CA3012

FM IF Wideband Amplifier

Features
- Exceptionally High Amplifier Gain
  - Power Gain at 4.5MHz ............................75dB
- Excellent Input Limiting Characteristics
  - Limiting Voltage (Knee) at 10.7MHz ........600µV (Typ)
- Wide Frequency Capability:
  - Bandwidth ............................... 100kHz to 20MHz

Applications
- FM IF Amplifiers
- FM Communication Receivers
- TV IF Amplifiers

Description
The CA3012 is an FM IF wideband amplifier with 3 limiter gain stages in a bipolar monolithic technology. The pin 1 input is an open base and has a separate feedback bias. The feedback bias pin, DC FB BYPASS, is externally bypassed and provides the means for a tuned coil input to the IF IN pin. The output is a high impedance open collector which may be matched to a tuned transformer, driving an FM detector. Internal regulation circuits provide DC bias to the gain stages and DC feedback circuit.

The CA3012 is intended for FM limiting applications requiring high gain.

Ordering Information

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>TEMP. RANGE (°C)</th>
<th>PACKAGE</th>
<th>PKG. NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA3012</td>
<td>-55 to 125</td>
<td>10 Ld Metal Can</td>
<td>T10.C</td>
</tr>
</tbody>
</table>

Pinout

CA3012 (METAL CAN) TOP VIEW

† Internal connection, do not use.

Schematic Diagram

† Internal connection, do not use.
### Absolute Maximum Ratings \( T_A = 25^\circ C \)
- Maximum Supply Voltage \( V_{CC} \), Pin 10: 10V
- Maximum Output Voltage, Pin 5: 13V
- Maximum Input Signal Voltage between Pin 1 and Pin 2: \( \pm 3V \)

### Operating Conditions
- Temperature Range: \(-55^\circ C \) to \(125^\circ C\)
- Supply Voltage Range (Typical): 5.5V to 10V

CAUTION: Stresses above those listed in “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

### Thermal Information
- Thermal Resistance (Typical, Note 1)
  - Thermal Resistance, Package: \( \theta_{JA} \) (°C/W)
  - \( \theta_{JC} \) (°C/W)
- Metal Can Package: 175 °C/W
- Maximum Junction Temperature: 175°C
- Maximum Storage Temperature Range: -65°C to 150°C
- Maximum Lead Temperature (Soldering 10s): 300°C

### Electrical Specifications

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>SETUP AND PROCEDURE (FIGURE)</th>
<th>FREQUENCY (MHz)</th>
<th>DC SUPPLY VOLTAGE (V)</th>
<th>TEMPERATURE (°C)</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
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<td>6</td>
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<td>10.7</td>
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<td>55</td>
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### Input Impedance Components
- Parallel Input Resistance | \( R_{IN} \) | 6 | 4.5 | 7.5 | 25 | - | 3 | - | kΩ |
- Parallel Input Capacitance | \( C_{IN} \) | 6 | 4.5 | 7.5 | 25 | - | 7 | - | pF |

### Output Impedance Components
- Parallel Output Resistance | \( R_{OUT} \) | 8 | 4.5 | 7.5 | 25 | - | 31.5 | - | kΩ |
- Parallel Output Capacitance | \( C_{OUT} \) | 8 | 4.5 | 7.5 | 25 | - | 4.2 | - | pF |

### Noise Figure
- NF | 10 | 4.5 | 7.5 | 25 | - | 8.7 | - | dB |

### Input Limiting Voltage (Knee)
- \( V_{IL(LIM)} \) | 3 | 4.5 | 7.5 | 25 | - | 300 | 400 | µV |

NOTES:
2. The total current drain may be determined by dividing \( P_T \) by \( V_{CC} \).
3. Recommended minimum DC supply voltage \( (V_{CC}) \) is 5.5V. Nominal load current flowing into terminal 5 is 1.5mA at 7.5V.
Typical Performance Curves and Test Setups

**Procedures**

A. **Voltage Gain**
   1. Set input frequency at desired value, \( V_I = 100 \mu V_{RMS} \)
   2. Record \( V_O \)
   3. Calculate Voltage Gain \( A \) from \( A = 20 \log_{10} \frac{V_O}{V_I} \)
   4. Repeat steps 1, 2 and 3 for each frequency and/or for temperature desired

B. **Input Limiting Voltage (Knee)**
   1. Repeat steps A1 and A2, using \( V_I = 100 \mu V \)
   2. Decrease \( V_I \) to the level at which \( V_O \) is 3dB below its value for \( V_I = 100 \mu V \)
   3. Record \( V_I \) as Input Limiting Voltage (Knee)
Typical Performance Curves and Test Setups (Continued)

**FIGURE 6. INPUT IMPEDANCE TEST SETUP**

**FIGURE 7. INPUT IMPEDANCE vs FREQUENCY**

**FIGURE 8. OUTPUT IMPEDANCE TEST SETUP**

**FIGURE 9. OUTPUT IMPEDANCE vs FREQUENCY**

**FIGURE 10.**

**FIGURE 11. NOISE FIGURE vs DC SUPPLY VOLTAGE**
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NORTH AMERICA
Harris Semiconductor
P. O. Box 883, Mail Stop 53-210
Melbourne, FL 32902
TEL: 1-800-442-7747
(407) 729-4984
FAX: (407) 729-5321

EUROPE
Harris Semiconductor
Mercure Center
100, Rue de la Fusee
1130 Brussels, Belgium
TEL: (32) 2.724.2111
FAX: (32) 2.724.22.05

ASIA
Harris Semiconductor PTE Ltd.
No. 1 Tannery Road
Cencon 1, #09-01
Singapore 1334
TEL: (65) 748-4200
FAX: (65) 748-0400

FIGURE 12. BLOCK DIAGRAM OF TYPICAL FM RECEIVER USING THE CA3012 INTEGRATED CIRCUIT WIDEBAND AMPLIFIER