



# STV8130AD

## ADJUSTABLE AND +3.3 V DUAL VOLTAGE REGULATOR WITH DISABLE AND RESET FUNCTIONS

PRELIMINARY DATA

### FEATURES

- Input Voltage Range: 5 V to 18 V
- Output Currents up to 750 mA
- Fixed Precision Output 1 Voltage: 3.3 V  $\pm 2\%$
- Adjustable Output 2 Voltage: 2.8 to 16 V
- Output 1 with Reset Function
- Output 2 with Disable Function by TTL Input
- Short-circuit Protection at both Outputs
- Thermal Protection
- Low Dropout Voltage

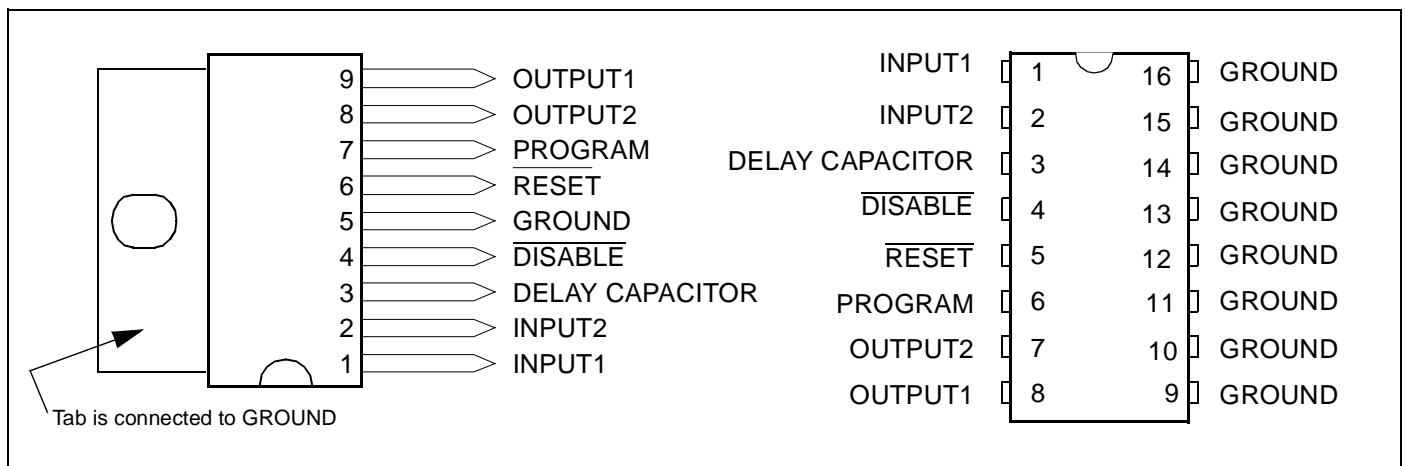
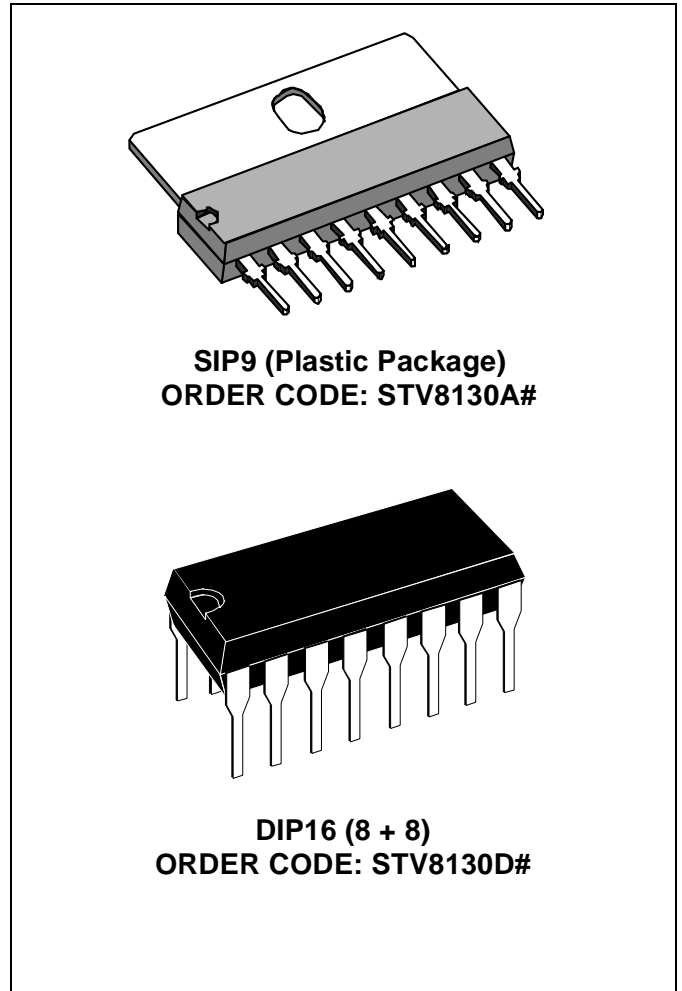
### DESCRIPTION

The STV8130A# and STV8130D# are monolithic dual positive voltage regulators designed to provide a fixed precision output voltage of 3.3 V and an adjustable voltage between 2.8 and 16 V for currents up to 750 mA.

An internal reset circuit generates a reset pulse when the voltage of Output 1 drops below the regulated voltage value.

Output 2 can be disabled via the TTL input.

Short-circuit and thermal protections are included.



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# 1 GENERAL INFORMATION

Figure 1: STV8130A# Block Diagram

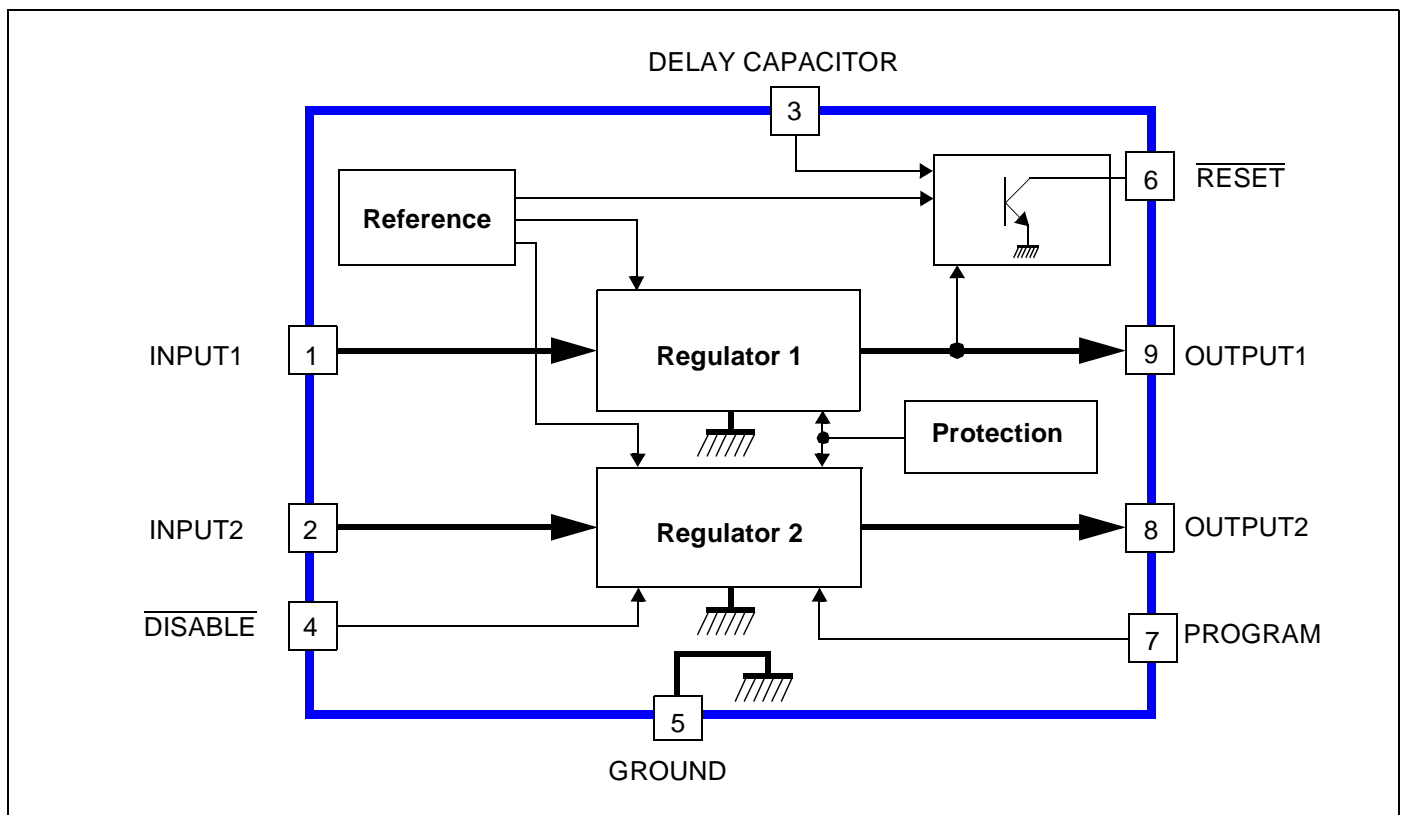
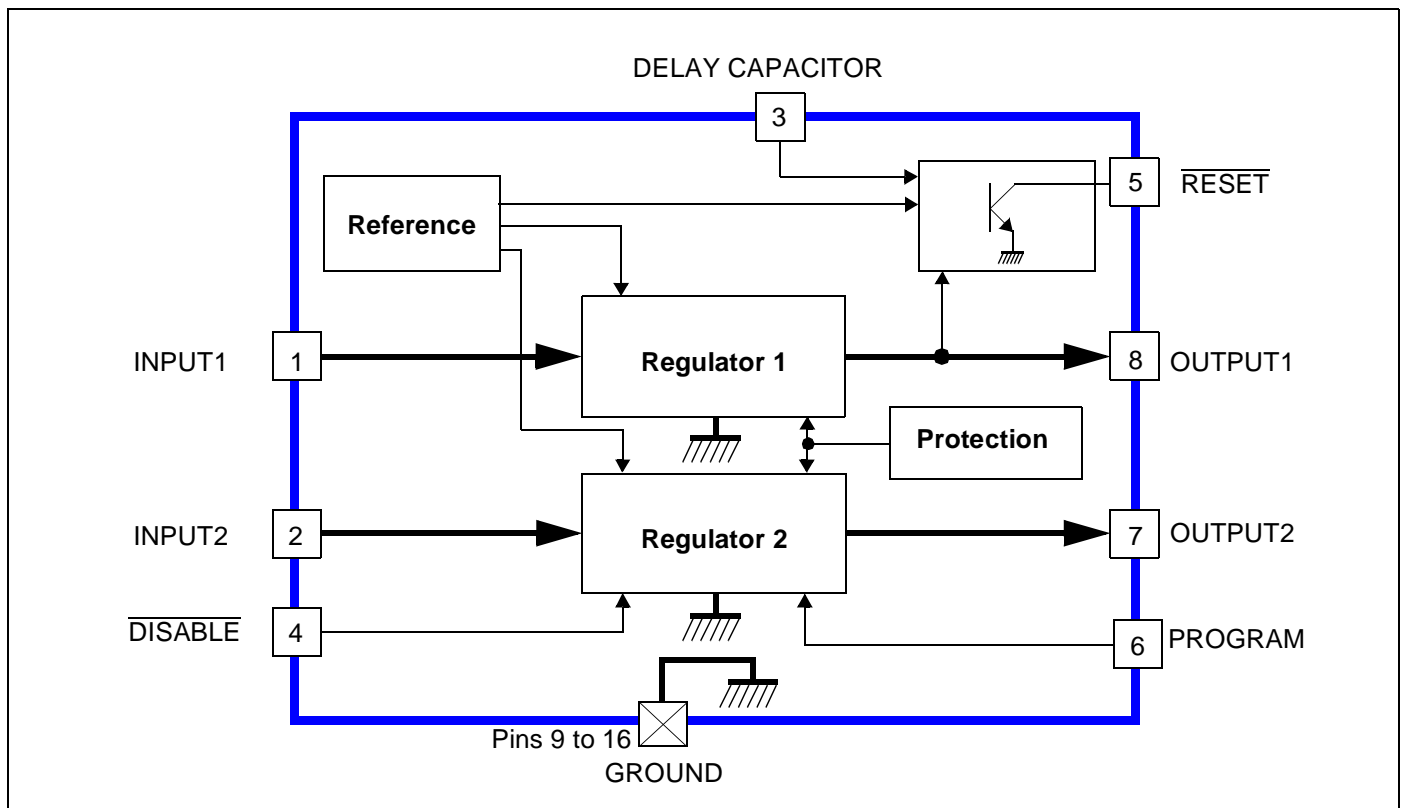


Figure 2: STV8130D# Block Diagram



## 2 ELECTRICAL CHARACTERISTICS

### 2.1 Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
$V_{IN}$	DC Input Voltage at pins INPUT1 and INPUT2	20	V
$V_{DIS}$	Disable Input Voltage at pin $\overline{DISABLE}$	20	V
$V_{RST}$	Output Voltage at pin $\overline{RESET}$	20	V
$I_{OUT1,2}$	Output Currents	Internally Limited	
$P_t$	Power Dissipation	Internally Limited	
$T_{STG}$	Storage Temperature	-65 to +150	°C
$T_J$	Junction Temperature	0 to +150	°C

### 2.2 Thermal Data

Symbol	Parameter	Value	Unit	
$R_{thJC}$	Thermal Resistance (Junction-to-Case)	STV8130A#	9	°C/W
		STV8130D#	15	
$R_{thJA}$	Thermal Resistance <sup>1</sup> (Junction-to-Ambient)	STV8130A#	50	°C/W
		STV8130D#	56	
$T_J$	Maximum Recommended Junction Temperature	140	°C	
$T_{OPER}$	Operating Free Air Temperature Range	0 to +70	°C	

1. Mounted on board. For more information, refer to [Section 5](#).

### 2.3 Electrical Characteristics

$T_{AMB} = 25^\circ \text{C}$ ,  $V_{IN1} = 7 \text{V}$ ,  $V_{IN2} = 10 \text{V}$ , unless otherwise specified.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{OUT1}$	Output Voltage	$I_{OUT1} = 10 \text{mA}$	3.23	3.30	3.37	V
$V_{OUT2}$	Output Voltage	$I_{OUT2} = 10 \text{mA}$	2.8		16.0	V
$V_{IO1,2}$	Dropout Voltage	$I_{OUT1,2} = 750 \text{mA}$			1.4	V
$V_{O1,2LI}$	Line Regulation	$6 \text{V} < V_{IN1} < 12 \text{V}$ $12 \text{V} < V_{IN2} < 18 \text{V}$ $I_{OUT1,2} = 200 \text{mA}$			50 100	mV
$V_{O1,2LO}$	Load Regulation	$5 \text{mA} < I_{OUT1} < 600 \text{mA}$ $5 \text{mA} < I_{OUT2} < 600 \text{mA}$			100 200	mV

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_Q$	Quiescent Current	$I_{OUT1} = 10 \text{ mA}$ , OUTPUT2 Disabled			2	mA
$V_{O1RST}$	Reset Threshold Voltage <sup>1</sup>	$K = V_{OUT1}$ , $I_{OUT1} \geq 50 \text{ mA}$	$K - 0.4$	$K - 0.25$	$K - 0.1$	V
$V_{RTH}$	Reset Threshold Hysteresis	See circuit description.	20	50	75	mV
$t_{RD}$	Reset Pulse Delay	$C_e = 100 \text{ nF}$ See circuit description.		25		ms
$V_{RL}$	Saturation Voltage in Reset Condition	$I_{RESET} = 5 \text{ mA}$			0.4	V
$I_{RH}$	Leakage Current in Normal Condition	$V_{RESET} = 10 \text{ V}$			10	$\mu\text{A}$
$K_{OUT1,2}$	Output Voltage Thermal Drift	$K_0 = \frac{\Delta V_0 \cdot 10^6}{\Delta T \cdot V_0}$ $T_J = 0 \text{ to } +125^\circ\text{C}$		100		ppm/ $^\circ\text{C}$
$I_{OUT1,2SC}$	Short Circuit Output Current	$V_{IN1} = 7 \text{ V}$ , $V_{IN2} = 10 \text{ V}$ $V_{IN1,2} = 16 \text{ V}^2$			1.6 1.0	A
$V_{DISH}$	Disable Voltage when pin $\overline{\text{DISABLE}}$ is High (OUTPUT2 active)		2			V
$V_{DISL}$	Disable Voltage when pin $\overline{\text{DISABLE}}$ is Low (OUTPUT2 disabled)				0.8	V
$I_{DIS}$	Disable Bias Current	$0 \text{ V} < V_{DIS} < 7 \text{ V}$	-100		2	$\mu\text{A}$
$V_{REF}$	Reference Voltage at PROGRAM Pin			2.44		V
$T_{JSD}$	Junction Temperature for Thermal Shutdown			145		$^\circ\text{C}$

1. This reset signal is activated by a decrease of  $V_{OUT1}$  voltage which can be due to an overload of pin OUT1 or by a lack of Input Voltage ( $V_{IN1}$ ).
2. The output short-circuit currents are tested one channel at time. During a short-circuit, a large consumption of power occurs, but the thermal protection circuit prevents any excessive temperatures. A safe permanent short-circuit protection is only guaranteed for input voltages up to 16 V.

### 3 CIRCUIT DESCRIPTION

The STV8130A# and STV8130D# are dual-voltage regulators with Reset and Disable functions.

The two regulation parts are supplied from a single voltage reference circuit trimmed by zener zapping during EWS testing. Since the supply voltage of this voltage reference is connected to pin INPUT1 ( $V_{IN1}$ ), the second regulator will not work if pin INPUT1 is not supplied.

The adjustable voltage of pin OUTPUT2 ( $V_{OUT2}$ ) is defined by output bridge resistors (R1, R2): the values of these resistors are calculated to obtain, with the targetted value for  $V_{OUT2}$ , the reference voltage ( $V_{REF} = 2.44 \text{ V}$ ) on the median point connected to pin PROGRAM.

The output stages are designed using a Darlington configuration with a typical dropout voltage of 1.2 V.

The Disable circuit will switch off pin OUTPUT2 if a voltage less than 0.8 V is applied to pin DISABLE.

The Reset circuit checks the voltage at pin OUTPUT1. If this voltage drops below  $V_{OUT1} - 0.25 \text{ V}$  (3.05 V Typ.), the "a" comparator (Figure 3) rapidly discharges the external capacitor ( $C_e$ ) and the reset output immediately switches to low. This drop can be caused by a parasitic loading condition on pin OUTPUT1 or by a too low value of  $V_{IN}$  (short powering off). When the voltage at pin OUTPUT1 exceeds  $V_{OUT1} - 0.2 \text{ V}$  (3.1 V Typ.), the  $V_{C_e}$  voltage increases linearly to the reference voltage ( $V_{REF} = 2.44 \text{ V}$ ) corresponding to a Reset Pulse Delay ( $t_{RD}$ ) as shown in Figure 4.

$$t_{RD} = \frac{C_e \times 2.44\text{V}}{10\mu\text{A}}$$

Afterwards, the reset output returns to high. To avoid glitches in the reset output, the second comparator "b" has a large hysteresis (1.84 V).

Figure 3: Reset Diagram

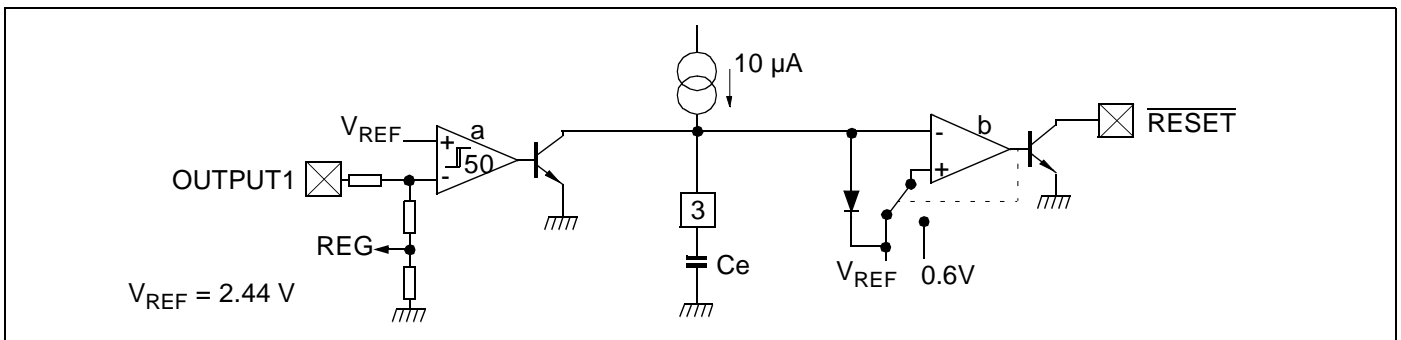
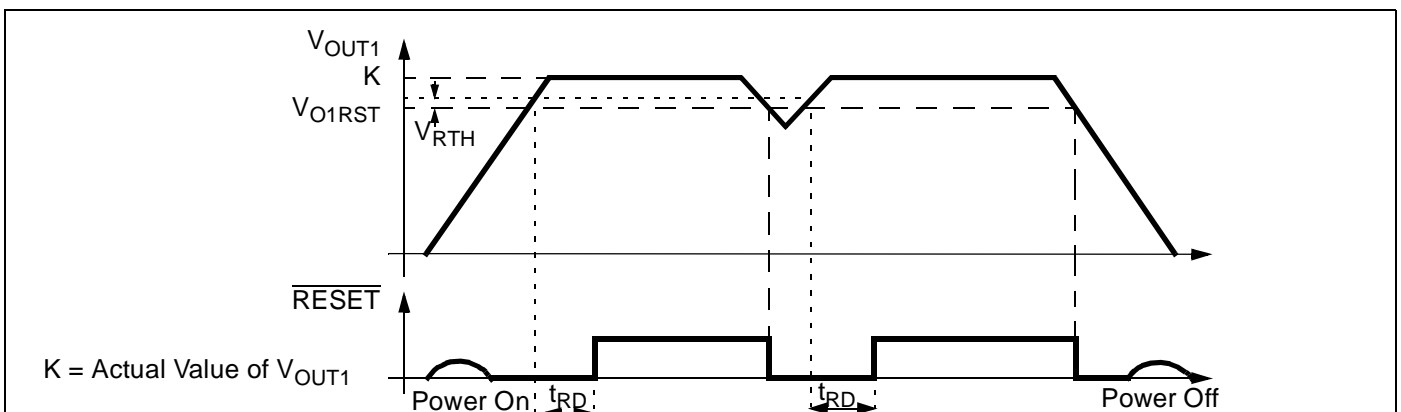


Figure 4: Internal Reset Voltages



# 4 APPLICATION DIAGRAMS

Figure 5: STV8130A# Typical Application

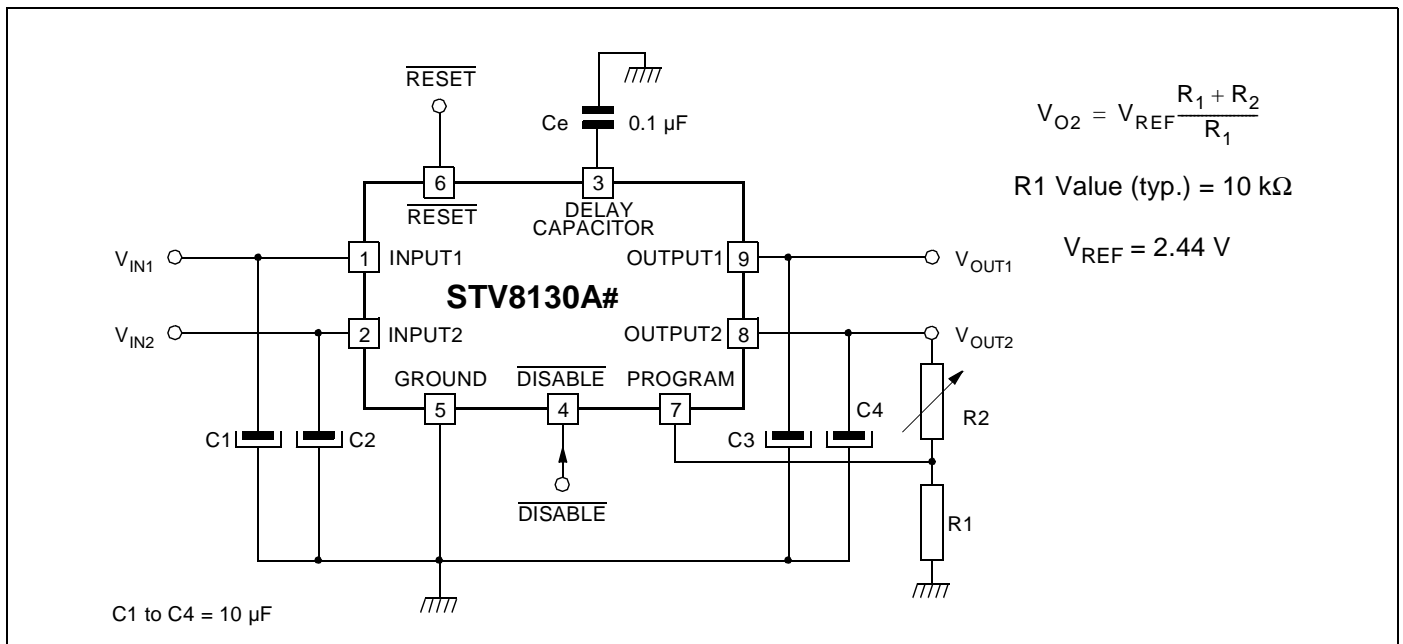
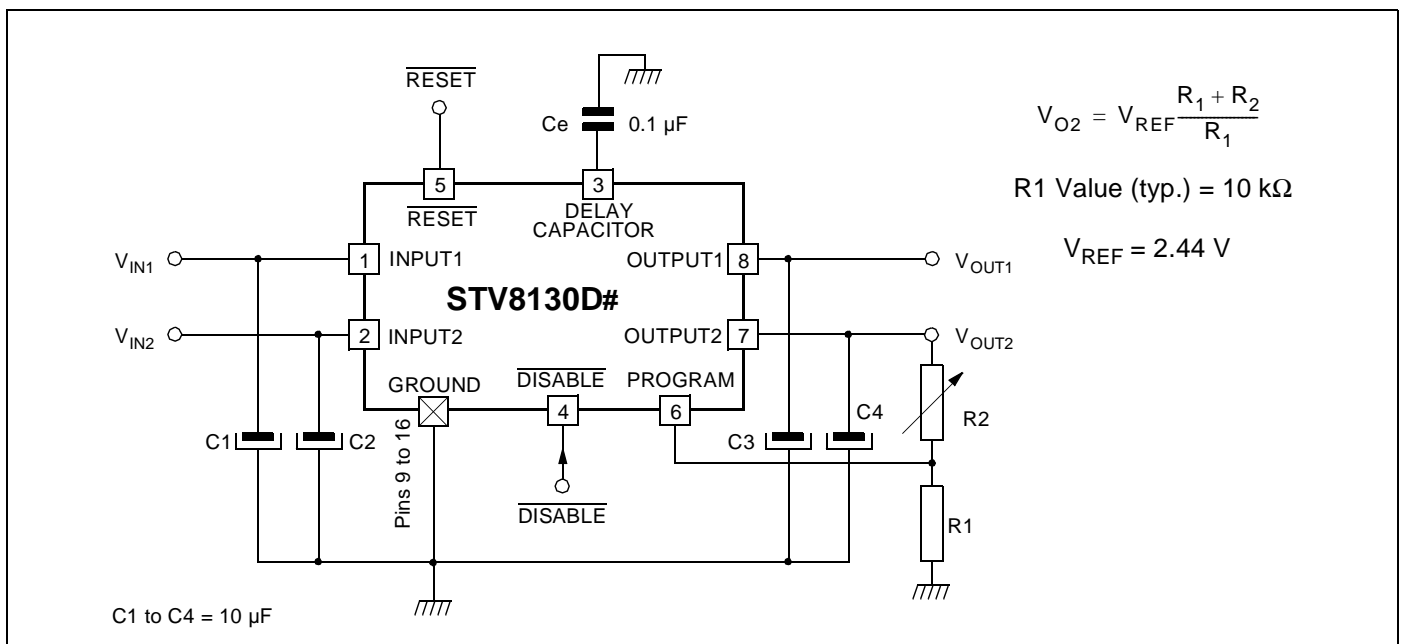


Figure 6: STV8130D# Typical Application



## 5 POWER DISSIPATION AND LAYOUT INDICATIONS

The power is mainly dissipated by the two device buffers. It can be calculated by the equation:

$$P = (V_{IN1} - V_{OUT1}) \times I_{OUT1} + (V_{IN2} - V_{OUT2}) \times I_{OUT2}$$

The following table lists the different  $R_{thJA}$  values of these packages with or without a heat sink and the corresponding maximum power dissipation assuming:

- Maximum Ambient Temperature = 70° C
- Maximum Junction Temperature = 140° C

Device	Heat Sink	$R_{thJA}$ in °C/W	$P_{MAX}$ in W
STV8130A#	No	50	1.4
	Yes	20	3.5
STV8130D#	No	56 to 40	1.25 to 1.75
	Yes	32	2.2

Figure 7: Thermal Resistance (Junction-to-Ambient) of DIP16 Package without Heat Sink

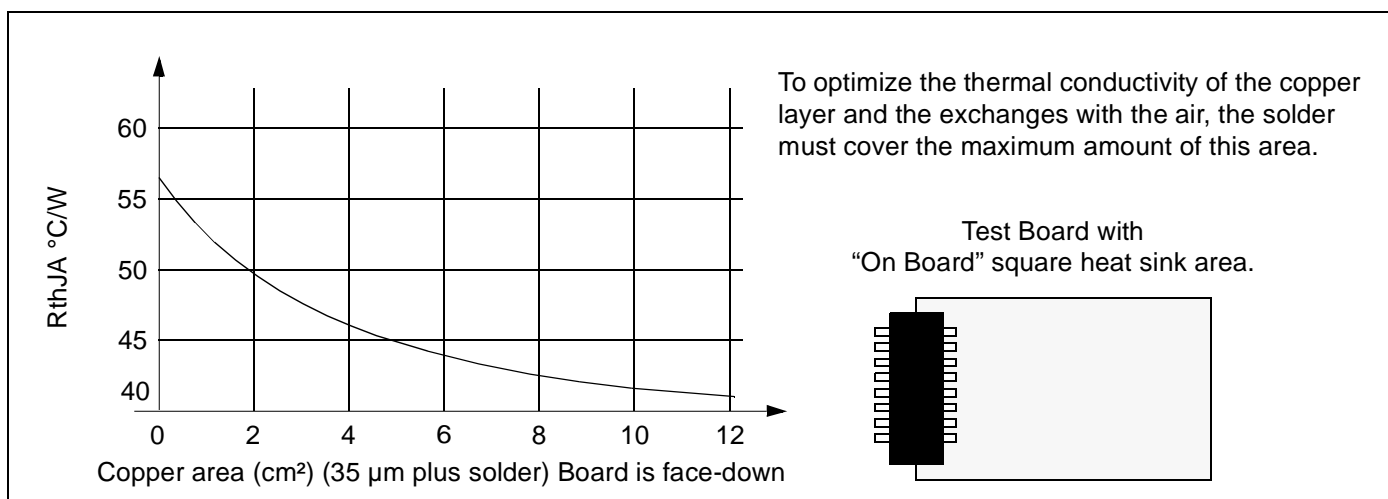
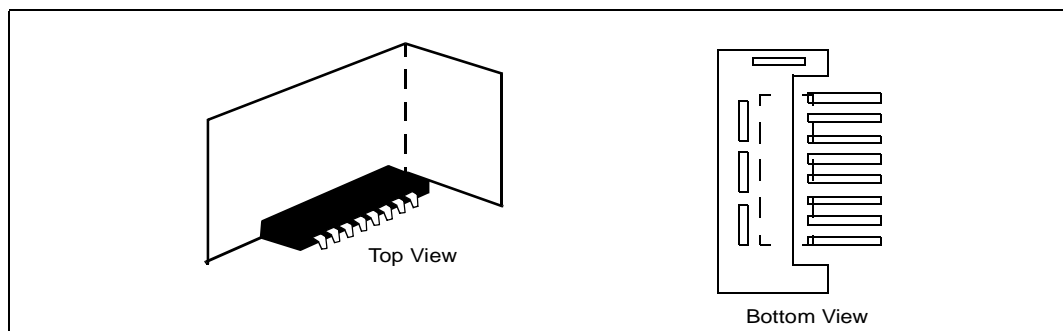


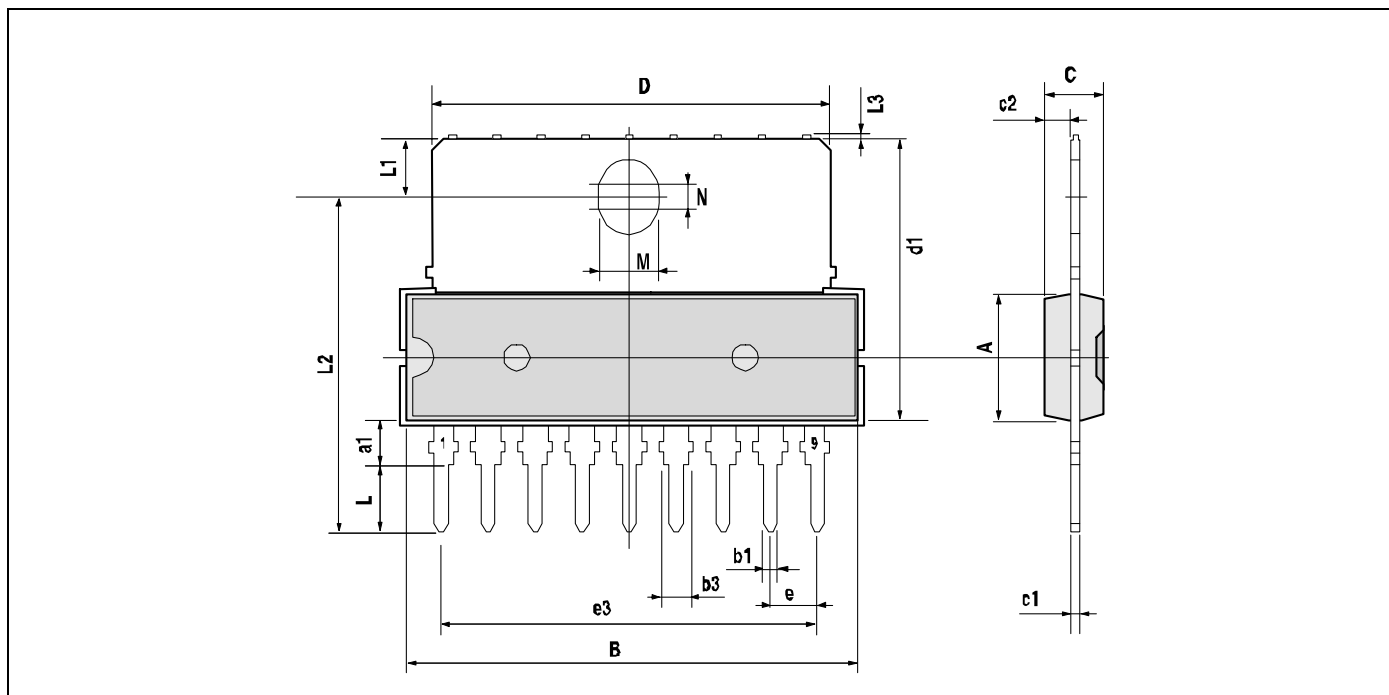
Figure 8: Metal plate mounted near the STV8130D# for heat sinking





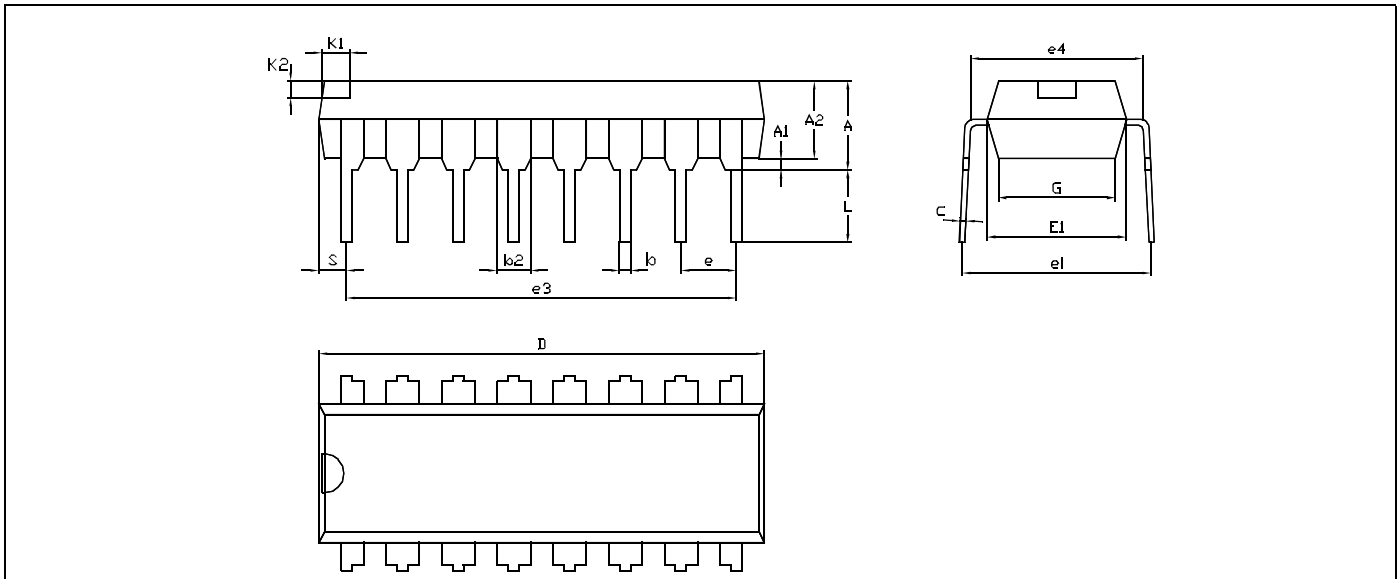
## 6 PACKAGE MECHANICAL DATA

Figure 9: 9-Pin Plastic Single In Line Package



Dim.	mm			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			7.1			0.280
a1	2.7		3	0.106		0.118
B			24.8			0.976
b1		0.5			0.020	
b3	0.85		1.6	0.033		0.063
C		3.3			0.130	
c1		0.43			0.017	
c2		1.32			0.052	
D			21.2			0.835
d1		14.5			0.571	
e		2.54			0.100	
e3		20.32			0.800	
L	3.1			1.122		
L1		3			0.116	
L2		17.6			0.693	
L3			0.25			0.010
M		3.2			0.126	
N		1			0.039	

Figure 10: 16-Pin Plastic Dual In-Line Package, 300-mil Width



Dim.	mm			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			5.33			0.210
A1	0.38			0.015		
A2	2.92	3.30	4.95	0.115	0.130	0.195
b	0.36		0.56	0.014		0.022
b2		1.52	1.78		0.060	0.070
c	0.20	0.25	0.36	0.008	0.010	0.014
D	18.67	19.18	19.69	0.735	0.755	0.775
e		2.54			0.100	
E1	6.10	6.35	7.11	0.240	0.250	0.280
L	2.92	3.30	3.81	0.115	0.130	0.150

## 7 REVISION HISTORY

Revision	Main Changes	Date
1.8	General Update; DISABLE pin renamed $\overline{\text{DISABLE}}$ (function remains unchanged).	August 2001
1.9	Thermal Data updated.	September 2001
2.0	Addition of DIP16 package.	September 2001
2.1	Thermal Data updated. <a href="#">Figure 1</a> and <a href="#">Figure 2</a> updated.	October 2001
2.2	Order code changed from STV8130A and STV8130D to STV8130A# and STV8130D#. Update of $V_{O1RST}$ values in <a href="#">Chapter 2.3: Electrical Characteristics on page 4</a> .	31 January 2002

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