



SANYO Semiconductors

DATA SHEET

LA7795T — Monolithic Linear IC AGC Amplifier with Step Gain Control

Overview

The LA7795T bipolar monolithic IC is an AGC amplifier with driver amplifier for analog-to-digital converters. It is ideally suited for use with receiver systems that receive QPSK and/or QAM data transmissions.

Functions

- IF AGC control
- IF AGC amplifier
- IF step gain controlled amplifier
- Driver amplifier

Applications

- Digital CATV
- Cable modem receivers
- IP Telephony receivers

Specifications

Absolute Maximum Ratings at $T_a = 25\text{ }^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum Supply Voltage	$V_{CC\text{ max}}$	Pin 1	7.0	V
Circuit Voltages	V max	Pin 4, Pin 5	$V_{CC\text{ op}}$	V
Circuit Current	I_6 I_7	Pin 6 sink current Pin 7 sink current	2 2	mA
Allowable Power Dissipation	$P_d\text{ max}$	$T_a \leq 85\text{ }^\circ\text{C}$	190*	mW
Operating Temperature	T_{opr}		-20 to +85	$^\circ\text{C}$
Storage Temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

*Mounted on PCB (paper phenol 20.0 × 10.0 × 0.8 t mm)

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SANYO Semiconductor Co., Ltd.

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LA7795T

Recommended Operating Conditions at $T_a = 25\text{ }^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Recommended Supply Voltage	V_{CC}	Pin 1	5.0	V
Operating Supply Voltage Range	$V_{CC\text{ op}}$	Pin 1	4.5 to 5.5	V

Electrical Characteristics

AC Characteristics at $T_a = 25\text{ }^\circ\text{C}$, $V_{CC} = 5.0\text{ V}$

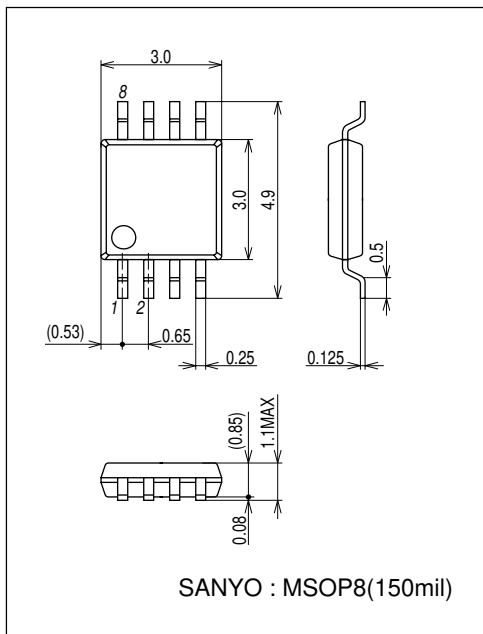
Parameter	Symbol	Pin No.	Conditions	Ratings			Unit	
				min	typ	max		
Circuit Current	I_{total}	1	No Signal	*1	18	24	30	mA
IF Input Frequency Range	$f(in)$	2, 3	$f_c : -3\text{ dB}$	*1	30	-	100	MHz
Noise Figure	NF	6, 7	$V_4 = 3.0\text{ V}$, $f = 45\text{ MHz}$ Pin 5 : V_{CC}	*2	-	5	-	dB
			$V_4 = 3.0\text{ V}$, $f = 45\text{ MHz}$ Pin 5 : GND	*2	-	5	-	dB
			$V_4 = 3.0\text{ V}$, $f = 45\text{ MHz}$ Pin 5 : OPEN	*2	-	8	-	dB
Intermodulation	IM3	6/2, 3 7/2, 3	$f_1 = 44\text{ MHz}$, $f_2 = 45\text{ MHz}$ Input = $90\text{ dB}\mu\text{Tone}$, Output = $104\text{ dB}\mu\text{Tone}$	*1	50	-	-	dBc
Total Amplifier Gain	$G(AGC1)$	6/2, 3	$V_4 = 3.0\text{ V}$, $f = 45\text{ MHz}$ Pin 5 : V_{CC}	*1	57.5	60	62.5	dB
	$G(AGC2)$	7/2, 3	$V_4 = 3.0\text{ V}$, $f = 45\text{ MHz}$ Pin 5 : GND	*1	47.5	50	52.5	dB
	$G(AGC3)$		$V_4 = 3.0\text{ V}$, $f = 45\text{ MHz}$ Pin 5 : OPEN	*1	33.5	36	38.5	dB
AGC Range 1	GR1	6/2, 3 7/2, 3	IF Output Level $< \pm 1\text{ dB}$, $f = 45\text{ MHz}$	*1	40	-	-	dB
IF Output Level	$V_O(IF)$	6, 7	Output Level, $f = 45\text{ MHz}$	*1	-	1.0	-	V _{p-p}
AGC Control Max. Voltage	V4H	4	Gain Max.	*1	2.5	-	3.3	V
AGC Control Min. Voltage	V4L	4	Gain Min.	*1	0	-	0.5	V
Input impedance	Z_{in}	2, 3	$V_4 = 0\text{ V}$, $f = 45\text{ MHz}$	*3	-	1 // 4.9	-	k Ω // pF

Note) *1 : Measurement circuit 1, *2 : Measurement circuit 2, *3 : Measurement circuit 3

Package Dimensions

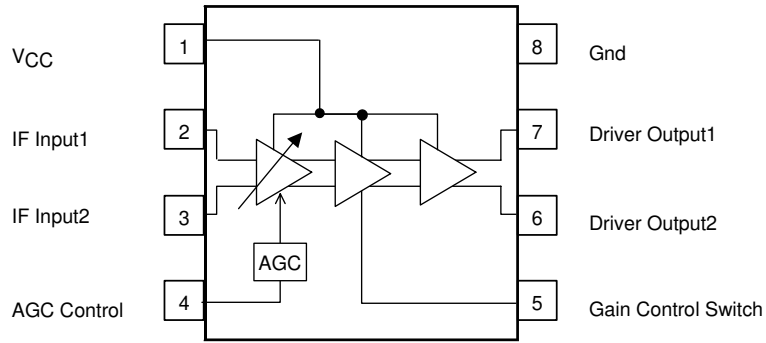
unit : mm (typ)

3245B



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Block Diagram

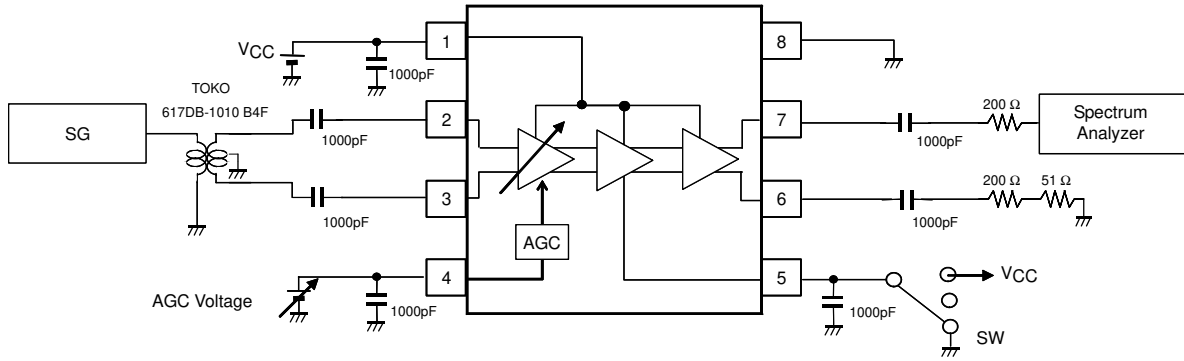


Pin Functions

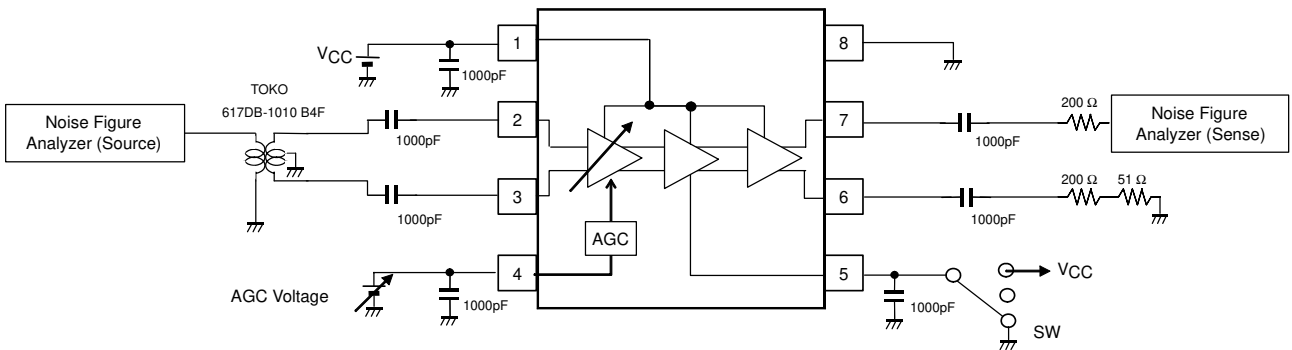
Pin Number	Pin Name	Descriptions
1	V _{CC}	
2 3	IF Input	<p>The IF input stage uses a differential pair of transistors. Each input (pins 2 and 3) is connected through a 1kΩ resistor. A bias supply is connected to the common emitter point of the pair. The outputs are connected to the internal amplifier stages.</p>
4	AGC Control	<p>The AGC control input (pin 4) is connected to a transistor. The base of the transistor is connected to VCC through a 1kΩ resistor. The emitter is grounded, and the collector is connected to the internal AGC control circuitry.</p>
5	Gain Control Switch	<p>The gain control switch (pin 5) is connected to a multi-stage transistor circuit. The base of the first transistor is connected to VCC through an 80kΩ resistor and to pin 5 through a 10kΩ resistor. The circuit includes several other resistors and transistors to provide gain control to the driver outputs.</p>
6 7	Driver Output	<p>The driver output stage (pins 6 and 7) is a push-pull stage. Each output is connected to a 20Ω resistor. The circuit is powered by VCC and includes two 5.0mA current sources connected to ground.</p>
8	GND	

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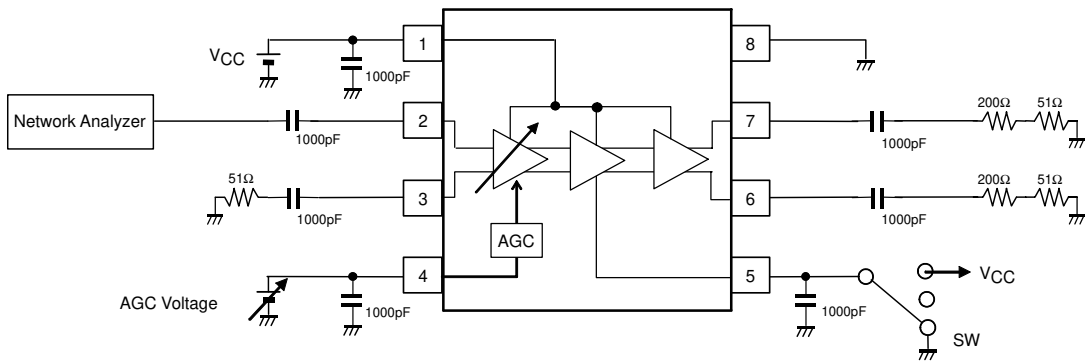
LA7795T Gain Measurement Circuit 1



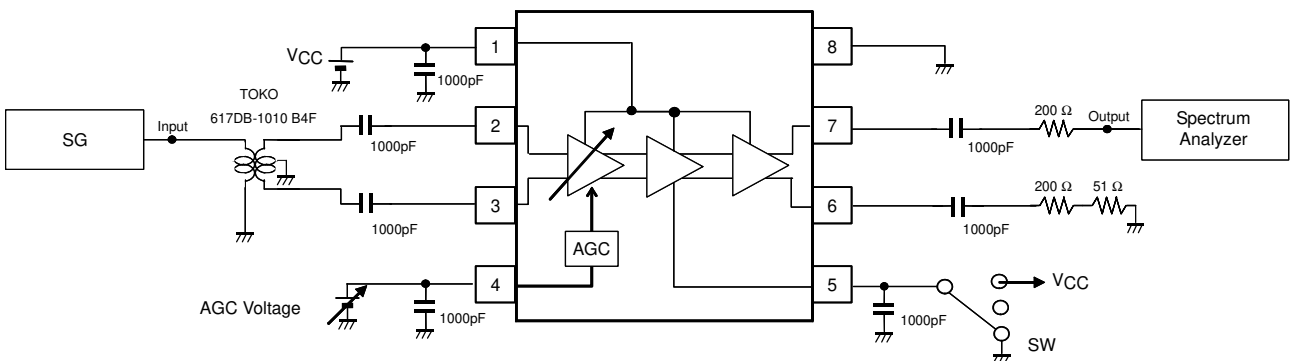
LA7795T Noise Figure Measurement Circuit 2



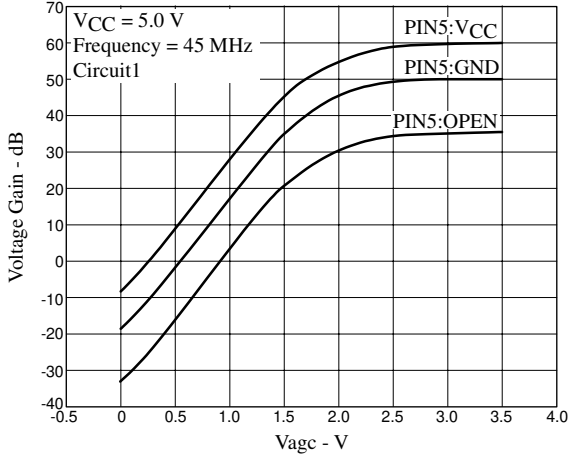
LA7795T Input Impedance Measurement Circuit 3



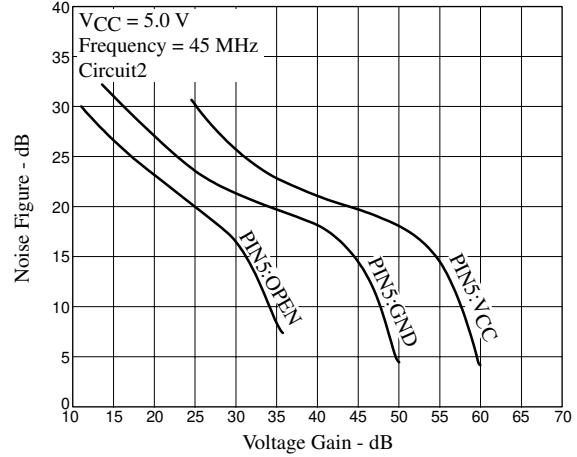
LA7795T Intermodulation Measurement Circuit 4



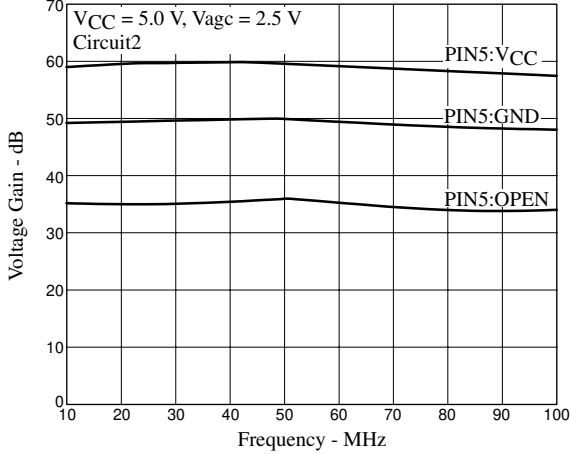
Gain - Vagc Characteristic



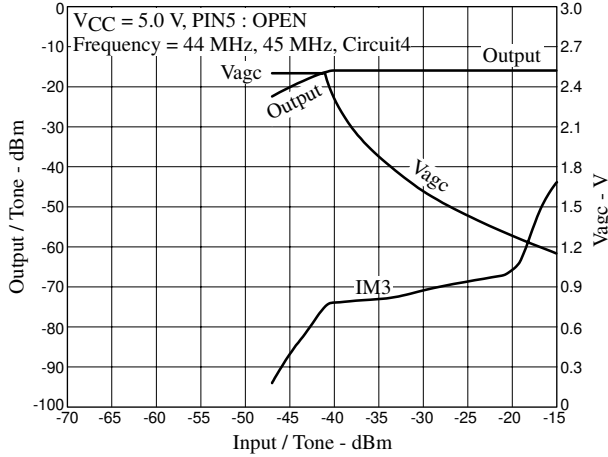
Noise Figure - Gain Characteristic



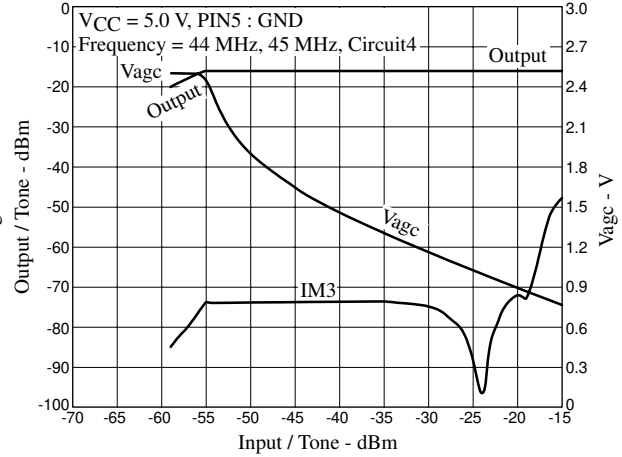
Gain - Frequency Characteristic



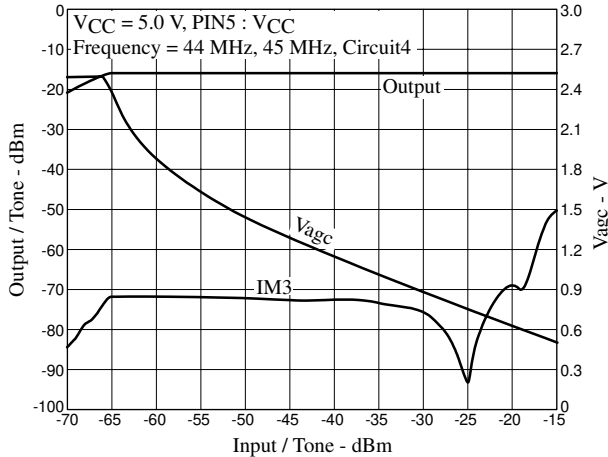
Intermodulation Characteristic



Intermodulation Characteristic



Intermodulation Characteristic

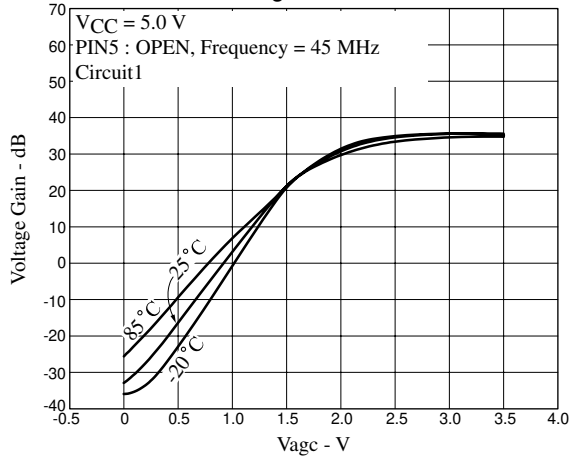


The vertical axis (Output/Tone) on this graph shows the values displayed by the spectrum analyzer for circuit 4.

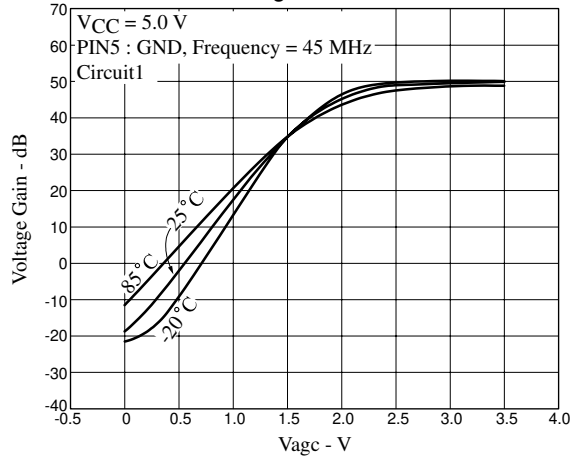
The actual output power for the corresponding pins is given by the following formula.

$$\{\text{output power [dBm]}\} = \{\text{displayed value [dBm]}\} + 10 \cdot \log(250 \Omega / 50 \Omega)$$

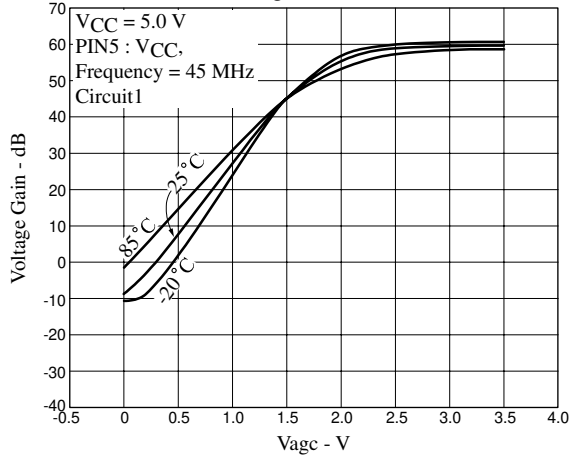
Gain - Vagc Characteristic



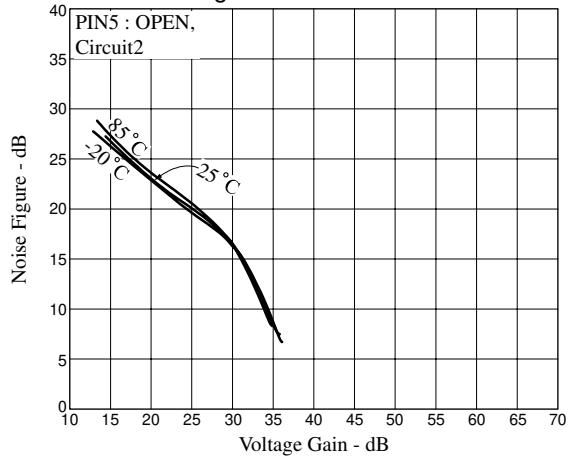
Gain - Vagc Characteristic



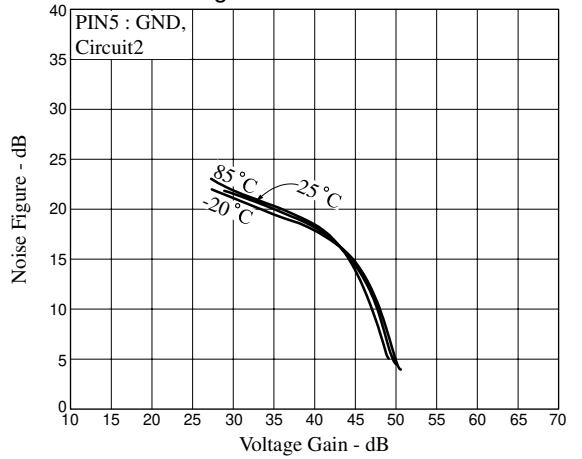
Gain - Vagc Characteristic



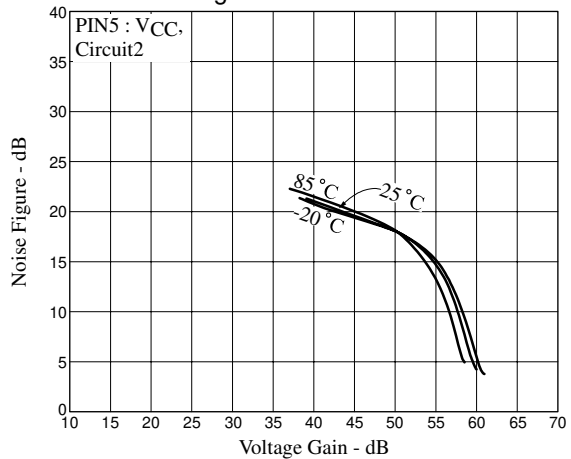
Noise Figure - Gain Characteristic

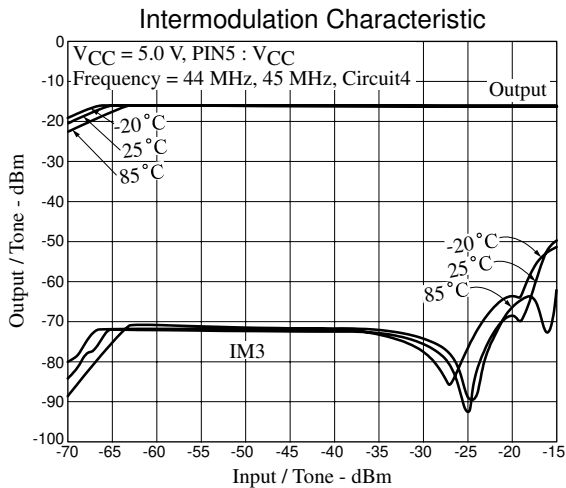
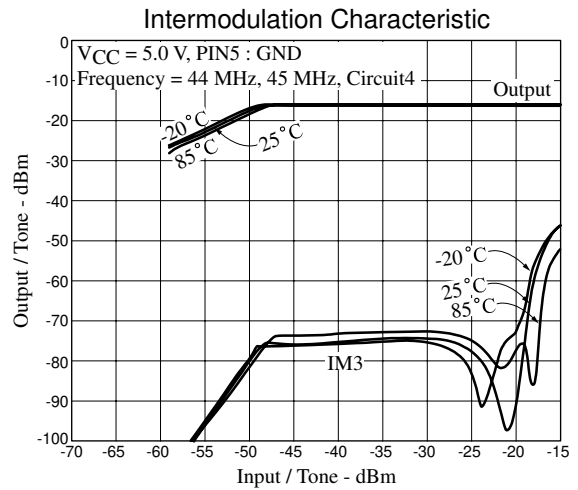
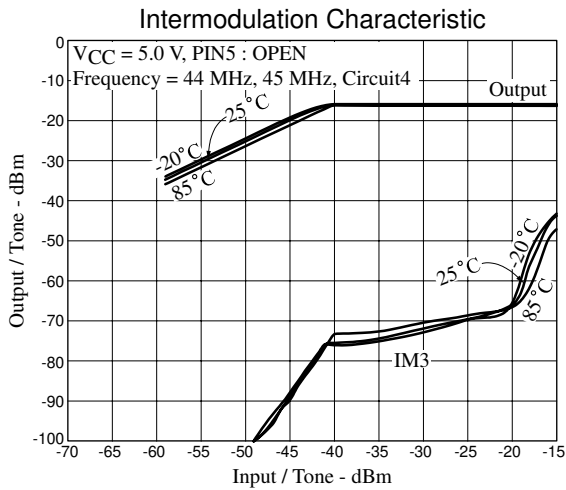
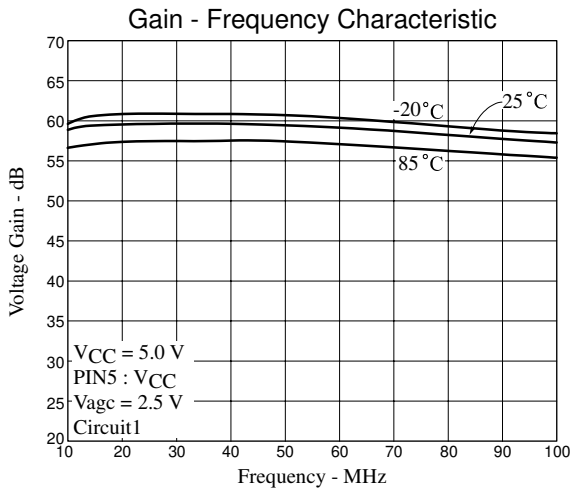
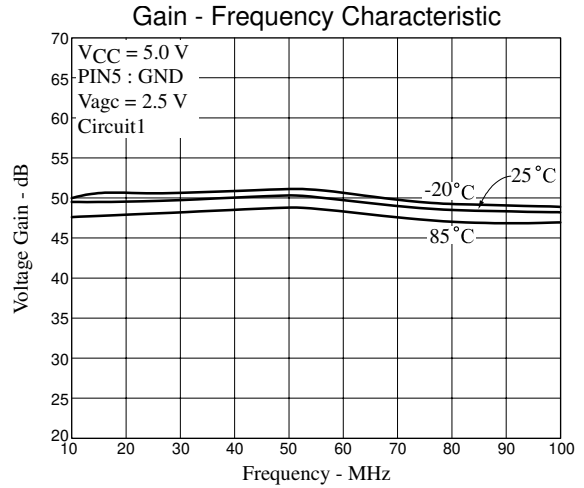
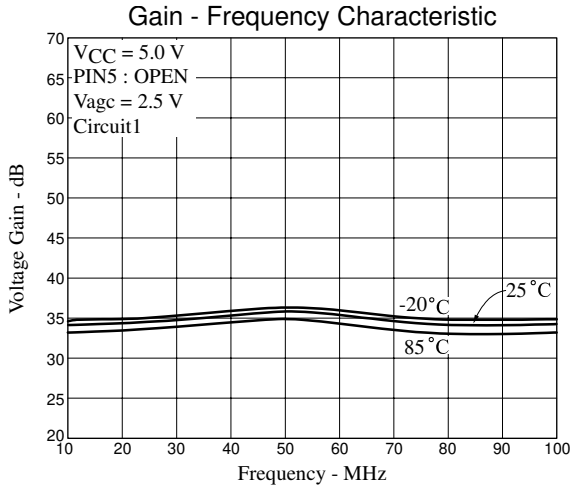


Noise Figure - Gain Characteristic



Noise Figure - Gain Characteristic





The vertical axis (Output/Tone) on this graph shows the values displayed by the spectrum analyzer for circuit 4.

The actual output power for the corresponding pins is given by the following formula.

$$\{\text{output power [dBm]}\} = \{\text{displayed value [dBm]}\} + 10 \cdot \log(250 \Omega / 50 \Omega)$$

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