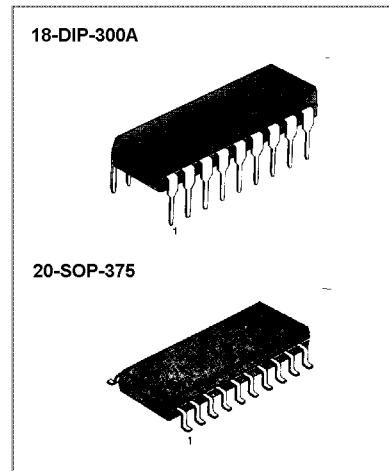


INTRODUCTION

The KA2425A is a telephone speech network integrated circuit which includes transmit amp, receive amp, sidetone amp, DC loop interface function, DTMF input, voltage regulator for speech, a regulated output voltage for a dialer, and equalization circuit.

FEATURES

- Low voltage operation (1.5V : speech)
- Transmit, receive, side tone and DTMF level are controlled by external resistors
- Regulated voltage for dialer
- Loop length equalization
- MUTE function
- Linear interface for DTMF



ORDERING INFORMATION

Device	Package	Operating Temperature
KA2425A	18-DIP-300A	- 20 ~ + 60 °C
KA2425AD	20-SOP-375	

PIN CONFIGURATION

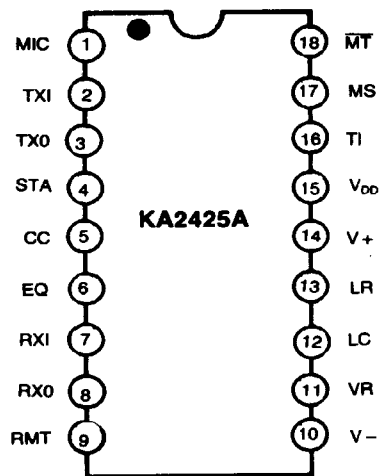


Fig. 1

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Characteristic	Symbol	Value	Unit
V ₊ Voltage	V ₊	-1.0 ~ + 18	V
V _{DD} (V ₊ = 0)	V _{DD}	-1.0 ~ + 6	V
MT, MS Inputs	V _M	-1.0 ~ V _{DD} + 1	V
V _{LR}	V _{LR}	-1.0V ~ V ₊ - 3.0	V
Storage Temperature	T _{STG}	-65 ~ + 150	°C

RECOMMENDED OPERATING CONDITIONS (Ta = 25°C)

Characteristic	Symbol	Value	Unit
I _{TXO} (Instantaneous)	I _{CC}	0 ~ 10	mA
V ₊ Voltage : Speech Mode	V ₊ (SM)	+ 1.5 ~ + 15	V
Tone Dialing Mode	V ₊ (TM)	+ 3.3 ~ + 15	V
Operating Temperature	T _{OPR}	- 20 ~ + 60	°C

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
SYSTEM SPECIFICATIONS (Refer to Fig. 3 and Fig. 4)						
T _X Gain from V _S to V ₊	G _{V(TX)}	Figure 3 (I _L = 20mA)	28	29.5	31	dB
Gain Change	ΔG _{V(TX)}	I _L = 60mA	-6.0	-4.5	-3.6	dB
Distortion	THD _{TX}		—	2.0	—	%
Output Noise	V _{NO(TX)}		—	11	—	dBmc
R _X						
V _{RXO} /V _S	G _{V(RX)}	f = 1.0KHz, I _L = 20mA	- 16	-15	-13	dB
R _X Gain Change	ΔG _{V(RX)}	(See Figure 4) I _L = 60mA	- 5.0	- 3.0	- 2.0	dB
Distortion	THD _{RX}		—	2.0	—	%
DTMF Driver						
V ₊ / V _{IN}	G _{V(MF)}	I _L = 20mA	3.2	4.8	6.2	dB
Sidetone Level						
V _{RXO} / V ₊	G _{V(ST)}	I _L = 20mA	—	-28	—	dB
		I _L = 60mA	—	-13	—	
Sidetone Rejection						
{ $\frac{V_{RXO}}{V_+}$ (Figure 4) } dB - { $\frac{V_{RXO}}{V_+}$ (Figure 3) } dB	RST	I _L = 20mA	12	18	—	dB
Tip-Ring Voltage (including polarity guard bridge drop of 1.4V) (Speech Mode)	V _{TR}	I _L = 5.0mA	—	2.4	—	V _{dc}
		I _L = 10mA	—	3.9	—	
		I _L = 20mA	—	4.6	—	
		I _L = 40mA	—	5.6	—	
		I _L = 60mA	—	6.6	—	
AC Impedance						
Speech mode (incl. C ₆ , See Figure 4)						
Z _{ac} = (600)V ₊ / (V _S - V ₊)	Z _{ac}	I _L = 20mA	—	750	—	Ω
		I _L = 60mA	—	300	—	
Tone Mode (including C ₆)		20mA < I _L < 60mA	—	1650	—	

Note : Typicals are not tested or guaranteed.

ELECTRICAL CHARACTERISTICS (Continued)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
SPEECH AMPLIFIERS						
T_x						
Gain	$G_{V(TX)}$	TXI to TXO	24	26	28	dB
TXO Bias Voltage	$V_{BIAS(SPM)}$	Speech/Pulse Mode	0.45	0.52	0.60	$\times V_R$
TXO Bias Voltage	$V_{BIAS(TM)}$	Tone Mode	$V_R - 25$	$V_R - 5.0$	—	mV
TXO High Voltage	$V_{OH(SPM)}$	Speech/Pulse Mode	$V_R - 25$	$V_R - 5.0$	—	mV
TXO Low Voltage	$V_{OL(SPM)}$	Speech/Pulse Mode	—	125	250	mV
TXI Input Resistance	$R_{I(TXI)}$		—	10	—	k Ω
R_x						
RXO Bias Voltage	$V_{BIAS(AM)}$	All Mode	0.45	0.52	0.60	$\times V_R$
RXO Source Current	$I_{SOURCE(SM)}$	Speech Mode	1.5	2.0	—	mA
RXO Source Current	$I_{SOURCE(PTM)}$	Pulse/Tone Mode	200	400	—	μ A
RXO High Voltage	$V_{OH(AM)}$	All Mode	$V_R - 100$	$V_R - 50$	—	mV
RXO Low Voltage	$V_{OL(AM)}$	All Mode	—	50	150	mV
SIDETONE AMPLIFIER						
Gain (TXO to STA)						
Speech Mode	$G_{V(STA)}$	@ $V_{LR} = 0.5V$	—	-15	—	dB
Speech Mode		@ $V_{LR} = 2.5V$	—	-21	—	
Pulse Mode		@ $V_{LR} = 0.2V$	—	-15	—	
Pulse Mode		@ $V_{LR} = 1.0V$	—	-21	—	
STA Bias Voltage	$V_{BIAS(STA)}$	All Modes	0.65	0.8	0.9	$\times V_R$
MICROPHONE, RECEIVER CONTROLS						
MIC Saturation Voltage	$V_{SAT(MIC)}$	Speech Mode, $I = 500\mu A$	—	50	125	mV
MIC Leakage Current	$I_{LKG(MIC)}$	Dialing Mode, Pin 1 = 3.0V	—	0	5.0	μ A
RMT Resistance	$R_{RMT(SM)}$ $R_{RMT(DM)}$	Speech Mode Dialing Mode	— 5.0	8.0 10	15 18	Ω k Ω
RMT Delay	$t_D(RMT)$	Dialing to Speech	2.0	4.0	20	ms
EQUALIZATION AMPLIFIER						
Gain (V + to EQ)						
Speech Mode	$G_{V(EQ)}$	@ $V_{LR} = 0.5V$	—	-12	—	dB
Speech Mode		@ $V_{LR} = 2.5V$	—	-2.5	—	
Pulse Mode		@ $V_{LR} = 0.2V$	—	-12	—	
Pulse Mode		@ $V_{LR} = 1.0V$	—	-2.5	—	
EQ Bias Voltage	$V_{BIAS(EQ)}$	@ $V_{LR} = 0.5V$	—	0.66	—	V_{dc}
Speech Mode	@ $V_{LR} = 0.5V$	—	1.3	—		
Pulse Mode	@ $V_{LR} = 0.5V$	—	3.3	—		
Speech, Pulse Mode	@ $V_{LR} = 2.5V$	—	—	—		

ELECTRICAL CHARACTERISTICS (Continued)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
DIALING INTERFACE						
MT Input Resistance	$R_{I(MT)}$	—	50	100	—	k Ω
MT, Input High Voltage	$V_{IH(MT)}$	—	$V_{DD}-0.3$	—	—	V_{dc}
MT, Input Low Voltage	$V_{IL(MT)}$	—	—	—	1.0	V_{dc}
MS Input Resistance	$R_{I(MS)}$	—	280	600	—	k Ω
MS Input High Voltage	$V_{IH(MS)}$	—	2.0	—	—	V_{dc}
MS Input Low Voltage	$V_{IL(MS)}$	—	—	—	0.3	V_{dc}
TI Input Resistance	$R_{I(TI)}$	—	—	1.25	—	k Ω
DTMF Gain	$G_V(MF)$	—	3.2	4.8	6.2	dB
LINE INTERFACE						
V+ Current (Pin 12 Grounded)	I+	V+ = 1.7V V+ = 12V V+ = 12V	4.5 5.5 6.0	7.1 8.4 8.8	9.0 12.5 14.0	mA
Speech Mode						
Speech/Pulse Modes						
Tone Mode						
V+ Voltage	V+	$I_L = 20mA$ $I_L = 30mA$ $I_L = 120mA$ $I_L = 20mA$ $I_L = 30mA$	2.6 3.0 7.0 4.1 4.5	3.2 3.7 8.2 4.9 6.4	3.8 4.4 9.5 5.7 6.2	V_{dc}
Speech/Pulse Mode						
Speech/Pulse Mode						
Speech/Pulse Mode						
Tone Mode						
Tone Mode						
LR Level Shift	ΔV_{LR}	V+ - V_{LR}	— —	2.7 4.3	— —	V_{dc}
Speech/Pulse Mode						
Tone Mode						
LC Terminal Resistance	R_{LC}	—	36	57	94	k Ω
VOLTAGE REGULATORS						
VR Voltage	V_R	(V+ = 1.7V)	1.1	1.2	1.3	V_{dc}
Load Regulation	ΔV_O	0mA < I_R < 6.0mA	—	20	—	mV
Line Regulation	ΔV_O	2.0V < V+ < 6.5V	—	25	—	mV
V _{DD} Voltage	V_{DD}	(V+ = 4.5V)	3.0	3.3	3.8	V_{dd}
Load Regulation (Dialing Mode)	$\Delta V_{O(DM)}$	0 < I_{DD} < 1.6mA	—	0.25	—	V_{dd}
Line Regulation (All Modes)	$\Delta V_{O(AM)}$	4.0V < V+ < 9.0V	—	50	—	mV
Max. Output Current	$I_{OSM(MAX)}$	Speech Mode	375	550	1000	μA
Max. Output Current	$I_{ODM(MAX)}$	Dialing Mode	1.6	2.0	3.6	mA
V _{DD} Leakage Current	$I_{LKG(VDD)}$	V+ = 0, V_{DD} = 3.0v	—	—	1.5	μA

TEST CIRCUIT

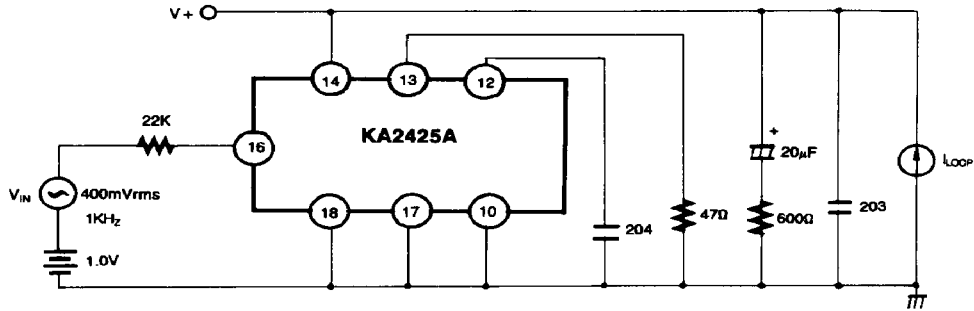


Fig. 2 DTMF Driver Test

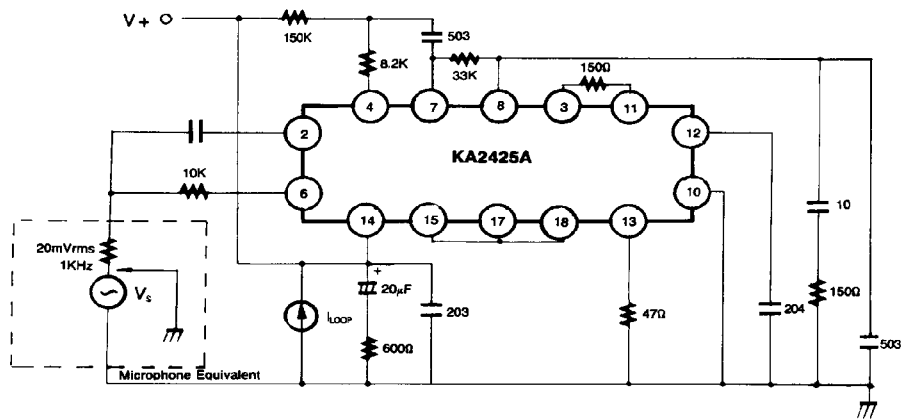


Fig. 3 Transmit and Sidetone Level Test

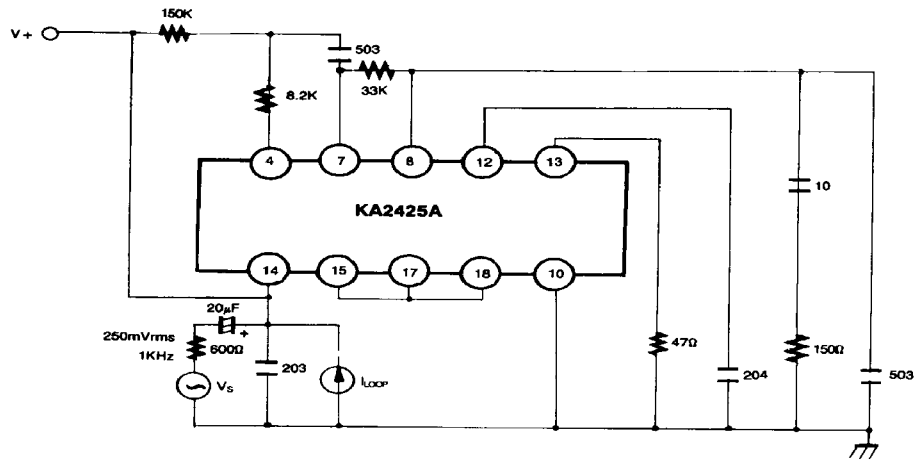


Fig. 4 AC Impedance, Receive and Sidetone Rejection Test

APPLICATION CIRCUIT

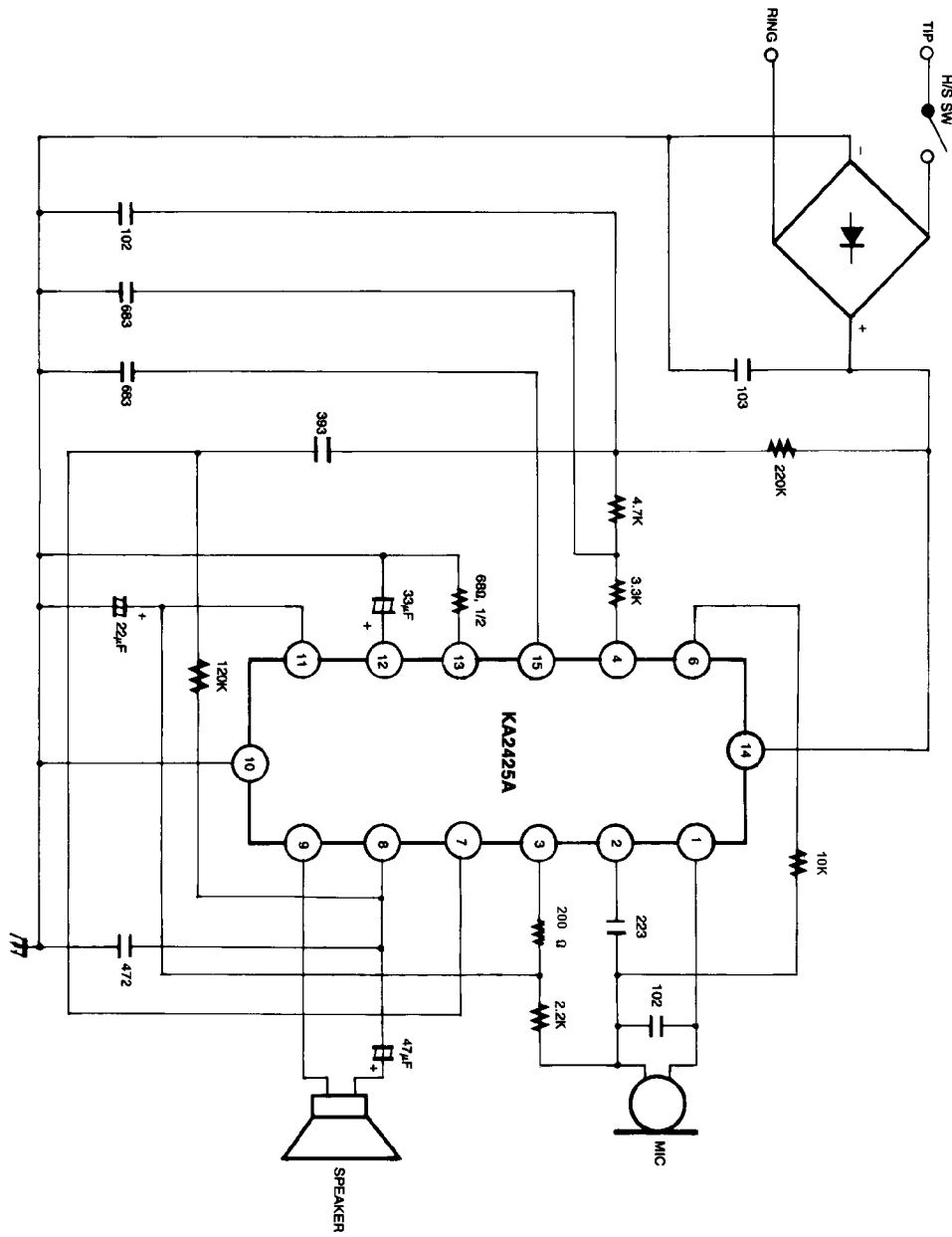


Fig. 5

Dimensions in Millimeters

