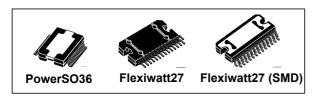


High efficiency digital input quad power amplifier with built-in diagnostics features, 'start stop' compatible

Data brief



Features

- 24-bit resolution
- 110 dB dynamic range (A-weighted)
- SB-I (SB improved) high efficiency operation the highest 'non class D' efficiency
- 1 Ohm driving capability (only in PowerSO36 package)
 - High output power capability:
 4 x 28 W 4 Ω @ 14.4 V, 1 kHz, THD = 10 %
 - Max output power: 4 x 72 W 2 Ω
- Flexible mode control:
 - Full I²C bus driving 1.8 V/3.3 V) with four addresses selectable (only for PowerSO36 package option)
 - Independent front/rear play/ mute
 - Four selectable gains for very-low noise line-out function
 - Digital diagnostic with DC and AC load detections
- Optional H/W control (no I²C bus)
- Start-stop compatibility (operation down to 6 V)
- Sample rates: 44.1 kHz, 48 kHz, 96 kHz, 192 kHz
- Flexible serial data port (1.8 V / 3.3 V):
 - I²S standard, TDM 4Ch, TDM 8Ch, TDM 16Ch
- · Offset detector (play or mute mode)
- Independent front/rear clipping detector
- Programmable diagnostic pin
- CMOS compatible enable pin
- Thermal protection
- Qualification in accordance to AEC Q100 rev. G standard

Description

The TDA7802 is a single chip quad bridge amplifier in advanced BCD technology integrating: a full D/A converter, digital input for direct connection to I²S (or TDM) and powerful MOSFET output stages.

The integrated D/A converter allows the performance to reach an outstanding 115 dB S/N ratio with more than 110 dB of dynamic range.

Moreover the TDA7802 integrates an innovative high efficiency concept, optimized also for uncorrelated music signals, that makes it the most suitable device to simplify the thermal management in high power sets.

Thanks to this concept, the dissipated output power under average listening conditions can be reduced up to 50% when compared to the conventional class AB solutions.

The TDA7802 integrates also a programmable PLL that is able to lock at the input frequencies of 64*Fs and 50*Fs for all the input configurations.

The device is equipped with a full diagnostics array that communicates the status of each speaker through the I²C bus. The same I²C bus allows to control several configurations of the device.

The TDA7802 is able to play music down to 6 V supply voltage - so it is compatible with the so called 'start stop' battery profile recently adopted by several car makers (thus reducing the fuel consumption and and the impact over the environment).

Table 1. Device summary

Order code	Package	Packing
TDA7802	Flexiwatt27 (Vertical)	Tube
TDA7802SM	Flexiwatt27 (SMD)	Tube
TDA7802SMTR	Flexiwatt27 (SiviD)	Tape & reel
TDA7802PD	PowerSO36	Tube
TDA7802PDTR	Fower3030	Tape & reel

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Block diagram and pins description

Block diagram 1.1

I²C CD/DIAG VCC 23 7 21 PLLLFilter/ ENABLE ▶ 10 OUT1+ Thermometric 64 x 2 Current Diagn. Fully Balanced PLL generators 8 OUT1array DDWA Thermometric ▶6 OUT2+ 64 x 2 Code Fully Balanced WS Current Conversiio Interpol. 64Fs generators 4 OUT2-SCK array DDWA 128 Noise SD2 4 18 _{OUT3+} 64 x 2 Current shaper Code Fully Balanced Conversion SD1_3 13 20 OUT3array DDWA rmometrio 22 _{OUT4+} 64 x 2 Current Fully Balanced Conversion ST-BY generators Power Filter 24 _{OUT4-} DDWA A2D Tvcc 16 14 17 1 25 19 9 3 D3V Dgnd PW GND A3V TAB Aand GAPGPS00795

Figure 1. Block diagram (Flexiwatt27)

Pins description 1.2

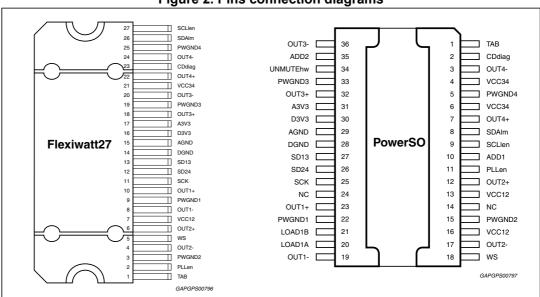


Figure 2. Pins connection diagrams

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Table 2. Flexiwatt27 pins description

N°	Pin	Function	
1	TAB	TAB connection	Ground
2	PLLen	PII loop filter / ENABLE	Input
3	PWGND2	Power ground channel 2	Power Ground
4	OUT 2-	Channel 2 (Left Rear) negative output	Power Output
5	WS	Word select (I2S bus)	Logic Input
6	OUT 2+	Channel 2 (Left Rear) positive output	Power Output
7	VCC12	Channel 1 and 2 positive supply	Battery
8	OUT 1-	Channel 1 (Left Front) negative output	Power Output
9	PWGND1	Power ground channel 1	Power Ground
10	OUT 1+	Channel 1 (Left Front) positive output	Power Output
11	SCK	Serial clock (I2S bus)	Logic Input
12	SD24	Serial data channels 2 and 4 (I2S bus)	Logic Input
13	SD13	Serial data channels 1 and 3 (I2S bus)	Logic Input
14	DGND	Digital ground	Signal Ground
15	AGND	Analog ground	Signal Ground
16	D3V3	Digital 3.3 V supply filter	Digital Regulator
17	A3V3	Analog 3.3 V supply filter	Analog Regulator
18	OUT3+	Channel 3 (right front) positive output	Power Output
19	PWGND3	Power ground channel 3	Power Ground
20	OUT3-	Channel 3 (right front) negative output	Power Output
21	VCC34	Channels 3 and 4 positive supply	Battery
22	OUT4+	Channel 4 (right rear) positive output	Power Output
23 CDdiag		Clip detector and diagnostic output: Overcurrent protection intervention Thermal warning POR Output DC offset Output short to VCC/GND	Open Drain Output
24	OUT4-	Channel 4 (right rear) negative output	Power Output
25	PWGND4	Power ground channel 4	Power Ground
26	SDAlm	I ² C data/legacy mode mute	Signal Input/Output
27	SCLlen	I ² C clock/enable legacy mode	Signal Input

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Table 3. PowerSO36 pins description

N°	Pin	Function				
1	TAB	TAB connection	-			
2	CDdiag	Clip detector and diagnostic output: Overcurrent protection intervention Thermal warning POR	Open Drain Output			
3	OUT4-	Channel 4 (right rear) negative output	Power Output			
4	VCC34	Channels 3 and 4 positive supply	Battery			
5	PWGND4	Power ground channel 4	Power Ground			
6	VCC34	Channels 3 and 4 positive supply	Battery			
7	OUT4+	Channel 4 (right rear) positive output	Power Output			
8	SDAlm	I ² C data/legacy mode mute	Signal Input/Output			
9	SCLlen	I ² C clock/enable legacy mode	Signal Input			
10	ADD1	I2C Address - First Pin	Logic Input			
11	PLLen	PII loop filter / ENABLE	Input			
12	OUT 2+	Channel 2 (Left Rear) positive output	Power Output			
13	VCC12	Channel 1 and 2 positive supply	Battery			
14	NC	Not Connected	-			
15	PWGND2	Power ground channel 2	Power Ground			
16	VCC12	Channel 1 and 2 positive supply	Battery			
17	OUT 2-	Channel 2 (Left Rear) negative output	Power Output			
18	WS	Word select (I2S bus)	Logic Input			
19	OUT 1-	Channel 1 (Left Front) negative output	Power Output			
20	LOAD1A	Load Selection (channels 1 and 2)	Logic Input			
21	LOAD1B	Load Selection (channels 3 and 4)	Logic Input			
22	PWGND1	Power ground channel 1	Power Ground			
23	OUT 1+	Channel 1 (Left Front) positive output	Power Output			
24	NC	Not Connected	-			
25	SCK	Serial clock (I2S bus)	Logic Input			
26	SD24	Serial data channels 2 and 4 (I2S bus)	Logic Input			
27	SD13	Serial data channels 1 and 3 (I2S bus)	Logic Input			
28	DGND	Digital ground	Signal Ground			
29	AGND	Analog ground	Signal Ground			
30	D3V3	Digital 3.3 V supply filter	Digital Regulator			
31	A3V3	Analog 3.3 V supply filter	Analog Regulator			
32	OUT3+	Channel 3 (right front) positive output	Power Output			
33	PWGND3	Power ground channel 3	Power Ground			
34	UNMUTEhw	Unmute Hardware	Logic input			
35	ADD2	I2C Address - Second Pin	Logic Input			
36	OUT3-	Channel 3 (right front) negative output	Power Output			



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2 Package information

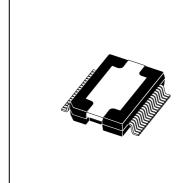
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com.

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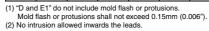
Figure 3. PowerSO36 (slug up) mechanical data and package dimensions

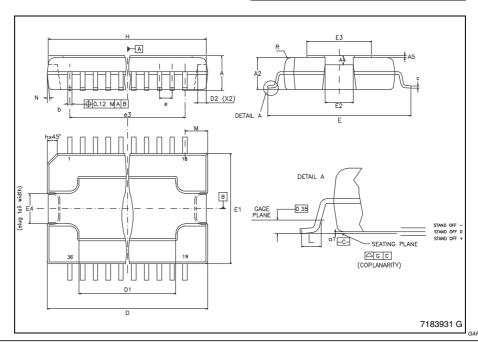
DIM.		mm		inch			
DIIVI.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Α	3.270	-	3.410	0.1287	-	0.1343	
A2	3.100	-	3.180	0.1220	1	0.1252	
A4	0.800	1	1.000	0.0315	1	0.0394	
A5	-	0.200		-	0.0079	-	
a1	0.030		-0.040	0.0012		-0.0016	
b	0.220	-	0.380	0.0087	-	0.0150	
С	0.230	1	0.320	0.0091	1	0.0126	
D	15.800		16.000	0.6220	•	0.6299	
D1	9.400	1	9.800	0.3701	1	0.3858	
D2	-	1.000	1	-	0.0394	-	
E	13.900		14.500	0.5472	•	0.5709	
E1	10.900		11.100	0.4291	•	0.4370	
E2	-		2.900	-		0.1142	
E3	5.800	-	6.200	0.2283	-	0.2441	
E4	2.900		3.200	0.1142	•	0.1260	
е	-	0.650		-	0.0256	-	
e3	-	11.050	1	-	0.4350	-	
G	0		0.075	0	•	0.0031	
Н	15.500	1	15.900	0.6102	1	0.6260	
h	-	-	1.100	-	-	0.0433	
L	0.800	-	1.100	0.0315	-	0.0433	
N	-	-	10°		-	10°	
S	-	-	8°	-	-	8°	

OUTLINE AND MECHANICAL DATA



PowerSO36 (SLUG UP)





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Figure 4. Flexiwatt27 (vertical) mechanical data and package dimensions

H (2) H1 H2 H3 L (2)	4.45 1.80 0.75 0.37	1.90 1.40 0.90 0.39	4.65 2.00	MIN. 0.175 0.070	TYP. 0.177	MAX. 0.183	OUTLINE AND	
B C D E F (1) G G 1 H (2) H 1 H 2 H 3 L (2)	0.75 0.37 0.80	1.90 1.40 0.90			0.1//			
C D E F (1) G G 1 H (2) H1 H2 H3 L (2)	0.75 0.37 0.80	1.40 0.90	2.00					
D E F (1) G G1 H (2) H1 H2 H3 L (2)	0.37	0.90		0.070	0.074	0.079	MECHANICAL DATA	
E F (1) G G1 H (2) H1 H2 H3 L (2)	0.37		1.05	0.029	0.055	0.041		
F (1) G G1 H (2) H1 H2 H3 L (2)	0.80		0.42	0.029	0.035	0.041		
G G1 H (2) H1 H2 H3 L (2)		0.00	0.57	0.014	0.013	0.022		
G1 H (2) H1 H2 H3 L (2)		1.00	1.20	0.031	0.040	0.047		
H (2) H1 H2 H3 L (2)	25.75	26.00	26.25	1.014	1.023	1.033		
H2 H3 L (2)	28.90	29.23	29.30	1.139	1.150	1.153		
H3 L (2)		17.00			0.669			
L (2)		12.80			0.503			
	00.07	0.80	00.07	0.000	0.031	0.004	ह्य र	
	22.07	22.47	22.87	0.869	0.884	0.904 0.762		
	18.57 15.50	18.97 15.70	19.37 15.90	0.731 0.610	0.747 0.618	0.762		
L3	7.70	7.85	7.95	0.303	0.309	0.313		
L4	0	5		0.000	0.197	0.010		
L5		3.5			0.138			
M	3.70	4.00	4.30	0.145	0.157		1 10	
M1	3.60	4.00	4.40	0.142	0.157	0.173		
N		2.20	 	 	0.086			
0		2	-	-	0.079			
R R1		1.70 0.5			0.067			
R2		0.3			0.02			
R3		1.25			0.049			
R4		0.50			0.019			
V			5° (Гур.)			Flexiwatt27 (vertical)	
V1				Гур.)			riexiwalizi (verticai)	
V2			20° (
V3	har nrati	ısion not i	45° (Typ.)				
2): moldi	na protu	sion inclu	ded					
	<u>V</u>	V3	:		H H1		c - + v	
Pin 1 Pi								



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Figure 5. Flexiwatt27 (SMD) mechanical data and package dimensions

MINITE NEW MAX. MINITE NEW MAX. A 4.45 4.50 4.65 0.1782 11772 0.1831 B 2.12 2.22 2.32 0.0835 0.0874 0.0913 C 1.40	Milk	DIM.		mm			inch		
B	B		MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	OUTLINE AND
C	C								
E 0.36 0.40 0.44 0.0142 0.0157 0.0173 F(***) 0.47 0.51 0.57 0.0185 0.0201 0.0224 G(***) 0.75 1.00 1.25 0.0295 0.0394 0.0492 G(***) 0.75 2.00 2.25 0.0898 0.0797 0.0888 G2(***) 1.75 2.00 2.25 0.0898 0.0797 0.0888 H**) 2.88 2.92.3 2.94 1.1358 1.1508 1.1575 H** 1 17.00 0.0689 0.0797 0.0888 H** 1 17.00 0.0689 0.0315 0.0314 0.0492 H** 1 1.80 0.80 0.0315 0.0314 0.0315 0.0314 H** 1 1.80 0.80 0.0315 0.0318 0.0315 0.0314 H** 1 1.80 1.20 14.40 0.5512 0.5591 0.5699 0.0313 0.0313 0.0313 0.0314 0.0315 0.0314 0.0315 0.0315 0.0314 0.0315 0.0315 0.0314 0.0315 0.0315 0.0314 0.0315 0.0315 0.0314 0.0315 0.0315 0.0314 0.0315 0.0315 0.0314 0.0315 0.0315 0.0314 0.0315 0.0315 0.0314 0.0315 0.0315 0.0315 0.0315 0.0314 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315 0.0315	D		2.12		2.32	0.0835		0.0913	MECHANICAL DATA
E 0.38 0.40 0.44 0.0142 0.0157 0.0173 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.070 0.07	E 0.38 0.40 0.44 0.0142 0.0157 0.0173 (C) 0.0173 (C) 0.0173 (C) 0.0173 (C) 0.0173 (C) 0.0173 (C) 0.0183 (C) 0.0203 (C) 0.0224 (C) 0.75 (C) 0.02 (C) 0.0224 (C) 0.022 (C) 0.0224 (C) 0.022 (C) 0.0225 (INEVIATIONE DATA
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1.75	G8(*) 1.75 2.00 2.25 0.0689 0.0767 0.0886 H** **** 1.75 2.00 2.25 0.0689 0.0767 0.0886 H** **** 1.75 0.00 1.1358 1.1358 1.1358 1.13576 H** **** 1.75 0.00 1.1358 1.1358 1.1358 1.13576 H** **** 1.75 0.00 1.1358 1.1358 1.1358 1.13576 H** **** 1.75 0.00 1.1358 1.1358 1.00 1.00315 D.00315 D.00315								
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H1	H1	G2(*)	1.75	2.00	2.25	0.0689	0.0787	0.0886	
H1	H1	H(**) 2	28.85	29.23	29.40	1.1358	1.1508	1.1575	
H3	H3	H1		17.00					
L(**) 15.50 15.70 15.90 0.6102 0.6181 0.6260 L1 7.70 7.85 7.95 0.3031 0.3091 0.3130 L2 14.00 14.20 14.40 0.5512 0.5591 0.5669 L3 11.80 12.00 12.20 0.4646 0.4724 0.4803 L4 13.30 1.48 1.66 0.0512 0.0593 0.0654 L5 2.42 2.50 2.58 0.0983 0.0984 0.1016 L6 0.42 0.50 0.58 0.065 0.0197 0.0228 N 1.50 0.0591 0.00866 NN 1.50 0.0591 0.00868 NN 2.20 0.0066 0.0114 0.0154 NN 1.30 1.48 1.66 0.0512 0.0593 0.0654 NN 1.30 1.48 3.493 0.1862 0.1902 0.1941 R 1.70 0.0669 R1 0.030 0.0118 0.0157 0.0177 R3 0.35 0.40 0.45 0.0138 0.0157 0.0177 R4 0.050 0.050 0.018 0.0157 0.0177 R4 0.050 0.050 0.0031 0.0039 NY 45° 0.018 0.0157 0.0177 R4 0.050 0.0031 0.0039 NY 45° 0.01 0.0039 NY 45° 0.0039	15.50 15.70 15.90 0.102 0.6181 0.6800	H2		12.80			0.5039		
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TDA7802 Revision history

3 Revision history

Table 4. Document revision history

Date	Revision	Changes
18-Jul-2013	1	Initial release.
18-Sep-2013	2	Updated Disclaimer.
24-Oct-2014	3	Added 'AEC Q100 rev. G compliant' in Features list.
27-Oct-2014	4	Modified in cover page the feature 'AEC Q100 rev. G compliant' in 'Qualification in accordance to AEC Q100 rev. G standard'.

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