

# AN6215S

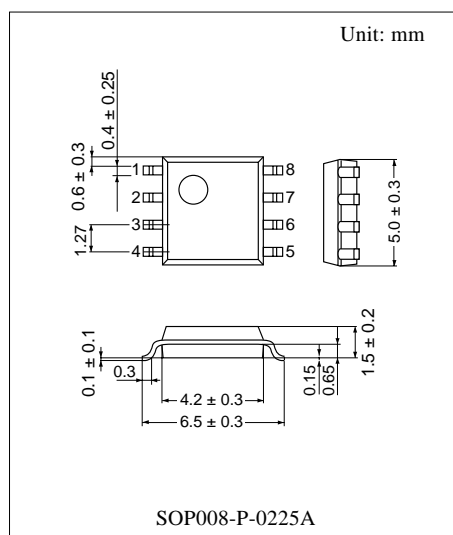
## AGC IC for telephone speech network

### Overview

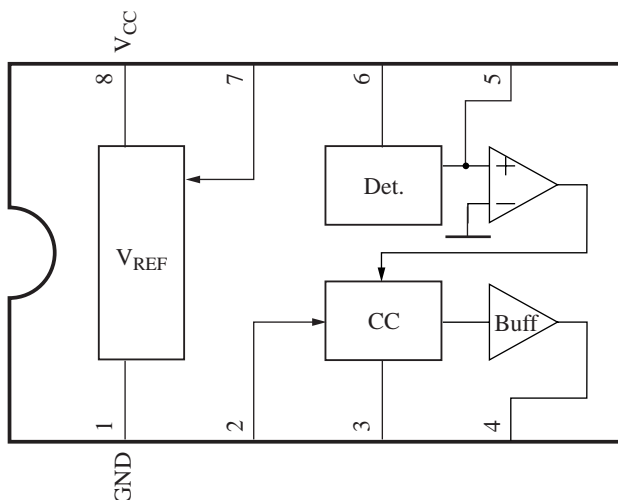
The AN6215S is an AGC IC for telephone speech network, and it incorporates an microphone input detection circuit and a receiver gain control circuit. It is especially best suited for cordless telephone thanks to a good speech tone quality obtained by reducing howling and echo sound.

### Features

- Operation with wide power supply voltage range from 2.1 V to 6.0 V
- Enlargement of dynamic range by incorporating a variable  $V_{REF}$  circuit that varies according to the supply voltage
- Possible to adjust the received voice attenuation amount with an external resistor
- Possible to adjust the AGC operating point with an external resistor
- Possible to design with fewer external components



### Block Diagram



## ■ Pin Descriptions

Pin No.	Symbol	Description
1	GND	Ground pin
2	$\Delta$ GAIN	Variable gain adjustment pin
3	RX IN	Receiver signal input pin
4	RX OUT	Receiver signal output pin
5	TX DET	Transmitter signal detection pin
6	TX IN	Transmitter signal input pin
7	$V_C$	$V_{REF}$ control pin
8	$V_{CC}$	Supply voltage pin

## ■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	6.5	V
Supply current	$I_{CC}$	3.0	mA
Power dissipation	$P_D$	19.5	mW
Operating ambient temperature *	$T_{opr}$	-20 to +75	°C
Storage temperature *	$T_{stg}$	-55 to +125	°C

Note) \*: Except for the operating ambient temperature and storage temperature, all ratings are for  $T_a = 25^\circ\text{C}$ .

## ■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	$V_{CC}$	2.1 to 6.0	V

## ■ Electrical Characteristics at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating current *1	$I_{CC}$	Operating time at no signal input	—	1.4	2.0	mA
Receiver amp. voltage gain *1	$G_{RX}$	RX in = -20 dBm	1.5	3.5	5.5	dB
Receiver amp. output D range *1	$V_{ORX}$	Output voltage at THD = 5%	0	2	—	dBm
Receiver amp. variable gain width *1, *2	$\Delta$ Gain	Receiver amp. gain variation between TX in = -50 dBm and TX in = -30 dBm	-10	-8	-6	dB
High-level $V_{REF}$ control sink current	$I_{CH}$	$V_{CH} = 3\text{ V}$	—	25	50	$\mu\text{A}$
High-level $V_{REF}$ control voltage	$V_{CH}$	Pin 7 voltage range in a base-set mode	1.5	—	$V_{CC}$	V
Low-level $V_{REF}$ control voltage	$V_{CL}$	Pin 7 voltage range in a hand-set mode	0	—	0.5	V

Note) 1.  $V_{CC} = 5.0\text{ V}$ ,  $f = 1\text{ kHz}$  unless otherwise specified.

2. \*1: Pin 7 DC voltage sets to  $V_{CH} = 5.0\text{ V}$

\*2: ERO-25CKF6802 produced by Matsushita Electronic Components Co. is used for RX in = -30 dBm.

(Refer to " Application circuit example".)

## ■ Electrical Characteristics at $T_a = 25^\circ\text{C}$ (continued)

### • Design reference data

Note) 1. The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

2.  $V_{CC} = 5.0\text{ V}$ ,  $f = 1\text{ kHz}$  unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Detection circuit input impedance	$Z_{IDET}$	Pin 5 input impedance	—	50	—	$\Omega$
Detection circuit gain	$G_{DET}$	R in = 10 k $\Omega$	—	27	—	dB
Receiver amp. input impedance	$Z_{IRX}$	Pin 3 input impedance	—	25	—	k $\Omega$
Receiver amp. output wave distortion factor	THD	$V_{ORX} = -10\text{ dBm}$ (80 kHz LPF)	—	0.3	—	%
Receiver amp. output noise voltage	$N_{ORX}$	Wide band	—	-65	—	dBm
Receiver amp. output impedance	$Z_{ORX}$	Pin 4 output impedance	—	1	—	k $\Omega$
Sidetone control operation voltage	$V_{DET}$	DC voltage of pin 5 when sidetone control operates	—	0.3	—	V
Sidetone control $\Delta$ Gain variation rate	$\Delta R$	$\Delta RX\text{ out}/\Delta TX\text{ in}$ at TX in = -39 dBm	—	-0.6	—	dB/dB
Base set mode $V_{REF}$ voltage	$V_{RB}$	Pin 4 DC voltage at pin 7 = high	—	2	—	V
Hand set mode $V_{REF}$ voltage	$V_{RH}$	Pin 4 DC voltage at pin 7 = low	—	1.15	—	V

## ■ Terminal Equivalent Circuits

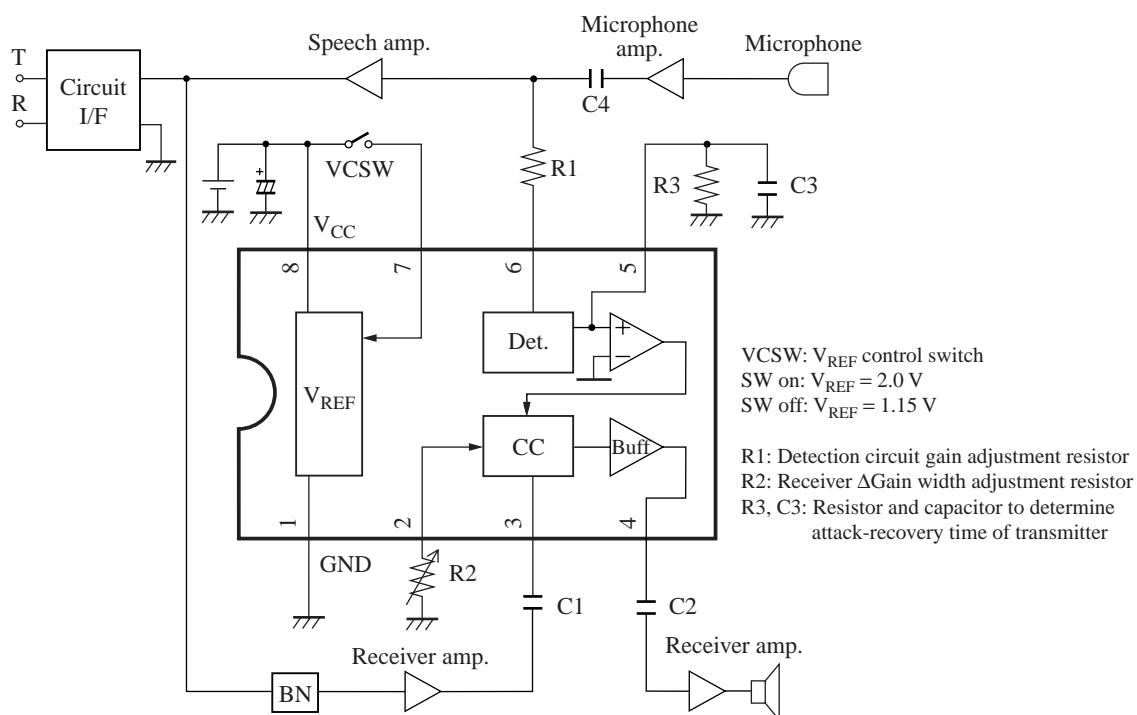
Pin No.	Equivalent circuit	Description	Typical wave
1	—	GND: Ground pin	0 V
2		<p><math>\Delta</math>GAIN: Gain adjustment pin</p> <p>Gain width of receiver amp. can be changed by changing the external resistance.</p> <p>R1 to large <math>\rightarrow</math> Gain width becomes large.</p> <p>R1 to small <math>\rightarrow</math> Gain width becomes small.</p>	<p>DC</p> <p>1.15 V</p>
3		<p>RX IN: Receiver signal input pin</p> <p>Input receiver sound signal from line.</p> <p>Input impedance is 25 k<math>\Omega</math>.</p>	
4		<p>RX OUT: Receiver signal output pin</p> <p>Connect receiver amp. etc.</p> <p>Output impedance is approximately 50 <math>\Omega</math>.</p>	

■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Description	Typical wave
5	<p>Full wave detection → DC</p> <p>100 kΩ</p> <p>100 kΩ R3</p> <p>10 μF C3</p> <p>To receiver amp.</p>	<p>TX DET: Transmitter signal detection pin</p> <p>Connect a smoothing capacitor and a resistor to adjust attack-recovery time of transmitter signal detection.</p> <p>Detection amp. gain is determined by the following equation:</p> $G = \frac{100 \text{ (k}\Omega\text{)} \times 3}{R_4 \text{ (k}\Omega\text{)}}$ <p>C3 large → Attack time becomes long.</p> <p>R3 small → Recovery time becomes short.</p>	<p>With capacitor</p> <p>Without capacitor</p>
6	<p>C4</p> <p>R4</p> <p>Transmitter signal</p> <p>6</p> <p>Detection</p> <p>5</p>	<p>TX IN: Transmitter signal input pin</p> <p>Input transmitter sound signal</p>	
7	<p>V<sub>H</sub>/V<sub>L</sub></p> <p>100 kΩ</p> <p>10 kΩ</p> <p>180 kΩ</p>	<p>V<sub>C</sub>: Reference voltage control pin</p> <p>Reference voltage V<sub>REF</sub> becomes 2 V when voltage is high, and becomes 1.15 V when voltage is low.</p> <p>Normally, reference voltage is set to V<sub>REF</sub> = 2 V when it is used for a base-set, and to V<sub>REF</sub> = 1.15 V when it is used for a hand-set.</p>	<p>DC</p>
8		<p>V<sub>CC</sub>: Supply voltage pin</p> <p>Connect supply voltage.</p>	<p>DC</p>

## ■ Application Circuit Example

- System configuration
  - Detects input of microphone and gives attenuation to a receiver system
  - Operating point and variable width of attenuator can be set with external resistor respectively.



- Characteristics

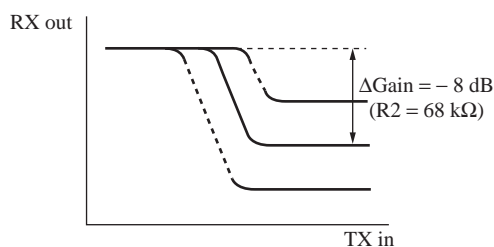


Figure 1. Variable width of attenuation

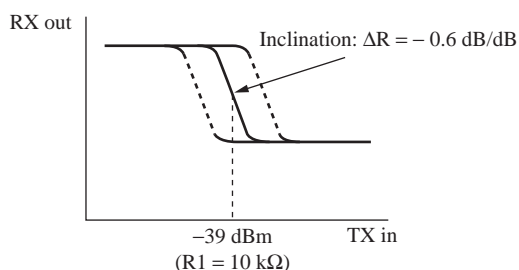


Figure 2. Operating point of attenuation

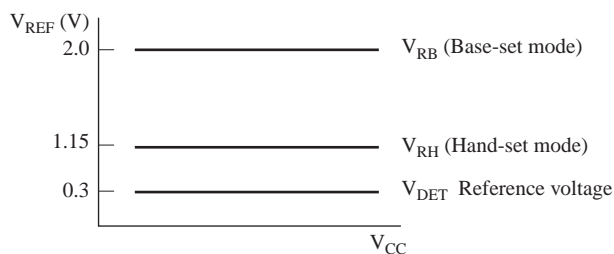


Figure 3. Operation of variable  $V_{REF}$  circuit