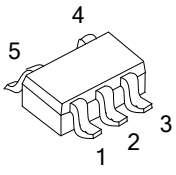
LOW-POWER SINGLE OPERATIONAL AMPLIFIER



SOT-25

■ DESCRIPTION

The UTC **TS321**'s quiescent current is only 500μA (5V). The UTC **TS321** brings performance and economy to low power systems. With a high unity gain frequency and a specified 0.4V/μs slew rate. The device is able to operate in single supply applications as well as in dual supply applications.

The UTC **TS321** is a bipolar operational amplifier for cost-sensitive applications in which space savings are important.

■ FEATURES

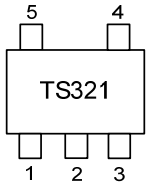
* Wide Power-Supply Range
  Single Supply: 3V~30V or Dual Supply: ±1.5V~±15V
* Large Output Voltage Swing: 0V~3.5V (Min.) (V_{CC}=5V)
* Low Supply Current: 500μA (Typ.)
* Low Input Bias Current: 20nA (Typ.)
* Low Input Offset Voltage: 4mV (Max.)
* Stable With High Capacitive Loads

■ ORDERING INFORMATION

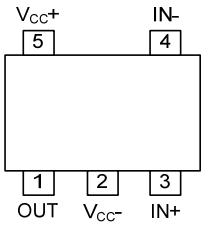
Ordering Number		Package	Packing
Lead Free	Halogen Free		
TS321L-AF5-R	TS321G-AF5-R	SOT-25	Tape Reel

TS321G-AF5-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) AF5: SOT-25 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



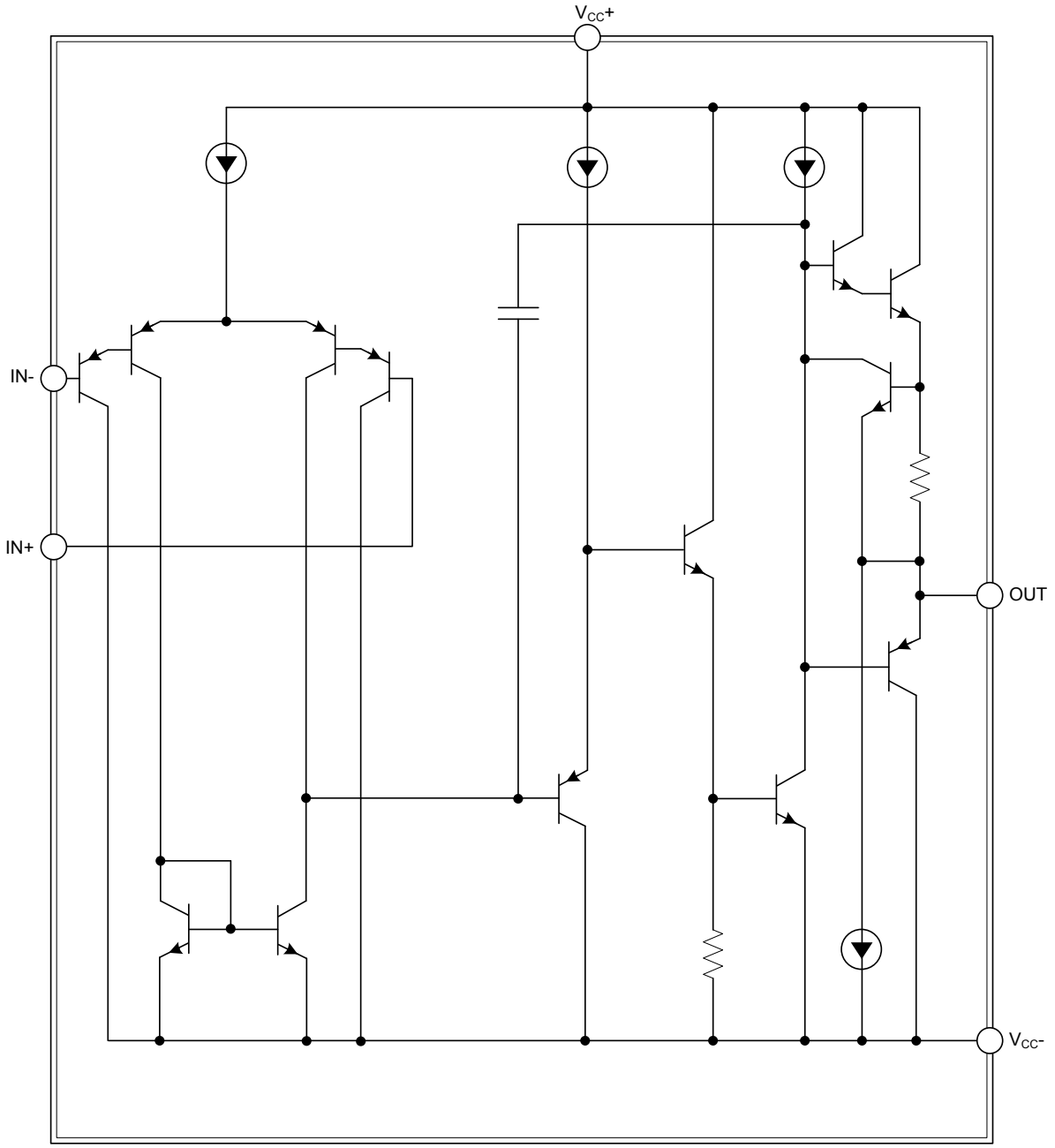
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	OUT	Output
2	V_{CC}-	Ground
3	IN+	Non- negative input
4	IN-	Negative input
5	V_{CC}+	Power supply

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (Note 1)

Over operating free-air temperature range (unless otherwise noted)

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage (Note 2)	Single	V_{CC}	32	V
	Dual		±16	V
Differential Input Voltage (Note 3)		V_{ID}	32	V
Input Voltage Range (Note 2, 4)		V_I	-0.3 ~ 32	V
Input Current (Note 4)		I_I	50	mA
Duration Of Output Short Circuit To Ground		T_{SHORT}	Unlimited	
Power Dissipation		P_D	0.595	W
Operating Virtual Junction Temperature		T_J	+150	°C
Storage Temperature Range		T_{STG}	-65 ~ +150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. These voltage values are with respect to the midpoint between V_{CC+} and V_{CC-}.
3. Differential voltages are at IN+ with respect to IN-.
4. Neither input must ever be more positive than V_{CC+} or more negative than V_{CC-}.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage	Single Supply	V_{CC}	3 ~ 30	V
	Dual Supply		±1.5 ~ ±15	V
Operating Free-Air Temperature		T_A	-40 ~ +125	°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	210	°C/W

■ ELECTRICAL CHARACTERISTICS

(V_{CC+}=5V, V_{CC-}=GND, V_O=1.4V (unless otherwise noted))

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Input Offset Voltage	V_{IO}	R_S=0, 5V<V_{CC+}<30V 0<V_{IC}<(V_{CC+}-1.5V)			0.5	4	mV
Input Offset Current	I_{IO}				2	30	nA
Input Bias Current (Note 1)	I_{IB}				20	150	nA
Large-Signal Differential Voltage Amplification	A_{VD}	V_{CC}=15V, R_L=2kΩ, V_O=1.4V~11.4V		50	100		V/mV
Common-Mode Input Voltage (Note 2)	V_{ICR}	V_{CC}=30V		0		V_{CC+}-1.5	V
High-Level Output Voltage	V_{OH}	V_{CC}=30V	R_L=2kΩ	26	27		V
			R_L=10kΩ	27	28		
		V_{CC}=5V	R_L=2kΩ	3.5			
Low-Level Output Voltage	V_{OL}	R_L=10kΩ			5	15	mV
Gain Bandwidth Product	GBP	V_{CC}=30V, V_I=10mV, R_L=2kΩ, f=100kHz, C_L=100pF			0.8		MHz
Slew Rate	SR	V_{CC}=15V, V_I=0.5V~3V, R_L=2kΩ, C_L=100pF, unity gain			0.4		V/μs
Phase Margin	φ_m				60		°
Common-Mode Rejection Ratio	CMRR	R_S≤10kΩ		65	85		dB
Output Source Current	I_{SOURCE}	V_{CC}=15V, V_O=2V, V_{ID}=1V		20	40		mA
Output Sink Current	I_{SINK}	V_{CC}=15V, V_{ID}=1V	V_O=2V	10	20		mA
			V_O=0.2V	12	50		μA
Short-Circuit To GND	I_O	V_{CC}=15V			40	60	mA
Supply-Voltage Rejection Ratio	SVR	V_{CC}=5V~30V		65	110		dB
Total Supply Current	I_{CC}	No load	V_{CC}=5V		500	800	μA
			V_{CC}=30V		600	900	μA
Total Harmonic Distortion	THD	V_{CC}=30V, V_O=2V_{PP}, A_V=20dB, R_L=2kΩ, f=1kHz, C_L=100pF			0.015		%
Equivalent Input Noise Voltage	e_N	V_{CC}=30V, f=1kHz, R_S=100Ω			50		nV/$\sqrt{Hz}$

Notes: 1. The direction of the input current is out of the device. This current essentially is constant, independent of the state of the output, so no loading change exists on the input lines.

2. The input common-mode voltage of either input signal should not be allowed to go negative by more than 0.3V. The upper end of the common-mode voltage range is V_{CC+}-1.5V, but either or both inputs can go to 32V without damage.