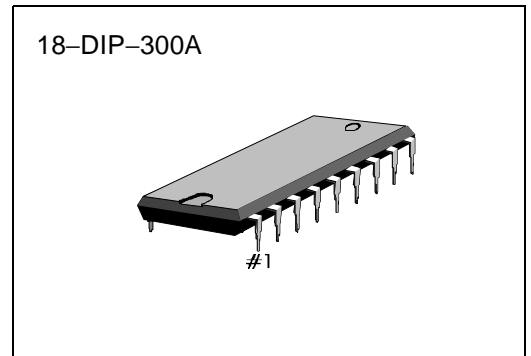


INTRODUCTION

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

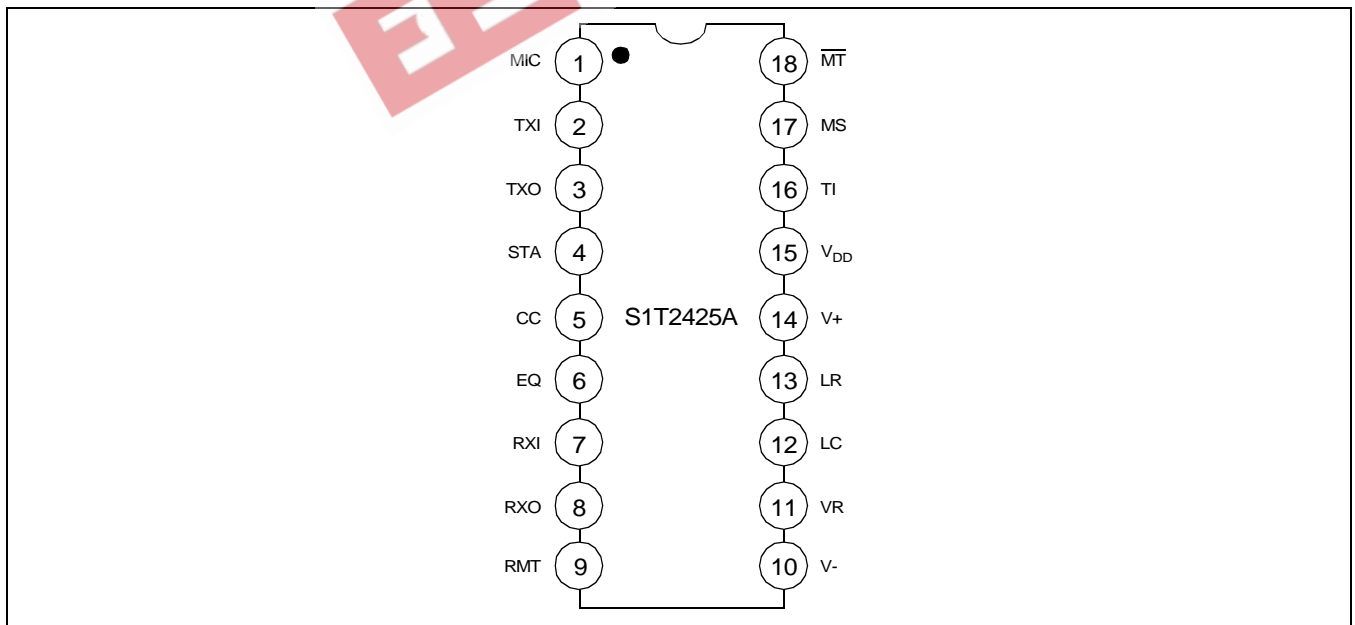
- Low voltage operation (1.5V : speech)
- Transmit, Receive, Side tone and DTMF level are controlled by external resistors
- Regulated voltage for dialer
- Loop length equalization
- MUTE function
- Linear interface for DTMF



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 (See Figure.4) I _L = 60mA	-16	-15	-13	dB
RX Gain Change	ΔG _V (RX)		-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 - { $\frac{V_{RXO}}{V_+}$ (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 < I _L , 60mA	–	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	–	kΩ
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, I = 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	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	$V_{BIAS (EQ)}$	@ $V_{LR} = 0.5V$ @ $V_{LR} = 0.5V$ @ $V_{LR} = 2.5V$	–	0.66 1.3 3.3	–	V_{dc}
DIALING INTERFACE						
MT Input Resistance	$R_1 (MT)$	–	50	100	–	$k\Omega$
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	$R_1 (MS)$	–	280	600	–	$k\Omega$
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	–	$k\Omega$
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+	$V_+ = 1.7V$ $V_+ = 12V$ $V_+ = 12V$	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	$K\Omega$
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

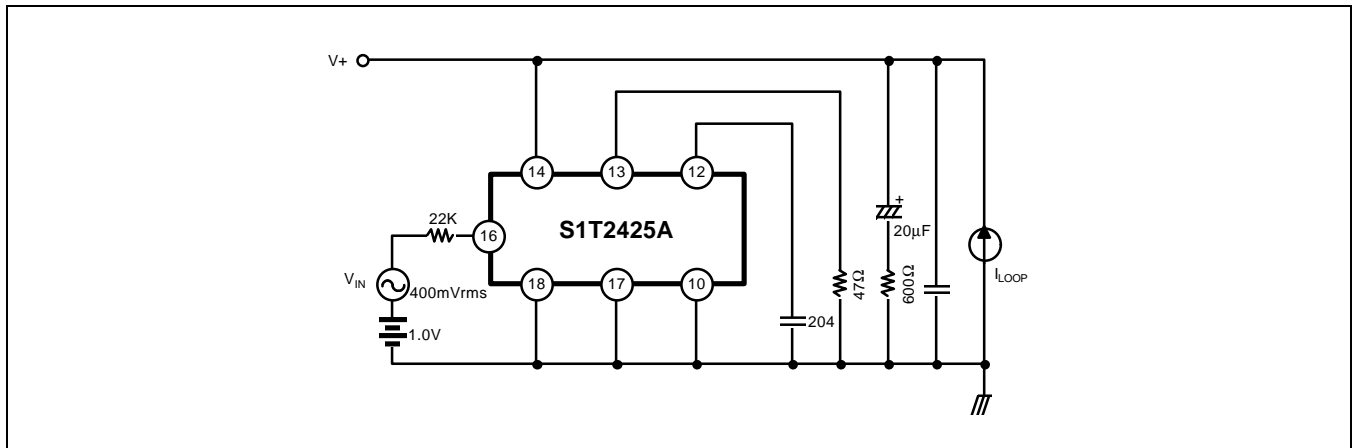


Figure 1. DTMF Driver Test

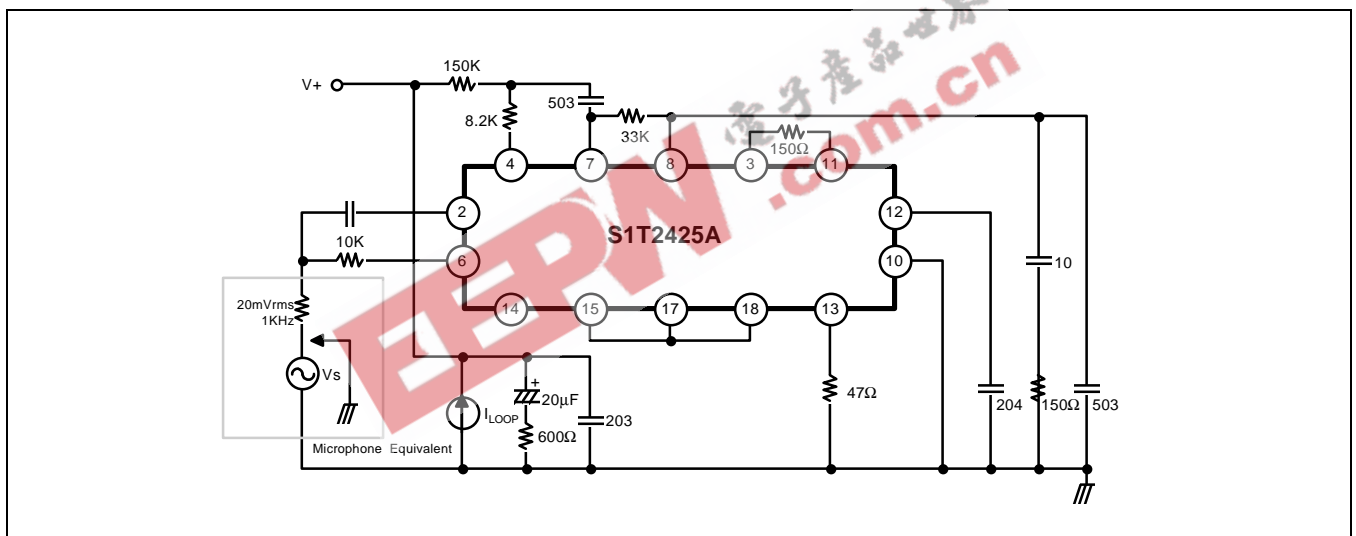


Figure 2. Transmit and sidetone level test

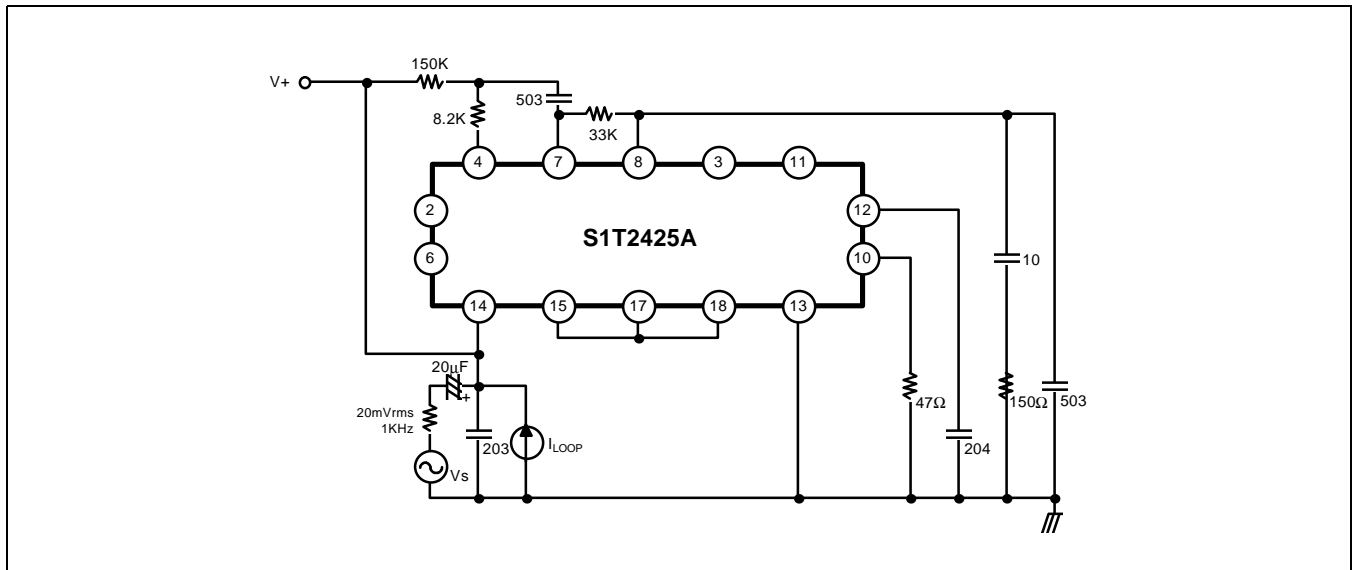


Figure 3. Impedance, Receive and Sidetone Rejection Test

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APPLICATION CIRCUIT

