TDA7388

4 X 41W QUAD BRIDGE CAR RADIO AMPLIFIER

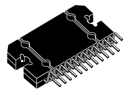
1 FEATURES

- HIGH OUTPUT POWER CAPABILITY:
- 4 x 41W/4Ω MAX.
- 4 x 25W/4Ω @ 14.4V, 1KHz, 10%
- LOW DISTORTION
- LOW OUTPUT NOISE
- ST-BY FUNCTION
- MUTE FUNCTION
- AUTOMUTE AT MIN. SUPPLY VOLTAGE DETECTION
- LOW EXTERNAL COMPONENT COUNT:
  - INTERNALLY FIXED GAIN (26dB)
  - NO EXTERNAL COMPENSATION
  - NO BOOTSTRAP CAPACITORS

2 PROTECTIONS:

- OUTPUT SHORT CIRCUIT TO GND, TO V_S, ACROSS THE LOAD
- VERY INDUCTIVE LOADS
- OVERRATING CHIP TEMPERATURE WITH SOFT THERMAL LIMITER
- LOAD DUMP VOLTAGE
- FORTUITOUS OPEN GND
- REVERSED BATTERY
- ESD

Figure 1. Package



Flexiwatt25

Table 1. Order Codes

Part Number	Package
TDA7388	Flexiwatt25

3 DESCRIPTION

The TDA7388 is a new technology class AB Audio Power Amplifier in Flexiwatt 25 package designed for high end car radio applications.

Thanks to the fully complementary PNP/NPN output configuration the TDA7388 allows a rail to rail output voltage swing with no need of bootstrap capacitors. The extremely reduced components count allows very compact sets.

Figure 2. Block and Application Diagram

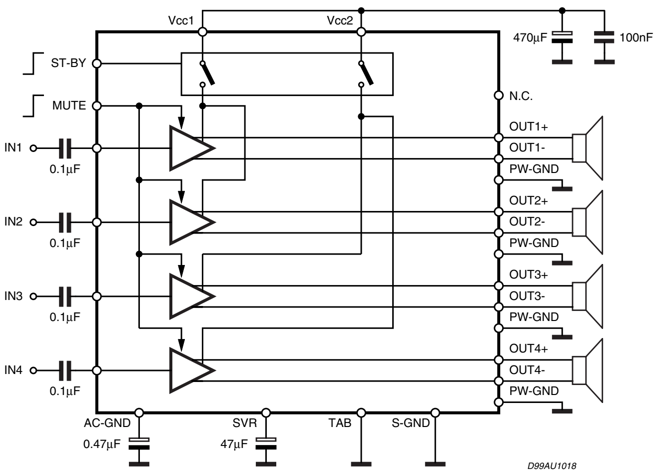


Table 2. Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CC}	Operating Supply Voltage	18	V
$V_{CC\ (DC)}$	DC Supply Voltage	28	V
$V_{CC\ (pk)}$	Peak Supply Voltage (t = 50ms)	50	V
I_O	Output Peak Current: Repetitive (Duty Cycle 10% at f = 10Hz) Non Repetitive (t = 100µs)	 4.5 5.5	 A A
P_{tot}	Power dissipation, (T_{case} = 70°C)	80	W
T_j	Junction Temperature	150	°C
T_{stg}	Storage Temperature	– 55 to 150	°C

Figure 3. Pin Connection

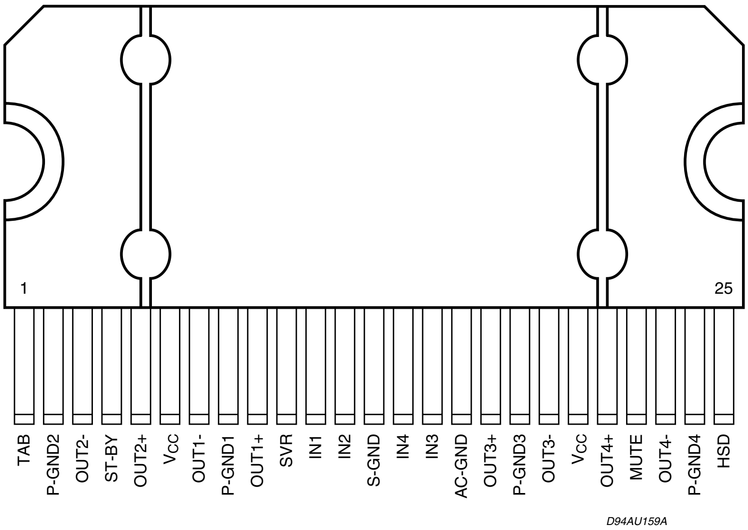


Table 3. Thermal Data

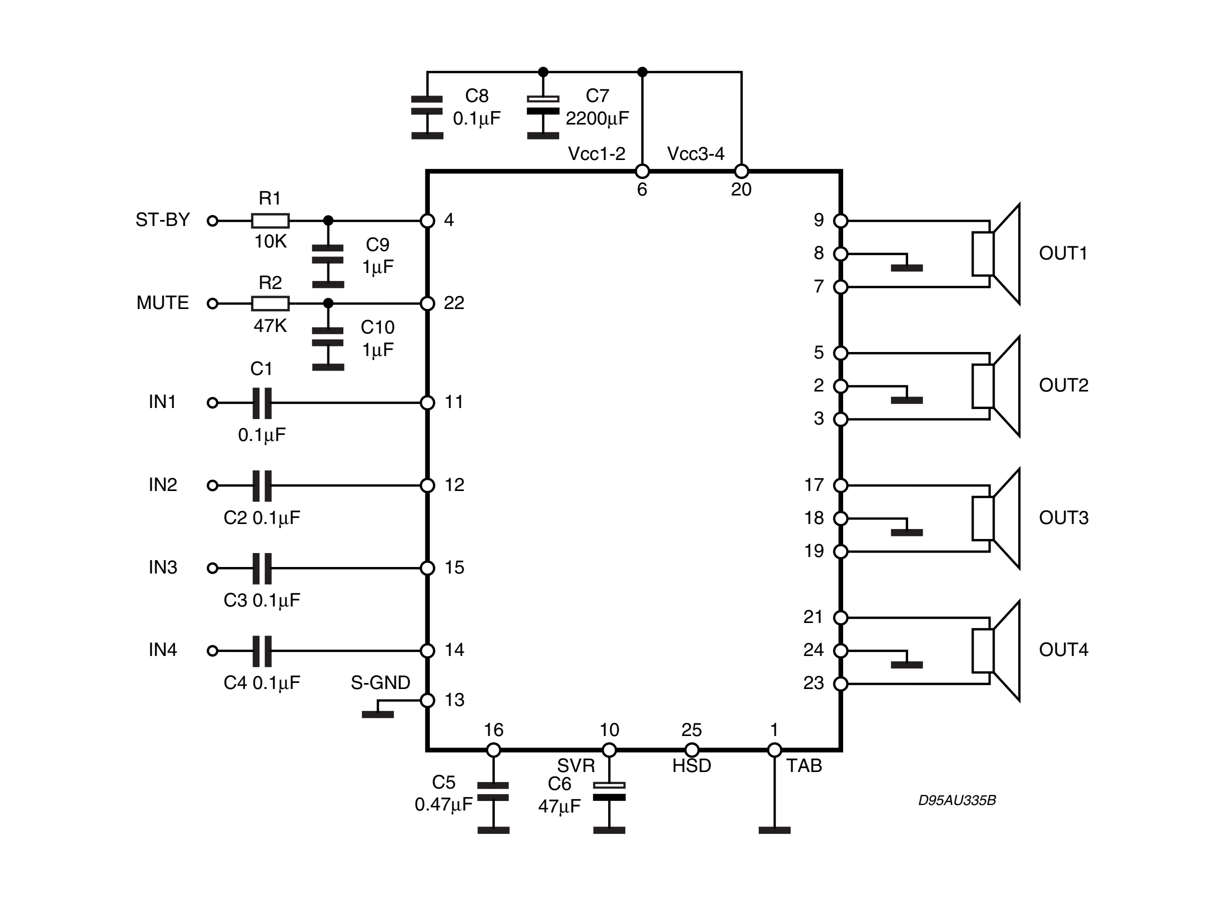
Symbol	Parameter	Value	Unit
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction to Case max	1	°C/W

Table 4. Electrical Characteristcs (V_S = 14.4V; f = 1KHz; R_g = 600Ω; R_L = 4Ω;T_{amb} = 25°C; Refer to the Test and application diagram, unless otherwise specified**.)**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_{q1}	Quiescent Current	$R_L = \infty$	120	190	350	mA
V_{OS}	Output Offset Voltage	Play Mode			±80	mV
ΔV_{OS}	During Mute ON/OFF Output Offset Voltage				±80	mV
G_v	Voltage Gain		25	26	27	dB
P_o	Output Power	THD = 10%; V_S = 14.4V	22	26		W
$P_{o\ max}$	Max.Output Power (*)	V_S = 14.4V	38	41		W
THD	Distortion	P_o = 4W		0.04	0.15	%
e_{No}	Output Noise	"A" Weighted		50	70	µV
		Bw = 20Hz to 20KHz		70	100	µV
SVR	Supply Voltage Rejection	f = 100Hz; V_r = 1V_{rms}	50	65		dB
f_{ch}	High Cut-Off Frequency	P_o = 0.5W	100	200		KHz
R_i	Input Impedance		70	100		KΩ
C_T	Cross Talk	f = 1KHz; Po = 4W	60	70		dB
		f = 10KHz; Po = 4W	50	60		dB
I_{SB}	St-By Current Consumption				50	µA
$V_{SB\ out}$	St-By OUT Threshold Voltage	(Amp: ON)	3.5			V
$V_{SB\ IN}$	St-By IN Threshold Voltage	(Amp: OFF)			1.5	V
A_M	Mute Attenuation	P_{Oref} = 4W	80	90		dB
$V_{M\ out}$	Mute OUT Threshold Voltage	(Amp: Play)	3.5			V
$V_{M\ in}$	Mute IN Threshold Voltage	(Amp: Mute)			1.5	V
$V_{AM\ in}$	V_S Automute Threshold	(Amp: Mute); Att ≥ 80dB; P_{Oref} = 4Ω (Amp: Play); Att < 0.1dB; P_O = 0.5Ω		 7.6	6.5 8.5	V V
I_{pin22}	Muting Pin Current	V_{MUTE} = 1.5V (Source Current)	5	11	20	µA

(*) Saturated square wave output.
(

Figure 4. Standard Test and Application Circuit



4 P.C.B. AND COMPONENT LAYOUT OF THE FIGURE 4

Figure 5. Components & Top Copper Layer

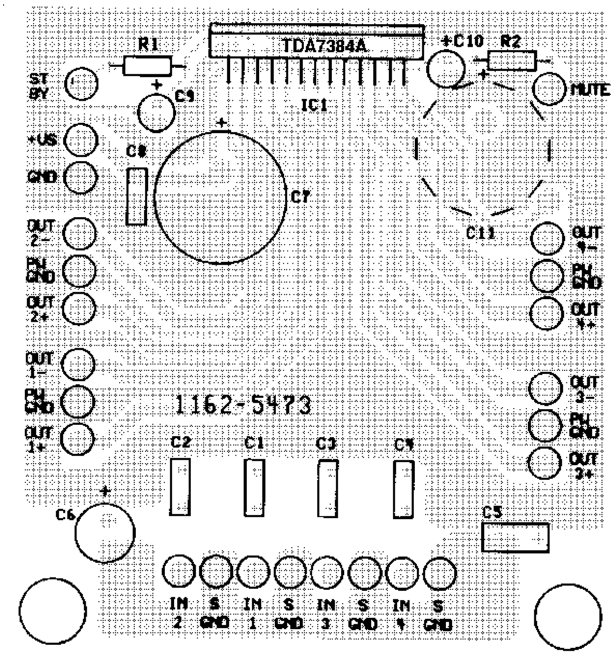


Figure 6. Bottom Copper Layer

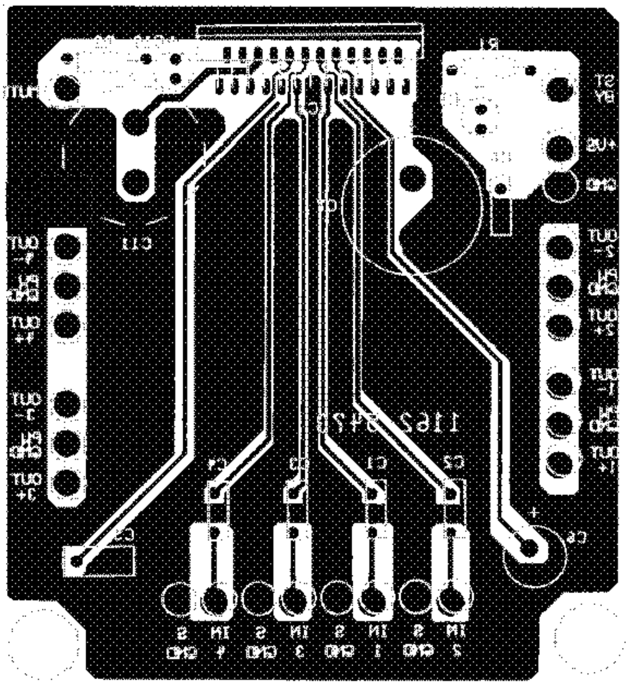


Figure 7. Quiescent Current vs. Supply Voltage

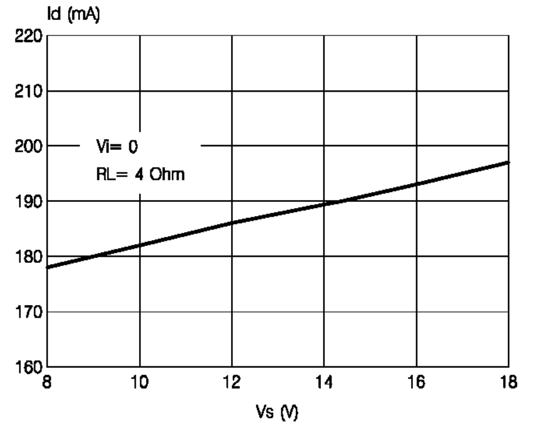


Figure 8. Quiescent Output Voltage Supply Voltage

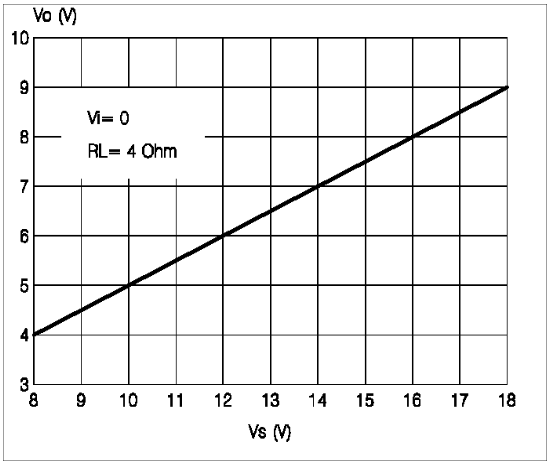


Figure 9. Output Power vs. Supply Voltage

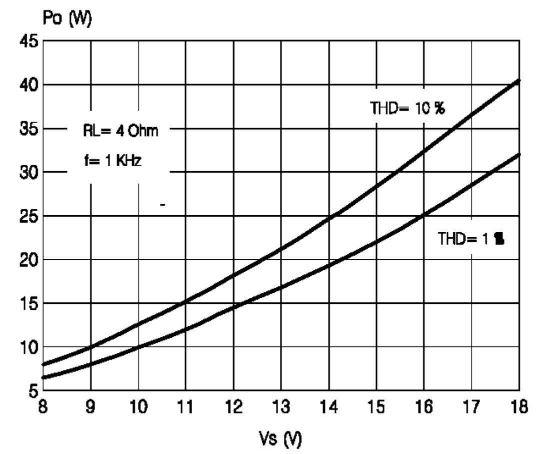


Figure 10. Distortion vs. Output Power

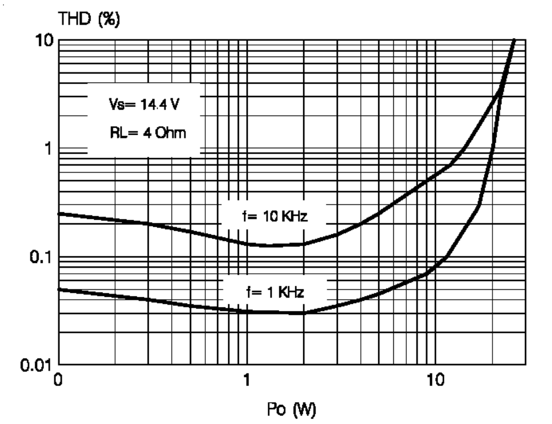


Figure 11. Distortion vs. Frequency

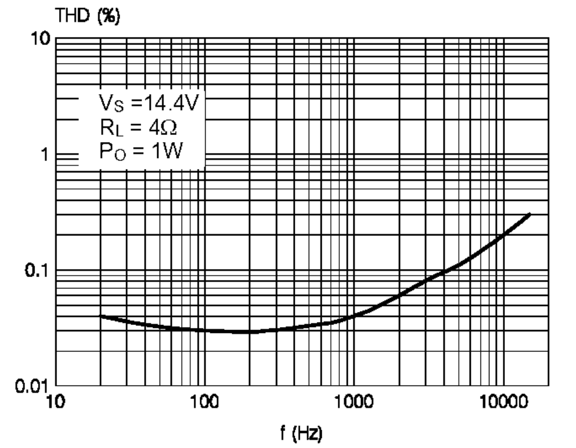


Figure 12. Supply Voltage Rejection vs. Frequency.

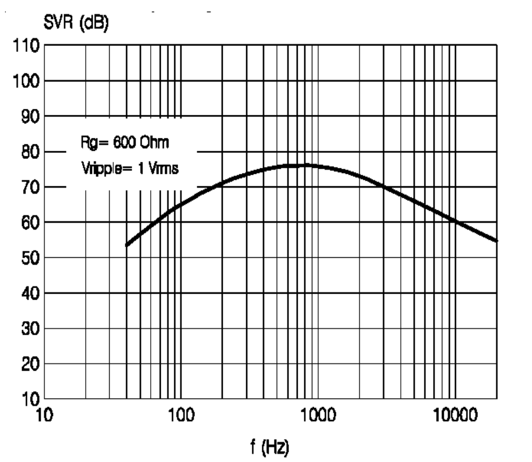


Figure 13. Output Noise vs. Source Resistance.

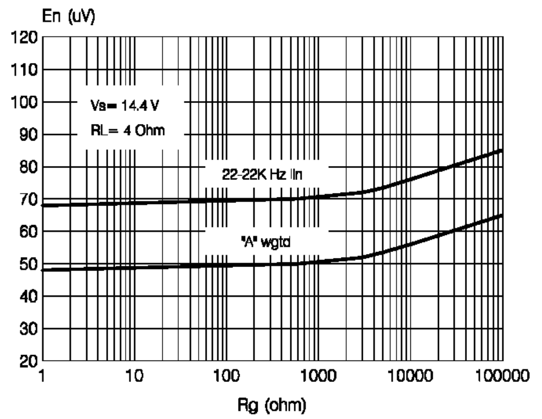
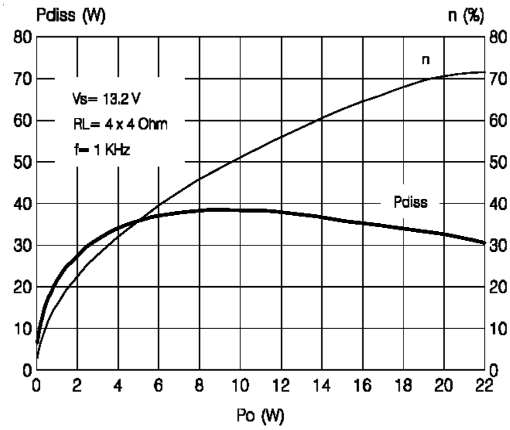


Figure 14. Power Dissipation & Efficiency vs. Output Power.



5 APPLICATION HINTS

(ref. to the circuit of fig. 4)

5.1 SVR

Besides its contribution to the ripple rejection, the SVR capacitor governs the turn ON/OFF time sequence and, consequently, plays an essential role in the pop optimization during ON/OFF transients. To conveniently serve both needs, **ITS MINIMUM RECOMMENDED VALUE IS 10µF**.

5.2 INPUT STAGE

The TDA7388'S inputs are ground-compatible and can stand very high input signals (± 8Vpk) without any performances degradation. If the standard value for the input capacitors (0.1µF) is adopted, the low frequency cut-off will amount to 16 Hz.

5.3 STAND-BY AND MUTING

STAND-BY and MUTING facilities are both CMOS-COMPATIBLE. If unused, a straight connection to Vs of their respective pins would be admissible.

Conventional/low-power transistors can be employed to drive muting and stand-by pins in absence of true CMOS ports or microprocessors. R-C cells have always to be used in order to smooth down the transitions for preventing any audible transient noises.

Since a DC current of about 10 µA normally flows out of pin 22, the maximum allowable muting-series resistance (R2) is 70KΩ, which is sufficiently high to permit a muting capacitor reasonably small (about 1µF).

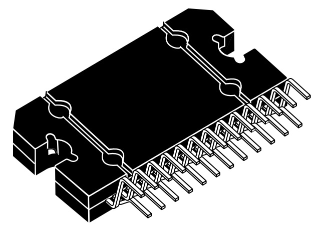
If R_2 is higher than recommended, the involved risk will be that the voltage at pin 22 may rise to above the 1.5 V threshold voltage and the device will consequently fail to turn OFF when the mute line is brought down. About the stand-by, the time constant to be assigned in order to obtain a virtually pop-free transition has to be slower than 2.5V/ms.

Figure 15. Flexiwatt 25 Mechanical Data & Package Dimensions

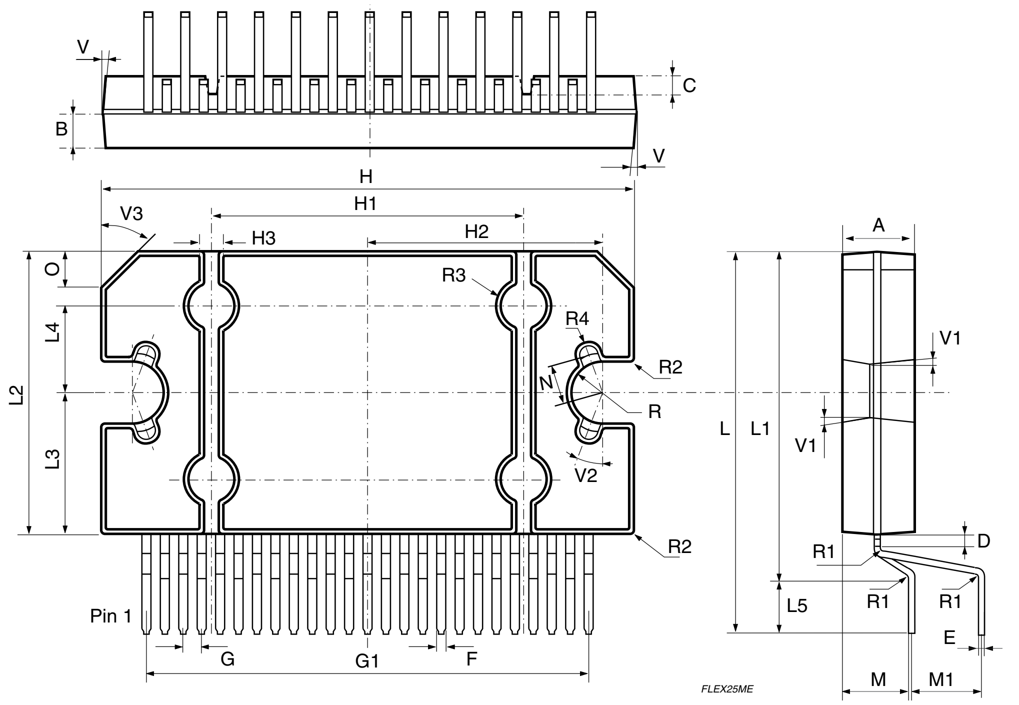
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.45	4.50	4.65	0.175	0.177	0.183
B	1.80	1.90	2.00	0.070	0.074	0.079
C		1.40			0.055	
D	0.75	0.90	1.05	0.029	0.035	0.041
E	0.37	0.39	0.42	0.014	0.015	0.016
F (1)			0.57			0.022
G	0.80	1.00	1.20	0.031	0.040	0.047
G1	23.75	24.00	24.25	0.935	0.945	0.955
H (2)	28.90	29.23	29.30	1.139	1.150	1.153
H1		17.00			0.669	
H2		12.80			0.503	
H3		0.80			0.031	
L (2)	22.07	22.47	22.87	0.869	0.884	0.904
L1	18.57	18.97	19.37	0.731	0.747	0.762
L2 (2)	15.50	15.70	15.90	0.610	0.618	0.626
L3	7.70	7.85	7.95	0.303	0.309	0.313
L4		5			0.197	
L5		3.5			0.138	
M	3.70	4.00	4.30	0.145	0.157	0.169
M1	3.60	4.00	4.40	0.142	0.157	0.173
N		2.20			0.086	
O		2			0.079	
R		1.70			0.067	
R1		0.5			0.02	
R2		0.3			0.12	
R3		1.25			0.049	
R4		0.50			0.019	
V	5˚ (T p.)					
V1	3˚ (Typ.)					
V2	20˚ (Typ.)					
V3	45˚ (Typ.)					

(1): dam-bar protusion not included
(2): molding protusion included

OUTLINE AND MECHANICAL DATA



Flexiwatt25 (vertical)



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6 REVISION HISTORY

Table 5. Revision History

Date	Revision	Description of Changes
July 2005	1	First Issue