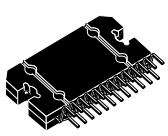
TDA7564B

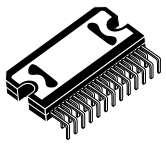
4 x 50W multifunction quad power amplifier with built-in diagnostics feature

Features

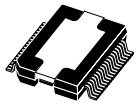
- Multipower BCD technology
- MOSFET output power stage
- DMOS power output
- New high efficiency (class SB)
- High output power capability 4x28 W/4 Ω @ 14.4 V, 1 kHz, 10 % THD, 4x50 W max, power
- Max. output power 4x72 W/2 Ω
- Full I^2C bus driving:
  - Standby
  - Independent front/rear soft play/mute
  - Selectable gain (for low noise line output function)
  - High efficiency enable/disable
  - I^2C bus digital diagnostics (including AC and DC load detection)
- Full fault protection
- DC offset detection
- Four independent short circuit protection
- Clipping detector (2 %/10 %)
- Linear thermal shutdown with multiple thermal warning
- ESD protection



Flexiwatt25 (Vertical)



Flexiwatt25 (Horizontal)



PowerSO36 (slug up)

PowerSO36 package specially intended for car radio applications.

Description

The TDA7564B is a new BCD technology quad bridge type of car radio amplifier in Flexiwatt25 / PowerSO36 package specially intended for car radio applications.

Thanks to the DMOS output stage the TDA7564B has a very low distortion allowing a clear powerful sound. Among the features, its superior efficiency performance coming from the internal exclusive structure, makes it the most suitable device to simplify the thermal management in high power sets.

The dissipated output power under average listening condition is in fact reduced up to 50% when compared to the level provided by conventional class AB solutions. This device is equipped with a full diagnostics array that communicates the status of each speaker through the I^2C bus.

Table 1. Device summary

Order code	Package	Packing
TDA7564B	Flexiwatt25 (vertical)	Tube
TDA7564BH	Flexiwatt25 (horizontal)	Tube
TDA7564BPD	PowerSO36	Tube
TDA7564BPDTR	PowerSO36	Tape and reel

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Figure 1. Block diagram

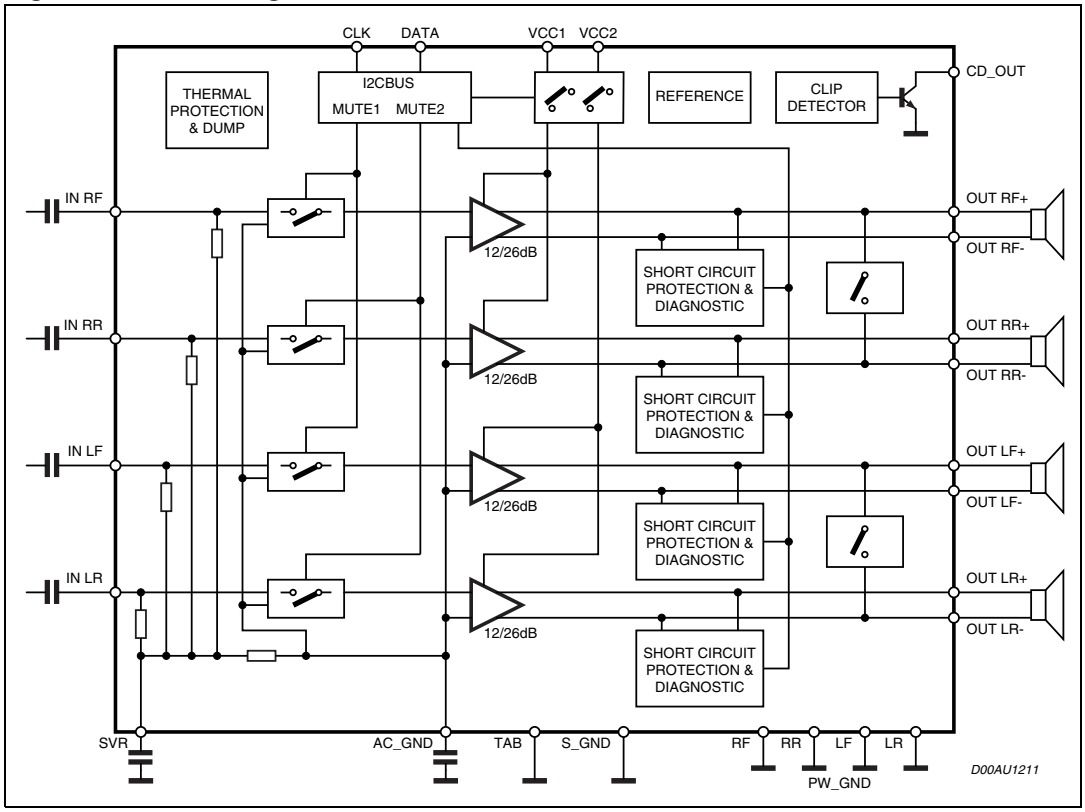
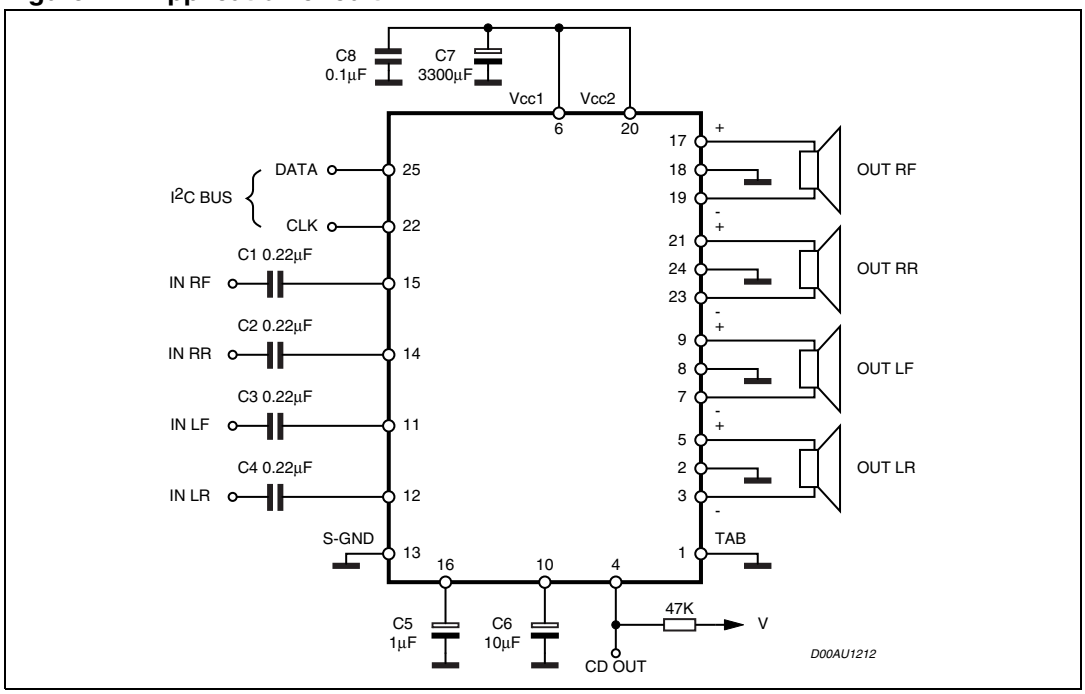


Figure 2. Application circuit



2 Pins description

Figure 3. Flexiwatt25 pins connection diagram (top of view)

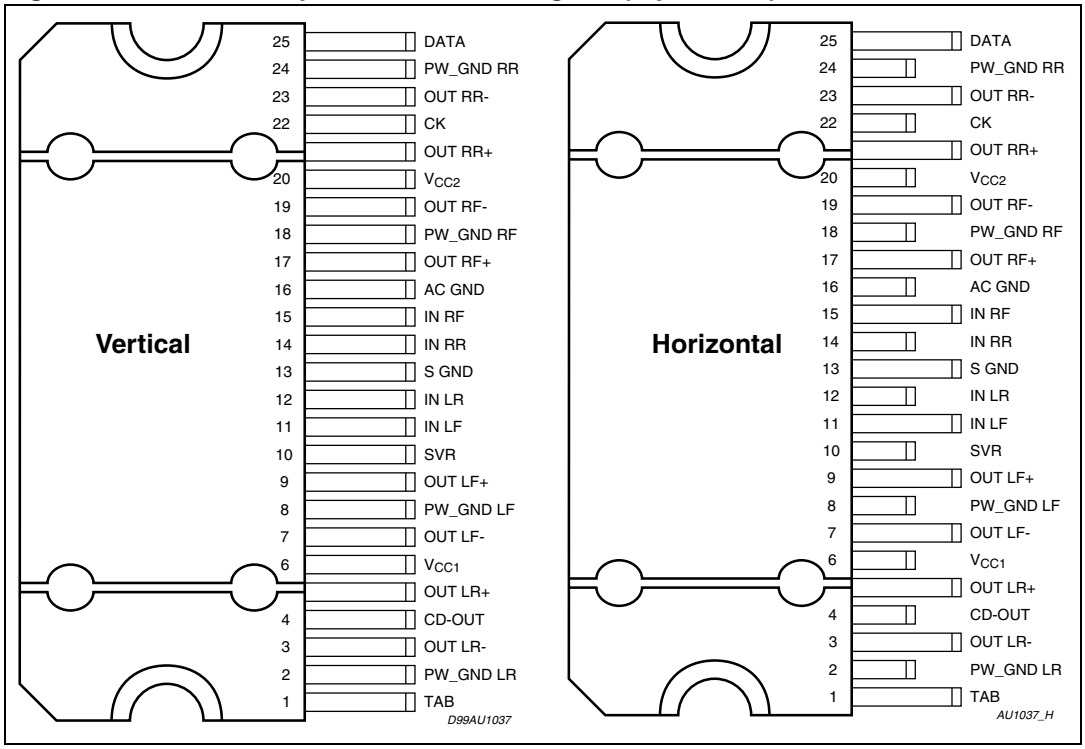
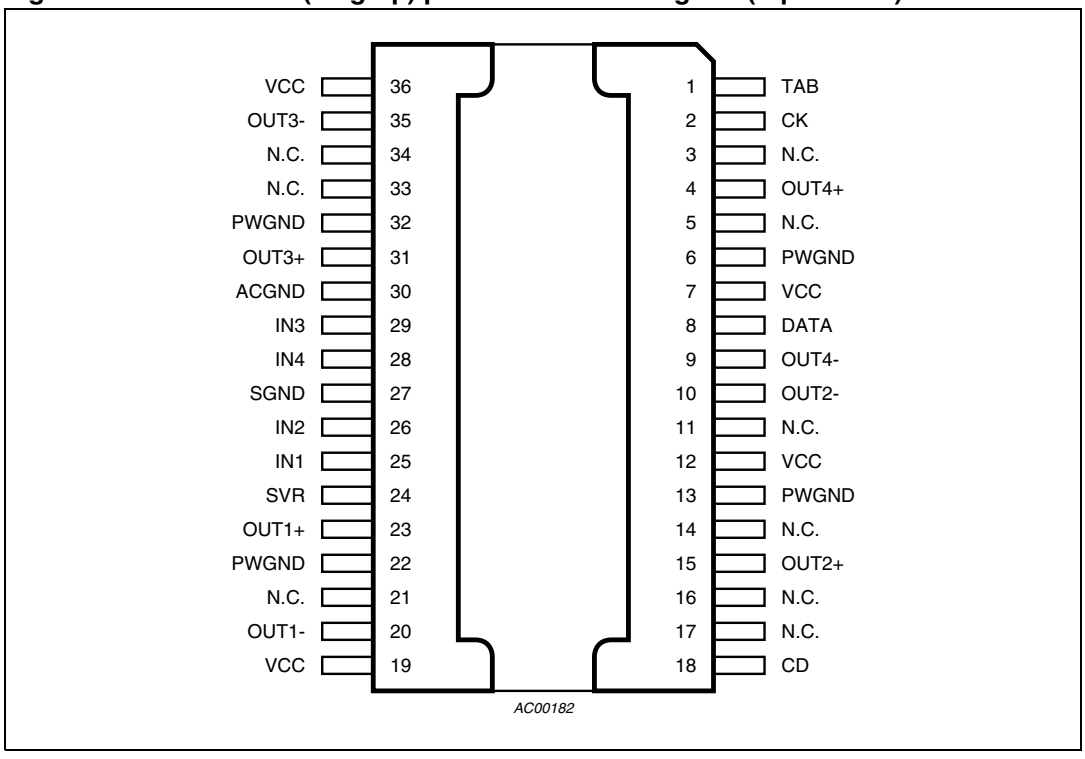


Figure 4. PowerSO36 (slug-up) pins connection diagram (top of view)



3 Electrical specifications

3.1 Absolute maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{op}	Operating supply voltage	18	V
V_S	DC supply voltage	28	V
V_{peak}	Peak supply voltage (for t = 50 ms)	50	V
V_{CK}	CK pin voltage	6	V
V_{DATA}	Data pin voltage	6	V
I_O	Output peak current (not repetitive t = 100 ms)	8	A
I_O	Output peak current (repetitive f > 10 Hz)	6	A
P_{tot}	Power dissipation T_{case} = 70 °C	85	W
T_{stg}, T_j	Storage and junction temperature	-55 to 150	°C

3.2 Thermal data

Table 3. Thermal data

Symbol	Parameter		PowerSO	Flexiwatt	Unit
$R_{th\ j\text{-}case}$	Thermal resistance junction-to-case	Max.	1	1	°C/W

3.3 Electrical characteristics

Refer to the test circuit, V_S = 14.4 V; R_L = 4 Ω; f = 1 kHz; G_V = 30 dB; T_{amb} = 25 °C; unless otherwise specified.

Table 4. Electrical characteristics

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
Power amplifier						
V_S	Supply voltage range	-	8	-	18	V
I_d	Total quiescent drain current	-	-	170	300	mA
P_O	Output power	Max. power (V_S = 15.2 V, square wave input (2 Vrms))	-	50	-	W
		THD = 10 % THD = 1 %	25 20	28 22	-	W

Table 4. Electrical characteristics (continued)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
P_O	Output power	R_L = 2 Ω; EIAJ (V_S = 13.7V) R_L = 2 Ω; THD 10% R_L = 2 Ω; THD 1% R_L = 2 Ω; max. power	55 40 32 60	68 50 40 75	-	W
THD	Total harmonic distortion	P_O = 1 W to 10 W; STD mode HE MODE; P_O = 1.5 W HE MODE; P_O = 8 W	-	0.02 0.015 0.15	0.1 0.1 0.5	%
		G_V = 12 dB; STD mode V_O = 0.1 to 5 V_{RMS}	-	0.02	0.05	%
C_T	Cross talk	f = 1 kHz to 10 kHz, R_g = 600 Ω	50	60	-	dB
R_{IN}	Input impedance	-	60	100	130	kΩ
G_{V1}	Voltage gain 1	-	25	26	27	dB
ΔG_{V1}	Voltage gain match 1	-	-1	-	1	dB
G_{V2}	Voltage gain 2	-	11	12	13	dB
ΔG_{V2}	Voltage gain match 2	-	-1	-	1	dB
E_{IN1}	Output noise voltage 1	R_g = 600 Ω 20 Hz to 22 kHz	-	35	100	µV
E_{IN2}	Output noise voltage 2	R_g = 600 Ω; G_V = 12 dB 20 Hz to 22 kHz	-	12	30	µV
SVR	Supply Voltage Rejection	f = 100 Hz to 10 kHz; V_r = 1 Vpk; R_g = 600 Ω	50	60	-	dB
BW	Power bandwidth	-	100	-	-	kHz
A_{SB}	Standby attenuation	-	90	110	-	dB
I_{SB}	Standby current	$V_{st\text{-}by}$ = 0	-	25	50	µA
A_M	Mute attenuation	-	80	100	-	dB
V_{OS}	Offset voltage	Mute and play	-100	0	100	mV
V_{AM}	Min. supply mute threshold	-	6.5	7	8	V
CMRR	Input CMRR	V_{CM} = 1 Vpk-pk; Rg = 0 Ω	-	55	-	dB
T_{ON}	Turn ON Delay	D2/D1 (IB1) 0 to 1	-	20	40	ms
T_{OFF}	Turn OFF Delay	D2/D1 (IB1) 1 to 0	-	20	40	ms
CD_{LK}	Clip det high leakage current	CD off	-	0	5	µA
CD_{SAT}	Clip det sat. voltage	CD on; I_{CD} = 1 mA	-	150	300	mV
CD_{THD}	Clip det THD level	D0 (IB1) = 1	5	10	15	%
		D0 (IB1) = 0	1	2	3	%

Table 4. Electrical characteristics (continued)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
Turn on diagnostics 1 (Power amplifier mode)						
Pgnd	Short to GND det. (below this limit, the output is considered in short circuit to GND)	Power amplifier in standby	-	-	1.2	V
Pvs	Short to Vs det. (above this limit, the output is considered in short circuit to V_S)		Vs -1.2	-	-	V
Pnop	Normal operation thresholds. (Within these limits, the output is considered without faults).		1.8	-	Vs -1.8	V
Lsc	Shorted load det.		-	-	0.5	Ω
Lop	Open load det.		85	-	-	Ω
Lnop	Normal load det.		1.5	-	45	Ω
Turn on diagnostics 2 (Line driver mode)						
Pgnd	Short to GND det. (below this limit, the output is considered in short circuit to GND)	Power amplifier in standby	-	-	1.2	V
Pvs	Short to Vs det. (above this limit, the output is considered in short circuit to VS)	-	Vs -1.2	-	-	V
Pnop	Normal operation thresholds. (Within these limits, the output is considered without faults).	-	1.8	-	Vs -1.8	V
Lsc	Shorted load det.	-	-	-	2	Ω
Lop	Open load det.	-	330	-	-	Ω
Lnop	Normal load det.	-	7	-	180	Ω
Permanent diagnostics 2 (Power amplifier mode or line driver mode)						
Pgnd	Short to GND det. (below this limit, the output is considered in short circuit to GND)	Power amplifier in mute or play, one or more short circuits protection activated	-	-	1.2	V
Pvs	Short to Vs det. (above this limit, the output is considered in short circuit to VS)		Vs -1.2	-	-	V
Pnop	Normal operation thresholds. (within these limits, the output is considered without faults).		1.8	-	Vs -1.8	V
L_{SC}	Shorted load det.	Pow. amp. mode	-	-	0.5	Ω
		Line driver mode	-	-	2	Ω
V_O	Offset detection	Power amplifier in play, AC Input signals = 0	±1.5	±2	±2.5	V
I_{NLH}	Normal load current detection	V_O < (V_S - 5)pk IB2 (D7) = 0	500	-	-	mA