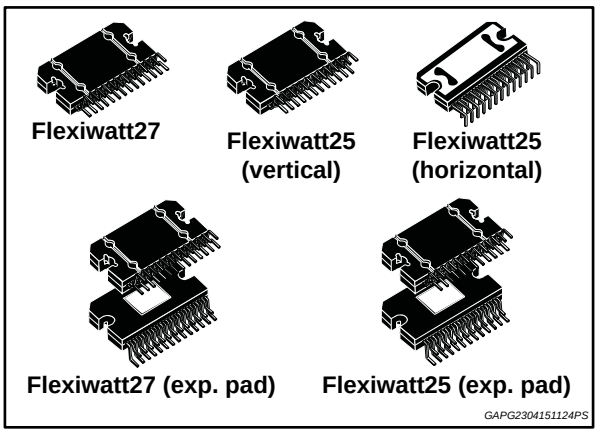
STPA008

4 x 50 W MOSFET quad bridge power amplifier

Data brief



Features

- High output power capability:
  - 4 x 50 W/4 Ω Max.
  - 4 x 28 W/4 Ω @ 14.4 V, 1 kHz, 10 %
  - 4 x 72 W/2 Ω Max.
- MOSFET output power stage
- 2 Ω driving capability
- Capable to operate down to 6 V (suitable for start-stop car operation)
- Excellent GSM noise immunity
- Hi-Fi class distortion
- Low output noise
- High immunity to RF noise injection
- Standby function
- Mute function
- Automute at min. supply voltage detection
- Low external component count
- Internally fixed gain (26 dB)
- Protections:
  - Output short circuit to GND, to Vs, across the load
  - Very inductive loads
  - Overrating chip temperature with soft thermal limiter
  - Output DC offset detection
  - Load dump
  - Fortuitous open GND
  - Reversed battery
  - ESD

Description

STPA008 is a breakthrough MOSFET technology class AB audio power amplifier designed for high power car radio. The fully complementary P-Channel/N-Channel output structure allows a rail to rail output voltage swing which, combined with high output current and minimized saturation losses sets new power references in the car-radio field, with unparalleled distortion performances. STPA008 can operate down to 6 V and this makes the IC compliant to the most recent OEM specifications for low voltage operation (so called 'start-stop' battery profile during engine stop), helping car manufacturers to reduce the overall emissions and thus contributing to environment protection.

Table 1: Device summary

Order code	Package	Packing
STPA008-4WX	Flexiwatt25 (vertical)	Tube
STPA008-QIX	Flexiwatt25 (horizontal)	Tube
STPA008-48X	Flexiwatt27	Tube
STPA008-J7X	Flexiwatt25 (exp. pad)	Tube
STPA008-HLX	Flexiwatt27 (exp. pad)	Tube

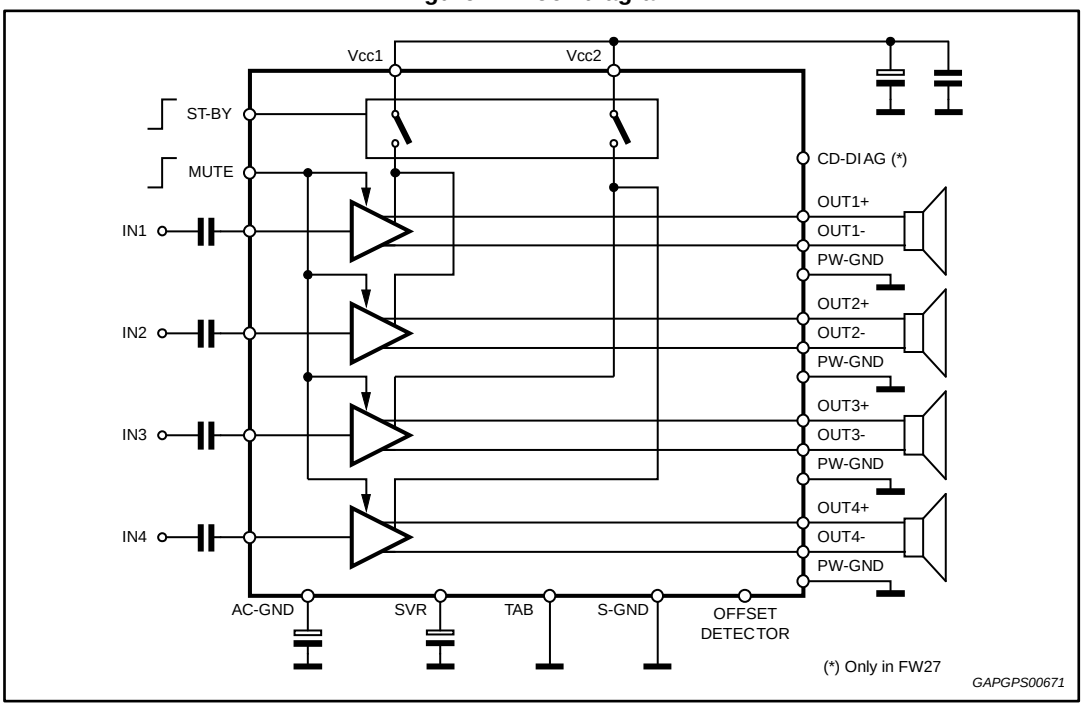
Contents

1 Overview

STPA008 is a complementary quad audio power amplifier. It is available in two different packages, Flexiwatt25 and Flexiwatt27. It embeds four independent amplifiers working in class AB, a standby and a mute pin, an offset detector and, only for the Flexiwatt27 package, a clipping detector and diagnostics output. The amplifier is fully operational down to a battery voltage of 6 V, without producing pop noise and continuing to play during battery transitions. STPA008 can drive 2 ohm loads and has a very high immunity to disturbs without need of external components or compensation. It is protected against any kind of short or open circuit, over-voltage and over-temperature.

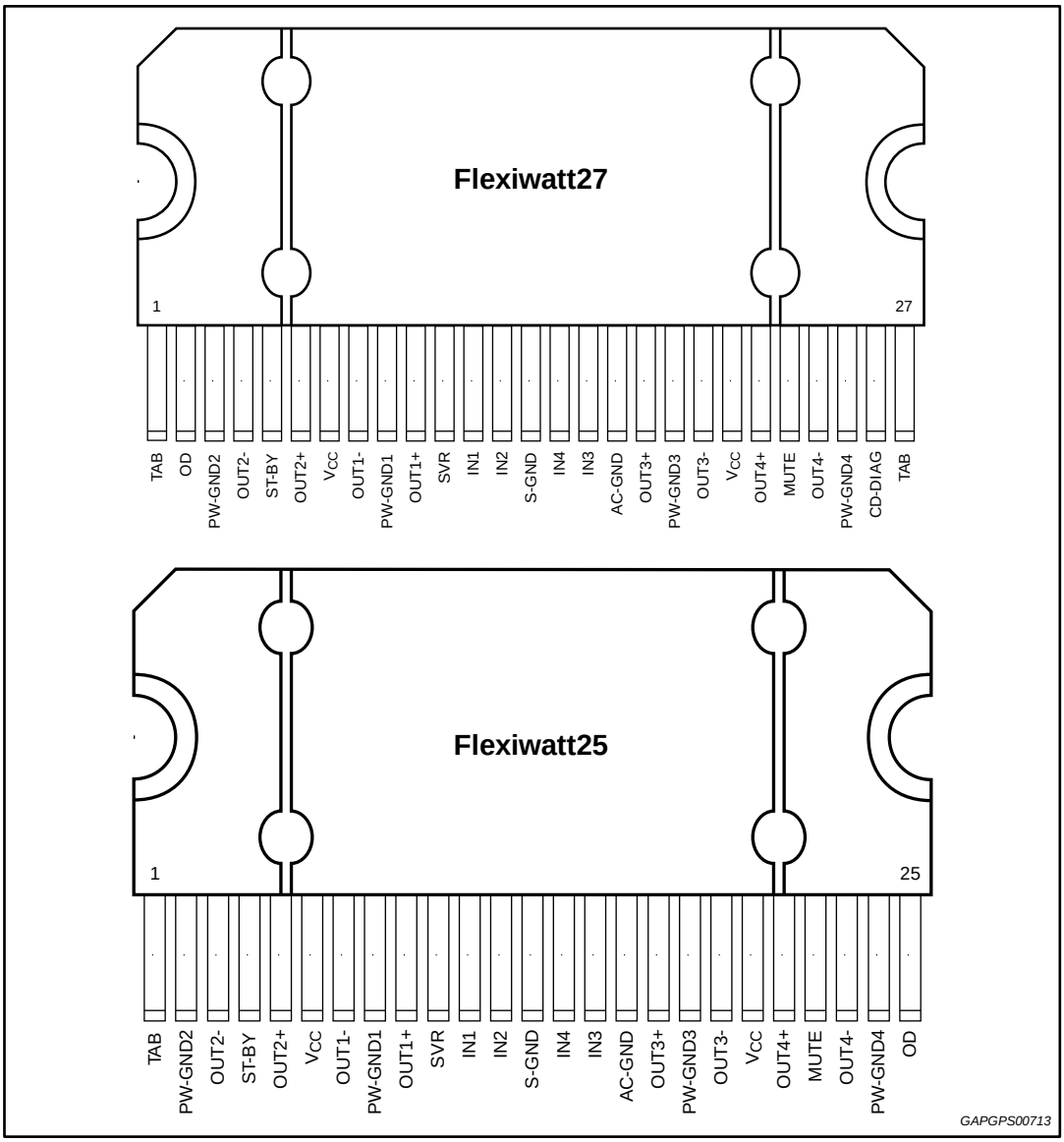
1.1 Block diagram

Figure 1: Block diagram



1.2 Pin connection

Figure 2: Pin connection (top view)



2 Package information

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.

2.1 Flexiwatt 27 (vertical) package information

Figure 3: Flexiwatt 27 (vertical) package outline

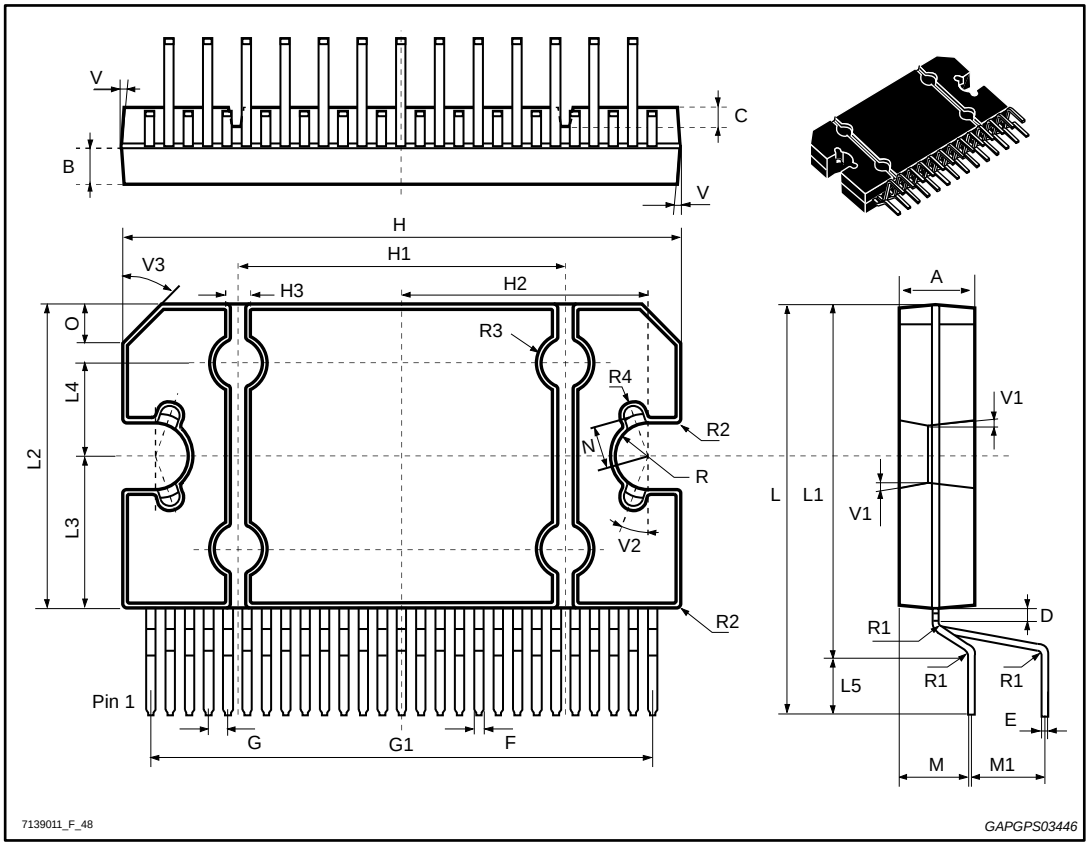


Table 2: Flexiwatt 27 (vertical) package mechanical data

Ref	Dimensions					
	Millimeters			Inches (1)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.45	4.50	4.65	0.1752	0.1772	0.1831
B	1.80	1.90	2.00	0.0709	0.0748	0.0787
C	-	1.40	-	-	0.0551	-
D	0.75	0.90	1.05	0.0295	0.0354	0.0413
E	0.37	0.39	0.42	0.0146	0.0154	0.0165
F (2)	-	-	0.57	-	-	0.0224
G	0.80	1.00	1.20	0.0315	0.0394	0.0472
G1	25.75	26.00	26.25	1.0138	1.0236	1.0335

Ref	Dimensions					
	Millimeters			Inches [1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
H [3]	28.90	29.23	29.30	1.1378	1.1508	1.1535
H1	-	17.00	-	-	0.6693	-
H2	-	12.80	-	-	0.5039	-
H3	-	0.80	-	-	0.0315	-
L [3]	22.07	22.47	22.87	0.8689	0.8846	0.9004
L1	18.57	18.97	19.37	0.7311	0.7469	0.7626
L2 [3]	15.50	15.70	15.90	0.6102	0.6181	0.6260
L3	7.70	7.85	7.95	0.3031	0.3091	0.3130
L4	-	5	-	-	0.1969	-
L5	3.35	3.5	3.65	0.1319	0.1378	0.1437
M	3.70	4.00	4.30	0.1457	0.1575	0.1693
M1	3.60	4.00	4.40	0.1417	0.1575	0.1732
N	-	2.20	-	-	0.0866	-
O	-	2	-	-	0.0787	-
R	-	1.70	-	-	0.0669	-
R1	-	0.5	-	-	0.0197	-
R2	-	0.3	-	-	0.0118	-
R3	-	1.25	-	-	0.0492	-
R4	-	0.50	-	-	0.0197	-
V	5°			5°		
V1	3°			3°		
V2	20°			20°		
V3	45°			45°		

Notes:

(1)Values in inches are converted from mm and rounded to 4 decimal digits.

(2)dam-bar protusion not included.

(3)molding protusion included.

2.2 Flexiwatt 27 (vertical exposed pad) package information

Figure 4: Flexiwatt 27 (vertical exposed pad) package outline

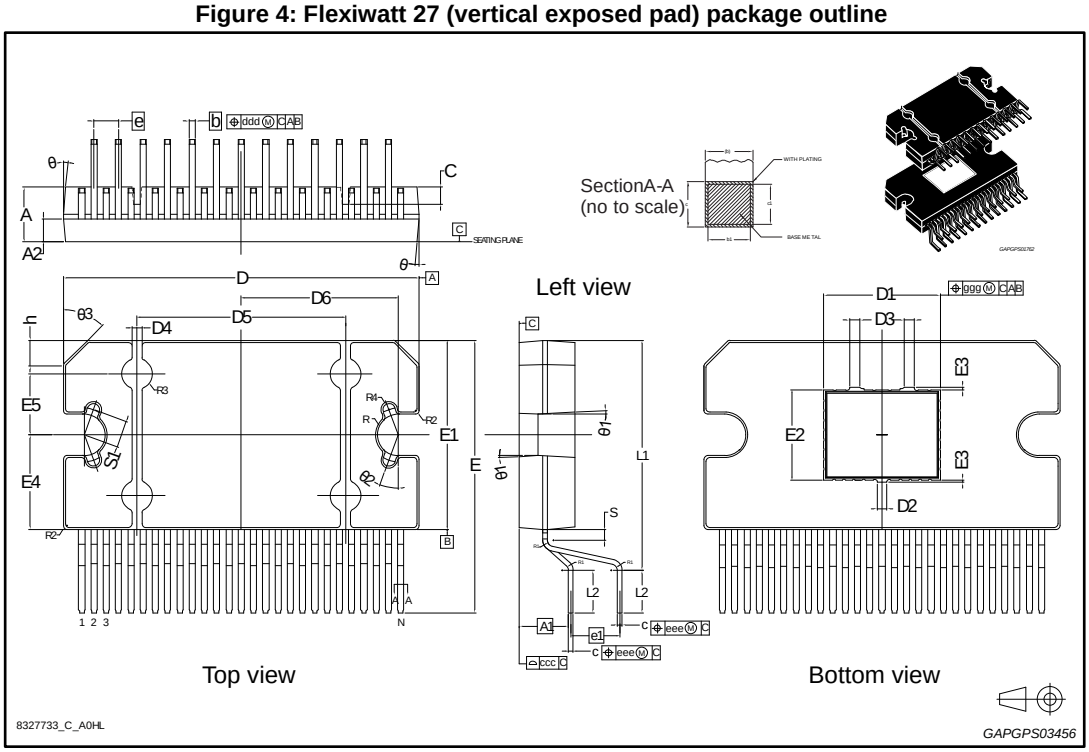


Table 3: Flexiwatt 27 (vertical exposed pad) package mechanical data

Ref	Dimensions					
	Millimeters			Inches (1)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
Θ		5°			5°	
Θ1		3°			3°	
Θ2		20°			20°	
Θ3		45°			45°	
A	4.45	-	4.65	0.1752	-	0.1831
A1	3.70	-	4.30	0.1457	-	0.1693
A2	1.80	-	2.0	0.0709	-	0.0787
b	0.48	-	0.57	0.0189	-	0.0224
b1	0.46	0.50	0.54	0.0181	0.0197	0.0213
c	0.38	-	0.42	0.0150	-	0.0165
C	-	1.40	-	-	0.0551	-
c1	0.36	0.38	0.40	0.0142	0.0150	-
D (2)(3)	28.9	29.23	29.30	1.1378	1.1508	1.1535
D1	9.475	-	9.525	0.3730	-	0.3750
D2	0.80	-	-	0.0315	-	-
D3	0.85	-	-	0.0335	-	-
D4	0.70	0.80	0.90	0.0276	0.0315	0.0354

Ref	Dimensions					
	Millimeters			Inches [1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
D5	-	17.00	-	-	0.6693	-
D6	-	12.80	-	-	0.5039	-
e	1.00 BSC			0.0394 BSC		
e1	4.00 BSC			0.1575 BSC		
E	22.07	22.47	22.87	0.8689	0.8846	0.9004
E1 [2]	15.50	15.70	15.90	0.6102	0.6181	0.6260
E2	7.375	-	7.425	0.2904	-	0.2923
E3	-	-	0.20	-	-	0.0079
E4	7.70	7.85	7.95	0.3031	0.3091	0.3130
E5	-	5.0	-	-	0.1969	-
h	-	2.0	-	-	0.0787	-
L1	18.57	18.97	19.37	0.7311	0.7469	0.7626
L2	-	3.50	-	-	0.1378	-
N	27					
R	-	1.70	-	-	0.0669	-
R1	-	0.50	-	-	0.0197	-
R2	-	0.30	-	-	0.0118	-
R3	-	1.25	-	-	0.0492	-
R4	-	0.50	-	-	0.0197	-
S	0.75	0.90	1.05	0.0295	0.0354	0.0413
S1	-	2.20	-	-	0.0866	-
Tolerance of form and position						
ccc	0.15			0.0059		
ddd	0.30			0.0118		
eee	0.60			0.0236		
ggg	0.30			0.0118		

Notes:

[1]Values in inches are converted from mm and rounded to 4 decimal digits.

[2]D and E1 are maximum plastic body size dimensions including mold mismatch.

[3]Dimensions D and E1 include mold flash or protrusions.

2.3 Flexiwatt 25 (vertical) package information

Figure 5: Flexiwatt 25 (vertical) package outline

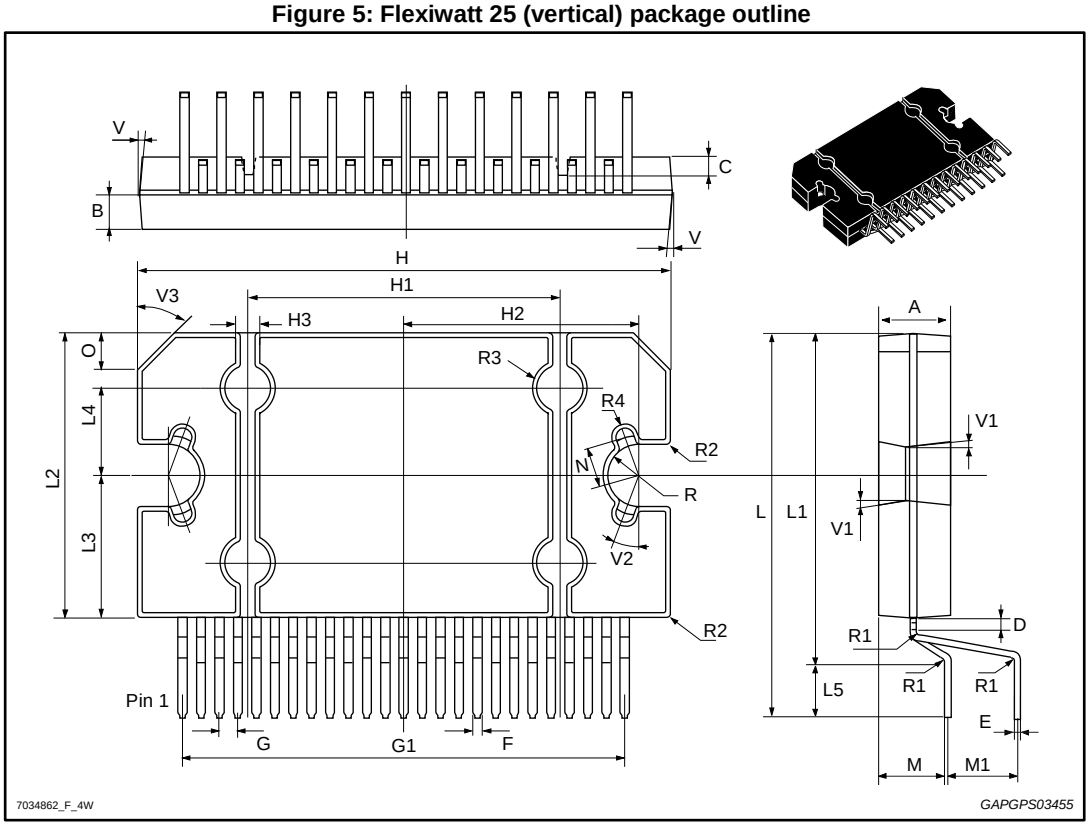


Table 4: Flexiwatt 25 (vertical) package mechanical data

Ref	Dimensions					
	Millimeters			Inches (1)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.45	4.50	4.65	0.1752	0.1772	0.1831
B	1.80	1.90	2.00	0.0709	0.0748	0.0787
C	-	1.40	-	-	0.0551	-
D	0.75	0.90	1.05	0.0295	0.0354	0.0413
E	0.37	0.39	0.42	0.0146	0.0154	0.0165
F (2)	-	-	0.570	-	-	0.0224
G	0.80	1.00	1.20	0.0315	0.0394	0.0472
G1	23.75	24.00	24.25	0.9350	0.9449	0.9547
H (3)	28.90	29.23	29.30	1.1378	1.1508	1.1535
H1	-	17.00	-	-	0.6693	-
H2	-	12.80	-	-	0.5039	-
H3	-	0.80	-	-	0.0315	-
L	22.07	22.47	22.87	0.8689	0.8846	0.9004
L1	18.57	18.97	19.37	0.7311	0.7469	0.7626
L2	15.50	15.70	15.90	0.6102	0.6181	0.6260

Ref	Dimensions					
	Millimeters			Inches [1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
L3	7.70	7.85	7.95	0.3031	0.3091	0.3130
L4	-	5.00	-	-	0.1969	-
L5	3.35	3.50	3.65	0.1319	0.1378	0.1437
M	3.70	4.00	4.30	0.1457	0.1575	0.1693
M1	3.60	4.00	4.40	0.1417	0.1575	0.1732
N	-	2.20	-	-	0.0866	-
O	-	2.00	-	-	0.0787	-
R	-	1.70	-	-	0.0669	-
R1	-	0.50	-	-	0.0197	-
R2	-	0.30	-	-	0.0118	-
R3	-	1.25	-	-	0.0492	-
R4	-	0.50	-	-	0.0197	-
V	5°			5°		
V1	3°			3°		
V2	20°			20°		
V3	45°			45°		

Notes:

[1]Values in inches are converted from mm and rounded to 4 decimal digits.

[2]dam-bar protusion not included.

[3]molding protusion included.

2.4 Flexiwatt 25 (vertical exposed pad) package information

Figure 6: Flexiwatt 25 (vertical exposed pad) package outline

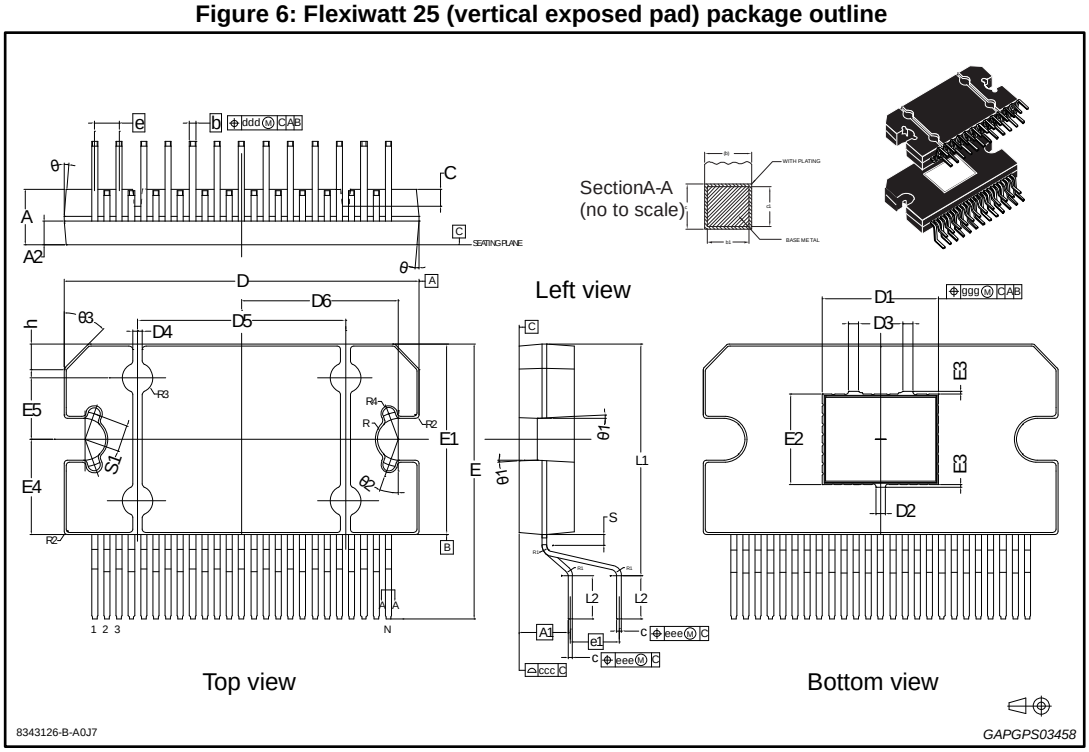


Table 5: Flexiwatt 25 (vertical exposed pad) package mechanical data

Ref	Dimensions					
	Millimeters			Inches (1)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
Ə		5°			5°	
Ə1		3°			3°	
Ə2		20°			20°	
Ə3		45°			45°	
A	4.45	-	4.65	0.1752	-	0.1831
A1	3.70	-	4.30	0.1457	-	0.1693
A2	1.80	-	2.0	0.0709	-	0.0787
b	0.48	-	0.57	0.0189	-	0.0224
b1	0.46	0.50	0.54	0.0181	0.0197	0.0213
c	0.38	-	0.42	0.0150	-	0.0165
C	-	1.40	-	-	0.0551	-
c1	0.36	0.38	0.40	0.0142	0.0150	-
D (2)(3)	28.9	29.23	29.30	1.1378	1.1508	1.1535
D1	9.475	-	9.525	0.3730	-	0.3750
D2	0.80	-	-	0.0315	-	-
D3	0.85	-	-	0.0335	-	-
D4	0.70	0.80	0.90	0.0276	0.0315	0.0354

Ref	Dimensions					
	Millimeters			Inches [1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
D5	-	17.00	-	-	0.6693	-
D6	-	12.80	-	-	0.5039	-
e	1.00 BSC			0.0394 BSC		
e1	4.00 BSC			0.1575 BSC		
E	22.07	22.47	22.87	0.8689	0.8846	0.9004
E1 [2]	15.50	15.70	15.90	0.6102	0.6181	0.6260
E2	7.375	-	7.425	0.2904	-	0.2923
E3	-	-	0.20	-	-	0.0079
E4	7.70	7.85	7.95	0.3031	0.3091	0.3130
E5	-	5.0	-	-	0.1969	-
h	-	2.0	-	-	0.0787	-
L1	18.57	18.97	19.37	0.7311	0.7469	0.7626
L2	-	3.50	-	-	0.1378	-
N	25					
R	-	1.70	-	-	0.0669	-
R1	-	0.50	-	-	0.0197	-
R2	-	0.30	-	-	0.0118	-
R3	-	1.25	-	-	0.0492	-
R4	-	0.50	-	-	0.0197	-
S	0.75	0.90	1.05	0.0295	0.0354	0.0413
S1	-	2.20	-	-	0.0866	-
Tolerance of form and position						
ccc	0.15			0.0059		
ddd	0.30			0.0118		
eee	0.60			0.0236		
ggg	0.30			0.0118		

Notes:

[1]Values in inches are converted from mm and rounded to 4 decimal digits.

[2]D and E1 are maximum plastic body size dimensions including mold mismatch.

[3]Dimensions D and E1 include mold flash or protrusions.

2.5 Flexiwatt 25 (horizontal) package information

Figure 7: Flexiwatt 25 (horizontal) package outline

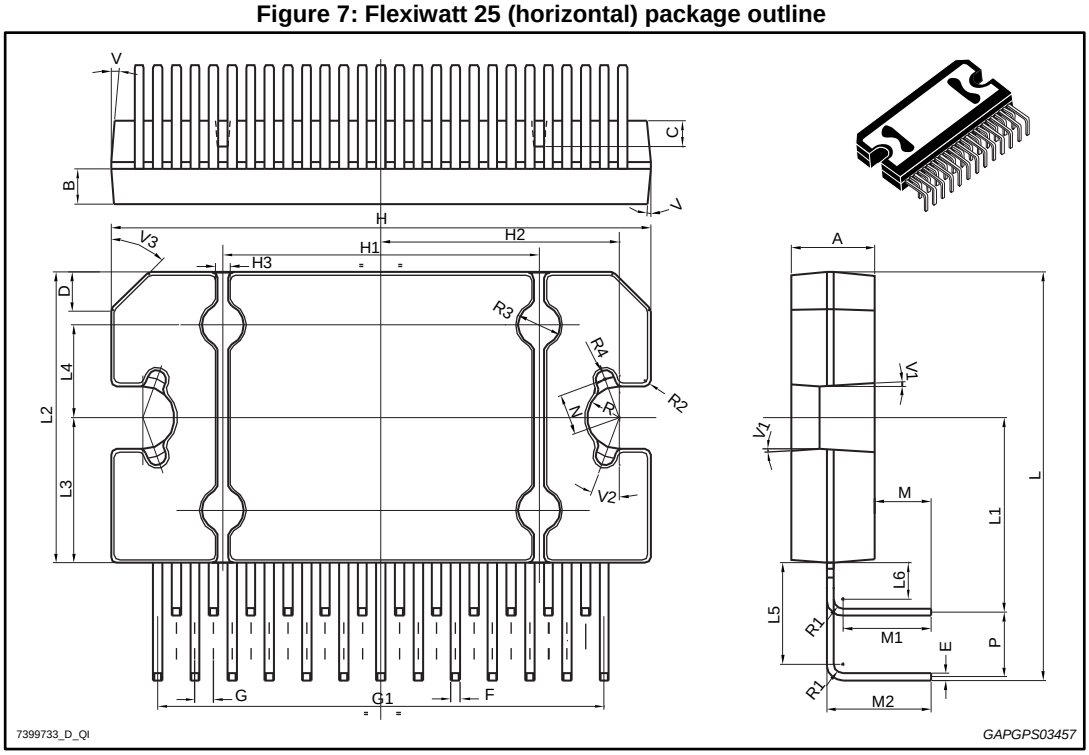


Table 6: Flexiwatt 25 (horizontal) package mechanical data

Ref	Dimensions					
	Millimeters			Inches [1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.45	4.50	4.65	0.1752	0.1772	0.1831
B	1.80	1.90	2.00	0.0709	0.0748	0.0787
C	-	1.40	-	-	0.0551	-
D	-	2.00	-	-	0.0787	-
E	0.37	0.39	0.42	0.0146	0.0154	0.0165
F [2]	-	-	0.57	-	-	0.0224
G	0.75	1.00	1.25	0.0295	0.0394	0.0492
G1	23.70	24.00	24.30	0.9331	0.9449	0.9567
H [3]	28.90	29.23	29.30	1.1378	1.1508	1.1535
H1	-	17.00	-	-	0.6693	-
H2	-	12.80	-	-	0.5039	-
H3	-	0.80	-	-	0.0315	-
L	21.64	22.04	22.44	0.8520	0.8677	0.8835
L1	10.15	10.5	10.85	0.3996	0.4134	0.4272
L2 [3]	15.50	15.70	15.90	0.6102	0.6181	0.6260
L3	7.70	7.85	7.95	0.3031	0.3091	0.3130
L4	-	5	-	-	0.1969	-

Ref	Dimensions					
	Millimeters			Inches [1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
L5	5.15	5.45	5.85	0.2028	0.2146	0.2303
L6	1.80	1.95	2.10	0.0709	0.0768	0.0827
M	2.75	3.00	3.50	0.1083	0.1181	0.1378
M1	-	4.73	-	-	0.1862	-
M2	-	5.61	-	-	0.2209	-
N	-	2.20	-	-	0.0866	-
P	3.20	3.50	3.80	0.1260	0.1378	0.1496
R	-	1.70	-	-	0.0669	-
R1	-	0.50	-	-	0.0197	-
R2	-	0.30	-	-	0.0118	-
R3	-	1.25	-	-	0.0492	-
R4	-	0.50	-	-	0.0197	-
V	5°			5°		
V1	3°			3°		
V2	20°			20°		
V3	45°			45°		

Notes:

[1] Values in inches are converted from mm and rounded to 4 decimal digits.

[2] dam-bar protusion not included.

[3] molding protusion included.

3 Revision history

Table 7: Document revision history

Date	Revision	Changes
28-Apr-2015	1	Initial release.

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