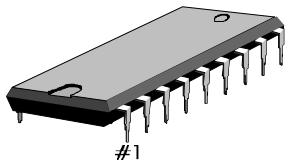
INTRODUCTION

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 .

18–DIP–300A



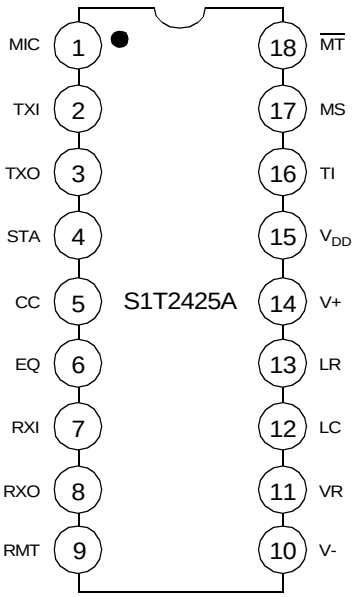
FEATURES

- 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 SPECIFICATIONS (Refer to Fig.3 and Fig.4)						
TX Gain from V_S to V_+ Gain Change Distortion Output Noise	$G_{V (TX)}$ $\Delta G_{V (TX)}$ THD_{TX} $V_{NO (TX)}$	 Figure (I_L = 20mA) I_L = 60mA 	28 –6.0 – –	29.5 –4.5 2.0 11	31 –3.6 – –	dB dB % dBmc
RX V_{RXO} / V_S RX Gain Change Distortion	 $G_{V (RX)}$ $\Delta G_{V (RX)}$ THD_{RX}	 f = 1.0kHz, I_L = 20mA (See Figure.4) I_L = 60mA	 –16 –5.0 –	 –15 –3.0 2.0	 –13 –2.0 –	 dB dB %
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°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 = 5.0mA 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 fig. 4) Z_{ac} = (600)V +/ (V_S - V+) Tone Mode (including C_6)	Z_{ac}	I_L = 20mA I_L = 60mA 20mA < IL , 60mA	– – –	750 300 1650	– – –	W
SYSTEM AMPLIFIERS						
TX Gain TXO Bias Voltage TXO Bias Voltage TXO Bias Voltage TXO Bias Voltage TXI input Resistance	$G_{V\ (TX)}$ $V_{BIAS\ (SPM)}$ $V_{BIAS\ (TM)}$ $V_{OL\ (SPM)}$ $V_{OL\ (SPM)}$ $R_{I\ (TXI)}$	 TXI to TXO Speech/Pulse Mode Tone Mode Speech/Pulse Mode Speech/Pulse Mode	24 0.45 V_R –25 V_R –25 – –	26 0.52 V_R –5.0 V_R –5.0 125 10	28 0.60 – – 250 –	dB xV_R mV mV mV kΩ
RX RXO Bias voltage RXO Source current RXO Source current RXO High Voltage RXO Low Voltage	 $V_{BIAS\ (AM)}$ $I_{SOURCE\ (SM)}$ $I_{SOURCE\ (PTM)}$ $V_{OH\ (AM)}$ $V_{OL\ (AM)}$	 All Mode Speech Mode Pulse/tone Mode All Mode All Mode	 0.45 1.5 200 V_R –100 –	 0.52 2.0 400 V_R –50 50	 0.60 – – – 150	 xV_R mA µA mV mV
SIDETONE AMPLIFIER						
Gain (TXO to STA) Speech Mode Speech Mode Pulse Mode Pulse Mode	 $Gv_{(STA)}$	 @V_{LR} = 0.5V @V_{LR} = 2.5V @V_{LR} = 0.2V @V_{LR} = 1.0V	 – – – –	 –15 –21 –15 –21	 – – – –	dB
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
MAT Resistance	$R_{RMT\ (SM)}$ $R_{RMT\ (DM)}$	Speech Mode Dialing Mode	– 5.0	8.0 10	15 18	Ω kΩ
RMT Delay	$t_{D\ (RMT)}$	Dialing to Speech	2.0	4.0	20	ms
EQUALIZATION AMPLIFIER						
GAIN (V + to EQ) Speech Mode Speech Mode Pulse Mode Pulse Mode	 $G_{V\ (EQ)}$	 @ V_{LR} = 0.5V @ V_{LR} = 2.5V @ V_{LR} = 0.2V @ V_{LR} = 1.0V	 – – – –	 –12 –2.5 –12 –2.5	 – – – –	dB

ELECTRICAL CHARACTERISTICS (T_a = 25°C) (Continued)

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
EQ Bias Voltage Speech Mode Pulse Mode Speech, Pulse Mode	$V_{BIAS\ (EQ)}$	 @ V_{LR} = 0.5V @ V_{LR} = 0.5V @ V_{LR} = 2.5V	 – – –	 0.66 1.3 3.3	 – – –	 V_{dc}
DIALING INTERFACE						
MT Input Resistance	$R_{1\ (MT)}$	–	50	100	–	kΩ
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	–	kΩ
MS Input High Voltage	$V_{IH\ (MS)}$	–	2.0	–	–	V_{dc}
MS Input Low Voltage TI Input Resistance	$V_{IL\ MS)}$ $R_{I\ (T1)}$	– –	– –	– 1.25	0.3 –	V_{dc} kΩ
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+ = 1.7V V+ = 12V V+ = 12V	 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_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}
LR Level Shift Speech/Pulse Mode Tone Mode	ΔV_{LR}	V + -V_{LR}	 – –	 2.7 4.3	 – –	 V_{dc}
LC Terminal Resistance	R_{LC}	-	36	57	94	KΩ
VOLTAGE REGULATORS						
VR Voltage Load Regulation Line Regulation	V_R ΔV_O ΔV_O	(V+ = 1.7V) 0mA < I_R < 1.6mA 2.0V < V + < 6.5V	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} $\Delta V_{O\ (DM)}$ $\Delta V_{O\ (AM)}$ $I_{OSM\ (MAX)}$ $I_{ODM\ (MAX)}$	(V+ = 4.5V) 0 < I_{DD} < 1.6mA 4.0V < V + < 9.0V 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	$I_{LKG\ (VDD)}$	V + = 0, V_{DD} = 3.0V	–	–	1.5	µA

NOTE: Typicals are tested or guaranteed.

TEST CIRCUIT

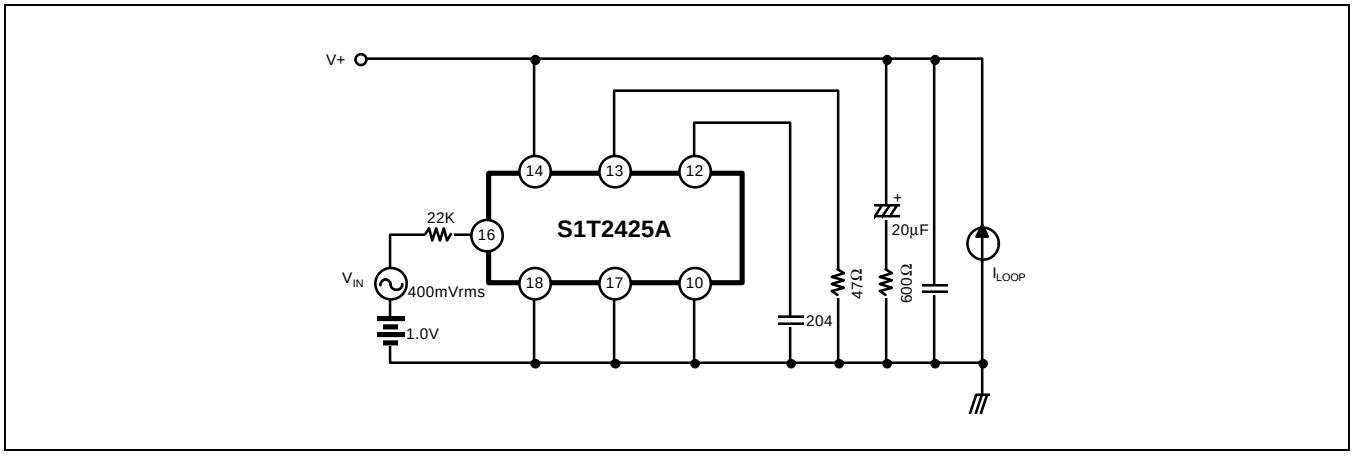


Figure 1. DTMF Driver Test

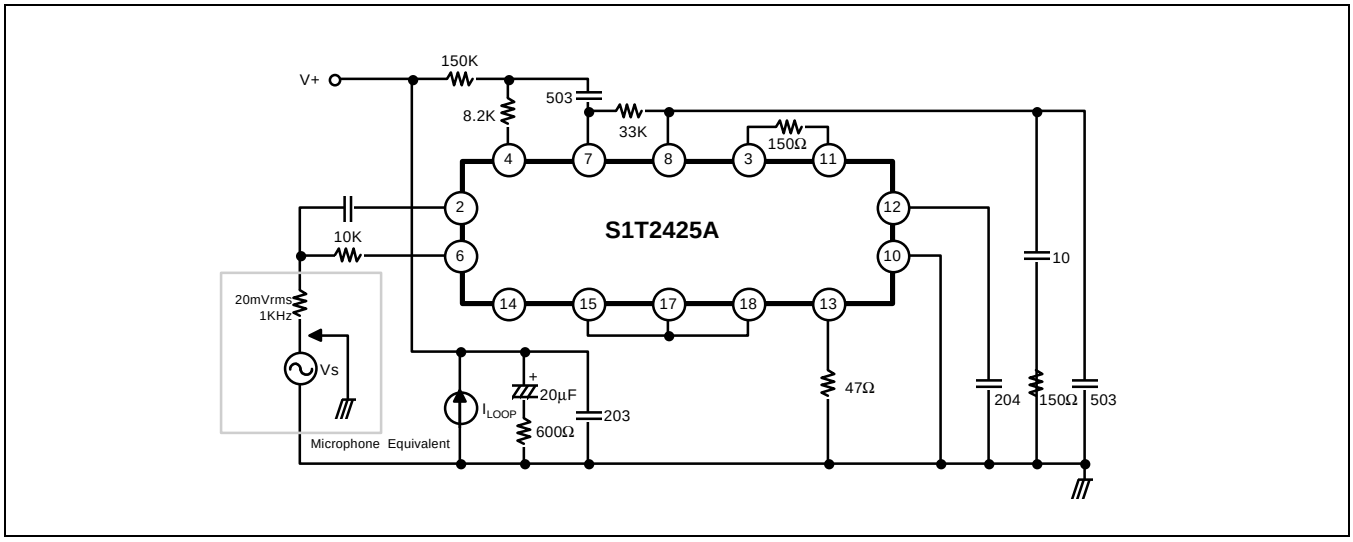


Figure 2. Transmit and sidetone level test

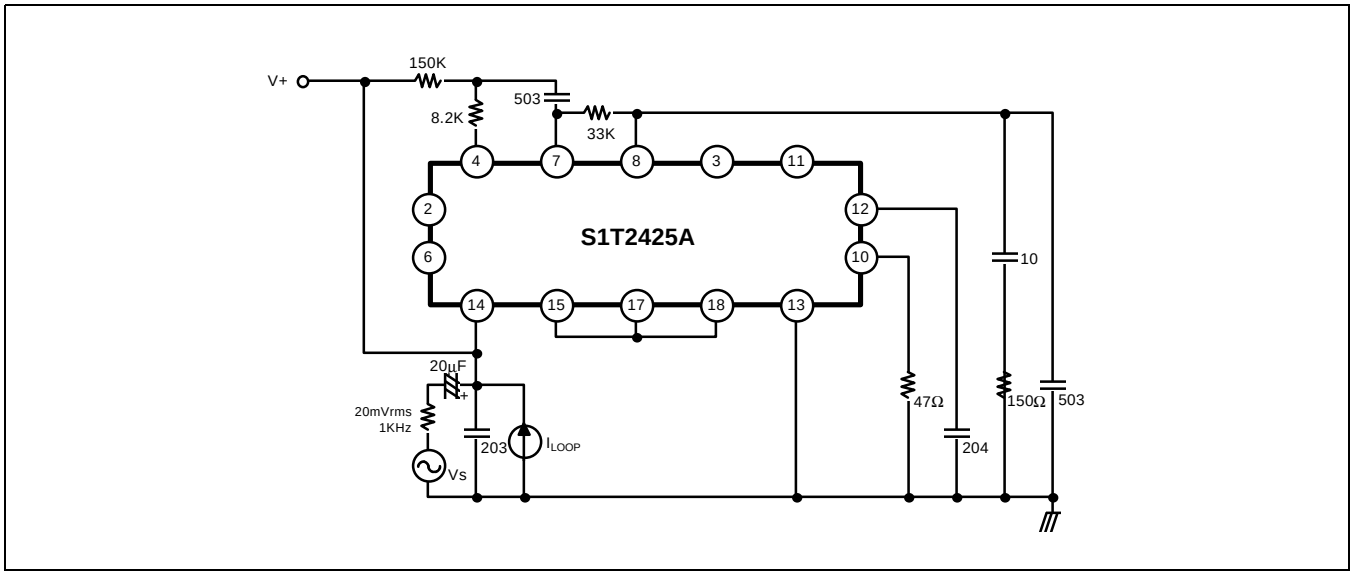


Figure 3. Impedance, Receive and Sidetone Rejection Test

APPLICATION CIRCUIT