

KA2425A

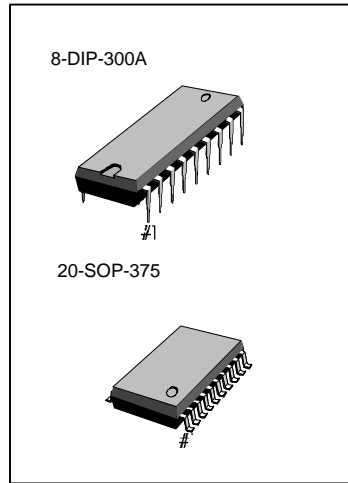
SPEECH NETWORK WITH DIALER INTERFACE

INTRODUCTION

The KA2425A is telephone speech network integrated circuit which includes transmit amp, receive amp, side tone 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
KA2425B	18-DIP-300A	- 20°C ~ + 60°C
KA2425AD	20-SOP-375	

PIN CONFIGURATION

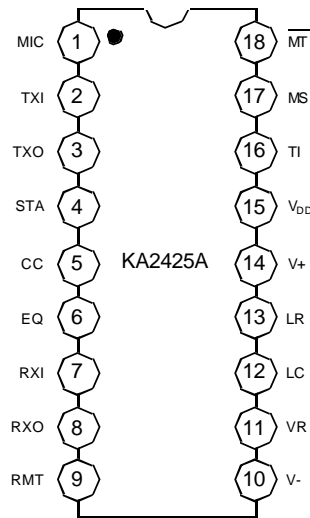


Fig. 1

ABSOLUTE MAXIMUM RATINGS

Characteristic	Symbol	Value	Unit
V ₊ Voltage	V _C	-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 (T_a = 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 _{ORR}	-20 ~ +60	°C

ELECTRICAL CHARACTERISTICS (T_a = 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 (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	-	dBm
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 I _L = 60mA	-	-28 -13	-	dB
Sidetone Rejection						
$\frac{V_{RXO}}{V_+}$ (Figure 4)dB - $\frac{V_{RXO}}{V_+}$ (Figer 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 I _L = 10mA I _L = 20mA I _L = 40mA I _L = 60mA	-	2.4 3.9 4.6 5.6 6.6	-	V _{DC}
AC impedance						
Speech mode (incl. C ₆ ,See Figure 4)	Z _{ac}	I _L = 20mA	-	750	-	Ω
Z _{ac} = (600)V ₊ / (V _S - V ₊)		I _L = 60mA	-	300	-	
Tone Mode (including C ₆)		20mA < I _L , 60mA	-	1650	-	

None : Typicals are tested or guaranteed.

ELECTRICAL CHARACTERISTICS (Continued)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
SYSTEM 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 Bias Voltage	$V_{OL(SPM)}$	Speech/Pulse Mode	$V_R - 25$	$V_R - 5.0$	-	mV
TXO Bias Voltage	$V_{OL(SPM)}$	Speech/Pulse Mode	-	125	250	mV
TXI input Resistance	$R_I(TXI)$		-	10	-	$K\Omega$
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, $I = 500\mu A$	-	50	125	mV
MIC Leakage Current	$I_{LKG(MIC)}$	Dialing Mode, Pin 1=3.0V	-	0	5.0	μA
RMT Resistance	$R_{RMT(SM)}$ $R_{RMT(DM)}$	Speech Mode Dialing Mode	- 5.0	8.0 10	15 18	Ω $K\Omega$
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	$V_{BIAS(EQ)}$					
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						
$\overline{\text{MT}}$ Input Resistance	$R_{I(\overline{\text{MT}})}$	-	50	100	-	$\text{K}\Omega$
$\overline{\text{MT}}$ Input High Voltage	$V_{IH(\overline{\text{MT}})}$	-	$V_{DD}-0.3$	-	-	V_{dc}
$\overline{\text{MT}}$ Input Low Voltage	$V_{IL(\overline{\text{MT}})}$	-	-	-	1.0	V_{dc}
MS Input Resistance	$R_{I(\text{MS})}$	-	280	600	-	$\text{K}\Omega$
MS Input High Voltage	$V_{IH(\text{MS})}$	-	2.0	-	-	V_{dc}
MS Input Low Voltage	$V_{IL(\text{MS})}$	-	-	-	0.3	V_{dc}
TI Input Resistance	$R_{I(\text{TI})}$	-	-	1.25	-	$\text{K}\Omega$
DTMF Gain	$G_V(\text{MF})$	-	3.2	4.8	6.2	dB
LINE INTERFACE						
V+ Current (Pin 12 Grounded)						
Speech Mode	1+	$V+ = 1.7\text{V}$	4.5	7.1	9.0	mA
Speech/Pulse Modes		$V+ = 12\text{V}$	5.5	8.4	12.5	
Tone Mode		$V+ = 12\text{V}$	6.0	8.8	14.0	
V+ Voltage						V_{dc}
Speech/Pulse Mode	V+	$I_L = 20\text{mA}$	2.6	3.2	3.8	
Speech/Pulse Mode		$I_L = 30\text{mA}$	3.0	3.7	4.4	
Speech/Pulse Mode		$I_L = 120\text{mA}$	7.0	8.2	9.5	
Tone Mode		$I_L = 20\text{mA}$	4.1	4.9	5.7	
Tone Mode		$I_L = 30\text{mA}$	4.5	6.4	6.2	
LR Level Shift						V_{dc}
Speech/Pulse Mode	ΔV_{LR}	$V+ - V_{LR}$	-	2.7	-	
Tone Mode			-	4.3	-	
LC Terminal Resistance	R_{LC}	-	36	57	94	$\text{K}\Omega$
VOLTAGE REGULATORS						
VR Voltage	V_R	$(V+ = 1.7\text{V})$	1.1	1.2	1.3	V_{dc}
Load Regulation	ΔV_O	$0\text{mA} < I_R < 1.6\text{mA}$	-	20	-	mV
Line Regulation	ΔV_O	$2.0\text{V} < V+ < 6.5\text{V}$	-	25	-	mV
V_{DD} Voltage	V_{DD}	$(V+ = 4.5\text{V})$	3.0	3.3	3.8	V_{dd}
Load Regulation (Dialing Mode)	$\Delta V_{O(\text{DM})}$	$0 < I_{DD} < 1.6\text{mA}$	-	0.25	-	V_{dd}
Line Regulation (All Modes)	$\Delta V_{O(\text{AM})}$	$4.0\text{V} < V+ < 9.0\text{V}$	-	50	-	mV
Max. Output Current	$I_{OSM(\text{MAX})}$	Speech Mode	375	550	1000	μA
Max. Output Current	$I_{ODM(\text{MAX})}$	Dialing Mode	1.6	2.0	3.6	mA
V_{DD} Leakage Current	$I_{LKG(VDD)}$	$V+ = 0, V_{DD} = 3.0\text{V}$	-	-	1.5	μA

TEST CIRCUIT

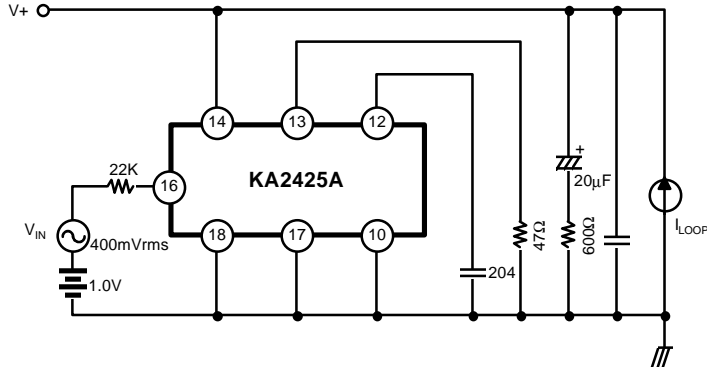


Fig 2. DTMF Driver Test

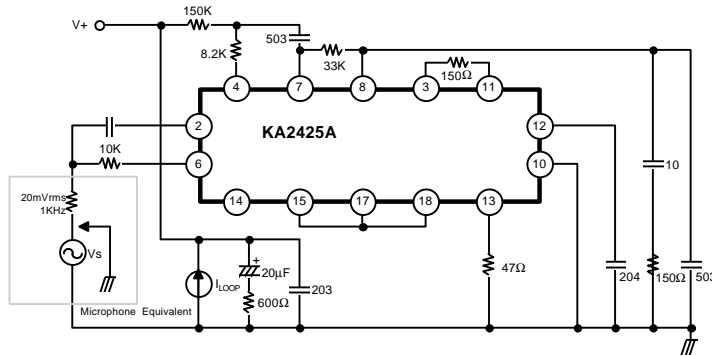


Fig 3. Transmit and sidetone level test

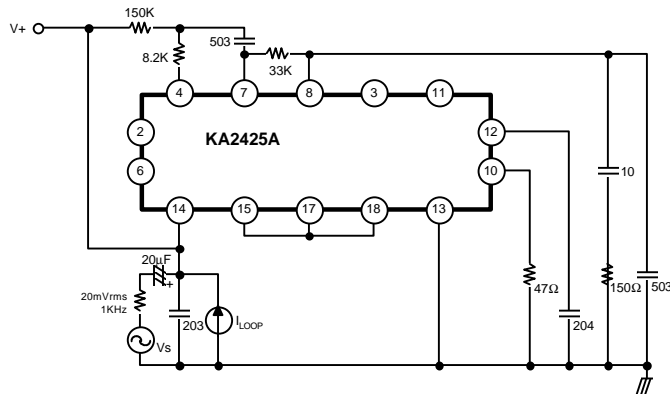
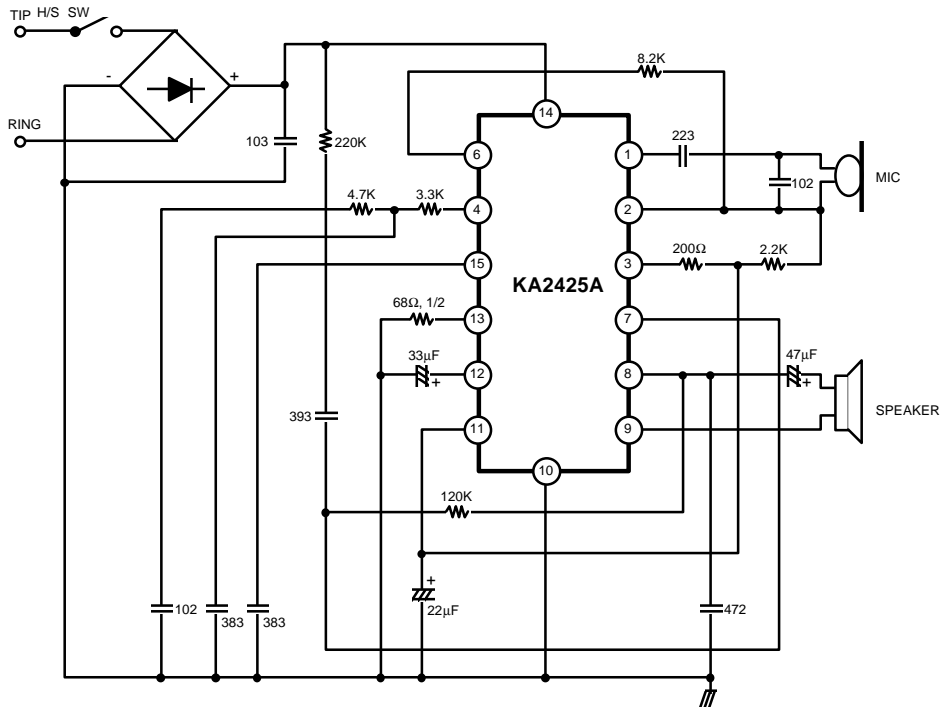


Fig 4. AC Impedance, Receive and Sidetone Rejection Test

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APPLICATION CIRCUIT



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