *(10-470 Mhz)*	Splitter loss *(1006-1300 Mhz)*
2-way splitter	SiS 02	3.3	4.0
3-way splitter	SiS 03	5.2	6.2
3-way splitter asymmetric	SiS 03A	3.3 / 6.6	4.2 / 7.8
4-way splitter	SiS 04	6.6	7.9
6-way splitter	SiS 06	8.4	9.9
8-way splitter	SiS 08	10.1	11.9

Standardization of Signia splitters

The Signia splitter series complies with a range of standards, below are some of the most relevant for cable TV networks.

Description	Name	Conformity
Dry Heat	EN60068-2-2	✓
Change of temperature	EN60068-2-14	✓
Return loss	EN60728-4	Grade 1*
Screening effectiveness	EN50083-2	Exceeds Class A
Isolation (TAP-TAP)	EN60728-4	✓

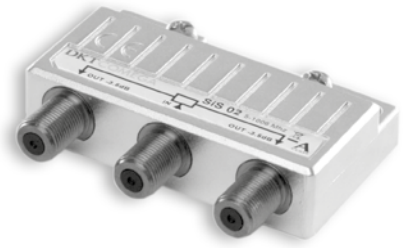
Description	Name	Conformity
Protection against instrusion	IEC 60529	IP67
Damp Heat	EN60068-2-30	✓
Salt Mist	EN60068-2-11	✓
Vibration	EN60068-2-6	✓

A CLASS

2-way splitters

Type	Insertion loss, typical IN-OUT (dB ± 0.5) *Frequency range (MHz)*				Isolation, typical / minimum OUT-OUT (dB) *Frequency range (MHz)*				Item no.
	10-470	*470-862*	*862-1006*	*1006-1300*	*10-470*	*470-862*	*862-1006*	*1006-1300*	
SiS 02	3.3	3.5	3.7	4.0	34 / 28	30 / 23	29 / 22	24 / 20	48002

Return loss: Grade 1
Connectors: F-Female
Dimensions: 65 x 50 x 16 mm
Weight: 86 g



3-way splitters

Type	Insertion loss, typical IN-OUT (dB ± 0.5) *Frequency range (MHz)*				Isolation, typical / minimum OUT-OUT (dB) *Frequency range (MHz)*				Item no.
	10-470	*470-862*	*862-1006*	*1006-1300*	*10-470*	*470-862*	*862-1006*	*1006-1300*	
SiS 03	5.2	5.6	5.8	6.2	32 / 25	30 / 22	26 / 20	23 / 18	48003
SiS 03A	3.3 6.6	3.7 7.0	3.8 7.3	4.2 7.8	32 / 24	30 / 24	30 / 24	28 / 21	48005

Return loss: Grade 1
Connectors: F-Female
Dimensions: 109 x 50 x 16 mm
Weight: 118 g

4-way splitters

Type	Insertion loss, typical IN-OUT (dB ± 0.5) *Frequency range (MHz)*				Isolation, typical / minimum OUT-OUT (dB) *Frequency range (MHz)*				Item no.
	10-470	*470-862*	*862-1006*	*1006-1300*	*10-470*	*470-862*	*862-1006*	*1006-1300*	
SiS 04	6.6	7.1	7.5	7.9	35 / 24	30 / 22	30 / 20	30 / 20	48004

Return loss: Grade 1
Connectors: F-Female
Dimensions: 109 x 50 x 16 mm
Weight: 122 g

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6-way splitters

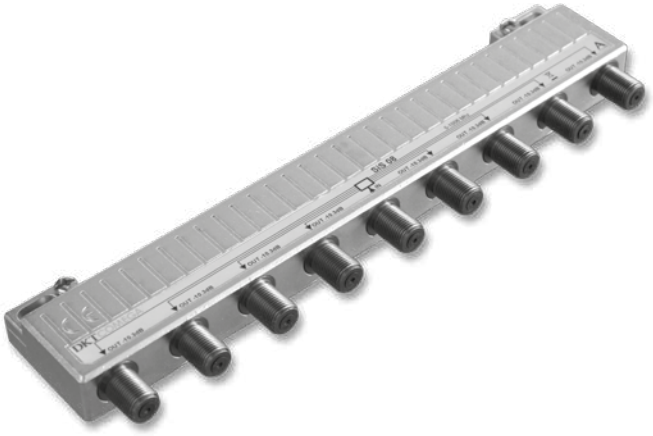
Type	Insertion loss, typical IN-OUT (dB ± 0.5) *Frequency range (MHz)*				Isolation, typical / minimum OUT-OUT (dB) *Frequency range (MHz)*				Item no.
	10-470	*470-862*	*862-1006*	*1006-1300*	*10-470*	*470-862*	*862-1006*	*1006-1300*	
SiS 06	8.4	9.0	9.4	9.9	33 / 23	28 / 20	28 / 20	28 / 18	48006

Return loss: Grade 1
Connectors: F-Female
Dimensions: 196 x 50 x 16 mm
Weight: 207 g

8-way splitters

Type	Insertion loss, typical IN-OUT (dB ± 0.5) *Frequency range (MHz)*				Isolation, typical / minimum OUT-OUT (dB) *Frequency range (MHz)*				Item no.
	10-470	*470-862*	*862-1006*	*1006-1300*	*10-470*	*470-862*	*862-1006*	*1006-1300*	
SiS 08	10.1	10.7	11.2	11.9	33 / 24	32 / 22	31 / 20	30 / 20	48008

Return loss: Grade 1
Connectors: F-Female
Dimensions: 196 x 50 x 16 mm
Weight: 214 g

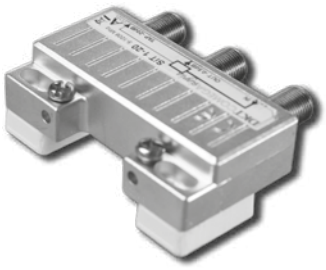


accessories for signia taps and splitters

Signia taps and splitters can be fitted with a set of spacers to allow easy installation of cables beneath the units. With a height of 8 mm it allows space for the most commonly used installation cables.

The spacers are easily snapped on if extra space is required.

Type name Signia FS, item no. 49120



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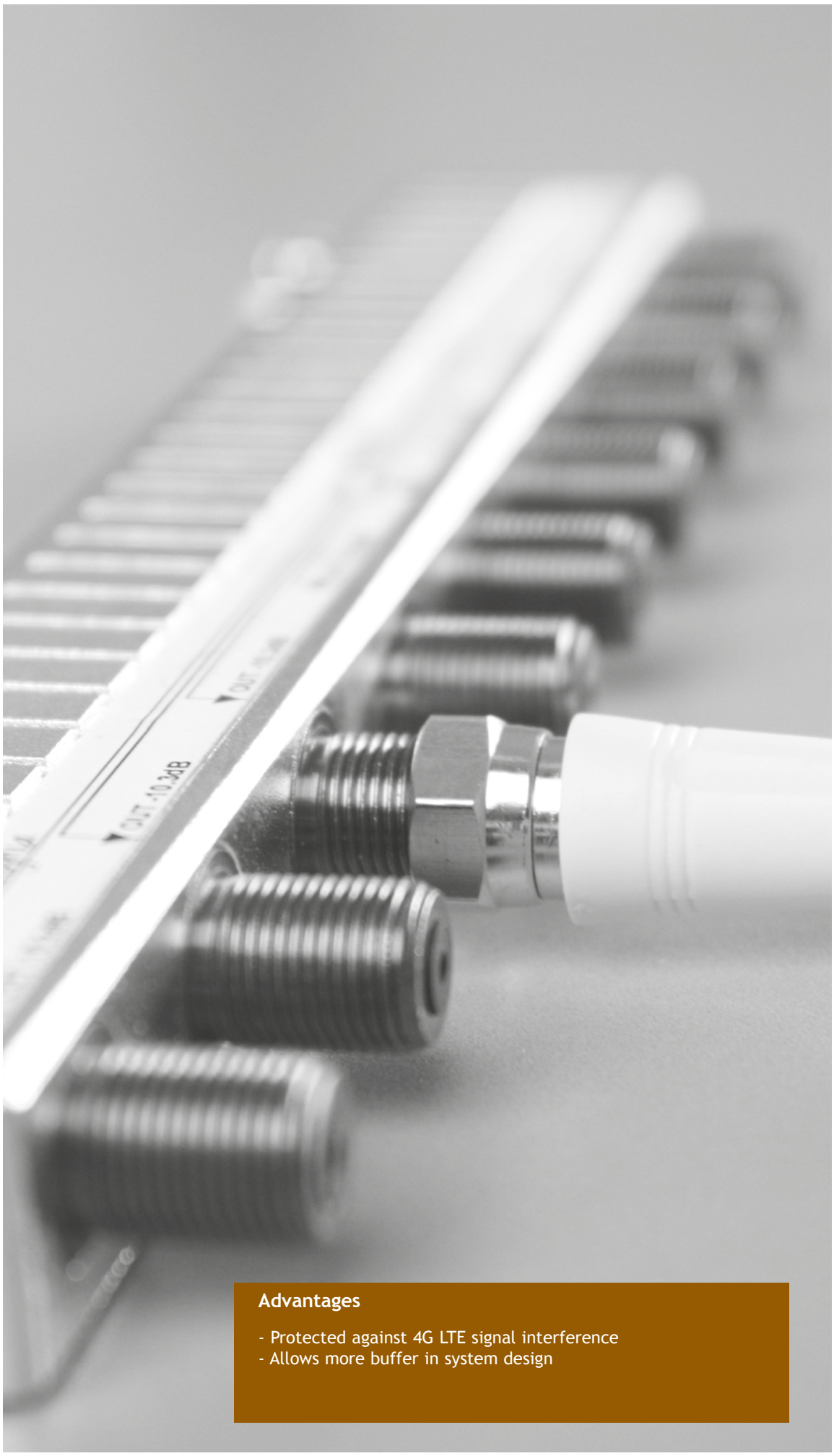


Advantages

- Protected against 4G LTE signal interference
- Allows more buffer in system design

electrical features

Frequency range

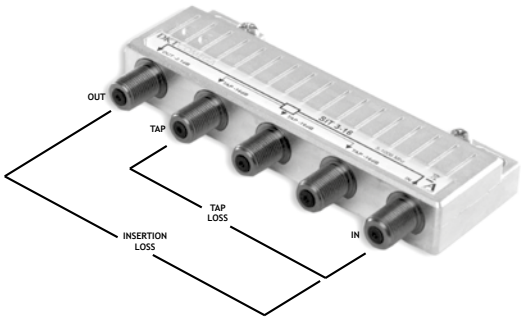
The Signia products are designed to operate within the frequency range specified in DOCSIS 3.1 phase 2 (5-1218 MHz).

Insertion loss

The insertion loss indicates how much of the signal strength is lost by leading the signal from IN to OUT. Signia is designed to provide the least possible insertion loss. The curve is optimized to be as flat as possible, to allow for high consistency in the signal passing through.

The Signia series has been designed to simulate the attenuation of coaxial cable over the frequency range, with a low loss in the 5-65 MHz frequency range and rising as the frequency increases, thereby making network planning easier. It allows for compensation by equalization in the amplifier.

Loss measurement



A signal is applied to the IN connector. For Tap Loss the output is measured on the other TAP connectors. For Insertion Loss the output is measured on the OUT connector.

Tap loss

The tap loss indicates how much of the signal strength is lost by leading the signal from IN to TAP. Some physical conditions make it possible to further enhance tap loss in comparison to insertion loss. This leads to a very flat curve for tap loss.

The Signia series have their tap loss designed to be as flat as possible. Each unit performs with a very small margin, varying only ±0.4 dB from 10 to 1300 MHz.

Isolation

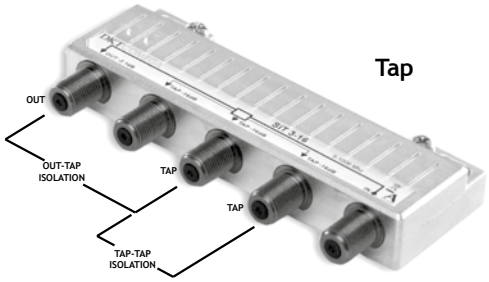
Isolation is also an important factor, it indicates how effectively the unit negates interference from one output to another, i.e. from one subscriber to his neighbour. There are 3 types of measurements, OUT-OUT, which is relevant for splitters, TAP-TAP and TAP-OUT that are relevant to taps.

A high isolation between TAP-TAP means that noise from TAP1 does not interfere with signals or TAP2, and services as well as maintenance are optimized.

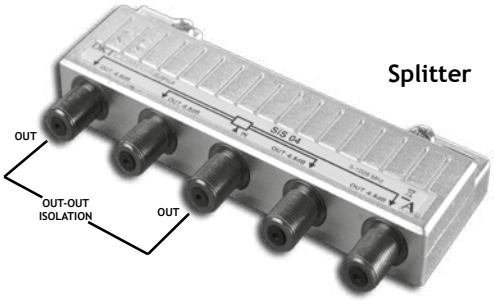
The Signia TAP-TAP isolation is so high that it complies with EN 60728-4 requirements for isolation between two subscribers, and this without having to add any other equipment for additional isolation.

Isolation measurement

Tap



Splitter



For isolation measurements a signal is applied to a connector and the output is measured on the other connectors.

Return loss

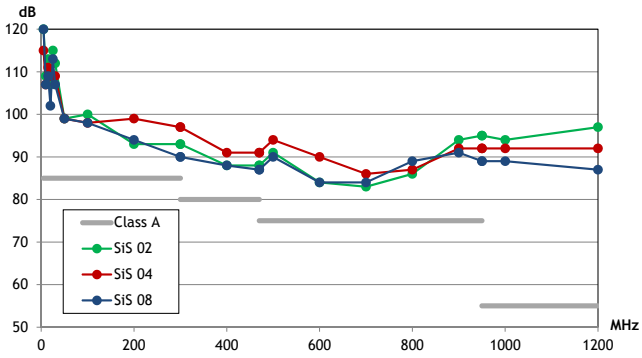
Return loss is the measurement of how much of the signal is being reflected backwards in the system. No reflections in the network are desired and the return loss should thus be as high as possible, and in a perfect network the return loss is infinitely high.

A return loss of 3 dB means that 50% of the signal is reflected back to the source; with a 20 dB return loss it is only 1%.

The Signia line is designed for maximum return loss, and according to the standardization of EN60728-4, the Grade 1 requirements are fulfilled. Even after surge pulses the return loss remains high. This provides a higher safety margin when projecting.

Screening effectiveness/efficiency/RFI

The screening effectiveness is the product's ability to shield its internal circuits from exterior electromagnetic interference and vica-versa. The graph shows the screening effectiveness measured according to EN50083-2 for all of the Signia housings.



The electromagnetic disturbance may interrupt, obstruct, or otherwise degrade or limit the effective performance of the network. These effects can range from a simple degradation of data to a total loss of data. The source may be any object, artificial or natural, that carries rapidly changing electrical currents, e.g. mobile broadband signals. With an increasing amount of interfering signals in the surroundings, screening effectiveness is far more crucial than before. As the screening effectiveness for Signia exceeds the requirements for Class A, it offers a very high level of resistance to interference, which leads to less pixelation and signal outage. For example, in cases with LTE/4G signals there are no problems when the Signia line is used.

High voltage blocking (AC)

There is built-in surge protection against AC power. This eliminates problems with TVs discharging currents or possibly current surges from the network into the installation with the possibility of damaging sensitive equipment.

A 1 kV capacitor is installed on all ports; hence all devices are capable of withstanding up to 2 kV between the inner conductors of any connection cables.

Passive intermodulation

Passive intermodulation occurs in passive components such as taps and splitters. This is if the ferrite cores are saturated by exceedingly high signal levels, like the ones seen in the upstream channels. As the cores saturate downstream and upstream signals mix, giving rise to a substancial range of intermodulation products which act as disturbing signals and noise in the HFC network. The Signia line has been designed with ferrite cores having a high saturation threshold, thereby the passive intermodulation is very small. In this way, using the Signia products in HFC networks adds to keep the noise level low.

Surge pulse protection

Surge pulses are closely related to passive intermodulation. It is the measurement of the level of intermodulation after high pulses of signal level into the unit. Such high pulses might permanently magnetize the ferrite cores, which will degrade the saturation threshold and lead to higher passive intermodulation. The ferrite cores used in the Signia line has a high threshold for the onset of magnetization. Additionally the electrical circuit around the ferrite cores is designed to protect the cores from magnetizing pulses.

The surge pulses are measured with two carriers, 120 dBµV at 50 and 55 MHz OUT-IN. The level of the resulting intermodulation product at 105 MHz is recorded. For the two-way SiS 02 splitter the following results are obtained:

No surge:	-6 dBµV at 105 MHz -> PIM 126 dB
Surge 10 pulses at 25 V:	16 dBµV at 105 MHz -> PIM 104 dB
Surge 1 pulse at 1 kV:	19 dBµV at 105 MHz -> PIM 101 dB

With the high PIM values for the Signia series, disturbing signals (from passive intermodulation) remain low even after transients, overvoltages or surge pulses have flown through the network.

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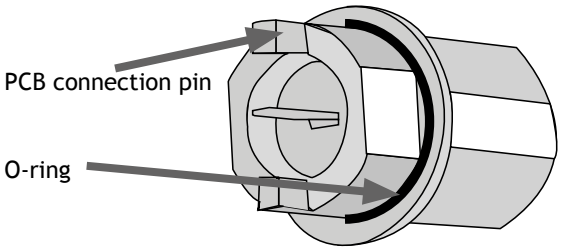
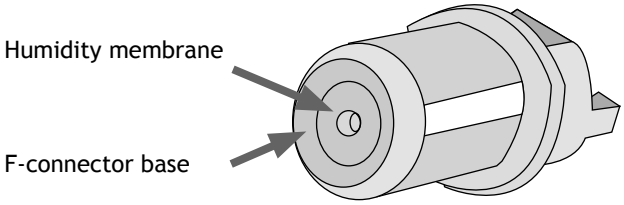
mechanical features

Enclosure

The Signia housing is cast in a zinc alloy and the aluminum backplate is sealed with a strong glue. The F-connector is fitted into a DD hole in the housing and it is sealed with an O-ring. The F-connector is designed with a rubber humidity membrane, which is not perforated until connectors are installed.
A minimum inner conductor of 0.64 mm of pure copper or 0.41 mm of copper-clad steel is needed to perforate this membrane. All these ensure that no water or dust can enter the housing.



To ensure that potential corrosion over a long period of time does not affect the the electrical performance, the outer shield of the F-connector is soldered directly onto the printed circuit board (PCB). This is an improvement to the norm where the outer shield of the F-connector is part of the housing and through soldering pins connected to the PCB. But the housing can be vulnerable to electrolytic corrosion as it is made from zinc. If the housing was used as connection between the connected cable's shield, and if it oxidizes as part of the corrosion, then it could act as a semiconductor that will degrade the signal quality.



The Signia housing has been tested under 1 meter of water for 30 minutes, corresponding to the IPx7 requirements. No water penetrated into the housing with the glue sealing, so the sealing between the backplate and the housing, and the sealing between the F-connector and the housing are both water tight to at least 1 meter.
Based on these results, it is concluded that the Signia housing is itself IP class 64 (dust and dripping water tight). With cables and/or terminators mounted on all ports, the Signia housing is IP class 67.

F-connector

The Signia series F-female connector follows the dimensions as standardized in ANSI/SCTE 01 2006. The connector is made of pure brass which is the same metal as professional cable connectors. Brass is a very stable metal compared to zinc, which is usually used for casting F-connectors. When a cable connector is properly installed on an F-female connector there is a high pressure between the two threads. The stable brass does not deform (coldflow) under this pressure, as the softer zinc will do. As the zinc deforms, and in combination with temperature changes and vibrations, the cable connector will eventually loosen, and the cable network becomes faulty. With the Signia series stable brass connector the predominant failure cause of loose connectors is heavily reduced.
Furthermore, the connectors are plated with a nickel-tin alloy, ensuring minimal corrosion over time. As the plating does not corrode, no oxide semiconductors are formed at the junction between the Signia series connector and the cable connector. This again means that no passive intermodulation - known as common path distortion (CPD) - is generated in this interface, so no spurious noise signals are introduced. Thus in a cable network based on the Signia series the wellknown CPD problem is non-existing.
Having removed these very common cause of errors in cable networks many hours per year is saved.

Clamping force

The clamp-claw inside the connector is made with a phosphor bronze alloy, allowing it to be very flexible. It allows insertion of small inner conductors even after large inner conductors have been fitted without loss of electrical performance. Furthermore, the clamp-claw is plated with the same nickel-tin alloy as the F-connector.
After five insertions of an inner conductor with a diameter of 1.3 mm, the F-connector is capable of carrying an inner conductor with a diameter of 1.0 mm and with a weight of 250 g.
After three insertions of an inner conductor with a diameter of 1.2 mm, the F-connector is capable of carrying an inner conductor with a diameter of 0.64 mm and with a weight of 34.5 g.

Cable tightening torque

The Signia passives are tested with up to 10 Nm tigtening torque without observering any damage to the housing or connector. Outdoor female "F" ports must withstand a minimum tightening torque of 4.5 Nm (40 in.-lb.), without damage when measured per IPS TP 253. This is achieved by the mechanical design in the sturdiness of pure brass and the DD shape of the connector insert.

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Advantages

- Environmentally friendly materials (RoHS & WEEE compliant)
- Protected against AC surges
- Superb screening effectiveness with negligible RFI

environmental tests

Introduction

Considering the effort that has been put into designing the ultimate series of distribution passives, it is necessary to accompany the excellent specifications with environmental tests of the mechanical and electrical features, to prove the durability of both the exterior and interior of the Signia. Below are the test results, and the conclusion is that Signia suffers no crucial deterioration.

Salt mist

The Signia housing was exposed to salt mist according to EN60068-2-11:

- Concentration 5%
- Temperature +35 °C
- Exposure time 16 hours
- Terminators are mounted on all F-connectors

No salt residues are observed inside the housing after this test. Salt deposit is observed on the outside of the housing, but not on the F-connectors.

In conclusion, the electrical parameters are unaffected by the salt mist exposure.

Vibration

Some Signia samples were exposed to a sequence of Vibration Test according to EN60068-2-6:

- Frequency range 10-55 Hz
- Sweep rate 1 octave per minute
- Sweep cycles 10
- Displacement amplitude 0.75 mm
- 3 Directions

For the insertion loss an increase of maximum 0.5 dB is observed, but only at the highest frequencies. Also, the return loss and the isolation changed after the test sequence, but in all cases the specifications are fulfilled.

Dry heat

Some Signia samples were exposed to a sequence of Dry Heat Test according to EN60068-2-2:

- Temperature +70°C
- Time 16 hours
- Relative humidity <30%

For the insertion loss an increase of maximum 0.5 dB is observed, but only at the highest frequencies. The return loss and the isolation changed after the test sequence, but in all cases the specifications are fulfilled.

Change of temperature

Some Signia samples were exposed to Change of Temperature according to EN60068-2-14:

- Low temperature -15°C
- High temperature +55°C
- Rate of temperature change 1°C per minute
- Number of cycles 5
- Stable time at low and high temperature 3 hours

All of the electrical parameters were still within the specifications after the test.

Damp heat

Some Signia samples were exposed to Damp Heat according to EN60068-2-30:

- Low temperature +25°C
- High temperature +40°C
- Number of cycles 21
- Stable time at low and high temperature 12 hours
- Relative humidity >95%

All of the electrical parameters were still within the specifications after the test.

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Advantages

- Superior electrical and mechanical performance
- Surge pulse protection, for example from the return path
- Extremely long lifetime

useful terms and standards

DOCSIS

An international standard developed by major companies to define the communication and operation support interface requirements for data over cable systems. DOCSIS 1.0 was issued in March 1997, DOCSIS 2.0 in December 2001, DOCSIS 3.0 in August 2006, and DOCSIS 3.1 in October 2013. The operating frequency range was expanded to 5-1218 MHz in phase 2 of DOCSIS 3.1, allowing even higher data rates to be transmitted.

Usually 5-15 MHz are not utilized for upstream transmissions, but are included in the standard, to allow buffering on the products so they are fully operational at 15 MHz. Occasionally the 5-15 MHz band is used for measurement signals and other operator tools.

IP

As defined in international standard IEC 60529, IP Code classifies and rates the degrees of protection provided against the intrusion of solid objects (including body parts such as hands and fingers), dust, accidental contact, and water in mechanical casings and with electrical enclosures.

The first digit indicates the level of protection that the enclosure provides against access to hazardous parts (electrical conductors, moving parts etc.) and the ingress of solid foreign objects.

Level	Object size protected against	Effective against
0	–	No protection against contact and ingress of objects
1	>50 mm	Any large surface of the body, such as the back of a hand, but no protection against deliberate contact with a body part
2	>12.5 mm	Fingers or similar objects
3	>2.5 mm	Tools, thick wires, etc.
4	>1 mm	Most wires, screws, etc.
5	Dust protected	Ingress of dust is not entirely prevented, but it must not enter in sufficient quantity to interfere with the satis-factory operation of the equipment; complete protection against contact
6	Dust tight	No ingress of dust; complete protection against contact

The second digit indicates protection of the equipment inside the enclosure against harmful ingress of water.

Level	Protected against	Testing for	Details
0	Not protected	–	–
1	Dripping water	Dripping water (vertically falling drops) shall have no harmful effect.	Test duration: 10 minutes Water equivalent to 1 mm rainfall per minute
2	Dripping water when tilted up to 15°	Vertically dripping water shall have no harmful effect when the enclosure is tilted at an angle up to 15° from its normal position.	Test duration: 10 minutes Water equivalent to 3 mm rainfall per minute
3	Spraying water	Water falling as a spray at any angle up to 60° from the vertical shall have no harmful effect.	Test duration: 5 minutes Water volume: 0.7 litres per minute Pressure: 80-100 kN/m²
4	Splashing water	Water splashing against the enclosure from any direction shall have no harmful effect.	Test duration: 5 minutes Water volume: 10 litres per minute Pressure: 80-100 kN/m²
5	Water jets	Water projected by a nozzle (6.3 mm) against enclosure from any direction shall have no harmful effects.	Test duration: at least 3 minutes Water volume: 12.5 litres per minute Pressure: 30 kN/m² at distance of 3 m
6	Powerful water jets	Water projected in powerful jets (12.5 mm nozzle) against the enclosure from any direction shall have no harmful effects.	Test duration: at least 3 minutes Water volume: 100 litres per minute Pressure: 100 kN/m² at distance of 3 m
7	Immersion up to 1 m	Ingress of water in harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time (up to 1 m of submersion).	Test duration: 30 minutes Immersion at depth of 1 m

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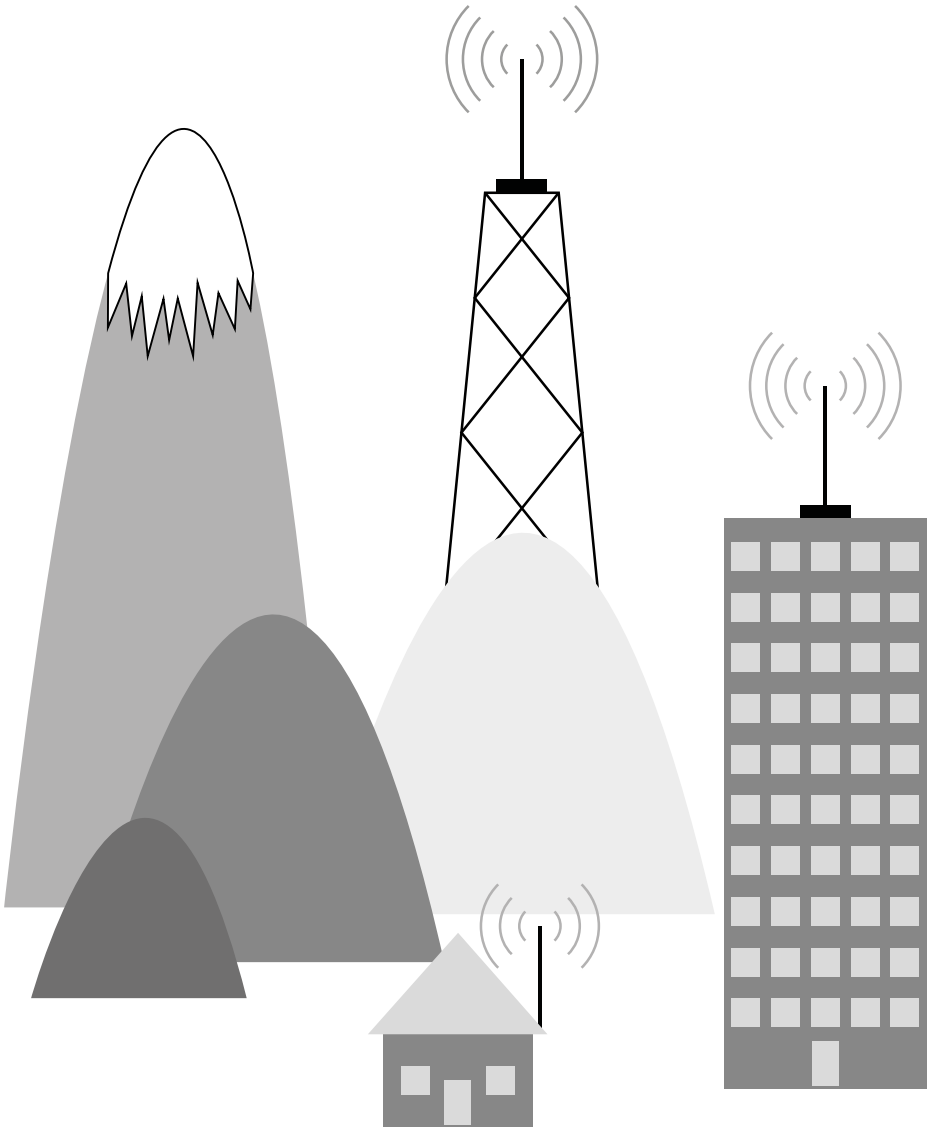

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ANSI/SCTE 01 2006

A specification for F-type radio frequency connectors where the male pin or inner coaxial conductor may have a diameter from 0.51 to 1.63 mm.

EN 50083-2

A standard dealing with cabled distribution systems for television, sound and interactive multimedia signals using all applicable transmission media. Developed by CENELEC the European Committee for Electrotechnical Standardization.

Class A: 5-300 MHz ≥ 85 dB, 300-470 MHz ≥ 80 dB, 470-950 MHz ≥ 75 dB, 950-1300 MHz ≥ 55 dB

Class B: 5-470 MHz ≥ 75 dB, 470-950 MHz ≥ 65 dB, 950-1300 MHz ≥ 50 dB

EN60728-4

A standard covering Cable networks for television signals, sound signals and interactive services. Passive wideband equipment for coaxial cable networks. It supersedes EN50083-4. Amongst others it includes standardization of return loss.

Grade 1: 10-47 MHz ≥ 22 dB, 47-950 MHz ≥ 22 dB ÷ 1.5 dB/oct. min. 14 dB, 950-3000MHz ≥ 14 dB descreasing linearly to 10 dB

Grade 2: 10-47 MHz ≥ 18 dB, 47-950 MHz ≥ 18 dB ÷ 1.5 dB/oct. min. 10 dB, 950-3000MHz ≥ 10 dB descreasing linearly to 6 dB

Grade 3: 10-47 MHz ≥ 14 dB, 47-950 MHz ≥ 14 dB ÷ 1.5 dB/oct. min. 10 dB, 950-3000MHz ≥ 10 dB descreasing linearly to 6 dB

LTE

LTE (Long Term Evolution), marketed as 4G LTE, is a standard for wireless communication of high-speed data for mobile phones and data terminals. It is based on the GSM/EDGE and UMTS/HSPA network technologies, increasing the capacity and speed using a different radio interface together with core network improvements.

The LTE standard can be used with many different frequency bands. In Europe the 800, 900, 1800 and 2600 MHz frequency bands have been chosen to operate LTE networks. This however conflicts with the current CATV and terrestrial TV transmissions, the interference from LTE can cause permanent, periodical or random loss of TV signals, which at customer premises will be experienced as pixelation or freezing of the picture. The cause for this is that LTE signals enter the customer's TV installation and distort an amplifier or tuner.

In CATV networks this can be avoided by using products with a very high screening effectiveness, where exceeding Class A requirements, and for cables Class A+ (> 95 dB) both in the 30-1218 MHz frequency range will be sufficient.

Triple Play

The transfer of voice, video and data over broadband networks.

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