

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) |
| | | |

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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.

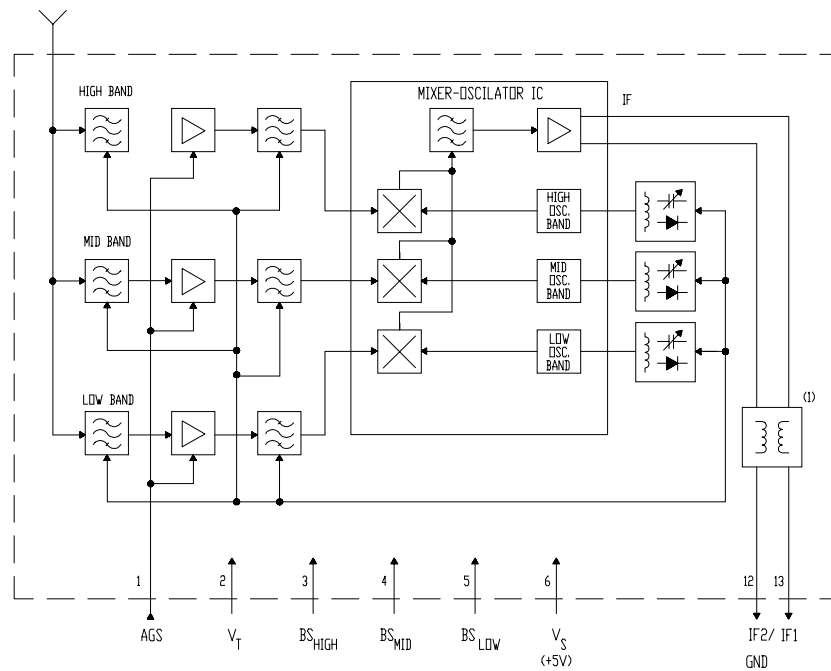


Fig.1 Electrical block diagram

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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 | $^{\circ}\text{C}$ |
| RH | relative humidity | - | 100 | % |
| Operational conditions | | | | |
| T_{amb} | ambient temperature | -15 | +60 | $^{\circ}\text{C}$ |
| 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 |

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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 | $^{\circ}\text{C}$ |
| 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 | $\text{dB}\mu\text{V}$ |

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General characteristics

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

Note

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

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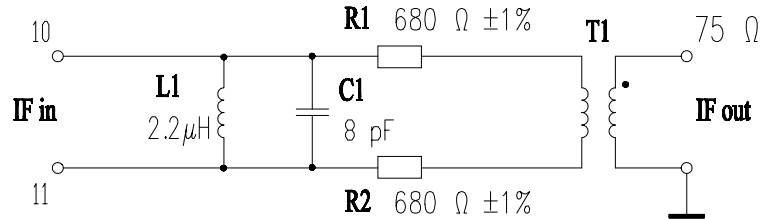
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Visibility test

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.



Dummy Attenuation = 22.6 dB

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

Fig. 2 Test circuit

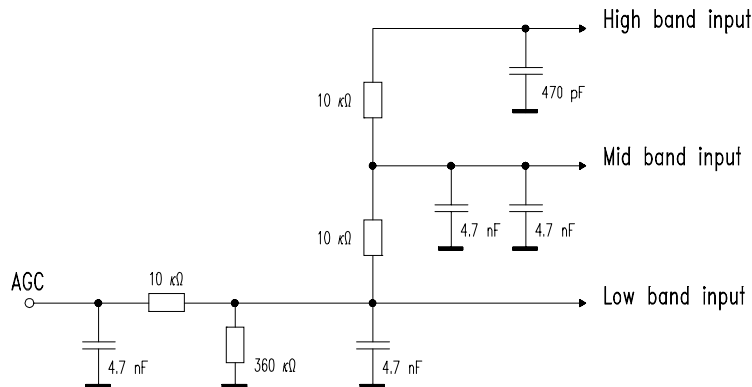


Fig.3 Internal AGC circuit.

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

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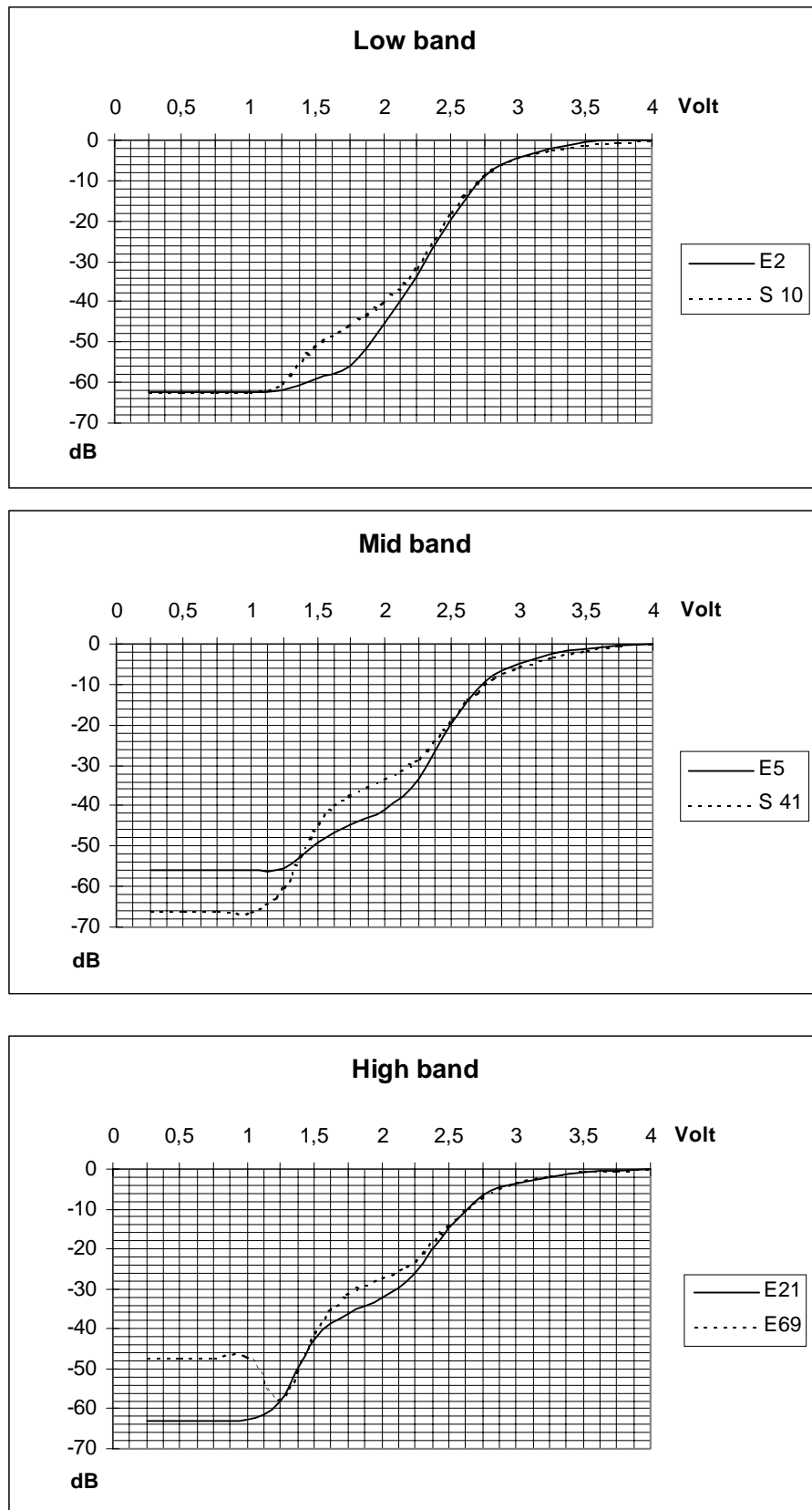


Fig.4 AGC characteristics

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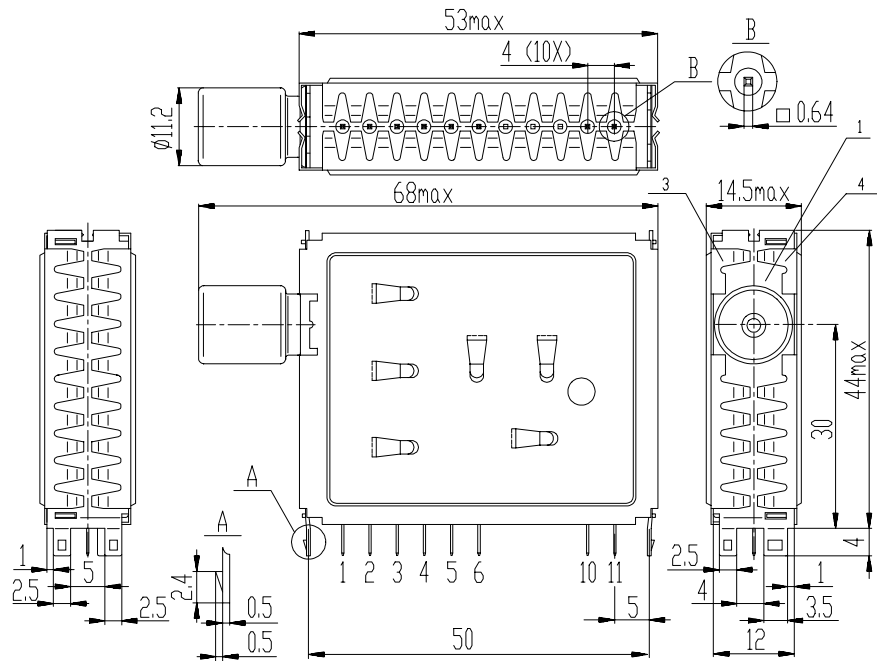


Fig.5 Mechanical outline

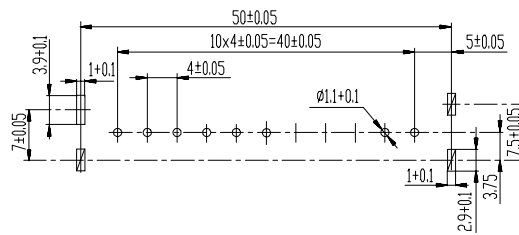


Fig.6 Punching pattern seen from solder side

Aerial connections

Standard IEC socket female 75 Ω .