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 μV typ. at 10.7 MHz/s*
- *Wide frequency capability - 100 kHz/s to > 20 MHz/s*

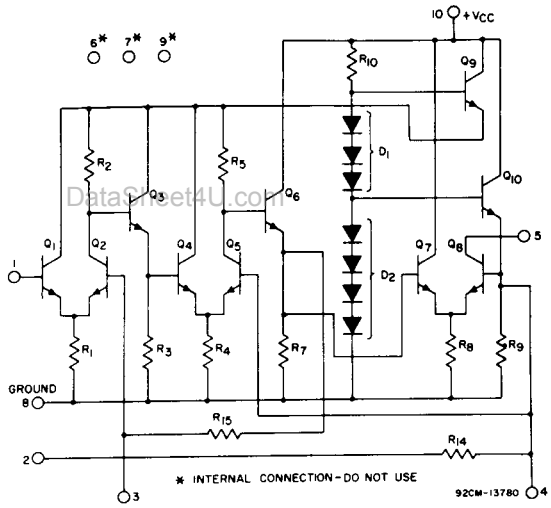


Fig. 1 - Schematic diagram for CA3011 and CA3012.

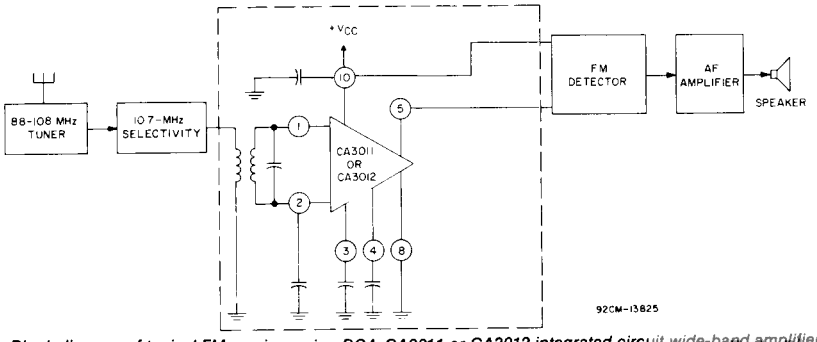


Fig. 2 - Block diagram of typical FM receiver using RCA-CA3011 or CA3012 integrated circuit wide-band amplifier.

File Number **128**

ABSOLUTE-MAXIMUM VOLTAGE LIMITS AT T_A = 25° 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 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 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)								

OPERATING-TEMPERATURE RANGE . . . . . -55 to +125° C
STORAGE-TEMPERATURE RANGE . . . . . -65 to +150° C

LEAD TEMPERATURE (During Soldering):
At distance 1/16 ± 1/32 inch (1.59 ± 0.79mm)
from case for 10 seconds max. . . . . +265°C

MAXIMUM INPUT-SIGNAL VOLTAGE:
Between Terminals 1 and 2 . . . . . ±3 V

MAXIMUM DEVICE DISSIPATION . . . . . 300 mW

RECOMMENDED MINIMUM DC SUPPLY VOLTAGE (V_{CC}) . . 5.5 V

Example of Use of LIMITS TABLE:

For RCA-3012, a maximum voltage of ±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 (See Page 7 for Definitions of Terms)	SYMBOLS	TEST CONDITIONS				LIMITS						UNITS	TYPICAL CHARACTERISTICS CURVES
		SETUP & PROCEDURE	FREQUENCY f	DC SUPPLY VOLTAGE V_{CC}	AMBIENT TEMPERATURE T_A	RCA CA3011			RCA CA3012				
		Fig.	Mc/s	Volts	°C	Min.	Typ.	Max.	Min.	Typ.	Max.		Fig.
Total Device Dissipation*	P_T	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
			10.7	7.5	+25	55	61	–	55	61	–	dB	
Input-Impedance Components: Parallel Input Resistance	R_{IN}	8	4.5	7.5	+25	–	3	–	–	3	–	kΩ	9
Parallel Input Capacitance	C_{IN}	8	4.5	7.5	+25	–	7	–	–	7	–	pF	9
Output Impedance Components: Parallel Output Resistance	R_{OUT}	10	4.5	7.5	+25	–	31.5	–	–	31.5	–	kΩ	11
Parallel Output Capacitance	C_{OUT}	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 Voltage (Knee)	$v_{i(lim)}$	5	4.5	7.5	+25	–	300	450	–	300	400	μV	6

* The total current drain may be determined by dividing P_T by V_{CC}.

** Recommended minimum dc supply voltage (V_{CC}) is 5.5 V. Nominal load current flowing into terminal 5 is 1.5 mA at 7.5 V.

TYPICAL CHARACTERISTICS AND TEST SETUPS

DISSIPATION TEST SETUP

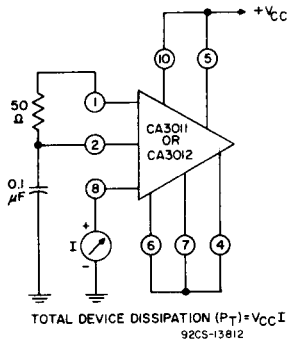


Fig.3

DISSIPATION VS TEMPERATURE

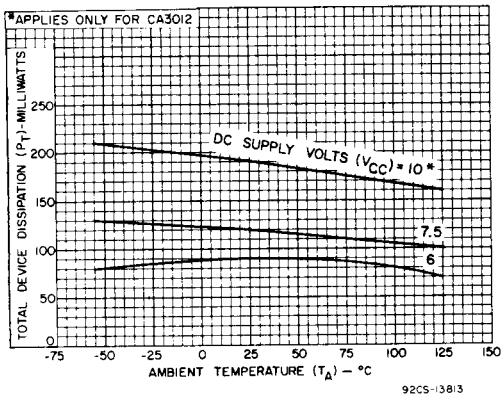
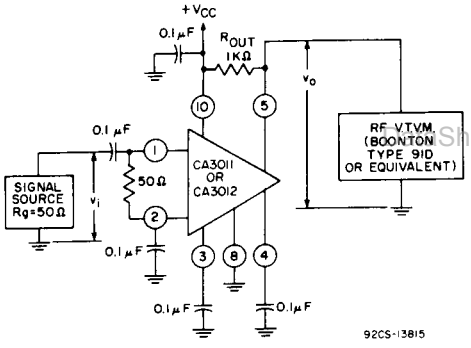


Fig.4

VOLTAGE-GAIN TEST SETUP



PROCEDURES

A - Voltage Gain:

1) Set input frequency at desired value, v_i = 100 μV 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).

Fig.5

VOLTAGE GAIN & INPUT LIMITING VOLTAGE VS TEMPERATURE

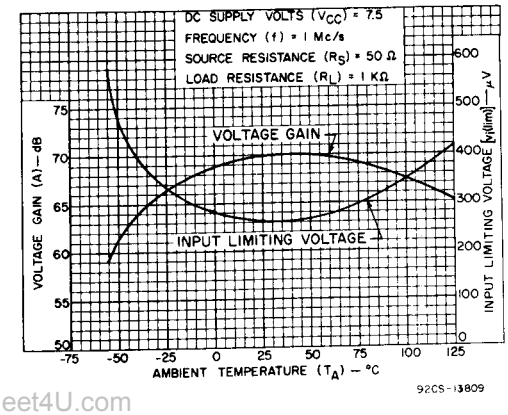


Fig.6

VOLTAGE GAIN AND INPUT LIMITING VOLTAGE VS FREQUENCY

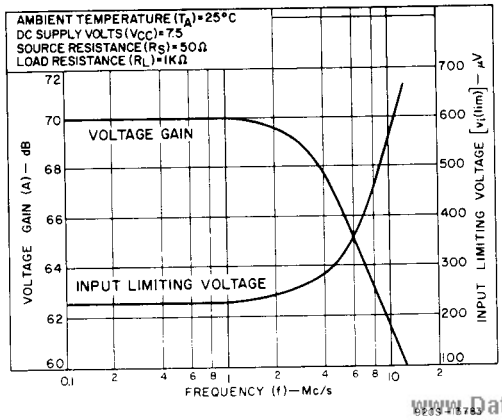


Fig.7

CA3011, CA3012

TYPICAL CHARACTERISTICS AND TEST SETUPS

INPUT-IMPEDANCE COMPONENTS
TEST SETUP

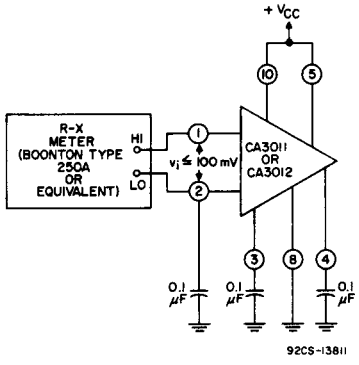


Fig.8

INPUT-IMPEDANCE COMPONENTS
VS FREQUENCY

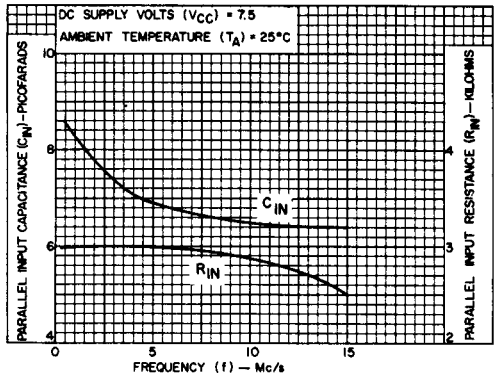


Fig.9

OUTPUT-IMPEDANCE COMPONENTS
TEST SETUP

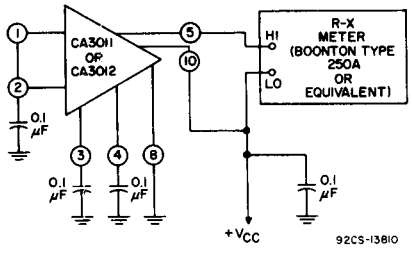


Fig.10

OUTPUT-IMPEDANCE COMPONENTS
VS FREQUENCY

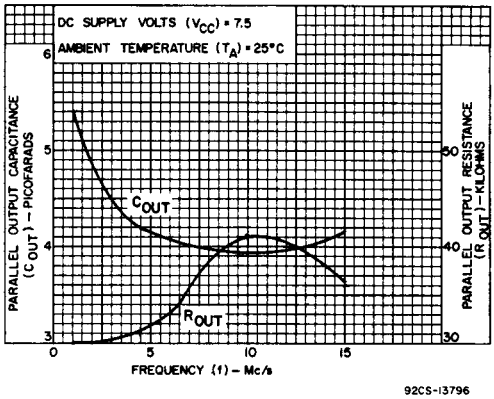
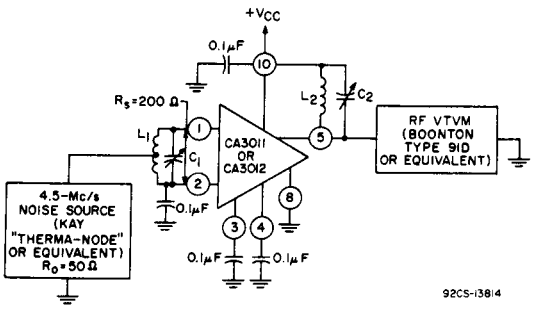


Fig.11

TYPICAL CHARACTERISTICS AND TEST SETUPS

NOISE FIGURE TEST SETUP



L_1 = 82 μH, center-tapped

L_2 = 2.36 μH

C_1,C_2 = Arco Type 423 padder, or equivalent

Fig. 12

NOISE FIGURE VS DC SUPPLY VOLTAGE

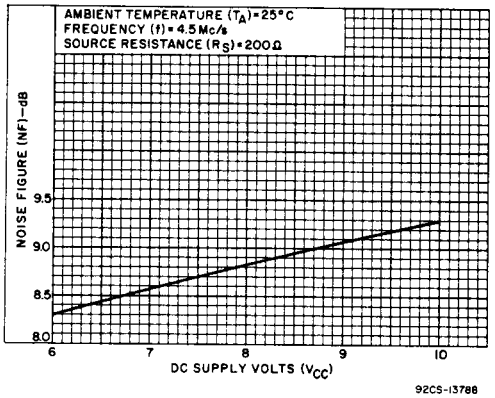


Fig. 13