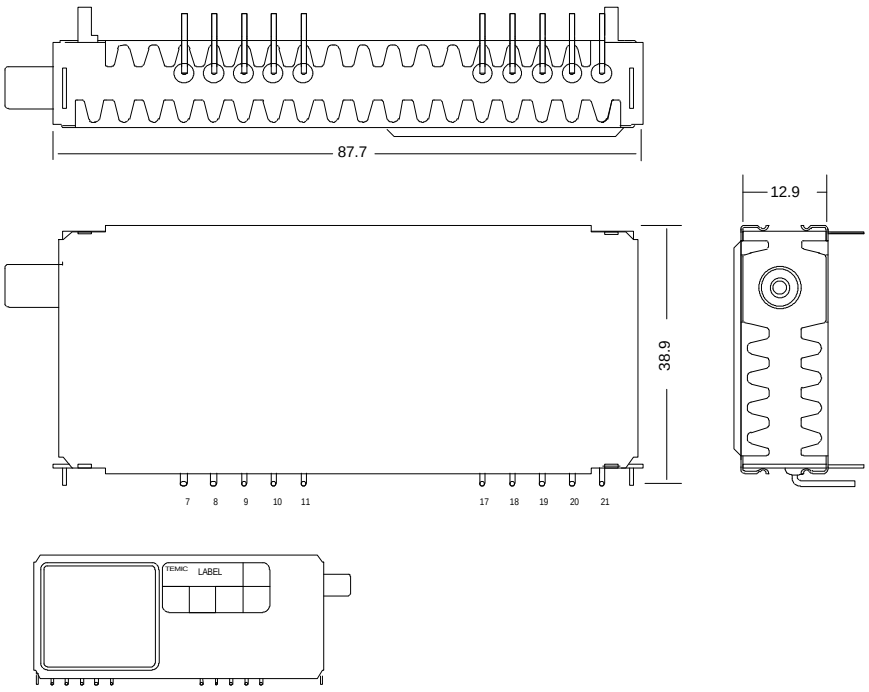
FRONTEND 4036FY5 3X 1981 3X 1223

TARGET SPECIFICATION ELECTRICAL DATA (PRELIMINARY)

1. Description:

The frontend 4036 FY5 is specially designed for multimedia applications. Reception standard is NTSC M/N. The frontend includes a hyperband tuner which covers the frequency range from 54 to 805 MHz and an IF-part with SAW-filter, IF-amplifier, video- and sound demodulator. The AF signal is available at the audio output terminal, the CVBS signal is available at the video output terminal. A video buffer is built in for direct connection to a 75 Ω input.

The reception frequency range is divided in VHF low, VHF high and UHF. Bandselection and tuning is done via I²C-bus, completely. Also a digital AFC-function can be realized, because the AFC-voltage generated by the IF-demodulator is fed to an analog/digital converter which is integrated in the PLL-IC and readable via I²C-bus. A DC/DC converter is built in, therefore supply voltage is 5V only.

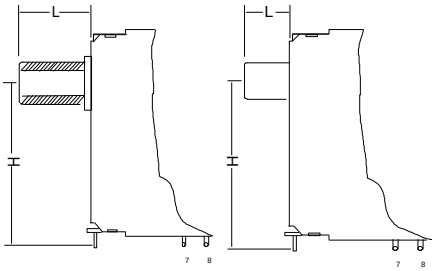


PIN	
4	
5	
6	
7	NOT CONNECTED
8	SUPPLY VOLTAGE VS1 FOR TUNER 5V
9	IIC BUS SIGNAL SCL
10	IIC BUS SIGNAL SDA
11	ADDRESS SELECTION FOR IIC BUS
12	
13	
14	
15	
16	
17	NOT CONNECTED
18	2nd IF
19	VIDEO OUTPUT CVBS
20	SUPPLY VOLTAGE VS1 FOR IF PART 5V
21	AF1 SOUND OUTPUT

2. Mechanical Characteristics:

2.1. Dimensions: according drawing 3X 1981GZ
2.2. Weight: ca. 51 g

2.3. Types



Tunertype	3X 1223	3X 1981
Sockettype	F-CONNECTOR	MINI PHONO
Socketlength	18.0 mm	8.5 mm
Height	29.1 mm	29.1 mm

3. Working Data:

3.1. Reception Standard: NTSC M/N

3. 2. Frequency Range:

VHF low	ch 02 ...G	54 MHz ... 157.25 MHz
VHF high	ch H ...W+26	162 MHz ... 451.25 MHz
UHF	ch W+27 ...69	456 MHz ... 801.25 MHz

Margin:

VHF low	ch 02 ...	G	+1MHz/-1MHz
VHF high	ch H ...	W+26	+1MHz/-5MHz
UHF	ch W+27 ...	69	+3MHz/-3MHz

Recommened take over frequencies:

VHF low / VHF high	158MHz
VHF high/ UHF	453MHz

Frequency referred to picture carrier.

IF:

picture carrier:	45.75 MHz
sound carrier:	41.25 MHz

Oscillator operates above received frequency.

3.3. Supply Voltage:

Supply Voltage V_{S1}	5 V +/- 5%	max. 200 mA

3.4. Input Impedance:

VHF/UHF common	75 Ω, unbalanced

3.5. Temperature:

Operating temperature:	0 ...60 °C
Storage temperature:	-25 ...60 °C

(measured in slowly moved air)

4. Test Conditions:

If not otherwise noticed all data are hold under following conditions:

Measurement tolerance:	10 % or 1 dB
Ambient temperature:	25 °C +/- 3°
Supply voltage:	V_{S1} +/- 5%

5. Tuner Data:

5.1. Voltage Gain:

Voltage gain is measured between antenna input and IF1-Mp and IF2-Mp.
For this measurement the input is loaded with 75Ω, the output is loaded with a test circuit according diagram.

	min.	typ.	max.	unit
ch 02 ... ch 69	40	45		dB

5.2. Noise Figure:

VHF low	8.0	dB
VHF high	9.0	dB
UHF	9.0	dB

5.3. VSWR:

VHF low	4.0
VHF high	4.0
UHF	4.0

Referred to channel center frequency.

5.4. AGC-Range:

	min.	typ.	max.	unit

VHF low	45	dB
VHF high	40	dB
UHF	35	dB

5.5. IF-Rejection:

VHF low	50	dB
VHF high	60	dB
UHF	60	dB

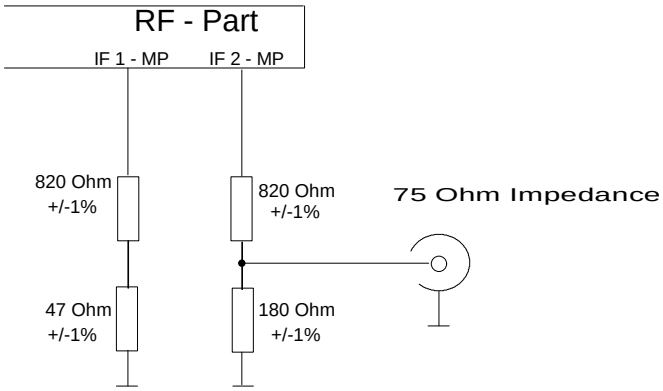
5.6. Image-Rejection:

VHF low		60	dB
VHF high	ch H .... ch 13	60	dB
VHF high	ch J .... ch W+26	50	dB
UHF		50	dB

5.7. RF Tilt:

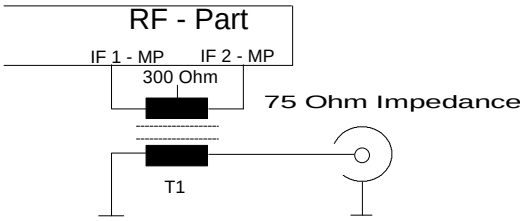
The amplitude difference between top of frequency response curve and any frequency between picture and sound carrier will not exceed 4 dB at nominal gain

5.8. Test circuit for voltage gain:



test circuit attenuation: 31.2 dB

5.9. Test circuit for noise figure:



6. Output Parameters:

6.1. Video Output:

Output signal type: CVBS

Conditions: Ant. input level 66 dBµV 12.5% residual carrier	Test signal	min.	typ.	max.	unit
CVBS - Output level:			1		Vpp
Load impedance			75		Ω
Video S/N (unweighted):	Flat Field (0 IRE)				
VHF		46			dB
UHF		45			dB
Frequency response: Ref.: 0.2 MHz	(sin x)/x				
1 MHz		-1.5		1.5	dB
2 MHz		-2		2	dB
3 MHz		-4		2	dB
3.58 MHz		-8		-1	dB
Differential gain	NTC 7 Composite			5	%pp
Differential phase	NTC 7 Composite			5	°pp

6.2. Sound Output:

Conditions:	Test signal	min.	typ.	max.	unit
Ant.input level 66 dBµV Video signal: color bar	1kHz, 25 kHz deviation 75µs preemphasis				
Output level:	AC		1.3		Vpp
	DC		2.0		V
Load impedance:		2.2			kΩ
Measurements with 75µs deemphasis:					
AF - level:		200	250	300	mV rms
THD+N:				0.5	%
S/N:			49		dB
Frequency response: (6 kHz deviation) 40 Hz ... 15 kHz		-1		1	dB

6.3. 2nd IF output

AC level of 4.5 MHz:	50	120		mVpp
Load impedance	0.5			kΩ

7. I²C bus

7.1. Write data format

	MSB							LSB	
Address byte	1	1	0	0	0	MA1	MA0	R/W	A
Divider byte 1	0	n14	n13	n12	n11	n10	n9	n8	A
Divider byte 2	n7	n6	n5	n4	n3	n2	n1	n0	A
Control byte 1	1	CP	T2	T1	T0	RSA	RSB	OS	A
Control byte 2	P7	P6	P5	P4	P3	P2	P1	P0	A

A = Acknowledge
R/W = 0 : Write mode
CP = 1 : charge pump current high

7.1.1 Address selection

MA1	MA0	Address	Voltage at Pin 11
0	0	C0	(0 to 0.1) * V_{S1}
0	1	C2	(0.2 to 0.3) * V_{S1} or open
1	0	C4	(0.4 to 0.6) * V_{S1}
1	1	C6	(0.9 to 1) * V_{S1}

7.1.2 Oscillator frequency and divider byte calculation:

RSA	RSB	Reference divider	Min. tuning step [kHz]	f_{ref} [kHz]
1	1	512	62.5	7.8125
X	0	640	50.0	6.25
0	1	1024	31.25	3.90625

$f_{osc} = f_{ref} * 8 * \mathbf{SF}$

f_{osc} : Local oscillator frequency
f_{ref} : Crystal reference frequency / 512 = 4 MHz / 512 = 7.8125 kHz
SF : Programmable scaling factor

Scaling factor

SF= 16348* n14 + 8192 * n13 * 4096 * n12 + 2048 * n11 + 1024 * n10 + 512 * n9 + 256* n8 + 128 * n7 + 64 * n6 + 32 * n5 + 16 * n4 + 8 * n3 + 4 * n2 + 2 * n1 + n0

7.1.3. Control byte 1 settings (default)

	MSB							LSB	
Control byte 1	1	0	0	0	1	1	1	0	A

7.1.4 Control byte 2 (Bandselection)

Band	Active port	P7	P6	P5	P4	P3	P2	P1	P0

VHF low	P7, P5	1	0	1	0	0	X	X	X
VHF high	P7,P4	1	0	0	1	0	X	X	X
UHF	P5,P4	0	0	1	1	0	X	X	X

7.2.Read data format

	MSB							LSB	
Address byte	1	1	0	0	0	MA1	MA0	R/W	A
Status byte	POR	FL	I2	I1	I0	A2	A1	A0	A

R/W : 1 = Read mode
POR : Power on reset flag (POR =1 at power on)
FL : In lock flag (FL= 1 when PLL is locked)
I2,I1, I0: not used
A2, A1, A0: Internally used for AFC function
Value for correct tuning: A2 = 0, A1= 1, A0 = 0

Note: Short circuit at pin 18,19 or 21 can damage internal circuits.

NAME	Szasz					
DATE	7.3.97					
REV.:	01					
FÄM.- NO.	018					
DATE	7.3.97					
NAME	Heigl					
SIGNATURE						

NTSC M / N AIR

IF_{PC} = 45,75 [MHz]

Reception frequency				**I^2C bus Code** [hex]							
				f step = 62,5 [kHz]				f step = 50 [kHz]			
Air Channel	CH#	Pix Carrier [MHz]	Band	control byte 1	byte 2	divider byte 1	byte 2	control byte 1	byte 2	divider byte 1	byte 2

2	2	55,25	VHFlow	8E	A2	06	50	88	A2	07	E4
3	3	61,25	VHFlow	8E	A2	06	B0	88	A2	08	5C
4	4	67,25	VHFlow	8E	A2	07	10	88	A2	08	D4
5	5	77,25	VHFlow	8E	A2	07	B0	88	A2	09	9C
6	6	83,25	VHFlow	8E	A2	08	10	88	A2	0A	14
7	7	175,25	VHFhigh	8E	94	0D	D0	88	94	11	44
8	8	181,25	VHFhigh	8E	94	0E	30	88	94	11	BC
9	9	187,25	VHFhigh	8E	94	0E	90	88	94	12	34
10	10	193,25	VHFhigh	8E	94	0E	F0	88	94	12	AC
11	11	199,25	VHFhigh	8E	94	0F	50	88	94	13	24
12	12	205,25	VHFhigh	8E	94	0F	B0	88	94	13	9C
13	13	211,25	VHFhigh	8E	94	10	10	88	94	14	14
14	14	471,25	UHF	8E	31	20	50	88	31	28	64
15	15	477,25	UHF	8E	31	20	B0	88	31	28	DC
16	16	483,25	UHF	8E	31	21	10	88	31	29	54
17	17	489,25	UHF	8E	31	21	70	88	31	29	CC
18	18	495,25	UHF	8E	31	21	D0	88	31	2A	44
19	19	501,25	UHF	8E	31	22	30	88	31	2A	BC
20	20	507,25	UHF	8E	31	22	90	88	31	2B	34
21	21	513,25	UHF	8E	31	22	F0	88	31	2B	AC
22	22	519,25	UHF	8E	31	23	50	88	31	2C	24
23	23	525,25	UHF	8E	31	23	B0	88	31	2C	9C
24	24	531,25	UHF	8E	31	24	10	88	31	2D	14
25	25	537,25	UHF	8E	31	24	70	88	31	2D	8C
26	26	543,25	UHF	8E	31	24	D0	88	31	2E	04
27	27	549,25	UHF	8E	31	25	30	88	31	2E	7C
28	28	555,25	UHF	8E	31	25	90	88	31	2E	F4
29	29	561,25	UHF	8E	31	25	F0	88	31	2F	6C
30	30	567,25	UHF	8E	31	26	50	88	31	2F	E4
31	31	573,25	UHF	8E	31	26	B0	88	31	30	5C
32	32	579,25	UHF	8E	31	27	10	88	31	30	D4
33	33	585,25	UHF	8E	31	27	70	88	31	31	4C
34	34	591,25	UHF	8E	31	27	D0	88	31	31	C4
35	35	597,25	UHF	8E	31	28	30	88	31	32	3C
36	36	603,25	UHF	8E	31	28	90	88	31	32	B4
37	37	609,25	UHF	8E	31	28	F0	88	31	33	2C
38	38	615,25	UHF	8E	31	29	50	88	31	33	A4
39	39	621,25	UHF	8E	31	29	B0	88	31	34	1C
40	40	627,25	UHF	8E	31	2A	10	88	31	34	94
41	41	633,25	UHF	8E	31	2A	70	88	31	35	0C
42	42	639,25	UHF	8E	31	2A	D0	88	31	35	84
43	43	645,25	UHF	8E	31	2B	30	88	31	35	FC
44	44	651,25	UHF	8E	31	2B	90	88	31	36	74
45	45	657,25	UHF	8E	31	2B	F0	88	31	36	EC
46	46	663,25	UHF	8E	31	2C	50	88	31	37	64
47	47	669,25	UHF	8E	31	2C	B0	88	31	37	DC
48	48	675,25	UHF	8E	31	2D	10	88	31	38	54
49	49	681,25	UHF	8E	31	2D	70	88	31	38	CC
50	50	687,25	UHF	8E	31	2D	D0	88	31	39	44
				f_{min} step =	62,5 [kHz]			f_{min} step =	50 [kHz]		
Air Channel	CH#	Pix Carrier [MHz]	Band	control byte 1	byte 2	divider byte 1	byte 2	control byte 1	byte 2	divider byte 1	byte 2
51	51	693,25	UHF	8E	31	2E	30	88	31	39	BC
52	52	699,25	UHF	8E	31	2E	90	88	31	3A	34
53	53	705,25	UHF	8E	31	2E	F0	88	31	3A	AC
54	54	711,25	UHF	8E	31	2F	50	88	31	3B	24

55	55	717,25	UHF	8E	31	2F	B0	88	31	3B	9C
56	56	723,25	UHF	8E	31	30	10	88	31	3C	14
57	57	729,25	UHF	8E	31	30	70	88	31	3C	8C
58	58	735,25	UHF	8E	31	30	D0	88	31	3D	04
59	59	741,25	UHF	8E	31	31	30	88	31	3D	7C
60	60	747,25	UHF	8E	31	31	90	88	31	3D	F4
61	61	753,25	UHF	8E	31	31	F0	88	31	3E	6C
62	62	759,25	UHF	8E	31	32	50	88	31	3E	E4
63	63	765,25	UHF	8E	31	32	B0	88	31	3F	5C
64	64	771,25	UHF	8E	31	33	10	88	31	3F	D4
65	65	777,25	UHF	8E	31	33	70	88	31	40	4C
66	66	783,25	UHF	8E	31	33	D0	88	31	40	C4
67	67	789,25	UHF	8E	31	34	30	88	31	41	3C
68	68	795,25	UHF	8E	31	34	90	88	31	41	B4
69	69	801,25	UHF	8E	31	34	F0	88	31	42	2C

NTSC M / N CABLE

IF_{PC} = 45,75 [MHz]

Reception frequency				**I²C bus Code** [hex]							
				f step = 62,5 [kHz]				f step = 50 [kHz]			
Cable Channel	CH#	Pix Carrier [MHz]	Band	control byte 1	byte 2	divider byte 1	byte 2	control byte 1	byte 2	divider byte 1	byte 2
4A	1	73,25	VHFlow	8E	A2	07	70	88	A2	09	4C
2	2	55,25	VHFlow	8E	A2	06	50	88	A2	07	E4
3	3	61,25	VHFlow	8E	A2	06	B0	88	A2	08	5C
4	4	67,25	VHFlow	8E	A2	07	10	88	A2	08	D4
5	5	77,25	VHFlow	8E	A2	07	B0	88	A2	09	9C
6	6	83,25	VHFlow	8E	A2	08	10	88	A2	0A	14
7	7	175,25	VHFhigh	8E	94	0D	D0	88	94	11	44
8	8	181,25	VHFhigh	8E	94	0E	30	88	94	11	BC
9	9	187,25	VHFhigh	8E	94	0E	90	88	94	12	34
10	10	193,25	VHFhigh	8E	94	0E	F0	88	94	12	AC
11	11	199,25	VHFhigh	8E	94	0F	50	88	94	13	24
12	12	205,25	VHFhigh	8E	94	0F	B0	88	94	13	9C
13	13	211,25	VHFhigh	8E	94	10	10	88	94	14	14
A	14	121,25	VHFlow	8E	A2	0A	70	88	A2	0D	0C
B	15	127,25	VHFlow	8E	A2	0A	D0	88	A2	0D	84
C	16	133,25	VHFlow	8E	A2	0B	30	88	A2	0D	FC
D	17	139,25	VHFlow	8E	A2	0B	90	88	A2	0E	74
E	18	145,25	VHFlow	8E	A2	0B	F0	88	A2	0E	EC
F	19	151,25	VHFlow	8E	A2	0C	50	88	A2	0F	64
G	20	157,25	VHFlow	8E	A2	0C	B0	88	A2	0F	DC
H	21	163,25	VHFhigh	8E	94	0D	10	88	94	10	54
				f_{min} step = 62,5 [kHz]				f_{min} step = 50 [kHz]			
Cable Channel	CH#	Pix Carrier [MHz]	Band	control byte 1	byte 2	divider byte 1	byte 2	control byte 1	byte 2	divider byte 1	byte 2
I	22	169,25	VHFhigh	8E	94	0D	70	88	94	10	CC
J	23	217,25	VHFhigh	8E	94	10	70	88	94	14	8C
K	24	223,25	VHFhigh	8E	94	10	D0	88	94	15	04
L	25	229,25	VHFhigh	8E	94	11	30	88	94	15	7C
M	26	235,25	VHFhigh	8E	94	11	90	88	94	15	F4

N	27	241,25	VHFhigh	8E	94	11	F0	88	94	16	6C
O	28	247,25	VHFhigh	8E	94	12	50	88	94	16	E4
P	29	253,25	VHFhigh	8E	94	12	B0	88	94	17	5C
Q	30	259,25	VHFhigh	8E	94	13	10	88	94	17	D4
R	31	265,25	VHFhigh	8E	94	13	70	88	94	18	4C
S	32	271,25	VHFhigh	8E	94	13	D0	88	94	18	C4
T	33	277,25	VHFhigh	8E	94	14	30	88	94	19	3C
U	34	283,25	VHFhigh	8E	94	14	90	88	94	19	B4
V	35	289,25	VHFhigh	8E	94	14	F0	88	94	1A	2C
W	36	295,25	VHFhigh	8E	94	15	50	88	94	1A	A4
W+1	37	301,25	VHFhigh	8E	94	15	B0	88	94	1B	1C
W+2	38	307,25	VHFhigh	8E	94	16	10	88	94	1B	94
W+3	39	313,25	VHFhigh	8E	94	16	70	88	94	1C	0C
W+4	40	319,25	VHFhigh	8E	94	16	D0	88	94	1C	84
W+5	41	325,25	VHFhigh	8E	94	17	30	88	94	1C	FC
W+6	42	331,25	VHFhigh	8E	94	17	90	88	94	1D	74
W+7	43	337,25	VHFhigh	8E	94	17	F0	88	94	1D	EC
W+8	44	343,25	VHFhigh	8E	94	18	50	88	94	1E	64
W+9	45	349,25	VHFhigh	8E	94	18	B0	88	94	1E	DC
W+10	46	355,25	VHFhigh	8E	94	19	10	88	94	1F	54
W+11	47	361,25	VHFhigh	8E	94	19	70	88	94	1F	CC
W+12	48	367,25	VHFhigh	8E	94	19	D0	88	94	20	44
W+13	49	373,25	VHFhigh	8E	94	1A	30	88	94	20	BC
W+14	50	379,25	VHFhigh	8E	94	1A	90	88	94	21	34
W+15	51	385,25	VHFhigh	8E	94	1A	F0	88	94	21	AC
W+16	52	391,25	VHFhigh	8E	94	1B	50	88	94	22	24
W+17	53	397,25	VHFhigh	8E	94	1B	B0	88	94	22	9C
W+18	54	403,25	VHFhigh	8E	94	1C	10	88	94	23	14
W+19	55	409,25	VHFhigh	8E	94	1C	70	88	94	23	8C
W+20	56	415,25	VHFhigh	8E	94	1C	D0	88	94	24	04
W+21	57	421,25	VHFhigh	8E	94	1D	30	88	94	24	7C
W+22	58	427,25	VHFhigh	8E	94	1D	90	88	94	24	F4
W+23	59	433,25	VHFhigh	8E	94	1D	F0	88	94	25	6C
W+24	60	439,25	VHFhigh	8E	94	1E	50	88	94	25	E4
W+25	61	445,25	VHFhigh	8E	94	1E	B0	88	94	26	5C
W+26	62	451,25	VHFhigh	8E	94	1F	10	88	94	26	D4
W+27	63	457,25	UHF	8E	34	1F	70	88	34	27	4C
W+28	64	463,25	UHF	8E	34	1F	D0	88	34	27	C4
W+29	65	469,25	UHF	8E	31	20	30	88	31	28	3C
66	66	475,25	UHF	8E	31	20	90	88	31	28	B4
67	67	481,25	UHF	8E	31	20	F0	88	31	29	2C
68	68	487,25	UHF	8E	31	21	50	88	31	29	A4
69	69	493,25	UHF	8E	31	21	B0	88	31	2A	1C
70	70	499,25	UHF	8E	31	22	10	88	31	2A	94
71	71	505,25	UHF	8E	31	22	70	88	31	2B	0C
72	72	511,25	UHF	8E	31	22	D0	88	31	2B	84
73	73	517,25	UHF	8E	31	23	30	88	31	2B	FC
74	74	523,25	UHF	8E	31	23	90	88	31	2C	74
75	75	529,25	UHF	8E	31	23	F0	88	31	2C	EC
76	76	535,25	UHF	8E	31	24	50	88	31	2D	64
				f_{min} step =	62,5 [kHz]			f_{min} step =	50 [kHz]		
Cable Channel	CH#	Pix Carrier [MHz]	Band	control byte 1	byte 2	divider byte 1	byte 2	control byte 1	byte 2	divider byte 1	byte 2
77	77	541,25	UHF	8E	31	24	B0	88	31	2D	DC
78	78	547,25	UHF	8E	31	25	10	88	31	2E	54
79	79	553,25	UHF	8E	31	25	70	88	31	2E	CC
80	80	559,25	UHF	8E	31	25	D0	88	31	2F	44
81	81	565,25	UHF	8E	31	26	30	88	31	2F	BC
82	82	571,25	UHF	8E	31	26	90	88	31	30	34

83	83	577,25	UHF	8E	31	26	F0	88	31	30	AC
84	84	583,25	UHF	8E	31	27	50	88	31	31	24
85	85	589,25	UHF	8E	31	27	B0	88	31	31	9C
86	86	595,25	UHF	8E	31	28	10	88	31	32	14
87	87	601,25	UHF	8E	31	28	70	88	31	32	8C
88	88	607,25	UHF	8E	31	28	D0	88	31	33	04
89	89	613,25	UHF	8E	31	29	30	88	31	33	7C
90	90	619,25	UHF	8E	31	29	90	88	31	33	F4
91	91	625,25	UHF	8E	31	29	F0	88	31	34	6C
92	92	631,25	UHF	8E	31	2A	50	88	31	34	E4
93	93	637,25	UHF	8E	31	2A	B0	88	31	35	5C
94	94	643,25	UHF	8E	31	2B	10	88	31	35	D4
A-5	95	91,25	VHFlow	8E	A2	08	90	88	A2	0A	B4
A-4	96	97,25	VHFlow	8E	A2	08	F0	88	A2	0B	2C
A-3	97	103,25	VHFlow	8E	A2	09	50	88	A2	0B	A4
A-2	98	109,25	VHFlow	8E	A2	09	B0	88	A2	0C	1C
A-1	99	115,25	VHFlow	8E	A2	0A	10	88	A2	0C	94
100	100	649,25	UHF	8E	31	2B	70	88	31	36	4C
101	101	655,25	UHF	8E	31	2B	D0	88	31	36	C4
102	102	661,25	UHF	8E	31	2C	30	88	31	37	3C
103	103	667,25	UHF	8E	31	2C	90	88	31	37	B4
104	104	673,25	UHF	8E	31	2C	F0	88	31	38	2C
105	105	679,25	UHF	8E	31	2D	50	88	31	38	A4
106	106	685,25	UHF	8E	31	2D	B0	88	31	39	1C
107	107	691,25	UHF	8E	31	2E	10	88	31	39	94
108	108	697,25	UHF	8E	31	2E	70	88	31	3A	0C
109	109	703,25	UHF	8E	31	2E	D0	88	31	3A	84
110	110	709,25	UHF	8E	31	2F	30	88	31	3A	FC
111	111	715,25	UHF	8E	31	2F	90	88	31	3B	74
112	112	721,25	UHF	8E	31	2F	F0	88	31	3B	EC
113	113	727,25	UHF	8E	31	30	50	88	31	3C	64
114	114	733,25	UHF	8E	31	30	B0	88	31	3C	DC
115	115	739,25	UHF	8E	31	31	10	88	31	3D	54
116	116	745,25	UHF	8E	31	31	70	88	31	3D	CC
117	117	751,25	UHF	8E	31	31	D0	88	31	3E	44
118	118	757,25	UHF	8E	31	32	30	88	31	3E	BC
119	119	763,25	UHF	8E	31	32	90	88	31	3F	34
120	120	769,25	UHF	8E	31	32	F0	88	31	3F	AC
121	121	775,25	UHF	8E	31	33	50	88	31	40	24
122	122	781,25	UHF	8E	31	33	B0	88	31	40	9C
123	123	787,25	UHF	8E	31	34	10	88	31	41	14
124	124	793,25	UHF	8E	31	34	70	88	31	41	8C
125	125	799,25	UHF	8E	31	34	D0	88	31	42	04