



SANYO Semiconductors DATA SHEET

LA8120T — Monolithic Linear IC AGC Amplifier with Step Gain Control

Overview

The LA8120T 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	$V\text{ max}$	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	$P_d\text{ max}$	$T_a \leq 85\text{ }^\circ\text{C}$	220*	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 $20.0 \times 10.0 \times 0.8\text{ t mm}$)

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

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LA8120T

Electrical Characteristics

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

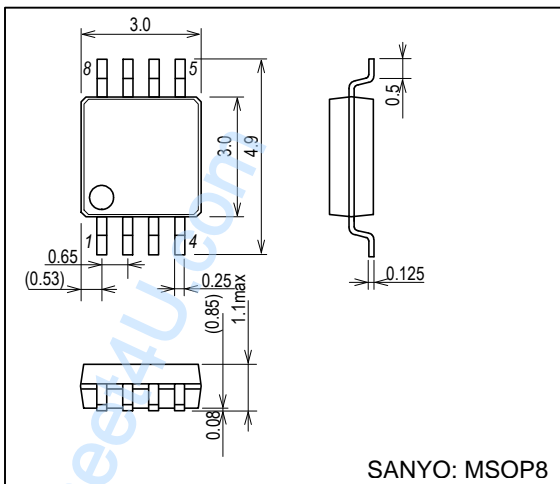
Parameter	Symbol	Pin No.	Conditions	Ratings			Unit		
				min	typ	max			
Circuit Current	I_{total}	1	No Signal	*1	25	30	35	mA	
IF Input Frequency Range	$f(in)$	2, 3	$f_c : -3\text{ dB}$	*1	30	-	100	MHz	
Noise Figure	NF	6, 7	$V_4 = 3.0\text{ V}$, $f = 45\text{ MHz}$	Pin 5 : V_{CC}	*2	-	5	-	dB
			$V_4 = 3.0\text{ V}$, $f = 45\text{ MHz}$	Pin 5 : GND	*2	-	6	-	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 7/2, 3	$V_4 = 3.0\text{ V}$, $f = 45\text{ MHz}$	Pin 5 : V_{CC}	*1	45.5	48	50.5	dB
	$G(AGC2)$	6/2, 3 7/2, 3	$V_4 = 3.0\text{ V}$, $f = 45\text{ MHz}$	Pin 5 : GND	*1	41.5	44	46.5	dB
	$G(AGC3)$	6/2, 3 7/2, 3	$V_4 = 3.0\text{ V}$, $f = 45\text{ MHz}$	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	-	Vp-p	
AGC Control Max. Voltage	V4H	4	Gain Max.	*1	2.5	-	3	V	
AGC Control Min. Voltage	V4L	4	Gain Max.	*1	0	-	0.5	V	
Input impedance	Z_{in}	2, 3	$V_4 = 0\text{ V}$, $f = 45\text{ MHz}$	*3	-	1 // 4.9	-	$k\Omega // pF$	

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

Package Dimensions

unit : mm

3245A [LA8120T]

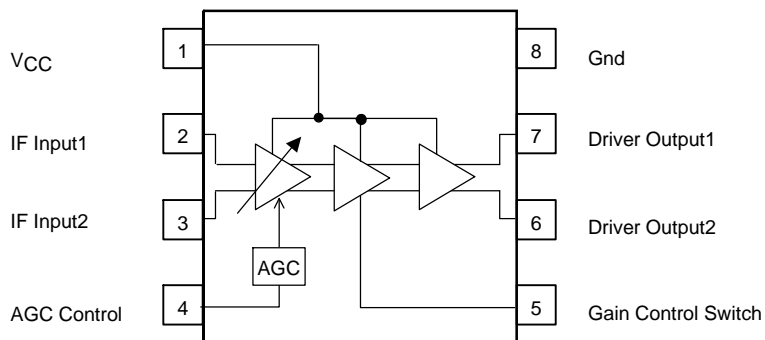


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Pin Functions

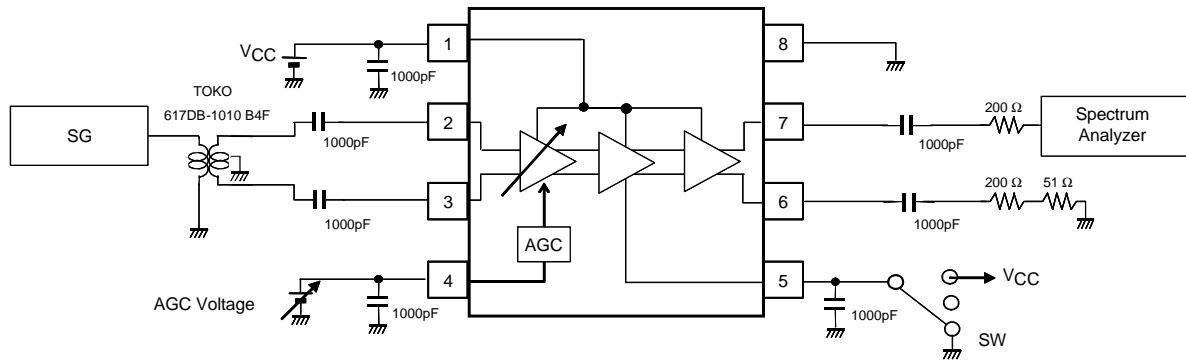
Pin Number	Pin Name	Descriptions
1	V _{CC}	
2 3	IF Input	
4	AGC Control	
5	Gain Control Switch	
6 7	Driver Output	
8	GND	

Block Diagram

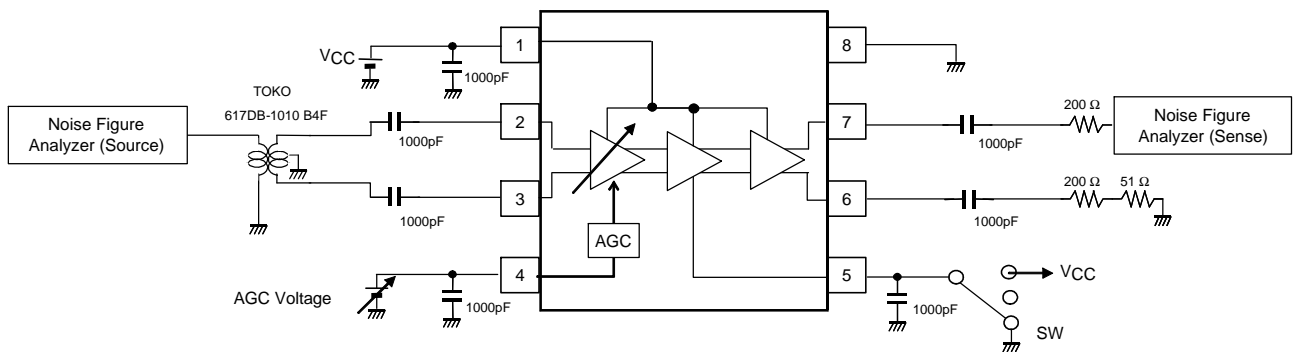


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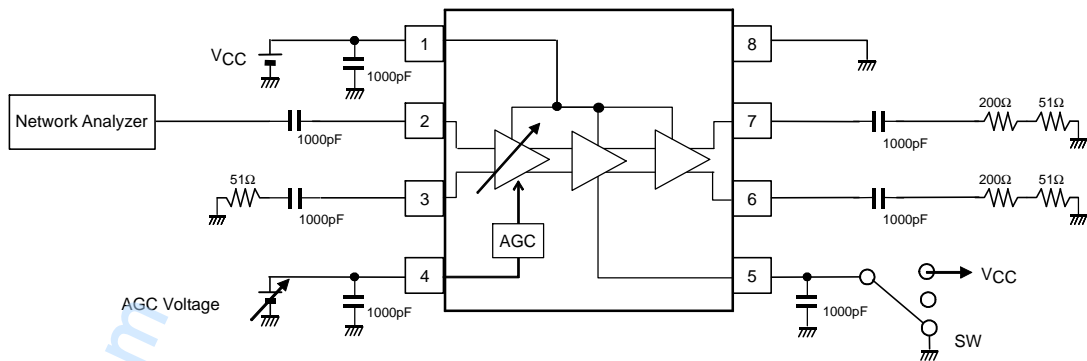
LA8120T Gain, Measurement Circuit 1



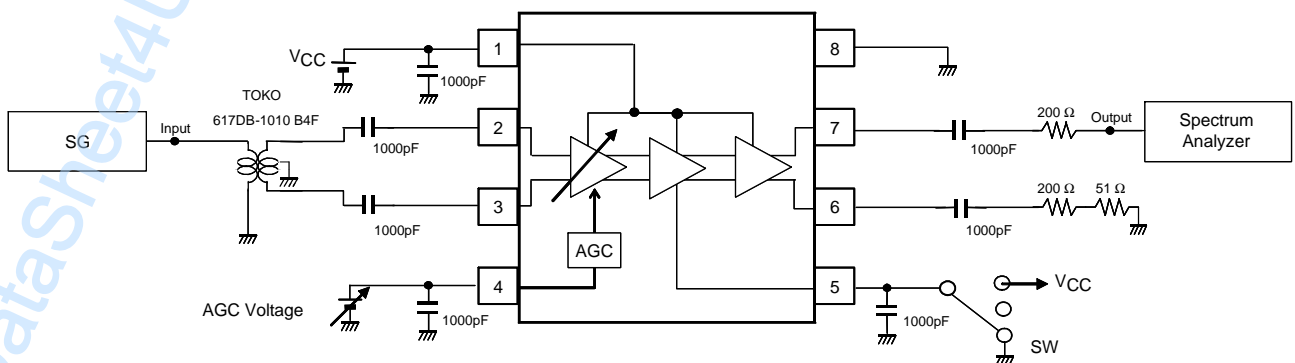
LA8120T Noise Figure Measurement Circuit 2



LA8120T Input Impedance Measurement Circuit 3

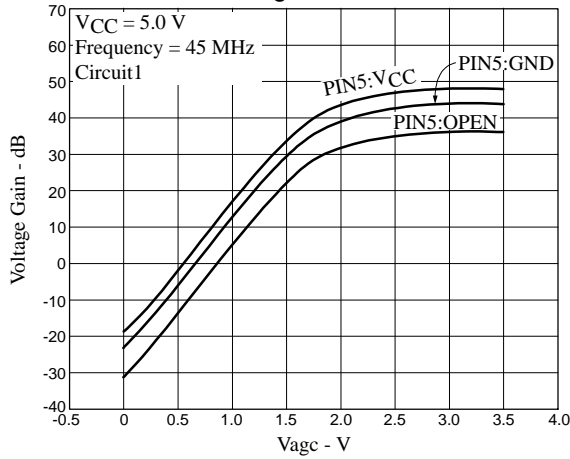


LA8120T Intermodulation Measurement Circuit 4

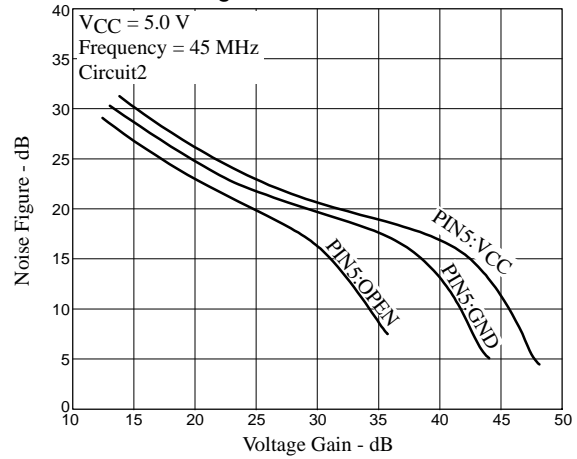


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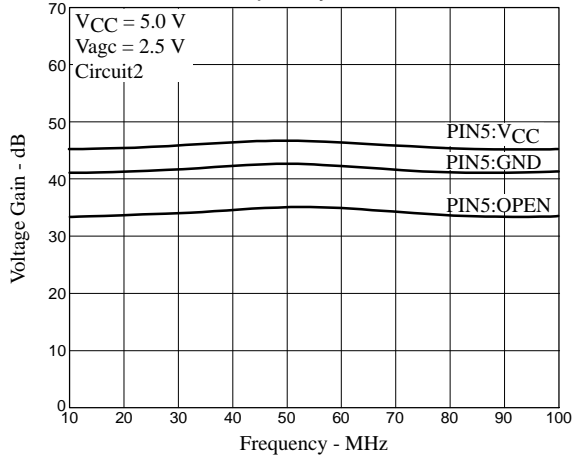
Gain - Vagc Characteristic



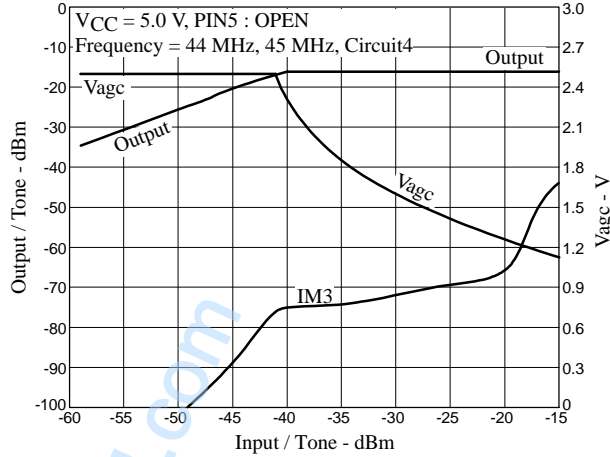
Noise Figure - Gain Characteristic



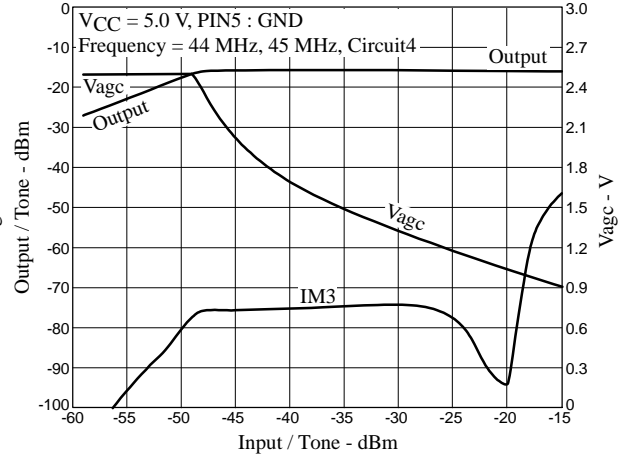
Gain - Frequency Characteristic



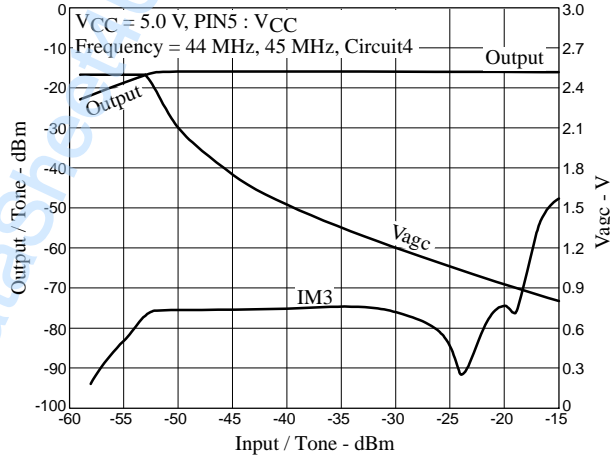
Intermodulation Characteristic



Intermodulation Characteristic



Intermodulation Characteristic



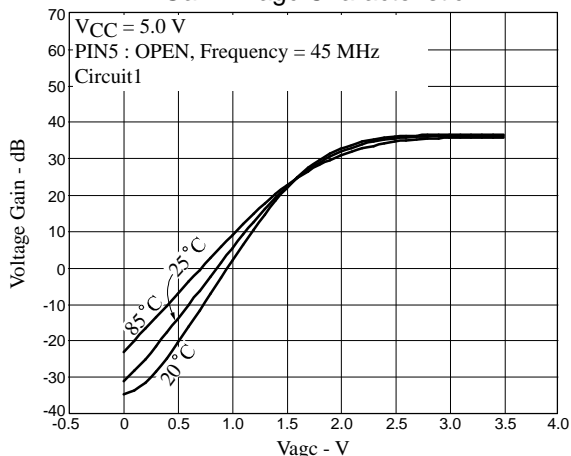
The vertical axis (Output/Tone) on this graph shows the values displayed by the spectrum analyzer for circuit 4.

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

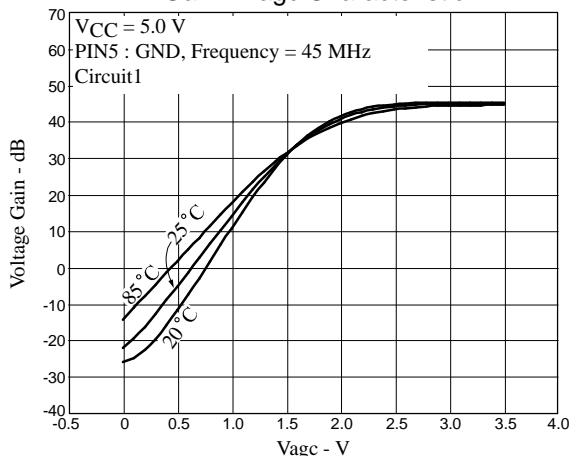
$$\{\text{output power [dBm]}\} = \{\text{displayed value [dBm]}\} + 10 \cdot \log(250 \Omega / 50 \Omega)$$

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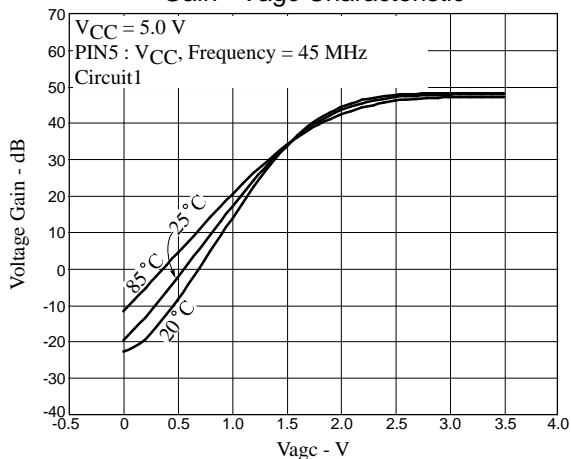
Gain - V_{agc} Characteristic



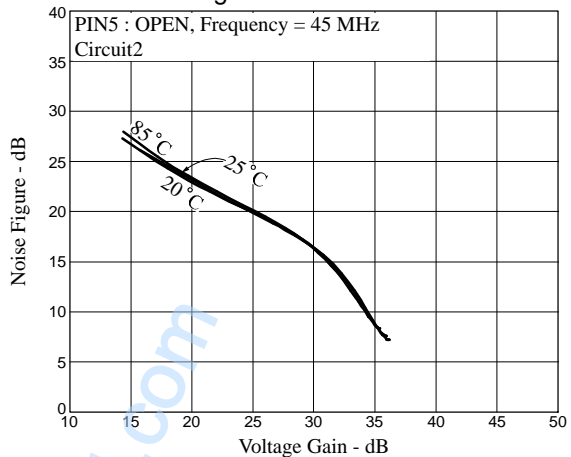
Gain - V_{agc} Characteristic



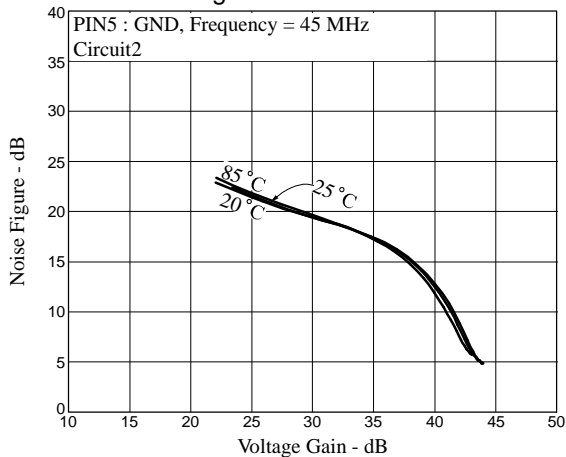
Gain - V_{agc} Characteristic



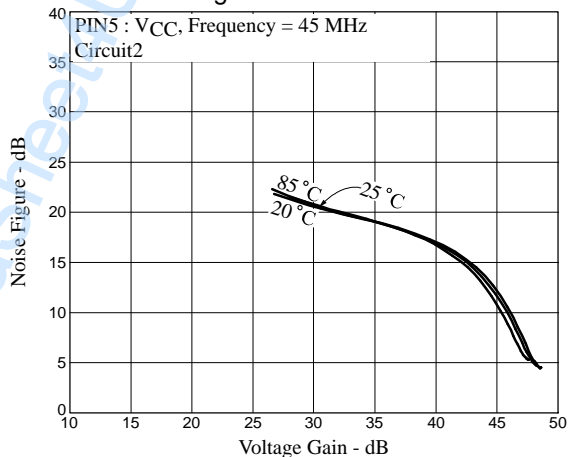
Noise Figure - Gain Characteristic



Noise Figure - Gain Characteristic

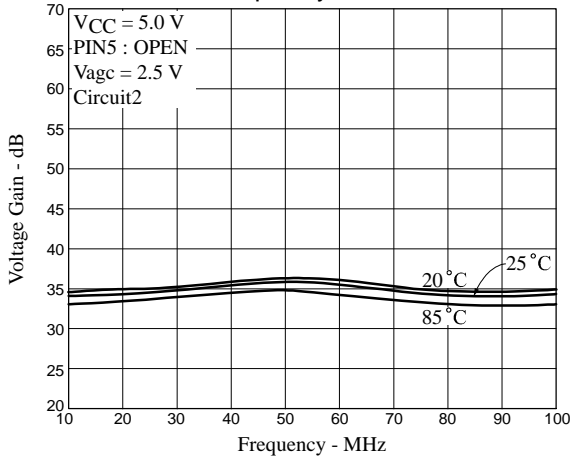


Noise Figure - Gain Characteristic

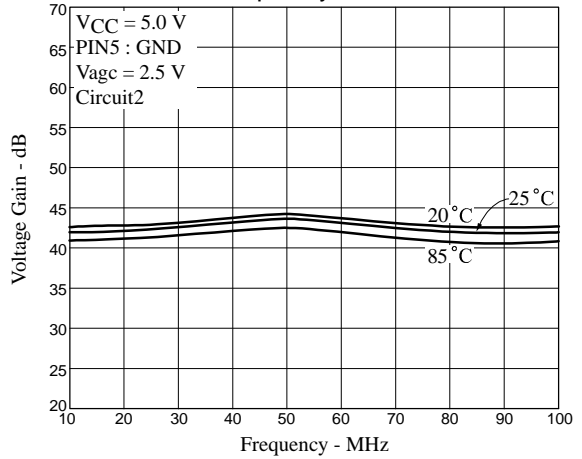


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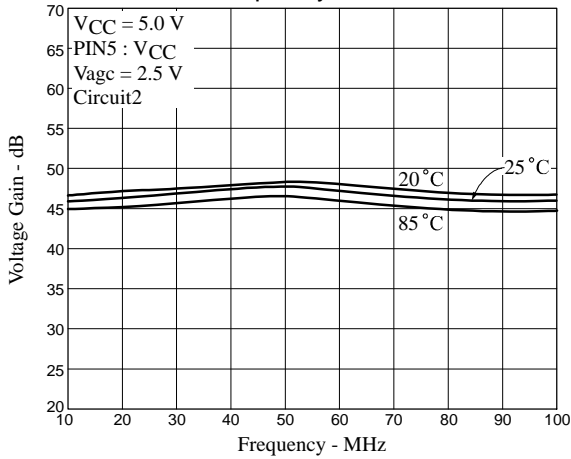
Gain - Frequency Characteristic



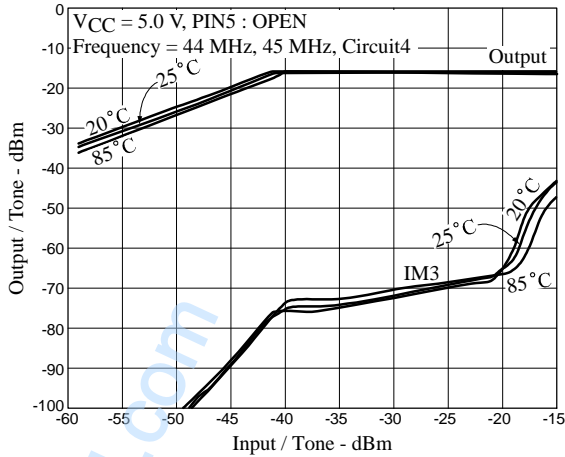
Gain - Frequency Characteristic



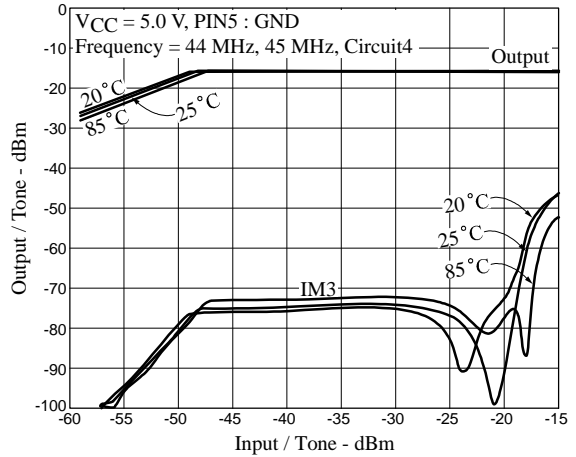
Gain - Frequency Characteristic



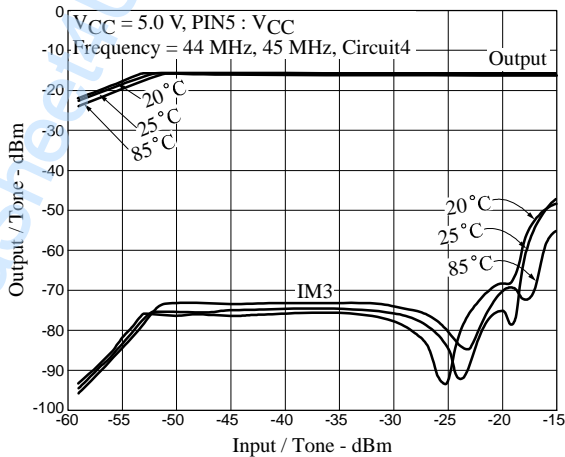
Intermodulation Characteristic



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.

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

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