

AGC AMPLIFIER UPC3211GR

FEATURES

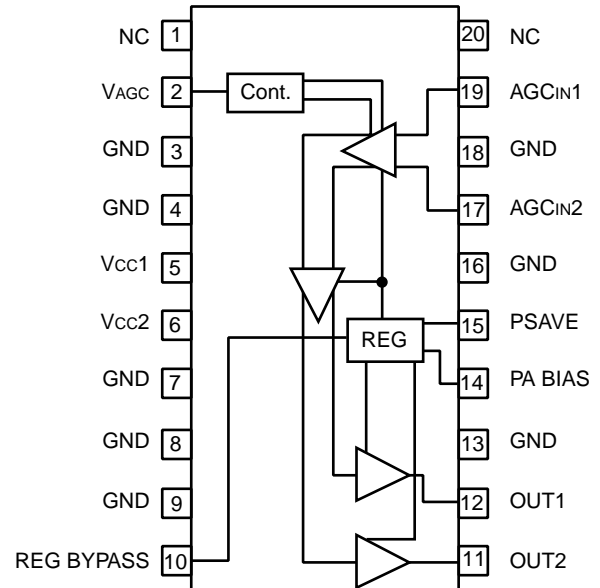
- **WIDE GAIN CONTROL RANGE:** 55 dB (TYP)
- **LOW DISTORTION:**
IM₃ = 57 dBc (TYP) at P_{OUT} = -10 dBm
IM₂ = 44 dBc (TYP) at P_{OUT} = -10 dBm
- **SUPPLY VOLTAGE:** 9 V
- **PACKAGED IN 20 PIN SSOP SUITABLE FOR HIGH-DENSITY SURFACE MOUNT**

DESCRIPTION

The UPC3211GR is a Silicon RFIC designed as an AGC amplifier for digital CATV return path applications. This IC consists of an AGC amplifier with 55 dB gain control range which is packaged in a 20 pin SSOP.

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

INTERNAL BLOCK DIAGRAM



ELECTRICAL CHARACTERISTICS (T_A = 25°C, V_{CC} = 9 V, V_{AGC} = 0 V, V_{PS} = 9 V, unless otherwise specified)

PART NUMBER PACKAGE OUTLINE			UPC3211GR S20		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
I _{CC}	Circuit Current (no input signal), V _{AGC} = 0 V V _{AGC} = 3 V	mA mA	29	38 43	51
I _{CC(PS)}	Circuit Current in Power Save Mode (no input signal), V _{PS} = 0 V ¹	mA		3	
G _{MAX}	Maximum Gain ²	dB	14	16	18
G _{CR}	Gain Control Range ² , V _{AGC} = 0 to 3 V	dB	47	55	
G _{FLAT}	Gain Flatness, f _{IN} = 5 to 100 MHz, 6 MHz Bandwidth	dB		±0.1	
P _{SAT}	Saturated Output Power, P _{IN} = -5 dBm	dBm		+5	
I _{SOL}	Isolation in Sleep Mode, V _{PS} = 0 V ¹	dB	60	65	
IM ₂	2nd Order Intermodulation Level, f _{IN1} = 65 MHz, f _{IN2} = 66.8 MHz, P _{OUT} = -10 dBm	dBc		44	40
IM ₃	3rd Order Intermodulation Level, f _{IN1} = 65 MHz, f _{IN2} = 66.8 MHz, P _{OUT} = -10 dBm	dBc		57	50
NF	Noise Figure, f _{IN} = 65 MHz	dB		10	
OIP ₃	Output 3rd Order Intercept Point, f _{IN1} = 65 MHz, f _{IN2} = 66.8 MHz	dBm		+16	
T _{PS (RISE)}	Power Save Rise Time, V _{PS(OFF)} → V _{PS(ON)}	μs		200	
T _{PS (FALL)}	Power Save Fall Time, V _{PS(ON)} → V _{PS(OFF)}	mS		1.7	

Notes:

1. Bias V_{PS} through a 5 kΩ Resistor.
2. f_{IN} = 65 MHz, P_{IN} = -20 dBm.

ABSOLUTE MAXIMUM RATINGS¹ (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{CC}	Supply Voltage	V	11.0
V _{PS}	Power Save Voltage ³	V	11.0
V _{AGC}	AGC Control Voltage	V	3.6
P _D	Power Dissipation ²	mW	500
T _A	Operating Ambient Temp.	°C	-40 to +75
T _{STG}	Storage Temp. Range	°C	-55 to +150
P _{IN} (MAX)	Maximum Input Level	dBm	+5

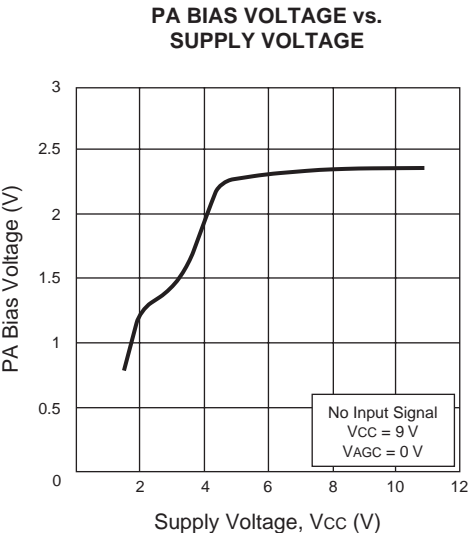
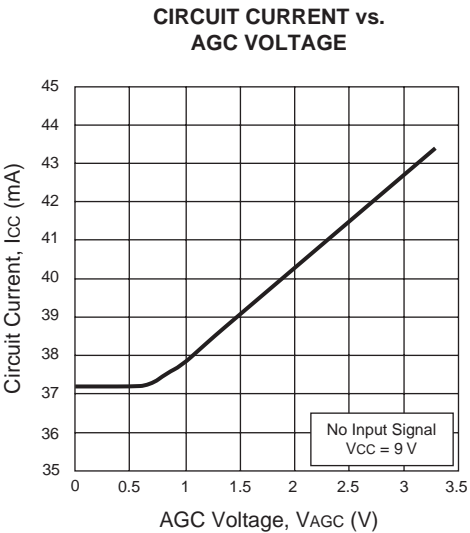
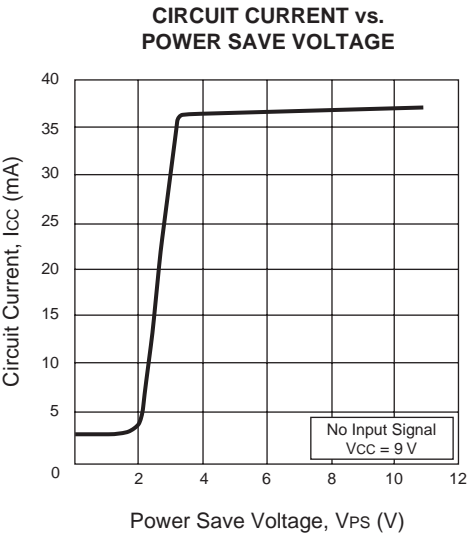
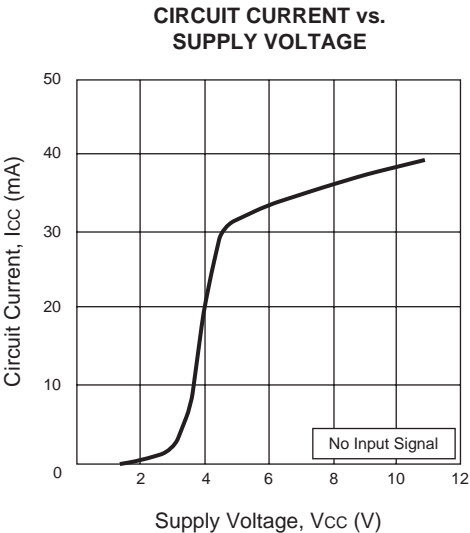
Notes:

1. Operation in excess of any one of these conditions may result in permanent damage.
2. T_A = 75°C Mounted on a 50x50x1.6 mm double epoxy glass board.
3. Bias V_{PS} through 5 k Ω resistor.

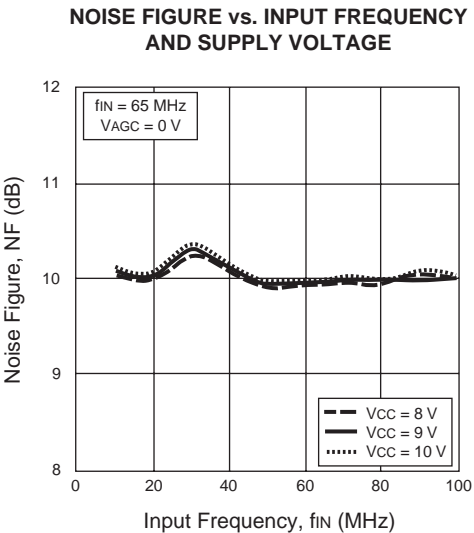
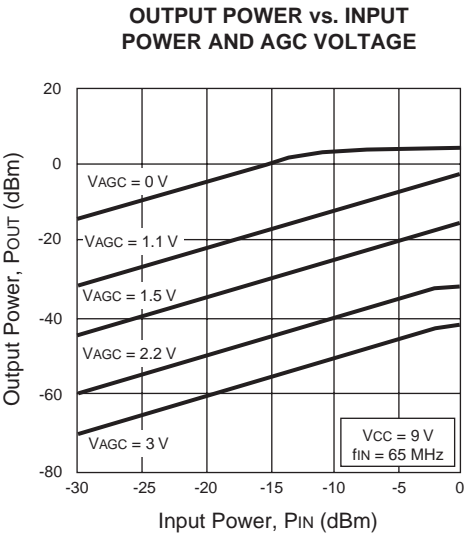
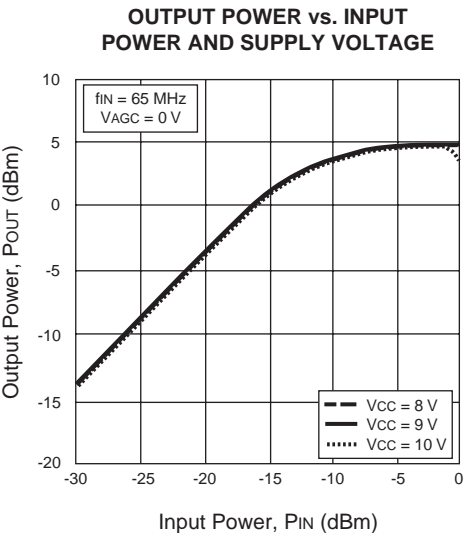
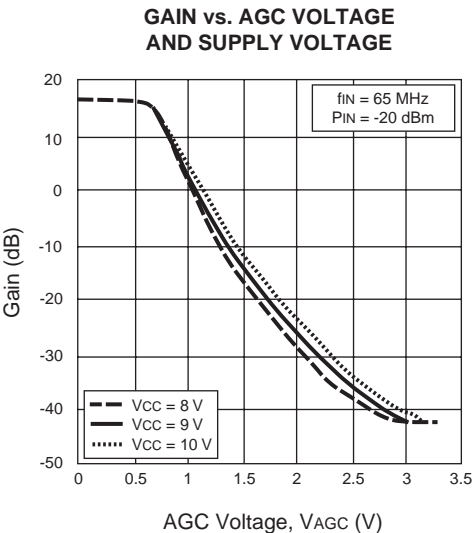
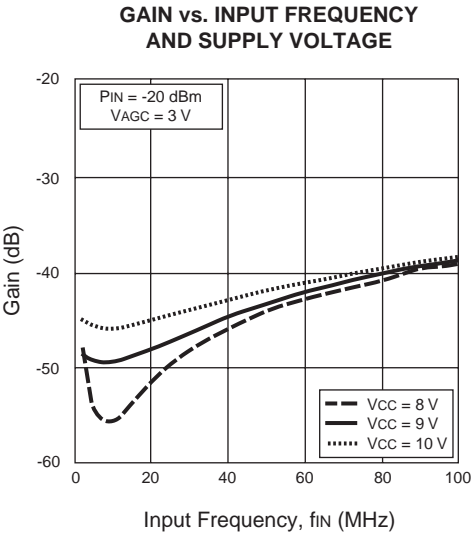
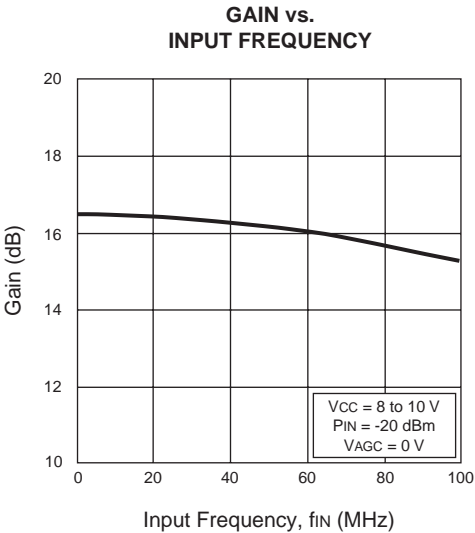
RECOMMENDED
OPERATING CONDITIONS

SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
V _{CC}	Supply Voltage	V	8.0	9.0	10.0
V _{PS}	Power Save Voltage	V	0	–	10.0
V _{AGC}	AGC Control Voltage	V	0	–	3.3
T _A	Operating Ambient Temp.	°C	-40	+25	+75
f _{IN}	Input Frequency	MHz	5	–	100
P _{IN} (MAX)	Maximum Input Level	dBm	–	–	0

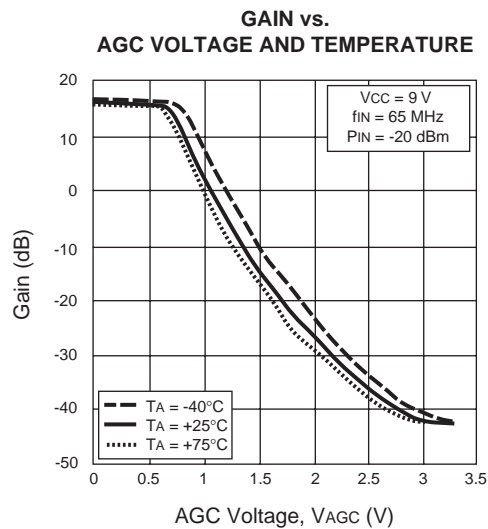
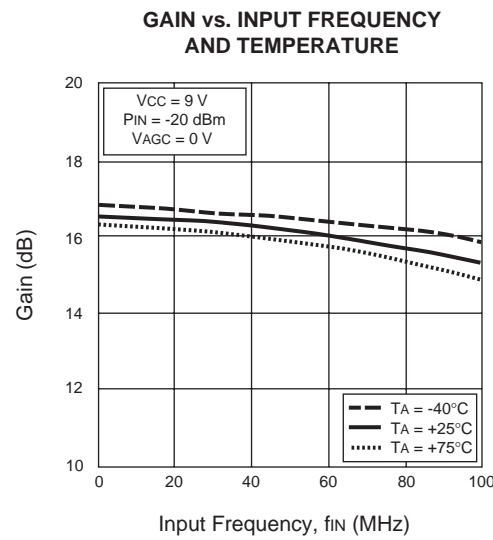
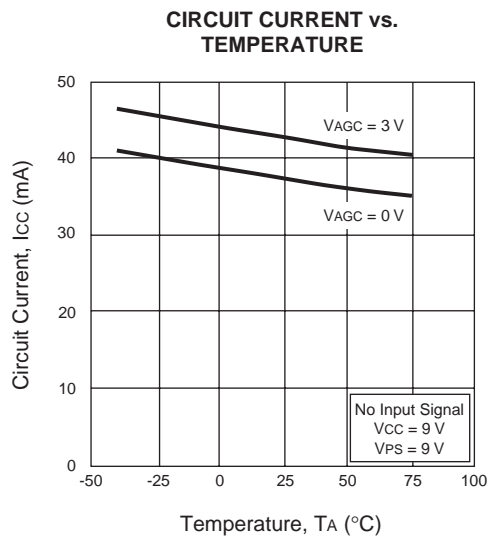
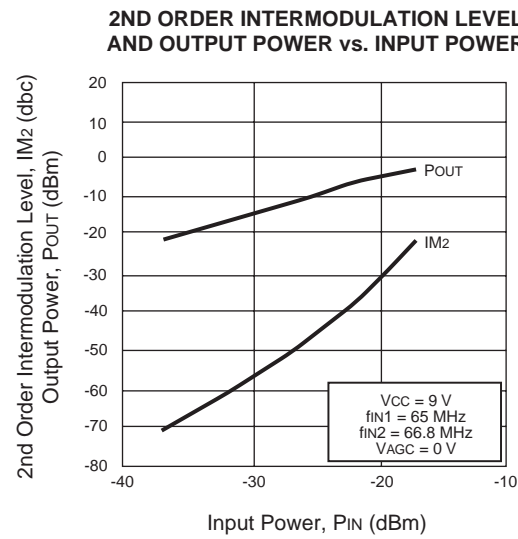
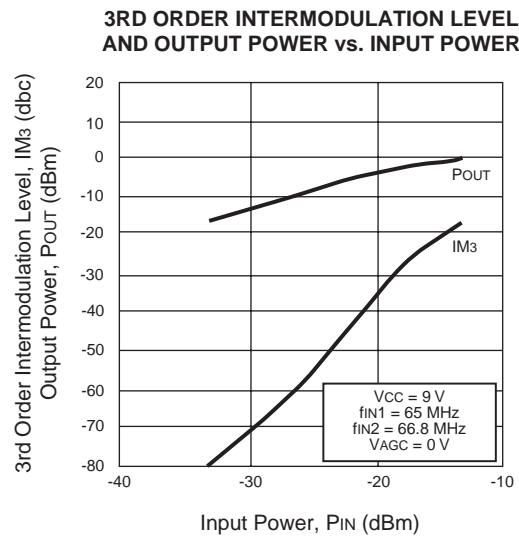
TYPICAL PERFORMANCE CURVES (T_A = 25°C)



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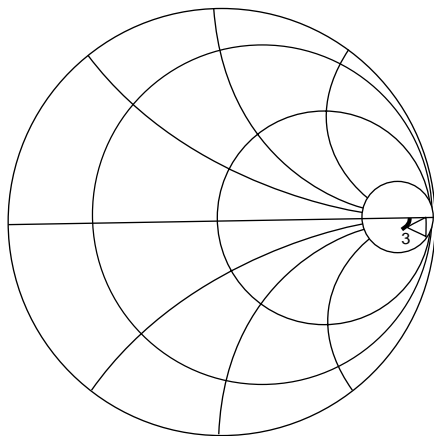


STANDARD PERFORMANCE CURVES (TA = 25°C)



STANDARD PERFORMANCE CURVES (TA = 25°C)

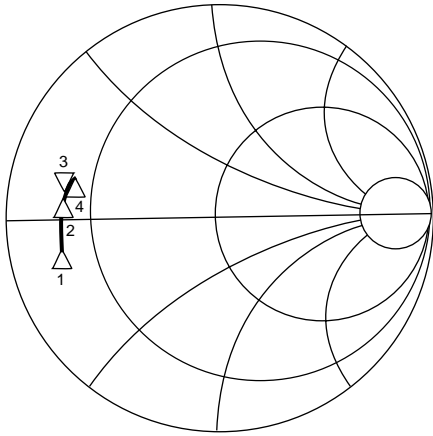
INPUT IMPEDANCE (PIN 19)



	Start 0.1 MHz	Stop 100 MHz
Δ 1: 5 MHz	533.6 Ω	-16.4 Ω
Δ 2: 40 MHz	515.2 Ω	-81.4 Ω
Δ 3: 65 MHz	493.7 Ω	-123.3 Ω
Δ 4: 100 MHz	455.9 Ω	-190.3 Ω

TA = 25°C
VCC = 9 V
PIN = -20 dBm

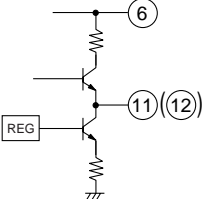
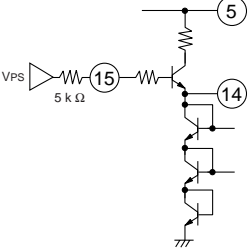
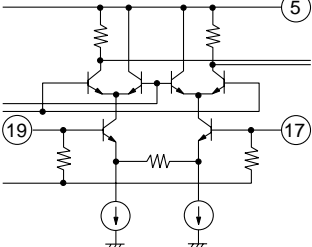
OUTPUT IMPEDANCE (PIN 11)

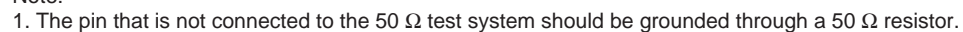


	Start 5 MHz	Stop 100 MHz
Δ 1: 5 MHz	9.779 Ω	-2.306 Ω
Δ 2: 40 MHz	10.066 Ω	3.033 Ω
Δ 3: 65 MHz	10.574 Ω	5.237 Ω
Δ 4: 100 MHz	11.88 Ω	7.805 Ω

TA = 25°C
VCC = 9 V
PIN = -20 dBm

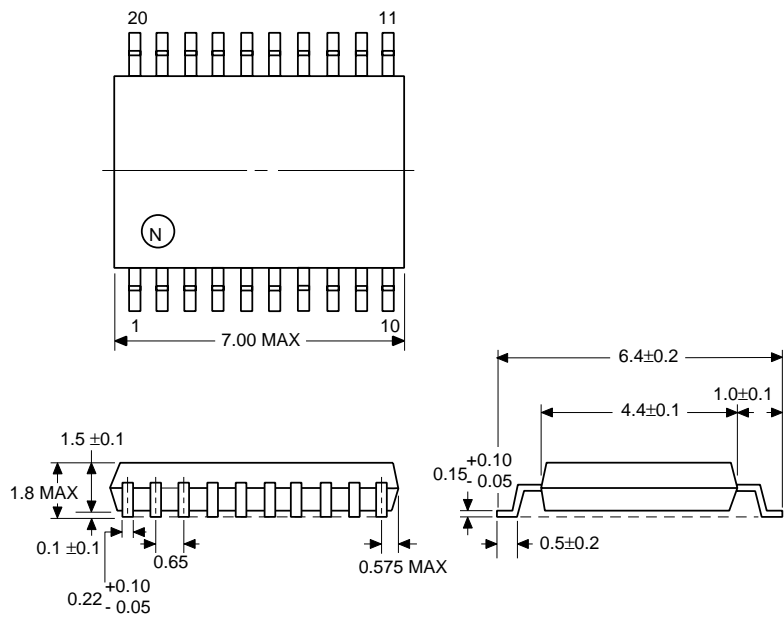
PIN FUNCTIONS

Pin No.	Symbol	Pin Voltage (V)	Description	Equivalent Circuit					
1	NC	—	No connection. This pin should be left open.						
2	V _{AGC}	0 to 3	Automatic gain control pin. V _{AGC} Up = Gain Down.						
3	GND	0	Differential amp ground pins. These pins must be connected to system ground. Form ground pattern as wide as possible to minimize ground impedance.						
4									
5	V _{cc1}	9.0	Supply voltage pin for the AGC amp. This pin should be connected with a bypass capacitor to minimize ground impedance.						
6	V _{cc2}	9.0	Supply voltage pin for the differential amp and output block. This pin should be connected with a bypass capacitor to minimize ground impedance.						
7	GND	0	Differential amp ground pins. These pins must be connected to system ground. Form ground pattern as wide as possible to minimize ground impedance.						
8									
9									
10	REG BYPASS	1.64	Bypass pin of regulator block. This pin should be bypassed to ground through a capacitor.						
11	OUT2	6.9	Signal output pins. These are emitter-follower outputs, which feature low impedance. In case of single-ended output, the unused pin should be connected to ground through a load resistor.						
12	OUT1	6.9							
13	GND	0	Output block ground pin. This pin must be connected to system ground. Form ground pattern as wide as possible to minimize ground impedance.						
14	PA_BIAS	2.45	This pin provides the base bias voltage to transistors configured as a power amplifier.						
15	V _{PS}	9.0	Power save control pin can control the On/Sleep state with bias as follows: <table border="1" data-bbox="647 1281 948 1360"><thead><tr><th>V_{PS} (V)</th><th>STATE</th></tr></thead><tbody><tr><td>3-9</td><td>ON</td></tr><tr><td>0-2</td><td>SLEEP</td></tr></tbody></table> It is recommended to use a 5 kΩ in series with this pin.		V _{PS} (V)	STATE	3-9	ON	0-2
V _{PS} (V)	STATE								
3-9	ON								
0-2	SLEEP								
16	GND	0	AGC amp ground pin. This pin must be connected to system ground. Form ground pattern as wide as possible to minimize ground impedance.						
18									
17	AGC _{IN2}	2.43	Signal input pins. In the case of single-ended input, bypass the unused pin to ground through a capacitor.						
19	AGC _{IN1}	2.43							
20	NC	—	No connection. This pin should be left open.						



PACKAGE DIMENSIONS (Units in mm)

PACKAGE OUTLINE S20



Note:
1. All dimensions are typical unless otherwise specified.

ORDERING INFORMATION

PART NUMBER	QUANTITY
UPC3211GR-E1	2.5 k/Reel

Notes:
Embossed tape, 12 mm wide. Pin 1 indicates pull-out direction of tape.