CA810, CA810A Types

Preliminary Data

7-Watt Audio Power Amplifier With Thermal Shut-Down

The RCA-CA810Q,CA810AQ, CA810QM and CA810AQM are monolithic audio amplifiers intended for class B operation. They are specifically designed for mobile equipment operating from 12-V battery supplies. They operate over a wide range of supply voltages (4 to 20 V) with very low harmonic and crossover distortion. The maximum repetitive peak output current is 2.5 A, and an integral thermal limiting circuit shuts the device down in case of output overload or excessive package temperature.

The CA810Q, CA810AQ, CA810QM, and CA810AQM are supplied in modified 16-lead quad-in-line plastic packages ("Q" suffix) with integral wing-tab heat sinks. The tabs on the CA810Q and CA810AQ are bent down for p.c. board insertion, and on the CA810QM and CA810AQM they are flat and pierced for easy attachment to an external heat sink.

The CA810Q and CA810QM are electrically equivalent to types TBA810S and TBA810AS, respectively. It should be noted that pin-numbering conventions for these devices may differ from manufacturer to manufacturer, however the devices are pin compatible and interchangeability is not affected.

The CA810AQ and CA810AQM are electrically the same as the CA810Q and CA810QM, respectively, except for the inclusion of a load dump (overvoltage) voltage surge protection circuit. This feature makes the CA810AQ and CA810AQM ideally suitable for automotive applications.

Features:

- **Power output – 7 W with 4Ω load**
- **Supply voltage range – 4 to 20 V**
- **Peak output current – 2.5 A (max.)**
- **Very low harmonic and cross-over distortion**
- **Load dump voltage surge protection (CA810AQ and CA810AQM)**

MAXIMUM RATINGS, *Absolute-Maximum Values:*

PEAK SUPPLY VOLTAGE (50 ms) (CA810AQ, CA810AQM)			40 V
OPERATING SUPPLY VOLTAGE			20 V
OUTPUT PEAK CURRENT:			
REPETITIVE			2.5 A
NON-REPETITIVE			3.5 A
POWER DISSIPATION, P_D			
At $T_A = 70^\circ C$			1 W
At $T_{tab} = 100^\circ C$			5 W
THERMAL RESISTANCE, JUNCTION	CA810Q CA810AQ	CA810QM CA810AQM	
Junction to tab	12	10	°C/W
Junction to ambient	70*	80	°C/W
AMBIENT-TEMPERATURE RANGE:			
OPERATING	−40°C to (Refer to Fig.7 for typical high-temperature limit)		
STORAGE	−40 to +150°C		
LEAD TEMPERATURE (DURING SOLDERING):			
At distance 1/16 ± 1/32 inch (1.59 ± 0.79 mm) from case for 10s max.			260°C

*Value obtained with tabs soldered to printed-circuit board.

ELECTRICAL CHARACTERISTICS, at $T_A = 25^\circ C$

CHARACTERISTIC	SYMBOL	TEST CONDITIONS Supply Voltage (V^+) = 14.4 V Unless Otherwise Specified		LIMITS CA810Q,CA810AQ CA810QM,CA810AQM MIN.	TYP.	MAX.	UNITS
Supply Voltage	V^+			4	–	20	V
Input Voltage	V_I			–	–	220	mV
Input Sensitivity	e_I	P_O = 6W, R_L = 4Ω, R1 = 56Ω, f = 1 kHz		–	80	–	mV
Quiescent Output Voltage	V_O			6.4	7.2	8	V
Quiescent Current Drain	I_O			–	12	20	mA
Input Noise Voltage	e_N	R_g = 0, BW (−3 dB) = 20 to 20,000 Hz		–	2	–	μV
Bias Current	I_{IB}			–	0.4	–	μA
Output Power	P_O	f = 1 kHz, R_L = 4Ω, THD = 10%	V^+ = 14.4 V	–	6	–	W
			V^+ = 6 V	–	1	–	
Input Resistance	R_I			–	5	–	MΩ
Total Harmonic Distortion	THD	P_O = 50 mW to 3W, R_L 4Ω, f = 1 kHz		–	0.3	–	%
Open-Loop Voltage Gain	A_{OL}	R_L = 4Ω, f = 1 kHz		–	80	–	dB
Closed-Loop Voltage Gain	A	R_L = 4Ω, f = 1 kHz, R1 = 56Ω		34	37	40	dB
Efficiency	η	P_O = 5W, R_L = 4Ω; f = 1 kHz		–	70	–	%

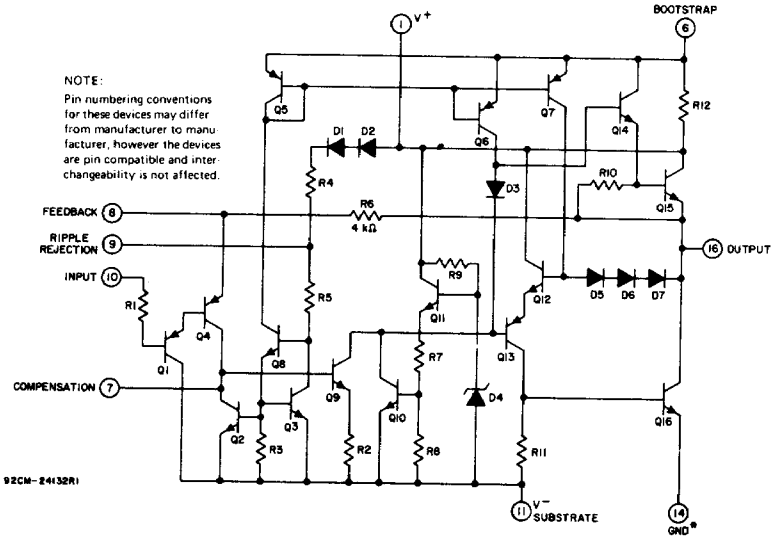


Fig. 1 – Schematic diagram of CA810Q, CA810QM.

*WING TABS ARE TO BE GROUNDED.

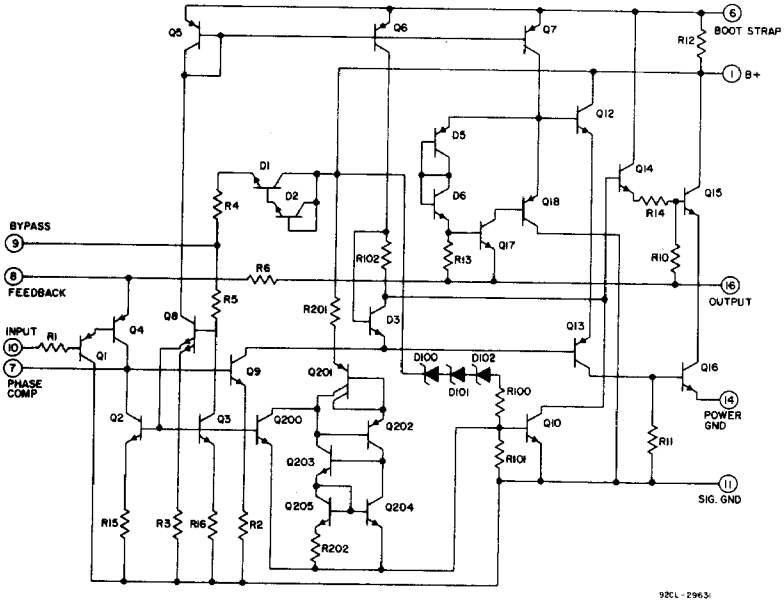


Fig. 3 – Schematic diagram of CA810AQ, CA810AQM.

Thermal Shut-Down

The thermal-limiting network incorporated in the CA810 Series circuits provides protection against damage due to excessive semiconductor temperatures that may result from high ambient temperatures and/or excessive dissipation, e.g., as encountered in sustained overloads. As indicated in Fig.2 the thermal-limiting feature automatically reduces the supply current (and output power) at the higher temperatures.

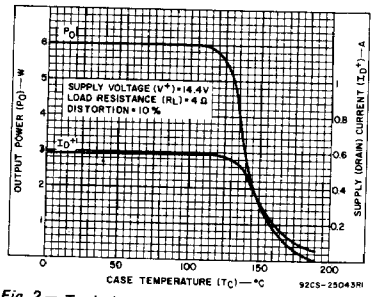


Fig. 2 – Typical output power and drain current as a function of case temperature for all types.

Load-Dump Voltage-Surge Protection

The maximum operating supply voltage of the CA810AQ and CA810AQM is 20 V, and internal protection is provided for peaks of up to 40 V, as shown in Fig. 4. Supply-voltage peaks of more than 40 V will require an LC network between the supply and terminal 5. An LC network, such as the one shown in Fig. 8, provides protection against supply-voltage surges of up to 120 V for 2 ms. This type of protection is ON when the supply voltage (pulsed or dc) exceeds 20 V.

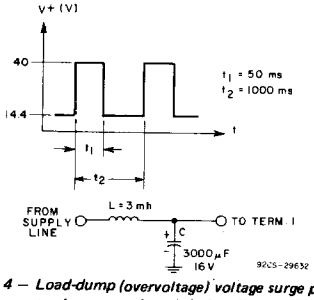


Fig. 4 – Load-dump (overvoltage) voltage surge protection network and timing diagram for CA810AQ and CA810AQM.

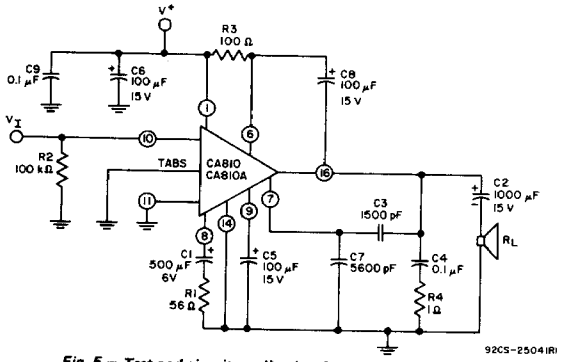
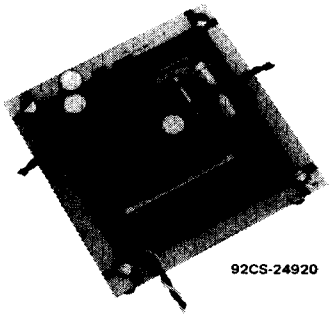


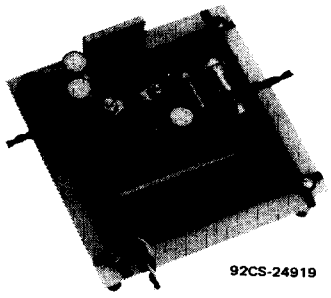
Fig. 5 – Test and circuit application for the CA810Q, CA810AQ and CA810M, CA810AQM.

Fig. 6 – Bottom view of printed-circuit boards shown in Figs. 7 and 8.



Circuit heat is dissipated by a combination of free air and printed-circuit board foil.

Fig. 7 – Component view of printed-circuit board for CA810Q and CA810AQ.



Circuit arrangement for use with chassis having a thermal resistance of $\leq 5^{\circ}C/W$. Vertical bracket should make good thermal contact to chassis.

Fig. 8 – Component view of printed-circuit board for CA810QM and CA810AQM.

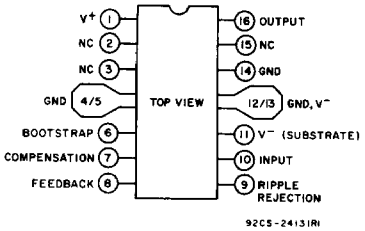


Fig. 9 – Terminal diagram of CA810Q, CA810AQ and CA810QM, CA810AQM. The wing tabs on the CA810Q and CA810AQ are bent down, and on the CA810QM and CA810AQM they are flat and pierced.