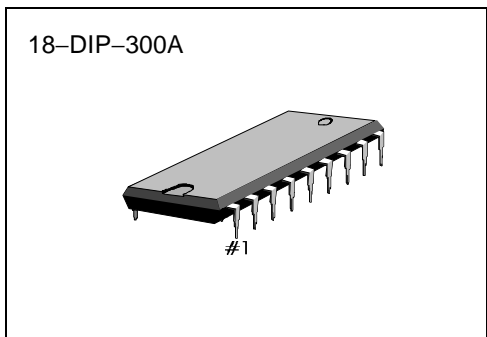


INTRODUCTION

The S1T2425A 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 .



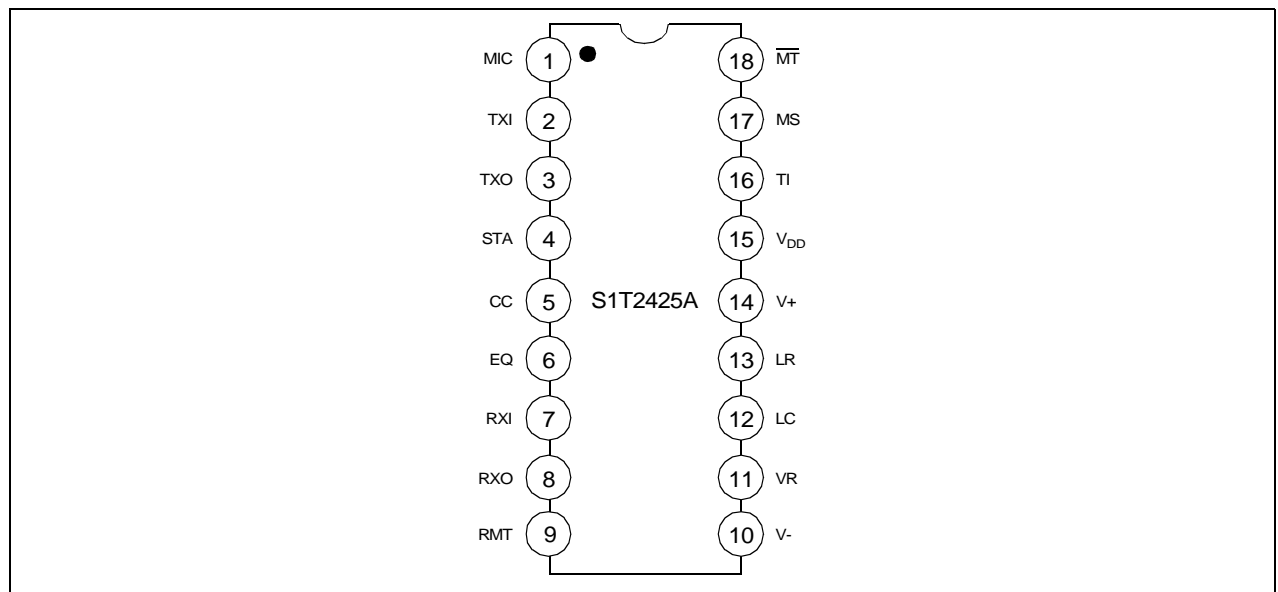
FEATURES

- 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
S1T2425A01-D0B0	18-DIP-300A	- 20 to + 60°C

PIN CONFIGURATION



ABSOLUTE MAXIMUM RATINGS

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

RECOMMENDED OPERATING CONDITIONS (TA = 25°C)

Characteristic	Symbol	Value	Unit
I _{TXO} (Instantaneous)	I _{CC}	0 to 10	mA
V ₊ (Voltage :Speech Mode)	V ₊ (SM)	+1.5 to +15	V
Tone Dialing Mode	V ₊ (TM)	+3.3 to +15	V
Operating Temperature	T _{ORR}	-20 to +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)						
TX Gain from V _S to V ₊	G _V (TX)	Figure (I _L = 20mA) I _L = 60mA	28	29.5	31	dB
Gain Change	ΔG _V (TX)		-6.0	-4.5	-3.6	dB
Distortion	THD _{TX}		-	2.0	-	%
Output Noise	V _{NO} (TX)		-	11	-	dBmc
RX						
V _{RXO} / V _S	G _V (RX)	f = 1.0kHz, I _L = 20mA	-16	-15	-13	dB
RX Gain Change	ΔG _V (RX)	(See Figure.4)	-5.0	-3.0	-2.0	dB
Distortion	THD _{RX}	I _L = 60mA	-	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 - { $\frac{V_{RXO}}{V_+}$ (figure 3)}dB	RST	I _L = 20mA	12	18	-	dB

ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$) (Continued)

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Tip-Ring Voltage (including polarity guard bridge drop of 1.4V) (Speech Mode)	V_{TR}	$I_L = 5.0\text{mA}$ $I_L = 10\text{mA}$ $I_L = 20\text{mA}$ $I_L = 40\text{mA}$ $I_L = 60\text{mA}$	- - - - -	2.4 3.9 4.6 5.6 6.6	- - - - -	V_{DC}
AC impedance Speech mode (incl. C_6 , see fig. 4) $Z_{ac} = (600)V \pm / (V_S - V_+)$ Tone Mode (including C_6)	Z_{ac}	$I_L = 20\text{mA}$ $I_L = 60\text{mA}$ $20\text{mA} < I_L, 60\text{mA}$	- - -	750 300 1650	- - -	W
SYSTEM AMPLIFIERS						
TX Gain	G_V (TX)		24	26	28	dB
TXO Bias Voltage	V_{BIAS} (SPM)	TXI to TXO	0.45	0.52	0.60	xV_R
TXO Bias Voltage	V_{BIAS} (TM)	Speech/Pulse Mode	$V_R - 25$	$V_R - 5.0$	-	mV
TXO Bias Voltage	V_{OL} (SPM)	Tone 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)	Speech/Pulse Mode	-	10	-	k Ω
RX						
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, 1 = 500 μA	-	50	125	mV
MIC Leakage Current	I_{LKG} (MIC)	Dialing Mode, Pin 1=3.0V	-	0	5.0	μA
MAT 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	-	

ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$) (Continued)

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
EQ Bias Voltage Speech Mode Pulse Mode Speech, Pulse Mode	$V_{\text{BIAS (EQ)}}$	@ $V_{\text{LR}} = 0.5\text{V}$ @ $V_{\text{LR}} = 0.5\text{V}$ @ $V_{\text{LR}} = 2.5\text{V}$	- - -	0.66 1.3 3.3	- - -	V_{dc}
DIALING INTERFACE						
MT Input Resistance	R_1 (MT)	-	50	100	-	$\text{k}\Omega$
MT Input High Voltage	V_{IH} (MT)	-	$V_{\text{DD}}-0.3$	-	-	V_{dc}
MT Input Low Voltage	V_{IL} (MT)	-	-	-	1.0	V_{dc}
MS Input Resistance	R_1 (MS)	-	280	600	-	$\text{k}\Omega$
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_1 (T1)	-	-	1.25	-	$\text{k}\Omega$
DTMF Gain	G_V (MF)	-	3.2	4.8	6.2	dB
LINE INTERFACE						
V+ Current (Pin 12 Grounded) Speech Mode Speech/Pulse Modes Tone Mode	1+	$V_+ = 1.7\text{V}$ $V_+ = 12\text{V}$ $V_+ = 12\text{V}$	4.5 5.5 6.0	7.1 8.4 8.8	9.0 12.5 14.0	mA
V+ Voltage Speech/Pulse Mode Speech/Pulse Mode Speech/Pulse Mode Tone Mode Tone Mode	V_+	$I_{\text{L}} = 20\text{mA}$ $I_{\text{L}} = 30\text{mA}$ $I_{\text{L}} = 120\text{mA}$ $I_{\text{L}} = 20\text{mA}$ $I_{\text{L}} = 30\text{mA}$	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}
LR Level Shift Speech/Pulse Mode Tone Mode	ΔV_{LR}	$V_+ - V_{\text{LR}}$	- -	2.7 4.3	- -	V_{dc}
LC Terminal Resistance	R_{LC}	-	36	57	94	$\text{K}\Omega$
VOLTAGE REGULATORS						
VR Voltage Load Regulation Line Regulation	V_{R} ΔV_{O} ΔV_{O}	($V_+ = 1.7\text{V}$) $0\text{mA} < I_{\text{R}} < 1.6\text{mA}$ $2.0\text{V} < V_+ < 6.5\text{V}$	1.1 - -	1.2 20 25	1.3 - -	V_{dc} mV mV
V_{DD} Voltage Load Regulation (Dialing Mode) Line Regulation (All Modes) Max. Output Current Max. Output Current	V_{DD} ΔV_{O} (DM) ΔV_{O} (AM) I_{OSM} (MAX) I_{ODM} (MAX)	($V_+ = 4.5\text{V}$) $0 < I_{\text{DD}} < 1.6\text{mA}$ $4.0\text{V} < V_+ < 9.0\text{V}$ Speech Mode Dialing Mode	3.0 - - 375 1.6	3.3 0.25 50 550 2.0	3.8 - - 1000 3.6	V_{dd} V_{dd} mV μA mA
V_{DD} Current Leakage	I_{LKG} (V_{DD})	$V_+ = 0, V_{\text{DD}} = 3.0\text{V}$	-	-	1.5	μA

NOTE: Typicals are tested or guaranteed.



TEST CIRCUIT

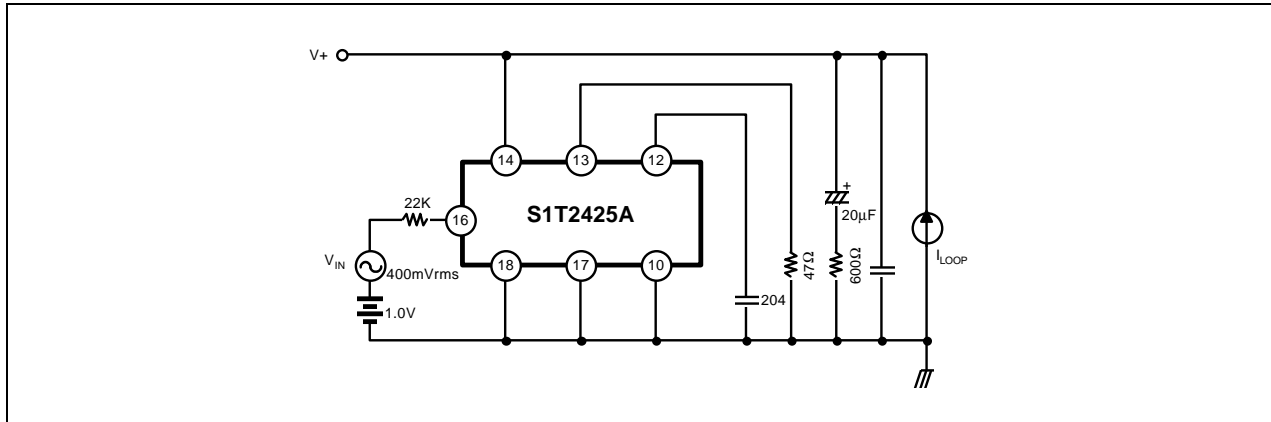


Figure 1. DTMF Driver Test

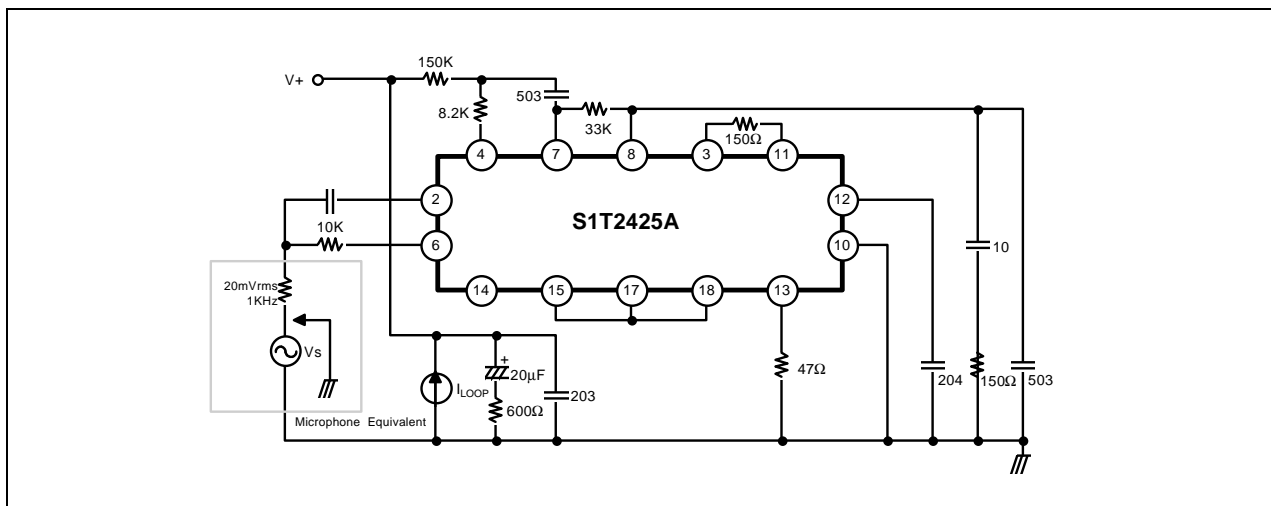


Figure 2. Transmit and sidetone level test

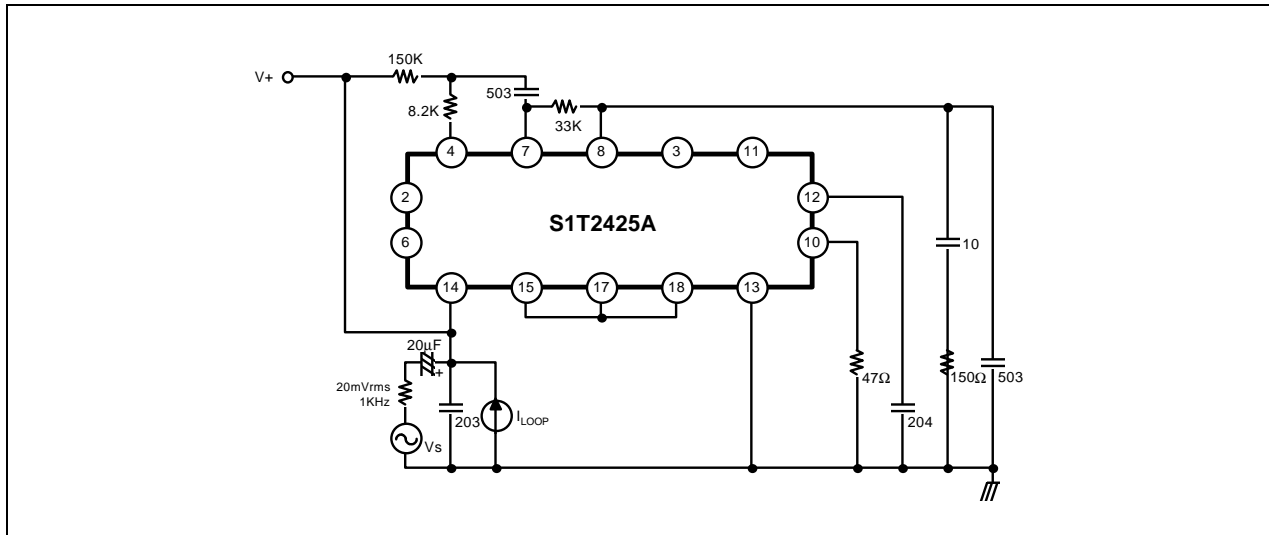


Figure 3. Impedance, Receive and Sidetone Rejection Test

APPLICATION CIRCUIT

