



## 7W x 4 QUAD AMPLIFIER

TARGET SPECIFICATIONS

### 1 FEATURES

- OUTPUT POWER CAPABILITY 7W x 4
- MINIMUM EXTERNAL COMPONENTS COUNT:
  - NO BOOTSTRAP CAPACITORS
  - NO BOUCHEROT CELLS
  - INTERNALLY FIXED GAIN 20dB
- ST-BY FUNCTION (CMOS COMPATIBLE)
- NO AUDIBLE POP DURING ST-BY OPERATIONS
- DIAGNOSTIC FACILITIES
  - CLIP DETECTOR
  - OUT TO GND SHORT
  - OUT TO VS SHORT
  - SOFT SHORT AT TURN-ON
  - THERMAL SHUTDOWN PROXIMITY

#### 1.1 Protections

- OUTPUT AC/DC SHORT CIRCUIT
- SOFT SHORT AT TURN-ON
- OVERRATING CHIP TEMPERATURE WITH SOFT THERMAL LIMITER

Figure 1. Packages

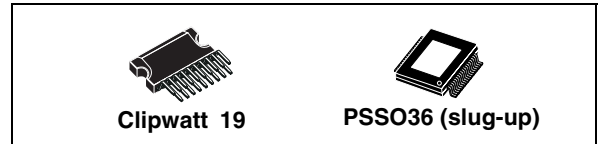


Table 1. Order Codes

Part Number	Package
STA540SA	Clipwatt 19
STA540P	PSSO36 (slug-up)

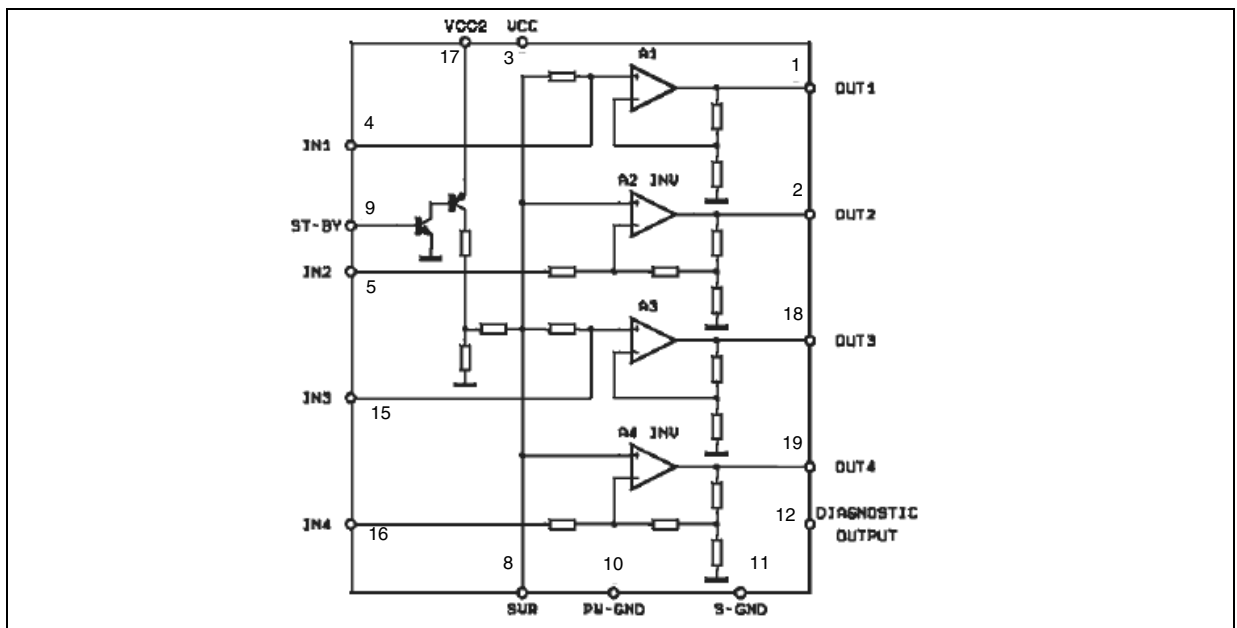
- VERY INDUCTIVE LOADS
- ESD

### 2 DESCRIPTION

The amplifier is a class AB Audio amplifier assembled in the Clipwatt19 package designed for high quality sound application.

The STA540SA is 4 Single ended amplifier with integrated in the device the Short Circuit Protection, the Thermal Protection and the Diagnostics Functions.

Figure 2. Block Diagram (referred to Clipwatt pin numbers)



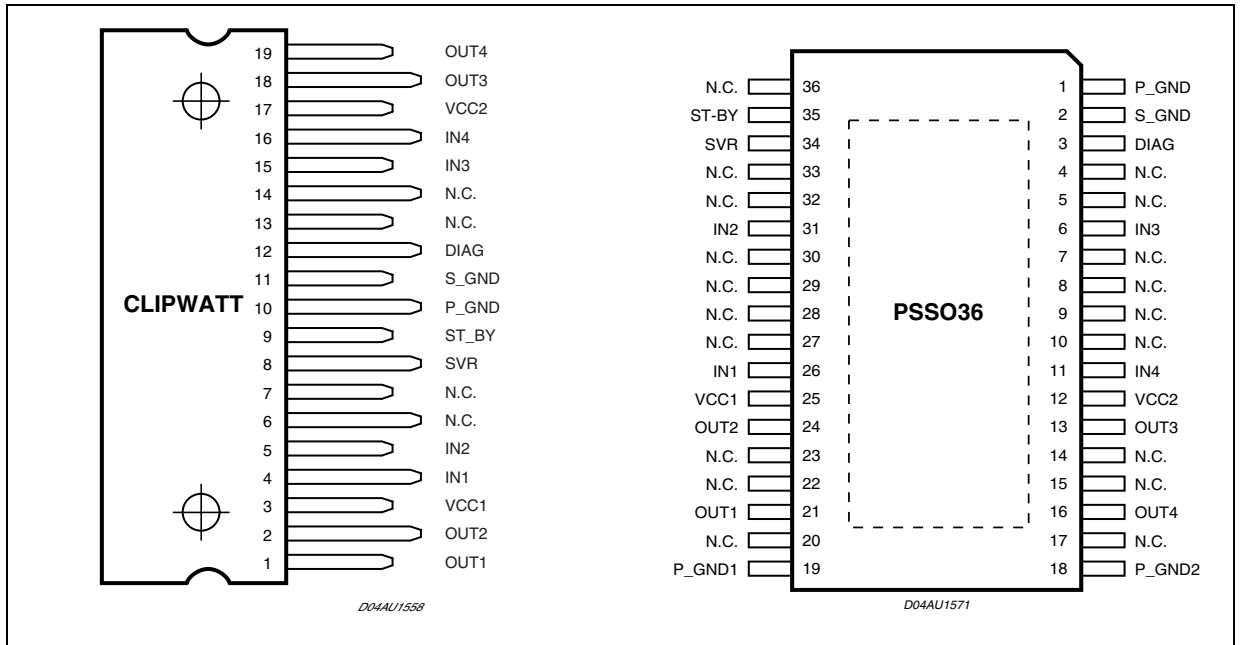
**Table 2. Absolute Maximum Ratings**

Symbol	Parameter	Value	Unit
V <sub>s</sub>	DC Supply Voltage	20	V
P <sub>tot</sub>	Total Power Dissipation (T <sub>case</sub> = 70°C)	35	W
T <sub>op</sub>	Operating Temperature	0 to 70	°C

**Table 3. Thermal Data**

Symbol	Parameter	Clipwatt	PSSO36	Unit
R <sub>th j-case</sub>	Thermal Resistance Junction to case	Max. 2	2	°C/W
R <sub>th j-amb</sub>	Thermal Resistance Junction to ambient	Max. 45	-	°C/W

**Figure 3. Pins Connections (Top view)**



**Table 4. Pin Description**

PSSO36 Pin#	Clipwatt Pin#	Pin Name	Pin Type	Function
1	10	P_GND	POWER	Power ground
2	11	S_GND	POWER	Signal Ground
3	12	DIAG	OUTPUT	Diagnostics
4, 5, 7, 8, 9, 10, 14, 15, 17, 20, 22, 23, 27, 28, 29, 30, 32, 33, 36	6, 7, 13, 14	N.C.		Not Connected
6	15	IN3	INPUT	Channel 3 input
11	16	IN4	INPUT	Channel 4 input
12	17	VCC2	POWER	Power supply

**Table 4. Pin Description** (continued)

PSS036 Pin#	Clipwatt Pin#	Pin Name	Pin Type	Function
13	18	OUT3	OUTPUT	Channel 3 output
16	19	OUT4	OUTPUT	Channel 4 output
18	-	P_GND2	POWER	Power ground for channel 2
19	-	P_GND1	POWER	Power ground for channel 1
21	1	OUT1	OUTPUT	Channel 1 output
24	2	OUT2	OUTPUT	Channel 2 output
25	3	VCC1	POWER	Power supply
26	4	IN1	INPUT	Channel 1 input
31	5	IN2	INPUT	Channel 2 input
34	8	SVR	INPUT	Supply Voltage Rejection
35	9	ST-BY	INPUT	Stand-by

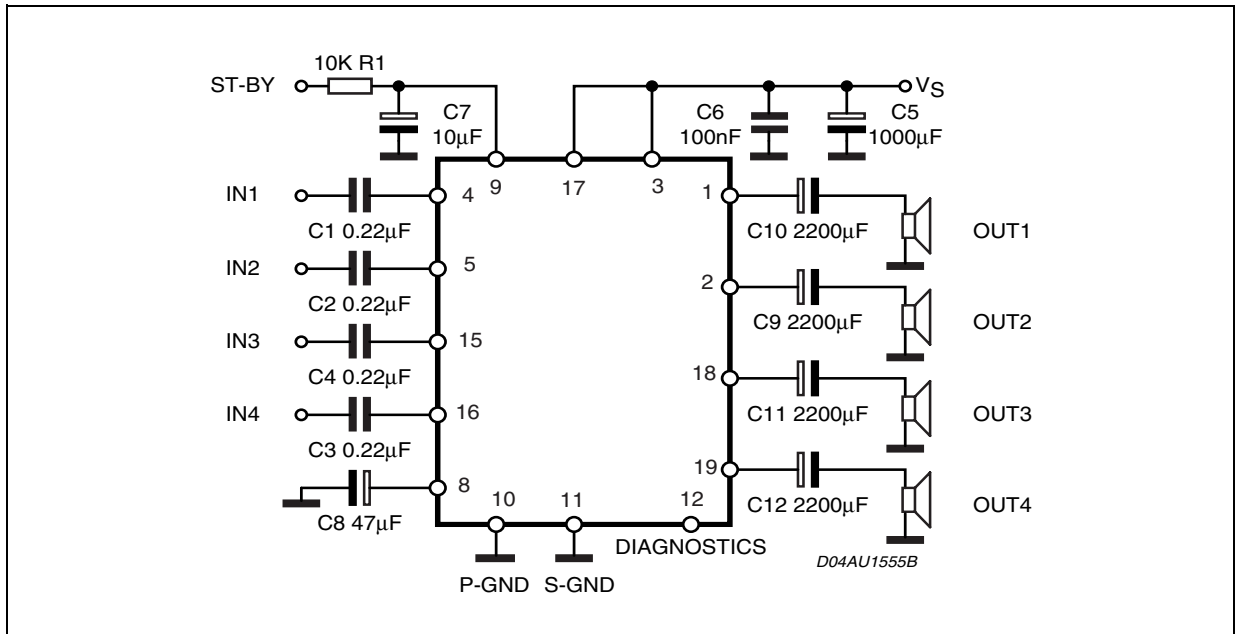
**Table 5. Electrical Characteristics**

(Refer to the test circuit,  $V_S = 14.4V$ ;  $R_L = 4\Omega$ ;  $f = 1kHz$ ;  $T_{amb} = 25^\circ C$  unless otherwise specified).

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_S$	Supply Voltage Range		8		18	V
$I_d$	Total Quiescent Drain Current			80		mA
$V_{oDC}$	DC Output Voltage			7.2	250	mV
$P_o$	Output Power	THD = 10%:		7		W
THD	Distortion	$R_L = 4\Omega$ , $P_o = 0.1$ to $4W$		0.02		%
$C_T$	Cross Talk	$f = 1$ kHz $f = 10$ kHz		70 60		dB dB
$R_{in}$	Input Impedance		20	30		k $\Omega$
$G_v$	Voltage Gain		19	20	21	dB
$G_v$	Voltage Gain Match				0.5	dB
$E_N$	Total Output Noise	$R_g = 0$ ; "A" weighted inverting channels non inverting channels		50 20		$\mu V$ $\mu V$
SVR	Supply Voltage Rejection	$R_g = 0$ ; $f = 300Hz$	50			dB
$A_{SB}$	Stand-by Attenuation		80	90		dB
$I_{SB}$	ST-BY Current Consumption	$V_{ST-BY} = 0$ to $1.5V$			100	$\mu A$
$V_{SB}$	ST-BY In Threshold Voltage				1.5	V
$V_{SB}$	ST-BY Out Threshold Voltage		3.5			V
$I_{stby}$	ST-BY Pin Current	Play Mode $V_{stby} = 5V$ Max Driving Current Under Fault			50 5	$\mu A$ mA
$I_{cd\ off}$	Clipping Detector Output Average Current	$d = 1\%$ (*)		90		$\mu A$
$I_{cd\ on}$	Clipping Detector Output Average Current	$d = 5\%$ (*)		140		$\mu A$
$V_{diag}$	Voltage Saturation on DIAG	Sink Current at DIAG = $1mA$			0.7	V
$T_W$	Thermal Warning			140		$^\circ C$
$T_M$	Thermal Muting			150		$^\circ C$
$T_S$	Thermal Shut-down			160		$^\circ C$

(\*) DIAG Pulled-up to 5V with 10 k $\Omega$ ;  $R_L = 4\Omega$  and symmetrical clipping.

Figure 4. Standard Test and Application Circuit (referred to Clipwatt pin numbers)



### 3 THERMAL INFORMATION:

The power dissipated within the device depends primarily on the supply voltage, load impedance and output modulation level. The PSSO36 Package of the STA540P includes an exposed thermal slug on the top of the device to provide a direct thermal path from the IC to the heatsink.

Considering that for the STA540P the Thermal resistance Junction to slug is 1.5°C/W and the estimated Thermal resistance due to the grease placed between slug and heat sink is 2.3°C/W ( the use of thermal pads for this package is not recommended), the suitable Heat Sink Rth to be used can be drawn from the following graph fig 5, where is shown the Derating Power vs.Tambient for different heatsinkers.

Figure 5. Power Derating Curve

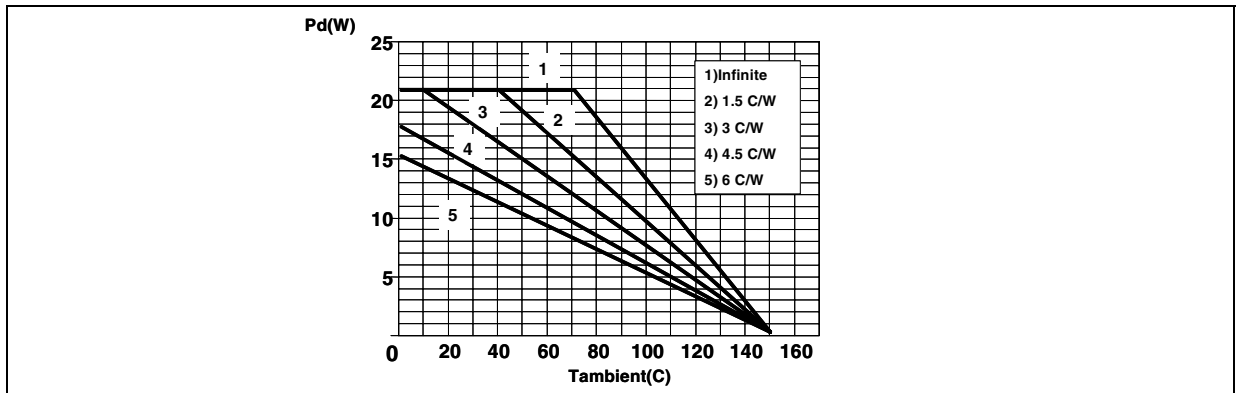
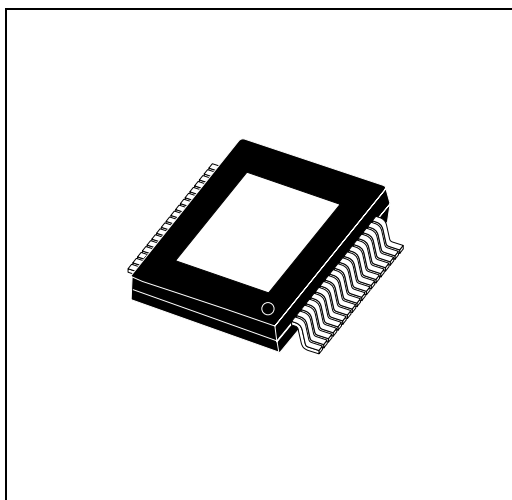


Figure 6. PSSO36 (Slug-up) Mechanical Data & Package Dimensions

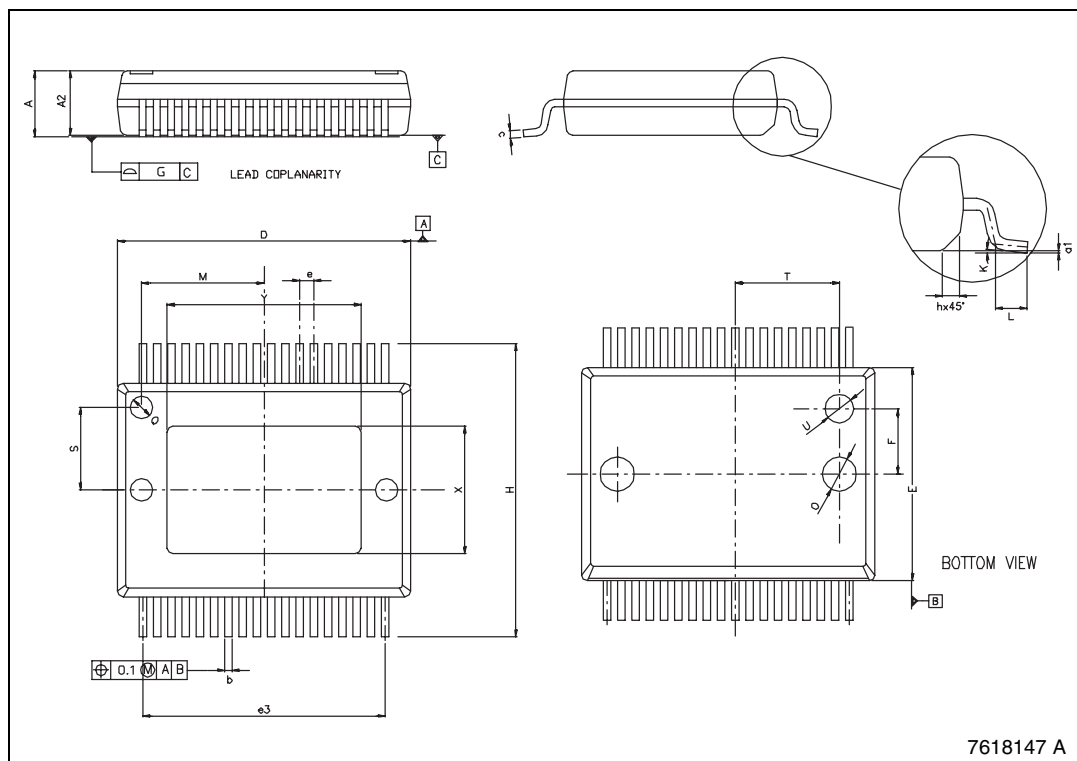
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.15		2.47	0.084		0.097
A2	2.15		2.40	0.084		0.094
a1	0		0.075	0		0.003
b	0.18		0.36	0.007		0.014
c	0.23		0.32	0.009		0.012
D (1)	10.10		10.50	0.398		0.413
E (1)	7.4		7.6	0.291		0.299
e		0.50			0.020	
e3		8.50			0.035	
F		2.3			0.090	
G			0.10			0.004
G1			0.06			0.002
H	10.10		10.50	0.398		0.413
h			0.40			0.016
L	0.55		0.85	0.022		0.033
M		4.3			0.169	
N	10° (max)					
O		1.2			0.047	
Q		0.8			0.031	
S		2.9			0.114	
T		3.65			0.144	
U		1.0			0.039	
X	4.10		4.70	0.161		0.185
Y	6.50		7.10	0.256		0.279

- (1) "D and E" do not include mold flash or protusions.  
Mold flash or protusions shall not exceed 0.15mm (0.006")
- (2) No intrusion allowed inwards the leads.
- (3) Flash or bleeds on exposed die pad shall not exceed 0.4 mm per side

**OUTLINE AND MECHANICAL DATA**



**PowerSSO-36 (slug-up)**

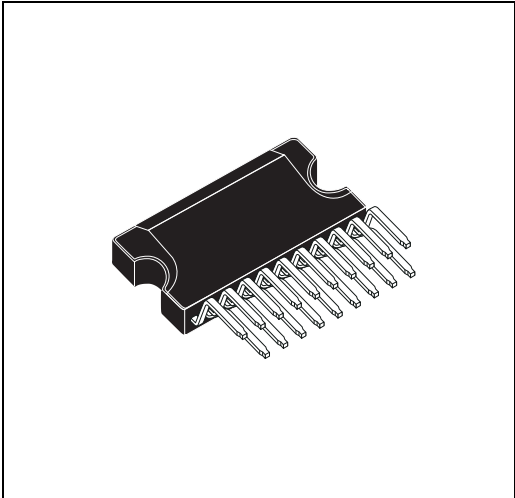


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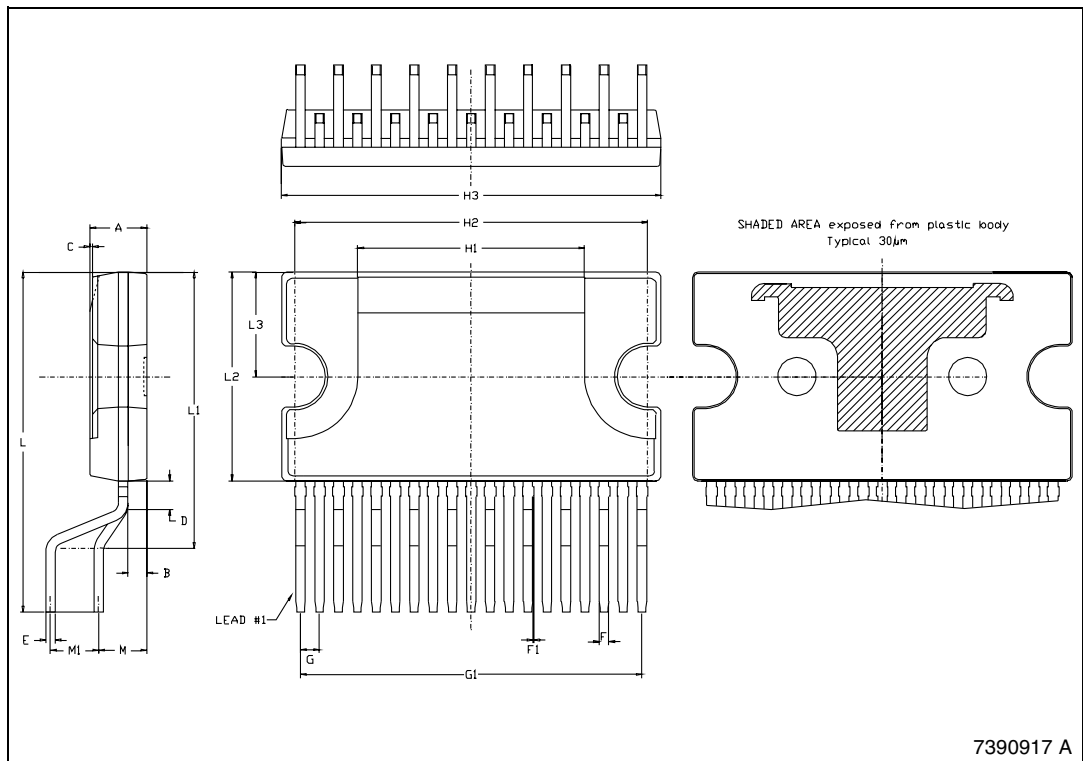
Figure 7. Clipwatt 19 Mechanical Data & Package Dimensions

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			3.2			0.126
B			1.05			0.041
C		0.15			0.006	
D		1.50			0.061	
E	0.49		0.55	0.019		0.022
F	0.47	0.50	0.58	0.018		0.020
F1			0.1			0.004
G	0.87	1.00	1.13	0.034	0.039	0.044
G1	17.87	18.0	18.13	0.703	0.708	0.713
H1		12.0			0.480	
H2		18.6			0.732	
H3	19.85			0.781		
L		17.9			0.704	
L1		14.55			0.572	
L2	10.7	11.0	11.2	0.421	0.433	0.441
L3		5.50			0.217	
M		2.54			0.100	
M1		2.54			0.100	

**OUTLINE AND MECHANICAL DATA**



**Clipwatt19**



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**Table 6. Revision History**

Date	Revision	Description of Changes
November 2004	1	First Issue

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