

TECHNICAL ANNEX

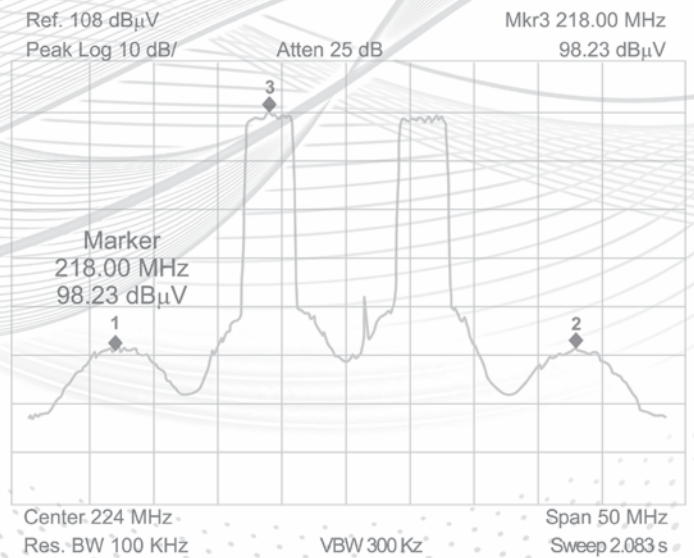
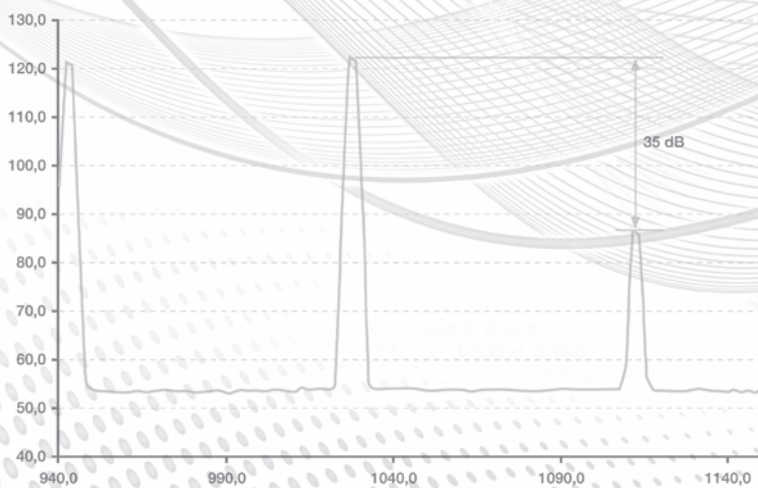
$$XMOD = XMOD_{ref} + 2 \cdot (N_{salida} - N_{ref.})$$

$$CSO \text{ (dB)} = CSO_{1_{amp}} - 15 \log N$$

$$XMOD_{N_{amp}} = XMOD_{1_{amp}} - 20 \log N$$

$$CSO \text{ (dB)} = CSO_{ref} + (N_{salida} - N_{ref.})$$

$$CSO_{total} = -15 \log [10^{CTB_1/15} + 10^{CTB_2/15} + \dots + 10^{CTB_N/15}]$$



TECHNICAL INFORMATION

TV frequency bands and channels: CCIR standard

Channel	Frequency (MHz)	Video carrier (MHz)	Color subcarrier (MHz)	Audio carrier (MHz)
BI				
2	47...54	48,25	52,68	53,75
3	54...61	55,25	59,68	60,75
4	61...68	62,25	66,68	67,75
S-Low Band				
S3	118...125	119,25	123,68	124,75
S4	125...132	126,25	130,68	131,75
S5	132...139	133,25	137,68	138,75
S6	139...146	140,25	144,68	145,75
S7	146...153	147,25	158,68	152,75
S8	153...160	154,25	158,68	159,75
S9	160...167	161,25	165,68	166,75
S10	167...174	168,25	172,68	173,75
BIII				
5	174...181	175,25	179,68	180,75
6	181...188	182,25	186,68	187,75
7	188...195	189,25	193,68	194,75
8	195...202	196,25	200,68	201,75
9	202...209	203,25	207,68	208,75
10	209...216	210,25	214,68	215,75
11	216...223	217,25	221,68	222,75
12	223...230	224,25	228,68	229,75
S-High Band				
S11	230...237	231,25	235,68	236,75
S12	237...244	238,25	242,68	243,75
S13	244...251	245,25	249,68	250,75
S14	251...258	252,25	256,68	257,75
S15	258...265	259,25	263,68	264,75
S16	265...272	266,25	270,68	271,75
S17	272...279	273,25	277,68	278,75
S18	279...286	280,25	284,68	285,75
S19	286...293	287,25	291,68	292,75
S20	293...300	294,25	298,68	299,75
Hyperband				
S21	302...310	303,25	307,68	308,75
S22	310...318	311,25	315,68	316,75
S23	318...326	319,25	320,68	324,75
S24	326...324	327,25	331,68	332,75
S25	334...342	335,25	339,68	340,75
S26	342...350	343,25	347,68	348,75
S27	350...358	351,25	355,68	356,75
S28	358...366	359,25	363,68	364,75
S29	366...374	367,25	371,68	372,75
S30	374...382	375,25	379,68	380,75
S31	382...390	383,25	387,68	388,75
S32	390...398	391,25	395,68	396,75
S33	398...406	399,25	403,68	404,75
S34	406...414	407,25	411,68	412,75
S35	414...422	415,25	419,68	420,75
S36	422...430	423,25	427,68	428,25
S37	430...438	431,25	435,68	436,75
S38	438...446	439,25	443,68	444,75

Channel	Frequency (MHz)	Video carrier (MHz)	Color subcarrier (MHz)	Audio carrier (MHz)
BIV (UHF)				
21	470...478	471,25	475,68	476,75
22	478...486	479,25	483,68	484,75
23	486...494	487,25	491,68	492,75
24	494...502	495,25	499,68	500,75
25	502...510	503,25	507,68	508,75
26	510...518	511,25	515,68	516,75
27	518...526	519,25	523,68	524,75
28	526...534	527,25	531,68	532,75
29	534...542	535,25	539,68	540,75
30	542...550	543,25	547,68	548,75
31	550...558	551,25	555,68	556,75
32	558...566	559,25	563,68	564,75
33	566...574	567,25	571,68	572,75
34	574...582	575,25	579,68	580,75
35	582...590	583,25	587,68	588,75
36	590...598	591,25	595,68	596,75
37	598...606	599,25	603,68	604,75
BV (UHF)				
38	606...614	607,25	611,68	612,75
39	614...622	615,25	619,68	620,75
40	622...630	623,25	627,68	628,75
41	630...638	631,25	635,68	636,75
42	638...646	639,25	643,68	644,75
43	646...654	647,25	651,68	652,75
44	654...662	655,25	659,68	660,75
45	662...670	663,25	667,68	668,75
46	670...678	671,25	675,68	676,75
47	678...686	679,25	683,68	684,75
48	686...694	687,25	691,68	692,75
49	694...702	695,25	699,68	700,75
50	702...710	703,25	707,68	708,75
51	710...718	711,25	715,68	716,75
52	718...726	719,25	723,68	724,75
53	726...734	727,25	731,68	732,75
54	734...742	735,25	739,68	740,75
55	742...750	743,25	747,68	748,75
56	750...758	751,25	755,68	756,75
57	758...766	759,25	763,68	764,75
58	766...774	767,25	771,68	772,75
59	774...782	775,25	779,68	780,75
60	782...790	783,25	787,68	788,75
61	790...798	791,25	795,68	796,75
62	798...806	799,25	803,68	804,75
63	806...814	807,25	811,68	812,75
64	814...822	815,25	819,68	820,75
65	822...830	823,25	827,68	828,75
66	830...838	831,25	835,68	836,75
67	838...846	839,25	843,68	844,75
68	846...854	847,25	851,68	852,75
69	854...862	855,25	859,68	860,75

TECHNICAL INFORMATION

Radio frequency standards

TV Band	Channel	Frequency (MHz)	Video carrier (MHz)	Audio carrier (MHz)
H Standard (Australia)				
IV	H28	526-533	527,25	532,75
	H29	533-540	534,25	539,75
	H30	540-547	541,25	546,75
	H31	547-554	548,25	553,75
	H32	554-561	555,25	560,75
	H33	561-568	562,25	567,75
	H34	568-575	569,25	574,75
	H35	575-582	576,25	581,75
	H36	582-589	583,25	588,75
	H37	589-596	590,25	595,75
H38	596-603	597,25	602,75	
V	H39	603-610	604,25	609,75
	H40	610-617	611,25	616,75
	H41	617-624	618,25	623,75
	H42	624-631	625,25	630,75
	H43	631-638	632,25	637,75
	H44	638-645	639,25	644,75
	H45	645-652	646,25	651,75
	H46	652-659	653,25	658,75
	H47	659-666	660,25	665,75
	H48	666-673	667,25	672,75
	H49	673-680	674,25	679,75
	H50	680-687	681,25	686,75
	H51	687-694	688,25	693,75
	H52	694-701	695,25	700,75
	H53	701-708	702,25	707,75
	H54	708-715	709,25	714,75
	H55	715-722	716,25	721,75
	H56	722-729	723,25	728,75
	H57	729-736	730,25	735,75
	H58	736-743	737,25	742,75
	H59	743-750	744,25	749,75
	H60	750-757	751,25	756,75
	H61	757-764	758,25	763,75
	H62	764-771	765,25	770,75
	H63	771-778	772,25	777,75
	H64	778-785	779,25	784,75
	H65	785-792	786,25	791,75
H66	792-799	793,25	798,75	
H67	799-806	800,25	805,75	
H68	806-813	807,25	812,75	
H69	813-820	814,25	819,75	
I Standard (United Kingdom - South Africa)				
III	I 4	174-182	175,25	181,25
	I 5	182-190	183,25	189,25
	I 6	190-198	191,25	197,25
	I 7	198-206	199,25	205,25
	I 8	206-214	207,25	213,25
	I 9	214-222	215,25	221,25
	I 10	222-230	223,25	229,25
	I 11	230-238	231,25	237,25
	I (12)	238-246		
	I 13	246-254	247,43	253,43

Tv Band	Channel	Frequency (MHz)	Video carrier (MHz)	Audio carrier (MHz)
B Standard (Italy)				
I	A	52,5-59,5	53,75	59,25
	B	61-68	62,25	67,75
II	C	81-88	82,25	87,75
III	D	174-181	175,25	180,75
	E	182,5-189,5	183,75	189,25
	F	191-198	192,25	197,75
	G	200-207	201,25	206,75
	H	209-216	210,25	215,75
	H1	216-223	217,25	222,75
	H2	223-230	224,25	229,75
L Standard (France)				
III	L05	174,75-182,75	176,00	182,50
	L06	182,75-190,75	184,00	190,50
	L07	190,75-198,75	192,00	198,50
	L08	198,75-206,75	200,00	206,50
	L09	206,75-214,75	208,00	214,50
	L10	214,75-222,75	216,00	222,50
K Standard				
III	K4	174-182	175,25	181,75
	K5	182-190	183,25	189,75
	K6	190-198	191,25	197,75
	K7	198-206	199,25	205,75
	K8	206-214	207,25	213,75
	K9	214-222	215,25	221,75
I Standard (Ireland)				
I	A-1	44,5-52,5	45,75	51,75
	B-1	52,5-60,5	53,75	59,75
	C-1	60,5-68,5	61,75	67,75
III	D-1	174-182	175,25	181,25
	E-1	182-190	183,25	189,25
	F-1	190-198	191,25	197,25
	G-1	198-206	199,25	205,25
	H-1	206-214	207,25	213,25
	E-1	214-222	215,25	221,25
D Standard (Russia) - OIRT				
I	R1	48,5 - 56,5	49,75	56,25
	R2	58 - 66	59,25	65,75
	R3	76 - 84	77,25	83,75
II	R4	84 - 92	85,25	91,75
	R5	92-100	93,25	99,75
	III	R6	174-182	175,25
R7		182-190	183,25	189,75
R8		190-198	191,25	197,75
R9		198-206	199,25	205,75
R10		206-214	207,25	213,75
R11		214-222	215,25	221,75
R12		222-230	223,25	229,75

TECHNICAL INFORMATION

Radio frequency standards for analogue TV

Country	VHF	UHF	Color System
Algeria	B	H	PAL
Argentina	N	N	PAL
Australia	B	H	PAL
Austria	B	G	PAL
Bahrain	B	G	PAL
Belgium	B	H	PAL
Bulgaria	D	K	SECAM
China	D	K	PAL
Croatia	B	G	PAL
Cyprus	B	G	PAL
Czechoslovakia	D	K	SECAM
Denmark	B	G	PAL
Egypt	B	G,H	SECAM
Finland	B	G	PAL
France	EIL	L	SECAM
Germany	B	G	PAL
Gibraltar	B	H	PAL
Greece	B	G	SECAM
Holland	B	G	PAL
Hong Kong	(A)I	I	PAL
Hungary	D	K	SECAM
India	B	-	PAL
Indonesia	B	-	PAL

Country	VHF	UHF	Color System
Iceland	B	G	PAL
Iran	B	G	SECAM
Iraq	B	-	SECAM
Ireland	I	I	PAL
Israel	B	G	PAL
Italy	B	G	PAL
Japan	M	M	NTSC
Jordan	B	G	PAL
Korea (Rep.)	M	-	NTSC
Kuwait	B	G	PAL
Lebanon	B	G	SECAM
Libya	B	H	PAL
Luxembourg	C	L	PAL/SECAM
Malaysia	B	G	PAL
Malta	B	H	PAL
Mexico	M	M	NTSC
Monaco	E	L	SECAM
Morocco	B	H	SECAM
Nigeria	B	G	PAL
Norway	B	G	PAL
Oman Sultanate	B	G	PAL
Pakistan	B	-	PAL
Philippines	M	M	NTSC
Poland	D	K	PAL

Country	VHF	UHF	Color System
Portugal	B	G	PAL
Qatar	B	-	PAL
Romania	B	G	PAL
Russia	D	K	SECAM
Saudi Arabia	B	G	PAL/SECAM
Singapore	B	G	PAL
Slovenia	B	G	PAL
South Africa	I	I	PAL
Spain	B	G	PAL
Sri Lanka	B	H	PAL
Syria	B	H	SECAM
Sweden	B	G	PAL
Switzerland	B	G	PAL
Thailand	B	R	PAL
Tunisia	B	G	SECAM
Turkey	B	G	PAL
United Kingdom	I	I	PAL
U.A.E	B	G	PAL
USA	M	M	NTSC
Yemen P.D. R	B	-	PAL

Channel loading derating table in Amplification

No. of channels	Derating (dB)	No. of channels	Derating (dB)	No. of channels	Derating (dB)	No. of channels	Derating (dB)
2	0,0	26	10,5	50	12,7	74	14,0
3	2,3	27	10,6	51	12,7	75	14,0
4	3,6	28	10,7	52	12,8	76	14,1
5	4,5	29	10,9	53	12,9	77	14,1
6	5,2	30	11,0	54	12,9	80	14,2
7	5,8	31	11,1	55	13,0	81,0	14,3
8	6,3	32	11,2	56	13,1	82,0	14,3
9	6,8	33	11,3	57	13,1	83	14,4
10	7,2	34	11,4	58	13,2	84	14,4
11	7,5	35	11,5	59	13,2	85	14,4
12	7,8	36	11,6	60	13,3	86	14,5
13	8,1	37	11,7	61	13,3	87	14,5
14	8,4	38	11,8	62	13,4	88	14,5
15	8,6	39	11,8	63	13,4	89	14,6
16	8,8	40	11,9	64	13,5	90	14,6
17	9,0	41	12,0	65	13,5	91	14,7
18	9,2	42	12,1	66	13,6	92	14,7
19	9,4	43	12,2	67	13,6	93	14,7
20	9,6	44	12,3	68	13,7	94	14,8
21	9,8	45	12,3	69	13,7	95	14,8
22	9,9	46	12,4	70	13,8	96	14,8
23	10,1	47	12,5	71	13,8	97	14,9
24	10,2	48	12,5	72	13,9	98	14,9
25	10,4	49	12,6	73	13,9	99	14,9

Glossary of measurements

GAIN (dB): Is the relation between the output power of an amplifier with the characteristic impedance (75Ω) and the input power (Fig.1).

FREQUENCY RESPONSE: The variation in amplitude within a certain band or channel.

FLATNESS (dB): The difference between the maximum and minimum gain in a certain band or channel.

NOISE FIGURE: The ratio of the actual noise power generated at the output of an amplifier to that which would be generated in an ideal resistor. The lower the noise figure, the better the performance.

The noise figure is expressed in (dB): $NF=10 \log F$.

MAXIMUM OUTPUT LEVEL (dB μ V):

Single Channel Amplifiers: N50083-5 standard. Intermodulation distance = 54 dB (Fig. 2)

PAL broadband amplifiers: DIN45004B standard. Intermodulation distance = 60 dB (Fig.3)

IF Amplifier: DIN VDE 0855/12 standard. Intermodulation distance = 35 dB (Fig.4)

DAB Amplifier: Intermodulation distance = 50 dB (2 channels of 4 MHz) (Fig.5)

FM Amplifier: UNE 523/79 standard. Intermodulation distance = 54 dB (Fig.3)

REJECTION BETWEEN INPUTS/OUTPUTS (dB): The band attenuation between inputs/outputs.

ADJACENT CHANNEL REJECTION (dB): The difference between the minimum gain in the channel and the maximum gain (minimum attenuation) in the adjacent channel. Adjacent channel in UHF is ($C\pm 2$, and in VHF is $C\pm 1$).

BAND REJECTION (dB): The difference between the minimum gain in the amplifier band and the maximum attenuation in the rejected band.

(Fig.6 BIII rejection of UHF), (Fig.7 UHF rejection of BIII), (Fig.8 rejection of FM)

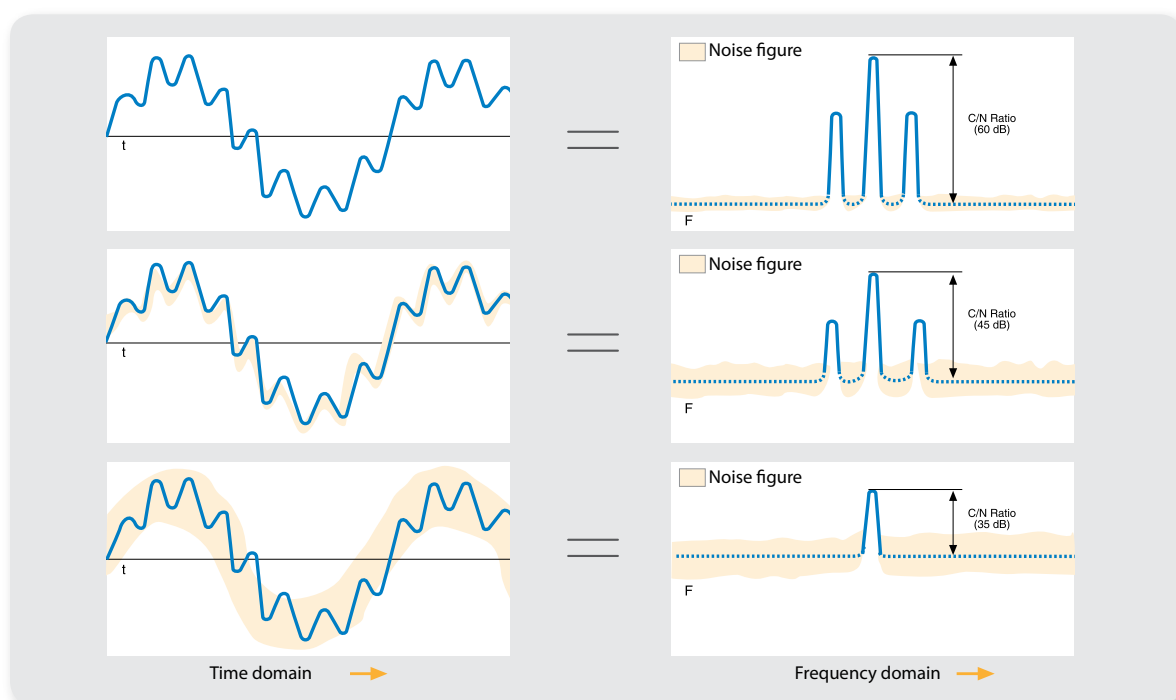
AGC RANGE(dB): The difference between the maximum and minimum signal that is necessary for a system with AGC to keep a constant output.

THROUGH LOSSES (dB): The attenuation that is undergone by signal in a specific band between the input and output of a device.

SPURIOUS (dBc): The difference in levels between the channel carrier created by a modulator or converter and the lower side band or local oscillator. This only applies when there is a broadband channel.

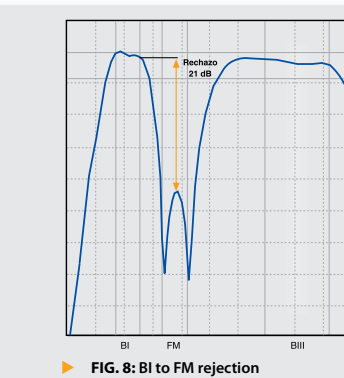
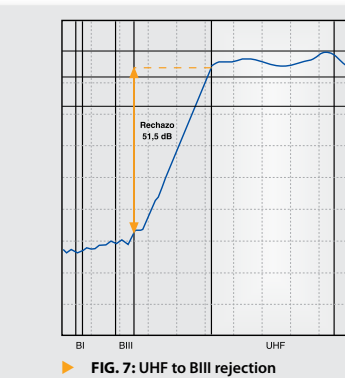
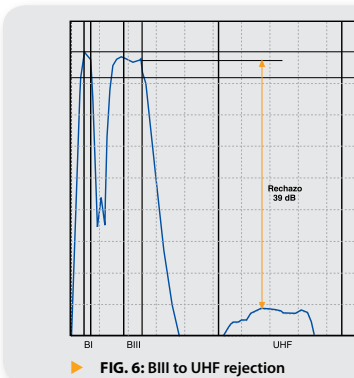
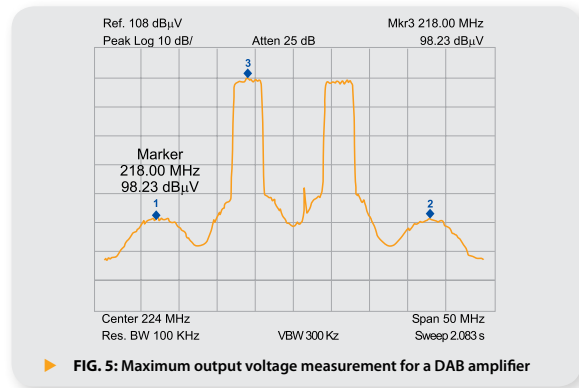
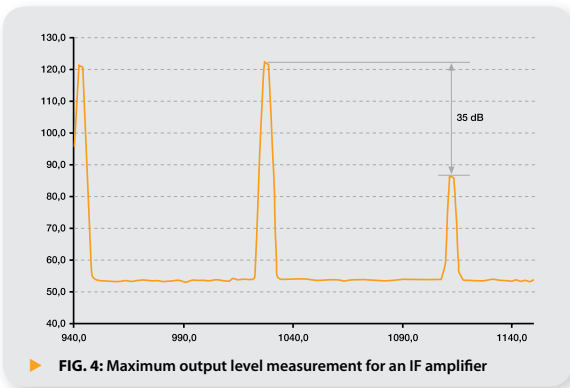
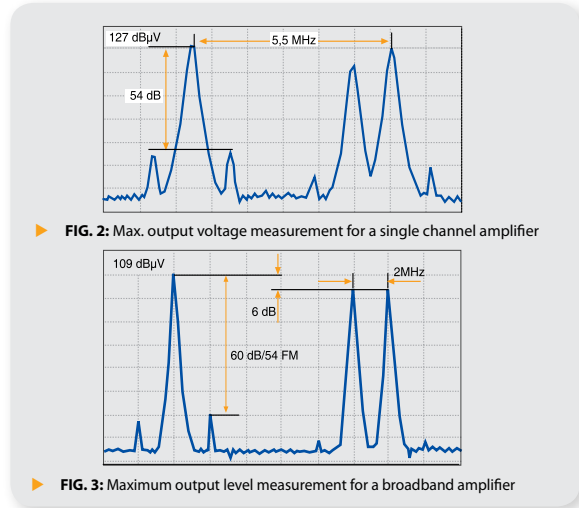
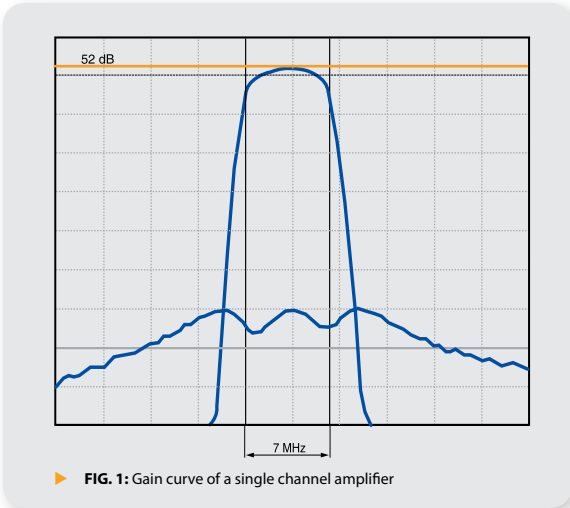
Working temperature: The optimum temperature to get the best performance from the electronic equipment is between -10 and 45 °C (unless otherwise specified).

► Signal noise representation



TECHNICAL INFORMATION

Glossary of measurements



OBSERVATIONS:

In general, the VHF band covers the following frequency ranges:

- ▶ For MATV: BI, FM, S-L BAND, BIII: 47...230 MHz.
- ▶ For SMATV and CATV: BI, FM, S-L BAND, BIII, S-H BAND, HYPERBAND: 47...446 MHz.
- ▶ In devices where FM rejection is not specified, this band is either amplifier or combined
- ▶ Rejection of 27 MHz or FM does not mean that the band is

not affected by the said bands as they can ingress into the system through the distribution network.

- ▶ The products corresponding to individual installations where "EMC" stands are included, are according with Electromagnetic Compatibility Directives (EC).
- ▶ All Televes products for headends are in compliance, on design and approval requirements, with this EC directive (EMC indication is obviated).

TECHNICAL INFORMATION

Carrier-noise ratio C/Nz

Is defined as the ratio between the video carrier signal level and the RMS noise level. The ratio is expressed in decibels. The threshold of perceptibility of noise on a TV receiver occurs at a C/N ratio approximately 45dB.

Mathematically, for one amplifier it is calculated this way:

$$C/N1 \text{ (dB)} = V_O - (N_t + N_F + G)$$

V_O : Output level

N_t : Thermal noise (depends on the considered bandwidth)

N_F : Amplifier noise figure

G : Gain

Carrier-to-Cross Modulation Ratio C/XMOD

It is defined as the third order distortion which causes the modulation of one signal carrier to modulate another signal carrier.

The threshold of perceptibility of this ratio on a TV screen is less than 40dB, so the C/X ratio is not the limiting factor in the design of most systems and is, therefore, below the threshold in system designs.

a) XMOD for 1 amplifier to a given output level V_o

$$XMOD = XMOD_{ref} + 2 \cdot (N_{out} - N_{ref})$$

b) XMOD for N identical amplifiers

$$XMOD_{Namp} = XMOD_{1amp} - 20 \log N$$

c) XMOD for N amplifiers in cascade with different XMOD.

$$XMOD_{Namps} = -20 \log [10^{-XMOD_1/20} + 10^{-XMOD_2/20} + \dots + 10^{-XMOD_N/20}]$$

Carrier-to-Third Order Intermodulation Ratio C/IMD

Third-order intermodulation is the simultaneous pulse of 2 or 3 signal carriers to produce a spurious carrier, caused by the third-order distortion characteristic of the amplifier.

The result of the simultaneous action of three carriers beat is commonly known as "composite triple beat" CTB.

This type of third-order distortion is generally the limiting factor in the output capability of an amplifier, by the following reasons:

1. Number of channel influence.- CTB increases exponentially as the number of amplifier channels.

2. Signal level influence.- Because CTB is a distortion, it will increase with the increase of the output level. If the amplifier operates with a tilt, the distortion will also be affected (a tilted output will give better improvement in the carrier-to-distortion ratio over a flat output).

a) CTB for 1 amplifier to a given output level V_o

$$CTB = CTB_{ref} + 2 \cdot (N_{output} - N_{ref})$$

b) CTB for N identical amplifiers

$$CTB_N = CTB_1 + 20 \log N$$

c) CTB for N amplifiers with different CTB

$$CTB_{total} = -20 \log [10^{-CTB_1/20} + 10^{-CTB_2/20} + \dots + 10^{-CTB_N/20}]$$

Carrier-to-Second Order Intermodulation Ratio C/CSO

It is the simultaneous pulse, or beating together, of 2 signal carriers because of the second-order distortion characteristics of the amplifier.

a) CSO (dB) for 1 amplifier to a given output level V_o

$$CSO \text{ (dB)} = CSO_{ref} + (N_{output} - N_{ref})$$

b) For N identical amplifiers in cascade:

$$CSO \text{ (dB)} = CSO_{1amp} - 15 \log N$$

c) CSO for N amplifiers with different CSO

$$CSO_{total} = -15 \log [10^{-CSO_1/15} + 10^{-CSO_2/15} + \dots + 10^{-CSO_N/15}]$$

TECHNICAL INFORMATION

Calculation example

We would like to know the CTB resulting of the use of 5 amplifiers ref. 4511 in cascade, with a tilt of 8dB.

Data:

From the technical specifications of the amplifier ref. 4511, we know that: CTB=60 dBc@117 dBμV (for plain output, without tilt).

as we install 5 amplifiers in cascade with a tilt of 8dB, we will recalculate the CTB for a medium value of output level:

- ▶ Output level for Ch69: 117 dBμV
- ▶ Output level for Ch2: 109 dBμV

Step 1

Calculate the specification for a new reference level of 113 dBμV, which is the medium value of the tilt (109 +8/2=113).

Because the new output level is lower (117 vs 113 dBμV), its value will improve.

General formula:

$$CTB = CTB_{ref} + 2 \cdot (N_{output} - N_{ref.})$$

We extract CTBref:

$$CTB_{ref} = CTB + 2 \cdot (N_{ref.} - N_{output})$$

Known data:

- CTB_{117dBμV} = 60 dBc
- Reference level: 117 dBμV
- Output level: 113 dBμV

Then:

$$CTB_{113dBμV} = 60 \text{ dB} + 2 \cdot (113 - 117)$$

$$dBμV = 60 - 2 \cdot 4 = 60 - 8 = 52 \text{ dBc}$$

Step 2

Make the calculation for 5 amplifiers in cascade with a tilt of 8dB, considering a new specification of CTB=68 dBc @ 113 dBμV (now it is considered as a plain response)

General formula for N amplifiers in cascade:

$$CTB_N = CTB_1 - 20 \log N$$

In this case:

$$N = 5 \text{ and } CTB_{1_{amp}} = 52 \text{ dBc}$$

Step 3

Substituting values:

$$CTB_5 = 52 + 20 \log 5$$

Already calculated values for the correction factor are shown in the table below.

$$CTB_5 = 52 + 20 \log 5 = 52 + 13,98 = 65,98 \text{ dBc}$$

TECHNICAL INFORMATION

Types of plugs

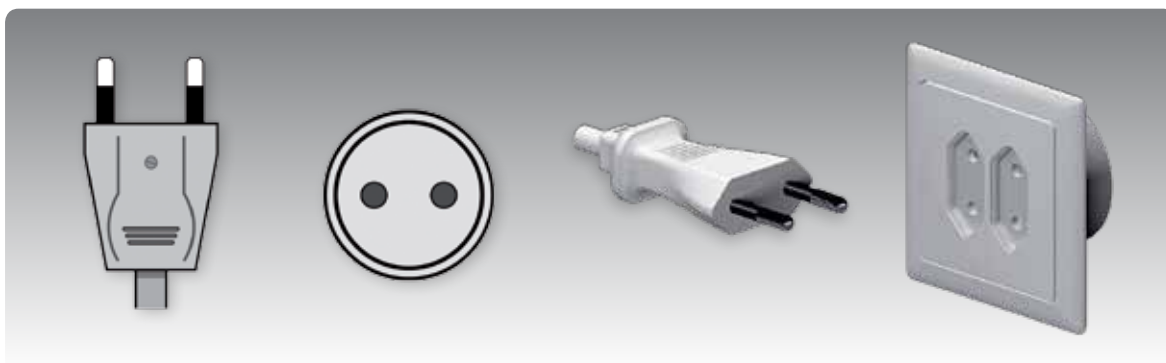
Throughout this catalogue, we offer devices that have different types of electrical plugs.

In general, if the type of plug is not specified for a reference, is correct to assume that it will be an "European plug", in particular: **Type "C"**⁽¹⁾.

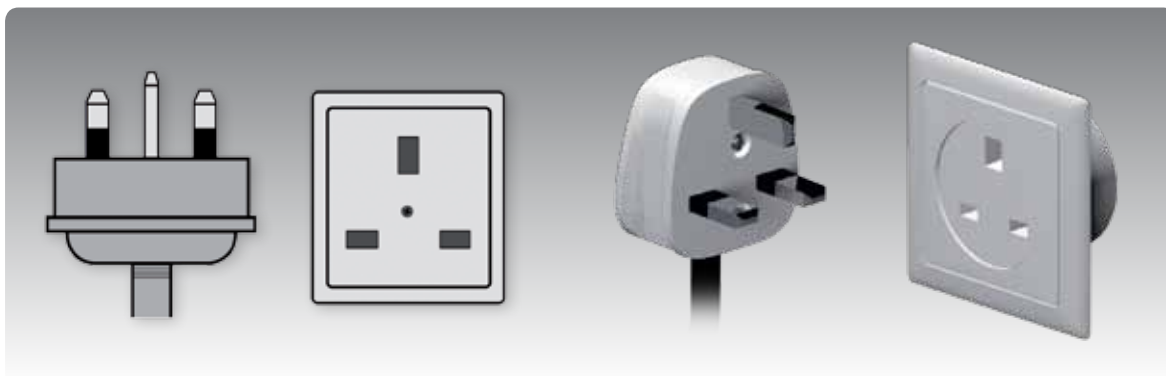
When "*UK plug*" is specified for a reference, it means that this product contains the kind of plug used in the United Kingdom, in particular: **Type "G"**⁽²⁾.

A reference with "*US plug*" includes a typical American plug, in particular: **Type "A"**⁽³⁾.

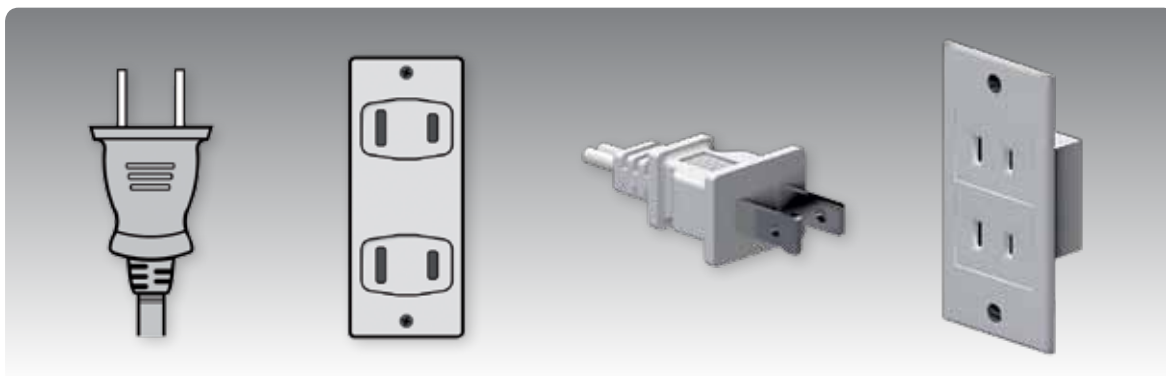
Type "C"⁽¹⁾



Type "G"⁽²⁾



Type "A"⁽³⁾



1.- Typification of plugs universally defined by the Department of Commerce of United States of America.

TECHNICAL INFORMATION

Color code for Basic Telephony



Pair identifier		
Pair	1	2
1	WHITE	Blue
2		Orange
3		Green
4		Brown
5		Grey
6	RED	Blue
7		Orange
8		Green
9		Brown
10		Grey
11	BLACK	Blue
12		Orange
13		Green
14		Brown
15		Grey
16	YELLOW	Blue
17		Orange
18		Green
19		Brown
20		Grey
21	VIOLET	Blue
22		Orange
23		Green
24		Brown
25		Grey



Pair identifier			
Unit	Tying tape color	Pair	
1	WHITE	Blue	1-25
2		Orange	26-50
3		Green	51-75
4		Brown	76-100
5		Grey	101-125
6	RED	Blue	126-150
7		Orange	151-175
8		Green	176-200
9		Brown	201-225
10		Grey	226-250
11	BLACK	Blue	251-275
12		Orange	276-300
13		Green	301-325
14		Brown	326-350
15		Grey	351-375
16	YELLOW	Blue	376-400
17		Orange	401-425
18		Green	426-450
19		Brown	451-475
20		Grey	476-500
21	VIOLET	Blue	501-525
22		Orange	526-550
23		Green	551-575
24		Brown	576-600

INDEX BY REFERENCE

Reference	Page	Reference	Page	Reference	Page	Reference	Page	Reference	Page	Reference	Page
1030	19	2139	235	231702	174	236109	187	308602	46	4130	221
1050	19	2140	234	231901	175	2362	281	3087	46	4131	221
1065	18	2141	231	232001	175	2363	33	308701	46	413201	221
106501	18	214102	231	232101	280	2363	178	308702	46	413301	221
1083	21	214104	231	2322	281	2364	186	3088	46	413401	222
112140	21	214105	231	2323	281	2365	186	3089	46	4135	222
112141	21	214107	231	2324	281	2366	186	312901	48	4138	233
1201	18	214108	231	2325	281	236801	182	312901	50	413801	233
1301	16	2145	222	232601	175	236901	183	3130	48	413802	233
130201	15	2145	286	2327	175	236902	183	3131	48	4162	94
144110	11	214901	234	2327	281	237001	183	313101	48	4163	59
144111	11	215101	231	2328	175	237002	183	3132	48	4163	94
144140	11	2155	231	2328	281	2401	24	313201	48	4163	216
144141	11	215501	231	2329	175	2403	24	3133	48	4171	222
144401	13	215502	231	2329	281	2404	24	3134	48	4173	222
1490	20	215503	231	233001	172	2405	24	313901	50	4176	222
149001	20	2162	222	233101	172	2406	24	3140	50	4177	59
149101	20	2162	286	233202	175	2407	24	314001	50	4177	216
149102	20	2163	222	2333	158	2408	28	3141	50	4221	93
149401	7	2163	286	233306	158	2409	24	3142	50	422601	154
149402	7	2164	286	233310	158	2410	24	3143	50	422602	154
1495	8	216801	93	233311	158	2412	28	3144	48	422603	139
149501	8	216801	134	2334	158	2413	28	3144	50	431001	224
149610	7	216801	153	233410	158	2414	24	4005	95	431002	224
149611	7	216801	286	233411	158	2415	24	4006	94	4361	28
149701	9	217001	242	2335	160	3008	24	4007	94	4386	61
149741	9	217101	242	233501	160	3009	24	4008	283	4388	61
149901	8	2172	240	2336	160	3010	24	403101	56	4507	80
149902	8	2173	240	233601	160	301002	24	403301	57	4508	80
2000	28	2174	241	2337	162	3014	40	403302	57	4509	80
2011	28	2176	242	2339	162	3015	40	403401	56	451201	83
2043	28	217602	242	2340	282	3017	40	4040	58	451202	83
2044	28	2177	242	2341	280	3019	40	404001	58	4513	84
2047	28	217702	242	234220	163	3020	40	4041	58	4516	215
2083	24	2178	242	234304	158	3021	40	404411	56	4517	215
209901	244	217802	242	234305	158	3029	40	404412	56	4518	215
209902	244	2179	242	234310	158	3031	40	405101	56	4519	215
210101	236	217902	242	234311	158	3032	40	405401	56	4530	211
210201	236	2181	241	234401	162	3034	28	4058	216	4531	211
210601	234	2182	240	234501	162	3034	40	4058	222	4532	211
210602	234	2183	240	234601	162	3037	40	4061	139	4533	211
210603	234	2187	240	2350	179	3038	40	4061	154	4534	211
2117	24	2188	240	2351	179	3040	24	4061	216	455320	85
2123	246	2189	241	2353	33	3041	24	4061	222	455325	85
2126	232	2195	245	2353	178	3042	24	4066	222	455328	85
212601	232	2196	245	2354	187	3048	40	4071	139	4560	215
212602	232	2198	241	2356	187	3049	42	4071	154	4561	215
212603	232	2199	246	235701	186	305001	41	4071	222	4562	215
212604	232	219901	246	235801	186	3058	40	4087	216	4563	215
2127	237	219910	246	235901	186	3058	46	4087	222	4564	215
212701	237	2310	167	236001	186	3059	28	4104	222	4565	215
212702	237	2311	169	2361	187	3059	46	4105	222	4566	215
212703	237	231201	167	236101	187	3072	24	4106	222	4567	215
212724	237	231301	173	236102	187	3075	24	410701	222	4571	215
2128	235	231401	173	236103	187	307502	24	410801	222	4572	215
212801	235	2315	173	236104	187	3085	46	4120	222	4573	215
213001	233	231501	173	236105	187	308501	46	4121	222	4574	215
213002	233	231601	174	236106	187	308502	46	4122	222	4575	215
2138	235	231603	174	236107	187	3086	46	4123	222	4576	215
213802	235	231701	174	236108	187	308601	46	4127	222	4577	215

INDEX BY REFERENCE

Reference	Page	Reference	Page	Reference	Page	Reference	Page	Reference	Page	Reference	Page
4578	215	5137	214	5333	92	544302	220	555901	132	593101	274
4580	215	5141	214	5333	139	544402	213	5575	136	593102	274
4581	215	5142	214	5333	153	544502	213	5575	164	5960	266
4603	216	5143	214	5334	92	544602	213	5605	67	596001	266
4605	216	5144	214	5334	153	544702	213	560510	67	596002	266
4606	216	5145	214	5335	82	544902	210	560541	67	596005	266
4607	216	5146	214	533501	82	5454	210	560542	67	598901	263
4611	216	5147	214	5337	82	545501	216	560543	67	598901	266
4613	216	5148	214	5338	80	5456	84	560601	70	598902	263
4614	216	5150	211	5339	83	5457	68	560610	70	598903	266
4615	216	5151	211	533901	83	5461	241	5610	213	5990	262
4616	216	5152	211	5340	80	546501	244	5611	213	599001	262
4617	216	5153	211	5341	80	546601	243	561501	60	599002	262
4622	212	5154	211	534101	80	546602	243	561601	60	599003	262
4623	212	5160	211	534202	85	546610	243	561701	60	599004	262
4947	17	5161	211	534302	85	5469	210	561801	60	599004	263
4947	95	5165	95	534402	85	5489	210	561901	10	599005	262
4947	139	5226	217	534602	85	5492	213	562001	10	5991	262
4947	154	522610	217	534702	85	5493	213	562301	74	5992	263
502905	150	5227	220	5350	61	5494	213	562302	74	599201	263
5059	150	5228	220	5351	61	549812	92	562401	74	599202	263
5069	92	5229	220	5352	61	5501	64	562501	74	599203	263
5069	153	5230	219	5353	61	550101	64	562601	74	599205	263
506901	92	5231	219	5354	61	550104	64	562701	66	5994	262
506901	153	523110	219	5356	61	5504	64	562702	66	5995	262
5071	92	5232	217	5357	61	550402	64	562703	66	5997	262
5071	139	5232	219	535802	61	5518	69	562711	66	5997	263
5071	153	5233	219	5359	61	5519	69	562712	66	5998	262
5072	92	5235	92	536001	61	5520	72	562713	66	5998	263
5072	153	5235	153	5363	78	5522	69	5629	137	5999	262
507202	92	5236	220	536310	78	5523	69	5629	165	5999	263
507202	139	5239	92	536602	85	552301	69	5630	110	599902	262
507202	153	5239	139	536702	85	5525	72	563101	102	599902	263
5073	154	5239	153	5370	61	5526	72	563301	104	599902	266
507312	92	5240	218	5372	76	5527	68	563401	120	6574	22
507312	153	524605	217	537201	76	552701	68	563501	112	6620	22
507312	154	5247	218	537302	76	5528	68	563601	122	6632	22
5074	93	5248	218	5377	61	5529	68	564101	106	7101	192
5075	149	5249	218	539104	76	5530	71	564201	108	7102	192
508012	90	5250	217	539105	76	553010	71	564901	124	7103	192
508112	90	5270	217	539201	76	5531	69	567201	139	7104	192
508212	90	527402	220	5396	78	553101	69	5673	139	7105	192
508312	90	5275	220	5399	76	5532	69	5750	93	7106	192
508612	90	5301	92	5402	241	553201	69	579401	64	7107	192
508712	90	5301	139	5415	241	5533	72	5795	64	7108	192
508812	90	5301	153	542503	213	5535	72	5796	64	7109	192
508912	90	531201	76	542603	213	553701	114	579901	66	7110	192
509512	90	5317	78	542703	213	553702	114	5806	126	7118	254
509712	90	532701	87	542803	213	5540	145	5836	151	711801	254
509812	90	532740	87	542903	210	554502	146	5837	152	713102	195
509912	90	532810	88	5430	210	554511	146	5838	286	713102	200
511501	248	532840	88	5433	210	554602	146	5858	255	713202	200
5124	250	532910	88	543503	210	554610	146	585801	255	713302	200
5130	214	532940	88	543603	210	554611	146	586301	144	713402	200
5131	214	5331	92	543702	210	554801	146	586401	144	713502	200
5132	214	5331	139	543802	210	554804	146	5865	149	713602	195
5133	214	5331	153	543902	210	554812	146	5909	262	713702	195
5134	214	5332	92	5440	220	554813	146	5909	263	713802	195
5135	214	5332	139	5441	220	554901	148	5909	266	713902	195
5136	214	5332	153	5442	220	5559	132	5930	284	714002	195

INDEX BY REFERENCE

Reference	Page	Reference	Page	Reference	Page	Reference	Page	Reference	Page	Reference	Page
7167	256	734402	197	747802	33	769210	289				
716902	195	734402	202	7485	34	769211	289				
717002	195	734501	204	7485	94	769220	289				
717501	252	735002	198	7494	33	790011	32				
717602	200	735002	203	7508	38	790021	32				
719001	190	735101	203	7534	32	7901	32				
719101	190	735402	198	753401	32	790101	32				
7219	257	735802	198	753410	32	790110	32				
7234	93	736002	198	753411	32	790111	32				
7234	138	736102	198	7535	32	790120	32				
7234	152	736202	198	753501	32	790121	32				
7234	286	736901	203	753510	32	7902	30				
7237	257	737001	203	753511	32	790202	30				
7268	34	737201	199	753520	32	790203	30				
7269	34	737301	204	753521	32	790204	30				
7301	286	737502	199	7572	32	7903	30				
7307	256	737602	199	757201	32	790302	30				
730704	256	737902	197	7604	256	790303	30				
731102	199	738102	197	7605	257	790304	30				
731802	199	738201	202	7606	257	790801	32				
731802	204	7406	211	761001	33	790901	38				
7321	206	7407	58	7611	33	790902	38				
732301	204	743002	197	7613	33	9306	32				
7328	206	743802	197	7637	285	930601	32				
733502	199	743902	197	7654	289	9349	222				
733701	196	7441	211	7689	288	9924	154				
733801	196	7450	34	768973	288						
733901	196	7452	58	769201	288						
734001	202	7475	33	769202	288						
734101	202	747701	33	769203	288						



THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

IQNet and
AENOR
hereby certify that the organization

TELEVES, S.A.

RÚA BENÉFICA DE CONXO, 17 PI DE OROSO, SECTOR AR-8 PARQUE EMPRESARIAL DE SIGÜEIRO, PARCELA 60
15706 - SANTIAGO DE COMPOSTELA(A CORUÑA) 15888 - OROSO(A CORUÑA) 15888 - OROSO(A CORUÑA)
España España España

for the following field of activities

The design, production and servicing of electronic and mechanical devices for reception, broadcasting and distribution of radiofrequency signals (television, radio and data) both terrestrial and satellite.

has implemented and maintains a

Quality Management System

which fulfills the requirements of the following standard

ISO 9001:2008

Issued on: 1999-08-01

Renewed on: 2012-11-04

Validity date: 2015-11-04

Registration Number: ES-0224/1994



Michael Drechsel
Michael Drechsel
President of IQNet

Avelino BRITO
AENOR Asociación Española de Normalización y Certificación
AENOR
Avelino BRITO
Chief Executive Officer

IQNet Partners*:
AENOR Spain AFNOR Certification France AIB-Vincotte International Belgium ANCE Mexico APCER Portugal CCC Cyprus
CISQ Italy CQC China CQM China CQS Czech Republic Cro Cert Croatia DQS Holding GmbH Germany DS Denmark
FCAV Brazil FONDONORMA Venezuela ICONTEC Colombia IMNC Mexico INNORPI Tunisia
Inspecta Certification Finland IRAM Argentina JQA Japan KFQ Korea MSZT Hungary Nemko AS Norway NSAI Ireland
PCBC Poland Quality Austria Austria RR Russia SII Israel SIQ Slovenia SIRIM QAS International Malaysia SQS Switzerland SRAC
Romania TEST St Petersburg Russia TSE Turkey YUQS Serbia
IQNet is represented in the USA by: AFNOR Certification, CISQ, DQS Holding GmbH and NSAI Inc.
* The list of IQNet partners is valid at the time of issue of this certificate. Updated information is available under www.iqnet-certification.com

INTERNATIONAL COMMERCIAL NETWORK



TELEVÉS S.A. (SEDE CENTRAL)

Rúa B. de Conxo, 17
15706 Santiago de Compostela
(SPAIN)

T. [+34] 981 52 22 00

F. [+34] 981 52 22 62

televes@televes.com



TELEVÉS ELECTRÓNICA PORTUGUESA LDA.

Via Dr. Francisco Sá Carneiro. Lote 17.
ZONA Ind. Maia 1. Sector-X.
C.P. 4470-518 Barca, Maia
(PORTUGAL)

T. [+351] 229 478 900

F. [+351] 229 488 719

GSM [+351] 968 581 614

televes.pt@televes.com

TELEVÉS ITALIA S.R.L.

S.op.Viale Liguria 24
20068 Peschiera Borromeo (MI)
(ITALIA)

T. [+39] 0251650604 (RA)

F. [+39] 0255307363

televes.it@televes.com

TELEVÉS FRANCE S.A.R.L.

1 Rue Louis de Broglie
Parc d'Activités de l'Esplanade
77400 St Thibault des Vignes
(FRANCE)

T. [+33] 0 1 60 35 92 10

F. [+33] 0 1 60 35 90 40

televes.fr@televes.com

TELEVÉS UNITED KINGDOM LTD

Unit 11 Hill Street, Industrial Estate
Cwmbran, Gwent NP44 7PG
(UNITED KINGDOM)

T. [+44] 01 633 87 58 21

F. [+44] 01 633 86 63 11

televes.uk@televes.com

TELEVÉS DEUTSCHLAND GMBH

Kuferstrasse 20
73257 Köngen
(DEUTSCHLAND)

T. [+49] 7024 46860

F. [+49] 7024 6295

televes.de@televes.com

TELEVÉS POLSKA SP. Z O.O.

ul. Bardzka 60,
50-517 Wrocław
(POLSKA)

T. [+48] 71 7901 115

F. [+48] 71 7901 112

televes.polska@televes.com

TELEVÉS USA LLC.

9800 Mount Pyramid Court,
Suite 400 Englewood, CO 80112
(USA)

T. [+1] 303 256 6767

F. [+1] 303 256 6769

televes.usa@televes.com

TELEVÉS MIDDLE EAST FZE

P.O. Box 17199
Jebel Ali Free Zone Dubai,
(UNITED ARAB EMIRATES)

T. [+97] 14 88 343 44

F. [+97] 14 88 346 44

televes.me@televes.com

TELEVÉS CHINA

Unit 207-208, Building A, No 374
Wukang Rd, Xuhui District Shanghai
P.R.C. 200031 (CHINA)

T. [+86] 21 61267620

F. [+86] 21 64666431

shanghai@televes.com.cn

Televes has made every effort to ensure that the information given in this catalogue is correct at the time of going to press. However, in line with our policy of ongoing product development and improvement, Televes reserves the right to alter product specifications without notice. Televes accepts no liability in respect of loss arising from errors or changes to the information provided.