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ECG® Semiconductors

ECG816, ECG817

RF/IF Amplifier

Features

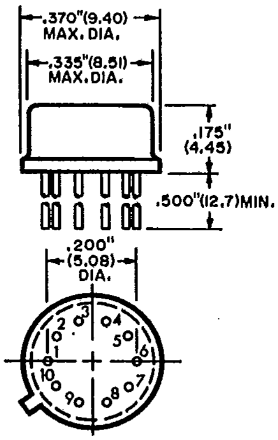
- **Constant input impedance over entire AGC range**
- **High power gain**
- **Good noise figures**
- **Versatile applications**

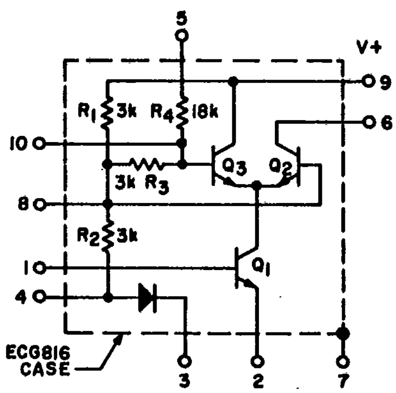
The ECG816 and ECG817 are silicon monolithic integrated circuits designed for communications applications as a RF/IF amplifier.

Pin Connections

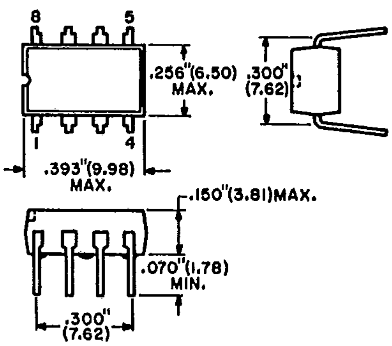
ECG816	Symbol	ECG817
1	Sig In	2
2	GND	No Pin
3	GND	No Pin
4	Bypass	3
5	AGC	4
6	Output	5
7	GND	6
8	Bypass	7
9	V_{CC}	8
10	Bypass	1

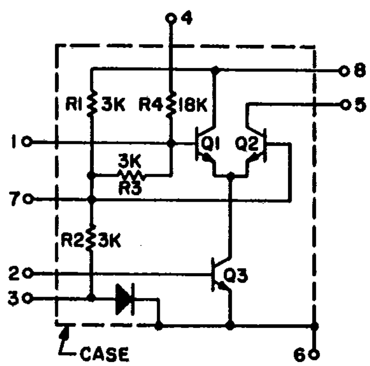
ECG816





ECG817





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Note: All Pin Numbers Used in Tables and Circuits are for ECG816

Absolute Maximum Ratings (T_A = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Power Supply Voltage, Pin 9	V_{CC}	20	Vdc
AGC Supply Voltage	V_{AGC}	20	Vdc
Input Differential Voltage, Pin 1 to Pin 4 (R_S = 500 Ω)	V_{ID}	±5.0	$V_{(RMS)}$
Power Dissipation (Package Limitation) Metal Can Derate above T_S = +25°C	P_D	 680 4.6	 mW mW/°C
Operating Ambient Temperature Range	T_{opg}	−155 to +125	°C
Storage Temperature Range	T_{stg}	−65 to +150	°C

Electrical Characteristics (V_{CC} = +6 Vdc, T_A = +25°C)

Characteristic	Conditions	Figure	Symbol	Min	Typ	Max	Unit
DC Characteristics							
Output Voltage	V_{AGC} = 0 Vdc V_{AGC} = +6 Vdc	1	V_O	3.80 5.90	-- --	4.65 6.00	Vdc
Test Voltage	V_{AGC} = 0 Vdc V_{AGC} = +6 Vdc	1	V8	2.85 3.25	-- --	3.40 3.80	Vdc
Supply Drain Current	V_{AGC} = 0 Vdc V_{AGC} = +6 Vdc	1	I_D	-- --	-- --	2.2 2.5	mAdc
AGC Supply Drain Current	V_{AGC} = 0 Vdc V_{AGC} = +6 Vdc	1	I_{AGC}	-- --	-- --	−0.2 0.18	mAdc
Small-Signal Characteristics							
Small-Signal Voltage Gain	f = 500 MHz	2	A_V	22	--	29	dB
Bandwidth	−30 dB	2	BW	22	--	--	MHz
Transducer Power Gain	f = 60 MHz, BW = 6 MHz f = 100 MHz, BW = 6 MHz	3	Ap	-- --	25 21	-- --	dB

Typical Characteristics (V_{CC} = 6.0 Vdc, T_A = +25°C unless otherwise noted.)

FIGURE 1 – DC CHARACTERISTICS TEST CIRCUIT

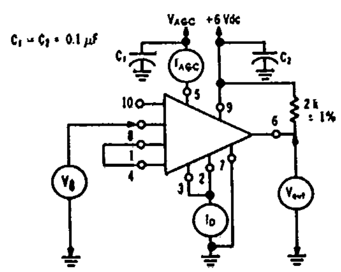

FIGURE 2 – VOLTAGE GAIN AND BANDWIDTH TEST CIRCUIT

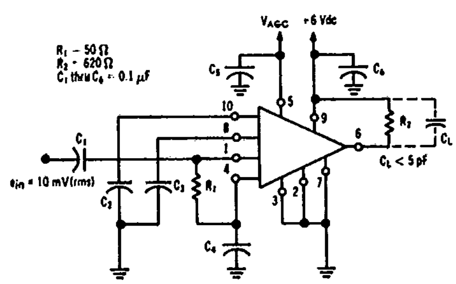

FIGURE 3 – POWER GAIN TEST CIRCUIT @ 60 MHz

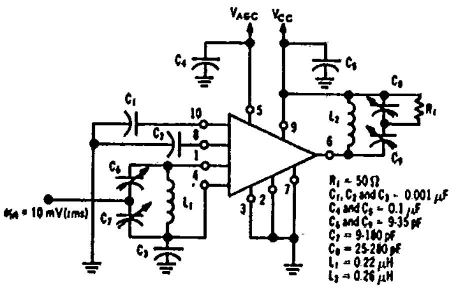

FIGURE 4 – DRAIN CURRENT TEMPERATURE CHARACTERISTICS

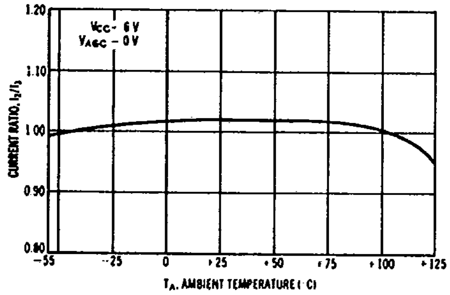

FIGURE 5 – INPUT RESISTANCE AND CAPACITANCE versus FREQUENCY

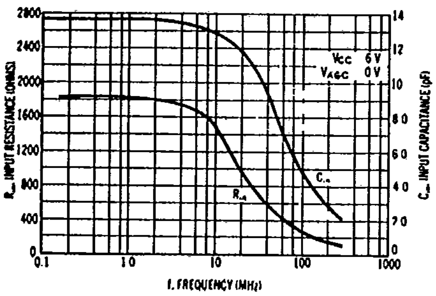

FIGURE 6 – INPUT RESISTANCE AND CAPACITANCE versus AGC VOLTAGE

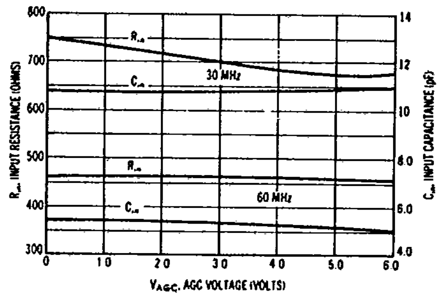

FIGURE 7 – OUTPUT RESISTANCE AND CAPACITANCE versus FREQUENCY

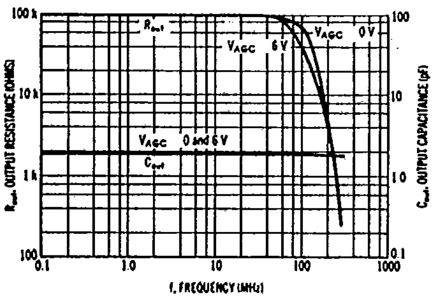

FIGURE 8 – OUTPUT RESISTANCE AND CAPACITANCE versus AGC VOLTAGE

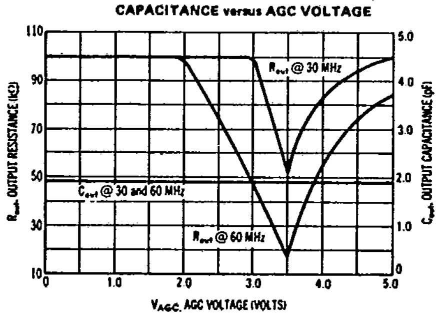

FIGURE 9 – MAXIMUM TRANSDUCER POWER GAIN versus FREQUENCY

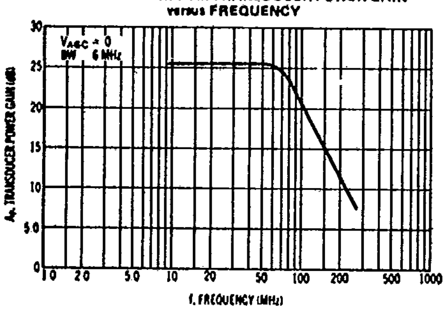

FIGURE 10 – TRANSDUCER POWER GAIN versus TEMPERATURE

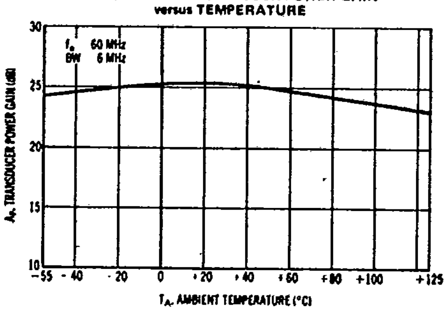

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FIGURE 11 – TRANSDUCER POWER BANDWIDTH versus AGC VOLTAGE

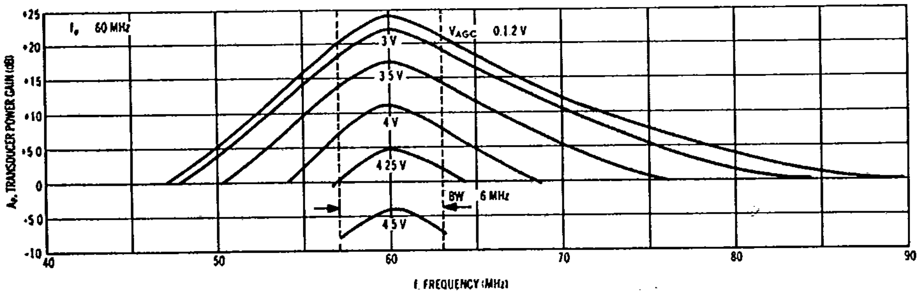


FIGURE 12 – NOISE FIGURE AND OPTIMUM SOURCE RESISTANCE versus FREQUENCY

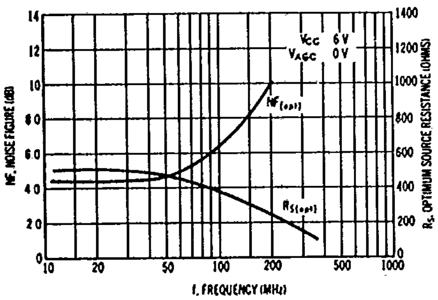


FIGURE 13 – NOISE FIGURE versus SOURCE RESISTANCE

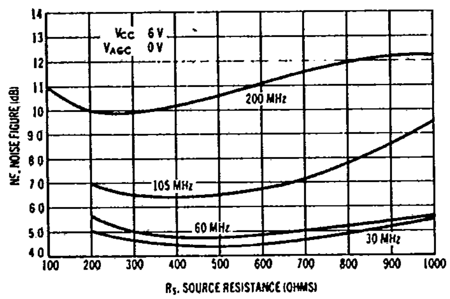


FIGURE 14 – y_{21}, FORWARD-TRANSFER ADMITTANCE versus FREQUENCY

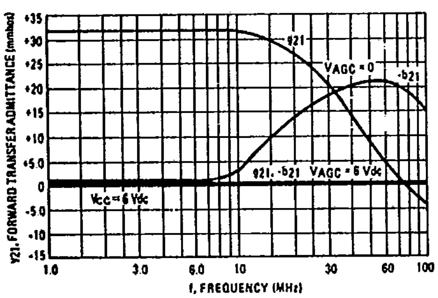


FIGURE 15 – y_{21}, FORWARD-TRANSFER ADMITTANCE versus AGC VOLTAGE

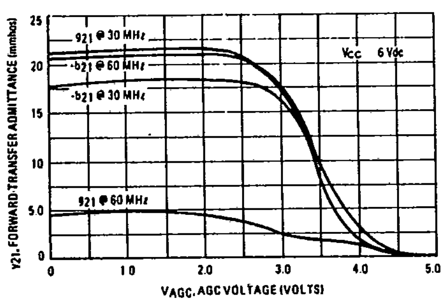


FIGURE 16 – y_{12}, REVERSE TRANSFER-ADMITTANCE versus FREQUENCY

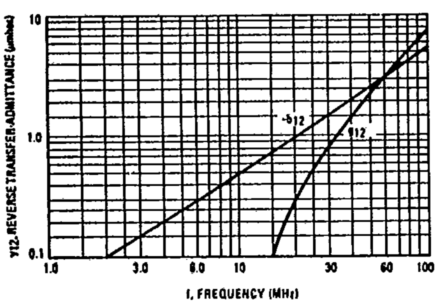
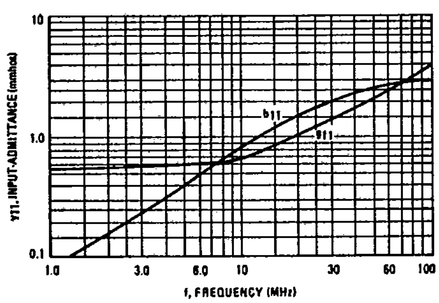


FIGURE 17 – y_{11}, INPUT-ADMITTANCE versus FREQUENCY



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The y_{12} shown in Figure 16 illustrates the extremely low feedback with no contribution from the external mounting circuitry. However, in many cases the external circuitry may contribute as much or more to the total feedback than the ECG816 or ECG817 does.

To perform more accurate design calculations of gain, stability, and input - output impedances it is recommended that the designer first determine the total feedback of device plus circuitry.

This can be done in one of two ways:

1. Measure the total y_{12} or s_{12} of the device installed in its mounting circuitry, or
2. Measure the y_{12} of the circuitry alone (without the device installed) and add the circuit y_{12} to the y_{12} for the device given in Figure 16.

FIGURE 18 – y_{22}, OUTPUT-ADMITTANCE versus FREQUENCY

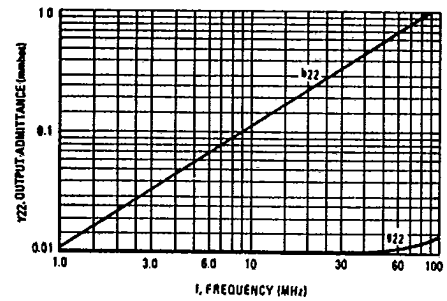

FIGURE 19 – s_{11} AND s_{22}, INPUT AND OUTPUT REFLECTION COEFFICIENT

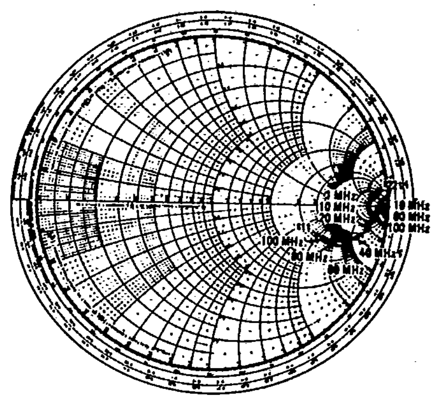

FIGURE 20 – s_{11}, INPUT REFLECTION COEFFICIENT versus FREQUENCY

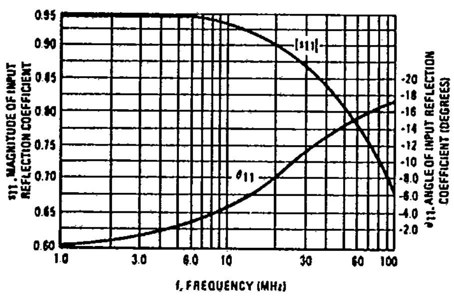

FIGURE 21 – s_{22}, OUTPUT REFLECTION COEFFICIENT versus FREQUENCY

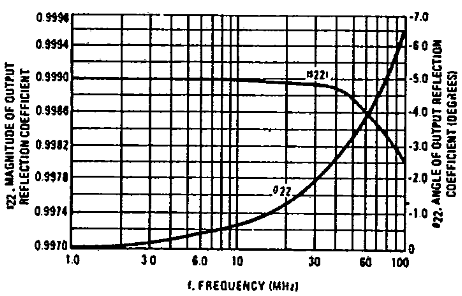

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FIGURE 22 – s_{21}, FORWARD TRANSMISSION COEFFICIENT (GAIN)

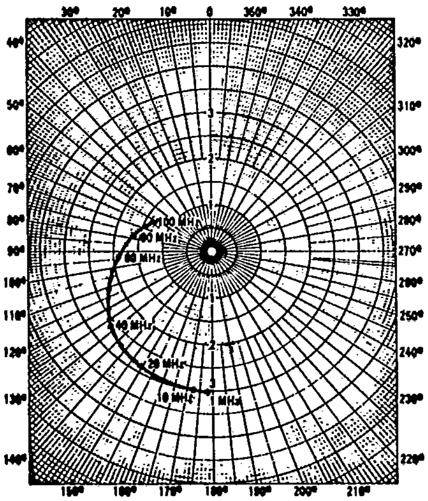

FIGURE 23 – s_{12}, REVERSE TRANSMISSION COEFFICIENT (FEEDBACK)