2 x 3 W stereo BTL audio output amplifier

TDA7057Q

FEATURES

- No external components
- No switch-on and off clicks
- Good overall stability
- Low power consumption
- Short-circuit proof
- Low HF radiation
- ESD protected on all pins.

GENERAL DESCRIPTION

The TDA7057Q is a stereo output amplifier in a 13 pin power package. The device is designed for battery-fed portable stereo recorders and radios, but also suitable for mains-fed applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_P	positive supply voltage range		3.0	11	18	V
P_O	output power	V_P = 11 V; R_L = 16 Ω	–	3	–	W
G_v	voltage gain		39	40	41	dB
I_P	total quiescent current	V_P = 11 V; R_L = ∞	–	10	14	mA
THD	total harmonic distortion	P_O = 0.5 W	–	0.25	1	%

ORDERING INFORMATION

EXTENDED TYPE NUMBER	PACKAGE			
	PINS	PIN POSITION	MATERIAL	CODE
TDA7057Q	13	SBD	plastic	SOT141

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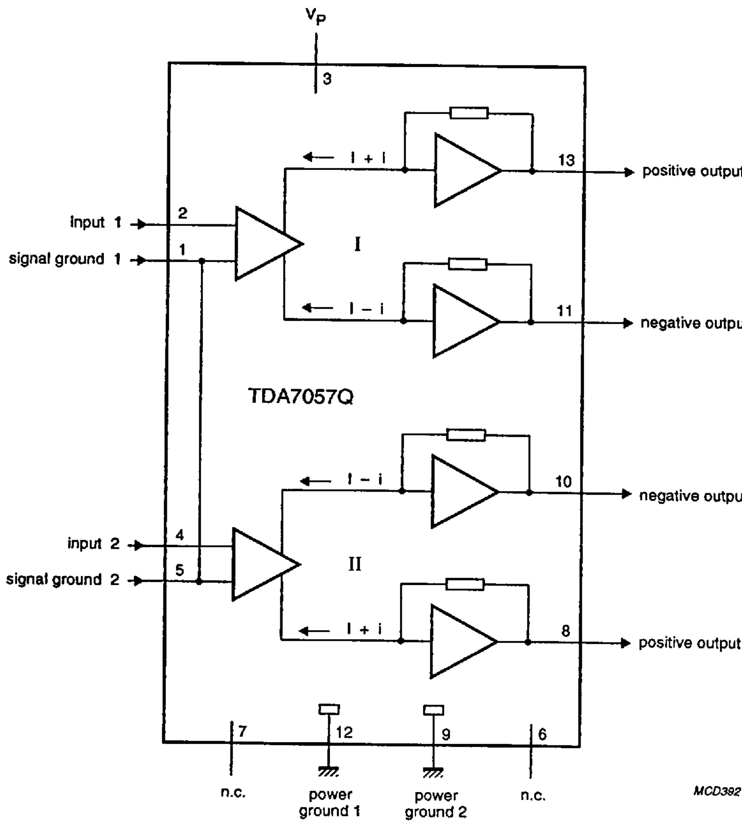

Fig.1 Block diagram.

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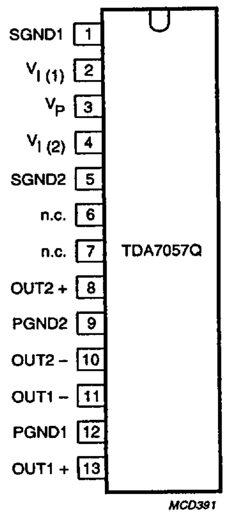

Fig.2 Pin configuration.

PINNING

SYMBOL	PIN	DESCRIPTION
SGND1	1	signal ground 1
$V_{I(1)}$	2	voltage input 1
V_P	3	positive supply voltage
$V_{I(2)}$	4	voltage input 2
SGND2	5	signal ground 2
n.c.	6	not connected
n.c.	7	not connected
OUT2+	8	positive output 2
PGND2	9	power ground 2
OUT2−	10	negative output 2
OUT1−	11	negative output 1
PGND1	12	power ground 1
OUT1+	13	positive output 1

FUNCTIONAL DESCRIPTION

The TDA7057Q is a stereo output amplifier, designed for battery-fed applications e.g. portable radios, but also suitable for mains fed applications. The gain is internally fixed at 40 dB.

For space reason there is a trend to decrease the number of battery cells. This means a decrease in supply voltage, resulting in a reduction of output power at conventional output stages. The latter is not preferred. Using the BTL principle increases the output power.

The TDA7057Q can deliver an output power of 3 W in a speaker load of 16 Ω with 11 V supply.

The circuit is designed such that no external components are required. Special attention is given to switch-on and off clicks, low HF radiation and a good overall stability. The load can be short-circuited at all input conditions.

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LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_P	positive supply voltage range		–	18	V
I_{ORM}	repetitive peak output current		–	1	A
I_{OSM}	non repetitive peak output current		–	1.5	A
P_{tot}	total power dissipation	$T_{case} < 60$ °C	–	9	W
T_{stg}	storage temperature range		–55	+150	°C
T_{vj}	virtual junction temperature		–	+150	°C
T_{sc}	short-circuit time	see note	–	1	hr

Note to the limiting values

The load can be short-circuited at all input conditions.

THERMAL RESISTANCE

SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$	from junction to ambient in free air	45 K/W
$R_{th\ j\text{-}c}$	from junction to case	8 K/W

Note to the thermal resistance

$V_P = 11$ V; $R_L = 16\ \Omega$; The maximum sine-wave dissipation is = 3 W; $T_{amb\ (max)} = 60$ °C; $R_{th\ vj\text{-}a} = (150 - 60)/3 = 30$ K/W
$R_{th\ vj\text{-}a} = R_{th\ vj\text{-}c} + R_{th\ c\text{-}HS} + R_{th\ HS}$
$R_{th\ c\text{-}HS} + R_{th\ HS} = 30 - 8 = 22$ K/W

CHARACTERISTICS

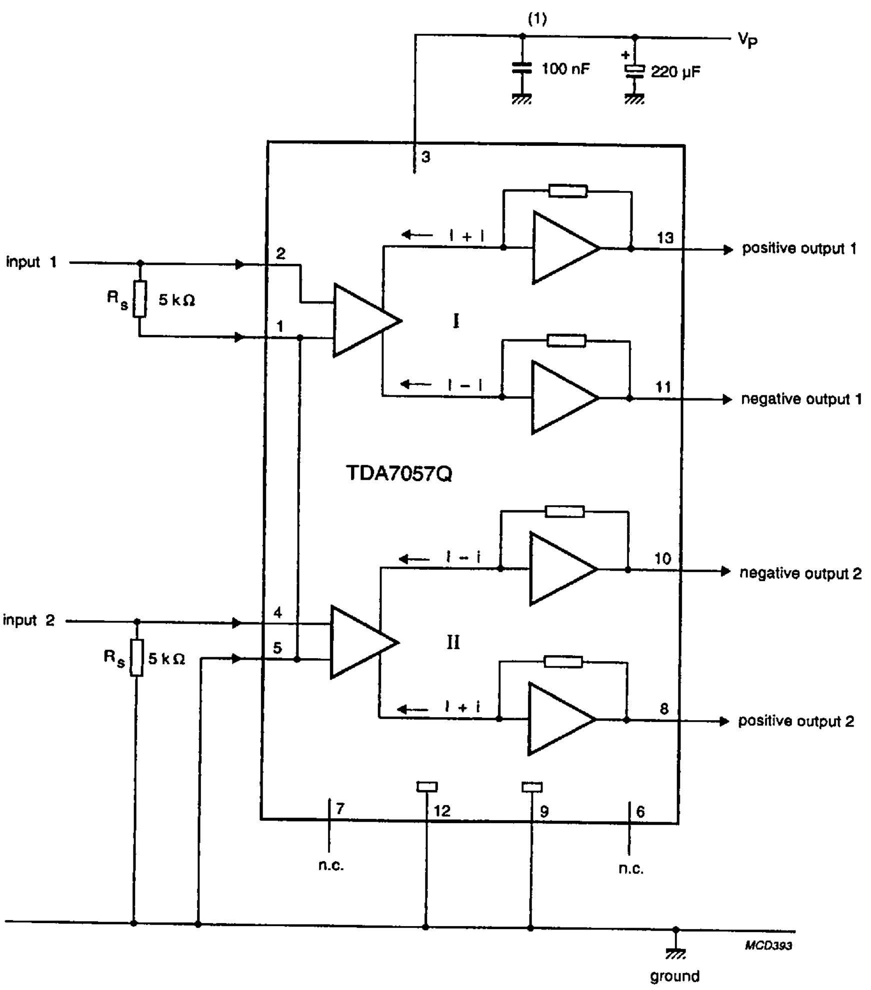
V_P = 11 V; f = 1 kHz; R_L = 16 Ω; T_{amb} = 25 °C; unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_P	positive supply voltage range		3.0	11	18	V
I_{ORM}	repetitive peak output current		–	–	0.6	A
Operating position						
I_P	total quiescent current	$R_L = \infty$; note 1	–	10	14	mA
P_O	output power	THD = 10%	2.5	3	–	W
THD	total harmonic distortion	P_O = 0.5 W	–	0.25	1	%
G_v	voltage gain		39	40	41	dB
$V_{no(rms)}$	noise output voltage (RMS value)	note 2	–	180	300	μV
$V_{no(rms)}$	noise output voltage (RMS value)	note 3	–	60	–	μV
B	bandwidth		–	20 Hz to 20 kHz	–	
SVRR	supply voltage ripple rejection	note 4	36	60	–	dB
$\|V_{off}\|$	DC output offset voltage	R_S = 5 kΩ	–	–	200	mV
Z_I	input impedance		–	100	–	kΩ
I_{bias}	input bias current		–	100	300	nA
α	channel separation	R_S = 5 kΩ	40	–	–	dB
$\|G_v\|$	channel balance		–	–	1	dB

Notes to the characteristics

1. With a load connected to the outputs the quiescent current will increase, the maximum value of this increase being equal to the DC output offset voltage divided by R_L.
2. The noise output voltage (RMS value) is measured with R_S = 5 kΩ unweighted (20 Hz to 20 kHz).
3. The noise output voltage RMS value) at f = 500 kHz is measured with R_S = 0 Ω and bandwidth = 5 kHz. With a practical load (R_L = 16 Ω, L = 200 μH) the noise output current is only 50 nA.
4. The ripple rejection is measured with R_S = 0 Ω and f = 100 Hz to 10 kHz. The ripple voltage of 200 mV (RMS value) is applied to the positive supply rail.

APPLICATION INFORMATION



(1) This capacitor can be omitted if the 220 µF electrolytic capacitor is connected close to pin 3.

Fig.3 Test and application diagram.