KA2425A SPEECH NETWORK WITH DIALER INTERFACE

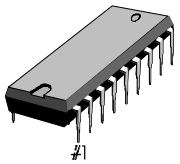
INTRODUCTION

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 .

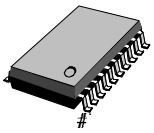
FEATURES

- 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

8-DIP-300A



20-SOP-375



ORDERING INFORMATION

Device	Package	Operating Temperature
KA2425B	18-DIP-300A	- 20°C ~ + 60°C
KA2425AD	20-SOP-375	

PIN CONFIGURATION

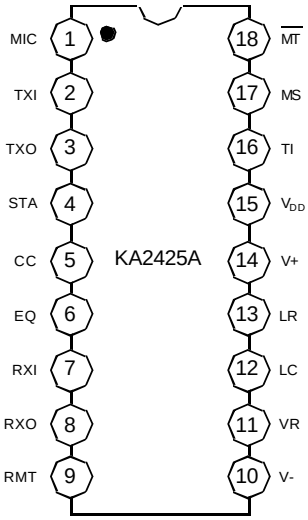


Fig. 1

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 (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_{ORR}	-20 ~ +60	°C

ELECTRICAL CHARACTERISTICS (T_a = 25°C)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
SYSTEM SPECTIFICATIONS (Refer to Fig.3 and Fig.4)						
T_X Gain from V_S to V_+	$G_{V(TX)}$		28	29.5	31	dB
Gain Change	$\Delta G_{V(TX)}$	Figure (I_L = 20mA)	-6.0	-4.5	-3.6	dB
Distortion	THD_{TX}	I_L = 60mA	-	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	$\Delta G_{V(RX)}$	(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 - $\{\frac{V_{RXO}}{V+}$(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	-	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 < IL , 60mA	-	1650	-	

None : Typicals are tested or guaranteed.

ECTRICAL 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	-	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	-	
Speech Mode		@V_{LR} = 2.5V	-	-21	-	dB
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,1 = 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	-	
Speech Mode		@ V_{LR} = 2.5V	-	-2.5	-	dB
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	-	
Pulse Mode		@ V_{LR} = 0.5V	-	1.3	-	V_{dc}
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	$R_{1\ (\overline{MT})}$	-	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	$R_{I\ (T1)}$	-	-	1.25	-	KΩ
DTMF Gain	$G_{V\ (MF)}$	-	3.2	4.8	6.2	dB
LINE INTERFACE						
V+ Current (Pin 12 Grounded)						
Speech Mode	1+	V+ = 1.7V	4.5	7.1	9.0	
Speech/Pulse Modes		V+ = 12V	5.5	8.4	12.5	mA
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	V+	I_L = 30mA	3.0	3.7	4.4	
Speech/Pulse Mode		I_L = 120mA	7.0	8.2	9.5	V_{dc}
Tone Mode		I_L = 20mA	4.1	4.9	5.7	
Tone Mode		I_L = 30mA	4.5	6.4	6.2	
LR Level Shift						
Speech/Pulse Mode	ΔV_{LR}	V + -V_{LR}	-	2.7	-	V_{dc}
Tone Mode			-	4.3	-	
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	ΔV_O	0mA < I_R < 1.6mA	-	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

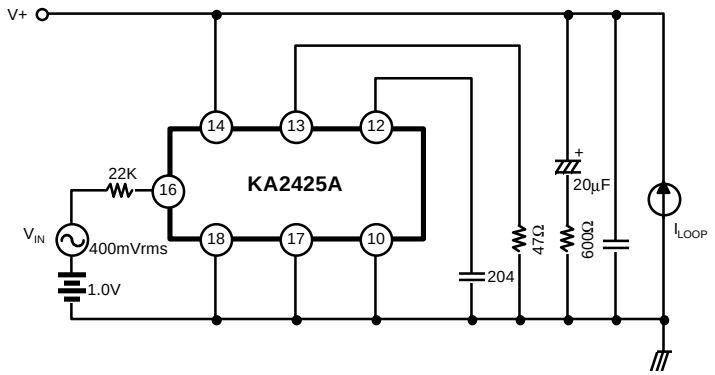


Fig 2. DTMF Driver Test

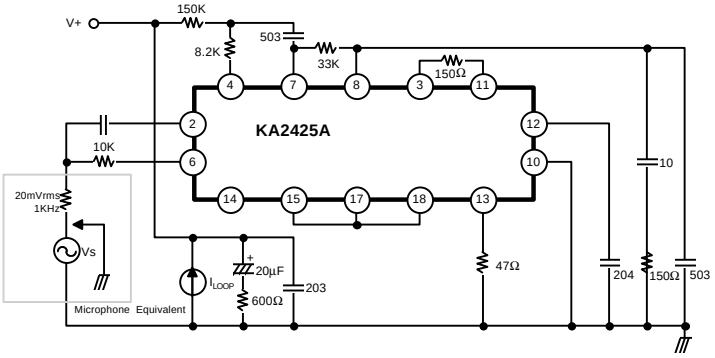


Fig 3. Transmit and sidetone level test

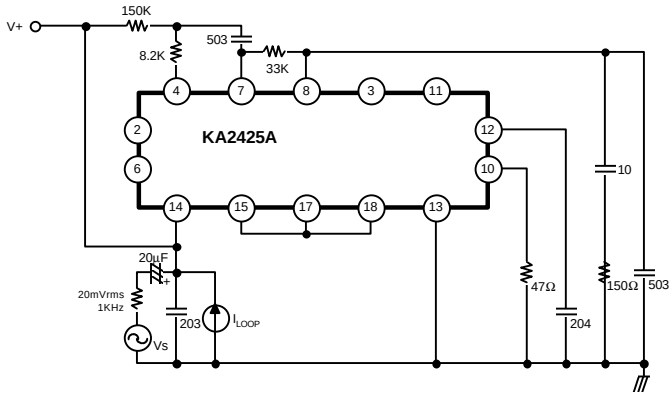


Fig 4. AC Impedance, Receive and Sidetone Rejection Test

APPLICATION CIRCUIT