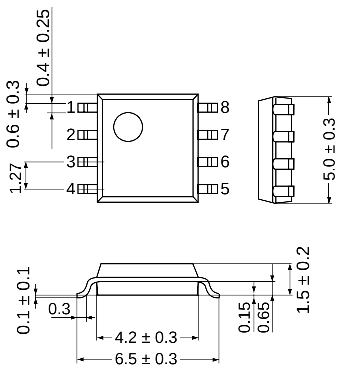
AN6215S

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.

Unit: mm

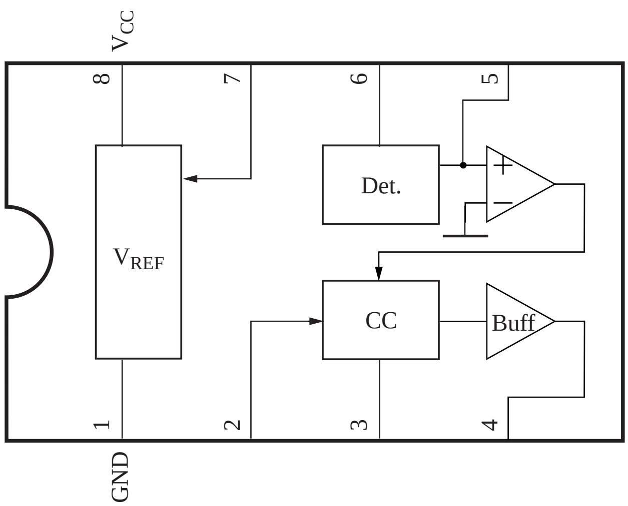


SOP008-P-0225A

■ 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	ΔGAIN	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 $T_a = 25°C$.

■ Recommended Operating Range

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

■ Electrical Characteristics at $T_a = 25°C$

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	ΔGain	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 V	—	25	50	µA
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 V, f = 1 kHz unless otherwise specified.
2. ∗1: Pin 7 DC voltage sets to V_{CH} = 5.0 V
∗2: ERO-25CKF6802 produced by Matsushita Electronic Components Co. is used for RX in = –30 dBm.
(Refer to "■ Application circuit example".)

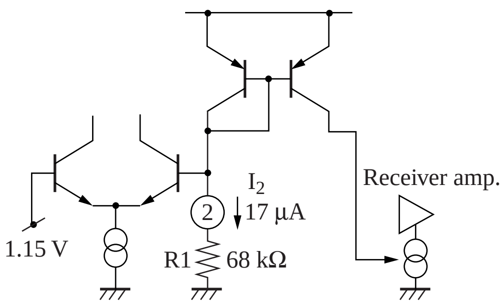
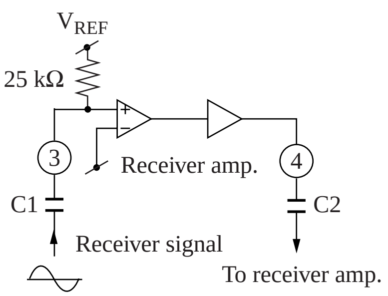
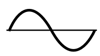
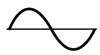
■ Electrical Characteristics at T_a = 25°C (continued)

• Design reference data

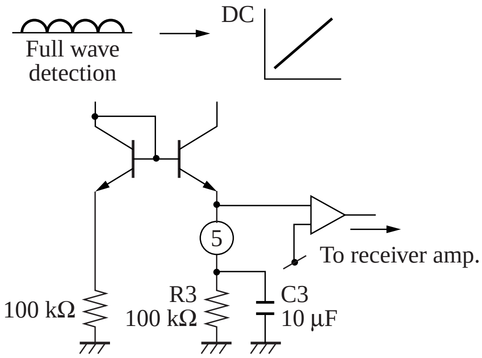
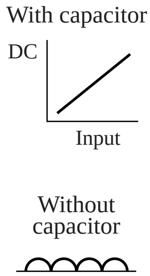
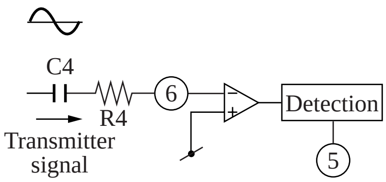
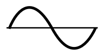
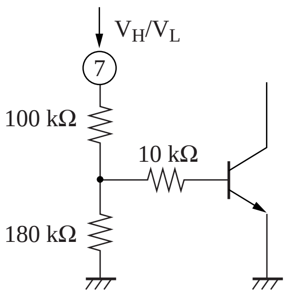
Note) 1. The characteristics listed below are theoretical values based on the IC design and are not guaranteed.
2. V_{CC} = 5.0 V, f = 1 kHz unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Detection circuit input impedance	Z_{IDET}	Pin 5 input impedance	—	50	—	Ω
Detection circuit gain	G_{DET}	R in = 10 kΩ	—	27	—	dB
Receiver amp. input impedance	Z_{IRX}	Pin 3 input impedance	—	25	—	kΩ
Receiver amp. output wave distortion factor	THD	V_{ORX} = −10 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	—	kΩ
Sidetone control operation voltage	V_{DET}	DC voltage of pin 5 when sidetone control operates	—	0.3	—	V
Sidetone control ΔGain variation rate	ΔR	ΔRX out/ΔTX 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

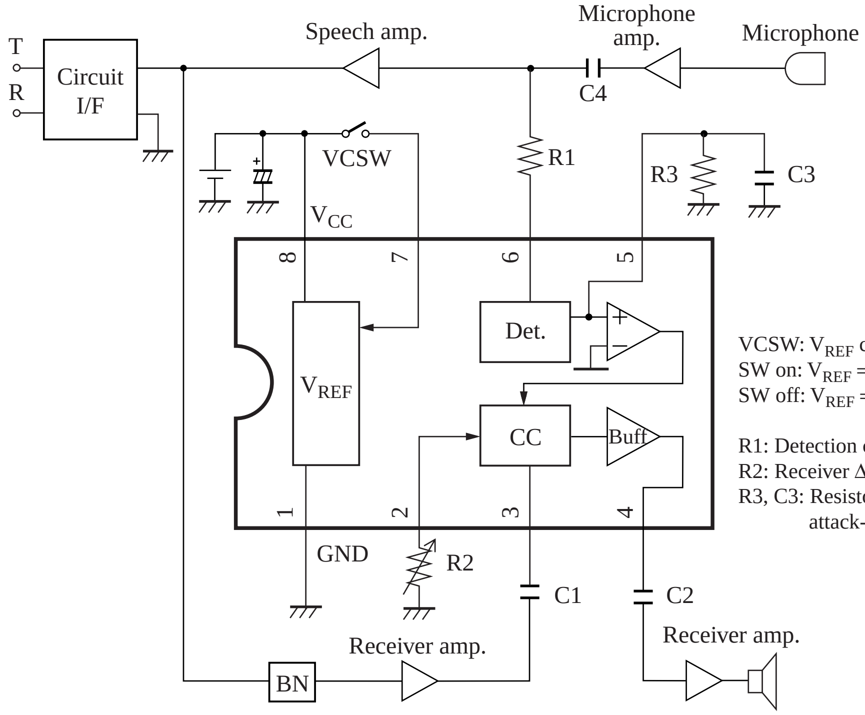
Pin No.	Equivalent circuit	Description	Typical wave
1	—	GND: Ground pin	0 V
2		ΔGAIN: Gain adjustment pin Gain width of receiver amp. can be changed by changing the external resistance. R1 to large → Gain width becomes large. R1 to small → Gain width becomes small.	DC 1.15 V
3		RX IN: Receiver signal input pin Input receiver sound signal from line. Input impedance is 25 kΩ.	
4		RX OUT: Receiver signal output pin Connect receiver amp. etc. Output impedance is approximately 50 Ω.	

■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Description	Typical wave
5		TX DET: Transmitter signal detection pin Connect a smoothing capacitor and a resister to adjust attack-recovery time of transmitter signal detection. Detection amp. gain is determined by the following equation: $G = \frac{100\ (k\Omega) \times 3}{R_4\ (k\Omega)}$ C3 large → Attack time becomes long. R3 small → Recovery time becomes short.	
6		TX IN: Transmitter signal input pin Input transmitter sound signal	
7		V_C: Reference voltage control pin Reference voltage V_{REF} becomes 2 V when voltage is high, and becomes 1.15 V when voltage is low. Normally, reference voltage is set to $V_{REF} = 2$ V when it is used for a base-set, and to $V_{REF} = 1.15$ V when it is used for a hand-set.	
8	—	V_{CC}: Supply voltage pin Connect supply voltage.	

■ 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.



VCSW: V_{REF} control switch
SW on: V_{REF} = 2.0 V
SW off: V_{REF} = 1.15 V

R1: Detection circuit gain adjustment resistor
R2: Receiver ΔGain width adjustment resistor
R3, C3: Resistor and capacitor to determine attack-recovery time of transmitter

- Characteristics

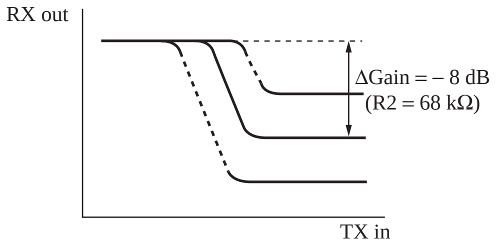


Figure 1. Variable width of attenuation

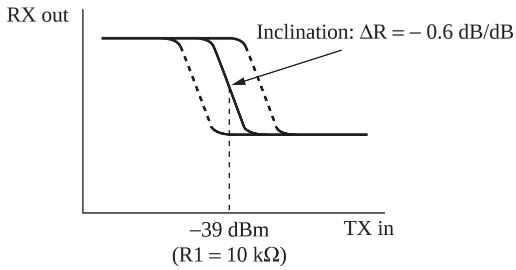


Figure 2. Operating point of attenuation

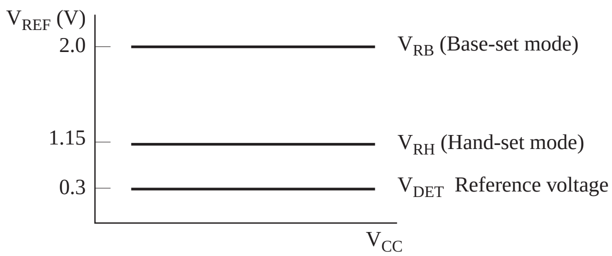


Figure 3. Operation of variable V_{REF} circuit