

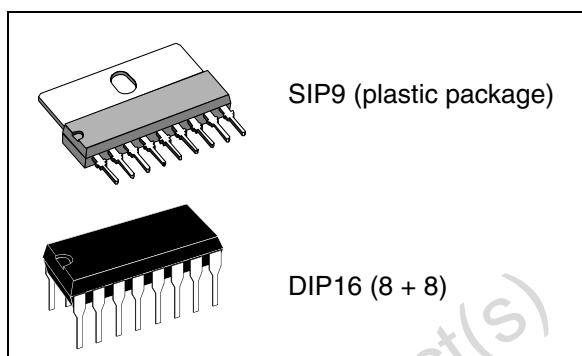


TDA8133

+5.1 V and +8 V dual voltage regulator with disable and reset functions

Features

- Input voltage range: 7 V to 18 V
- Output currents up to 750 mA
- Fixed precision output 1 voltage: 5.1 V \pm 2%
- Fixed precision output 2 voltage: 8 V \pm 2%
- 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 TDA8133 and the TDA8133D are monolithic dual positive voltage regulators designed to provide fixed precision output voltages of 5.1 V and 8.0 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.

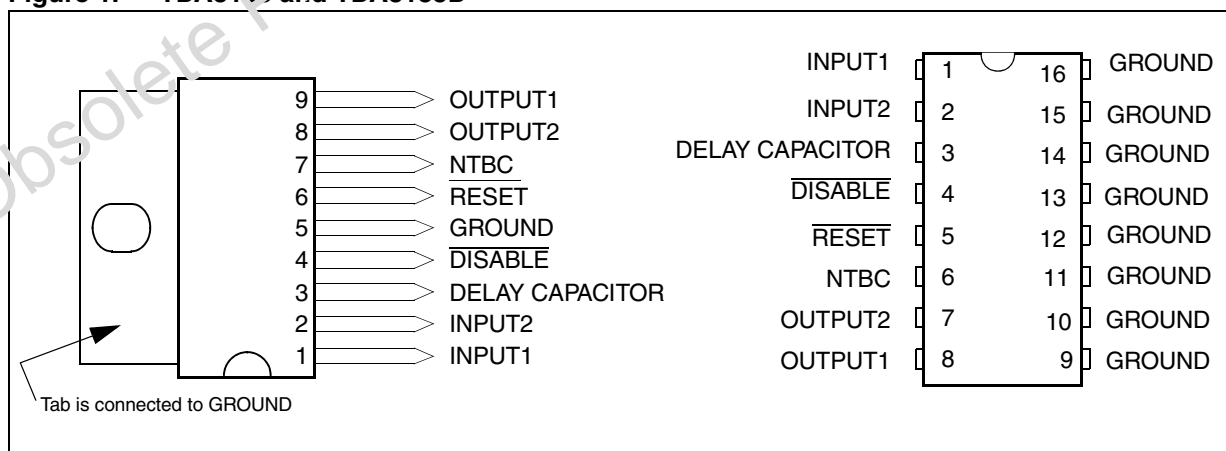
Output 2 can be disabled via the TTL input

Short-circuit and thermal protections are included in all versions.

Table 1. Device summary

Order code	Packaging
TDA8133	Tray
TDA8133D	Tray

Figure 1. TDA8133 and TDA8133D



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1 Description

Figure 2. TDA8133 block diagram

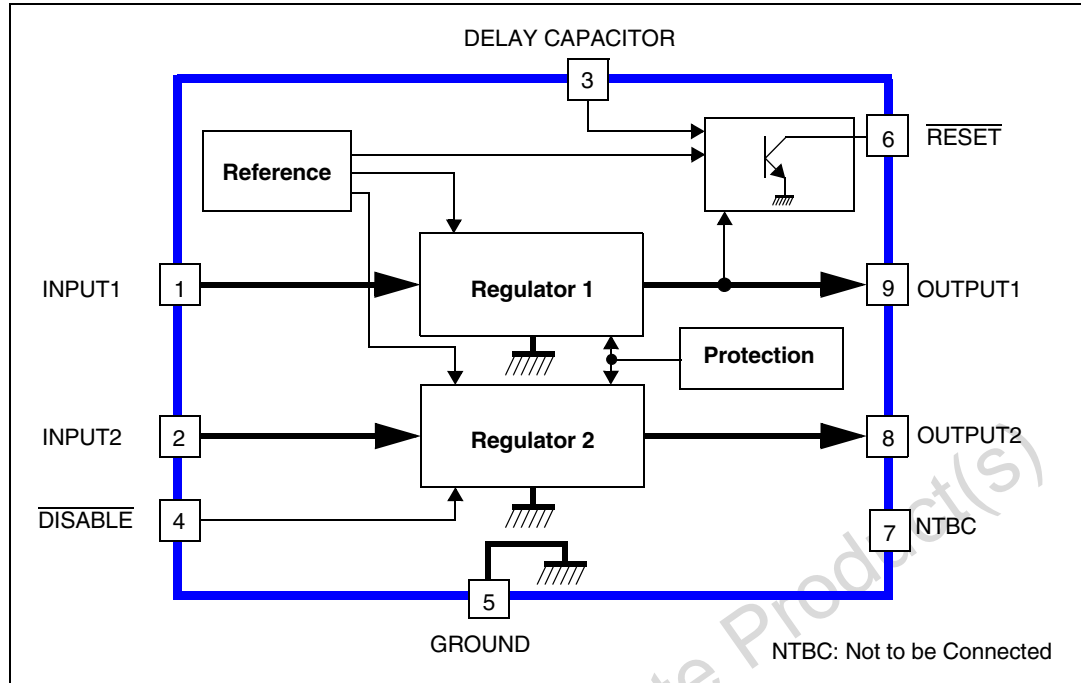
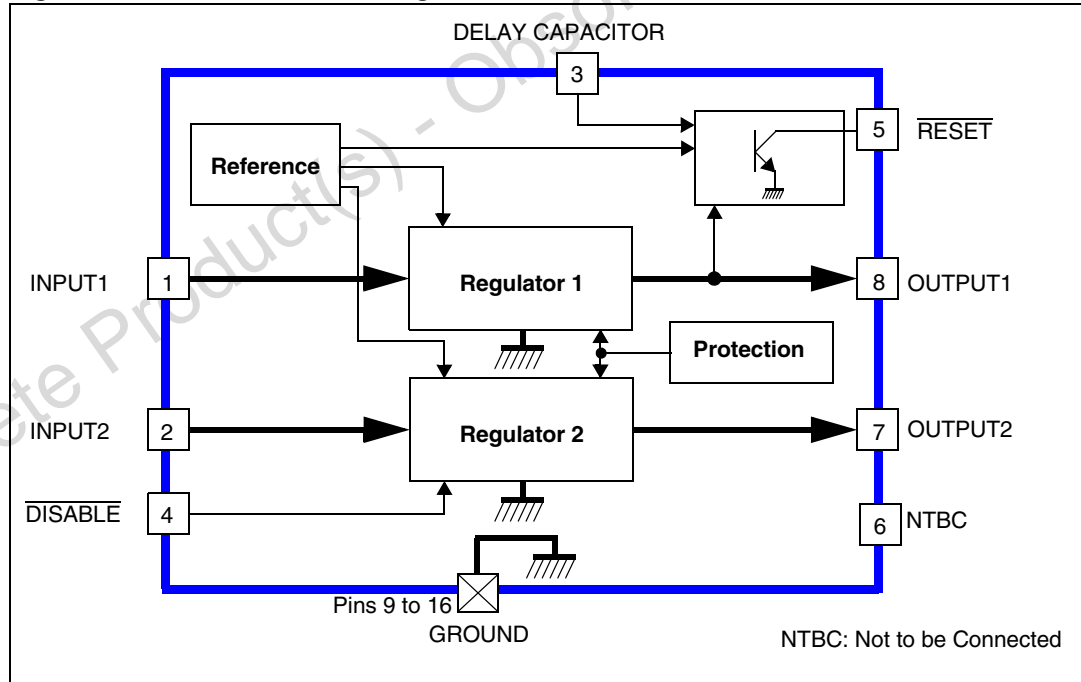


Figure 3. TDA8133D block diagram



2 Electrical characteristics

Table 2. 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
$I_{O1,2}$	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

Table 3. Thermal data

Symbol	Parameter	Value	Unit	
R_{thJC}	Thermal resistance (junction-to-case)	TDA8133	9	°C/W
		TDA8133D	15	
R_{thJA}	Thermal resistance ⁽¹⁾ (junction-to-ambient)	TDA8133	50	°C/W
		TDA8133D	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](#).

Table 4. Electrical characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{O1}	Output voltage	$I_{O1} = 10 \text{ mA}$	5	5.1	5.2	V
V_{O2}	Output voltage	$I_{O2} = 10 \text{ mA}$	7.84	8.00	8.16	V
$V_{IO1,2}$	Dropout voltage	$I_{O1,2} = 750 \text{ mA}$			1.4	V
$V_{O1,2LI}$	Line regulation	$7 \text{ V} < V_{IN1} < 14 \text{ V}$ $10 \text{ V} < V_{IN2} < 14 \text{ V}$ $I_{O1,2} = 200 \text{ mA}$			50 80	mV
$V_{O1,2LO}$	Load regulation	$5 \text{ mA} < I_{O1} < 600 \text{ mA}$ $5 \text{ mA} < I_{O2} < 600 \text{ mA}$			100 160	mV
I_Q	Quiescent current	$I_{O1} = 10 \text{ mA}$, OUTPUT2 Disabled			2	mA
V_{O1RST}	Reset threshold voltage	$K = V_{O1}$, $V_{IN1} \geq 7 \text{ V}$	$K - 0.4$	$K - 0.25$	$K - 0.1$	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

Table 4. Electrical characteristics (continued)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{RL}	Saturation voltage in reset condition	$I_{\overline{RESET}} = 5 \text{ mA}$			0.4	V
I_{RH}	Leakage current in normal condition	$V_{\overline{RESET}} = 10 \text{ V}$			10	μA
$K_{O1,2}$	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/ $^\circ\text{C}$
$I_{O1,2SC}$	Short circuit output current	$V_{IN1} = 7 \text{ V}, V_{IN2} = 10 \text{ V}$ $V_{IN1,2} = 16 \text{ V}^{(1)}$			1.6 1.0	A
V_{DISH}	Disable voltage when pin $\overline{DISABLE}$ is high (OUTPUT2 active)		2			V
V_{DISL}	Disable voltage when pin $\overline{DISABLE}$ is low (OUTPUT2 disabled)				0.8	V
I_{DIS}	Disable bias current	$0 \text{ V} < V_{DIS} < 7 \text{ V}$	-100		2	μA
T_{JSD}	Junction temperature for thermal shutdown			145		$^\circ\text{C}$

1. 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.

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

3 Circuit description

The TDA8133 and the TDA8133D 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 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 $V_{O1} - 0.25$ V (4.85 V Typ.), the "a" comparator (*Figure 4*) rapidly discharges the external capacitor (C_e) and the reset output immediately switches to low. When the voltage at pin OUTPUT1 exceeds $V_{O1} - 0.2$ V (4.9 V Typ.), the V_{C_e} voltage increases linearly to the reference voltage ($V_{REF} = 2.5$ V) corresponding to a reset pulse delay (t_{RD}) as shown in *Figure 5*.

$$t_{RD} = \frac{C_e \times 2.5V}{10\mu A}$$

Afterwards, the reset output returns to high. To avoid glitches in the reset output, the second comparator "b" has a large hysteresis (1.9 V).

Figure 4. Reset diagram

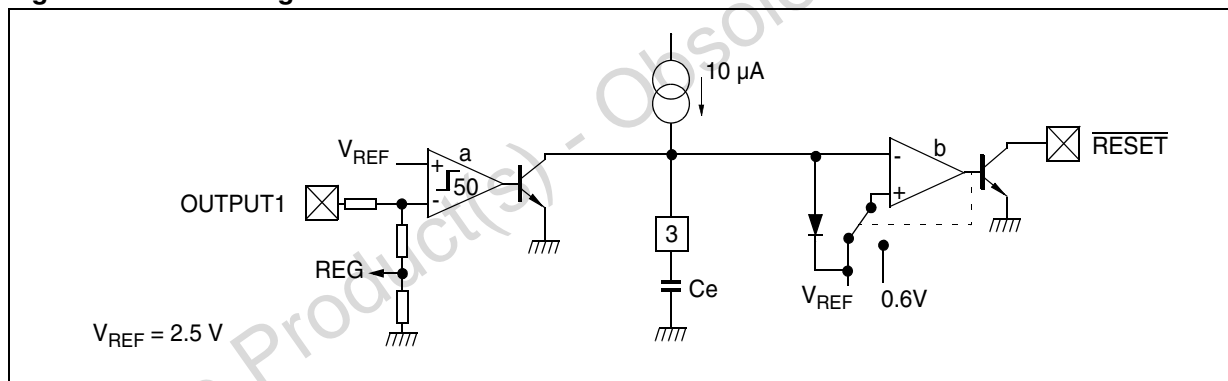
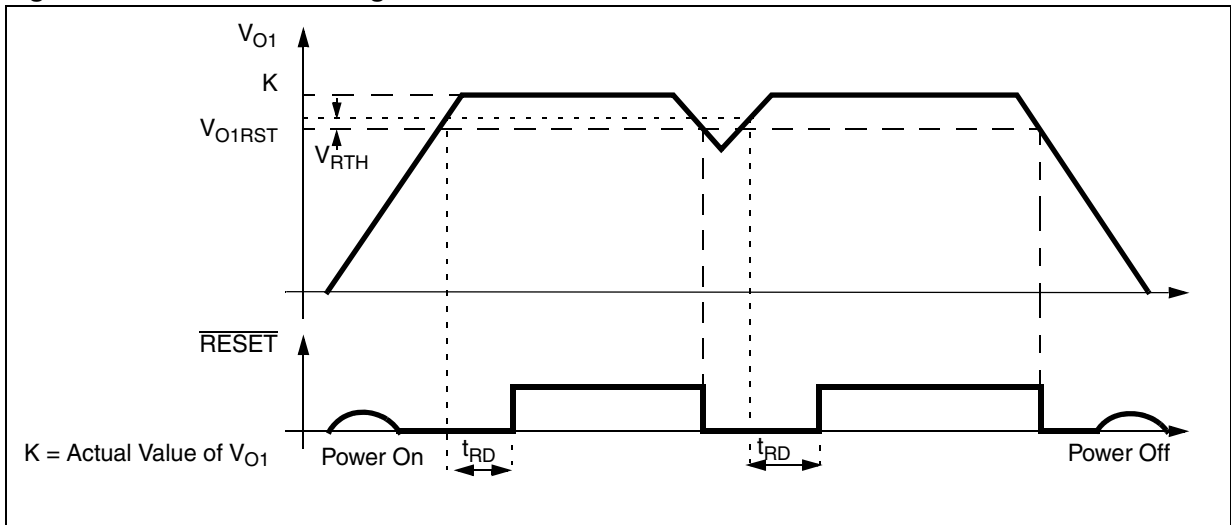


Figure 5. Internal reset diagram



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4 Application diagrams

Figure 6. TDA8133 typical application

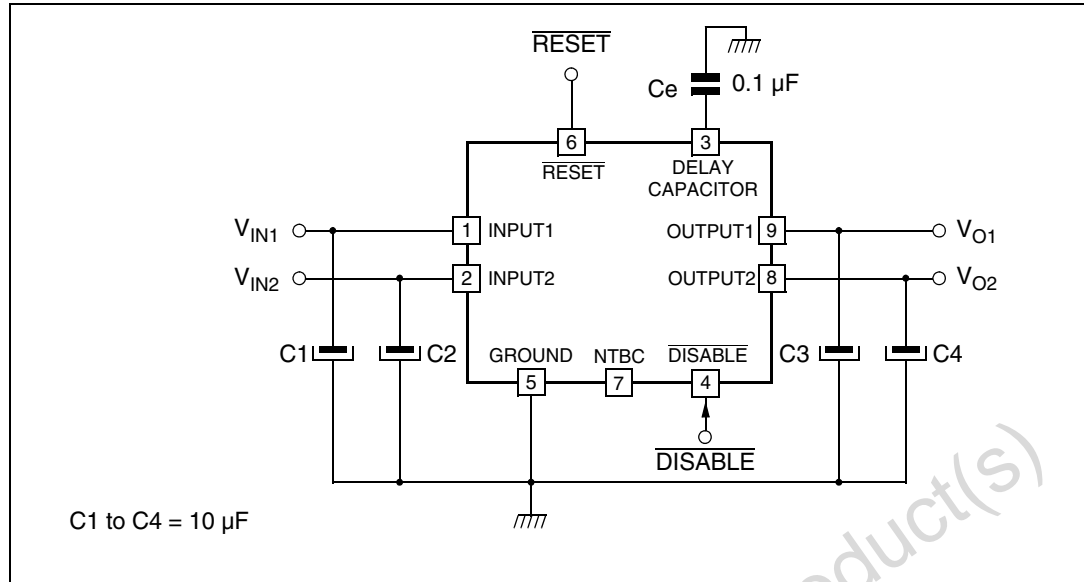
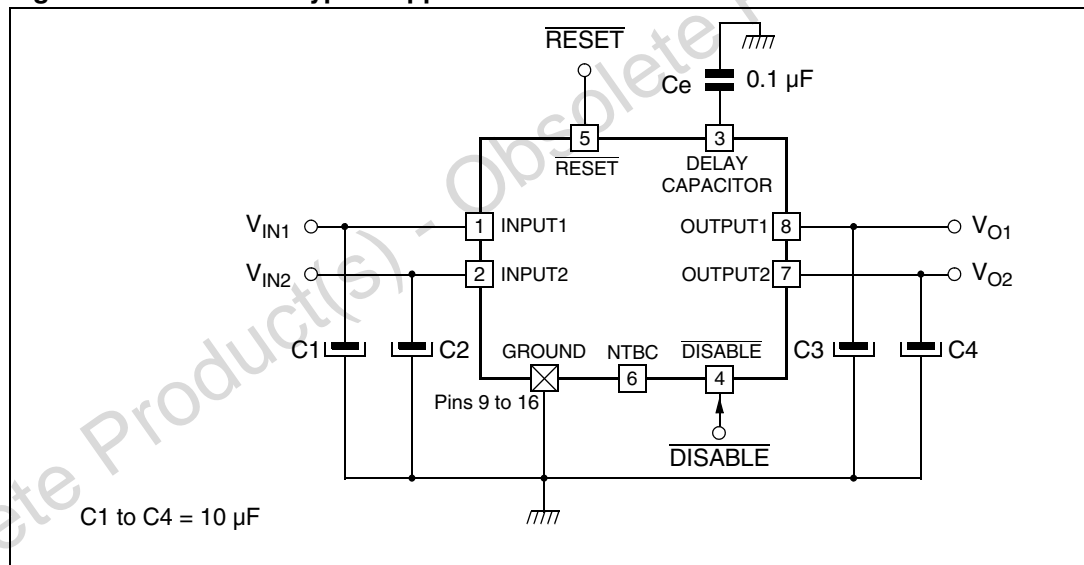


Figure 7. TDA8133D typical application



5 Power dissipation and layout indications

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

$$P = (V_{IN1} - V_{O1}) \times I_{O1} + (V_{IN2} - V_{O2}) \times I_{O2}$$

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

Table 5. Power dissipation

Device	Heat Sink	R_{thJA} in °C/W	P_{MAX} in W
TDA8133	No	50	1.4
	Yes	20	3.5
TDA8133D	No	56 to 40	1.25 to 1.75
	Yes	32	2.2

Figure 8. Thermal resistance (junction-to-ambient) for DIP16 package without heatsink

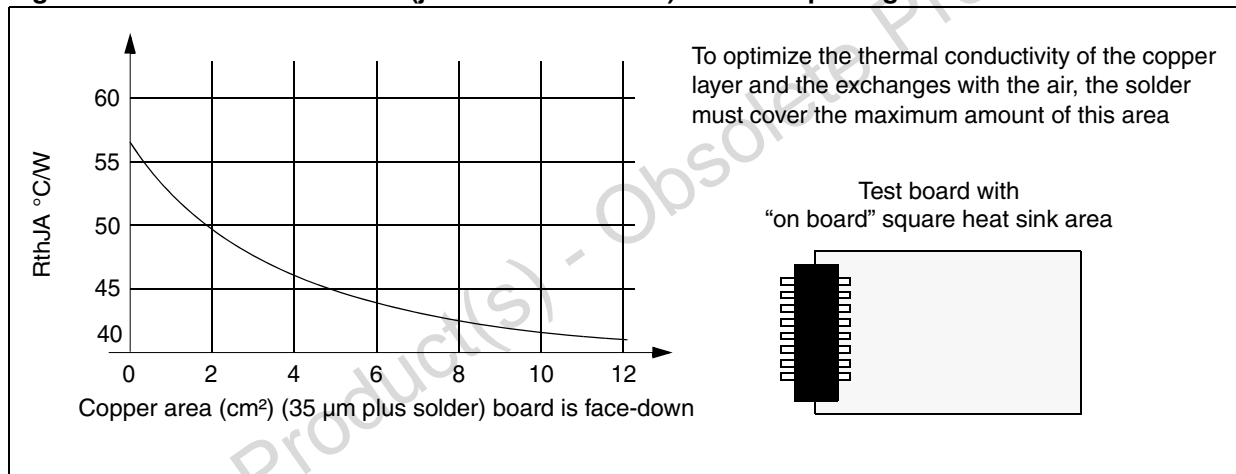
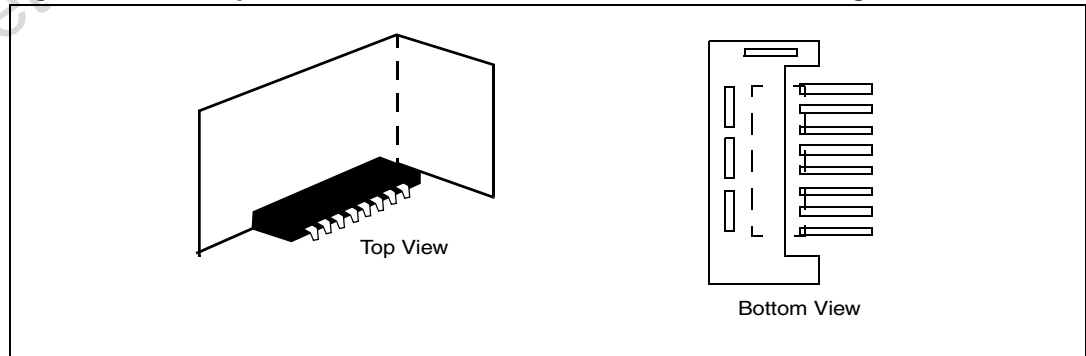


Figure 9. Metal plate mounted near the TDA8133D for heatsinking



6 Package mechanical data

Figure 10. 9-pin plastic single in-line package

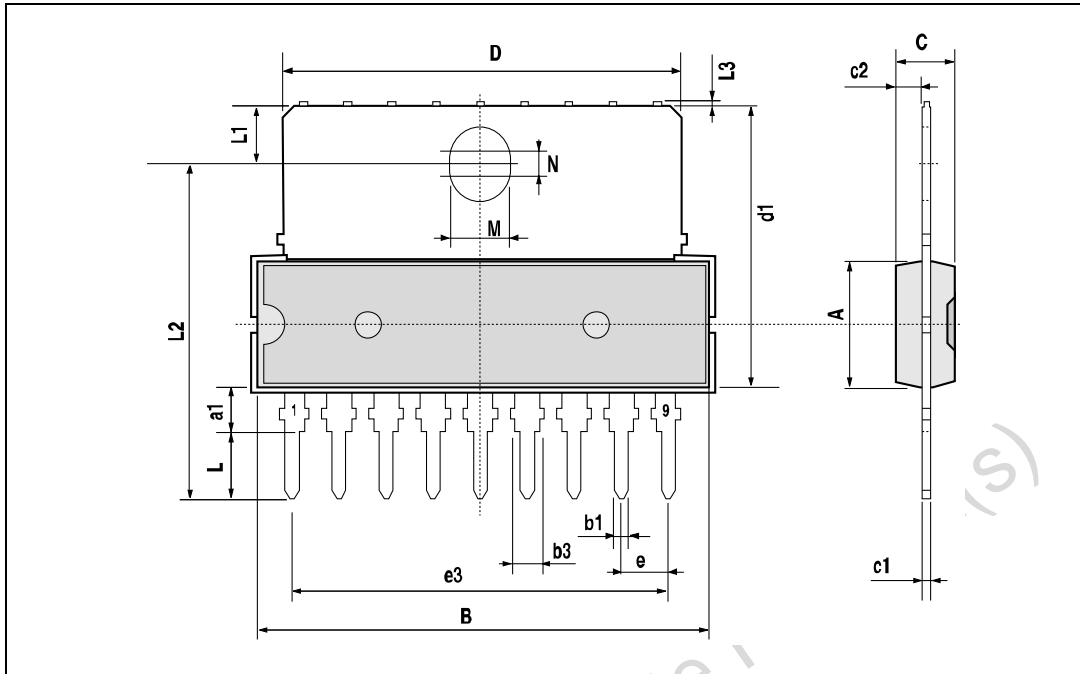


Table 6. 9-pin plastic single in-line package dimensions

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	

Table 6. 9-pin plastic single in-line package dimensions (continued)

Dim.	mm			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
L3			0.25			0.010
M		3.2			0.126	
N		1			0.039	

Figure 11. 16-pin plastic dual in-line package, 300 mil width

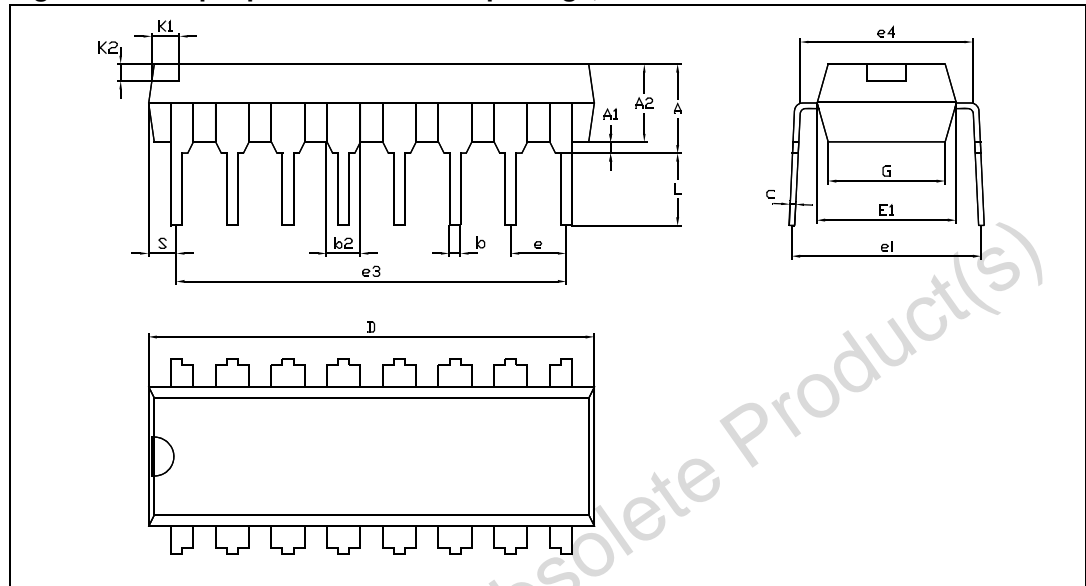


Table 7. 16-pin plastic dual in-line package dimensions

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

6.1 Environmentally-friendly packages

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance.

ECOPACK specifications, grade definitions and product status are available at: www.st.com.
ECOPACK is an ST trademark.

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7 Revision history

Table 8. Document revision history

Date	Revision	Changes
March 1994	1.0	First issue
July 2001	1.1	Datasheet update and addition of DIP16 package
August 2001	1.2	General update; DISABLE pin renamed $\overline{\text{DISABLE}}$ (function remains unchanged)
September 2001	1.3	Thermal data updated
October 2001	1.4	Thermal data updated. Figure 2 and Figure 3 updated
05-Mar-2009	2	Preliminary banner removed, template updated and Section 6.1 added

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