



# TSH341

## 320-MHz Single Supply Video Amplifier Negative In/Out Rail

### PRELIMINARY DATA

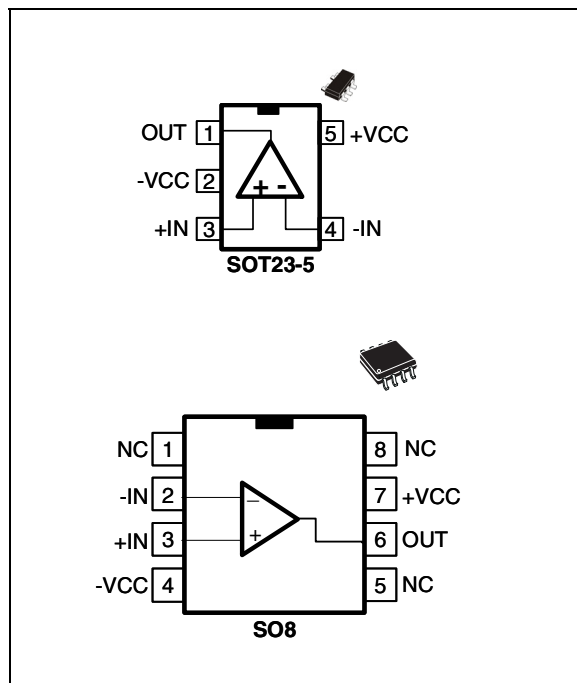
- Gain flatness of 110MHz
- Bandwidth: 320MHz
- Single supply operation down to 3V
- Tested on 5V power supply
- Negative input & output rail
- Very low harmonic distortion
- Slew rate: 400V/ $\mu$ s typ., 290V/ $\mu$ s min.
- Input noise: 3nV/ $\sqrt{\text{Hz}}$
- Specified for 150 $\Omega$  load

### Description

The TSH341 is a video operational amplifier of 320MHz bandwidth for only 9.3mA of quiescent current. This allows to achieve a gain flatness of 110MHz. Its structure features a very high slew rate of 290V/ $\mu$ s minimum guaranteed by test. With a very good THD associated to these characteristics the TSH341 is particularly intended in the high quality video systems.

The TSH341 is available in tiny SOT23-5 and SO8 plastic packages for size saving consideration.

### Pin Connections (top view)



### Applications

- High end video systems
- High definition TV (HDTV)
- Broadcast video
- Multimedia products

### Order Codes

Part Number	Temperature Range	Package	Packaging	Marking
TSH341ILT	-40°C to +85°C	SOT23-5	Tape & Reel	K307
TSH341ID		SO-8	Tube	TSH351I
TSH341IDT			Tape & Reel	TSH351I

## 1 Absolute Maximum Ratings

**Table 1. Key parameters and their absolute maximum ratings**

Symbol	Parameter	Value	Unit
VCC	Supply voltage <sup>1</sup>	6	V
Vid	Differential Input Voltage <sup>2</sup>	TBD	V
V <sub>in</sub>	Input Voltage Range <sup>3</sup>	TBD	V
T <sub>oper</sub>	Operating Free Air Temperature Range	-40 to +85	°C
T <sub>std</sub>	Storage Temperature	-65 to +150	°C
T <sub>j</sub>	Maximum Junction Temperature	150	°C
R <sub>thjc</sub>	Thermal Resistance Junction to Case SOT23-5 SO8	80 28	°C/W
R <sub>thja</sub>	Thermal Resistance Junction to Ambient Area SOT23-5 SO8	250 175	°C/W
P <sub>max.</sub>	Maximum Power Dissipation (@ Ta=25°C) for Tj=150°C SOT23-5 SO8	500 715	mW
ESD	CDM: Charged Device Model	TBD	kV
	HBM: Human Body Model	TBD	kV
	MM: Machine Model	TBD	V
	Output Short Circuit	4	

- 1) All voltage values, except differential voltage are with respect to network terminal.
- 2) Differential voltage are non-inverting input terminal with respect to the inverting input terminal.
- 3) The magnitude of input and output voltage must never exceed V<sub>CC</sub> +0.3V.
- 4) An output current limitation protects the circuit from transient currents. Short-circuits can cause excessive heating. Destructive dissipation can result from short circuit on amplifiers.

**Table 2. Operating Conditions**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Power Supply Voltage	3 to 5.5 <sup>1</sup>	V
V <sub>icm</sub>	Common Mode Input Voltage	-0.4 to 3	V

- 1) Tested in full production at 0V/5V single power supply

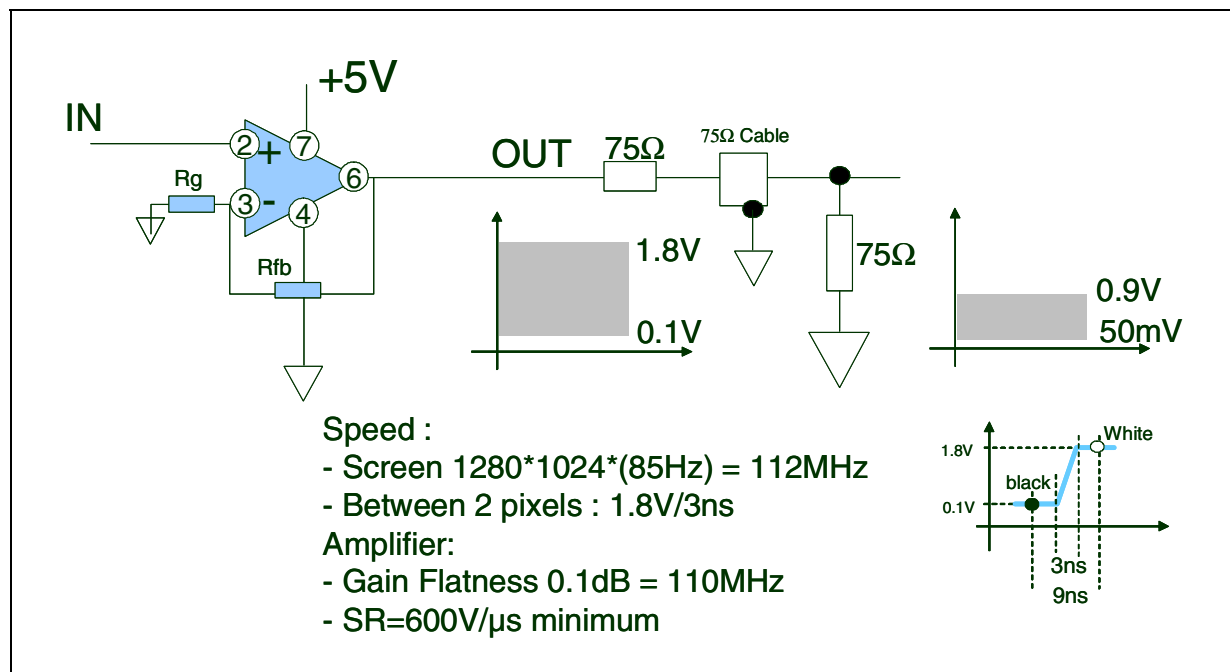
## 2 Electrical Characteristics

**Table 3.**  $V_{CC} = +5V$ ,  $T_{amb} = 25^{\circ}C$  (unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<b>DC PERFORMANCE</b>						
$V_{io}$	Input Offset Voltage	$T_{amb}$ , $V_{icm}=0.6V$		0.9	7	mV
		$-40^{\circ}C < T_{amb} < +85^{\circ}C$		8		
$\Delta V_{io}$	$V_{io}$ drift vs. Temperature	$-40^{\circ}C < T_{amb} < +85^{\circ}C$		TBD		$\mu V/^{\circ}C$
$I_{ib}$	Non Inverting Input Bias Current	$T_{amb}$ , $V_{icm}=0.6V$		-6	-16	$\mu A$
		$-40^{\circ}C < T_{amb} < +85^{\circ}C$		-32		
$A_{VD}$	Open Loop Gain	$\Delta V_{OUT}=2V$ , $R_L=150\Omega$	TBD	TBD	0	dB
CMR	Common Mode Rejection Ratio $20 \log (\Delta V_{icm}/\Delta V_{io})$	$\Delta V_{icm} = 2V$		-90		dB
		$-40^{\circ}C < T_{amb} < +85^{\circ}C$		TBD		
SVR	Supply Voltage Rejection Ratio $20 \log (\Delta V_{cc}/\Delta V_{io})$	$\Delta V_{cc}=4V$ to $5V$ , $V_{icm}=0.6V$		-86		dB
		$-40^{\circ}C < T_{amb} < +85^{\circ}C$		TBD		
PSR	Power Supply Rejection Ratio $20 \log (\Delta V_{cc}/\Delta V_{out})$	$\Delta V_{cc}=200mVp-p$ , $F=1MHz$		-77		dB
		$-40^{\circ}C < T_{amb} < +85^{\circ}C$		TBD		
$R_{IN}$	Input Resistance			TBD	0	W
$C_{IN}$	Input Capacitance			TBD	0	pF
ICC	Total Supply Current	No Load, $V_{icm}=0.6V$		9.3	12.7	mA
<b>DYNAMIC PERFORMANCE and OUTPUT CHARACTERISTIC</b>						
Bw	-3dB Bandwidth	Small Signal $V_{OUT}=20mVp$ Gain=1, $V_{icm}=0.6V$ , $R_L=150\Omega$	178	327		MHz
	Gain Flatness @ 0.1dB	Small Signal $V_{OUT}=20mVp$ Gain=1, $V_{icm}=0.6V$ , $R_L=150\Omega$		65		
FPBW	Full Power Bandwidth	$V_{icm}=2V$ , $V_{OUT} = 2Vp-p$ , Gain=1, $R_L = 150\Omega$	TBD	TBD		MHz
SR	Slew Rate	$V_{OUT}=2Vp-p$ , $R_L=150\Omega$ , Gain=1,		TBD		V/ $\mu s$
$V_{OH}$	High Level Output Voltage	$R_L = 150\Omega$	3.8	3.87		V
$V_{OL}$	Low Level Output Voltage	$R_L = 150\Omega$		45	52	mV
$I_{OUT}$	Output Short Circuit Current	$T_{amb}$	50	95		mA
		$-40^{\circ}C < T_{amb} < +85^{\circ}C$		42		
$\Delta G$	Differential Gain	$R_L = 150\Omega$		0.005		%
DF	Differential Phase	$R_L = 150\Omega$		0.005		$^{\circ}$
<b>NOISE AND DISTORTION</b>						
eN	Equivalent Input Noise Voltage	$F = 100kHz$		7		nV/ $\sqrt{Hz}$
iN	Equivalent Input Noise Current (+)	$F = 100kHz$		TBD		pA/ $\sqrt{Hz}$
HD2	2nd Harmonic Distortion	$V_{OUT}= 2Vp-p$ , $R_L = 150\Omega$ Gain=2, $F= 10MHz$ ,		-70		dBc
HD3	3rd Harmonic Distortion	$V_{OUT}= 2Vp-p$ , $R_L = 150\Omega$ Gain=2, $F= 10MHz$ ,		-57		dBc

### 3 Application Schematic

Figure 1. High-end video driver

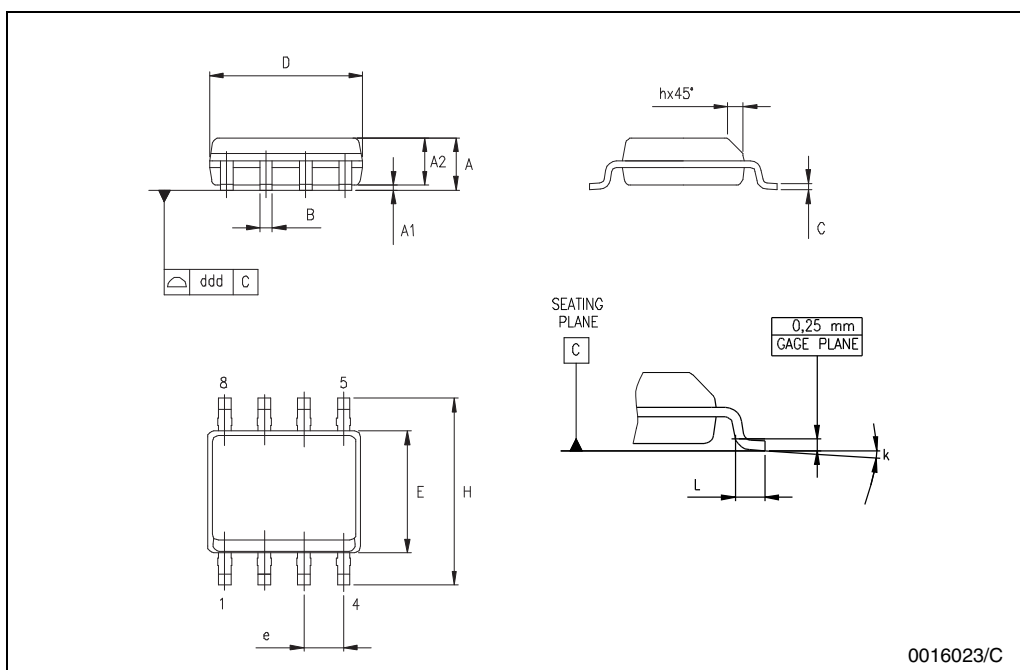


## 4 Package Mechanical Data

### 4.1 SO-8 Package

#### SO-8 MECHANICAL DATA

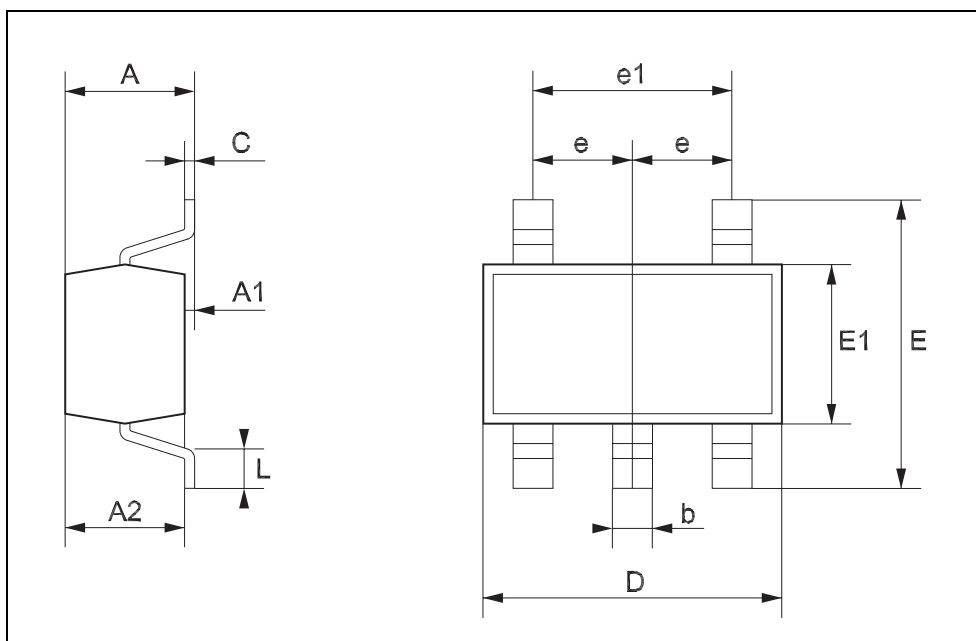
DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	1.35		1.75	0.053		0.069
A1	0.10		0.25	0.04		0.010
A2	1.10		1.65	0.043		0.065
B	0.33		0.51	0.013		0.020
C	0.19		0.25	0.007		0.010
D	4.80		5.00	0.189		0.197
E	3.80		4.00	0.150		0.157
e		1.27			0.050	
H	5.80		6.20	0.228		0.244
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
k	8° (max.)					
ddd			0.1			0.04



## 4.2 5 pins - Tiny Package (SOT23)

SOT23-5L MECHANICAL DATA

DIM.	mm.			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	0.90		1.45	35.4		57.1
A1	0.00		0.15	0.0		5.9
A2	0.90		1.30	35.4		51.2
b	0.35		0.50	13.7		19.7
C	0.09		0.20	3.5		7.8
D	2.80		3.00	110.2		118.1
E	2.60		3.00	102.3		118.1
E1	1.50		1.75	59.0		68.8
e		0.95			37.4	
e1		1.9			74.8	
L	0.35		0.55	13.7		21.6



## 5 Revision History

Date	Revision	Description of Changes
01 Jan. 2005	1	First release corresponding to Preliminary Data version of datasheet.

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