

## CA3011, CA3012

## Wide-Band Amplifiers

## Features:

- Exceptionally high amplifier gain:  
power gain at 4.5 MHz/s - 75 dB typ.
- Excellent limiting characteristics -  
Input limiting voltage (knee) = 600  $\mu$ V typ. at 10.7 MHz/s
- Wide frequency capability -  
100 kHz/s to > 20 MHz/s

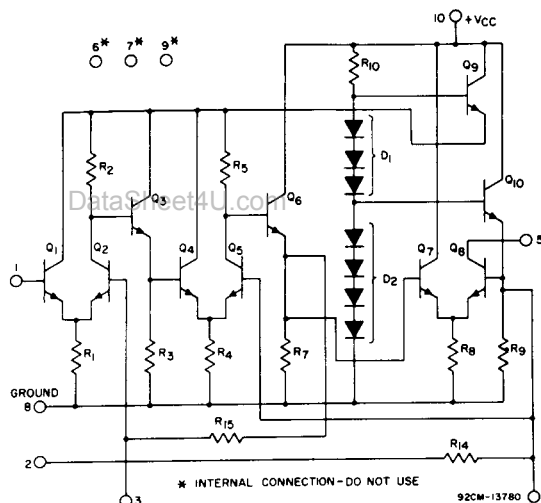


Fig. 1 - Schematic diagram for CA3011 and CA3012.

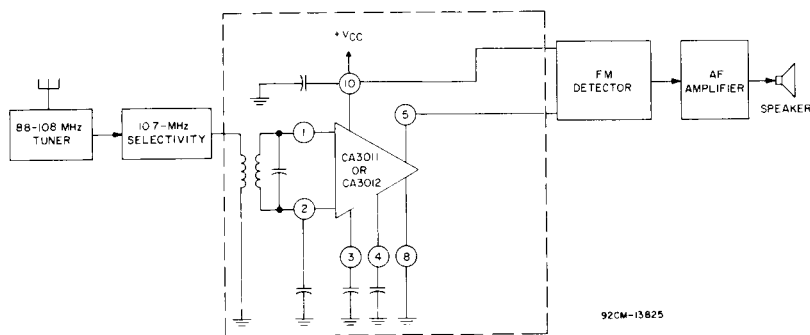


Fig. 2 - Block diagram of typical FM receiver using RCA-CA3011 or CA3012 integrated circuit wide-band amplifier.

## CA3011, CA3012

ABSOLUTE-MAXIMUM VOLTAGE LIMITS AT  $T_A = 25^\circ\text{C}$ 

Indicated voltage limits for each terminal can be applied under the specified voltage conditions for other terminals. All voltages are with respect to ground (Terminal 8).

NOTE: TERMINALS 6, 7, AND 9 OF RCA-CA3011 AND CA3012 ARE USED FOR INTERNAL CONNECTIONS. DO NOT APPLY VOLTAGES OR MAKE EXTERNAL CONNECTIONS TO THESE TERMINALS.

## CA3011

| TERMINAL | VOLTAGE LIMITS  |      | VOLTAGE CONDITIONS AT OTHER TERMINALS |           |                                  |              |      |        |      |
|----------|---|------|---------------------------------------|-----------|----------------------------------|--------------|------|--------|------|
|          |   |      | 1                                     | 2         | 3                                | 4            | 5    | 8      | 10   |
| 1        | -3  | +3   | -                                     | Same as 1 | Do Not Apply<br>External Voltage | +2.5 to +7.5 | +7.5 | Ground | +7.5 |
| 2        | -3  | +3   | Same as 2                             | -         |                                  | +2.5 to +7.5 | +7.5 | Ground | +7.5 |
| 3        | -3  | +3   | -3 to +3                              | Same as 1 |                                  | +2.5 to +7.5 | +7.5 | Ground | +7.5 |
| 4        | +2.5  | +7.5 | -3 to +3                              | Same as 1 |                                  | -            | +7.5 | Ground | +7.5 |
| 5        | 0   | +10  | -3 to +3                              | Same as 1 |                                  | +2.5 to +7.5 | -    | Ground | +7.5 |
| 8        | -3  | +7.5 | -3 to +3                              | Same as 1 |                                  | +2.5 to +7.5 | +7.5 | Ground | +7.5 |
| 10       | 0   | +10  | -3 to +3                              | Same as 1 |                                  | +2.5 to +7.5 | +7.5 | Ground | -    |
| CASE     | INTERNALLY CONNECTED TO TERMINAL NO.8 (GROUND TERMINAL) |      |                                       |           |                                  |              |      |        |      |

## CA3012

| TERMINAL | VOLTAGE LIMITS  |     | VOLTAGE CONDITIONS AT OTHER TERMINALS |           |                                  |             |     |        |     |
|----------|---|-----|---------------------------------------|-----------|----------------------------------|-------------|-----|--------|-----|
|          |   |     | 1                                     | 2         | 3                                | 4           | 5   | 8      | 10  |
| 1        | -3  | +3  | -                                     | Same as 1 | Do Not Apply<br>External Voltage | +2.5 to +10 | +10 | Ground | +10 |
| 2        | -3  | +3  | Same as 2                             | -         |                                  | +2.5 to +10 | +10 | Ground | +10 |
| 3        | -3  | +3  | -3 to +3                              | Same as 1 |                                  | +2.5 to +10 | +10 | Ground | +10 |
| 4        | +2.5  | +10 | -3 to +3                              | Same as 1 |                                  | -           | +10 | Ground | +10 |
| 5        | 0   | +13 | -3 to +3                              | Same as 1 |                                  | +2.5 to +10 | -   | Ground | +10 |
| 8        | -3  | +10 | -3 to +3                              | Same as 1 |                                  | +2.5 to +10 | +10 | Ground | +10 |
| 10       | 0   | +13 | -3 to +3                              | Same as 1 |                                  | +2.5 to +10 | +10 | Ground | -   |
| CASE     | INTERNALLY CONNECTED TO TERMINAL NO.8 (GROUND TERMINAL) |     |                                       |           |                                  |             |     |        |     |

## Example of Use of LIMITS TABLE:

OPERATING-TEMPERATURE RANGE .....  $-55$  to  $+125^\circ\text{C}$   
 STORAGE-TEMPERATURE RANGE .....  $-65$  to  $+150^\circ\text{C}$

LEAD TEMPERATURE (During Soldering):

At distance  $1/16 \pm 1/32$  inch ( $1.59 \pm 0.79\text{mm}$ )  
 from case for 10 seconds max. ....  $+265^\circ\text{C}$

MAXIMUM INPUT-SIGNAL VOLTAGE:

Between Terminals 1 and 2 .....  $\pm 3\text{V}$   
 MAXIMUM DEVICE DISSIPATION .....  $300\text{mW}$   
 RECOMMENDED MINIMUM DC SUPPLY VOLTAGE ( $V_{CC}$ ) ...  $5.5\text{V}$

For RCA-3012, a maximum voltage of  $\pm 3$  volts may be applied to Terminal 1 under the following conditions:

Terminal 2 is at the same dc potential as Terminal 1  
 Terminal 3: do not apply external voltage  
 Terminal 4 is at any dc potential between  $+2.5$  and  $+10$  volts  
 Terminal 5 is at a dc potential of  $+10$  volts  
 Terminals 6, 7, and 9 are at  $0$  dc potential (NOT USED)  
 Terminal 8 is at dc ground potential  
 Terminal 10 is at a dc potential of  $+10$  volts

## CA3011, CA3012

## ELECTRICAL CHARACTERISTICS

| CHARACTERISTICS<br>(See Page 7 for<br>Definitions of<br>Terms)   | SYMBOLS             | TEST CONDITIONS         |                |  |   | LIMITS        |      |      |               |      |      | TYPICAL<br>CHARAC-<br>TERISTICS<br>CURVES |       |
|--|---------------------|-------------------------|----------------|--|---|---------------|------|------|---------------|------|------|---|-------|
|  |                     | SETUP<br>&<br>PROCEDURE | FREQUENCY<br>f | DC<br>SUPPLY<br>VOLTAGE<br>V <sub>CC</sub> | AMBIENT<br>TEMPERA-<br>TURE<br>T <sub>A</sub> | RCA<br>CA3011 |      |      | RCA<br>CA3012 |      |      |   | UNITS |
|  |                     |                         |                |  |   | Min.          | Typ. | Max. | Min.          | Typ. | Max. |   |       |
| Total<br>Device<br>Dissipation *                                 | P <sub>T</sub>      | 3                       | -              | 6  | -55   | -             | 80   | -    | 66            | 80   | 135  | mW  | 4     |
|  |                     |                         |                |  | +25   | 60            | 90   | 133  | 66            | 90   | 121  | mW  |       |
|  |                     |                         |                |  | +125  | -             | 70   | -    | 65            | 70   | 121  | mW  |       |
|  |                     | -                       | 7.5            | -55  | -   | 130           | -    | 97   | 130           | 190  | mW   | 4   |       |
|  |                     |                         |                | +25  | 95  | 120           | 187  | 97   | 120           | 167  | mW   |   |       |
|  |                     |                         |                | +125                                       | -   | 100           | -    | 95   | 100           | 167  | mW   |   |       |
|  |                     | -                       | 10             | -55  | -   | -             | -    | 150  | 210           | 275  | mW   | 4   |       |
|  |                     |                         |                | +25  | -   | -             | -    | 150  | 190           | 255  | mW   |   |       |
|  |                     |                         |                | +125                                       | -   | -             | -    | 150  | 160           | 255  | mW   |   |       |
| Voltage Gain**   | A                   | 5                       | 1              | 6  | -55   | -             | 55   | -    | 50            | 55   | -    | dB  | 6     |
|  |                     |                         |                |  | +25   | 60            | 66   | -    | 60            | 66   | -    | dB  |       |
|  |                     |                         |                |  | +125  | -             | 61   | -    | 50            | 61   | -    | dB  |       |
|  |                     | 5                       | 1              | 7.5  | -55   | -             | 59   | -    | 55            | 59   | -    | dB  | 6     |
|  |                     |                         |                |  | +25   | 65            | 70   | -    | 65            | 70   | -    | dB  |       |
|  |                     |                         |                |  | +125  | -             | 65   | -    | 55            | 65   | -    | dB  |       |
|  |                     | 5                       | 1              | 10   | -55   | -             | -    | -    | 55            | 61   | -    | dB  | 6     |
|  |                     |                         |                |  | +25   | -             | -    | -    | 65            | 71   | -    | dB  |       |
|  |                     |                         |                |  | +125  | -             | -    | -    | 55            | 66   | -    | dB  |       |
| 5  | 4.5                 | 7.5                     | +25            | 60   | 67  | -             | 60   | 67   | -             | dB   | 7    |   |       |
|  |                     |                         | +25            | 55   | 61  | -             | 55   | 61   | -             | dB   |      |   |       |
| Input Impedance<br>Components:<br>Parallel Input<br>Resistance   | R <sub>IN</sub>     | 8                       | 4.5            | 7.5  | +25   | -             | 3    | -    | -             | 3    | -    | kΩ  | 9     |
|  | C <sub>IN</sub>     | 8                       | 4.5            | 7.5  | +25   | -             | 7    | -    | -             | 7    | -    | pF  | 9     |
| Output Impedance<br>Components:<br>Parallel Output<br>Resistance | R <sub>OUT</sub>    | 10                      | 4.5            | 7.5  | +25   | -             | 31.5 | -    | -             | 31.5 | -    | kΩ  | 11    |
|  | C <sub>OUT</sub>    | 10                      | 4.5            | 7.5  | +25   | -             | 4.2  | -    | -             | 4.2  | -    | pF  | 11    |
| Noise Figure   | NF                  | 12                      | 4.5            | 7.5  | +25   | -             | 8.7  | -    | -             | 8.7  | -    | dB  | 13    |
| Input Limiting<br>Voltage (Knee)                                 | V <sub>i(lim)</sub> | 5                       | 4.5            | 7.5  | +25   | -             | 300  | 450  | -             | 300  | 400  | μV  | 6     |

\* The total current drain may be determined by dividing P<sub>T</sub> by V<sub>CC</sub>.\*\* Recommended minimum dc supply voltage (V<sub>CC</sub>) is 5.5 V. Nominal load current flowing into terminal 5 is 1.5 mA at 7.5 V.

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## TYPICAL CHARACTERISTICS AND TEST SETUPS

## DISSIPATION TEST SETUP

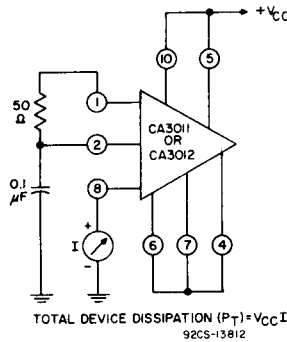


Fig.3

## DISSIPATION VS TEMPERATURE

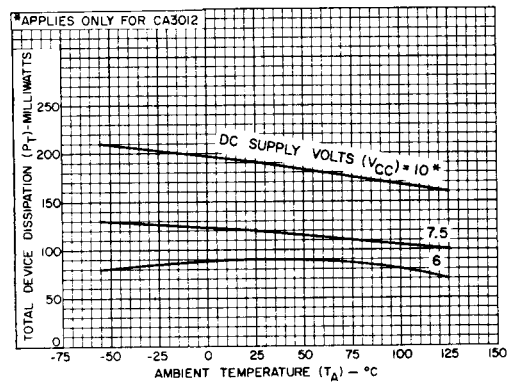


Fig.4

## VOLTAGE-GAIN TEST SETUP

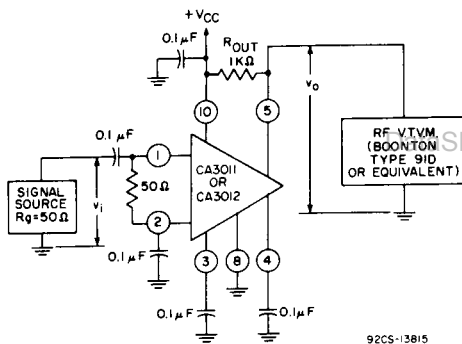


Fig.5

## 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  $A = 20 \log_{10} v_o/v_i$
- 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  $v_i = 100$  mV
- 2) Decrease  $v_i$  to the level at which  $v_o$  is 3 dB below its value for  $v_i = 100$  mV.
- 3) Record  $v_i$  as Input Limiting Voltage (Knee).

## VOLTAGE GAIN &amp; INPUT LIMITING VOLTAGE VS TEMPERATURE

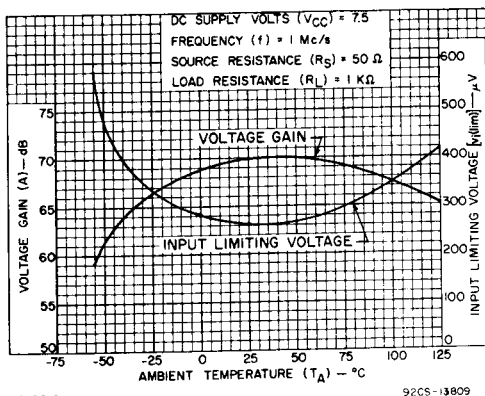


Fig.6

## VOLTAGE GAIN AND INPUT LIMITING VOLTAGE VS FREQUENCY

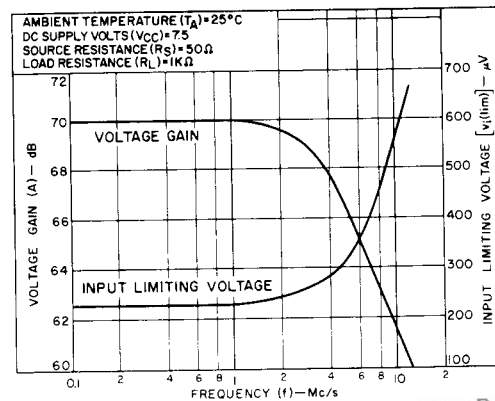


Fig.7

## CA3011, CA3012

## TYPICAL CHARACTERISTICS AND TEST SETUPS

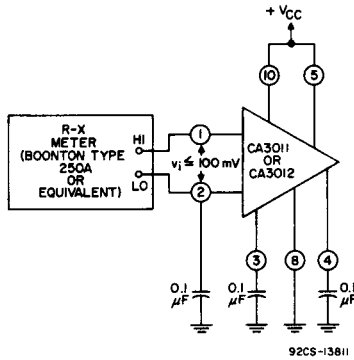
INPUT-IMPEDANCE COMPONENTS  
TEST SETUP

Fig.8

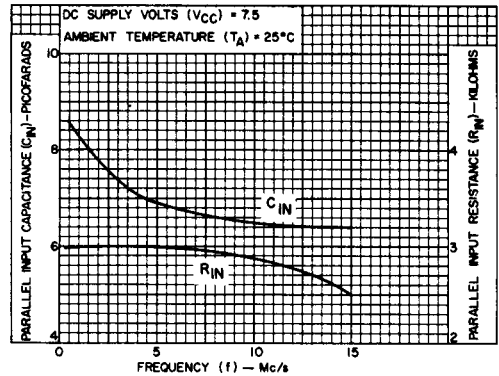
INPUT-IMPEDANCE COMPONENTS  
VS FREQUENCY

Fig.9

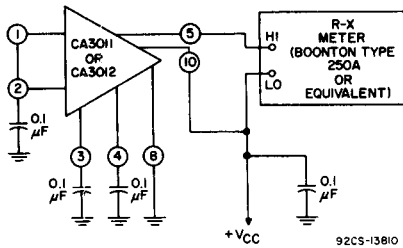
OUTPUT-IMPEDANCE COMPONENTS  
TEST SETUP

Fig.10

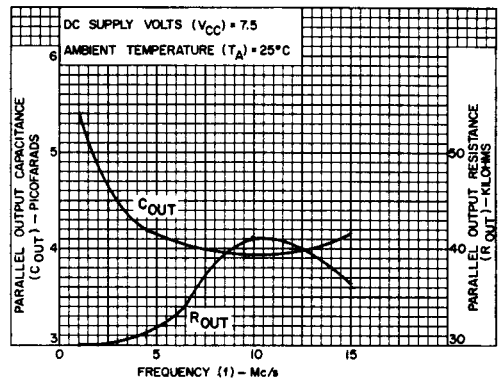
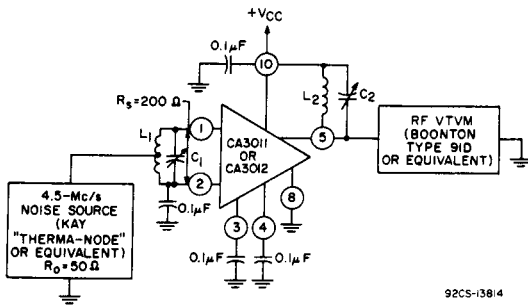
OUTPUT-IMPEDANCE COMPONENTS  
VS FREQUENCY

Fig.11

## CA3011, CA3012

## TYPICAL CHARACTERISTICS AND TEST SETUPS

NOISE FIGURE TEST SETUP

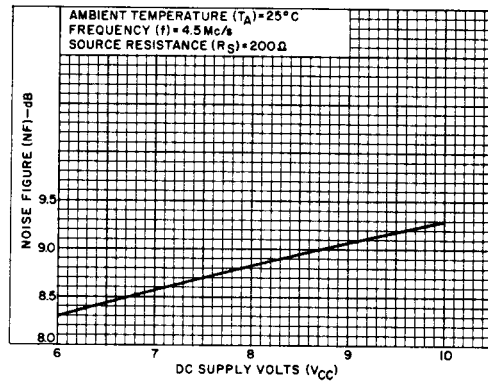


92CS-13814

 $L_1 = 82 \mu\text{H}$ , center-tapped $L_2 = 2.36 \mu\text{H}$  $C_1, C_2 =$  Arco Type 423 padder, or equivalent

Fig. 12

NOISE FIGURE VS DC SUPPLY VOLTAGE



92CS-13788

Fig. 13