HARRIS SEMICONDUCTOR

CA3012

November 1996

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.

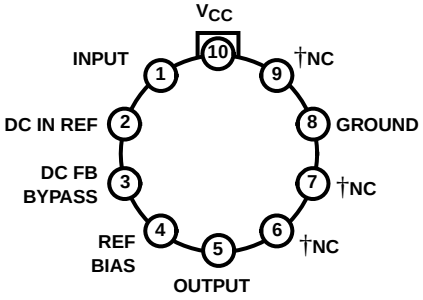
The CA3012 is intended for FM limiting applications requiring high gain.

Ordering Information

PART NUMBER	TEMP. RANGE (^{O}C)	PACKAGE	PKG. NO.
CA3012	-55 to 125	10 Ld Metal Can	T10.C

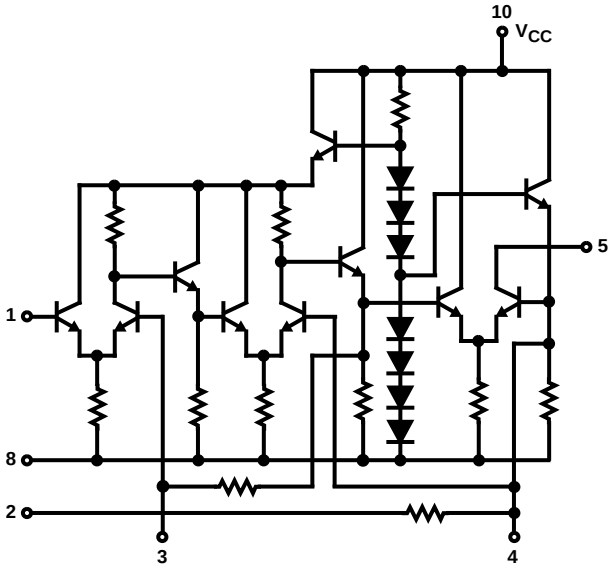
Pinout

CA3012
(METAL CAN)
TOP VIEW



†Internal connection, do not use.

Schematic Diagram



File Number **128.1**

Absolute Maximum Ratings $T_A = 25^oC$

Maximum Supply Voltage V_{CC}, Pin 10 . . . . . 10V
Maximum Output Voltage, Pin 5 . . . . . 13V
Maximum Input Signal Voltage between Pin 1 and Pin 2 . . . . . ±3VV

Operating Conditions

Temperature Range . . . . . -55^oC to 125^oC
Supply Voltage Range (Typical) . . . . . 5.5V to 10V

Thermal Information

Thermal Resistance (Typical, Note 1)	θ_{JA} ($^oC/W$)	θ_{JC} ($^oC/W$)
Metal Can Package	175	100

Maximum Junction Temperature . . . . . 175^oC
Maximum Storage Temperature Range . . . . . -65^oC to 150^oC
Maximum Lead Temperature (Soldering 10s) . . . . . 300^oC

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.

NOTE:

1. θ_{JA} is measured with the component mounted on an evaluation PC board in free air.

Electrical Specifications

PARAMETER	SYMBOL	TEST CONDITIONS: SETUP AND PROCEDURE (FIGURE)	TEST CONDITIONS: FREQUENCY f (MHz)	TEST CONDITIONS: DC SUPPLY VOLTAGE V_{CC} (V)	TEST CONDITIONS: TEMP (^oC)	MIN	TYP	MAX	UNITS
Total Device Dissipation (Note 2)	P_T	1	-	6	-55	66	80	135	mW
					25	66	90	121	mW
					125	65	70	121	mW
			-	7.5	-55	97	130	190	mW
					25	97	120	167	mW
					125	95	100	167	mW
			-	10	-55	150	210	275	mW
					25	150	190	255	mW
					125	150	160	255	mW
Voltage Gain (Note 3)	A	3	1	6	-55	50	55	-	dB
					25	60	66	-	dB
					125	50	61	-	dB
		3	1	7.5	-55	55	59	-	dB
					25	65	70	-	dB
					125	55	65	-	dB
		3	1	10	-55	55	61	-	dB
					25	65	71	-	dB
					125	55	66	-	dB
		3	4.5	7.5	25	60	67	-	dB
			10.7	7.5	25	55	61	-	dB
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)	$V_{I(LIM)}$	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

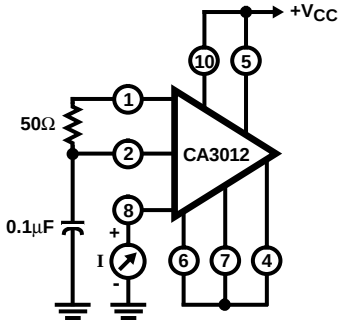


FIGURE 1. DISSIPATION TEST SETUP

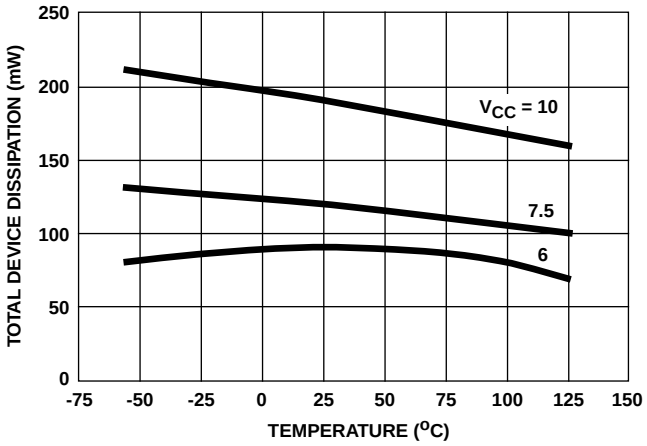
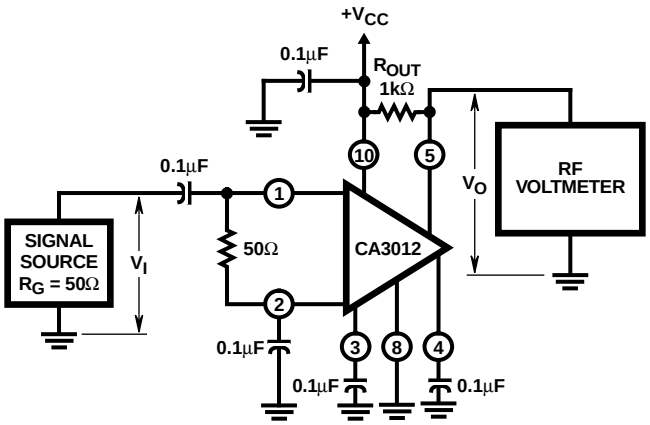


FIGURE 2. DISSIPATION vs TEMPERATURE



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 $V_I = 100mV$
2. Decrease V_I to the level at which V_O is 3dB below its value for $V_I = 100mV$
3. Record V_I as Input Limiting Voltage (Knee)

FIGURE 3. VOLTAGE GAIN TEST SETUP

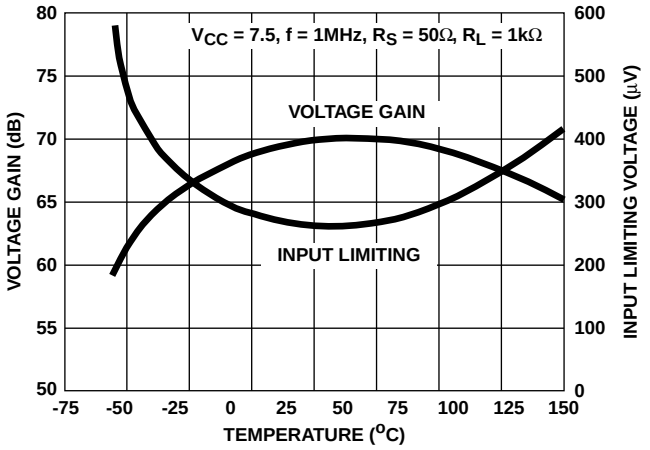


FIGURE 4. VOLTAGE GAIN AND INPUT LIMITING VOLTAGE vs TEMPERATURE

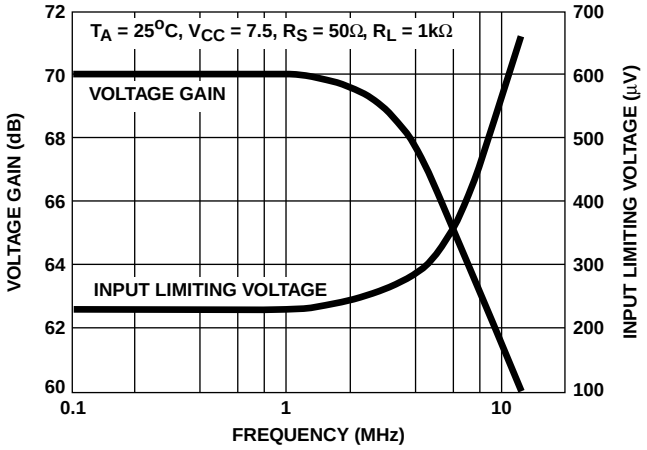


FIGURE 5. VOLTAGE GAIN AND INPUT LIMITING VOLTAGE vs FREQUENCY

Typical Performance Curves and Test Setups (Continued)

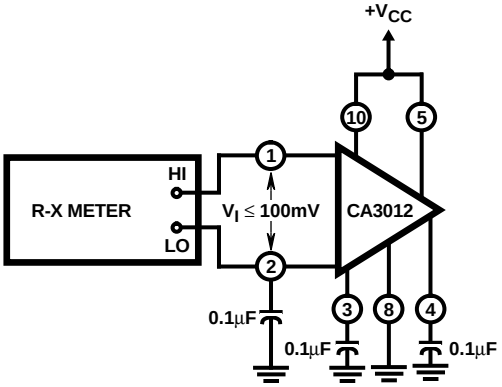


FIGURE 6. INPUT IMPEDANCE TEST SETUP

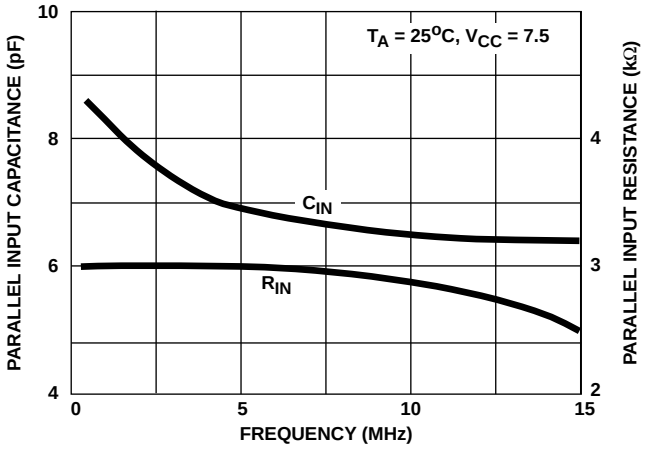


FIGURE 7. INPUT IMPEDANCE vs FREQUENCY

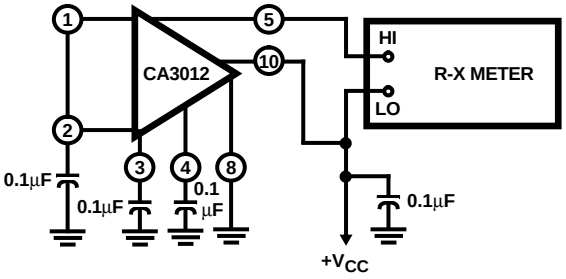


FIGURE 8. OUTPUT IMPEDANCE TEST SETUP

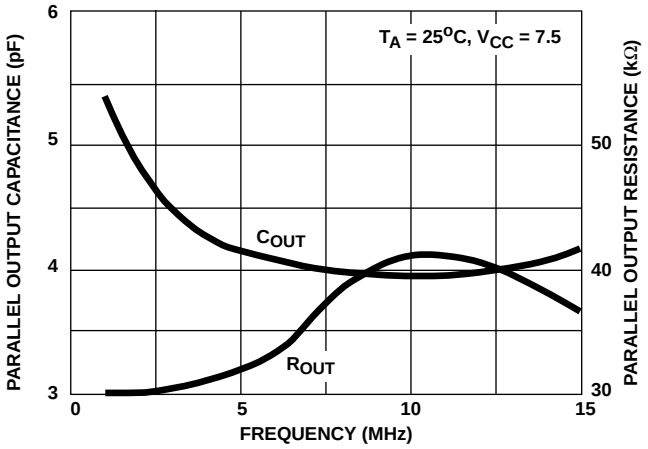


FIGURE 9. OUTPUT IMPEDANCE vs FREQUENCY

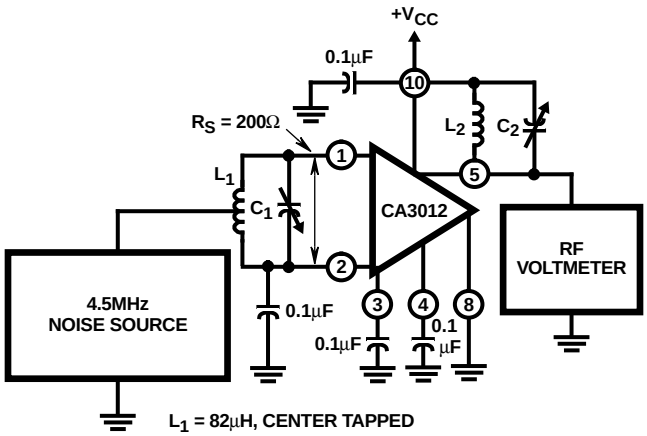


FIGURE 10.

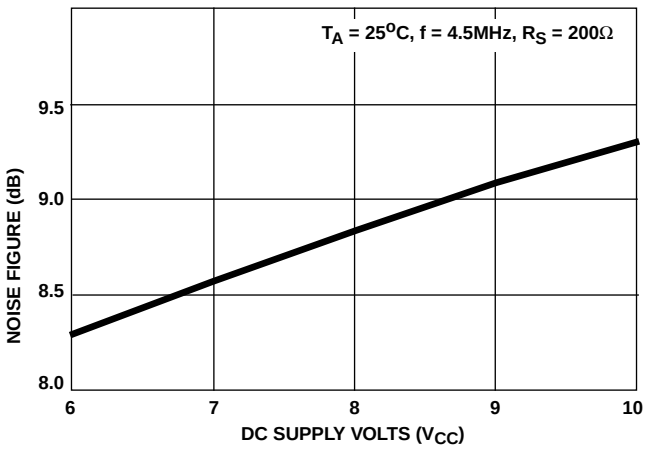


FIGURE 11. NOISE FIGURE vs DC SUPPLY VOLTAGE

Typical Application

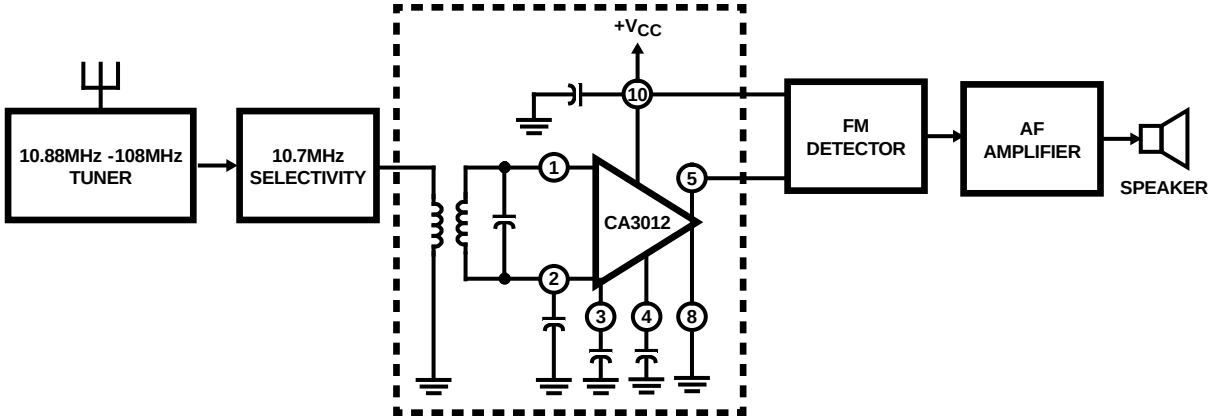


FIGURE 12. BLOCK DIAGRAM OF TYPICAL FM RECEIVER USING THE CA3012 INTEGRATED CIRCUIT WIDEBAND AMPLIFIER

Sales Office Headquarters

For general information regarding Harris Semiconductor and its products, call **1-800-4-HARRIS**

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

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