BIPOLAR ANALOG INTEGRATED CIRCUIT
μPC1028H

FM IF AMPLIFIER WITH DIFFERENTIAL PEAK DETECTOR
SILICON BIPOLAR MONOLITHIC INTEGRATED CIRCUIT

DESCRIPTION

The μPC1028H is a silicon monolithic integrated circuit intended for an FM IF amplifier with a differential peak detector.

The device contains a three-stage direct coupled differential amplifier, a low pass filter, and a differential peak detector.

The differential peak detector has such feature as simplifying external circuits and components compared with a ratio detector.

The μPC1028H is packaged in a plastic single in-line package (SIP) for easy mounting on a printed circuit board.

FEATURES

- Few external components required.
- Only one coil necessary in detector circuit, all tuning performed with the coil.
- Low distortion: T.H.D. = 0.3 % TYP. at 100 % modulation.
- SIP assures easy mounting on a printed circuit board.

PACKAGE DIMENSIONS

in millimeters (inches)

CONNECTION DIAGRAM

BLOCK DIAGRAM

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EQUIVALENT CIRCUIT

ABSOLUTE MAXIMUM RATINGS (Ta = 25 °C)
- Supply Voltage: VCC = 15 V
- Package Dissipation (Ta = 75 °C): PD = 270 mW
- Operating Temperature: T_{opt} = -20 to +75 °C
- Storage Temperature: T_{stg} = -40 to +125 °C

RECOMMENDED OPERATING CONDITIONS (Ta = 25 °C)
- Operating Supply Voltage: 10 V
- Supply Voltage Range: 8 to 15 V

ELECTRICAL CHARACTERISTICS
(Ta = 25 °C, VCC = 10 V, f_0 = 10.7 MHz, f_MLO = 400 Hz, Δf = ±22.5 kHz, Dev., Peak separation = 1.2 MHz, R_G = 60 Ω)

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>SYMBOL</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
<th>TEST CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit Current</td>
<td>I_{CC}</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td>mA</td>
<td>V_{in} = 0</td>
</tr>
<tr>
<td>Voltage Gain (IF Amp. stage)</td>
<td>A_e</td>
<td>67</td>
<td></td>
<td></td>
<td>dB</td>
<td>V_{in} = -40 dB_{μ}, carrier signal only</td>
</tr>
<tr>
<td>Limiting Sensitivity</td>
<td>V_{in (lim.)}</td>
<td>48</td>
<td></td>
<td></td>
<td>dB_{μ}</td>
<td>Input voltage, -3 dB Limiting</td>
</tr>
<tr>
<td>AM Rejection</td>
<td>A.M.R.</td>
<td>40</td>
<td></td>
<td></td>
<td>dB</td>
<td>V_{in} = -80 dB_{μ}, AM = 30 %</td>
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<tr>
<td>Detector Output Voltage</td>
<td>V_{O AF}</td>
<td>185</td>
<td></td>
<td></td>
<td>mV</td>
<td>V_{in} = 80 dB_{μ}</td>
</tr>
<tr>
<td>Total Harmonic Distortion</td>
<td>T.H.D. 1</td>
<td>0.3</td>
<td></td>
<td></td>
<td>%</td>
<td>V_{in} = 80 dB_{μ}, Δf = ±25 kHz Dev.</td>
</tr>
<tr>
<td>Total Harmonic Distortion</td>
<td>T.H.D. 2</td>
<td>0.1</td>
<td></td>
<td></td>
<td>%</td>
<td>V_{in} = 80 dB_{μ}, Δf = ±22.5 kHz Dev.</td>
</tr>
<tr>
<td>S/N Ratio</td>
<td>S/N</td>
<td>65</td>
<td></td>
<td></td>
<td>dB</td>
<td>V_{in} = 80 dB_{μ}</td>
</tr>
<tr>
<td>Output Impedance</td>
<td>R_o</td>
<td>7.5</td>
<td></td>
<td></td>
<td>kΩ</td>
<td>f = 400 Hz</td>
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</tbody>
</table>
TEST CIRCUIT

TYPICAL CHARACTERISTICS (T_a = 25 °C)

DETECTOR OUTPUT VOLTAGE, TOTAL HARMONIC DISTORTION vs. CARRIER FREQUENCY DEVIATION

TOTAL HARMONIC DISTORTION, DETECTOR OUTPUT VOLTAGE, CIRCUIT CURRENT vs. SUPPLY VOLTAGE

DETECTOR OUTPUT VOLTAGE, AM REJECTION, TOTAL HARMONIC DISTORTION, SN RATIO vs. INPUT VOLTAGE

S CURVE

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DETECTOR COIL TUNING PROCEDURE

1. In the test circuit, the signal generator SG is connected to the input terminal pin 1, and the AF voltmeter and the total harmonic distortion meter are connected to the output terminal pin 7.

2. The SG is set at f = 10.7 MHz, f_{mod} = 400 Hz, Δf = ±22.5 kHz and the input level to the device under test should be 200 μV.

3. After the procedure of 1 and 2, the detector coil is adjusted so that the output level as indicated by the AF voltmeter is maintained the maximum value.

4. Then the detector coil is finely adjusted so that the total harmonic distortion is obtained the minimum value.

5. After the setting of 1 mV input level, the procedure of 3 and 4 are repeated.

(By the tuning at 200μV and 1 mV input level, the device provides the most stable characteristic from weak to strong input signal level.)

TYPICAL APPLICATION

CF: Ceramic Filter
CFSA-107
TOKO INC. made
SFE 10.7MA
MURATA CO. made or equivalent.

Det, Coll
f_o = 10.7 MHz, Q_o = 50
C=22 pF (Built in)
TKACA-17472Z
TOKO INC. made or equivalent.
PRINTED CIRCUIT BOARD PATTERN

FOIL SIDE

COMPONENTS LAYOUT

CF: Ceramic Filter
SFE10.7 MA (Red)
MURATA CO. made
or equivalent

Tr: 2SC1674
2SC1675

DET COIL DATA

TYPE TKACA-17473Z
TOKO INC., made
\( f_0 = 10.7 \text{ MHz} \)
\( C = 22 \text{ pF} \)
\( Q_0 = 50 \)