

DATA SHEET

FM1246

**Desktop video & FM radio module
system CCIR I**

Preliminary specification
File under Tuners, DC03

1997 May 14

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FEATURES

- System I and FM radio broadcast
- True 5 V device (low power dissipation)
- Full TV frequency range from channel A (45.75 MHz) to channel 69 (855.25 MHz)
- FM radio band coverage from 87.50 to 108.00 MHz
- PLL controlled tuning
- Programmable PLL step size (31.25, 50 or 62.5 kHz)
- True-synchronous vision IF demodulator (PLL)
- Ultra-linear FM PLL demodulator for FM radio broadcast
- Demodulated video output, AF sound output, second sound IF output
- I²C-bus control of tuning, address selection, AFC status information
- Complies with European regulations on radiation, signal handling and immunity "CENELEC 55020, 55013"
- Small horizontally mounted metal housing.

DESCRIPTION

The FM1246 front-end is designed to receive both TV and FM stereo signals in the PC Multimedia environment. The units are available with separate 75 Ω inputs for TV and FM broadcast reception. The input connectors available are either standard phono or IEC type (female for TV, male for FM radio). The tuning, bandswitching and antenna selection are made through the I²C-bus.

The front-end covers the TV bands from 45.75 MHz to 855.25 MHz. The FM band covers the standard 87.50 MHz to 108.00 MHz. An RDS decoder can be connected to the AF-MPX output. The FM1246 meets the input immunity and radiation requirements of CENELEC.

The FM1246 consists of a TV tuner, an FM radio tuner and an IF section, all on a single PCB. The front-end is assembled in a metal housing made of a rectangular tin-plated steel frame, with front and rear covers, which have soldered contacts to the frame. The two phono or IEC antenna connectors (female for TV, male for FM radio) are mounted on one side of the frame for the TV/FM signal inputs. All other connections are made via pins at the bottom.

The TV IF section uses an intercarrier SAW filter, followed by a true-synchronous vision IF demodulator (PLL) IC. The analog AFC voltage is fed to the 5-level A/D converter in the PLL tuning IC, so that the AFC status can be read via the I²C-bus.

In the FM radio mode, the level detector and AFT functions are provided for the auto-search routines. The level detector and AFT status can be read from the A/D bits in the status-byte. The mute function is also provided to suppress the audio output signal, if required.

The tuner AGC for both TV and FM radio operation, is generated with a novel AGC detector which measures the IF signal level directly at the tuner IF output pins. As opposed to the conventional AGC detector, this new circuit allows a higher take-over level and offers superior immunity against tuner overload.

The demodulation of the TV sound and FM radio IF (10.70 MHz) is done with a PLL demodulation circuit contained in the IF IC. In the FM radio mode, the multiplexed AF signal is then channelled to a stereo decoder IC which extracts the left/right analog signals. The multiplexed audio signal is also available at pin 25 to support RDS implementations. The 2nd IF TV sound output is provided to connect external (analog 2 carrier or digital) stereo processing.

ORDERING INFORMATION

| TYPE | DESCRIPTION | CATALOGUE NUMBERS |
|--------------|----------------|-------------------|
| FM1246/HM/PH | standard phono | 3139 147 13901 |
| FM1246/HM/I | IEC connector | 3139 147 13911 |

MARKING

The following items of information are printed on a sticker that is on the top cover of the tuner:

- Type number
- Code number
- Origin letter of factory
- Change code
- Year and week code.

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INTERMEDIATE FREQUENCIES

| SYSTEM | FREQUENCY (MHz) |
|-----------------|--------------------|
| Picture carrier | 38.90 |
| Colour | 34.47 |
| Sound | 32.90 |
| NICAM | 32.348 |
| FM | 10.70 |

CHANNEL COVERAGE

| BAND | FREQUENCY (MHz) |
|---------------|--------------------|
| FM radio band | 87.50 to 108.00 |
| Low band | 45.75 to 170.00 |
| Mid band | 170.00 to 450.00 |
| High band | 450.00 to 855.25 |

PINNING

| SYMBOL | PIN | DESCRIPTION |
|------------------------|-----------------------|---|
| V _T | 11 | tuning voltage (monitor) |
| V _{S(tuner)} | 12 | supply voltage tuner section +5 V |
| SCL | 13 | I ² C-bus serial clock |
| SDA | 14 | I ² C-bus serial data |
| AS | 15 | I ² C-bus address select |
| AF O/P right | 20 | FM radio right channel |
| AF O/P left | 21 | FM radio left channel |
| 2 nd IF O/P | 22 | second IF TV sound output |
| CVBS | 23 | Composite Video Baseband Signal (CVBS) output |
| V _{S(IF)} | 24 | supply voltage IF section +5 V |
| AF O/P | 25 | AF sound output |
| – | TH1, TH2, TH3 and TH4 | mounting tags (ground) |

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LIMITING VALUES

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 | 12 | 4.75 | 5.00 | 5.25 | V |
| $V_{S(\text{ripple})}$ | peak-to-peak ripple voltage susceptibility (at 5 V $\pm 5\%$); note 1 20 Hz to 100 kHz >100 kHz to 500 kHz | | – | – | 5 | mV |
| | | | – | – | 10 | mV |
| $I_{S(\text{tuner})}$ | supply current | | – | – | 120 | mA |
| V_{SCL} | SCL bus input voltage | 13 | –0.3 | – | +5.25 | V |
| V_{SDA} | SDA bus input voltage | 14 | –0.3 | – | +5.25 | V |
| I_{SDA} | SDA bus current (open collector) | | –1 | – | +5 | mA |
| V_{AS} | address select voltage; note 2 | 15 | – | – | +5.25 | V |
| $V_{AFright(FM)}$ | FM right channel DC voltage | 20 | – | 1.0 | – | V |
| $Z_{AFright(FM)}$ | FM right channel load impedance parallel connected: resistive value capacitive value | | – | 50 | – | k Ω |
| | | | – | 9 | – | pF |
| $V_{AFleft(FM)}$ | FM left channel DC voltage | 21 | – | 1.0 | – | V |
| $Z_{AFleft(FM)}$ | FM left channel load impedance: resistive value capacitive value | | – | 50 | – | k Ω |
| | | | – | 9 | – | pF |
| Z_{IF} | 2 nd IF sound output load impedance | 22 | 0.5 | – | – | k Ω |
| Z_{CVBS} | Composite Video Baseband Signal load impedance | 23 | – | 75 | – | Ω |
| t_L | CVBS load time constant | | – | – | 100 | ns |
| $V_{S(IF)}$ | IF supply voltage | 24 | 4.75 | 5.0 | 5.25 | V |
| $I_{S(IF)}$ | IF supply current | | – | – | 150 | mA |
| Z_{AF} | AF sound output load impedance parallel connected: resistive value capacitive value | 25 | 5.0 | – | – | k Ω |
| | | | – | – | 4 | nF |

Notes

1. Sinusoidal ripple voltage superimposed on the 5 V supply voltage in the frequency range of 20 Hz to 500 kHz. Criteria for TV interference >57 dB.
2. For detailed information about the address decoding, refer to Chapter "Application information".

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Environmental conditions

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-----------------------------------|---------------------|-------------|------|------|------|------------------|
| Non-operational conditions | | | | | | |
| T _{amb} | ambient temperature | | -25 | - | +85 | °C |
| RH | relative humidity | | - | - | 100 | % |
| g _B | bump acceleration | 25 g | - | - | 245 | m/s ² |
| g _S | shock acceleration | 50 g | - | - | 490 | m/s ² |
| | vibration amplitude | 10 to 55 Hz | - | 0.35 | - | mm |
| Operational conditions | | | | | | |
| T _{amb} | ambient temperature | | -10 | - | +60 | °C |
| RH | relative humidity | | - | - | 95 | % |

OVERALL PERFORMANCE

Conditional data

Unless otherwise specified, all electrical values for Chapter "Overall performance" apply at the following conditions.

| SYMBOL | PARAMETER | VALUE | UNIT |
|--------------------|---|----------|---------|
| T _{amb} | ambient temperature | 25 ±5 | °C |
| RH | relative humidity | 60 ±15 | % |
| V _S | supply voltage (tuner and IF section) | 5 ±0.125 | V |
| Z _{CVBS} | video output load impedance (DC) | 75 | Ω |
| Z _{IF} | 2 nd IF sound output load impedance (DC) | 0.5 | kΩ |
| Z _{AF} | AF sound output load impedance | 100 | kΩ |
| t _{pr} | pre-heating time (+5 V at pin 24) | 10 | minutes |
| Z _{S(AE)} | aerial source impedance (asymmetrical) | 75 | Ω |

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TUNER CHARACTERISTICS

For detailed information about the PLL programming, refer to Chapter "Application information".

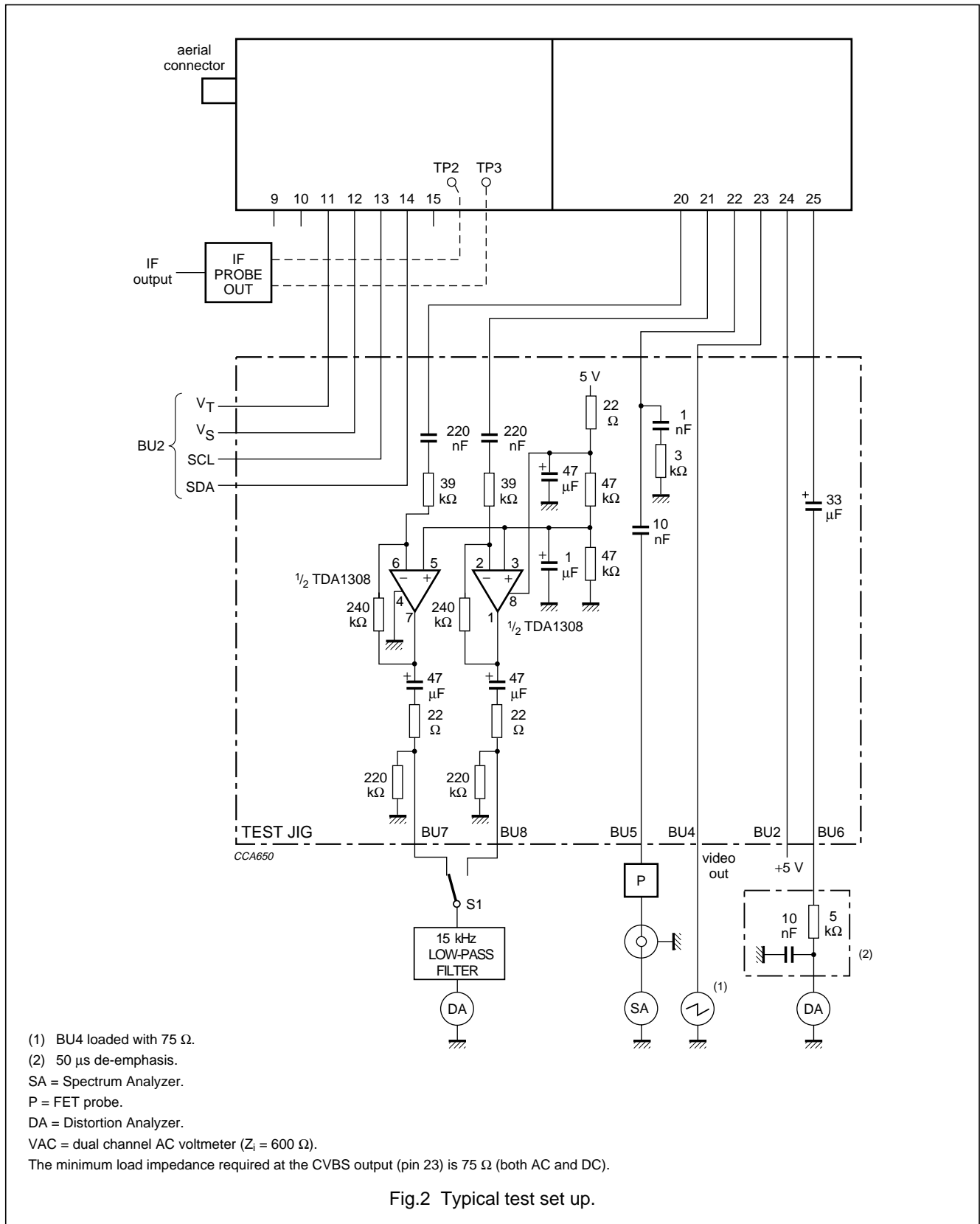
The desktop video tuner is guaranteed to function properly within the specified operational conditions, but a certain deterioration of performance parameters may occur at the limits of the operational conditions.

Required data for test equipment to be used

| EQUIPMENT | PARAMETER | VALUE | UNIT |
|-------------------|---|-----------|------------------|
| DC voltmeter | input impedance | >1 | M Ω |
| Oscilloscope | input impedance: resistance capacitance | >1 <15 | M Ω pF |
| Spectrum analyzer | input impedance | 50 | Ω |
| FET probe | input impedance: resistance capacitance | 1 3.5 | M Ω pF |
| | output impedance | 50 | Ω |
| | voltage gain | 0 | dB |
| AC millivoltmeter | input impedance | >100 | k Ω |

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Definitions of test signals (see Fig.2)

| TEST SIGNAL | FREQ. (MHz) | AMPLITUDE | MODULATION | |
|--|----------------|--------------------------|---|--|
| | | | VIDEO | AUDIO |
| A0: unmodulated vision carrier | 480.25 | 60 dB μ V | | |
| A1: CCIR I standard signal with video modulation | 480.25 | 60 dB μ V (top sync) | 100% (rest carrier 10%) 2T pulse and bar | |
| B1: unmodulated sound carrier I system | 486.25 | -7 dB w.r.t. A1 | | |
| B2: FM modulated sound carrier I system | 486.25 | -7 dB w.r.t. A1 | | 1 kHz; modulation frequency deviation ± 27 kHz; 50 μ s pre-emphasis |
| B3: unmodulated sound carrier I system | 478.25 | -15 dB w.r.t. A1 | | |
| C1: FM modulated sound carrier | 87.5 | 60 dB μ V | | 1 kHz; modulation frequency deviation ± 75 kHz; 10% pilot carrier (L = R) |
| C2: FM modulated sound carrier | 98.0 | 60 dB μ V | | 1 kHz; modulation frequency deviation ± 75 kHz; 10% pilot carrier (L = R) |
| C3: FM modulated sound carrier | 108.0 | 60 dB μ V | | 1 kHz; modulation frequency deviation ± 75 kHz; 10% pilot carrier (L = R) |
| C4: FM modulated sound carrier | 98.0 | 60 dB μ V | | 1 kHz; modulation frequency deviation ± 22.5 kHz |
| C5: unmodulated sound carrier | 98.0 | 60 to 100 dB μ V | | |

Aerial input characteristics

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|------------------|--|--|------|--------|------------|
| V _{SWR} | reflection coefficient | referred to 75 Ω impedance (worst case on or between picture and sound carrier at maximum gain): all channels in TV mode FM (centre of channel) | - | 5 4 | |
| V _{PSM} | surge protection voltage | | 5 | - | kV |
| V _{ant} | antenna connection disturbance voltage | <1.75 GHz | - | 46 | dB μ V |

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General characteristics

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---------------|---|----------------------------|--------|------|--------|------------|
| f_b | frequency range: | | | | | |
| | FM band | | 87.50 | – | 108.00 | MHz |
| | low band | | 45.75 | – | 168.25 | MHz |
| | mid band | | 175.25 | – | 447.25 | MHz |
| | high band | | 455.25 | – | 855.25 | MHz |
| Δf_b | margin: | | | | | |
| | for FM band | | 3 | – | – | MHz |
| | for low band | | 1.5 | – | – | MHz |
| | for mid/high band | | 3 | – | – | MHz |
| α_i | image rejection (nominal gain to 10 dB gain reduction): | | | | | |
| | low band | | 68 | – | – | dB |
| | mid band | <300 MHz | 66 | – | – | dB |
| | mid band | >300 MHz | 60 | – | – | dB |
| | high band (channel 14 to 69) | | 50 | – | – | dB |
| α_{IF} | IF rejection (picture) | | 60 | – | – | dB |
| Z_{IF} | $\frac{1}{2}$ IF susceptibility: | | | | | |
| | low, mid band | | 75 | – | – | dB μ V |
| | high band | | 60 | – | – | dB μ V |
| m_x | cross modulation: | | | | | |
| | in-channel | | 65 | – | – | dB μ V |
| | in-band | | | | | |
| | low band ($n \pm 2$) | | 78 | – | – | dB μ V |
| | mid band ($n \pm 3$) | | 78 | – | – | dB μ V |
| | high band ($n \pm 5$) | | 84 | – | – | dB μ V |
| | out of band | | – | 100 | – | dB μ V |
| | breakthrough susceptibility: | | | | | |
| | channel A to 69 | | 60 | – | – | dB μ V |
| V_{osc} | oscillator voltage at all pins | | – | – | 70 | dB μ V |
| t_{li} | oscillators lock-in time | charge pump set logic HIGH | – | – | 150 | ms |
| α_{vs} | the video signal-to-sound interference ratio with the tuner exposed to sound signals in the audio frequency range 100 Hz to 10 kHz and sound pressure levels up to 105 dB (20 μ Pa) | | 40 | – | – | dB |
| | audio S/N ratio | | 40 | – | – | dB |
| V_{ESD} | electrostatic discharge (ESD) on all pins | note 1 | 2 | – | – | kV |

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| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---------------------------------|--|------------------------------|------|------|------|------------|
| FM radio characteristics | | | | | | |
| α_{26} | limiting sensitivity for (S+N)/N | test signal C1 | – | 7 | 30 | dB μ V |
| α_{50} | | test signal C3 | – | 30 | 40 | dB μ V |
| | S/N ratio: mono at f = 22.5 kHz mono at f = 75 kHz stereo | test signal C1 | 55 | 58 | – | dB |
| | | | 65 | 68 | – | dB |
| | | test signal C3 | 55 | 63 | – | dB |
| $\alpha_{i(FM)}$ | FM image rejection | test signal C1 | 53 | 65 | – | dB |
| | effective selectivity S_{300} | test signal C1 + C2 | 50 | – | – | dB |
| | frequency response: lower –3 dB point upper –3 dB point | test signal C3; –3 dB points | – | 20 | 40 | Hz |
| | | | 14 | 18 | – | kHz |
| | AM suppression | test signal C1 | 38 | – | – | dB |
| | FM AF output level at terminal 20/21 (RMS value): mono stereo | test signal C1 | 40 | 57 | 74 | mV |
| | | test signal C3 | 120 | 175 | 230 | mV |
| | stereo separation | test signal C3; 1 kHz | 28 | 35 | – | dB |
| THD | total harmonic distortion: stereo at 1 kHz during overmodulation at f = ± 100 kHz | test signal C3 | – | 0.8 | 1.5 | % |
| | | | – | 1.5 | 3 | % |

Note

1. All the pins of the desktop video tuner are protected against electrostatic discharge (ESD) up to 2 kV. The product is classified in category B ("MIL-STD-883C").

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Video and audio characteristics (see Fig.2)

| PARAMETER | TEST SIGNAL | TEST POINT | MIN. | TYP. | MAX. | UNIT |
|--|------------------------------------|------------|------|------|------|------------|
| CVBS characteristics: | | | | | | |
| video amplitude signal at pin 23 | A1 (peak-to-peak value) | BU4 | 0.75 | 0.95 | 1.15 | V |
| DC level sync pulse at pin 23 | A1 | BU4 | – | 0.7 | – | V |
| Video amplitude drop with respect to modulation 1 MHz at $T_{amb} = 45\text{ }^{\circ}\text{C}$: | | | | | | |
| at 2 MHz | A1 | BU4 | –1.5 | – | +1.5 | dB |
| at 3 MHz | A1 | BU4 | –2.5 | – | +1.5 | dB |
| at 4 MHz | A1 | BU4 | –4.0 | – | +2.0 | dB |
| at 4.43 MHz | A1 | BU4 | –4.0 | – | +2.0 | dB |
| Sound carrier rejection | A1 (1 MHz) + B1 | BU4 | 40 | – | – | dB |
| Residual 40.40 MHz signal in video channel: level of 1.5 MHz | A1 + B3 | BU4 | – | – | 68 | dB μ V |
| Residual 77.8 MHz signal in video channel | A1 | BU4 | – | – | 80 | dB μ V |
| Second IF sound output level at level of 6.0 MHz | A1 (black) + B1 | BU5 | 84 | – | – | dB μ V |
| Test on 2T pulse at $T_{amb} = 45\text{ }^{\circ}\text{C}$: | | | | | | |
| 2T pulse/bar response | A1 | BU4 | –2.8 | – | +2.8 | % |
| 2T pulse response | A1 | BU4 | – | – | +3.5 | % |
| CVBS S/N (unweighted) | A1 + B1 | BU4 | 41 | – | – | dB |
| Gain limited sensitivity at 1 dB reduction of video output | A1 | BU4 | – | – | 30 | dB μ V |
| Maximum usable single input signal | A1 | BU4 | 90 | – | – | dB μ V |
| Audio characteristics: | | | | | | |
| AF output level measured via LP 200 kHz filter, RMS detector, 50 μ s de-emphasis | A1 + B2 | BU6 | 250 | 350 | 450 | mV |
| THD (Total Harmonic Distortion) measured via LP 200 kHz filter, RMS detector, 50 μ s de-emphasis | A1 + B2 | BU6 | – | – | 0.5 | % |
| S/N measured via CCIR filter, peak CCIR detector, 50 μ s de-emphasis | A1 (full field colour bar) + B1 | BU6 | 38 | – | – | dB |
| AM suppression ratio | A1 (black) + B2 | BU6 | 40 | – | – | dB |
| Aerial input level for S/N = 41 dB | A1 (black) + B2 | BU6 | – | – | 45 | dB μ V |

Digital AFC status

ADC word at I²C-bus during read operation

| DIGITAL READ-OUT | FREQUENCY (kHz) |
|---------------------|--------------------|
| 00 | –125 |
| 01 | –62.5 |
| 02 | 0 |
| 03 | +62.5 |
| 04 | +125 |

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APPLICATION INFORMATION

A detailed description of the I²C-bus specification, with applications, is given in brochure "The I²C-bus and how to use it". This brochure may be ordered using the code number 9398 393 40011.

WRITE mode

| BYTE | BITS | | | | | | | | |
|----------------------------|----------|-----|-----|-----|-----|-----|-----|----------|------------------|
| | 7 MSB | 6 | 5 | 4 | 3 | 2 | 1 | 0 LSB | A ⁽¹⁾ |
| Address byte | 1 | 1 | 0 | 0 | 0 | MA1 | MA0 | 0 | A |
| Program divider byte 1 | 0 | n14 | n13 | n12 | n11 | n10 | n9 | n8 | A |
| Program divider byte 2 | n7 | n6 | n5 | n4 | n3 | n2 | n1 | n0 | A |
| Control information byte 1 | 1 | CP | T2 | T1 | T0 | RSA | RSB | OS | A |
| Control information byte 2 | P7 | P6 | P5 | P4 | P3 | P2 | P1 | P0 | A |

Note

1. A = Acknowledge.

ADDRESS SELECTION

V_S = +5 V (PLL supply voltage).

| MA1 | MA0 | ADDRESS | VOLTAGE AT PIN 15 (see note 1) |
|-----|-----|---------|--|
| 0 | 0 | C0 | 0.0V _S to 0.1V _S |
| 0 | 1 | C2 | 0.2V _S to 0.3V _S |
| 1 | 0 | C4 | 0.4V _S to 0.6V _S |
| 1 | 1 | C6 | 0.9V _S to 1.0V _S |

Note

1. If the AS pin is left floating, the internal bias will automatically set the address to C2.

PROGRAMMABLE DIVIDER SETTINGS (BYTES 1 AND 2)

Divider ratio:

$N = 16 \times \{f_{RF(pc)} + f_{IF(pc)}\}$, where (pc) is picture carrier and f_{RF} and f_{IF} are expressed in MHz.

$f_{osc} = N/16$ (MHz).

$N = (8192 \times n13) + (4096 \times n12) + (2048 \times n11) + (1024 \times n10) + (512 \times n9) + (256 \times n8) + (128 \times n7) + (64 \times n6) + (32 \times n5) + (16 \times n4) + (8 \times n3) + (4 \times n2) + (2 \times n1) + n0$

For FM radio, $f_{IF(fm)} = 10.70$ MHz

$N = (f_{RF} + f_{IF(fm)})/\text{step size} = (f_{RF} + f_{IF(fm)})/50 \text{ kHz} = 20 \times (f_{RF} + f_{IF(fm)})$

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CONTROL BYTE

Charge pump settings:

CP = 1, for fast tuning

CP = 0, for moderate speed tuning with slightly better residual oscillator FM.

It is recommended to set CP = 1 at all times in the TV mode. In the FM radio mode, set CP = 1 only during the search tuning. Once the wanted channel is obtained, set CP = 0 to get the best signal-to-noise ratio.

Test mode settings:

T2 = T1 = 0; T0 = 1, for normal operation.

PLL disabling:

OS = 0, for normal operation

OS = 1, for switching the charge pump to the high impedance state. I_{DC} output voltage is LOW.

Ratio select bits

| RSA | RSB | STEP SIZE |
|-----|-----|--------------------------------------|
| X | 0 | 50 kHz (for FM band) |
| 0 | 1 | 31.25 kHz (for slow picture search) |
| 1 | 1 | 62.5 kHz (for normal picture search) |

PORTS BYTE

| FUNCTION | BIT | | | | | | | |
|------------------------------|-----|----|----|----|----|----|----|----|
| | P7 | P6 | P5 | P4 | P3 | P2 | P1 | P0 |
| TV/FM bandswitching | | | | | | | | |
| FM band | 1 | 0 | 1 | 0 | | 1 | | |
| Low band | 1 | 0 | 1 | 0 | | 0 | | |
| Mid band | 1 | 0 | 0 | 1 | | 0 | | |
| High band | 0 | 0 | 1 | 1 | | 0 | | |
| TV mode | | | | | | | | |
| Power down mode; see note 1 | | | | | 0 | 0 | 0 | 1 |
| System I negative mode | | | | | 0 | 0 | 0 | 0 |
| FM radio mode | | | | | | | | |
| AFC; see note 2 | | | | | 0 | 1 | 0 | 1 |
| R _{IF} ; see note 3 | | | | | 0 | 1 | 0 | 0 |
| Mono | | | | | 0 | 1 | 1 | 0 |
| Mute | | | | | 1 | 1 | 0 | 0 |

Notes

1. If the TV function is not required, the tuner can be switched to power-down mode. In this mode the tuner reduces the current consumption by up to 100 mA.
2. By this setting the FM radio AFC status can be read from the A/D bits in the status byte.
3. By this setting the RF input level can be read from the A/D bits in the status byte.

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TELEGRAM EXAMPLES (WRITE MODE)

Start - Adb - Ack - Db1 - Ack - Db2 - Ack - Cb - Ack - Pb - Ack - Stop.

Start - Adb - Ack - Cb - Ack - Pb - Ack - Db1 - Ack - Db2 - Ack - Stop.

Start - Adb - Ack - Db1 - Ack - Db2 - Ack - Cb - Ack - Stop.

Start - Adb - Ack - Db1 - Ack - Db2 - Ack - Stop.

Where:

Start = start condition

Adb = address byte

Ack = acknowledge

Db1 = divider byte 1

Db2 = divider byte 2

Cb = control byte

Pb = ports byte

Stop = stop condition.

READ mode

The in-lock can be read by setting the R/W bit to 1.

| BYTE | BITS | | | | | | | | |
|--------------|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|
| | 7 MSB | 6 | 5 | 4 | 3 | 2 | 1 | 0 LSB | A ⁽⁵⁾ |
| Address byte | 1 | 1 | 0 | 0 | 0 | MA1 | MA0 | 1 | A |
| Status byte | POR ⁽¹⁾ | FL ⁽²⁾ | I2 ⁽³⁾ | I1 ⁽³⁾ | I0 ⁽³⁾ | A2 ⁽⁴⁾ | A1 ⁽⁴⁾ | A0 ⁽⁴⁾ | A |

Notes

1. POR = Power On Reset. POR is internally set to 1 in case V_S drops below 3 V. The POR bit is reset when an end of data is detected by the PLL IC.
2. FL = In-lock flag; FL = 1: loop is phase-locked. The loop must be phase-locked during at least 8 periods of the internal reference frequency (either 7.8125 kHz, 3.90625 kHz or 6.25 kHz) before the FL flag is internally set to 1.
3. I2, I1 and I0 = digital information for I/O ports P2, P1 and P0 respectively.
4. A2, A1 and A0 = built-in 5-level A/D converter on the internal I/O port P6 (see Table "Digital AFC status").
5. A = Acknowledge.

TELEGRAM EXAMPLES (READ MODE)

Start - Adb - Ack - STB - Ack - STB - - Stop (no Ack from processor = End-of-data).

Start - Adb - Ack - STB - - Stop (no Ack from processor = End-of-data).

Where:

STB = Status byte.

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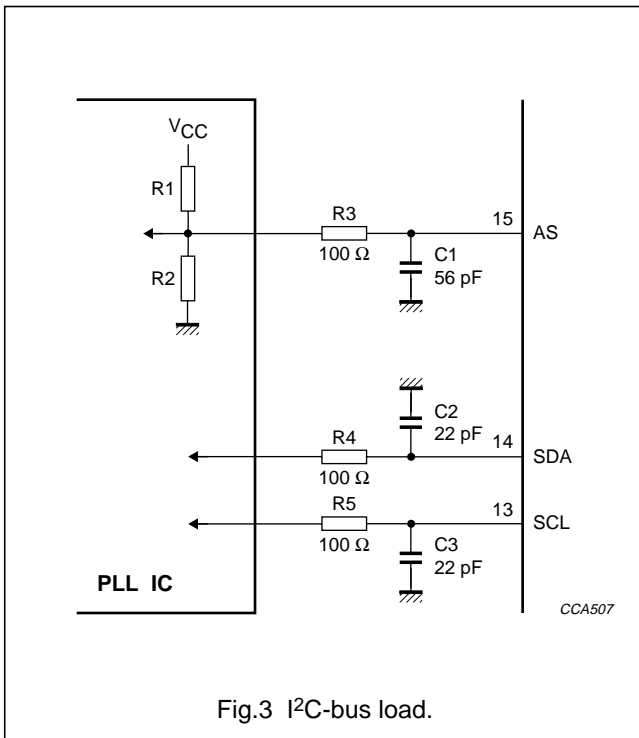


Fig.3 I²C-bus load.

Video buffer

A video buffer is built into the video module to enable the unit to drive a 75 Ω load directly.

I²C-bus load

The FM1246 contains a series resistor (R = 100 Ω) in the SCL and SDA lines. Both lines also have a capacitive load of typical 22 pF (see Fig.3).

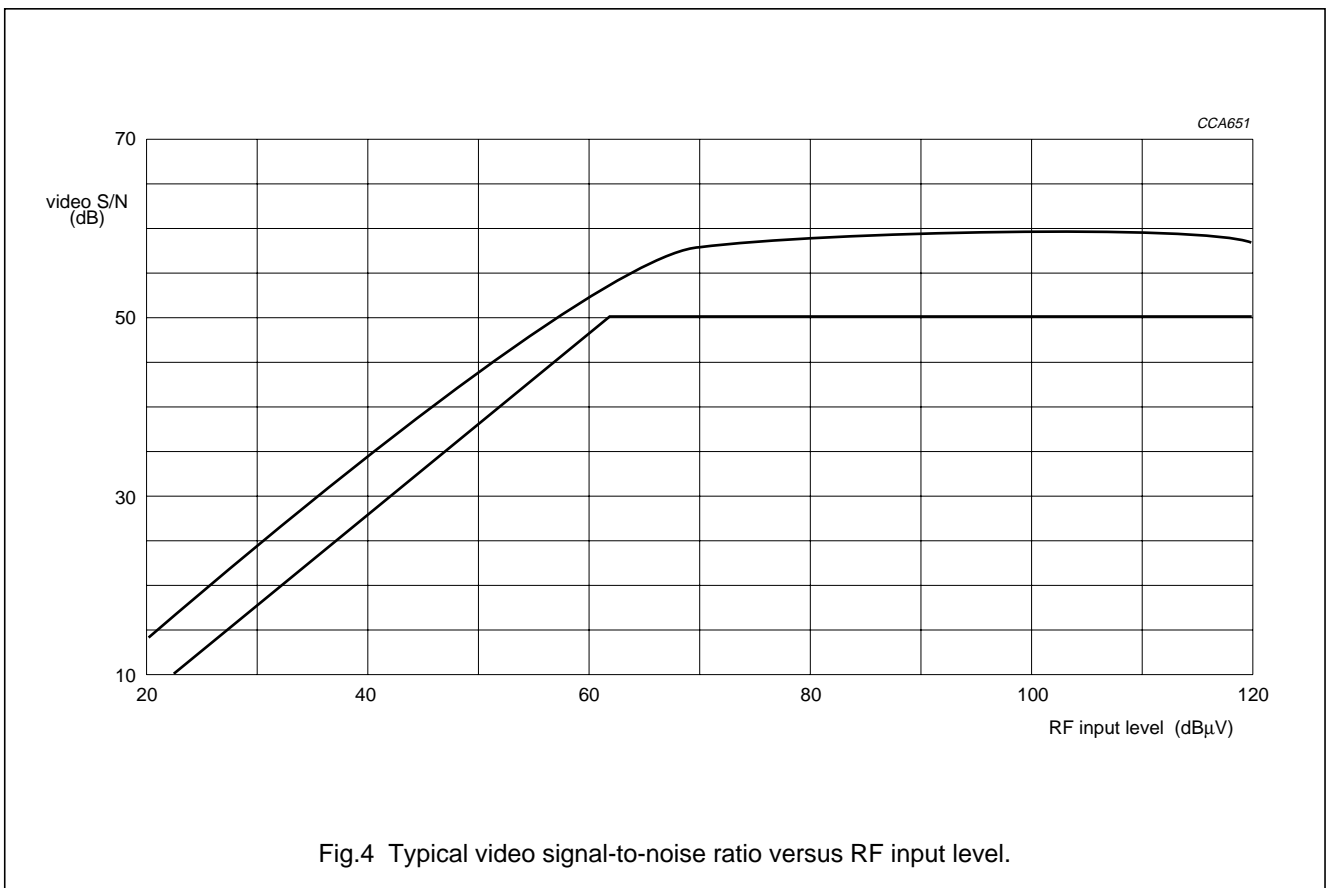
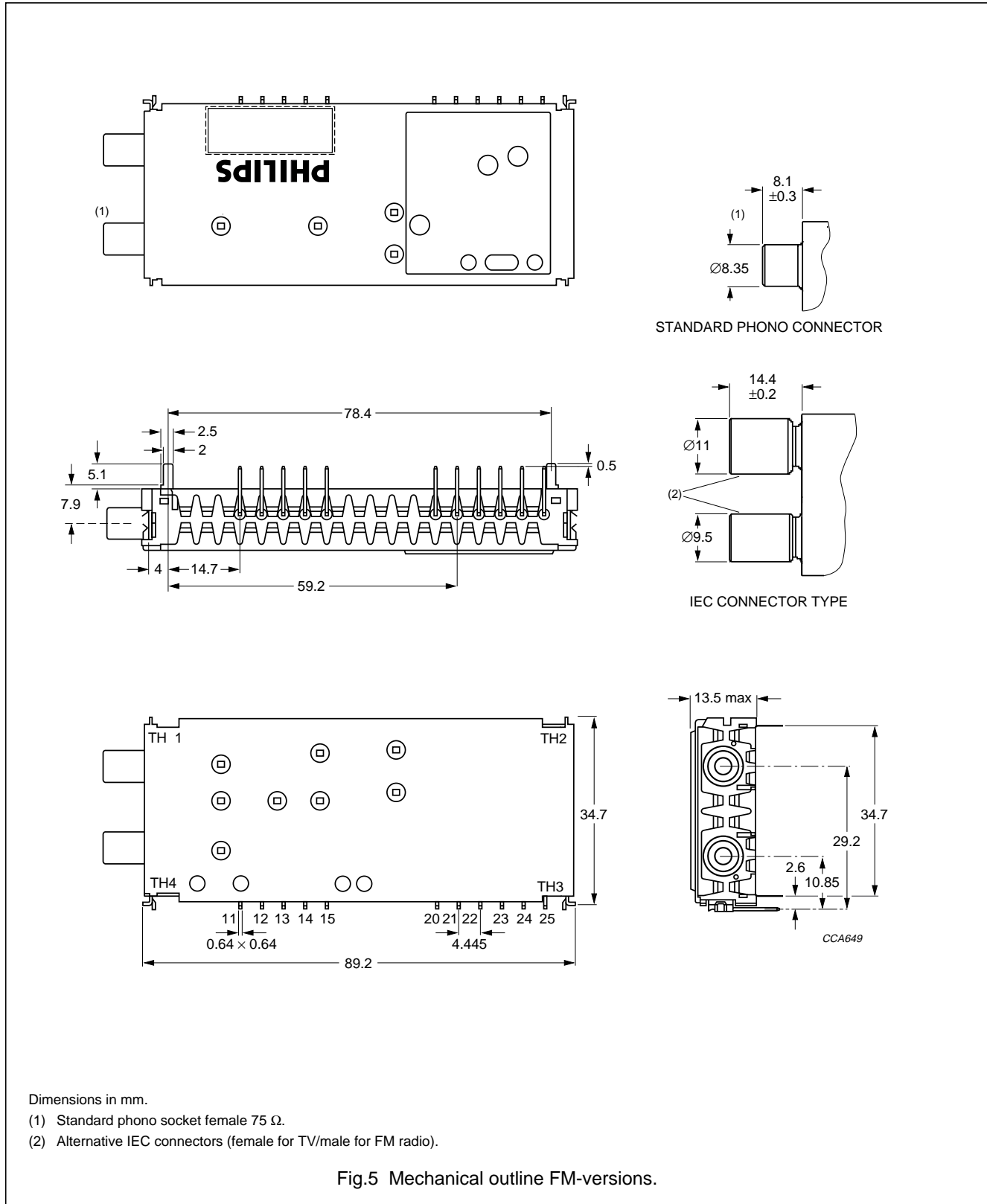


Fig.4 Typical video signal-to-noise ratio versus RF input level.

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MECHANICAL DATA



Dimensions in mm.

- (1) Standard phono socket female 75 Ω .
- (2) Alternative IEC connectors (female for TV/male for FM radio).

Fig.5 Mechanical outline FM-versions.

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Aerial connections

Standard-phono socket female 75 Ω or IEC (female for TV, male for FM radio).

Solderability

The solderability of pins and mounting tags when tested initially and after 16 hours steam ageing in accordance with "IEC 68-2-20", test Ta, method 1 (solder bath 235 ±5 °C for 2 ±5 s), results in a wetted area of 95%. No de-wetting will occur when soldered at 260 ±5 °C for 5 ±0.5 s.

Resistance to soldering heat

The product will not be damaged when tested in accordance with "IEC 68-2-20", test Tb, method 1A (solder bath 260 ±5 °C for 5 ±1 s).

Mass

Approximately 50 g.

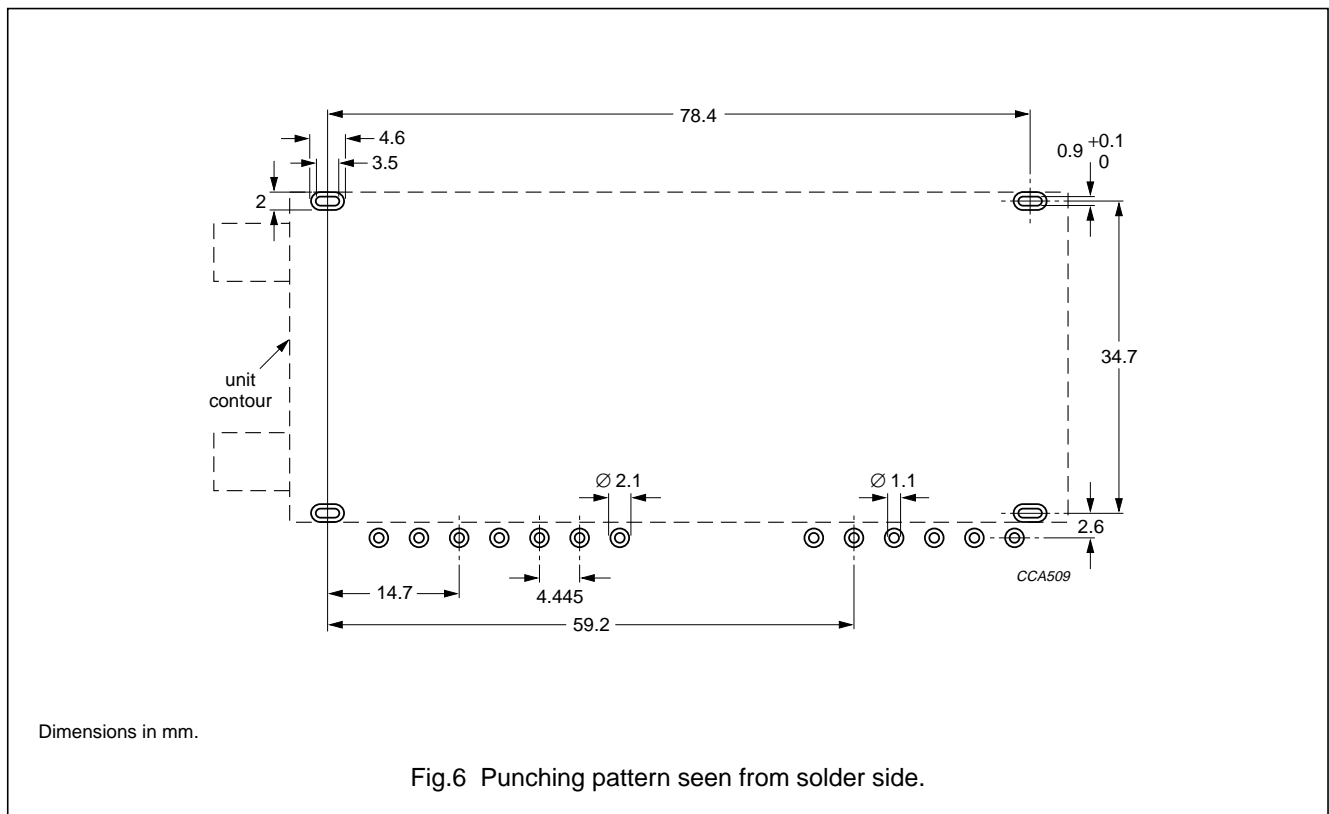
Robustness of pins

The pins will not be damaged when tested in accordance with "IEC 68-2-21":

- Test Ua1, tensile of 20 N in axial direction
- Test Ua2, thrust of 4 N in axial direction
- Test Ua2, thrust of 2 N in axial direction.

Punching pattern of chassis PCB

Field rejects are often related to broken tag joints. Therefore, the following punching pattern is recommended (see Fig.6).



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TV CHANNEL FREQUENCIES (MHz)

Ireland

| CHANNEL | PICTURE CARRIER FREQUENCY | SOUND CARRIER FREQUENCY |
|---------|---------------------------|-------------------------|
| A | 45.75 | 51.75 |
| B | 53.75 | 59.75 |
| C | 61.75 | 67.75 |
| D | 175.25 | 181.25 |
| E | 183.25 | 189.25 |
| F | 191.25 | 197.25 |
| G | 199.25 | 205.25 |
| H | 207.25 | 213.25 |
| J | 215.25 | 221.25 |

South Africa

| CHANNEL | PICTURE CARRIER FREQUENCY | SOUND CARRIER FREQUENCY |
|---------|---------------------------|-------------------------|
| 4 | 175.25 | 181.25 |
| 5 | 183.25 | 189.25 |
| 6 | 191.25 | 197.25 |
| 7 | 199.25 | 205.25 |
| 8 | 207.25 | 213.25 |
| 9 | 215.25 | 221.25 |
| 10 | 223.25 | 229.25 |
| 11 | 231.25 | 237.25 |
| 13 | 247.43 | 253.43 |

Angola

| CHANNEL | PICTURE CARRIER FREQUENCY | SOUND CARRIER FREQUENCY |
|---------|---------------------------|-------------------------|
| 1 | 43.25 | 49.25 |
| 2 | 52.25 | 58.25 |
| 3 | 60.25 | 66.25 |
| 4 | 175.25 | 181.25 |
| 5 | 183.25 | 189.25 |
| 6 | 191.25 | 197.25 |
| 7 | 199.25 | 205.25 |
| 8 | 207.25 | 213.25 |
| 9 | 215.25 | 221.25 |
| 10 | 223.25 | 229.25 |

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DEFINITIONS

| Data sheet status | |
|---|---|
| Objective specification | This data sheet contains target or goal specifications for product development. |
| Preliminary specification | This data sheet contains preliminary data; supplementary data may be published later. |
| Product specification | This data sheet contains final product specifications. |
| Application information | |
| Where application information is given, it is advisory and does not form part of the specification. | |

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NOTES

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