SGS-THOMSON MICROELECTRONICS

TDA7454

HIGH EFFICIENCY QUAD BRIDGE CAR RADIO POWER AMPLIFIER

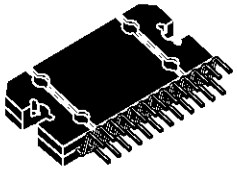
PRODUCT PREVIEW

- HIGH OUTPUT POWER CAPABILITY
  4 x 22W/4Ω @14.4V, 1KHz, 10%
- DUAL MODE OPERATING EXTERNALLY PRESETTABLE: CONVENTIONAL CLASS A-B MODE, HIGH EFFICIENCY MODE
- LOW EXTERNAL COMPONENTS COUNT:
  – NO BOOTSTRAP CAPACITORS
  – NO EXTERNAL COMPENSATION
  – INTERNALLY FIXED GAIN (26dB)
- CLIPPING DETECTOR
- ST-BY FUNCTION (CMOS COMPATIBLE)
- MUTE FUNCTION (CMOS COMPATIBLE)
- AUTOMUTE AT MINIMUM SUPPLY VOLTAGE DETECTION
- LOW RADIATION

Protections:

- OUPUT SHORT CIRCUIT
  TO GND; TO V_S; ACROSS THE LOAD
- 3 STEPS OVERRATING CHIP TEMPERATURE
- LOAD DUMP VOLTAGE
- FORTUITOUS OPEN GND
- LOUDSPEAKER DC CURRENT
- ESD

MULTIPOWER BCD TECHNOLOGY



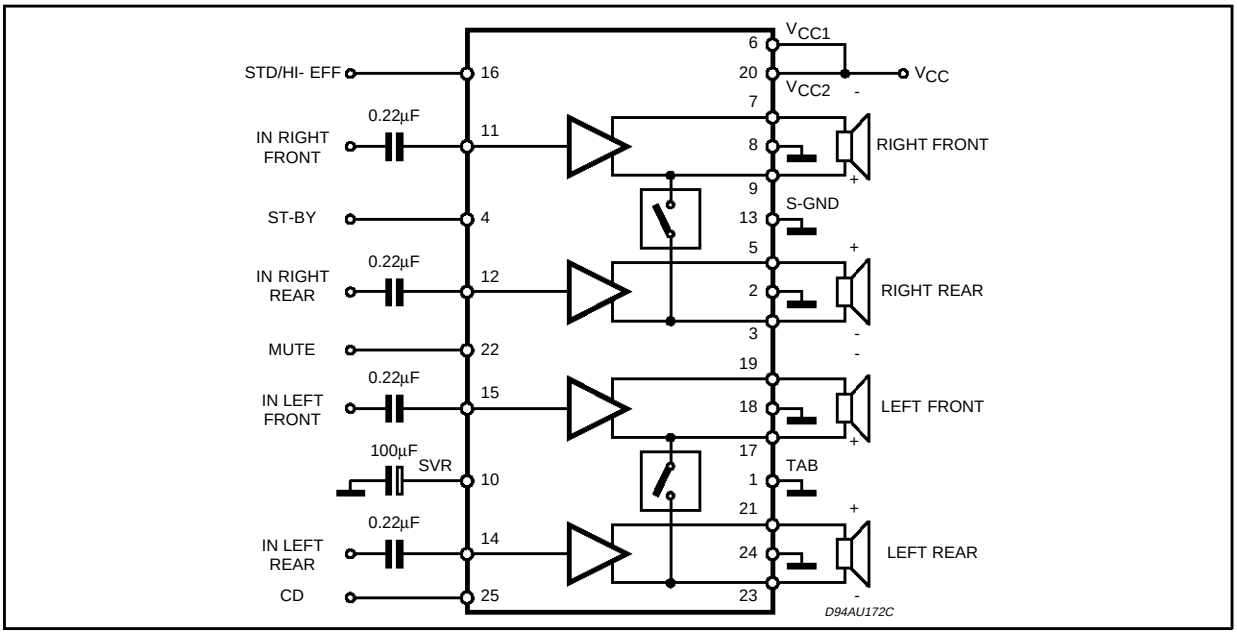
Flexiwatt 25

DESCRIPTION

The TDA7454 is a new BCD technology QUAD BRIDGE type of car radio amplifier in Flexiwatt25 package specially intended for car radio applications.

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.

BLOCK & APPLICATION DIAGRAM



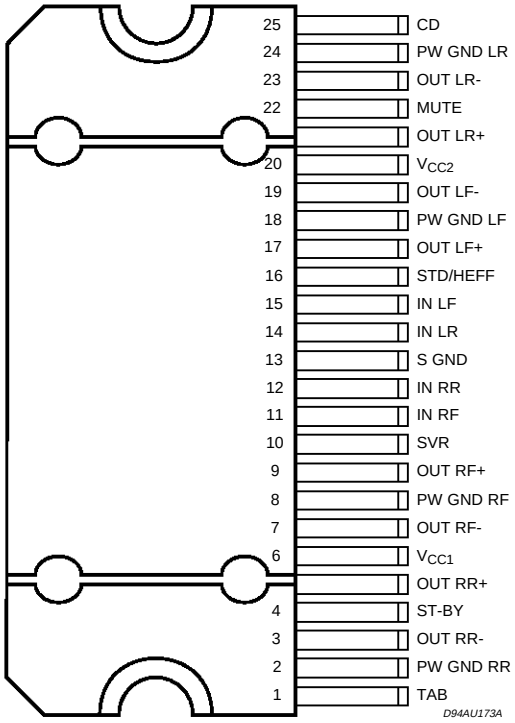
ABSOLUTE MAXIMUM RATINGS

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 = 50ms)	40	V
I_O	Output Peak Current (not repetitive t = 100µs)	4.5	A
I_O	Output Peak Current (repetitive f > 10Hz)	3.5	A
P_{tot}	Power Dissipation T_{case} = 70°C	86	W
T_{stg}, T_j	Storage and Junction Temperature	-55 to 150	°C

THERMAL DATA

Symbol	Description		Value	Unit
$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case	Max	1	°C/W

PIN CONNECTION (Top view)



ELECTRICAL CHARACTERISTICS (Refer to the test circuit V_S = 14.4V; R_L = 4Ω; f = 1KHz; T_{amb} = 25°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			140		mA
P_O	Output Power	@ EIAJ		30		W
		THD = 10%		22		W
		THD = 1% : BTL MODE		18		W
THD	Total harmonic distortion	P_O = 1W : BTL MODE P_O = 10W : BTL MODE		0.03 0.03		% %
		P_O = 1W : Hi-EFF MODE P_O = 10W : Hi-EFF MODE		0.03 0.3		% %
C_T	Cross Talk	f = 1KHz f = 10KHz		55 45		dB dB
R_{IN}	Input Impedance			15		KΩ
G_V	Voltage Gain		25	26	27	dB
ΔG_V	Voltage Gain Match				1	dB
E_{IN}	Output Noise Voltage	R_g = 600Ω		100		mV
SVR	Supply Voltage Rejection	f = 300Hz; Vr = 1Vpp; R_g = 0 to 100Ω;		50		dB
BW	Power Bandwidth	(–3dB)	75			KHz
A_{SB}	Stand-by Attenuation			100		dB
$V_{sb\ IN}$	Stand-by in Threshold				1.5	V
$V_{sb\ OUT}$	Stand-by out Threshold		3.5			V
I_{sb}	Stand-by Current Consumption				100	µA
A_M	Mute Attenuation			90		dB
$V_{M\ IN}$	Mute in Thereshold				1.5	V
$V_{M\ OUT}$	Mute out Threshold		3.5			V
I_M	Mute pin Current (Sourced)	V = 0 to V_S $V_{S\ max}$ = 18V		1		µA
	Mode Select Switch	Standard BTL Mode Op. ($V_{pin\ 16}$)		Open		
		High Efficiency Mode ($V_{pin\ 16}$)			0.5	V
CD	Clip Det. out Current (Pull up to 5V with 10KΩ)	CD off: P_{Omin} = 10W CD on: THD = 5%		 150	5	µA µA

Figure 1: Standard Test and Application Circuit.

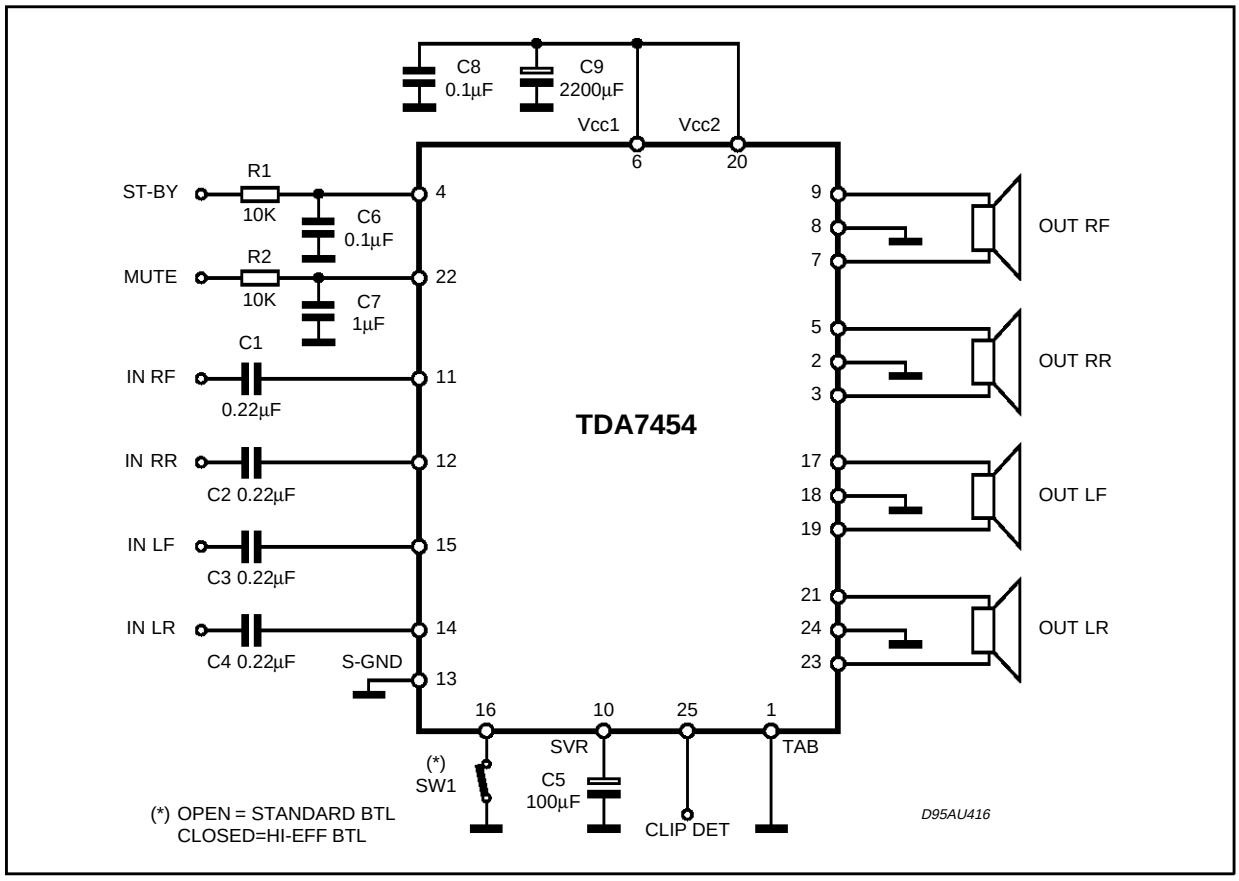
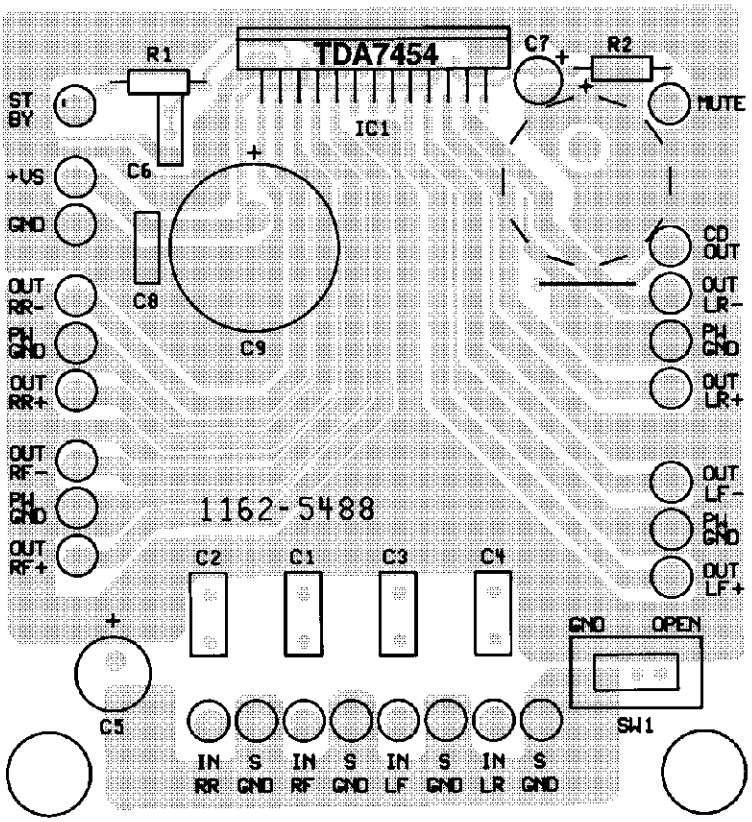
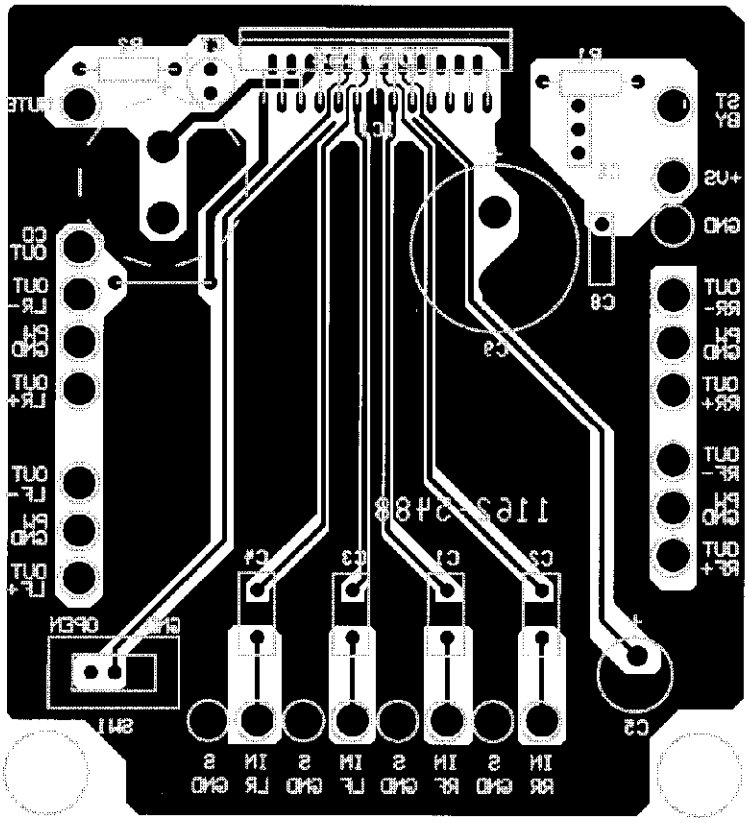


Figure 2: P.C.B. and components layout of fig. 1 circuit. (1.25 :1 scale)

COMPONENTS & TOP COPPER LAYER



BOTTOM COPPER LAYER



MODE SELECTION TABLE OPERATION OF THE DEVICE

1) STD/HI-EFF (pin 16 = OPEN)

STANDARD QUAD BRIDGE MODE	HIGH-EFF QUAD BRIDGE MODE	STANDARD QUAD SINGLE-ENDED MODE	ST-BY MODE

100 150 170 Tchip (deg)

2) STD/HI-EFF (pin 16 = GND)

HIGH-EFF QUAD BRIDGE MODE	STANDARD QUAD SINGLE-ENDED MODE	ST-BY MODE

150 170 Tchip (deg)

1) STD/HI-EFF (pin 16 connected as shown in the figure below.

STANDARD QUAD BRIDGE MODE OR HIGH-EFF MODE (Theatsink dependent)	HIGH-EFF QUAD BRIDGE MODE	STANDARD QUAD SINGLE-ENDED MODE	ST-BY MODE

100 150 170 Tchip (deg)

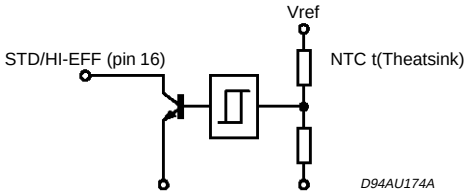


Figure 3: Quiescent Current vs. Supply Voltage

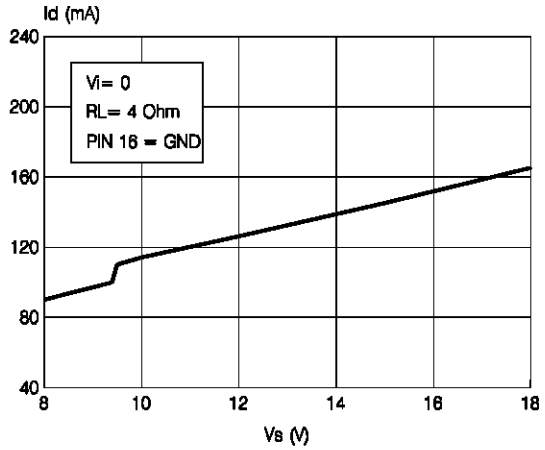


Figure 4: Output Power vs. Supply Voltage

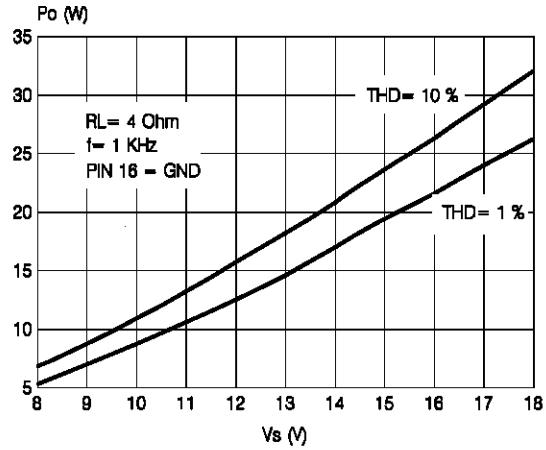


Figure 5: Distortion vs. Frequency

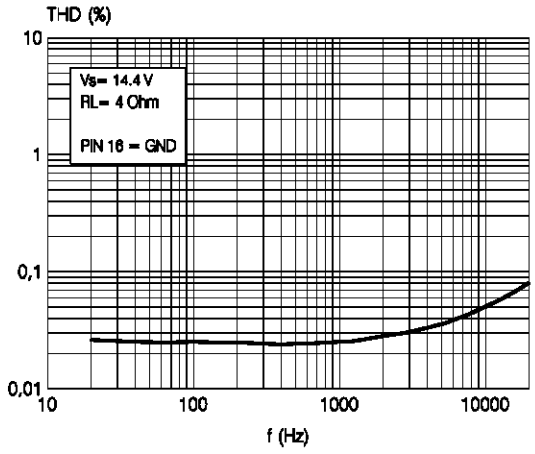


Figure 6: Muting Attenuation vs. Vpin 22

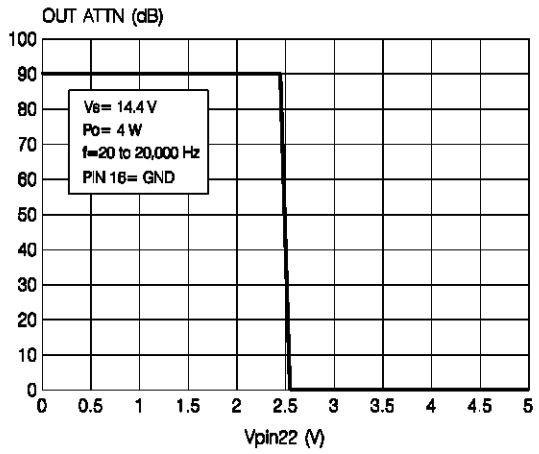


Figure 7: Supply Voltage Rejection vs. Frequency

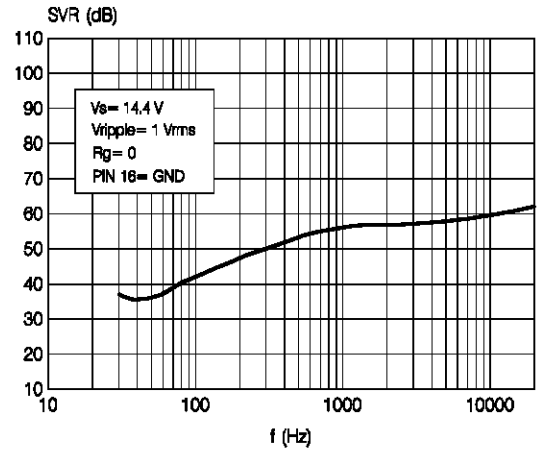
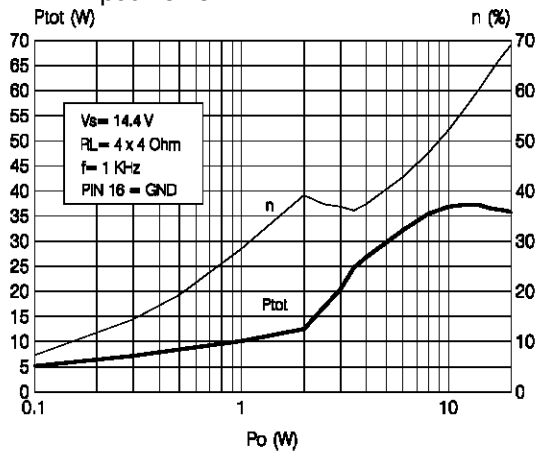


Figure 8: Power Dissipation & Efficiency vs. Ouput Power



FLEXIWATT25 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.45		4.65	0.175		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			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	28.90	29.23	29.30	1.138	1.150	1.153
H1		17.00			0.669	
H2		12.80			0.503	
H3		0.80			0.031	
L	21.57	21.97	22.37	0.849	0.865	0.880
L1	18.57	18.97	19.37	0.731	0.786	0.762
L2	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
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	
R4		0.50			0.019	
V2	20°					
V3	45°