	Low Voltage Telephone Speech Transmission Circuit (High Level Mute) HC1062
	Low Voltage Telephone Speech Transmission Circuit (Low Level Mute) HC1062A
HSiN Semiconductor Pte Ltd	**www.hsin.com.sg**

1. Overview

The HC1062(High Level Mute) /HC1062A (Low Level Mute) are integrated circuit that perform all speech and line interface functions required in fully electronic telephone sets. They also perform electronic switching between dialing and speech. The ICs operate at line voltage down to 1.6V (with reduce performance) to facilitate the use of more telephone sets connected in parallel.

- Low line voltage down to 1.6V (excluding polarity guard)
- Voltage regulator with adjustable static resistance
- Provides a supply for external circuit
- Symmetrical high-impedance inputs (64kΩ) for dynamic, magnetic or piezoelectric microphone
- Asymmetrical high-impedance (32kΩ) for electret microphone
- DTMF signal input with confidence tone
- Mute input for pulse or DTMF dialing
- Receiving amplifier for dynamic, magnetic or piezoelectric earpieces
- Large gain range settings for microphone and earpieces amplifiers
- Line loss compensation (line current dependent) for microphone and earpiece amplifier
- Gain control curve adaptable for exchange supply
- DC line voltage adjustment facility
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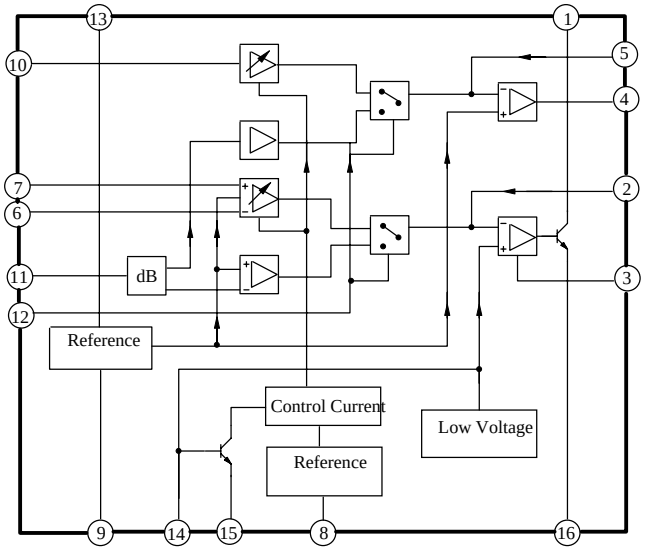


2. 2 Pin Description

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	LN_+	Positive Line	9	LN_-	Negative Line
2	ADJ_{MIC1}	Gain Adjustment, Transmitting AMP	10	IN_R	Receiving Input
3	ADJ_{MIC2}	Gain Adjustment, Transmitting AMP	11	IN_{DTMF}	DTMF Input
4	OUT_R	Receiving Output	12	IN_{MUTR}	Mute Input
5	ADJ_R	Gain Adjustment, Receiving AMP	13	V_{CC}	Supply Voltage
6	IN^-_{MIC}	Inverting Microphone Input	14	REG	De-coupling
7	IN^+_{MIC}	Non-Inverting Microphone Input	15	IN_{AGC}	AGC Input
8	CS	Current Stabilizer	16	ADJ_{SL}	Slope Adjustment

3. Electrical Characteristics

3. 1 Absolute Maximum Ratings

Unless otherwise specified, T_{amb}= 25℃

Parameter	Symbol	Conditions	Value	Unit
Continuous Line Voltage	V_{LN}		12	V
Repetitive Line Voltage	V_{LN}	During switch on or interruption	13.2	V
Repetitive Peak Line Voltage	V_{LN}	R_9=20Ω,R_{10}=13Ω tp/p=1ms/5s	28	V
Line Current	I_{LINS}	R_9=20Ω	140	mA
Input Voltage of All Pins	V_{PINS}		V_{CC}+0.7/-0.7	V
Power Dissipation	P_D	R_9=20Ω	666	mW
Junction Temperature	T_J		125	℃
Operating Temperature	T_{amb}		-25 ~ 75	℃
Storage Temperature	T_{stg}		-40 ~ 125	℃

3. 2 Electrical Characteristics

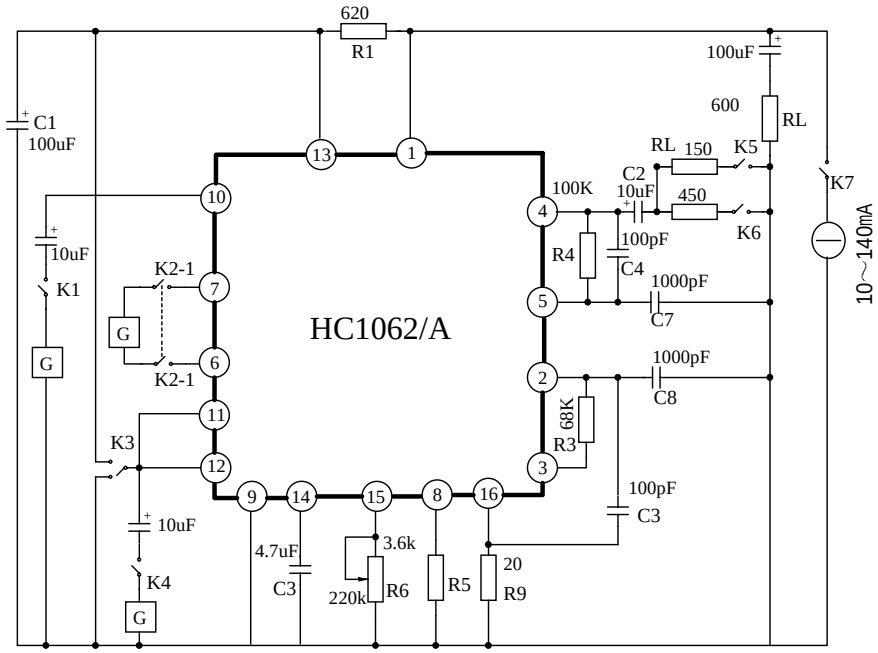
Unless otherwise specified, T_{amb}= 25℃, I_{LINE} =11~140mA, V_9=0V, f=800H_Z

Parameter	Symbol	Test Conditions	Value			Unit
			Min	Typ	Max	
Supplies LN and V_{CC} pin 1 and 13						
Line Voltage When MIC Input Open	V_{LN}	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
Variation with Temperature	ΔV_{LN} / ΔT	I_{LINE} =15mA		0.3		mV/K
V_{LN} with external Resistor	V_{LN}	R_{AV}=68kΩ(LN to REG)		3.5		V
		R_{AV}=68kΩ(REG to SLPE)		4.5		V
Supply Current	I_{CC}	V_{CC}=2.8V		0.9	1.35	mA
Supply for External Circuit	V_{CC}	I_P=1.2mA	2.2	2.7		V
	V_{CC}	I_P=0mA		3.4		V

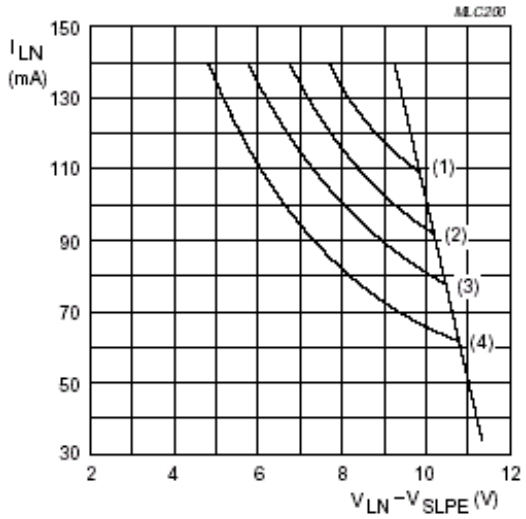
Parameter	Symbol	Test Conditions	Value			Unit
			Min	Typ	Max	
Microphone Input						
Input Impedance Differential	Z_I	Between Pin 6 and 7		64		k Ω
Input Impedance Single	Z_I	Between pin 6 (or 7) and 9		32		k Ω
Common Mode Rejection	CMR			82		dB
Voltage Gain	A_V	Between pin 6 (or 7) and 1 I_{LINE} =15mA, R_7=68 k Ω	50.5	52	53.5	dB
Gain Variation with Frequency	ΔA_{Vf}	f=300 ~ 3400Hz w.r.t.800Hz		±0.2		dB
Gain Variation with Temperature	ΔA_{VT}	T_{amb}= -25 ~ 75℃ w.r.t. 25℃, I_{LINE} =50mA		±0.2		dB
Transmitting Gain Variation	ΔA_V	Adjust R7 between Pin 2 and 3	-8		0	V
Transmitting Amp Output Voltage	V_{LN}	I_{LINE} =15mA THD=10%	1.7	2.3		V
		I_{LINE} =4mA THD=10%		0.8		V
Output Noise Voltage	V_{LN}	I_{LINE} =15mA, R_7=68 k Ω 200 Ω between pin 6 and 7		0.27		mV
DTMF						
Input Impedance	Z_I	Pin 11		20.7		k Ω
Voltage Gain from DTMF to LN	A_V	I_{LINE} =15mA， R_7=68 k Ω	24.0	25.5	27.0	dB
Gain Variation with Frequency	ΔA_{Vf}	f=300~3400Hz w.r.t.800Hz		±0.2		dB
Gain Variation with Temperature	ΔA_{VT}	T_{amb}=-25~75℃ w.r.t. 25℃, I_{LINE} =50mA		±0.2		dB
Receiver						
Input Impedance	Z_I	Pin 10		21		k Ω
Input Impedance	Z_O	Pin 4		4		Ω
Voltage Gain	A_V	I_{LINE} =15mA, R_L=300 Ω	29.5	31	32.5	dB
Gain Variation with Frequency	ΔA_{Vf}	f=300~3400Hz w.r.t.800Hz		±0.2		dB
Gain Variation with Temperature	ΔA_{VT}	T_{amb}=-25~75℃,without R_6 w.r.t. 25℃， I_{LINE} =50mA		±0.2		dB
Output Voltage R_L=150 Ω	V_O	THD=2%, I_P=0mA Sine wave drive R_4=100k Ω, I_{LINE} =50mA	0.22	0.33		V
Output Voltage R_L=450 Ω			0.30	0.48		V
Output Voltage	V_O	THD=10%, R_4=100k Ω I_{LINE} =4mA, R_L=150 Ω		15		mV
Output Noise Voltage	V_{NO}	Pin 10 open circuit R_4=100k Ω I_{LINE} =15mA, R_L=300 Ω		50		uV
Gain Variation with R4	ΔA_V	Between Pin 4 and 5	-11		0	dB

Parameter	Symbol	Test Conditions	Value			Unit
			Min	Typ	Max	
Mute						
High Level Input Voltage	V_{IH}	Pin 12	1.5		V_{CC}	V
Low Level Input Voltage	V_{IL}	Pin 12			0.3	V
Input Current	I_{MUTE}	Pin 12		8	15	uA
Gain Attenuation	ΔA_V	From pin 6 (or 7) to pin 1		70		dB
Voltage Gain	A_V	From pin 11 to pin 4 R_4=100k Ω, R_L=300 Ω		-19		dB
AGC						
AGC Control Range	ΔA_V	From pin 10 to pin 4 R_4=110k Ω, I_{LINE} =70mA		-5.8		dB
AGC Control Range	ΔA_V	From pin 6 (or 7) to pin 1 R_4=110k Ω, I_{LINE} =70mA		-5.8		dB
Max. Line Current	I_{LINEM}	Highest gain		23		mA
Max. Line Current	I_{LINEm}	Lowest gain		61		mA

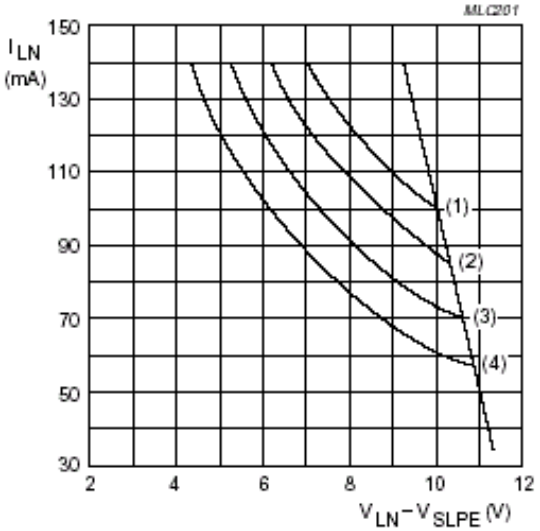
4. Test Circui



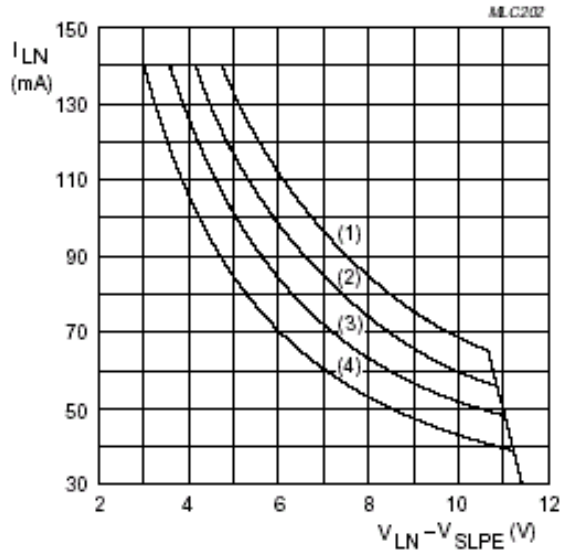
5. Characteristics Curve



(1) T_{amb} = 45 °C; P_{tot} = 1068 mW.
(2) T_{amb} = 55 °C; P_{tot} = 934 mW.
(3) T_{amb} = 65 °C; P_{tot} = 800 mW.
(4) T_{amb} = 75 °C; P_{tot} = 666 mW.

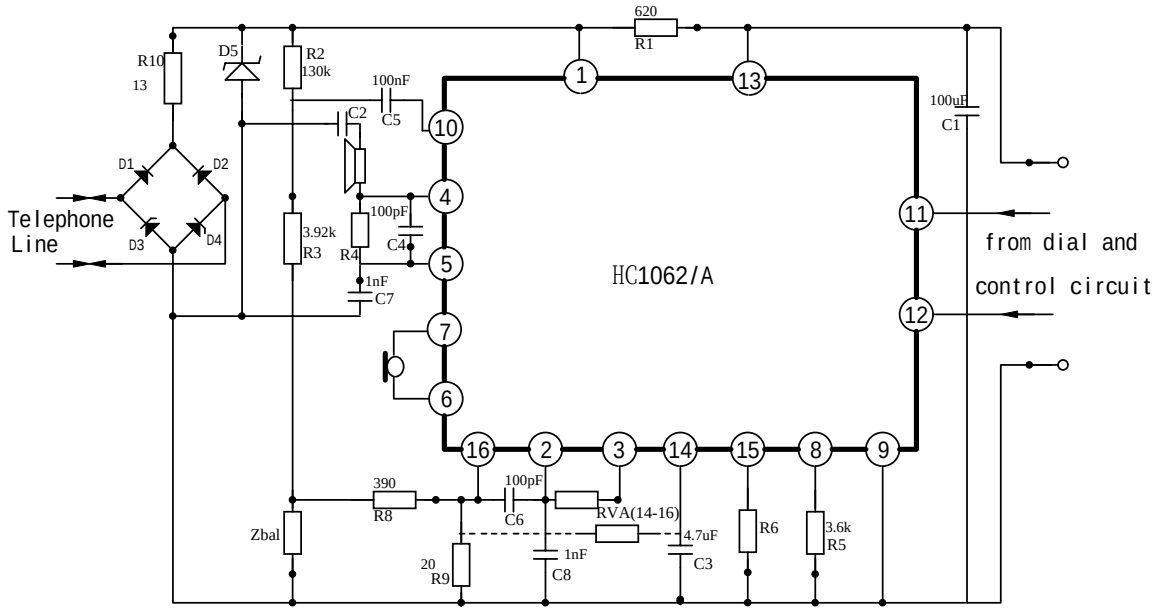


(1) T_{amb} = 45 °C; P_{tot} = 988 mW.
(2) T_{amb} = 55 °C; P_{tot} = 864 mW.
(3) T_{amb} = 65 °C; P_{tot} = 741 mW.
(4) T_{amb} = 75 °C; P_{tot} = 617 mW.



(1) T_{amb} = 45 °C; P_{tot} = 727 mW.
(2) T_{amb} = 55 °C; P_{tot} = 636 mW.
(3) T_{amb} = 65 °C; P_{tot} = 545 mW.
(4) T_{amb} = 75 °C; P_{tot} = 454 mW.

6. Application Circuit



7. Package Dimensions