

AN6215S

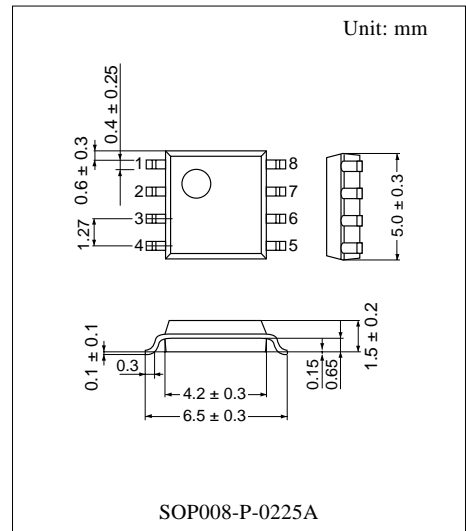
AGC IC for telephone speech network

■ Overview

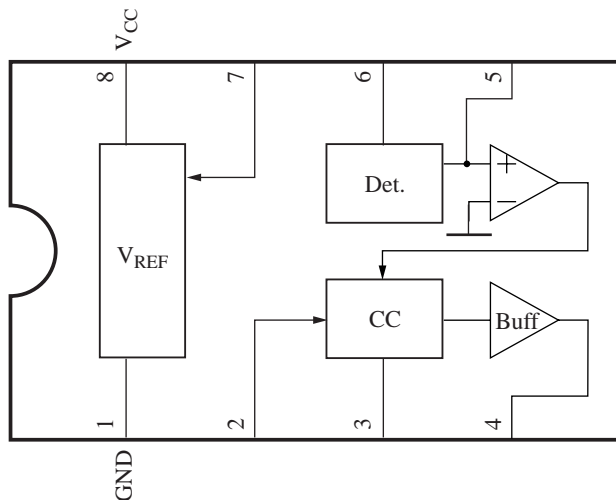
The AN6215S is an AGC IC for telephone speech network, and it incorporates an microphone input detection circuit and a receiver gain control circuit. It is especially best suited for cordless telephone thanks to a good speech tone quality obtained by reducing howling and echo sound.

■ 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	Δ 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	Δ 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	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. $V_{CC} = 5.0\text{ V}$, $f = 1\text{ kHz}$ 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	—	Ω
Detection circuit gain	G_{DET}	R in = 10 k Ω	—	27	—	dB
Receiver amp. input impedance	Z_{IRX}	Pin 3 input impedance	—	25	—	k Ω
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 Ω
Sidetone control operation voltage	V_{DET}	DC voltage of pin 5 when sidetone control operates	—	0.3	—	V
Sidetone control Δ Gain variation rate	ΔR	$\Delta RX\text{ out}/\Delta TX\text{ in}$ 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>ΔGAIN: Gain adjustment pin</p> <p>Gain width of receiver amp. can be changed by changing the external resistance.</p> <p>R1 to large \rightarrow Gain width becomes large.</p> <p>R1 to small \rightarrow 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 kΩ.</p>	
4		<p>RX OUT: Receiver signal output pin</p> <p>Connect receiver amp. etc.</p> <p>Output impedance is approximately 50 Ω.</p>	

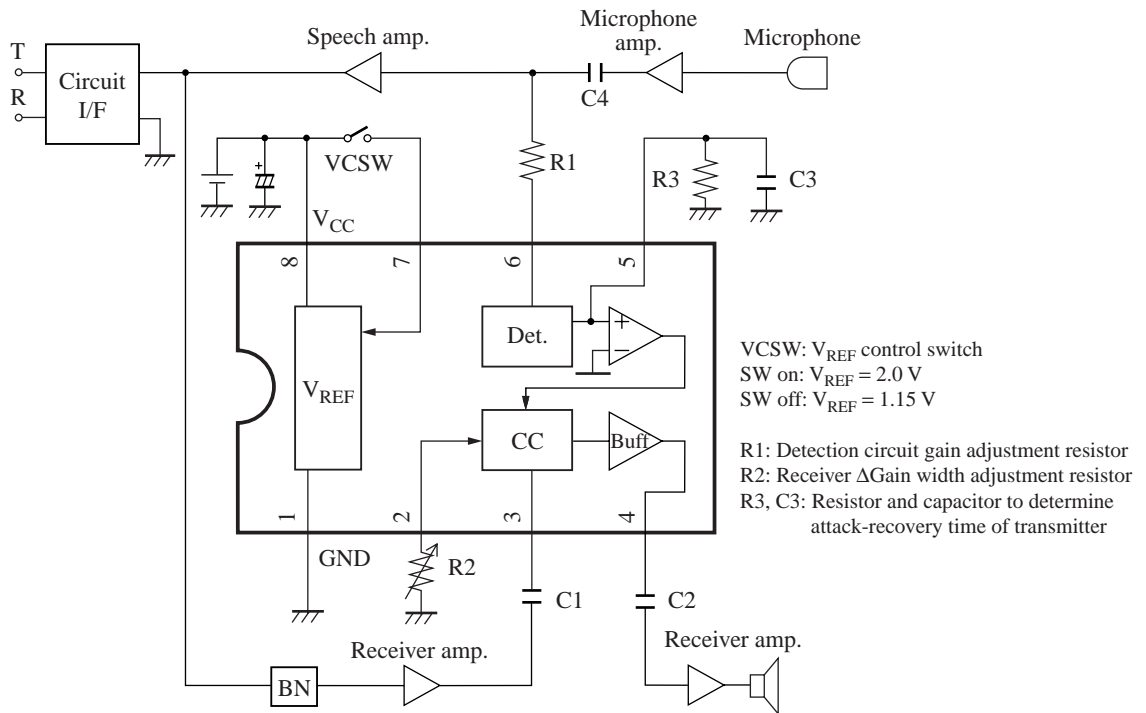
■ Terminal Equivalent Circuits (continued)

Pin No.	Equivalent circuit	Description	Typical wave
5	<p>Full wave detection → DC</p> <p>100 kΩ</p> <p>R3 100 kΩ</p> <p>C3 10 μF</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. Detection amp. gain is determined by the following equation: $G = \frac{100 \text{ (k}\Omega\text{)} \times 3}{R_4 \text{ (k}\Omega\text{)}}$ C3 large → Attack time becomes long. R3 small → Recovery time becomes short.</p>	<p>With capacitor</p> <p>DC</p> <p>Input</p> <p>Without capacitor</p>
6	<p>Transmitter signal</p> <p>C4</p> <p>R4</p> <p>6</p> <p>Detection</p> <p>5</p>	<p>TX IN: Transmitter signal input pin Input transmitter sound signal</p>	
7	<p>V_H/V_L</p> <p>7</p> <p>100 kΩ</p> <p>10 kΩ</p> <p>180 kΩ</p>	<p>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.</p>	<p>DC</p>
8	<p>—</p>	<p>V_{CC}: Supply voltage pin 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

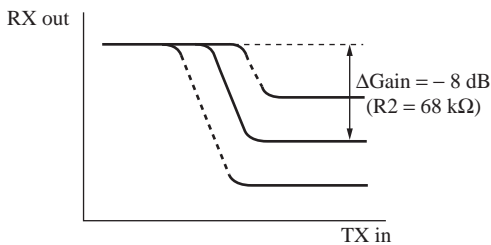


Figure 1. Variable width of attenuation

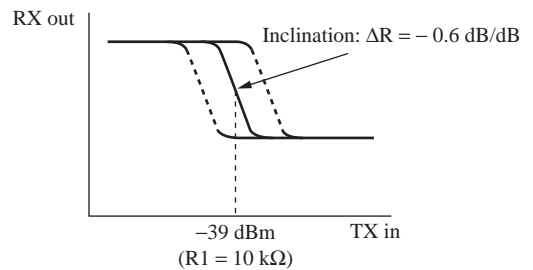


Figure 2. Operating point of attenuation

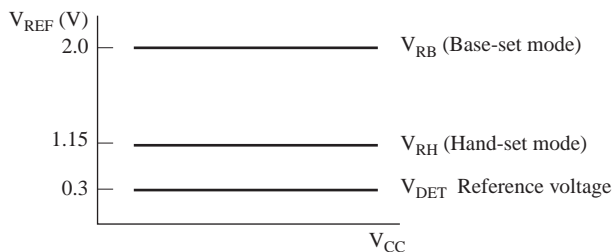


Figure 3. Operation of variable V_{REF} circuit



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