



## 9.5NS TRIPLE HIGH VOLTAGE VIDEO AMPLIFIER

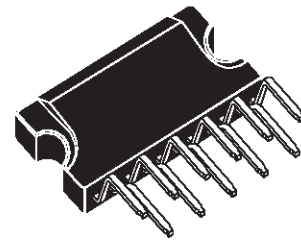
PRELIMINARY DATA

### FEATURE

- TRIPLE CHANNEL VIDEO AMPLIFIER
- SUPPLY VOLTAGE: 110V TYPICAL
- RISE AND FALL TIMES: 9.5ns TYPICAL
- BANDWIDTH: 37MHz TYPICAL
- 80 VOLTS OUTPUT DYNAMIC RANGE
- LOW POWER CONSUMPTION
- WELL MATCHED WITH TDA9210 PREAMP
- FULL PIN COMPATIBILITY WITH TDA9536

### DESCRIPTION

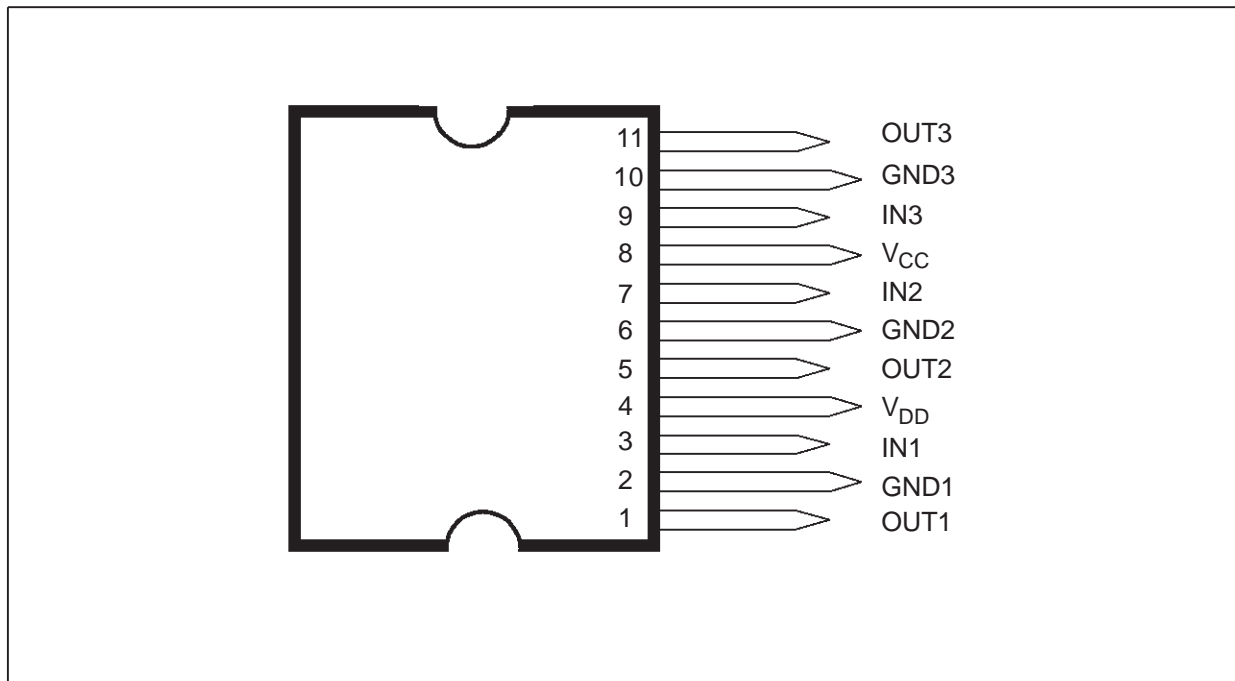
The TDA9535 is a triple video amplifier with high voltage Bipolar/CMOS/DMOS technology (BCD) for use in color monitor application. Used with TDA9210 preamp in DC coupled mode, it provides for a low component, high performance and cost effective system solution. Other features include 1024 x 768 displays, pixel clock frequencies up to 75MHz, and DC or AC coupling designs.



**CLIPWATT 11**  
(Plastic Package)

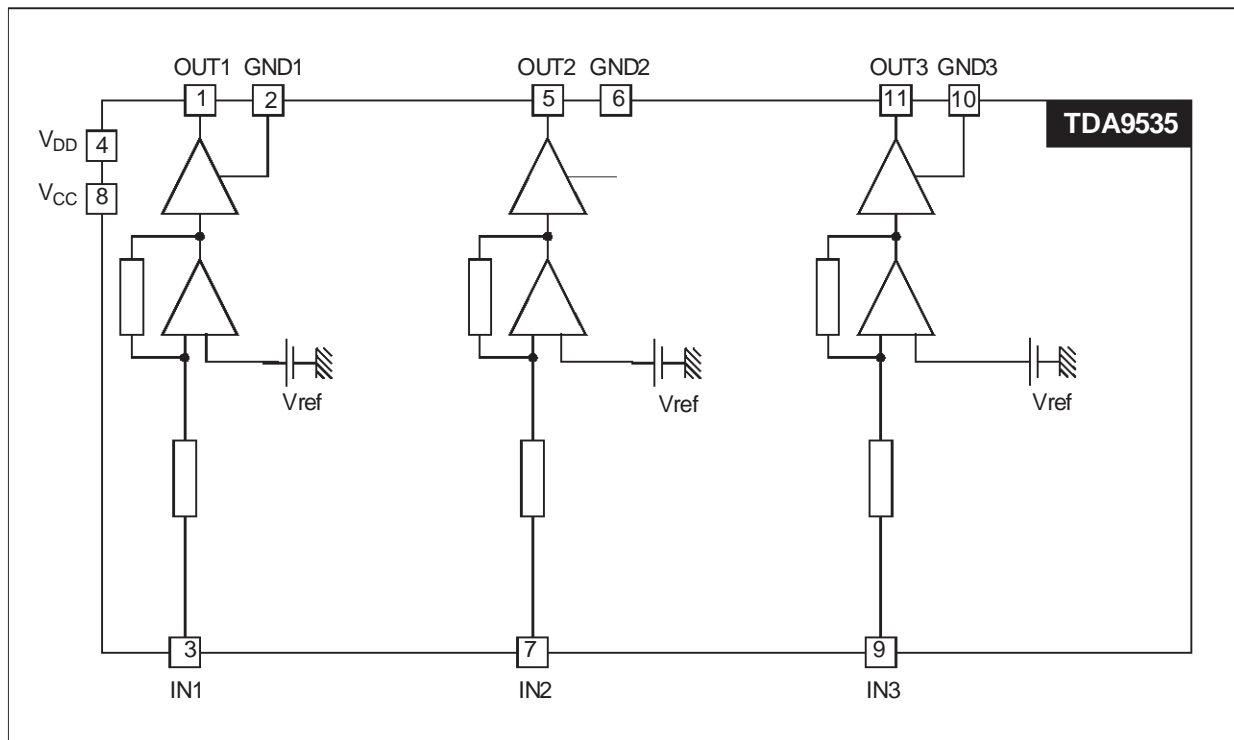
**ORDER CODE: TDA9535**

### PIN CONNECTIONS



Version 3.2

## BLOCK DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{DD}$	High Supply Voltage	120	V
$V_{CC}$	Low Supply Voltage	17	V
$V_{ESD}$	ESD Susceptibility Human Body Model, 100pF. Discharge through 1.5K $\Omega$ EIAJ Norm, 200pF. Discharge through 0 $\Omega$	2 250	kV V
$I_{OD}$	Output Source Current (pulsed < 50 $\mu$ s)	80	mA
$I_{OG}$	Output Sink Current (pulsed < 50 $\mu$ s)	80	mA
$V_{I\ Max}$	Maximum Input Voltage	15	V
$V_{I\ Min}$	Minimum Input Voltage	- 0.5	V
$T_J$	Junction Temperature	150	$^{\circ}$ C
$T_{STG}$	Storage Temperature	-20 + 150	$^{\circ}$ C

## THERMAL DATA

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction-Case Thermal Resistance (Max.)	3	$^{\circ}$ C/W
$R_{th(j-a)}$	Junction-Ambient Thermal Resistance (Typ.)	35	$^{\circ}$ C/W

## ELECTRICAL CHARACTERISTICS

(VCC = 12V, VDD = 110V, Tamb = 25 °C)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V <sub>DD</sub>	High Supply Voltage (Pin 4)			110	115	V
V <sub>CC</sub>	Low Supply Voltage (Pin 8)		10	12	15	V
I <sub>DD</sub> I <sub>CC</sub>	High Voltage Supply Internal DC Current Low Voltage Supply Internal DC Current	V <sub>OUT</sub> = 50V		15 40		mA mA
dV <sub>OUT</sub> /dV <sub>DD</sub>	High Voltage Supply Rejection	V <sub>OUT</sub> = 50V		0.5		%
dV <sub>OUT</sub> /dTemp	Output Voltage Drift Versus Temperature for any Channel	V <sub>OUT</sub> = 80V		15		mV/ °C
V <sub>OUT SATH</sub> V <sub>OUT SATL</sub>	Max. Output Voltage Min. Output Voltage	I <sub>0</sub> = -60mA, (1) I <sub>0</sub> = 60mA, (1)		V <sub>DD</sub> - 6.5 11		V V
AV <sub>R</sub>	Typical Video Gain	V <sub>OUT</sub> = 50V		20		
E <sub>lin</sub>	Linearity Error	17 < V <sub>OUT</sub> < V <sub>DD</sub> - 15V		5	8	%
OS	Overshoot			5		%
Lf Δg/g	Low Frequency Gain Matching	V <sub>OUT</sub> = 50V, f=1MHz			5	%
R <sub>IN</sub>	Video Input Resistor	V <sub>OUT</sub> = 50V		2		KΩ
BW	Bandwidth at -3dB	V <sub>OUT</sub> =50V, C <sub>LOAD</sub> =8pF R <sub>P</sub> =200Ω, ΔV <sub>OUT</sub> =20V		37		MHz
t <sub>R</sub> , t <sub>F</sub>	Rise and Fall Time	V <sub>OUT</sub> =50V, C <sub>LOAD</sub> =8pF R <sub>P</sub> =200Ω, ΔV <sub>OUT</sub> =40V		9.5		ns
Lf CT Hf CT	Low Frequency Crosstalk High Frequency Crosstalk	V <sub>OUT</sub> =50V, C <sub>LOAD</sub> =8pF R <sub>P</sub> =200 Ω, ΔV <sub>OUT</sub> =20V f = 1 MHz f = 20MHz		50 32		dB dB

**Note:** 1 Pulsed current width < 50μs

## TYPICAL APPLICATION

### PC Board Lay-out

The best performance is obtained with a carefully designed HF PC board, especially for the output and input capacitors.

Rise/fall time and bandwidth are measured on a 10pF load. The best rise/fall times and bandwidth results will be obtained with low Rp resistor value while the best CRT arcing protection will be obtained by a high Rp resistor value. Finally a value between 150 and 220Ω is a good compromise.

### Power Dissipation

The power dissipation is the sum of the DC and the dynamic dissipation.

As the feedback resistors are integrated, the DC power dissipation (capacitive load) can be estimated by:

$$P_{STAT} = V_{DD} \cdot I_{DD} + V_{CC} \cdot I_{CC}$$

The dynamic dissipation in the worst case (full bandwidth and black pixel/white pixel picture (note 2) is:

$$P_{DYN} = 3 V_{DD} \cdot C_L \cdot V_{OUT(PP)} \cdot f \cdot K$$

where f is the video frequency and K the active line duration / total duration.

Example:

for  $V_{DD} = 110V$ ,  $V_{CC} = 12V$ ,  $V_{OUT} = 40 V_{PP}$ ,  $I_{DD} = 15mA$ ,  $I_{CC} = 40mA$ ,  $f_{VIDEO} = 30MHz$ ,  $C_L = 8pF$  and  $K = 0.72$ .

We have:  $P_{STAT} = 2.13W$  and  $P_{DYN} = 2.28W$

Therefore:  $P_{tot} = 4.41W$ .

**Note: 2** This worst thermal case must only be considered for  $T_{Jmax}$  calculation. Nevertheless, during the average life of the circuit, the conditions are very close to the white picture conditions.

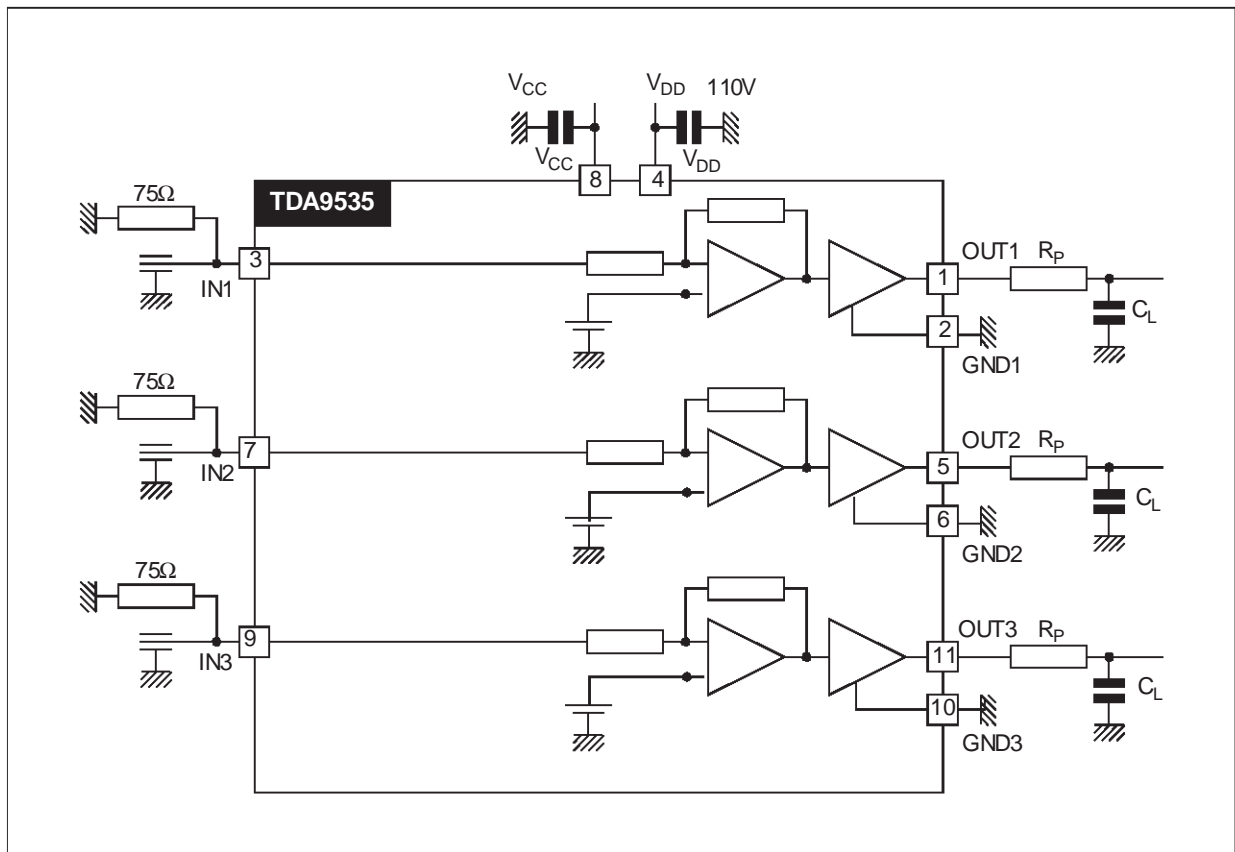


Figure 1. TDA9535/9536 - TDA9210 - Demonstration Board: Silk Screen and Trace (scale 1:1)

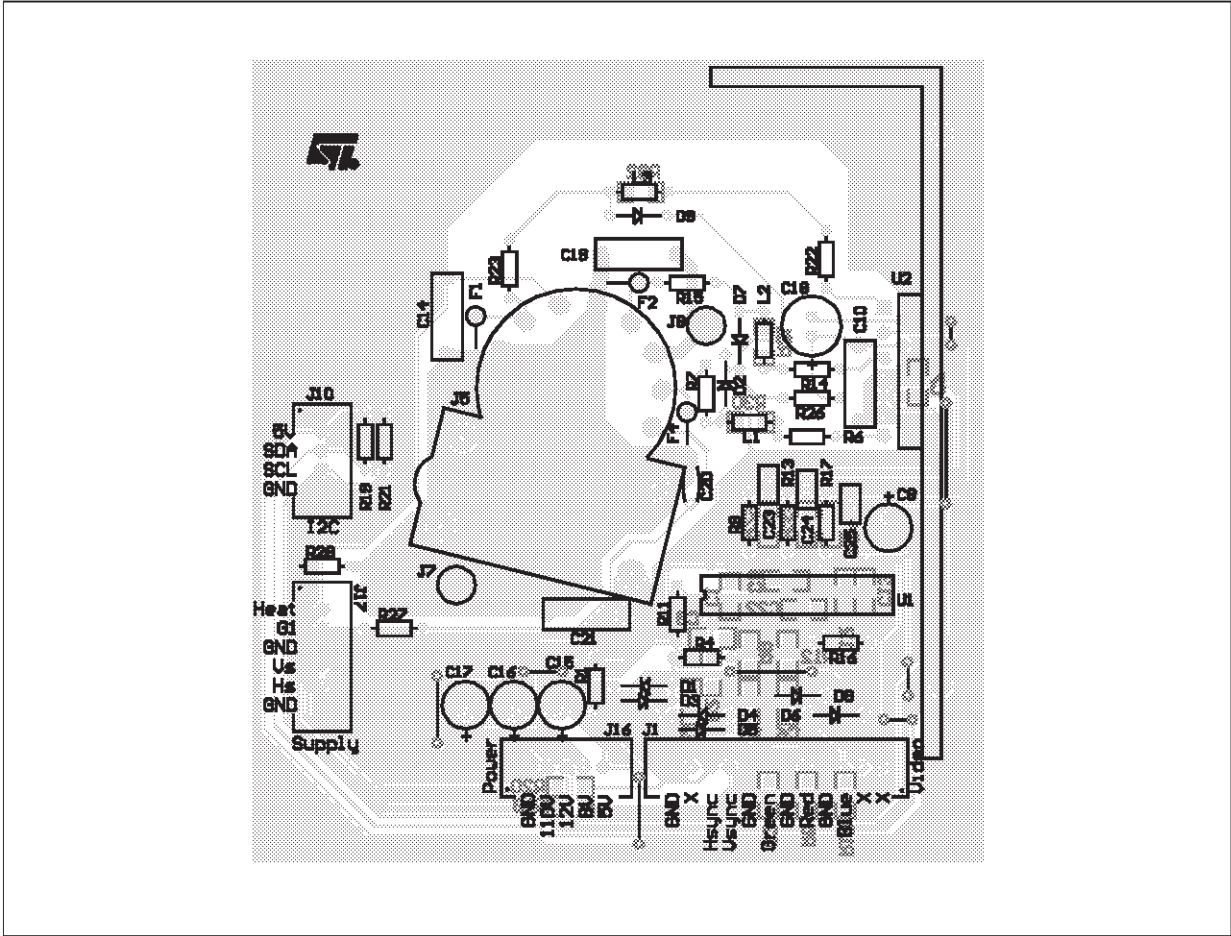
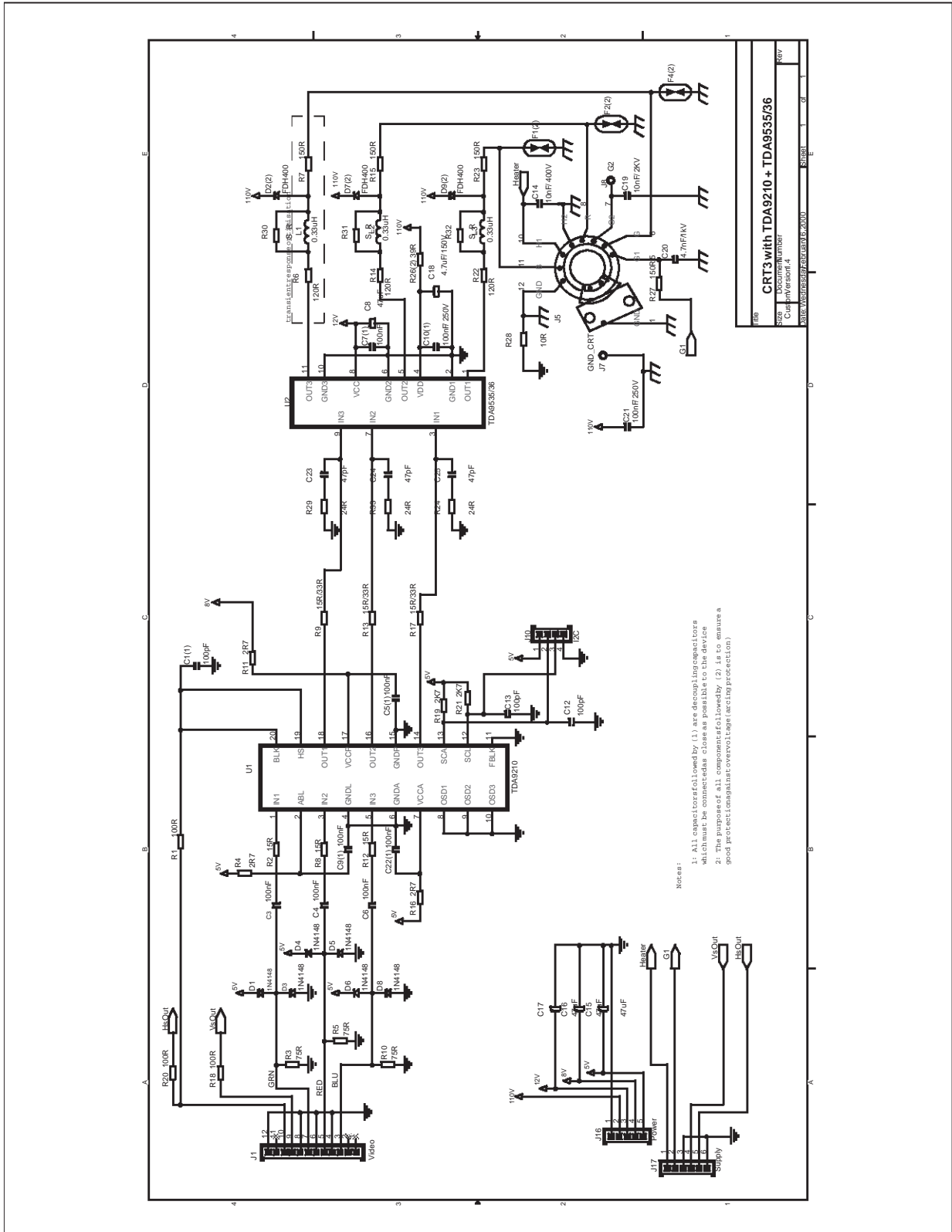
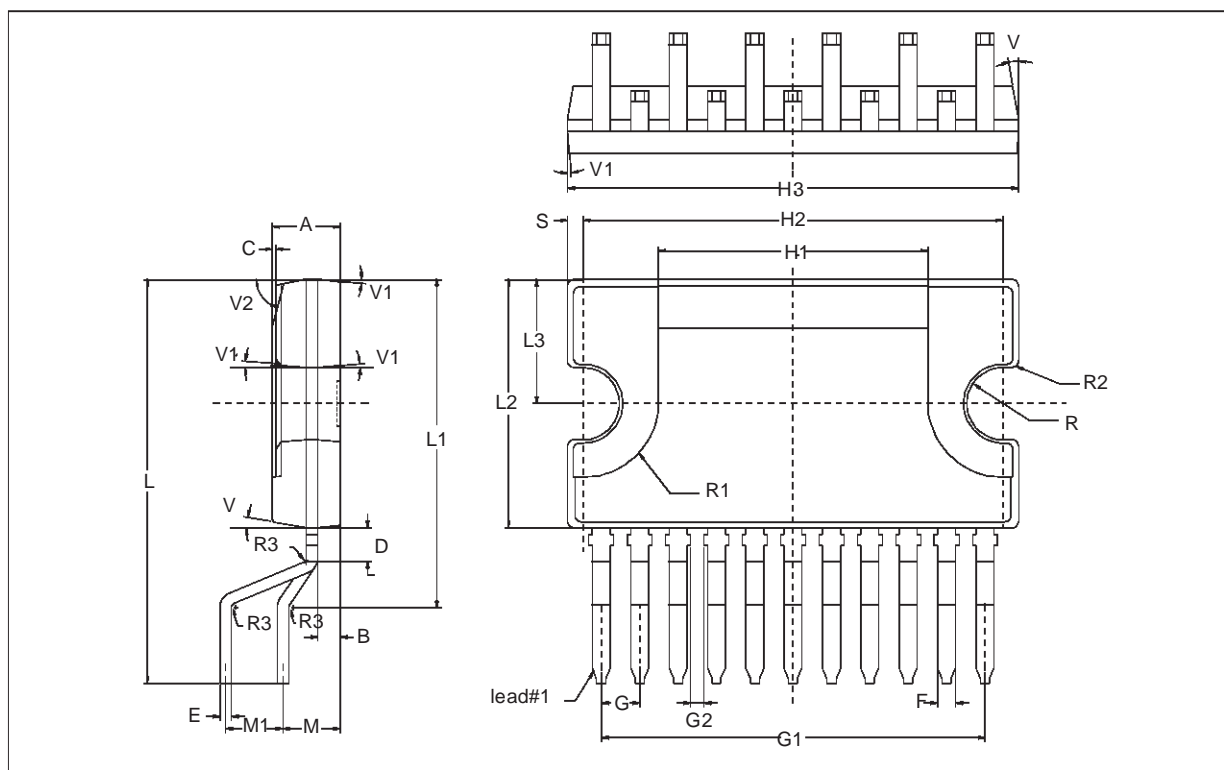


Figure 2. TDA9535/9536 - TDA9210 - Demonstration Board Schematic



## PACKAGE MECHANICAL DATA

11 PIN - CLIPWATT



Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.95	3.00	3.05	0.116	0.118	0.120
B	0.95	1.00	1.05	0.037	0.039	0.041
C		0.15			0.006	
D	1.30	1.50	1.70	0.051	0.059	0.066
E	0.49	0.515	0.55	0.019	0.020	0.021
F	0.78	0.80	0.88	0.031	0.033	0.034
G	1.60	1.70	1.80	0.063	0.067	0.071
G1	16.90	17.00	17.10	0.665	0.669	0.673
H1		12.00			0.472	
H2	18.55	18.60	18.65	0.730	0.732	0.734
H3	19.90	20.00	20.10	0.783	0.787	0.791 ( )
L	17.70	17.90	18.10	0.696	0.704	0.712
L1	14.35	14.55	14.65	0.564	0.572	0.576
L2	10.90	11.00	11.10	0.429	0.433	0.437( )
L3	5.40	5.50	5.60	0.212	0.216	0.220
M	2.34	2.54	2.74	0.092	0.100	0.107
M1	2.34	2.54	2.74	0.092	0.100	0.107
R	1.45			0.057		
R1	3.20	3.30	3.40	0.126	0.130	0.134

## TDA9535

---

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
R2		0.30			0.012	
R3		0.50			0.019	
S	0.65	0.70	0.75	0.025	0.027	0.029
V		10deg.			10deg.	
V1		5deg.			5deg.	
V2		75deg.			75deg.	

"H3 and L2" do not include mold flash or protrusions

Mold flash or protrusions shall not exceed 0.15mm per side.



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a trademark of STMicroelectronics.

© 2000 STMicroelectronics - All Rights Reserved

Purchase of I<sup>2</sup>C Components of STMicroelectronics, conveys a license under the Philips I<sup>2</sup>C Patent. Rights to use these components in a I<sup>2</sup>C system, is granted provided that the system conforms to the I<sup>2</sup>C Standard Specifications as defined by Philips.

**STMicroelectronics GROUP OF COMPANIES**

Australia - Brazil - China - Finland - France - Germany - Italy - Japan - Korea - Malaysia - Malta - Mexico - Morocco - The Netherlands - Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A.

<http://www.st.com>