GL6962/GL6962A

Low Voltage Universal Speech Network

Description

The GL6962 and GL6962A are bipolar integrated circuits that perform all speech and line interface functions required in fully electronic telephone sets. They perform electronic switching between dialing and speech. The ICs operate at line voltage down to 1.6V DC (with reduced performance) to facilitate the use of more telephone sets connected in parallel.

Features

Low DC line voltage: operates down to 1.6V (excluding polarity guard)

Voltage regulator with adjustable static resistance

Provides a supply for external circuits

Symmetrical high-impedance inputs (64k¥ Ø for dynamic, magnetic or piezo-electric microphones

Asymmetrical high-impedance inputs(32k¥ Ø for electric microphones

DTMF signal input with confidence tone

MUTE input for pulse or DTMF dialing (GL6962)

$\overline{\text{MUTE}}$ input for pulse or DTMF dialing (GL6962A)

Receiving amplifier for dynamic, magnetic or piezo-electric earpieces.

Large gain setting ranges on microphone and earpiece amplifiers.

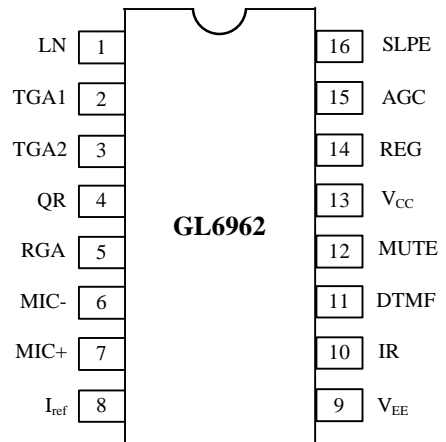Line loss compensation (line current dependent) for microphone and earpiece amplifiers

Gain control curve adaptable to exchange supply

DC line voltage adjustment facility
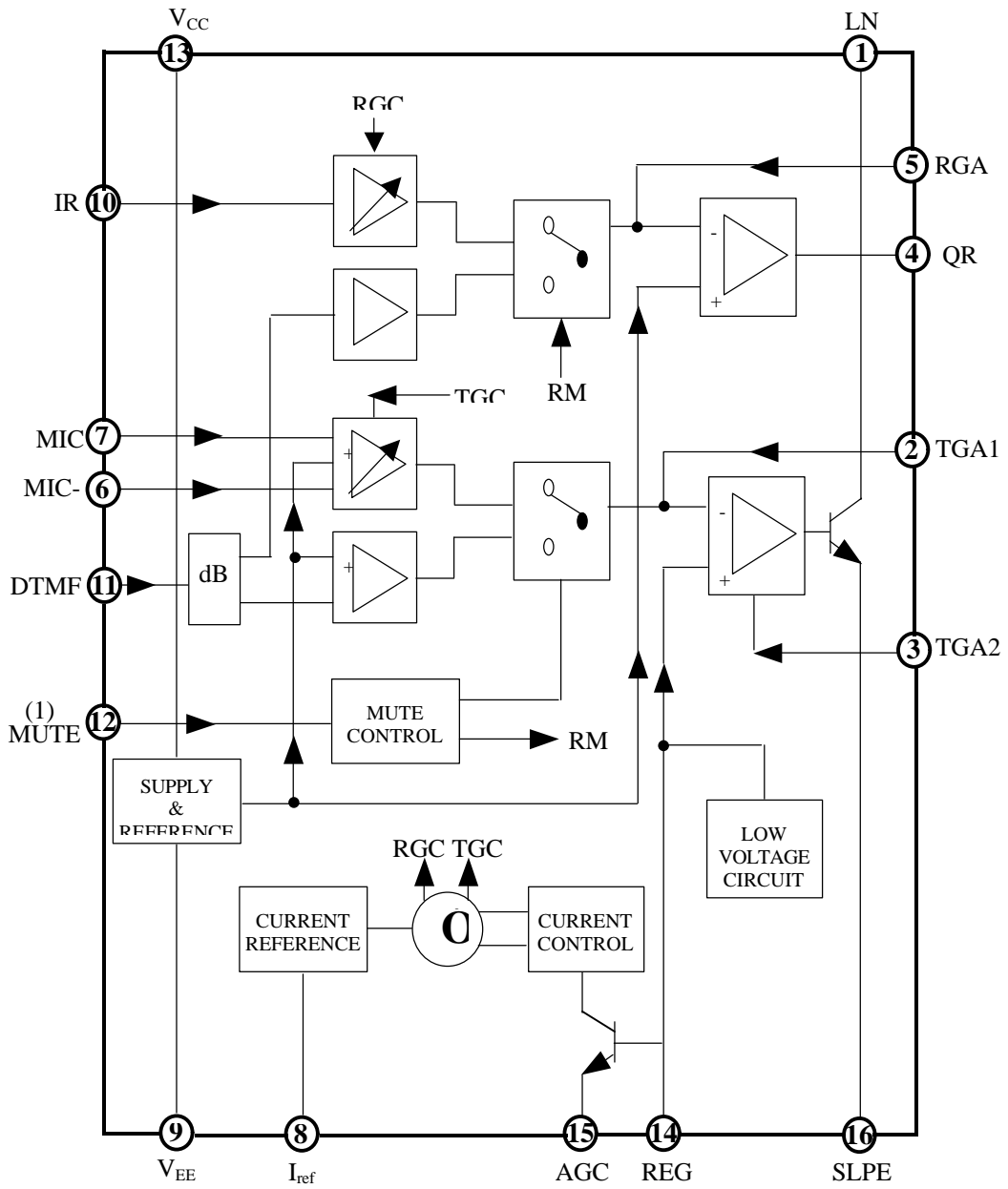
Packaged in 16 DIP/SOP.

PIN Configuration

(TOP View)

Pin	Name		Pin	Name
1	LN		16	SLPE
2	TGA1		15	AGC
3	TGA2		14	REG
4	QR	GL6962	13	V_{CC}
5	RGA		12	MUTE
6	MIC-		11	DTMF
7	MIC+		10	IR
8	I_{ref}		9	V_{EE}

* Pin 12 is active LOW($\overline{\text{MUTE}}$) for GL6962A

Block Diagram

*   Pin 12 is active LOW ($\overline{\text{MUTE}}$) for GL6962A.

Pin Description

PIN NUMBER	SYMBOL	DESCRIPTION
1	LN	Positive line terminal
2	TGA1	Gain adjustment: transmitting amplifier
3	TGA2	Gain adjustment: transmitting amplifier
4	QR	Non-inverting output: receiving amplifier
5	RGA	Gain adjustment: receiving amplifier
6	MIC-	Inverting microphone input
7	MIC+	Non-Inverting microphone input
8	I_{ref}	Current stabilizer
9	V_{EE}	Negative line terminal
10	IR	Receiving amplifier input
11	DTMF	Dual-tone multi-frequency input
12	MUTE	Mute input [1]
13	V_{CC}	Positive decoupling
14	REG	Voltage regulator decoupling
15	AGC	Automatic gain control input
16	SLPE	Slope (DC resistance) adjustment.

(1) Pin 12 is active LOW ($\overline{\text{MUTE}}$) for GL6962A.

Absolute Maximum Ratings

SYMBOL	PARAMETER	MIN	MAX	UNIT
V_{LN}	Positive continuous line voltage	-	12	V
I_{line}	Line Current R9 = 20 ; Note1 GL6962 ; GL6962A	- -	 140	 mA
V_i	Input voltage on all other pins Positive input voltage Negative input voltage	 - -	 V_{CC}+0.7 -0.7	 V V
P_{tot}	Total power dissipation R9 = 20 ; Note2 GL6962 ; GL6962A	 -	 666	 mW
T_{amb}	Operating ambient temperature	-25	+75	¡É
T_{stg}	Storage temperature	-40	+125	¡É

Maximum Ratings are those values beyond which damage to the device may occur.
Functional Operation should be restricted to the limits in the Electrical Characteristics tables or pin Descriptions section

Notes to the Absolute Maximum Ratings
1. Mostly dependent on the maximum required T_{amb} and on the voltage between LN and SLPE.
2. Calculated for the maximum ambient temperature specified T_{amb} = 75¡É and maximum junction temperature of 125¡É

Electrical Characteristics

I_{line} = 11 to 140 mA, V_{EE} = 0V, f = 800Hz; T_{amb} = 25 °É; unless otherwise specified

SYMBOL	PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
Supplies LN and VCC (Pin 1 and 13)						
V_{LN}	Voltage drop over circuit Between LN and V_{EE}	MIC inputs open circuit I_{line} = 1mA	-	1.6	-	V
		I_{line} = 4mA	-	1.9	-	V
		I_{line} = 15mA	3.55	4.0	4.25	V
		I_{line} = 100mA	4.9	5.7	6.5	V
		I_{line} = 140mA	-	-	7.5	V
V_{LN}	Voltage drop over circuit between LN and V_{EE} with external resistor R_{VA}	I_{line} = 15mA R_{VA}(LN to REG)=68 kΩ	-	3.5	-	V
		R_{VA}(REG to SLPE)=39kΩ	-	4.5	-	V
I_{CC}	Supply current	V_{CC} = 2.8V	-	0.9	1.35	mA
V_{CC}	Supply voltage available for peripheral circuitry GL6962	I_{line} = 15mA MUTE = HIGH				
		IP = 1.2mA	2.2	2.7	-	V
		IP = 0mA	-	3.4	-	V
	GL6962A	$\overline{MUTE}$ = LOW				
		IP = 1.2mA	2.2	2.7	-	V
		IP = 0mA	-	3.4	-	V
Microphone inputs MIC- and MIC+ (pin 6 and 7)						
$|Z_i|$	Input inpedance Differential	Between MIC- and MIC+	-	64	-	kΩ
	Single-ended	MIC- or MIC+ to V_{EE}	-	34	-	kΩ
CMRR	Common mode rejection ratio		-	82	-	dB
G_V	Voltage gain MIC+ or MIC- to LN	I_{line} = 15mA R7 = 68kΩ	50.5	52.0	53.5	dB
$¥ G_{vf}$	Gain variation with frequency referred to 800Hz	f = 300 and 3400 Hz	-	¡0.2	-	dB

| SYMBOL	PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
DTMF input (pin 11)						
$\lvert Z_i \rvert$	Input impedance		-	22	-	k§Ù
G_V	Voltage gain from DTMF to LN	I_{line} = 15mA R7 = 68k§Ù	24.0	25.5	27.0	dB
¥Ġ$_{vf}$	Gain variation with frequency referred to 80 Hz	f = 300 and 3400 Hz	-	¡¾ 0.2	-	dB
Gain adjustment input TGA1 and TGA2 (pin 2 and 3)						
¥Ġ$_V$	Transmitting amplifier gain variation by adjustment of R7 between TGA1 and TGA2		-8	-	0	dB
Sending adjustment output LN (pin 1)						
$V_{LN(RMS)}$	Output voltage (RMS value)	THD = 10% I_{line} = 4mA I_{line} = 15mA	- 1.7	0.8 2.3	- -	V V
$V_{no(RMS)}$	Noise output voltage (RMS value)	I_{line} = 15mA R7 = 68 k§Ù 200 §Ù between MIC- and MIC+; psophometrically weighted	-	-69	-	dBmp
Receiving amplifier input IR (pin 10)						
$\lvert Z_i \rvert$	Input impedance		-	22	-	k§Ù
Receiving amplifier output QR (pin 4)						
$\lvert Z_o \rvert$	Output impedance		-	4	-	¥Ø
G_V	Voltage gain from IR to QR	I_{line} = 15mA R_L =300 ¥Ø (from pin 9 to pin4)	29.5	31.0	32.5	dB
¥Ġ$_{vf}$	Gain variation with frequency referred to 800Hz	f = 300 and 3400 Hz	-	¡¾ 0.2	-	dB

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SYMBOL	PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
$V_{o(RMS)}$	Output voltage(RMS value)	THD = 2 % sinewave drive ; R4 = 100k¥ Ø I_{line} = 15mA ; I_p = 0mA ;				
		R_L = 150 ¥ Ø	0.22	0.33	-	V
		R_L= 150 ¥ Ø	0.3	0.48	-	V
$V_{o(RMS)}$	Output voltage(RMS value)	THD = 10% ; R4 = 100 k¥ Ø; R_L 150 ¥ Ø I_{line} = 4mA	-	15	-	mV
$V_{no(RMS)}$	Noise output voltage (RMS value)	I_{line} = 15mA ; R4 =100 k¥ Ø; IR open-circuit psophometrically weighted R_L =300 ¥ Ø	-	50	-	•V
Gain adjustment input RGA (pin 5)						
¥ Ĝ$_v$	Receiving amplifier gain Variation by adjustment of R4 between RGA and QR		-11	-	0	dB
MUTE input (pin 12)						
V_{IH}	HIGH level input voltage		1.5	-	V_{CC}	V
V_{IL}	LOW level input voltage		-	-	0.3	V
I_{MUTE}	Input current		-	8	15	μA
Reduction of gain						
G_v	Voltage gain from DTMF to QR GL6962 GL6962A	R4 =100 k¥ Ø; R_L = 300 ¥ Ø				
		MUTE = HIGH	-	-19	-	dB
		$\overline{\text{MUTE}}$ = LOW	-	-19	-	dB
Automatic gain control input AGC (pin 15)						
¥ Ĝ$_v$	Controlling the gain from IR to QR and the gain from MIC+, MIC- to LN Gain control range	R6 =100 K¥ ø (between AGC and V_{EE})			-	
		I_{line} = 70mA	-	-5.8	-	dB

Test Circuit
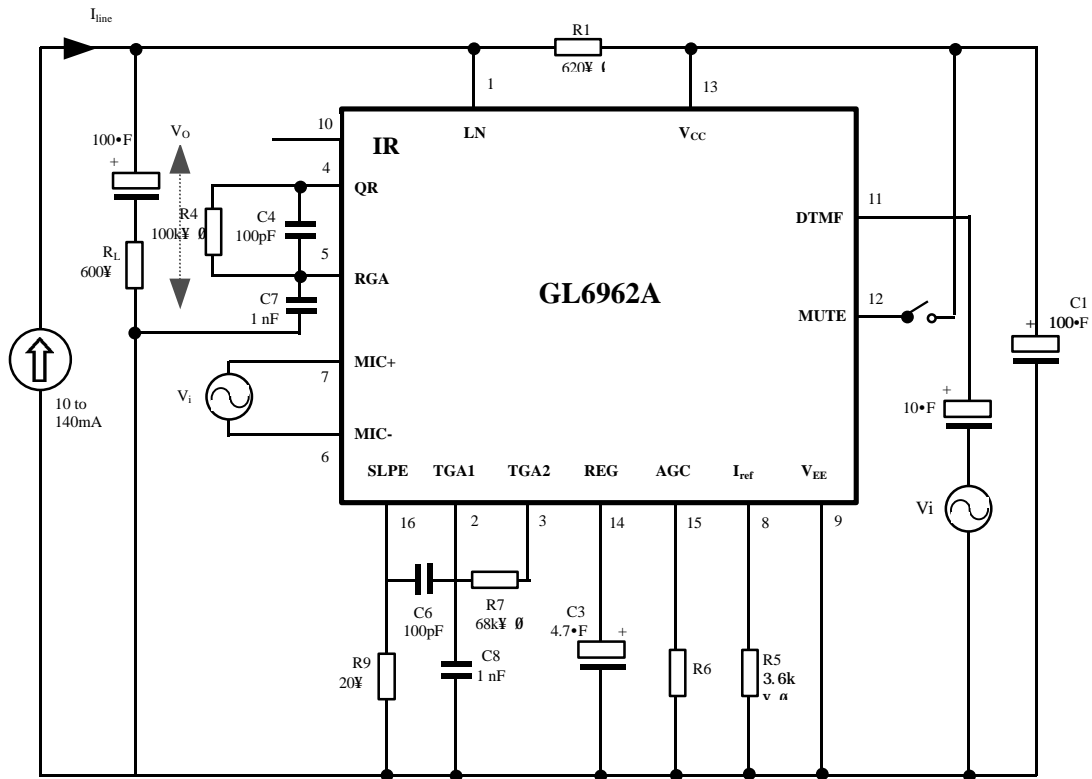
For measuring gain from MIC+ and MIC-, the MUTE input should be LOW or open-circuit.
For measuring the DTMF input, the MUTE input should be HIGH.
Inputs not being tested should be open-circuit.

Fig. 1 Test circuit for defining GL6962 voltage gain of MIC+, MIC- and DTMF inputs.
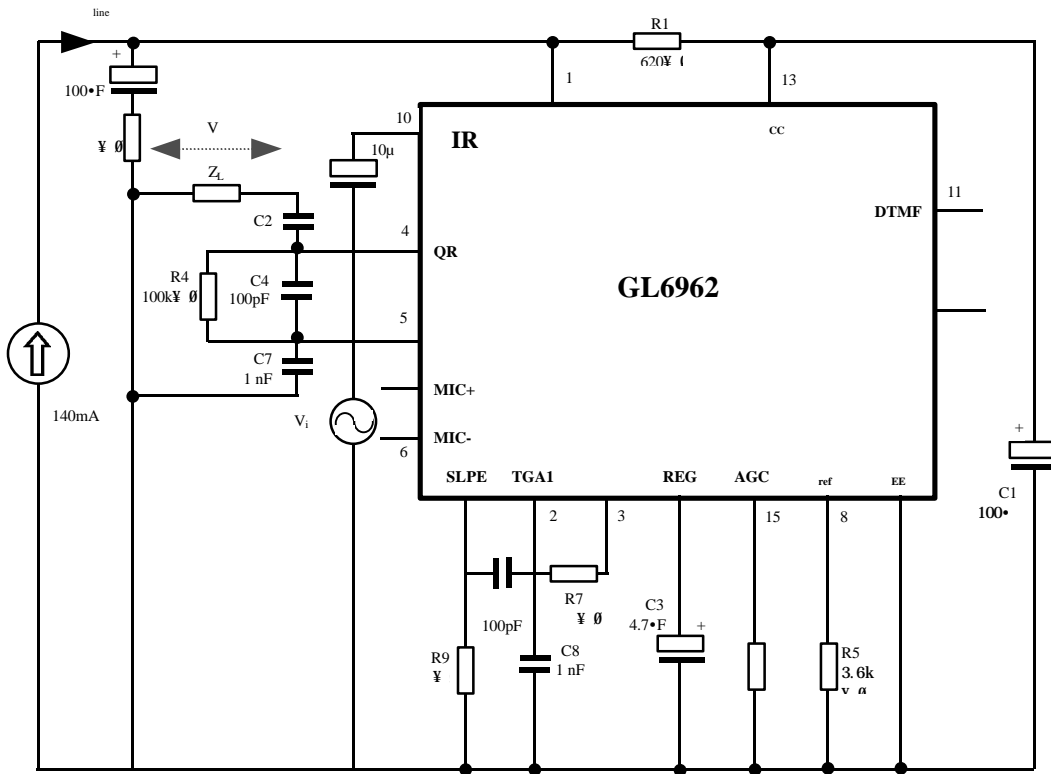   (Voltage gain is defined as $G_V = 20\log |V_o/V_i|$

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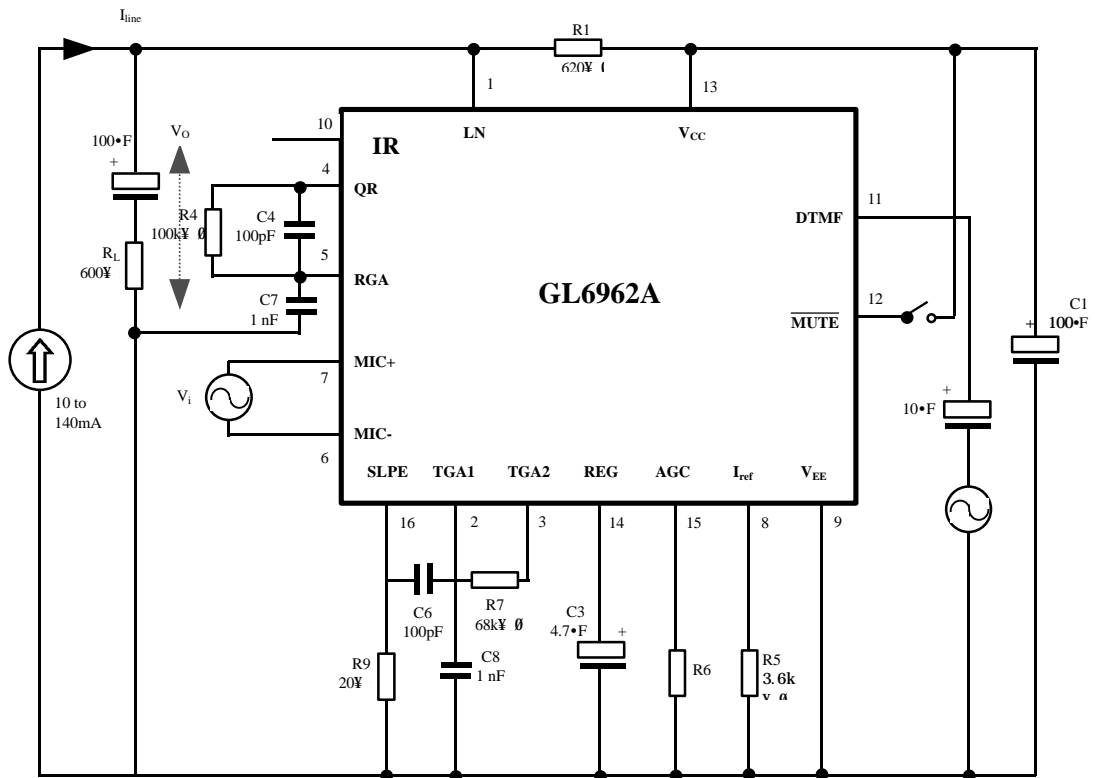
For measuring gain from MIC+ and MIC-, the $\overline{\text{MUTE}}$ input should be HIGH.
For measuring the DTMF input, the $\overline{\text{MUTE}}$ input should be LOW or open-circuit.
Inputs not being tested should be open-circuit.

Fig. 2 Test circuit for defining GL6962A voltage gain of MIC+, MIC- and DTMF inputs.
(Voltage gain is defined as $G_V = 20\log |V_o/V_i|$

Fig. 3 Test circuit for defining GL696
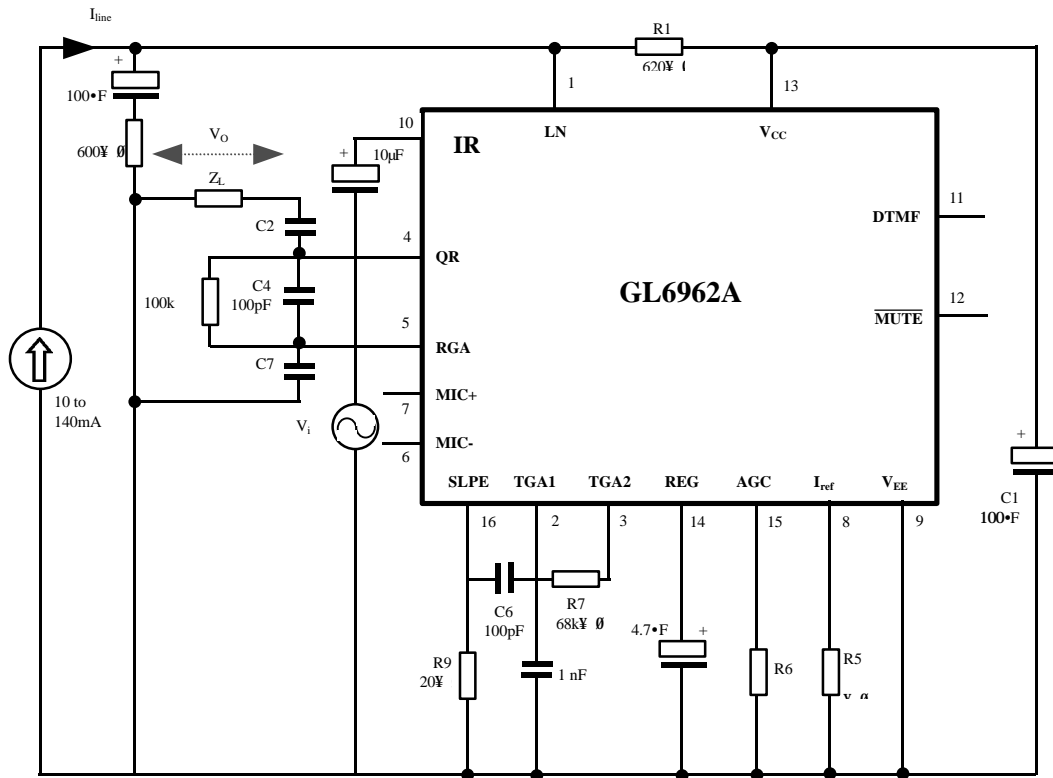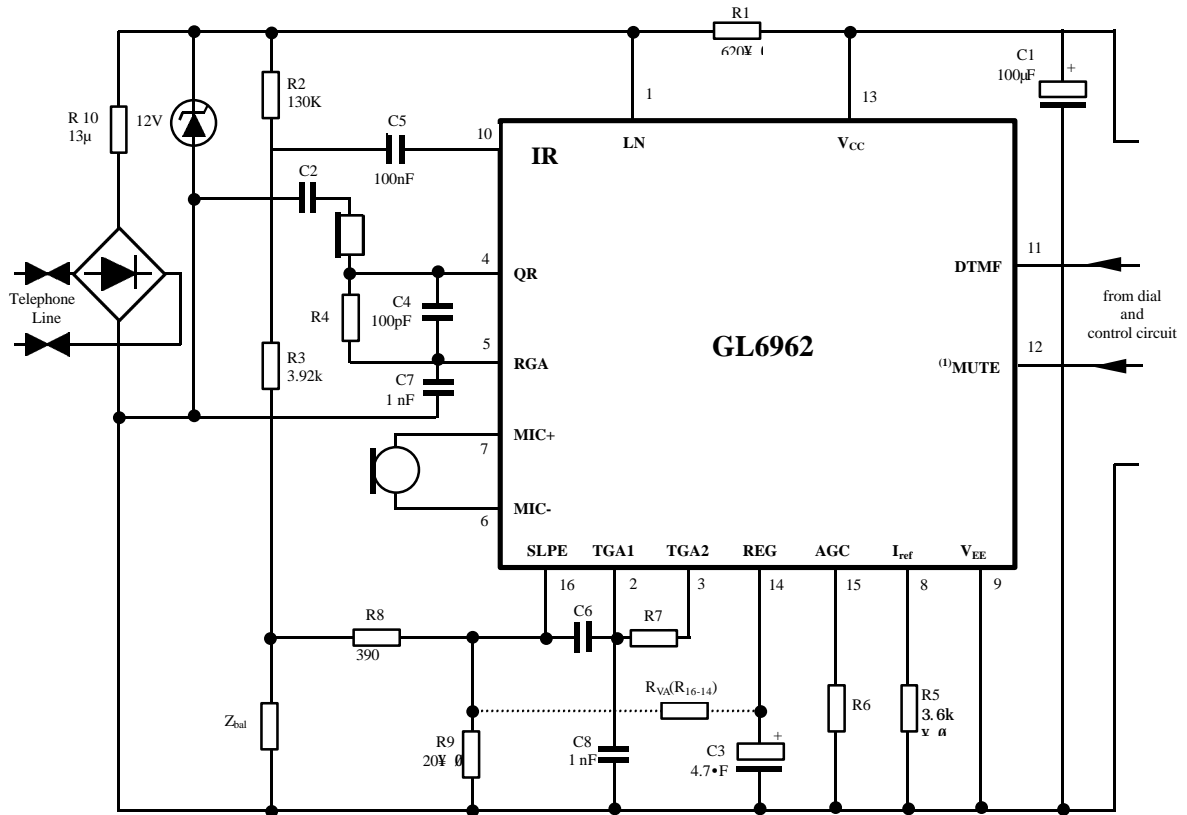(Voltage gain is defined as $G = 20\log | _o/V |$

Fig. 4 Test circuit for defining GL6962A voltage gain of receiving amplifier.
(Voltage gain is defined as $G_V = 20\log |V_o/V_i|$

Application Circuit

(1)   Pin 12 is active LOW ($\overline{\text{MUTE}}$) for GL6962A.

Fig. 5 Typical application of GL6962, shown there with piezo-electric earpiece and DTMF dialing. (The diode bridge, the zener diode and R10 limit current into, and the voltage across, the circuit during line transients. A different protection requirement is required for pulse dialing or register recall.)