

DATA SHEET

TDA5630BT

**9 V VHF and UHF mixer/oscillator
for TV and VCR cable tuners**

Product specification
Supersedes data of 1995 Mar 20
File under Integrated Circuits, IC02

1996 Jun 06

9 V VHF and UHF mixer/oscillator for TV and VCR cable tuners

TDA5630BT

FEATURES

- Balanced mixer with a common emitter input for band A (single input)
- 2-pin oscillator for band A
- Balanced mixer with a common base input for band C
- 3-pin oscillator for band C
- Local oscillator buffer output for external prescaler
- SAW filter preamplifier with a low output impedance to drive a SAW filter
- Band gap voltage stabilizer for oscillator stability
- Electronic band switch.

APPLICATIONS

- Cable tuners for TV and VCR (switched concept for VHF)
- Recommended RF bands for Europe:
48.25 to 105.25 MHz, 112.25 to 294.25 MHz and 471.25 to 855.25 MHz
- Recommended RF bands for the USA:
55.25 to 133.25 MHz, 139.25 to 361.25 MHz and 367.25 to 801.25 MHz.

GENERAL DESCRIPTION

The TDA5630BT is a monolithic integrated circuit that performs VHF and UHF mixer/oscillator functions in TV and VCR cable tuners. With a proper oscillator application and by using a switchable inductor to split the VHF band into two sub-bands, the full VHF/UHF TV bands can be covered. This low-power mixer/oscillator requires a power supply of 9 V and is available in a very small package.

The device gives the designer the capability to design an economical and physically small cable tuner.

The tuner development time can be drastically reduced by using this device.

Frequency bands are determined by the external tank circuit. They can be adapted to various standards.

QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------|--|--------------------------|------|------|------|------------|
| V_P | supply voltage | | – | 9.0 | – | V |
| I_P | supply current | | – | 48 | – | mA |
| f_{RF} | frequency range (picture carrier) | RF input; band A; note 1 | 45 | – | 470 | MHz |
| | | RF input; band C; note 1 | 430 | – | 860 | MHz |
| G_V | voltage gain | band A | – | 25 | – | dB |
| | | band C | – | 36 | – | dB |
| NF | noise figure | band A | – | 7.5 | – | dB |
| | | band C | – | 9.0 | – | dB |
| V_o | output voltage to get 1% cross modulation in channel | band A | – | 118 | – | dB μ V |
| | | band C | – | 120 | – | dB μ V |

Note

1. The limits are related to the tank circuits used in Fig.11 and the intermediate frequency. Frequency bands may be adjusted by the choice of external components.

ORDERING INFORMATION

| TYPE NUMBER | PACKAGE | | |
|-------------|---------|--|----------|
| | NAME | DESCRIPTION | VERSION |
| TDA5630BT | SO16 | plastic small outline package; 16 leads; body width 3.9 mm | SOT109-1 |

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BLOCK DIAGRAM

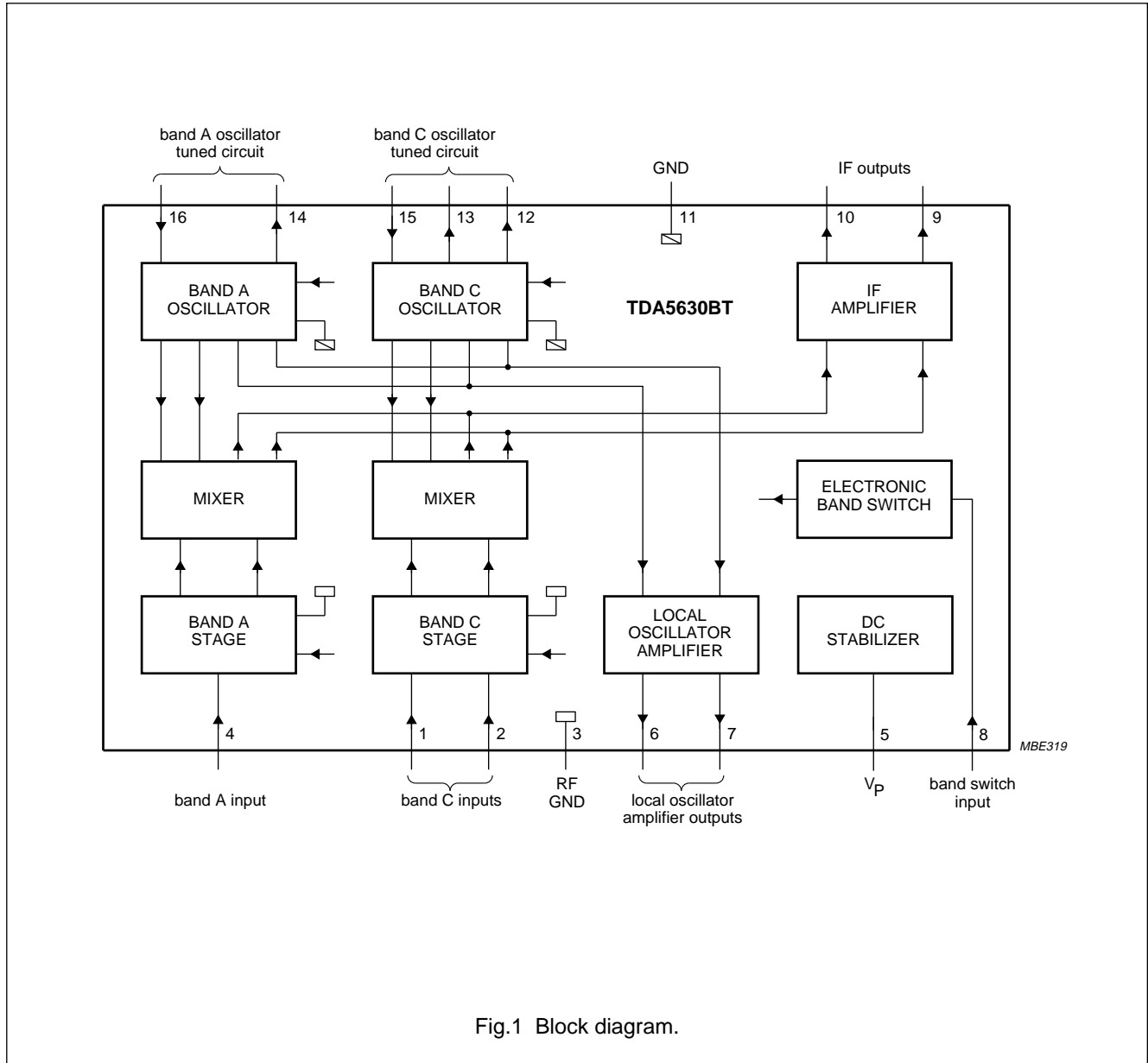


Fig.1 Block diagram.

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PINNING

| SYMBOL | PIN | DESCRIPTION |
|----------------|-----|--------------------------------------|
| CIN1 | 1 | band C input 1 |
| CIN2 | 2 | band C input 2 |
| RFGND | 3 | ground for RF inputs |
| AIN | 4 | band A input |
| V _P | 5 | supply voltage |
| LOOUT1 | 6 | local oscillator amplifier output 1 |
| LOOUT2 | 7 | local oscillator amplifier output 2 |
| BS | 8 | band switch input |
| IFOUT1 | 9 | IF amplifier output 1 |
| IFOUT2 | 10 | IF amplifier output 2 |
| GND | 11 | ground (0 V) |
| COSCOC1 | 12 | band C oscillator output collector 1 |
| COSCOC2 | 13 | band C oscillator output collector 2 |
| AOSCOC | 14 | band A oscillator output collector |
| COSCIB | 15 | band C oscillator input base |
| AOSCIB | 16 | band A oscillator input base |

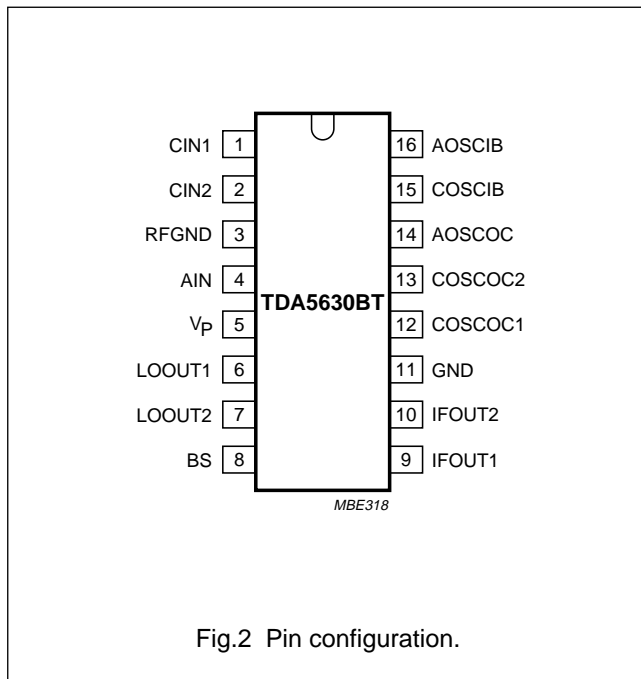


Fig.2 Pin configuration.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

| SYMBOL | PARAMETER | MIN. | MAX. | UNIT |
|---------------------|---|------|-------|------|
| V _P | supply voltage | -0.3 | +10.5 | V |
| V _{SW} | switching voltage | 0 | 10.5 | V |
| I _O | output current of each pin referenced to ground | - | -10 | mA |
| t _{s(max)} | maximum short-circuit time (all pins) | - | 10 | s |
| T _{stg} | IC storage temperature | -55 | +150 | °C |
| T _{amb} | operating ambient temperature | -10 | +70 | °C |
| T _j | junction temperature | - | 150 | °C |

THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | VALUE | UNIT |
|---------------------|---|-------|------|
| R _{th j-a} | thermal resistance from junction to ambient in free air | 115 | K/W |

HANDLING

Human body model: the IC withstands 2000 V in accordance with the UZW-B0/FQ-A302 specification equivalent to the MIL-STD-883C category B (2000 V) (stress reference pins RFGND, GND and V_P short-circuited together).

Machine model: the IC withstands 200 V in accordance with the UZW-B0/FQ-B302 specification (issue date: Nov 6th, 1990) (stress reference pins RFGND, GND and V_P short-circuited together).

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CHARACTERISTICS

$V_P = 9\text{ V}$; $T_{\text{amb}} = 25\text{ °C}$; measured in circuit of Fig.11; unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|--|---|---|------|------|------|------------------------|
| Supply | | | | | | |
| V_P | supply voltage | | 8.1 | 9.0 | 9.9 | V |
| I_P | supply current | | 35 | 48 | 55 | mA |
| V_{SW} | switching voltage | band A | 0 | – | 1.1 | V |
| | | band C | 3.0 | – | 5.0 | V |
| I_{SW} | switching current | band A | – | – | 2 | μA |
| | | band C | – | – | 10 | μA |
| Band A mixer including IF amplifier | | | | | | |
| f_{RF} | frequency range | note 1; $V_t = 0.45\text{ to }28\text{ V}$ | 45 | – | 300 | MHz |
| f_{max} | maximum frequency | note 1 | – | 470 | – | MHz |
| G_v | voltage gain | $f_{\text{RF}} = 50\text{ MHz}$; see Fig.3; note 2 | 22.5 | 25 | 27.5 | dB |
| | | $f_{\text{RF}} = 300\text{ MHz}$; see Fig.3; note 2 | 22.5 | 25 | 27.5 | dB |
| | | $f_{\text{RF}} = 470\text{ MHz}$; see Fig.3; note 2 | – | 25 | – | dB |
| NF | noise figure | $f_{\text{RF}} = 50\text{ MHz}$; see Figs 4 and 5 | – | 7.5 | 8.5 | dB |
| | | $f_{\text{RF}} = 180\text{ MHz}$; see Figs 4 and 5 | – | 9 | 10 | dB |
| | | $f_{\text{RF}} = 300\text{ MHz}$; see Fig.5 | – | 10.5 | 11.5 | dB |
| V_o | output voltage | causing 1% cross modulation in channel; $f_{\text{RF}} = 300\text{ MHz}$; see Fig.6 | 115 | 118 | – | $\text{dB}\mu\text{V}$ |
| V_i | input voltage | causing 10 kHz pulling in channel; $f_{\text{RF}} = 300\text{ MHz}$; note 3 | – | 104 | – | $\text{dB}\mu\text{V}$ |
| g_{os} | optimum source conductance for noise figure | $f_{\text{RF}} = 50\text{ MHz}$ | – | 0.5 | – | mS |
| | | $f_{\text{RF}} = 180\text{ MHz}$ | – | 1.1 | – | mS |
| g_i | input conductance | $f_{\text{RF}} = 50\text{ MHz}$; see Fig.12; note 4 | – | 0.26 | – | mS |
| | | $f_{\text{RF}} = 180\text{ MHz}$; see Fig.12; note 4 | – | 0.35 | – | mS |
| C_i | input capacitance | $f_{\text{RF}} = 50\text{ to }180\text{ MHz}$; see Fig.12; note 4 | – | 2 | – | pF |
| Band A oscillator | | | | | | |
| f_{osc} | frequency range | note 5; $V_t = 0.45\text{ to }28\text{ V}$ | 80 | – | 336 | MHz |
| f_{shift} | frequency shift | $\Delta V_P = 10\%$; note 6 | – | – | 200 | kHz |
| f_{drift} | frequency drift | $\Delta T = 25\text{ °C}$ with no compensation; NPO capacitors; note 7 | – | – | 500 | kHz |
| | | 5 s to 15 min after switch on; with no compensation; NPO capacitors; note 8 | – | 500 | 950 | kHz |
| | | 5 s to 15 min after switch on; with compensation; note 9 | – | 200 | 300 | kHz |

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| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|--|--|--|------------|------------|--------|--|
| Band C mixer including IF amplifier; measurements using hybrid; note 10 | | | | | | |
| f_{RF} | frequency range | $V_t = 0.45$ to 28 V; note 1 | 430 | – | 860 | MHz |
| G_v | voltage gain | $f_{RF} = 430$ MHz; see Fig.7; note 2 | 33 | 36 | 39 | dB |
| | | $f_{RF} = 860$ MHz; see Fig.7; note 2 | 33 | 36 | 39 | dB |
| NF | noise figure | not corrected for image | – | 9 | 10 | dB |
| | | $f_{RF} = 430$ MHz; see Fig.8 $f_{RF} = 860$ MHz; see Fig.8 | – | 11 | 12 | dB |
| V_o | output voltage | causing 1% cross modulation in channel | – | – | – | – |
| | | $f_{RF} = 430$ MHz; see Fig.9 $f_{RF} = 860$ MHz; see Fig.9 | 116 116 | 120 120 | – – | $\text{dB}\mu\text{V}$ $\text{dB}\mu\text{V}$ |
| V_i | input voltage | causing 10 kHz pulling in channel; $f_{RF} = 860$ MHz; note 3 | – | 84 | – | $\text{dB}\mu\text{V}$ |
| | | causing N + 5 - 1 MHz pulling; $f_{RF} = 820$ MHz; see Fig.10 | – | 63 | – | $\text{dB}\mu\text{V}$ |
| Z_i | input impedance ($R_S + jL_S\omega$) | R_S at $f_{RF} = 430$ MHz; see Fig.13; note 4 | – | 40 | – | Ω |
| | | R_S at $f_{RF} = 860$ MHz; see Fig.13; note 4 | – | 53 | – | Ω |
| | | L_S at $f_{RF} = 430$ to 860 MHz; see Fig.13; note 4 | – | 9 | – | nH |
| Band C oscillator | | | | | | |
| f_{osc} | frequency range | note 5; $V_t = 0.45$ to 28 V | 470 | – | 900 | MHz |
| f_{shift} | frequency shift | $\Delta V_P = 10\%$; note 6 | – | – | 400 | kHz |
| f_{drift} | frequency drift | $\Delta T = 25$ °C with no compensation; NPO capacitors; note 7 | – | – | 2.5 | MHz |
| | | 5 s to 15 min after switch on; with no compensation; NPO capacitors; note 8 | – | 1000 | 1300 | kHz |
| | | 5 s to 15 min after switch on; with compensation; note 9 | – | 550 | 950 | kHz |
| IF amplifier | | | | | | |
| S_{22} | output reflection coefficient | magnitude; see Fig.14; note 4 | – | –10 | – | dB |
| | | phase; see Fig.14; note 4 | – | 9 | – | ° |
| Z_o | output impedance ($R_S + jL_S\omega$) | R_S ; see Fig.14; note 4 | – | 95 | – | Ω |
| | | L_S ; see Fig.14; note 4 | – | 45 | – | nH |

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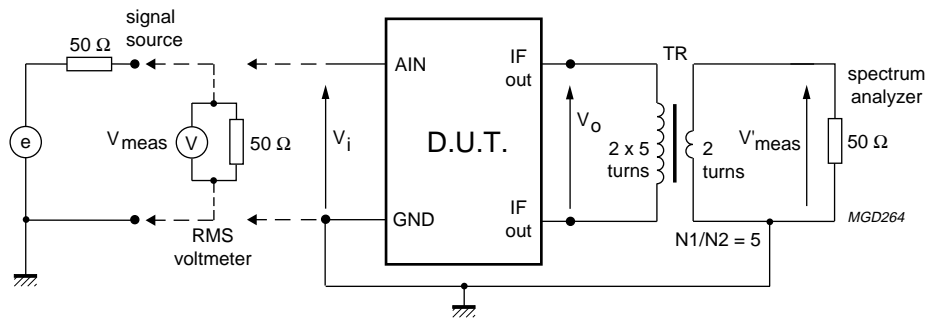
| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|--|------|------|------|------------------------|
| LO output; $R_L = 100 \Omega$ | | | | | | |
| Y_o | output admittance ($G_P + jC_P\omega$) | $f_{osc} = 80 \text{ MHz}$; see Fig.15; note 4 | – | 2.5 | – | mS |
| | | | – | 0.9 | – | pF |
| | | $f_{osc} = 900 \text{ MHz}$; see Fig.15; note 4 | – | 3.5 | – | mS |
| | | | – | 0.7 | – | pF |
| V_o | output voltage | $R_L = 100 \Omega$; $V_t = 0.45 \text{ to } 28 \text{ V}$ | 83 | 91 | 100 | $\text{dB}\mu\text{V}$ |
| SRF | spurious signal on LO output with respect to LO output signal | note 11 | – | – | –10 | dBc |
| SHD | LO signal harmonics with respect to LO signal | | – | – | –10 | dBc |

Notes to the characteristics

- The RF frequency range is defined by the oscillator frequency range and the intermediate frequency.
- The gain is defined as the transducer gain (measured in Fig.11) plus the voltage transformation ratio of L6 to L7 (10 : 2, 15.4 dB including transformer loss).
- The input level causing 10 kHz frequency detuning at the LO output. $f_{osc} = f_{RF} + 33.4 \text{ MHz}$.
- All s-parameters are referred to a 50Ω system.
- Limits are related to the tank circuits used in Fig.11. Frequency bands may be adjusted by the choice of external components.
- The frequency shift is defined as the change in oscillator frequency when the supply voltage varies from $V_P = 9$ to 8.1 V or from $V_P = 9$ to 9.9 V .
- The frequency drift is defined as the change in oscillator frequency when the ambient temperature varies from $T_{amb} = 25$ to $0 \text{ }^\circ\text{C}$ or from 25 to $50 \text{ }^\circ\text{C}$. With no compensation, all capacitors are NP0.
- Switch on drift with no compensation is defined as the change of oscillator frequency between 5 s and 15 min after switch on. All capacitors are NP0.
- Switch on drift with compensation is defined as the change of oscillator frequency between 5 s and 15 min after switch on. C5 to C11 are N750; C1, C2 and C4 are N470.
- The values have been corrected for hybrid and cable losses. The symmetrical output impedance of the hybrid is 100Ω .
- Measured with RF input voltage:
 - RF voltage = $120 \text{ dB}\mu\text{V}$ at $f_{RF} < 180 \text{ MHz}$.
 - RF voltage = $107.5 \text{ dB}\mu\text{V}$ at $180 \text{ MHz} < f_{RF} < 225 \text{ MHz}$.
 - RF voltage = $97 \text{ dB}\mu\text{V}$ at $225 \text{ MHz} < f_{RF} < 860 \text{ MHz}$.

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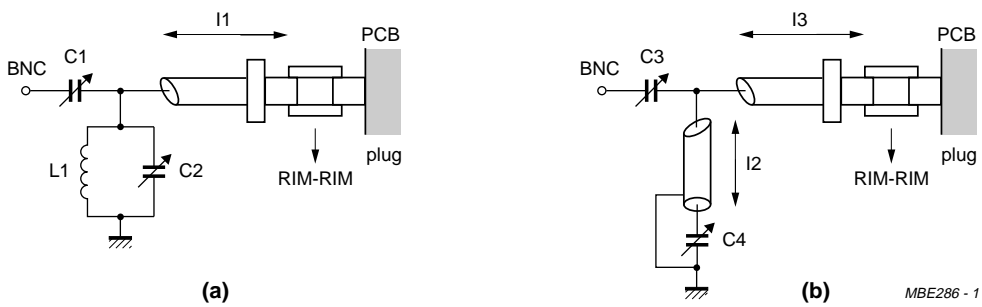
$Z_{in} (AIN) \gg 50 \Omega \quad V_i = 2 \times V_{meas}$.

$V_i = V_{meas} + 6 \text{ dB}$.

$V_o = V'_{meas} + 15.4 \text{ dB}$ (transformer ratio $N1/N2 = 5$ and transformer loss).

$G_v = 20 \log \left(\frac{V_o}{V_i} \right)$

Fig.3 Gain measurement in band A.



(a) For $f_{RF} = 50 \text{ MHz}$:

mixer A frequency response measured = 57 MHz, loss = 0 dB

image suppression = 16 dB

C1 = 9 pF

C2 = 15 pF

L1 = 7 turns (diameter = 5.5 mm, wire diameter = 0.5 mm)

l1 = semi rigid cable (RIM): 5 cm long

(semi rigid cable (RIM); 33 dB/100 m; 50 Ω; 96 pF/m).

(b) For $f_{RF} = 150 \text{ MHz}$:

mixer A frequency response measured = 150.3 MHz, loss = 1.3 dB

image suppression = 13 dB

C3 = 5 pF

C4 = 25 pF

l2 = semi rigid cable (RIM): 30 cm long

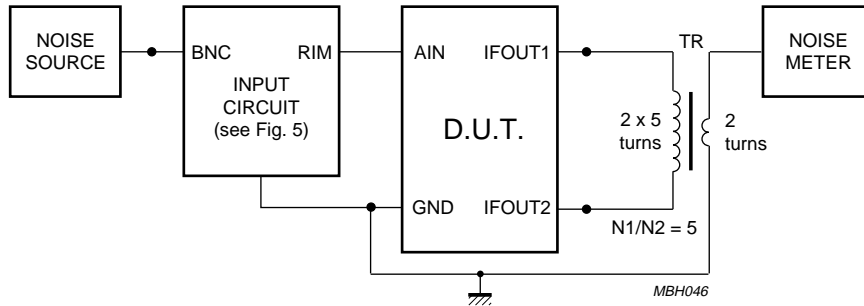
l3 = semi rigid cable (RIM): 5 cm long

(semi rigid cable (RIM); 33 dB/100 m; 50 Ω; 96 pF/m).

Fig.4 Input circuit for optimum noise figure in band A.

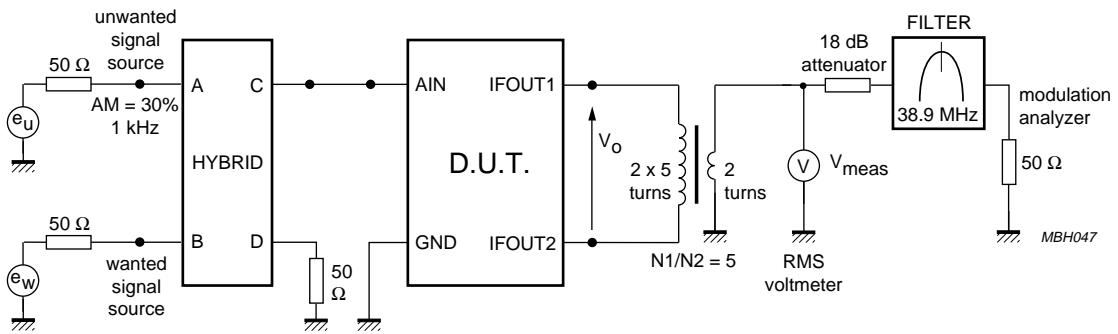
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(1) $NF = NF_{meas} - \text{loss (input circuit) dB}$.

Fig.5 Noise figure measurement in band A.



$V_{meas} = V_o - 15.4 \text{ dB}$ (transformer ratio $N1/N2 = 5$ and transformer loss).

Wanted output signal at $f_{RFW} = 300 \text{ MHz}$: $V_{ow} = 104 \text{ dB}\mu\text{V}$ ($V_{meas} = 88.6 \text{ dB}\mu\text{V}$).

We measure the level of the unwanted signal V_{ou} causing 0.3% AM modulation in the wanted output signal; $f_{RFU} = 305.5 \text{ MHz}$.

$V_{ou} = V_{meas} + 15.4 \text{ dB}$.

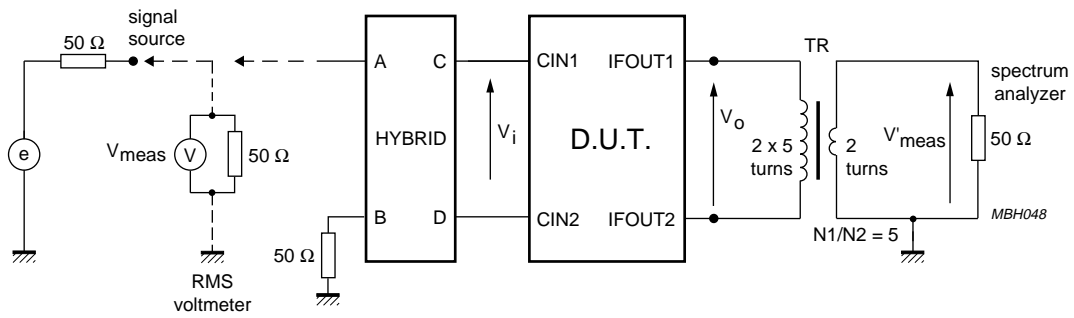
$f_{osc} = 338.9 \text{ MHz}$.

Filter characteristics: $f_c = 38.9 \text{ MHz}$; $f_{-3\text{dB BW}} = 1.2 \text{ MHz}$; $f_{-30\text{dB BW}} = 2.64 \text{ MHz}$.

Fig.6 Cross modulation measurement in band A.

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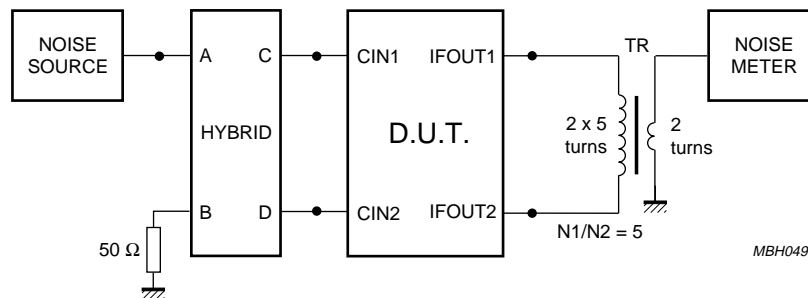
Loss of the hybrid: 1 dB.

$V_i = V_{meas} - \text{loss of the hybrid.}$

$V_o = V'_{meas} + 15.4 \text{ dB (transformer ratio } N1/N2 = 5 \text{ and transformer loss).}$

$$G_v = 20 \log \left(\frac{V_o}{V_i} \right)$$

Fig.7 Gain measurement in band C.



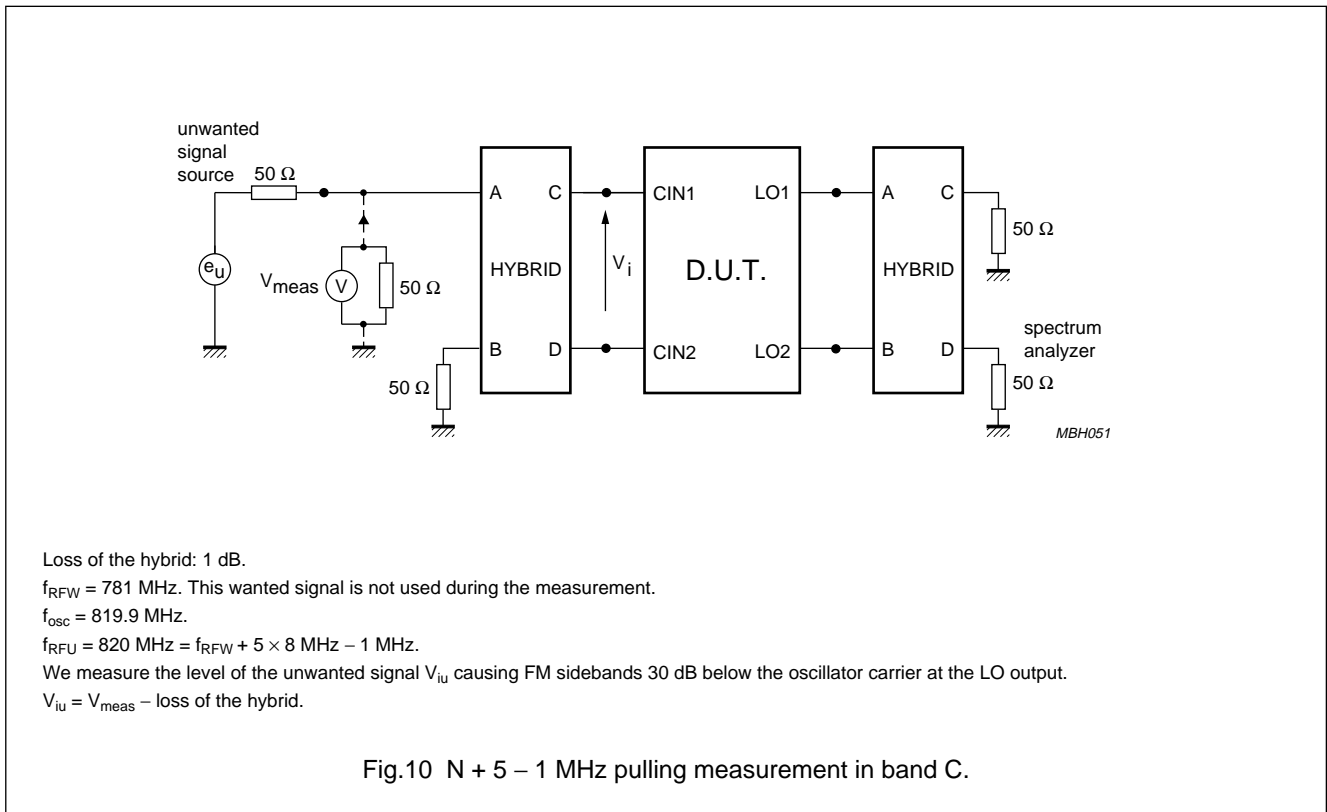
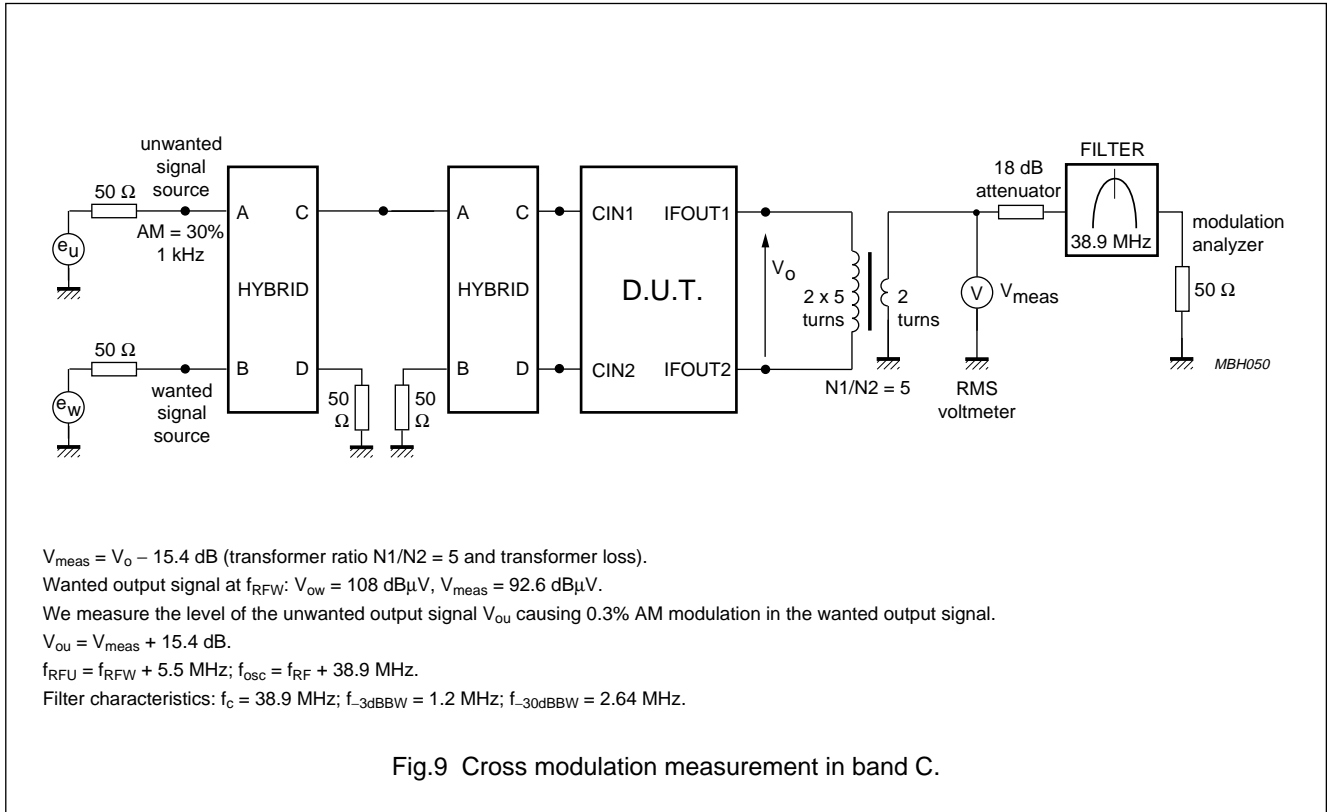
Loss of the hybrid: 1 dB.

$NF = NF_{meas} - \text{loss of the hybrid.}$

Fig.8 Noise figure measurement in band C.

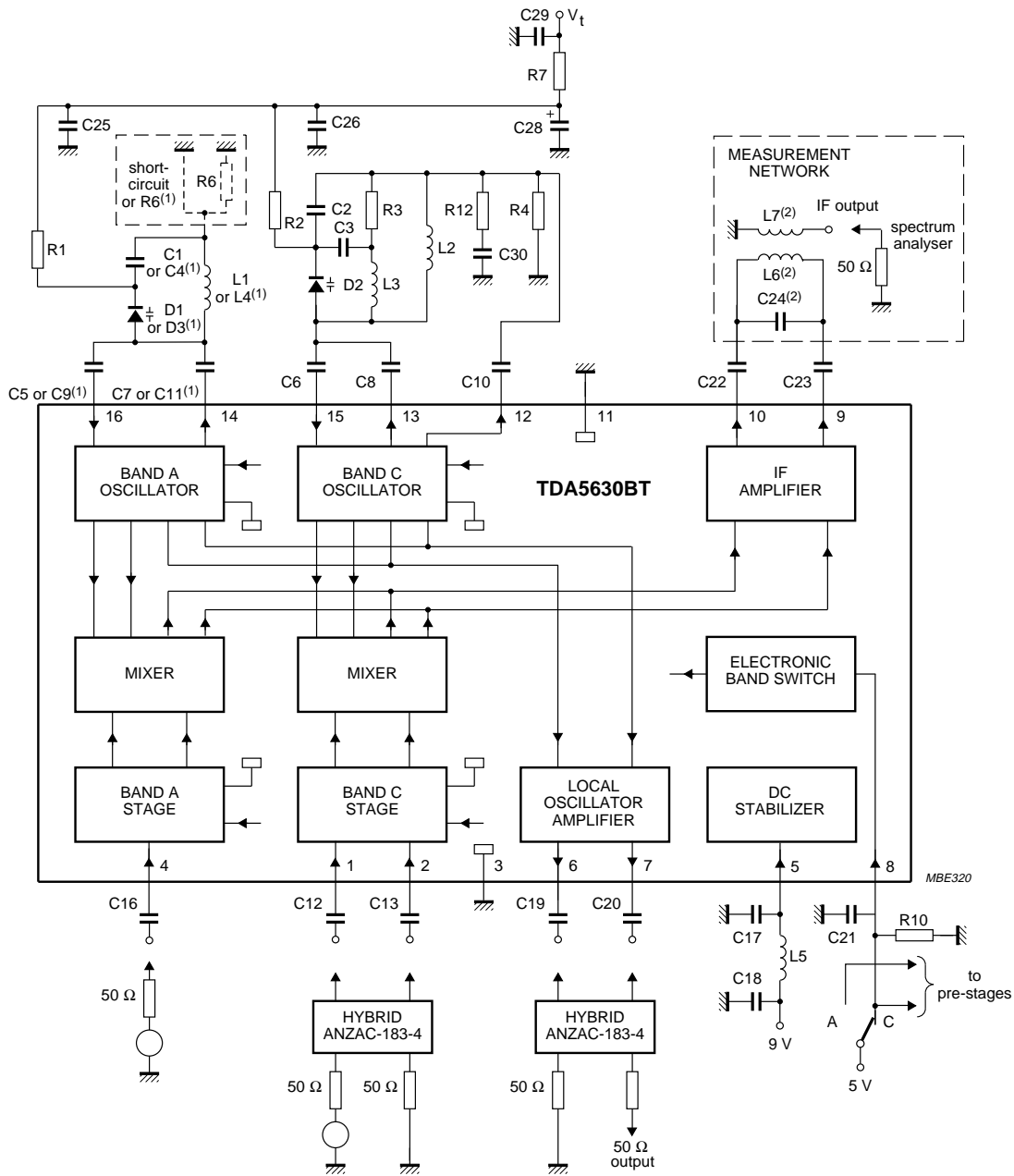
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- (1) There are two applications for the band A oscillator:
 - from 80 to 216 MHz: the band A tank circuit is built with C1, D1, L1, C5 and C7. R6 is a short-circuit.
 - from 180 to 506 MHz: the band A tank circuit is built with R6, C4, D3, L4, C9 and C11.
- (2) L6, L7 and C24 are only required for measurement purposes; they are not used in a tuner.

Fig.11 Measurement circuit.

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Component values for measurement circuit

Table 1 Capacitors (all SMD and NP0 except C28)

| COMPONENT | VALUE |
|-----------|------------------------------|
| C1 | 82 pF |
| C2 | 5.6 pF |
| C3 | 100 pF |
| C4 | 150 pF |
| C5 | 2.2 pF |
| C6 | 1 pF |
| C7 | 2.2 pF |
| C8 | 1 pF |
| C9 | 1.8 pF |
| C10 | 2.2 pF |
| C11 | 3.9 pF |
| C12 | 1 nF |
| C13 | 1 nF |
| C16 | 1 nF |
| C17 | 1.5 nF |
| C18 | 1.5 nF |
| C19 | 1 nF |
| C20 | 1 nF |
| C21 | 1.5 nF |
| C22 | 1 nF |
| C23 | 1 nF |
| C24 | 18 pF |
| C25 | 1.5 nF |
| C26 | 1.5 nF |
| C28 | 1 μ F; 40 V electrolytic |
| C29 | 1.5 nF |
| C30 | 0.56 pF |

Table 2 Resistors (all SMD)

| COMPONENT | VALUE |
|-----------|----------------|
| R1 | 47 k Ω |
| R2 | 22 k Ω |
| R3 | 2.2 k Ω |
| R4 | 22 k Ω |
| R6 | 22 Ω |
| R7 | 1 k Ω |
| R12 | 470 Ω |

Table 3 Diodes and IC

| COMPONENT | VALUE |
|-----------|----------------|
| D1 | BB911 |
| D2 | BB405 or BB215 |
| D3 | BB909 or BB219 |
| IC | TDA5630BT |

Table 4 Coils (wire size 0.4 mm)

| COMPONENT | VALUE |
|-----------|----------------------------|
| L1 | 7.5 turns; diameter 3 mm |
| L2 | 2.5 turns; diameter 3 mm |
| L3 | 1.5 turns; diameter 2.5 mm |
| L4 | 1.5 turns; diameter 4 mm |
| L5 | 4.7 μ H; choke coil |

Table 5 Transformers; note 1

| COMPONENT | VALUE |
|-----------|--------------------|
| L6 | 2 \times 5 turns |
| L7 | 2 turns |

Note

- Coil type: TOKO 7 kN; material: 113 kN; screw core 03-0093; pot core 04-0026.

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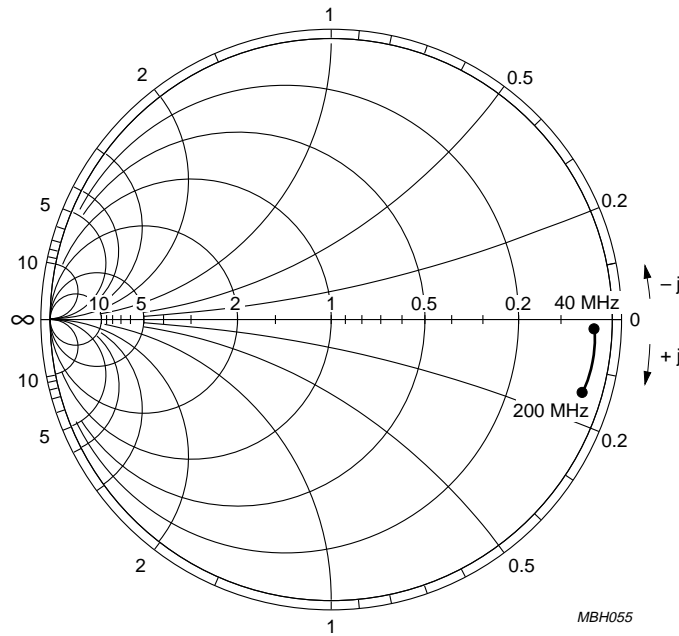


Fig.12 Input admittance (s_{11}) of the band A mixer input (40 to 200 MHz); $Y_0 = 20 \text{ mS}$.

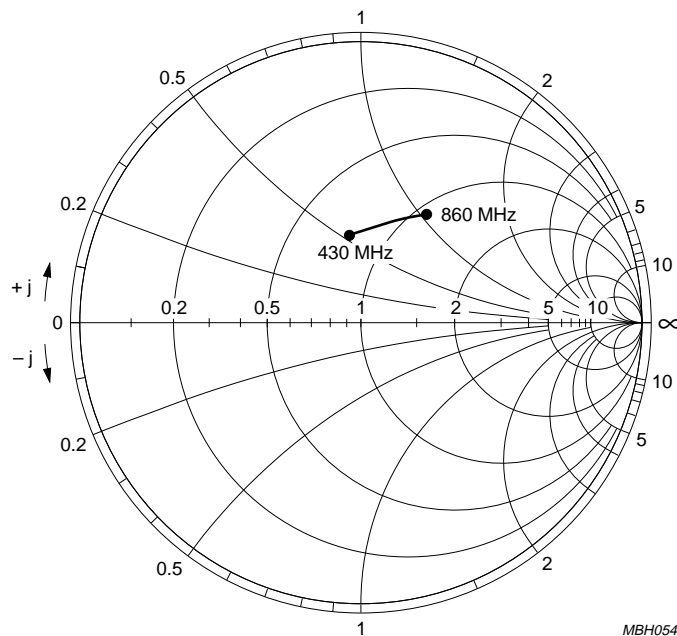


Fig.13 Input impedance (s_{11}) of the band C mixer input (430 to 860 MHz); $Z_0 = 50 \Omega$.

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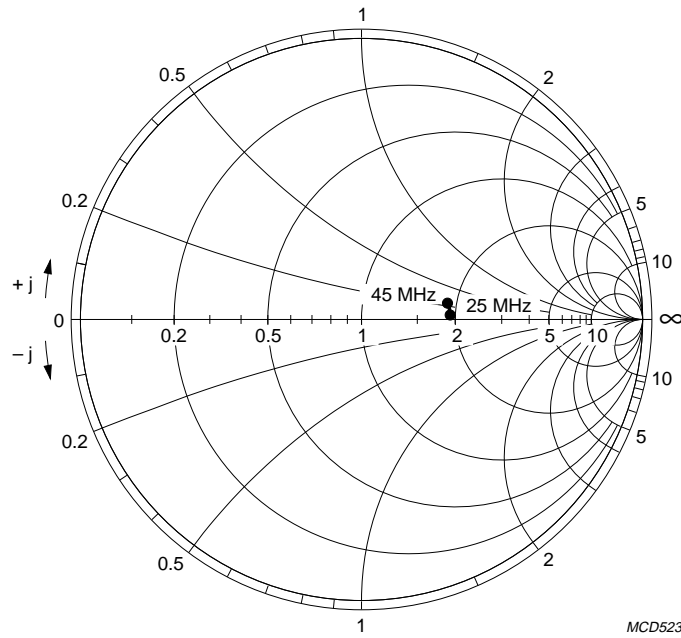


Fig.14 Output impedance (s_{22}) of the IF amplifier (25 to 45 MHz); $Z_0 = 50 \Omega$.

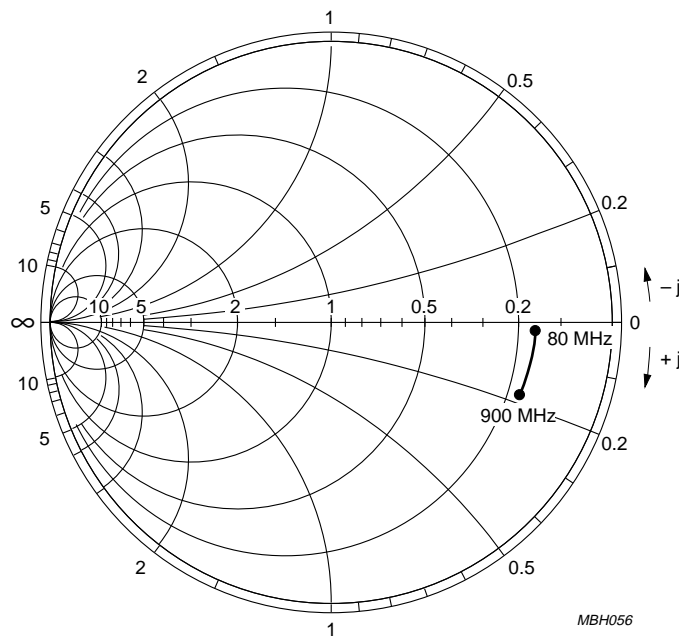
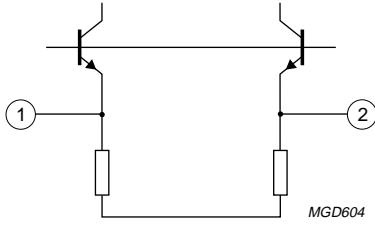
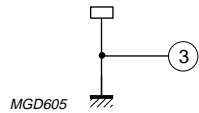
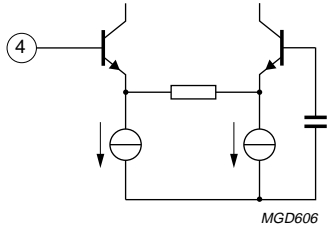
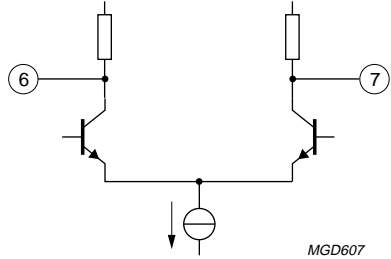
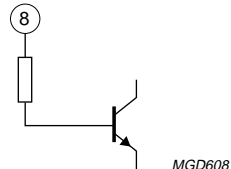


Fig.15 Output admittance (s_{22}) of the LO output (80 to 900 MHz); $Y_0 = 20 \text{ mS}$.

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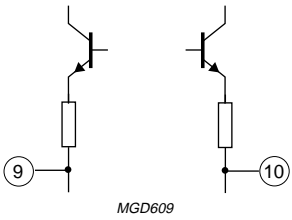
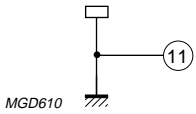
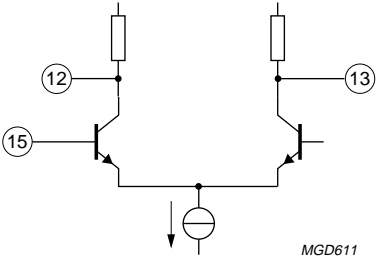
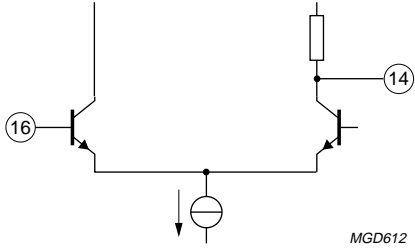
TDA5630BT

INTERNAL PIN CONFIGURATION

| SYMBOL | PIN | DESCRIPTION | AVERAGE DC VOLTAGE IN (V) measured in circuit of Fig.11 | |
|----------------|-----|---|--|-------------------|
| | | | BAND A | BAND C |
| CIN1 | 1 |  | NR ⁽¹⁾ | 2.2 |
| CIN2 | 2 | | NR ⁽¹⁾ | 2.2 |
| RFGND | 3 |  | 0.0 | 0.0 |
| AIN | 4 |  | 2.2 | NR ⁽¹⁾ |
| V _P | 5 | supply voltage | 9.0 | 9.0 |
| LOOUT1 | 6 |  | 7.3 | 7.3 |
| LOOUT2 | 7 | | 7.3 | 7.3 |
| BS | 8 |  | 0.0 | 5.0 |

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| SYMBOL | PIN | DESCRIPTION | AVERAGE DC VOLTAGE IN (V) measured in circuit of Fig.11 | |
|---------|-----|--|--|-------------------|
| | | | BAND A | BAND C |
| IFOUT1 | 9 |  | 4.0 | 4.0 |
| IFOUT2 | 10 | | 4.0 | 4.0 |
| GND | 11 |  | 0 | 0 |
| COSCOC1 | 12 |  | NR ⁽¹⁾ | 4.4 |
| COSCOC2 | 13 | | NR ⁽¹⁾ | 4.4 |
| COSCIB | 15 | | NR ⁽¹⁾ | 2.3 |
| AOSCOC | 14 |  | 4.0 | NR ⁽¹⁾ |
| AOSCIB | 16 | | 2.2 | NR ⁽¹⁾ |

Note

1. NR = not relevant.

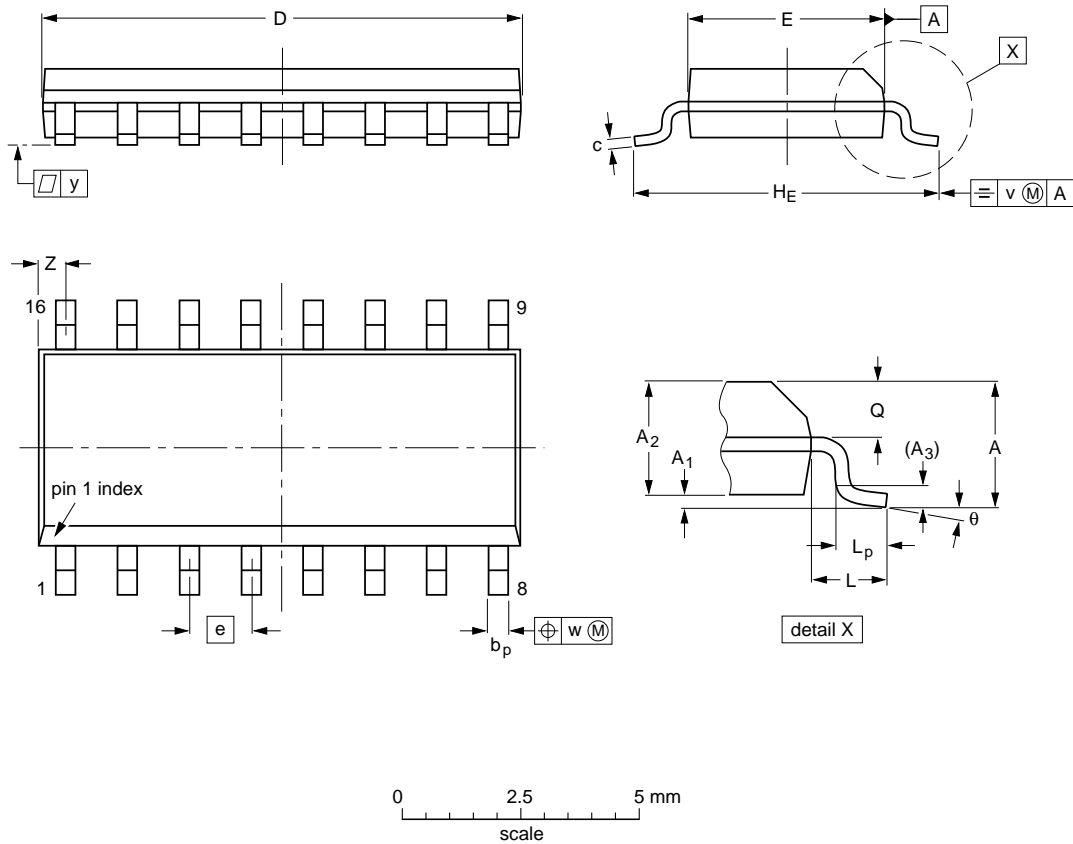
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PACKAGE OUTLINE

SO16: plastic small outline package; 16 leads; body width 3.9 mm

SOT109-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

| UNIT | A max. | A ₁ | A ₂ | A ₃ | b _p | c | D ⁽¹⁾ | E ⁽¹⁾ | e | H _E | L | L _p | Q | v | w | y | z ⁽¹⁾ | θ |
|--------|--------|------------------|----------------|----------------|----------------|------------------|------------------|------------------|-------|----------------|-------|----------------|----------------|------|------|-------|------------------|----------|
| mm | 1.75 | 0.25 0.10 | 1.45 1.25 | 0.25 | 0.49 0.36 | 0.25 0.19 | 10.0 9.8 | 4.0 3.8 | 1.27 | 6.2 5.8 | 1.05 | 1.0 0.4 | 0.7 0.6 | 0.25 | 0.25 | 0.1 | 0.7 0.3 | 8° 0° |
| inches | 0.069 | 0.0098 0.0039 | 0.057 0.049 | 0.01 | 0.019 0.014 | 0.0098 0.0075 | 0.39 0.38 | 0.16 0.15 | 0.050 | 0.24 0.23 | 0.041 | 0.039 0.016 | 0.028 0.020 | 0.01 | 0.01 | 0.004 | 0.028 0.012 | |

Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|----------|------|--|---------------------|----------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT109-1 | 076E07S | MS-012AC | | | | 91-08-13 95-01-23 |

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SOLDERING

Introduction

There is no soldering method that is ideal for all IC packages. Wave soldering is often preferred when through-hole and surface mounted components are mixed on one printed-circuit board. However, wave soldering is not always suitable for surface mounted ICs, or for printed-circuits with high population densities. In these situations reflow soldering is often used.

This text gives a very brief insight to a complex technology. A more in-depth account of soldering ICs can be found in our "*IC Package Databook*" (order code 9398 652 90011).

Reflow soldering

Reflow soldering techniques are suitable for all SO packages.

Reflow soldering requires solder paste (a suspension of fine solder particles, flux and binding agent) to be applied to the printed-circuit board by screen printing, stencilling or pressure-syringe dispensing before package placement.

Several techniques exist for reflowing; for example, thermal conduction by heated belt. Dwell times vary between 50 and 300 seconds depending on heating method. Typical reflow temperatures range from 215 to 250 °C.

Preheating is necessary to dry the paste and evaporate the binding agent. Preheating duration: 45 minutes at 45 °C.

Wave soldering

Wave soldering techniques can be used for all SO packages if the following conditions are observed:

- A double-wave (a turbulent wave with high upward pressure followed by a smooth laminar wave) soldering technique should be used.
- The longitudinal axis of the package footprint must be parallel to the solder flow.
- The package footprint must incorporate solder thieves at the downstream end.

During placement and before soldering, the package must be fixed with a droplet of adhesive. The adhesive can be applied by screen printing, pin transfer or syringe dispensing. The package can be soldered after the adhesive is cured.

Maximum permissible solder temperature is 260 °C, and maximum duration of package immersion in solder is 10 seconds, if cooled to less than 150 °C within 6 seconds. Typical dwell time is 4 seconds at 250 °C.

A mildly-activated flux will eliminate the need for removal of corrosive residues in most applications.

Repairing soldered joints

Fix the component by first soldering two diagonally-opposite end leads. Use only a low voltage soldering iron (less than 24 V) applied to the flat part of the lead. Contact time must be limited to 10 seconds at up to 300 °C. When using a dedicated tool, all other leads can be soldered in one operation within 2 to 5 seconds between 270 and 320 °C.

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TDA5630BT**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. |
| Limiting values | |
| Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability. | |
| Application information | |
| Where application information is given, it is advisory and does not form part of the specification. | |

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

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NOTES

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