NEC's GENERAL PURPOSE 5 V AGC AMPLIFIER

UPC3217GV UPC3218GV

FEATURES

- **ON-CHIP LOW DISTORTION AMPLIFIER:**
  IIP_3 = -4 dBm at minimuim gain
- **WIDE AGC DYNAMIC RANGE:**
  GCR = 53 dB TYP
- **ON-CHIP VIDEO AMPLIFIER:**
  V_{OUT} = 1.25 V_{P-P} at single-ended output
- **SUPPLY VOLTAGE:**
  V_{CC} = 5 V
- **PACKAGED IN 8 PIN SSOP SUITABLE FOR SURFACE MOUNTING**

DESCRIPTION

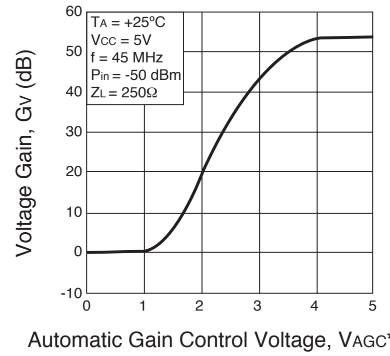
NEC's UPC3217GV and UPC3218GV are Silicon Monolithic ICs designed for use as AGC amplifiers for digital CATV, cable modems and IP telephony systems. These ICs consist of a two stage gain control amplifier and a fixed video gain amplifier. The devices provide a differential input and differential output for noise performance, which eliminates shielding requirements.

The package is 8-pin SSOP (Shrink Small Outline Package) suitable for surface mount.

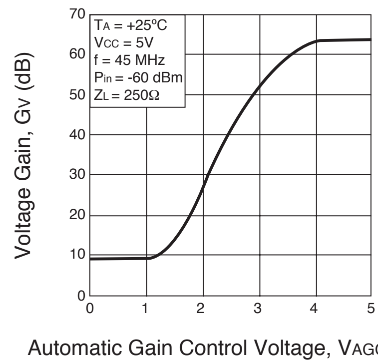
These ICs are manufactured using NEC's 10 GHz f_T NESAT™II AL silicon bipolar process. This process uses silicon nitride passivation film. This material can protect chip surface from external pollution and prevent corrosion/migration. Thus, these ICs have excellent performance, uniformity and reliability.

NEC's stringent quality assurance and test procedures ensure the highest reliability and performance.

VOLTAGE GAIN vs. AUTOMATIC GAIN CONTROL VOLTAGE*



UPC3217GV



UPC3218GV

APPLICATIONS

- Digital CATV
- Cable modem receivers
- IP Telephony Receivers

ELECTRICAL CHARACTERISTICS

(T_A = 25°C, V_{CC} = 5 V, Z_S = 1 K Ω, Z_L = 240 Ω, f_{IN} = 45 MHz, Unless otherwise specified)

	PART NUMBER PACKAGE OUTLINE		UPC3217GV S08			UPC3218GV S08		
SYMBOLS	**PARAMETERS AND CONDITIONS**	**UNITS**	**MIN**	**TYP**	**MAX**	**MIN**	**TYP**	**MAX**
DC Characteristics								
I_{CC}	Circuit Current (no input signal)	mA	15	23	34	15	23	34
RF Characterisitics								
BW	Frequency Bandwidth, V_{AGC}* = 4.5 V[1]	MHz		100			100	
G_{MAX}	Maximum Gain , V_{AGC}* = 4.5 V	dB	50	53	56	60	63	66
G_{MIN}	Minimum Gain, V_{AGC}* = 0.5 V	dB	-4.5	0	3.5	4.5	10	13.5
GCR	Gain ConTrol Range, V_{AGC}* = 0.5 to 4.5 V	dB	46.5	53		46.5	53	
NF_{AGC}	Noise Figure, V_{AGC}* = 4.5 V at MAX Gain	dB		6.5	8.0		3.5	4.5
V_{OUT}	Output Voltage, Single Ended Output	V_{P-P}		1.25			1.25	
IM_3	Third Order Intermodulation Distortion, f_{IN1} = 44 MHz, f_{IN2} = 45 MHz, V_{IN} = 30 dBmV per tone[2]	dBc		55			55	

Note:
1. -3dB with respect to 10 MHz gain
2. V_{AGC} is adjusted to establish VOUT = 1.25 V_{P-P} per tone

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* V_{AGC} shown as applied in the evaluation cicuit (see page 5) through a resistive bridge (voltage divider). Actual voltage range on the pin of the IC is 0 to 3 V.

ABSOLUTE MAXIMUM RATINGS[1]

(T_A = 25°C, unless otherwise specified)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{CC}	Supply Voltage	V	6.0
P_D	Power Dissipation[2], T_A = 85˚C	mW	250
T_{OP1}	Operating Ambient Temp.	°C	-40 to +85
T_{STG}	Storage Temperature	°C	-50 to +150

Notes:
1. Operation in excess of any one of these parameters may result in permanent damage.
2. Mounted on a 50 x 50 x 1.6 mm epoxy glass PWB, with copper patterning on both sides.

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	UNITS	MIN	TYP	MAX
V_{CC}	Supply Voltage	V	4.5	5.0	5.5
T_A	Operating Ambient Temp.[1]	°C	-40	+25	+85
V_{AGC}[2]	Gain Control Voltage Range	V	0	–	3.0
V_{IN}	Video Input Signal Range	dBmV	8		30

Note:
1. V_{CC} = 4.5 to 5.5 V
2. AGC range at pin 4 of the IC

ORDERING INFORMATION

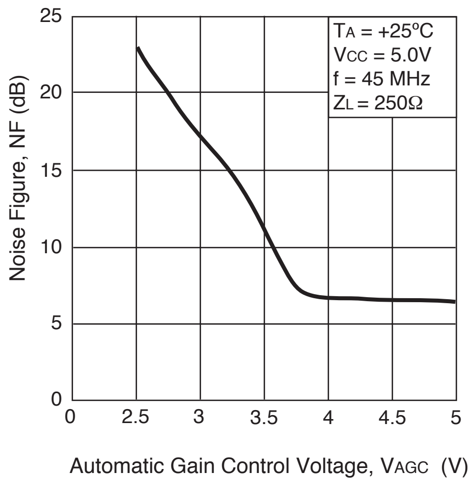
PART NUMBER	QUANTITY
UPC3217GV-E1-A	1 kp/Reel
UPC3218GV-E1-A	1 kp/Reel

Note:
Embossed tape 8 mm wide. Pin 1 indicates pull-out direction of tape.

TYPICAL PERFORMANCE CURVES (T_A = 25°C, unless otherwise specified)

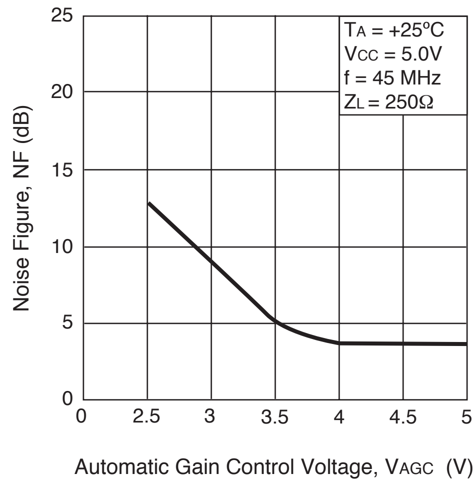
UPC3217GV

NOISE FIGURE vs. AUTOMATIC GAIN CONTROL VOLTAGE*

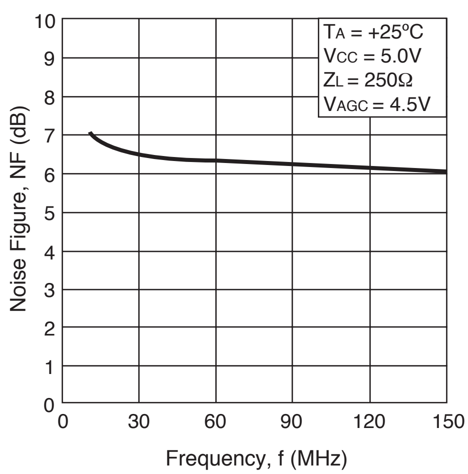


UPC3218GV

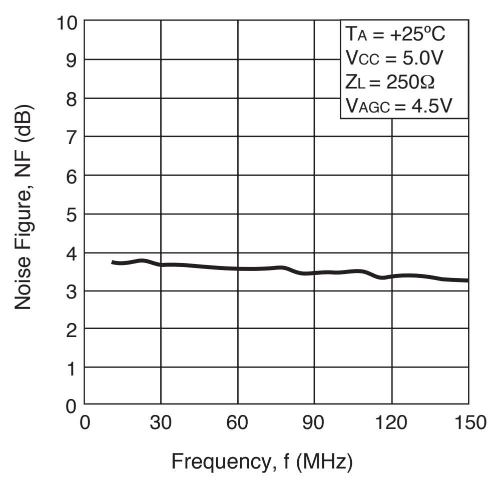
NOISE FIGURE vs. AUTOMATIC GAIN CONTROL VOLTAGE*



NOISE FIGURE vs. FREQUENCY



NOISE FIGURE vs. FREQUENCY

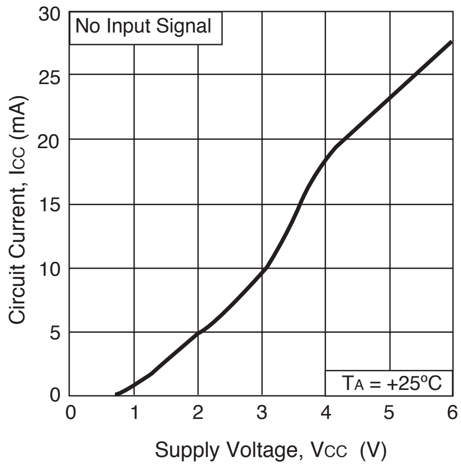


* V_{AGC} shown as applied in the evaluation cicuit (see page 5) through a resistive bridge (voltage divider). Actual voltage range on the pin of the IC is 0 to 3 V.

TYPICAL PERFORMANCE CURVES (T_A = 25°C, unless otherwise specified)

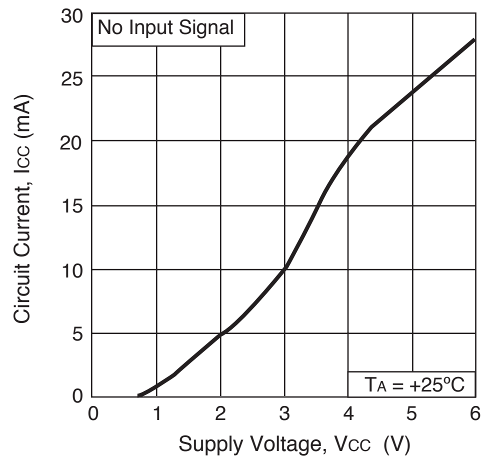
UPC3217GV

CIRCUIT CURRENT vs. SUPPLY VOLTAGE

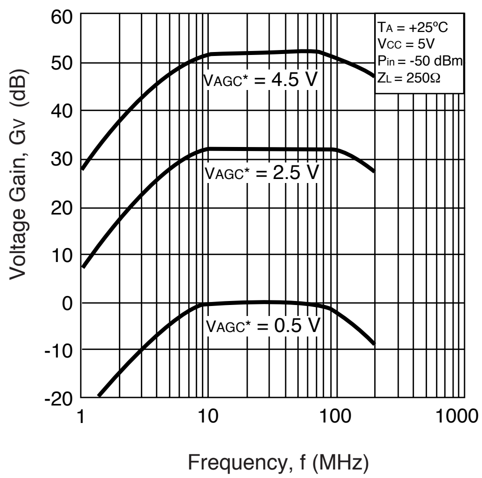


UPC3218GV

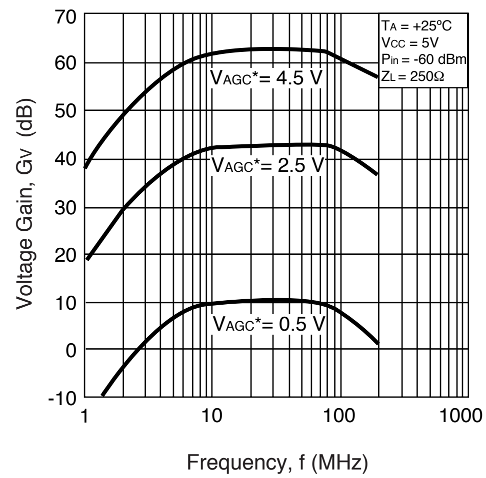
CIRCUIT CURRENT vs. SUPPLY VOLTAGE



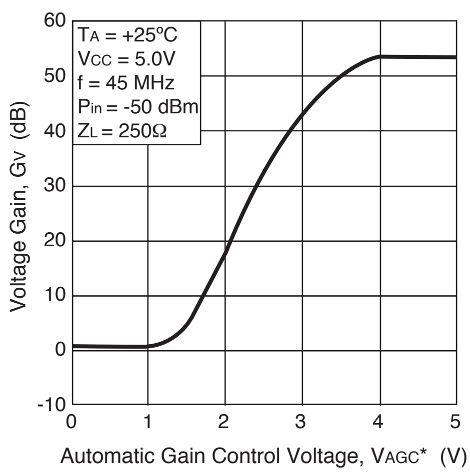
VOLTAGE GAIN vs. FREQUENCY



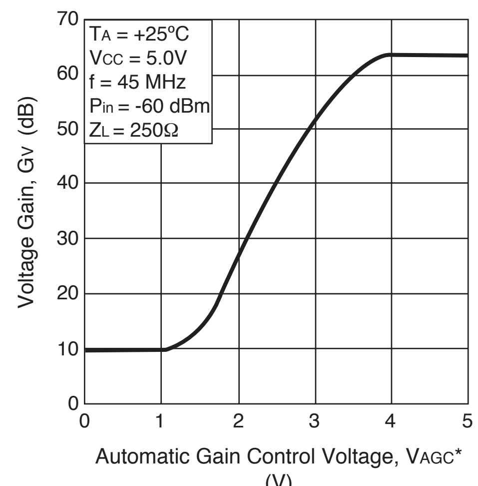
VOLTAGE GAIN vs. FREQUENCY



VOLTAGE GAIN vs. AUTOMATIC GAIN CONTROL VOLTAGE*



VOLTAGE GAIN vs. AUTOMATIC GAIN CONTROL VOLTAGE*

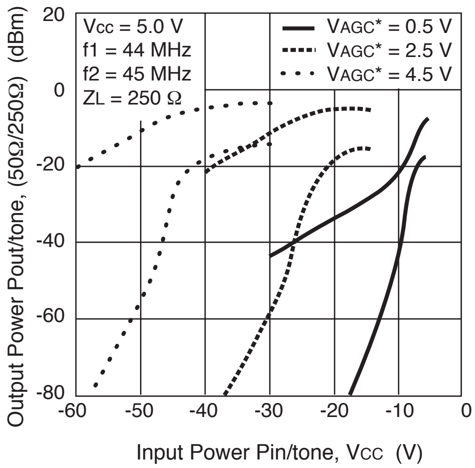


* V_{AGC} shown as applied in the evaluation cicuit (see page 5) through a resistive bridge (voltage divider).
Actual voltage range on the pin of the IC is 0 to 3 V.

TYPICAL PERFORMANCE CURVES, cont. (TA = 25°C, unless otherwise specified)

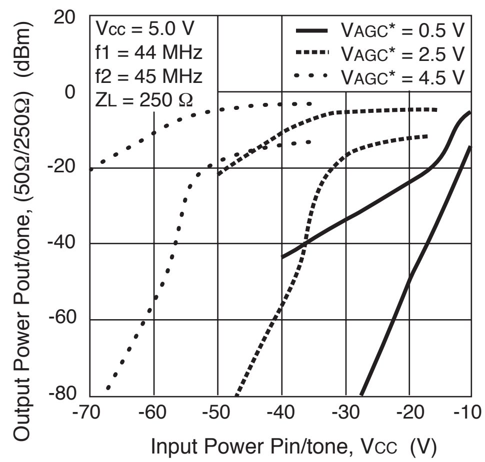
UPC3217GV

3RD ORDER INTERMODULATION DISTORTION

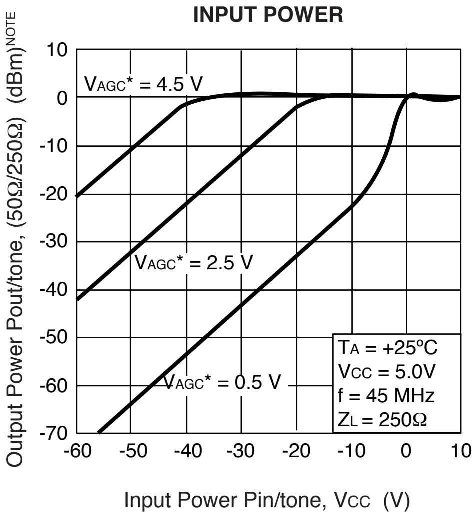


UPC3218GV

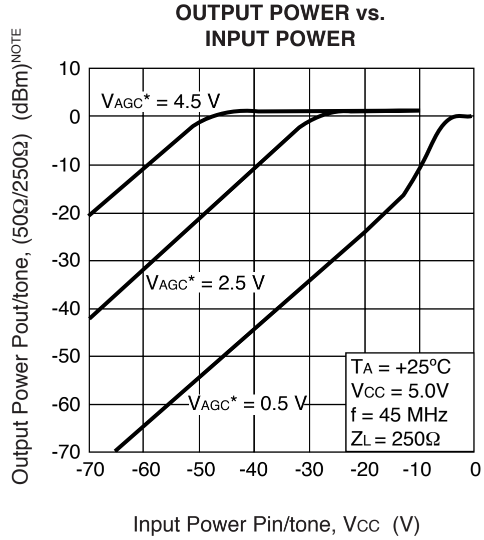
3RD ORDER INTERMODULATION DISTORTION



OUTPUT POWER vs. INPUT POWER



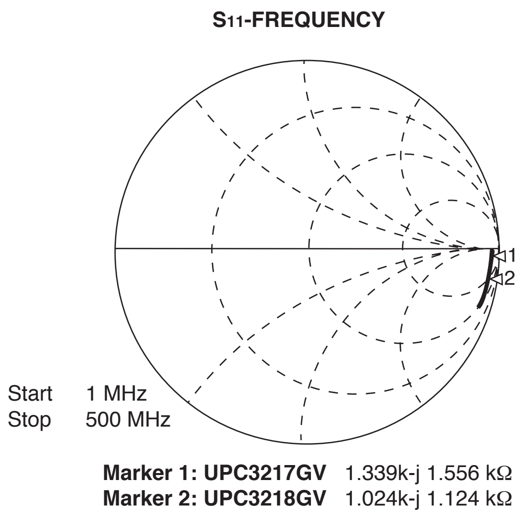
OUTPUT POWER vs. INPUT POWER

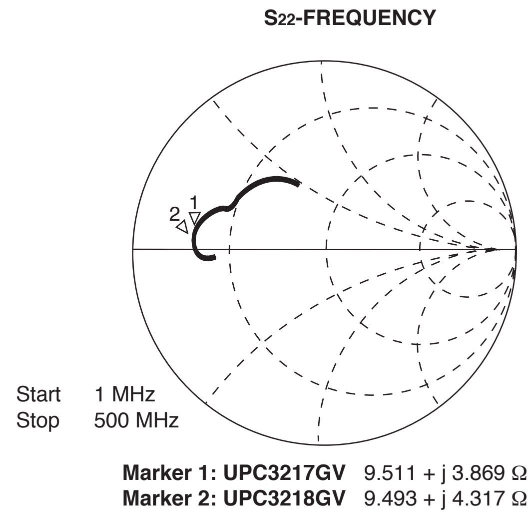


NOTE: Measurement value with spectrum analyzer.

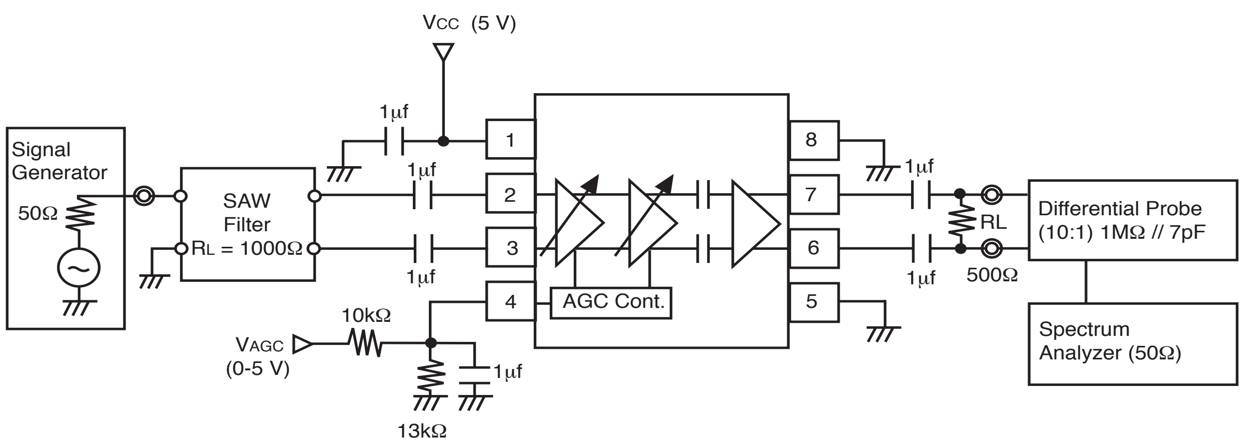
* VAGC shown as applied in the evaluation cicuit (see page 5) through a resistive bridge (voltage divider).
Actual voltage range on the pin of the IC is 0 to 3 V.

TYPICAL SCATTERING PARAMETERS

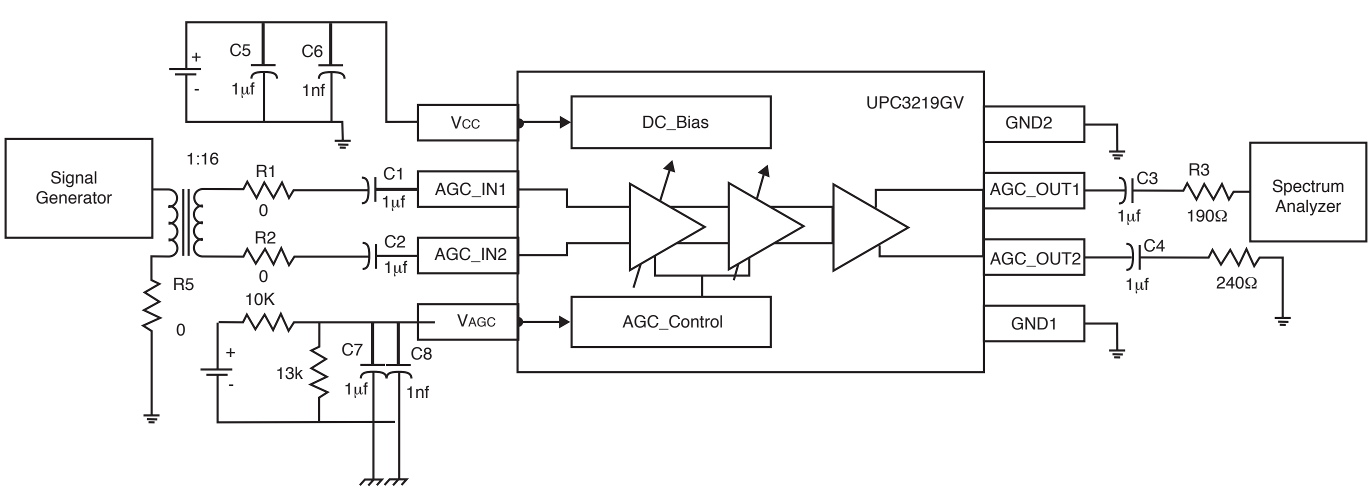




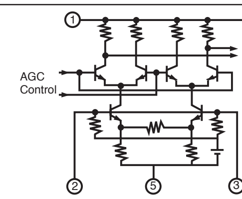
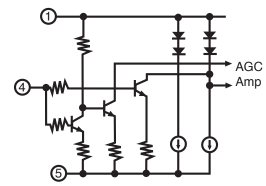
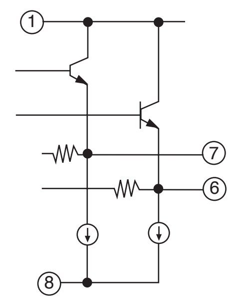
SYSTEM APPLICATION EXAMPLE



EVALUATION BOARD SCHEMATIC AND TEST



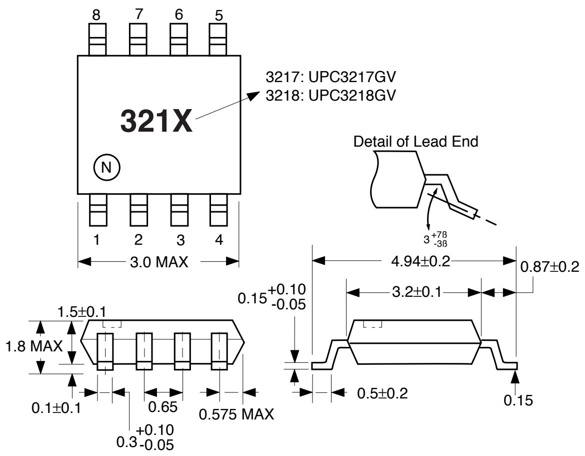
PIN EXPLANATIONS (UPC3217GV, UPC3218GV common)

Pin No.	Name	Applied Voltage (v)	Pin Voltage (v)[1]	Description	Internal Equivalent Circuit
1	V_{CC}	4.5 to 5.5		Power supply pin. This pin should be externally equipped with bypass capacitor to minimize ground impedance.	
2	INPUT1		1.45	Signal input pins of AGC amplifier.	
3	INPUT2		1.45		
4	V_{AGC}	0 to 3.0 V_{CC}		Gain control pin. This pin's bias govern the AGC output level. Minimuim Gain at V_{AGC} = 0.5 V Maximum Gain at V_{AGC} = 4.5 V Recommended to use a 0 to 5 V AGC range for the system and divide this voltage through a resistive bridge (see evaluation board). This helps make the AGC slope less steep.	
5	GND 2	0		Ground pin. This pin should be connected to system ground with minimum inductance. Ground pattern on the board should be formed as wide as possible.	
6	OUTPUT2		2.2	Signal output pins of video amplifier	
7	OUTPUT1		2.2		
8	GND 1	0		Ground pin. This pin should be connected to system ground with minimum inductance. Ground pattern on the board should be formed as wide as possible. All ground pins must be connected together with wide ground pattern to decrease impedance difference.	

Note:
1. PIN is measured at V_{CC} = 5 V

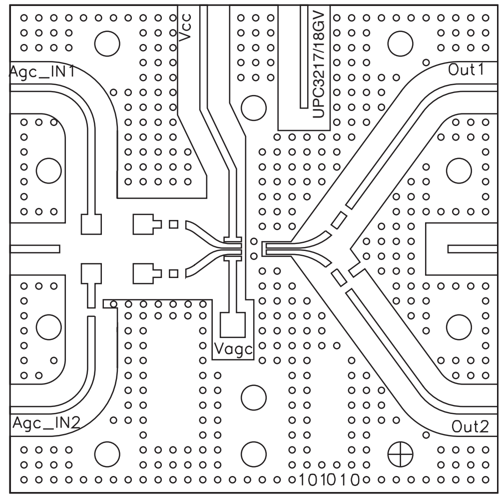
OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE S08

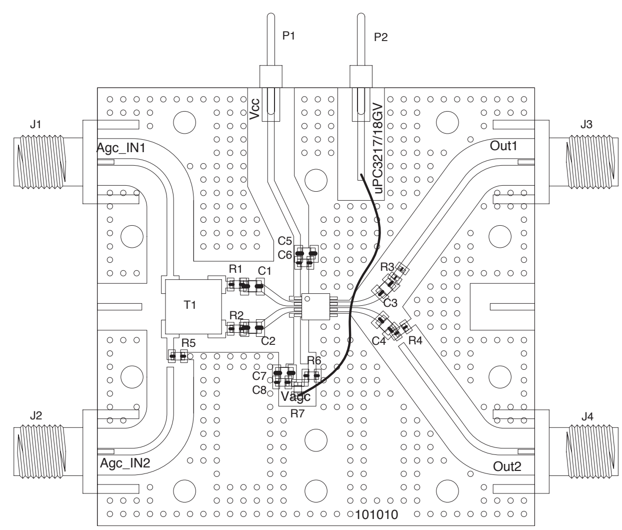


All dimensions are typical unless specified otherwise.

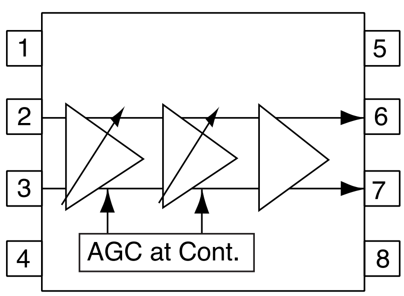
EVALUATION BOARD



EVALUATION BOARD ASSEMBLY



INTERNAL BLOCK DIAGRAM



T1	Transformer4:1 Coilcraft
R7	0603 10K OHM RES ROHM
R6	0603 13K OHM RES ROHM
R4	0603 240 OHM RES ROHM
R3	0603 191 OHM RES ROHM
R1,R2,R5	0603 0 OHM RES ROHM
C6, C8	0603 1000pF CAP ROHM
C1–C5, C7	0805 1uF CAP ROHM
U1	IC NEC, UPC3217/18GV IC NEC

Life Support Applications
These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
		-A	-AZ
Lead (Pb)	< 1000 PPM	Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

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