Hyperband television tuner TUN14414 and 14436

FEATURES

- VHF/Hyperband/UHF tuner
- Systems CCIR: B/G, H
- Voltage synthesized tuning (VST)
- Off-air channels,S-cable channels and Hyperband
- World standardized mechanical dimensions and world standard pinning
- Compact size
- Comply to “CENELEC EN55020” and “EN55013”

DESCRIPTION

TUN14414/14436 belong to the family of tuner, which are designed to meet a wide range of applications. It is a combined VHF/Hyperband/UHF tuner suitable for CCIR systems B/G and H. The IF output can drive a SAW filter directly and has capability to drive a symmetrical or asymmetrical load.
The tuners comply with the requirements of radiation, signal handling capability and immunity conforming with:

- CISPR 13 (1990) include. amendment 1 (1992) and amendment 2 (1993)
- European standards CENELEC EN55013, EN55020

ORDERING INFORMATION

TYPE	SYSTEM	DESCRIPTION
TUN14436	CCIR	symmetrical IF output; IEC connector (14.5 mm)
TUN14414	CCIR	asymmetrical IF output; IEC connector (14.5 mm)

INTERMEDIATE FREQUENCIES

SIGNAL	FREQUENCY (MHz)	
	SYSTEM B/G, H	
Picture carrier	38.90	
Colour	34.47	
Sound	33.40	

Note
The oscillator frequency is above the input signal frequency.

CHANNEL COVERAGE

Type	BAND	OFF-AIR CHANNELS		CABLE CHANNELS	
		CHANNELS	FREQUENCY RANGE (MHz)	CHANNELS	FREQUENCY RANGE (MHz)
TUN14414/14436	Low band	E2 to C	48.25 to 82.25(1)	S01 to S08	69.25 to 154.25
	Mid band	E5 to E12	175.25 to 224.25	S09 to S38	161.25 to 439.25
	High band	E21 to E69	471.25 to 855.25(2)	S39 to S41	447.25 to 463.25

Notes
1. Enough margin is available to tune down to 45.25 MHz.
2. Enough margin is available to tune up to 863.25 MHz.

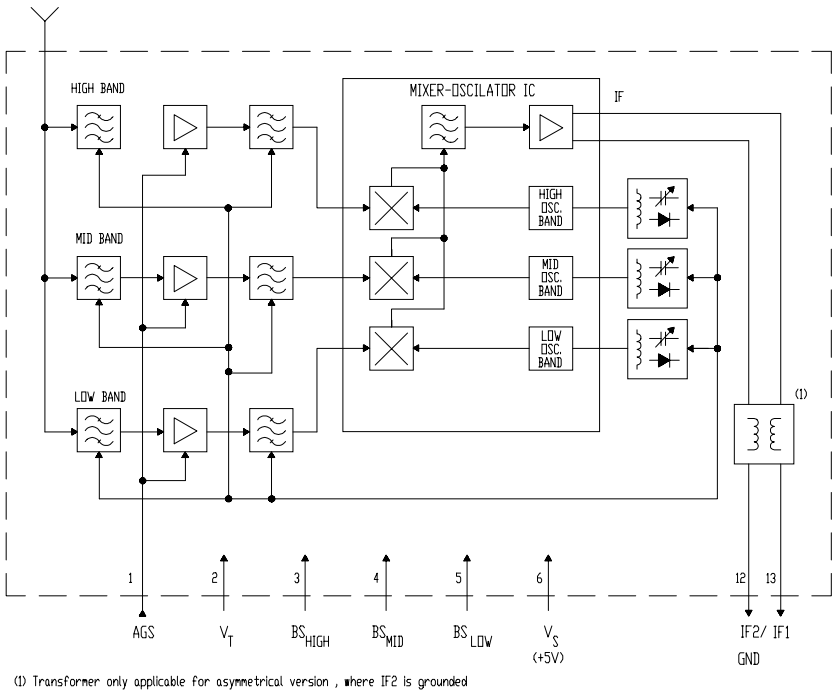


Fig.1 Electrical block diagram

PINNING

SYMBOL	PIN	DESCRIPTION
AGC	1	gain control voltage
V_T	2	tuning voltage
UHF	3	high band switch
VHF II	4	mid band switch
VHF I	5	low band switch
V_S	6	supply voltage +5 V
n.c.	7	not connected
n.c.	8	not connected
n.c.	9	not connected
IF2/GND	10	TUN14436: symmetrical IF output; TUN14414:ground
IF1	11	TUN14436: symmetrical IF output; TUN14414: asymmetrical IFoutput
GND	MT1, MT2	mounting tags (ground)
IN		aerial input connector IEC (14.5 mm)

LIMITING VALUES

Environmental conditions

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
Non-operational conditions				
T_{amb}	ambient temperature	-40	+60	^{0}C
RH	relative humidity	-	100	%
Operational conditions				
T_{amb}	ambient temperature	-15	+60	^{0}C
RH	relative humidity	-	93	%

Limiting values under operational conditions

The tuner can be guaranteed to function properly under the following conditions

SYMBOL	PARAMETER	PIN	MIN.	TYP.	MAX.	UNIT
V_S	supply voltage	6	4.75	5.0	5.5	V
I_S	supply current		-	-	65	mA
ΔV_T	tuning voltage range	2	0.5	-	28	V
I_T	tuning current		-	-	0.5	µA
V_{AGC}	AGC input voltage	1	-	4.0	4.5	V
ΔV_{AGC}	AGC input voltage range		0.3	-	4.0	V
I_{AGC}	AGC input current		-	-	20	µA
V_{BS}	bandswitching voltage	3,4 and 5	4.75	5.0	5.5	V
I_{BS}	bandswitching current		-	-	1.5	mA

Bandswitching

BAND	PIN 3	PIN 4	PIN 5	UNIT
Low	0 or open	0 or open	5	V
Mid	0 or open	5	0 or open	V
High	5	0 or open	0 or open	V

ELECTRICAL DATA

Conditional data

Unless otherwise specified, all electrical values for Chapter “Electrical data” apply at the following conditions and the electrical performance is related both to systems B, G and H .
A proper function is guaranteed within the specified operational conditions but a certain deterioration of performance parameters may occur at the limits of operational conditions.

SYMBOL	PARAMETER	VALUE	UNIT
T_{amb}	ambient temperature	25 +/- 5	^{0}C
RH	relative humidity	60 +/- 15	%
V_S	supply voltage	5.0 +/- 0.1	V
V_{AGC}	AGC input voltage	4.0 +/- 0.1	V
t_{pr}	pre-heating time (+5 V at pin 6)	10	minute
$Z_{S(AE)}$	aerial source impedance (unbalanced)	75	Ω

Aerial input characteristics

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
VSWR	reflection coefficient	referred to 75 Ω impedance	-	2	4	
V_{ant}	antenna connection disturbance voltage	< 1.75 GHz; comply to “EN55013 section 3.3”	-	-	46	dBµV

General characteristics

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
f_b	frequency range:					
	low band		48.25	-	154.25	MHz
	mid band		161.25	-	439.25	MHz
	high band		447.25	-	855.25	MHz
G_V	voltage gain:	The IFoutput is loaded				
	all channels	with a test circuit	38	45	52	dB
	gain taper	according diagram fig.2	-	-	7	dB
Y	RF-curves, tilt	The IF output is loaded with a test circuit according diagram fig.2	-	2.5	4.0	dB
F	noise:	The IF output is loaded				
	low band	with a test circuit	-	6.0	9	dB
	mid band	according diagram fig.2	-	6.0	9	dB
	high band		-	6.0	9	dB
ΔV_{AGC}	AGC input voltage range:					
	low and mid band		45	60	-	dB
	high band		40	50	-	dB
α_I	image rejection:					
	low band		66	70	-	dB
	mid band		60	69	-	dB
	high band		50	60	-	dB
α_{IF}	IF rejection (picture):					
	channel E2		55	68	-	dB
	low, mid and high bands		65	71	-	dB
V_{ESD}	electrostatic discharge (ESD):	note 1				
	protection on pins 1 to 5 and 6 to 11		2	-	-	kV
	protection on antenna socket		8	-	-	kV
Δf	oscillator drift:					
	Ambient temperature range					
	low band	$\Delta T=25^oC+/-2^oC$			+/-500	kHz
	mid band	(25^oC to 50^oC)			+/-750	kHz
	high band				+/-1200	kHz
	Supply voltage change					
	low band				+/-250	kHz
	mid band	+/-5%			+/-500	kHz
	high band				+/-500	kHz

Note

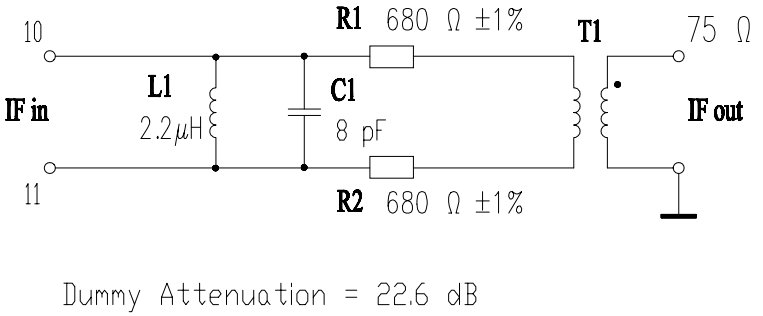
1. The tuner meets specifications IEC 1000-4-2 level 1 for pins and level 4 for antenna socket.

Visibility test

The tuners meet the requirements of the European norm “EN55020”, when measured in an adequate television receiver

Radiation

The tuners meet the requirements of the European norm “EN55013” and “CISPR13” (1990), when measured in an adequate television receiver.



T1 – RF Transformer.
W – Ratio = 1:4 (IF – IN = 4 / IF – OUT = 1).
Type: MCL T4-1 or equivalent.

Fig. 2 Test circuit

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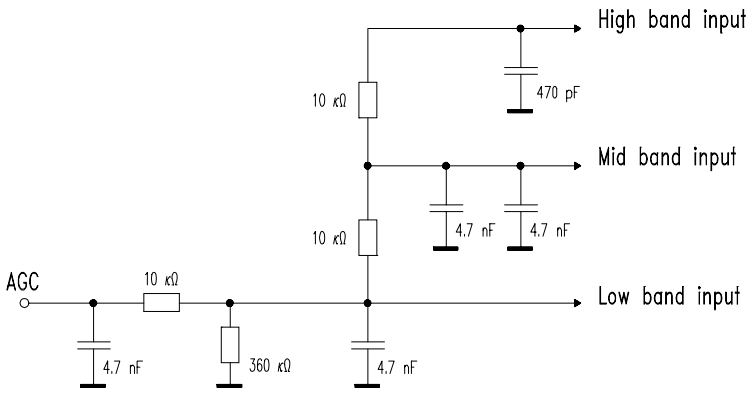
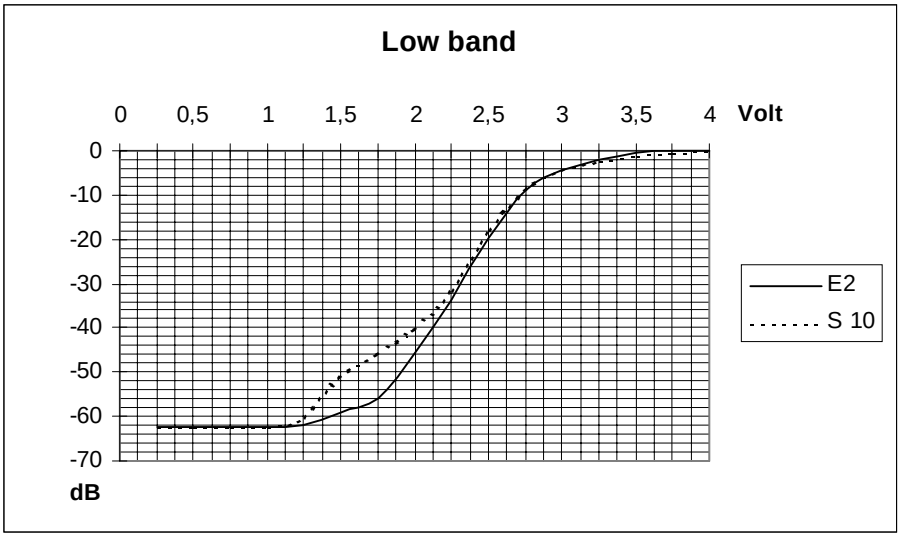


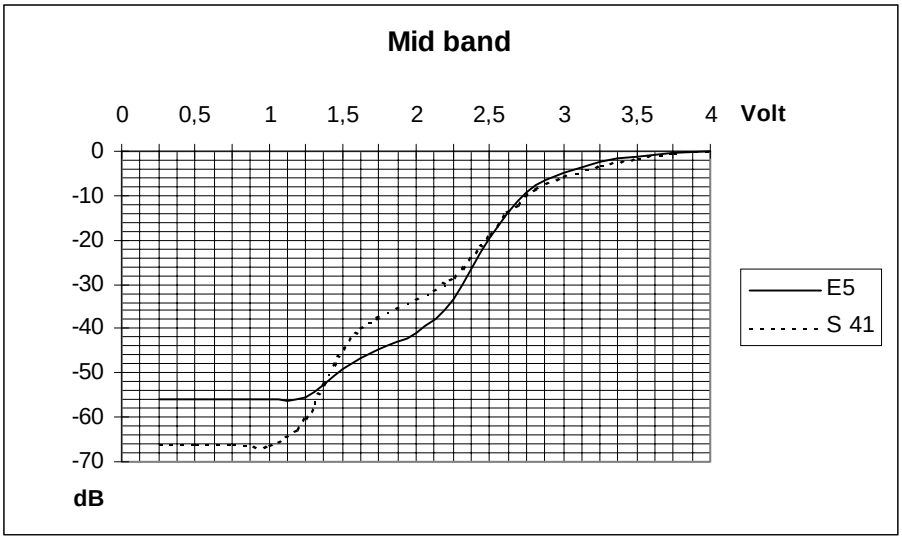
Fig.3 Internal AGC circuit.

Recommended adjustment of Tuner AGC in TV chassis:

Channel: E21 (471.25 MHz PC-frequency)
Input level: 70 dBµV/75 Ω
IF output level: 105 dBµV
Gain reduction: 10 dB
AGC-Voltage: 2.6 V +/-0.2V

AGC characteristics shown on Fig. 4





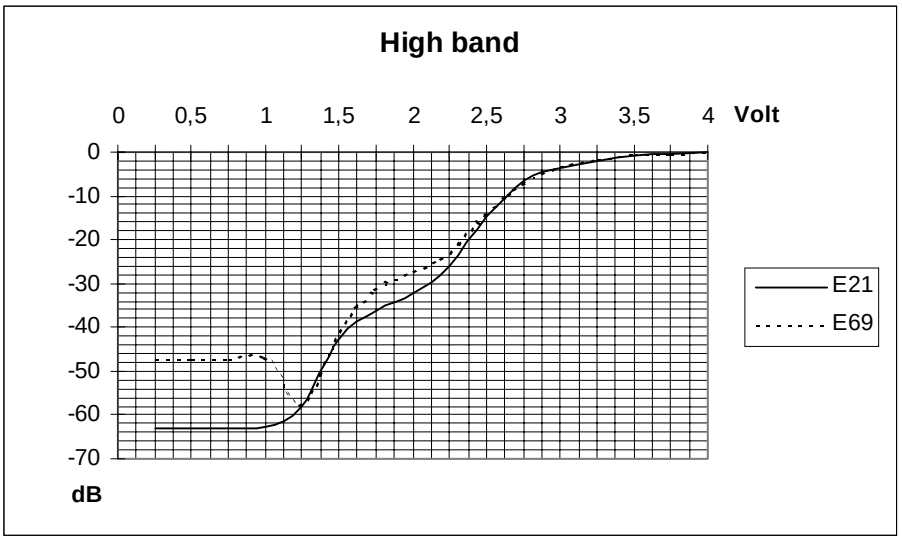


Fig.4 AGC characteristics

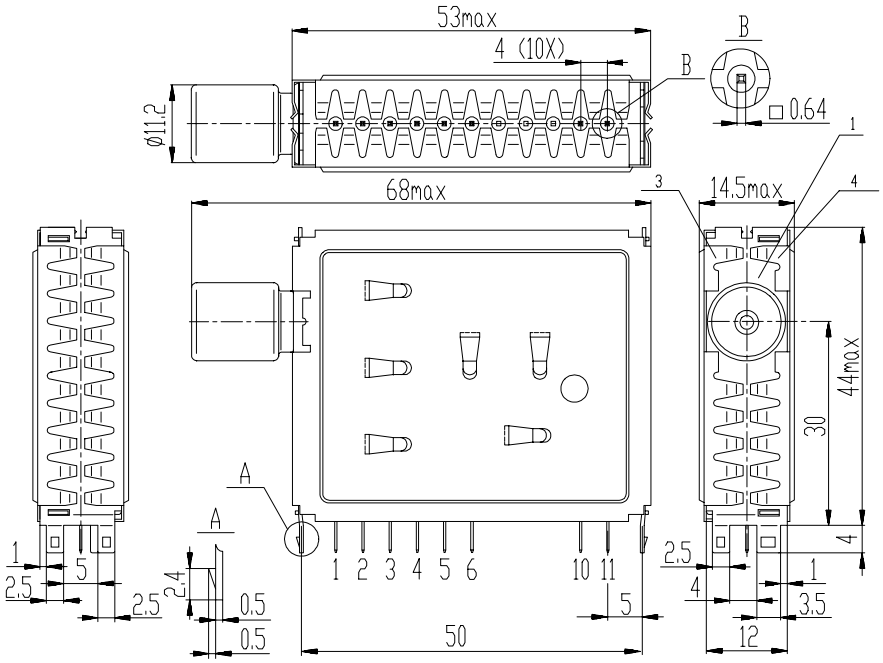


Fig.5 Mechanical outline

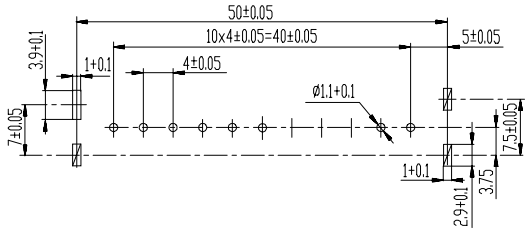


Fig.6 Punching pattern seen from solder side

Aerial connections

Standard IEC socket female 75 Ω.