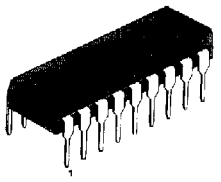
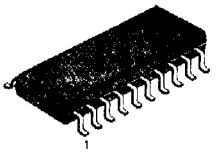
INTRODUCTION

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.

18-DIP-300A



20-SOP-375



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
- $\overline{\text{MUTE}}$ function
- Linear interface for DTMF

ORDERING INFORMATION

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

PIN CONFIGURATION

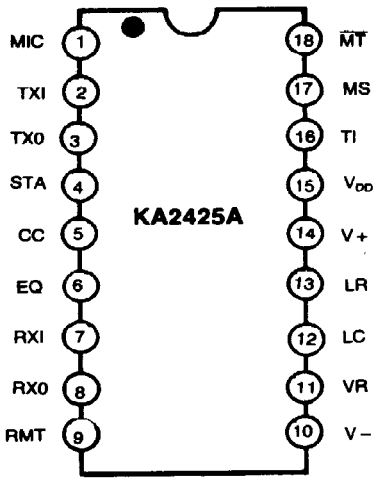


Fig. 1

ABSOLUTE MAXIMUM RATINGS (Ta = 25℃)

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	℃

RECOMMENDED OPERATING CONDITIONS (Ta = 25℃)

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	℃

ELECTRICAL CHARACTERISTICS (Ta = 25℃)

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	$\triangle G_{V(TX)}$	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	$\triangle G_{V(RX)}$	(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	$G_{V(ST)}$	I_L = 20mA	—	-28	—	dB
V_{RXO} / V+		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	Z_{ac}					Ω
Speech mode (incl. C_6, See Figure 4)		I_L = 20mA	—	750	—	
Z_{ac} = (600)V + / (V_S - V +)		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	xV_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	—	kΩ
R_X						
RXO Bias Voltage	$V_{BIAS\ (AM)}$	All Mode	0.45	0.52	0.60	xV_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	—	μA
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	xV_R
MICROPHONE, RECEIVER CONTROLS						
MIC Saturation Voltage	$V_{SAT\ (MIC)}$	Speech Mode, I = 500μA	—	50	125	mV
MIC Leakage Current	$I_{LKG\ (MIC)}$	Dialing Mode, Pin 1 = 3.0V	—	0	5.0	μA
RMT Resistance	$R_{RMT\ (SM)}$	Speech Mode	—	8.0	15	Ω
	$R_{RMT\ (DM)}$	Dialing Mode	5.0	10	18	kΩ
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						
Speech Mode	$V_{BIAS\ (EQ)}$	@V_{LR} = 0.5V	—	0.66	—	V_{dc}
Pulse Mode		@V_{LR} = 0.5V	—	1.3	—	
Speech, Pulse Mode		@V_{LR} = 2.5V	—	3.3	—	

ELECTRICAL CHARACTERISTICS (Continued)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
DIALING INTERFACE						
$\overline{MT}$ Input Resistance	$R_{I\ (\overline{MT})}$	—	50	100	—	kΩ
$\overline{MT}$, Input High Voltage	$V_{IH\ (\overline{MT})}$	—	V_{DD} -0.3	—	—	V_{dc}
$\overline{MT}$, Input Low Voltage	$V_{IL\ (\overline{MT})}$	—	—	—	1.0	V_{dc}
MS Input Resistance	$R_{I\ (MS)}$		280	600		kΩ
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	—	kΩ
DTMF Gain	$G_{V\ (MF)}$	—	3.2	4.8	6.2	dB
LINE INTERFACE						
V+ Current (Pin 12 Grounded)						
Speech Mode	I +	V + = 1.7V	4.5	7.1	9.0	mA
Speech/Pulse Modes		V + = 12V	5.5	8.4	12.5	
Tone Mode		V + = 12V	6.0	8.8	14.0	
V+ Voltage						
Speech/Pulse Mode		I_L = 20mA	2.6	3.2	3.8	
Speech/Pulse Mode		I_L = 30mA	3.0	3.7	4.4	
Speech/Pulse Mode	V +	I_L = 120mA	7.0	8.2	9.5	V_{dc}
Speech/Pulse Mode		I_L = 20mA	4.1	4.9	5.7	
Tone Mode		I_L = 30mA	4.5	6.4	6.2	
Tone Mode						
LR Level Shift			—	2.7	—	
Speech/Pulse Mode	$\triangle V_{LR}$	V + -V_{LR}	—	4.3	—	V_{dc}
Tone Mode						
LC Terminal Resistance	R_{LC}	—	36	57	94	kΩ
VOLTAGE REGULATORS						
VR Voltage	V_R	(V+ = 1.7V)	1.1	1.2	1.3	V_{dc}
Load Regulation	$\triangle V_O$	0mA < I_R < 6.0mA	—	20	—	mV
Line Regulation	$\triangle V_O$	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)	$\triangle V_{O\ (DM)}$	0 < I_{DD} < 1.6mA	—	0.25	—	V_{dd}
Line Regulation (All Modes)	$\triangle V_{O\ (AM)}$	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

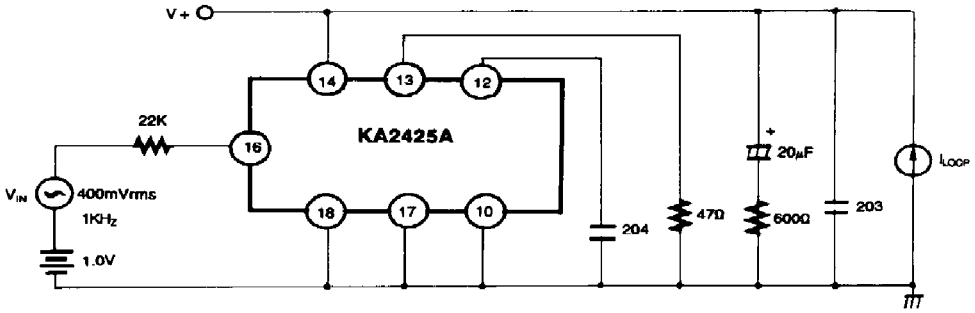


Fig. 2 DTMF Driver Test

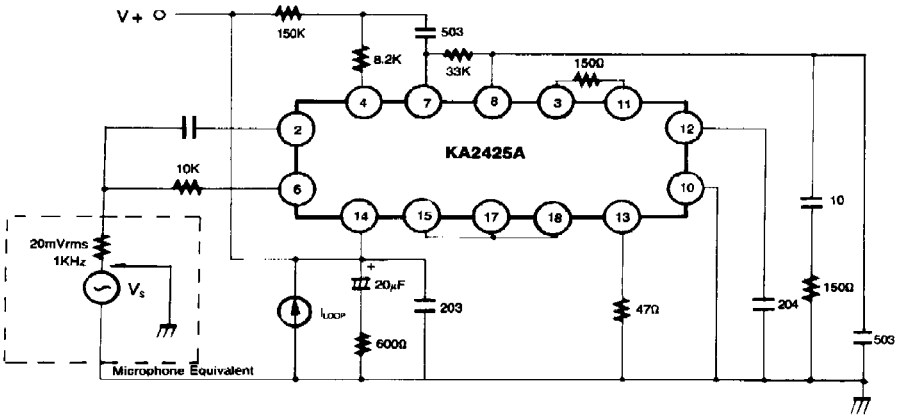


Fig. 3 Transmit and Sidetone Level Test

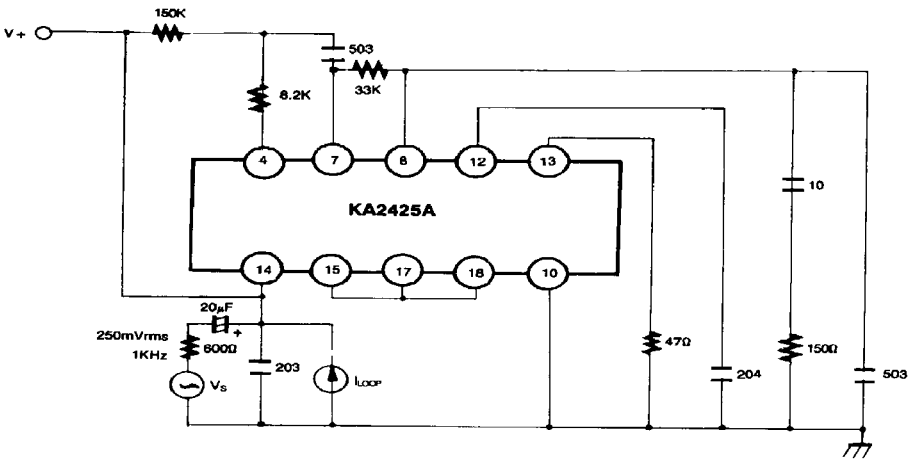


Fig. 4 AC Impedance, Receive and Sidetone Rejection Test

APPLICATION CIRCUIT

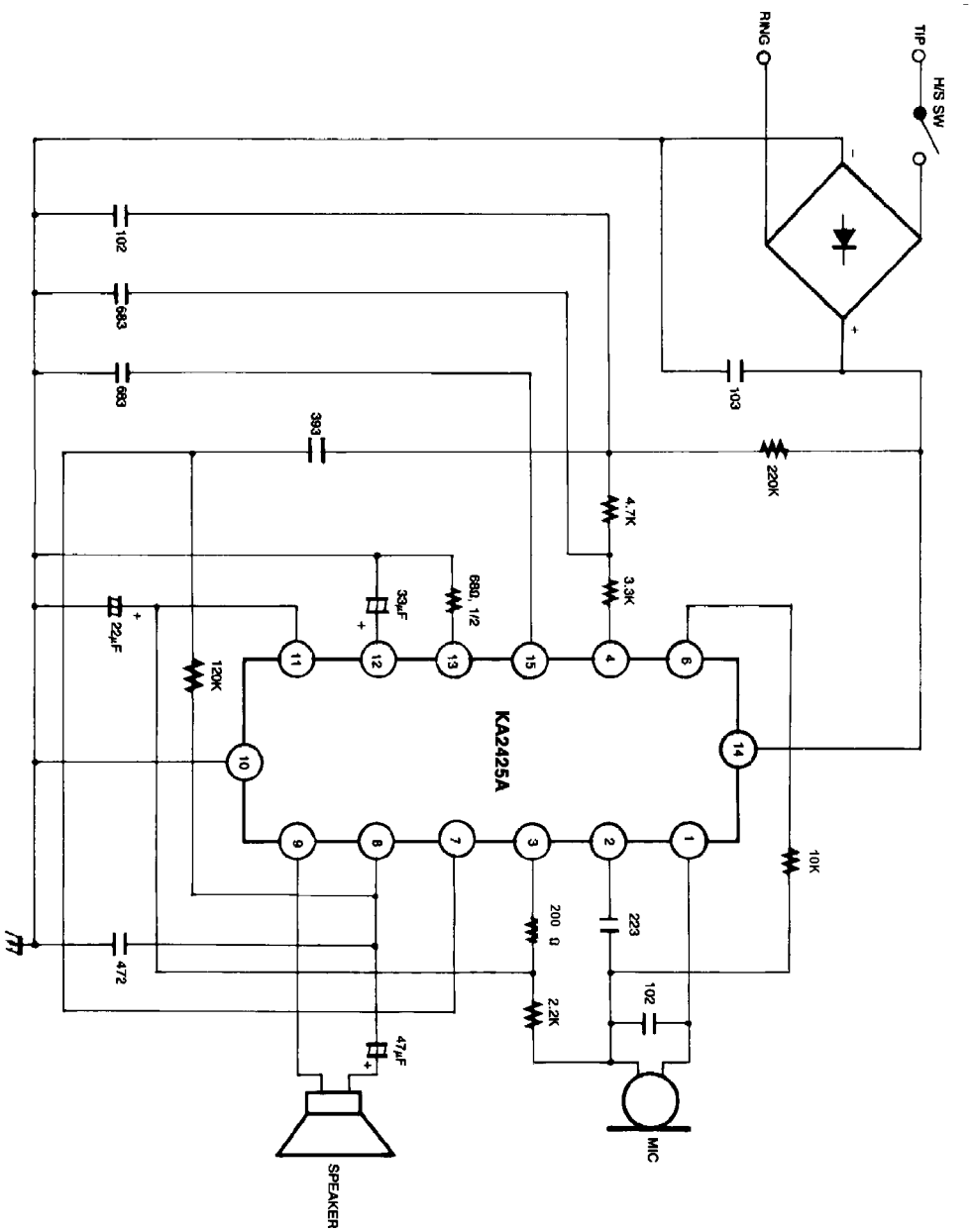
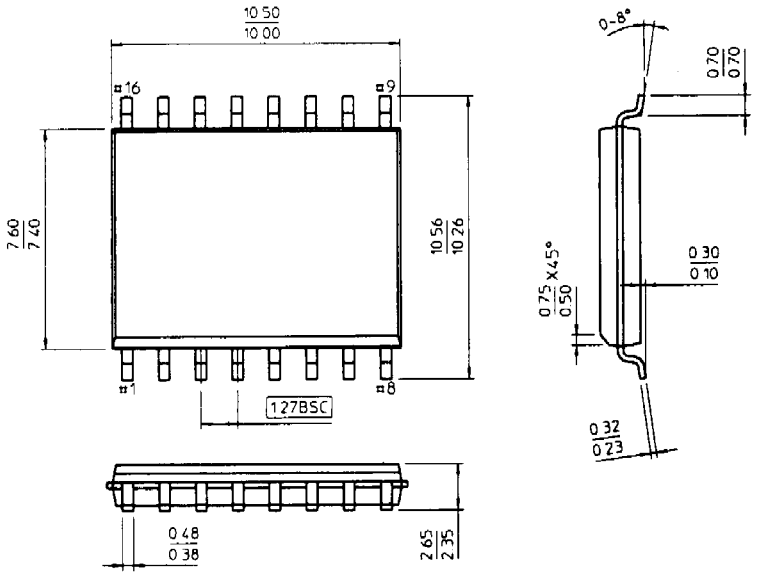


Fig. 5

Dimensions in Milimeters

16-SOP-BD300-SG



18-DIP-300A