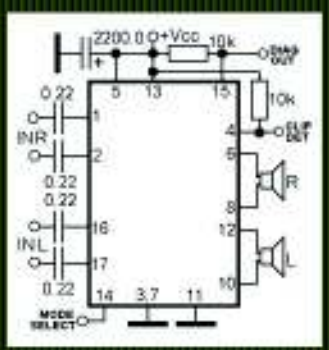
AUDIO AMPLIFIERS

DATABOOK

5000 INTEGRATED CIRCUITS POWER AUDIO AMPLIFIERS

CONNECTION DIAGRAMS
CHARACTERISTICS
CASES DRAWINGS
REPLACEMENTS
MANUFACTURERS



- 5000 integrated circuits - power audio amplifiers
- Standard and modifed connection diagrams
- Electrical characteristics
- Cases drawings
- Direct replacements guide
- Manufacturers guide

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ELECTRONICS COMPONENTS

Eugene Turuta

5000 Integrated Circuits-power audio amplifiers

databook

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INTRODUCTION

One of the basic components of any sound-reproducing system, without dependence from its class is the power amplifier of audio frequencies called also the power audio amplifier.

With reference to consumer and professional electronics equipments, the greatest popularity are the integrated circuits-power audio amplifiers, due to their advantages - schematic simplicity, small dimensionss, large range of output powers, polyfunctionality.

For correct usage of integrated circuits of the power audio amplifiers, irresepective of a field of application, it is necessary to know following:

- Function of integrated circuit;
- The main electrical characteristics;
- Schematic of connection and (or) internal structure;
- Package type;
- Equivalents (replacements).

In the literature, the great many of the characteristics which one describe the electrical and operational parameters of power audio amplifiers depending on evaluation yardsticks and can give completely different estimations to quality of operation of a amplifiers. Main of parameters used for the description of power audio amplifiers is following: a **gain**; **a bandwidt**; **a dynamic** (phase, phase-frequency, **peak** (amplitude)) **characteristic**; **linear** and **nonlinear distortions**; **efficiency**; **input characteristics** (impedance, current, voltage and power, impedance of a source of an input sound signal); **output characteristics** (impedance, current, voltage, output power); a **dinamic range**; **signal-to-noise ratio** and maximum ratings of electrical parameters.

The **gain Gv** (on a current, a voltage or power, depending on purpose of the amplifier) represents the logarithm of the ratio of signal output from a amplifier to signal input to the amplifier. The gain **Gv** can be expressed as a direct ratio (V/mV or V/μV), and in the logarithmic relation (in decibels -dB). The gain depends on value of external components, from resistance of loading Rl, input resistance Rin, a supply voltage Vcc, frequency and temperature.

The **frequency bandwidt Bw** - area of frequencies (a bandwidt from bottom limit frequency Fl up to top frequency Fh) within the gain changes no more than on ±3 dB, concerning gain measured on frequency 1 KHz. In the certain cases when the manufacturer wants to emphasize the expanded range of working frequencies of the amplifier at the improved non-uniformity frequency characteristics, the size of non-uniformity (1 dB, 0,5 dB etc.) is indicated also.

Instead of a frequency bandwidt, sometimes defined a frequency bandwidt at gain equal to unit or a power frequency bandwidt. The frequency bandwidt at gain equal to unit is an interval of frequencies on which borders the gain values equal to unit. The power frequency bandwidt is an interval of frequencies within the limits of which at the certain factor of distortions **k**, output power changes no more, than on ±3 dB in relation to output power on frequency in 1 KHz.

The **dinamic range** determines a ratio between maximum output and input tension of the amplifier. The ratio usually expresses in decibels and represents (in a theoretical case) a linear function.

The **frequency characteristics** determines relation of a gain of amplifier to frequency; **phase characteristics** - the phase shift of an output signal on relation to input signal (in frequency function of an input signal).

The **frequency - phase characteristic** summarizes frequency and phase characteristics of the amplifier in the field of a range of reproduced frequencies.

All amplifiers alter input signals, generally in two ways: they make them stronger (amplify) them, and they add characteristics which did not exist in the original signal. These undesirable characteristics are lumped together and called distortion. Noise can be considered a type of distortion.

One common type of distortion is **harmonic distortion**. Harmonics of a signal are signals which are related to the original (or fundamental) by an integer (non decimal) number. A pure tone (sinewave) signal has no harmonics; it consists of only one single frequency. If pure tone signal was applied to the input of an amplifier, we would (upon measurement with special test equipment) find that the output signal of the amplifier was no longer pure. Careful measurements would likely show that several “new” frequencies have appeared. These new frequencies are almost certainly to be integer multiples of the original tone; they are the harmonics of the original signal. In a good amplifier, the harmonics will be much weaker than the original tone. By much weaker, we mean on the order of a thousand times for decent amplifiers.

Intermodulation distortion is the second “major” type of distortion that is often specified for amplifiers. Intermodulation distortion is much more objectionable to the human ear, because it generates non-harmonically related “extra” signals which were not present in the original. Basically, two pure tones are simultaneously applied to the input of the amplifier. If the amplifier were perfect, the two tones (and only the two tones) would be present at the amplifier output. In the real world, the amplifier would have some harmonic distortion (as described above), but careful observation of the output signal (using laboratory equipment) would reveal that there are a number of new tones present which cannot be accounted for as a result of harmonic distortion. These “new” tones are called “beat products” or “sum and difference” frequencies, and are a result of the interaction of the two pure tones within the amplifier. No amplifier is perfect, all have some non linear characteristics. Whenever two signals are applied to a nonlinear system, new signals (in addition to the original two) are generated. For a good amplifier, the new signals are very small in relation to the two original tones.

All amplifiers are generally rated for **Total Harmonic Distortion** (or THD), usually at full power output over a given frequency band with a particular load. Good values are anything less than 0.5 %THD. When an amplifier is measured for THD, a pure tone is applied to the input and the output is measured with special test equipment. The energy of the pure tone is measured, and the energy of the harmonics is measured. Those two values are compared, and a THD rating is calculated. A THD rating of 1% means that the total energy of all the harmonics combined is one one-hundredth of the energy in the fundamental. Harmonic distortion (although certainly undesirable) is one of the more tolerable types of distortion as long as it is kept reasonably low. Distortion levels of 10% may be very tolerable.

At increase of input signal Uin the output voltage, a current and power are increased, but also the factor of nonlinear distortions simultaneously grows. Therefore, for reduction of nonlinear distortions target capacity of the amplifier are artificial limit in comparison with the greatest possible output power.

As **sensitivity** of the amplifier understand value of the sine wave input voltage, necessary for obtain of the maximal output power. Frequently, some manufacturers indicates value of a nominal input voltage. A nominal input voltage is a sine wave voltage applied to an input of the amplifier for obtain of nominal output power. It is meant, that the volume regulator of the amplifier should be exposed on the maximal value.

Besides linear and nonlinear distortions, any real amplifier generate the additional signals. Because of it, on an output of the amplifier there is a signal distinct from zero, even in absence of an entrance signal. This signal called as output noise and can be considered as the sum of infinite number of sine wave voltage (not only harmonious) including in a sound range of frequencies. Sources of internal noise of the amplifier are thermal noise of resistors, and also shot, flickering and thermal noise of active components (transistors and diodes). Quantitatively a value of noise on an output describe through effective value of noise Uno. As the voltage of noise grows simultaneously with a range of reproduced frequencies, it is necessary to specify frequencies within the limits of which measurements of noise on an output of the amplifier were made. If the range of frequencies is not underlined, own noise are measured within the limits of a working range of frequencies of the amplifier.

The range of change of a output voltage is determined by a difference between the maximal and minimal instant value of a voltage on an output of the amplifier. This parameter called sometimes a **peak output voltage** and designate Up-p (peak-to-peak).

There are many terms used to describe the **amplifier power ratings**- the maximal sinusoidal power, maximal continuous power, RMS power, music power (IHFM), peak power, instantaneous power. Depending on indicated term for output power, the same amplifier can have value which one differ in some times. Not resorting to the theories we shall mark that:

Maximal sinusoidal power- is the power delivered on optimal load (for the given amplifier), at a sine-wave input signal, when THD of the output signal reaches value of 10%.

Maximal continuous power- this same as maximal sinusoidal power and occurs under such name in the datasheets of USA and Japan manufacturers.

RMS power- (Root Mean Square power). In the simplified form is described as the power, giving on optimal load (for the given amplifier), at a sine-wave input signal, when output signal completely limits by an output stage of the amplifier and gains the square shape.

Musical power- IHFM (Institute of High Fidelity Manufactures) is the power delivered on optimal load (for the given amplifier), at a complex (musical) input signal, when THD of the output signal reaches value of 10%.

The peak power and instantaneous power describe extreme (critical) operation conditions of the amplifier and are specified basically in the advertising purposes.

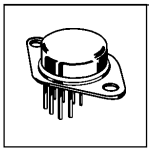
The **impedance of load Rl** has optimal value for each amplifier and determines a maximum output current (power) giving by the amplifier. If the impedance of load is less than a optimal value, a output current (accordingly output power) of the amplifier can exceed maximum rating and he can be shattered. If the impedance of load is more than optimal value, the output current (accordingly output power) of the amplifier will be less (under identical conditions of operation) than is specified for the given amplifier.

On a connection type of load it is possible to distinguish single ended (**SE**) and Bridged-Tied Loads (**BTL**) amplifiers. On a single ended amplifiers the load are connected between an amplifier output and ground (GND). Bridged amplifiers work basically as follows: a single input signal is applied to the amplifier. Internal to the amp, the input signal is split into two signals. One is identical to the original, and the second is inverted (sometimes called phase-flipped). The original signal is sent to one channel of the amp, and the inverted signal is applied to the second channel. Amplification of these two signals occurs just like for any other signal. The output results in two channels which are identical except one channel is the inverse of the other. The load is connected between the two amplifier output terminals. In words, one channel “pulls” one way while the second channel “pulls” in the opposite direction. This allows to delivered (at same load and at same power supply) in 3 times lot of power than at single ended amplifiers.

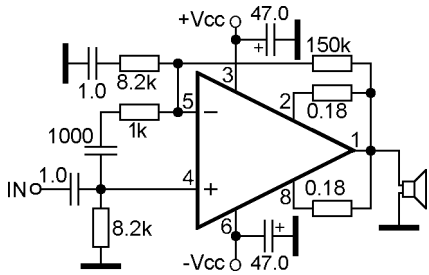
Due to improvements in the speed, power capacity and efficiency of modern semiconductor devices, the **class-D** amplifiers recently have received broad applying. Class-D amplifiers use a technique called pulse width modulation (sometimes combined with pulse frequency modulation). The input signal is converted to a sequence of pulses whose width at any time is proportional to the amplitude of the signal at that time. The frequency of the pulses is typically thirty or more times the highest frequency of interest in the input signal. The main advantages of a class- D amplifiers are efficiency and simplicity. Efficiencies are in the 80% to 90% range. Because the output pulses have a fixed amplitude, the switching elements (usually MOSFETs) are switched either on or off, rather than operated in linear mode. This means that very little power is dissipated by the transistors except during the very short interval between the on and off states. The wasted power is low because the instantaneous power dissipated in the transistor is the product of voltage and current, and one or the other is almost always close to zero.

This book proposes the short but full prezentation of the majority (about 5000) integrated circuits - power audio amplifiers that exist on the market; prezentation consisting from schematic diagrams (schematic of connections and (or) internal structure), short specification and basic electrical characteristics.

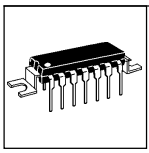
The schematic diagrams of integrated circuits with the identical terminal configurations (and connection) are arranged in the same place. They are not specifically equivalent (replacements) with each other (can have to different electrical characteristics and (or) type of case); for detection of equivalent, in any situation it is necessary to consult a electrical characteristics.



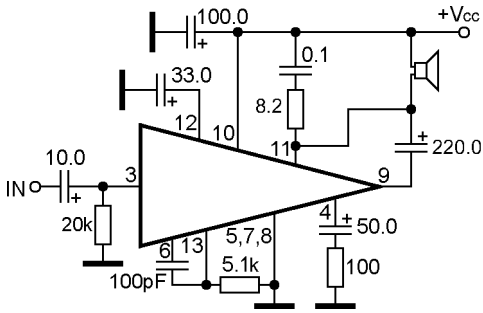
Power operational/audio amplifier



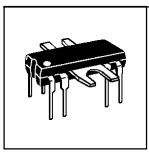
1468	OPA512SM
3571	PA01
3572	PA10
3573	PA10A
8510	PA12
8515	PA12A
8520	PA12H
8530	PA12M
OPA502BM	PA73
OPA502SM	PA73M
OPA511AM	TPA12
OPA512BM	TPA12A



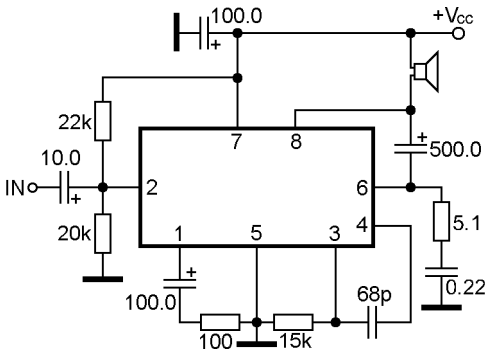
Power audio amplifier



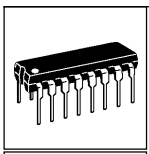
5G31A
5G31B
5G31C

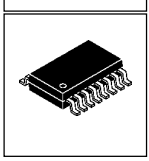


Power audio amplifier

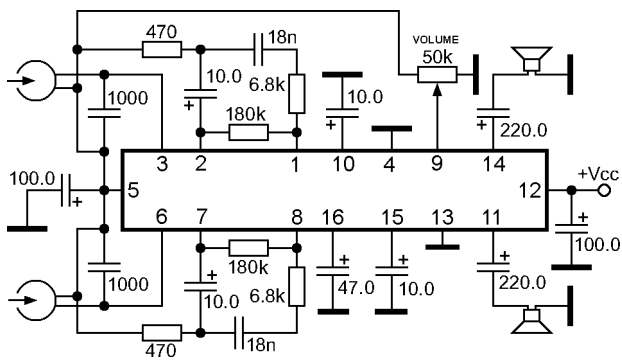


5G37

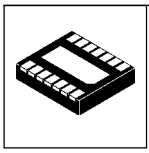




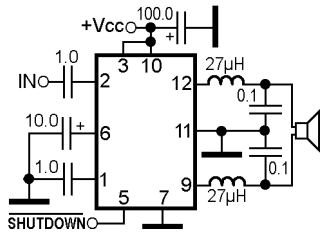
Dual playback preamplifier, volume control, power audio amplifier for headphone



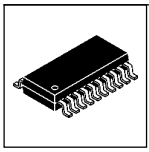
A1034P
AN7108
CXA1005P
CXA1034M
CXA1034P
CXA1634M
CXA1634P
KA22132



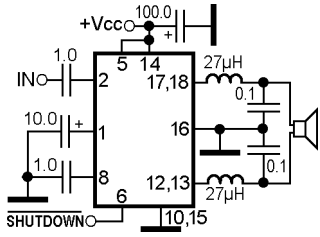
BTL class-D power audio amplifier with shutdown



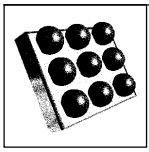
LM4668LD
LM4680SD



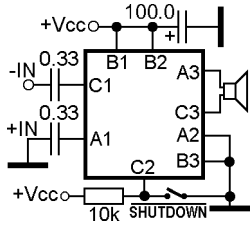
BTL class-D power audio amplifier with shutdown



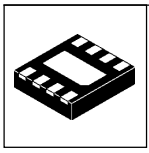
LM4668MH



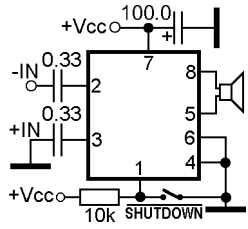
BTL class-D power audio amplifier with differential input, fixed gain and shutdown



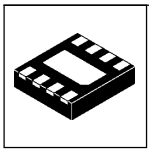
EUA2011HIR1	NCP2820FCT1G
LM4670ITL	NCP2820FCT2G
LM4670ITLX	NCP9004FCT1G
LM4671ITL	TPA2010D1YEF
LM4671ITLX	TPA2010D1YZF
LM4673TM	TPA2032D1YZF
LM4675TL	TPA2033D1YZF
NCP2820FCT1	TPA2034D1YZF



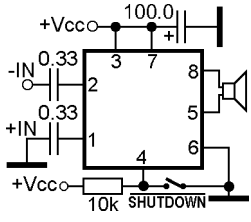
BTL class-D power audio amplifier with shutdown



LM4670SD

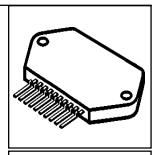


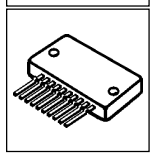
BTL class-D power audio amplifier with shutdown

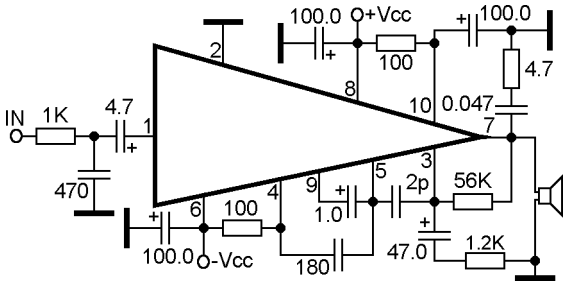


LM4673SD
LM4675SD

Power audio amplifier

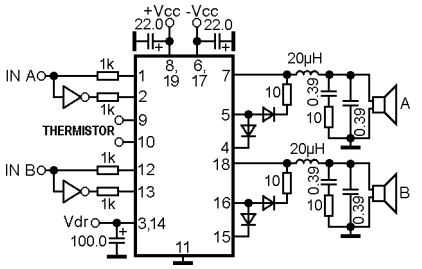






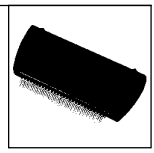
STK075G
STK077G
STK078G
STK080G
STK082G
STK083G
STK084G
STK085G
STK086G

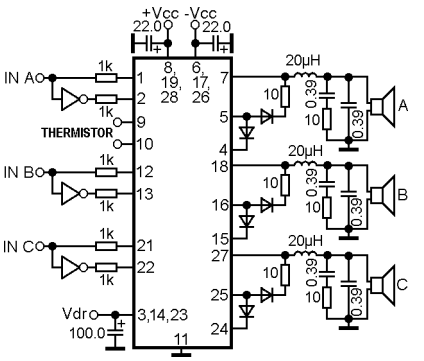
Dual class-D power audio amplifier



STK280-100
STK280-130

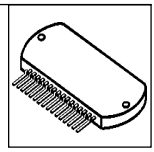
Triple class-D power audio amplifier

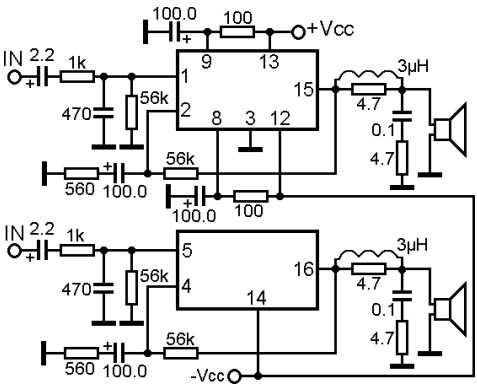




STK290-100
STK290-130

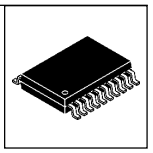
Dual power audio amplifier

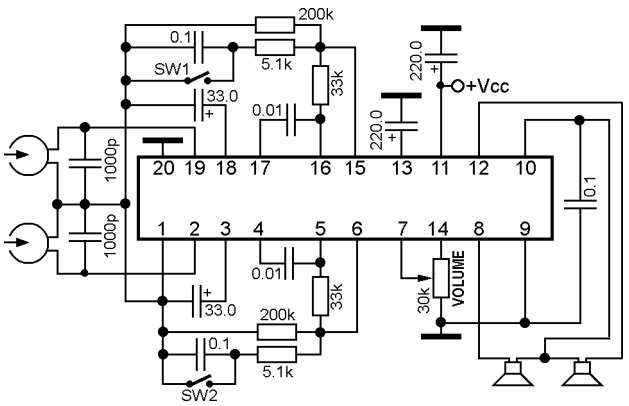




STK401-010
STK401-020 STK401-130
STK401-030 STK401-140
STK401-040 STK401-210
STK401-050 STK401-220
STK401-060 STK401-230
STK401-070 STK401-240
STK401-080 STK401-250
STK401-090 STK401-260
STK401-100 STK401-270
STK401-110 STK401-280
STK401-120 STK401-290

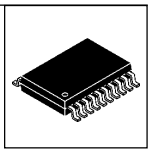
Dual playback preamplifier, power audio amplifier for headphone

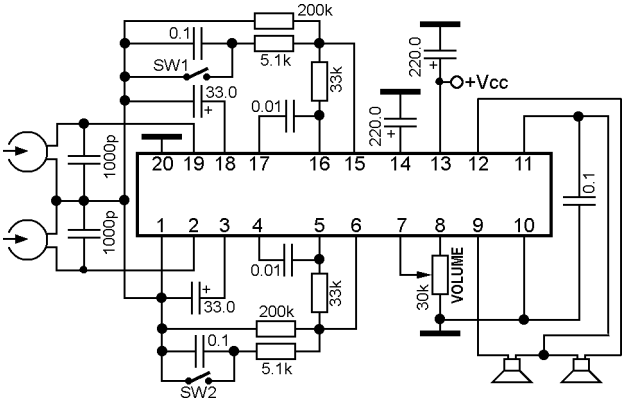




YD667

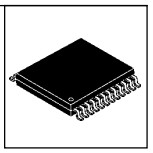
Dual playback preamplifier, power audio amplifier for headphone

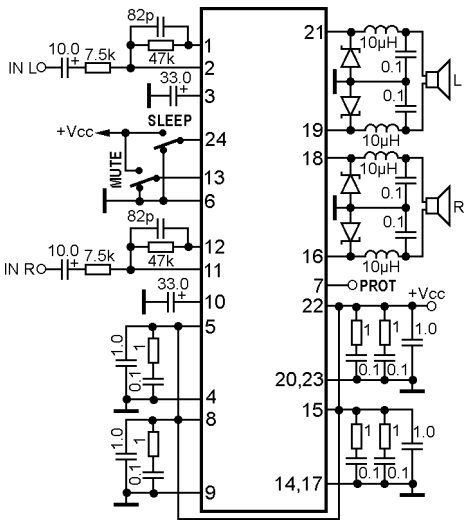




YD669

Dual BTL class-D power audio amplifier with mute and stand-by

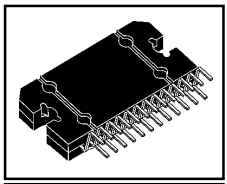


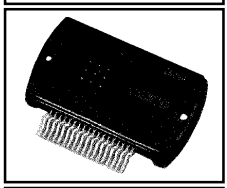


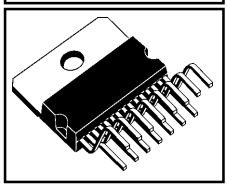
YDA131-EZ

Electrical characteristics

Type	Case	U_{cc}min	U_{cc}max	P_{out}max	R_l	I_{cc0}	I_{out}max	B_w	R_{in}	THD	G_v	Mnf.	Pg
µA706A	TABS-A	6V	14V	2.2W	4Ω	16mA	-	30Hz-18KHz	3MΩ	0.5%	46dB	Fch	200
µA706B	TABS-A	6V	16V	5.5W	4Ω	18mA	-	30Hz-18KHz	3MΩ	0.5%	46dB	Fch	200
µA7307	DIP-8	3V	16V	1.6W	8Ω	4mA	-	40Hz-18KHz	-	0.2%	-	Fch	200
µA759	TO220-5Z	±9V	±15V	2W	8Ω	12mA	-	40Hz-18KHz	-	0.2%	-	Fch	200
µA783	TABS-T-Q	4V	20V	7W	4Ω	12mA	2.5A	40Hz-20KHz	5MΩ	0.3%	37dB	Fch	6
µPC1001H	SIP2-10	7V	20V	4.5W	4Ω	28mA	2.5A	30Hz-18KHz	-	0.3%	50dB	Nec	73
µPC1020H	SIL-10H3	9V	17V	5.2W	4Ω	28mA	2.5A	30Hz-20KHz	-	0.4%	51.5dB	Nec	74
µPC1025H	SIP1-10A	9V	17V	4.8W	4Ω	28mA	2.5A	30Hz-18KHz	20kΩ	0.6%	51.5dB	Nec	71
µPC1030H	SIP6-10	9V	17V	5.8W	4Ω	35mA	2.5A	30Hz-20KHz	-	0.4%	55dB	Nec	75
µPC1154H	SIP3-10C	9V	17V	4.8W	4Ω	32mA	2.5A	30Hz-20KHz	-	0.3%	52dB	Nec	201
µPC1155H	SIP6-10	9V	17V	5.5W	4Ω	30mA	2.5A	30Hz-20KHz	-	0.5%	51.2dB	Nec	75
µPC1156H	SIP6-10	9V	17V	5.8W	4Ω	30mA	-	30Hz-20KHz	-	0.1%	-	Nec	75
µPC1177H	SIP3-12C	3.5V	10V	2x1W	4Ω	32mA	-	30Hz-18KHz	-	0.2%	-	Nec	201
µPC1181H3	SIP2-7	9.5V	18V	5.8W	4Ω	45mA	4.5A	30Hz-20KHz	33kΩ	0.3%	54dB	Nec	66
µPC1182H3	SIP2-7	9.5V	18V	5.8W	4Ω	45mA	4.5A	30Hz-20KHz	33kΩ	0.3%	54dB	Nec	66
µPC1185H2	SIP2-12	9.5V	18V	2x5.8W	4Ω	80mA	-	20Hz-20KHz	10kΩ	0.3%	54dB	Nec	77
µPC1188H	SIP2-10	±17V	±23V	20W	8Ω	60mA	3A	20Hz-20KHz	56kΩ	0.1%	40dB	Nec	83
µPC1212C	TABS3-8	3.5V	9V	1W	4Ω	15mA	-	30Hz-18KHz	10kΩ	1.5%	41dB	Nec	67
µPC1213C	TABS3-8	4.5V	11V	2.4W	4Ω	15mA	-	30Hz-18KHz	10kΩ	1.5%	45dB	Nec	67
µPC1218H	SIL-8	1.8V	5V	250mW	8Ω	23mA	-	30Hz-18KHz	-	0.2%	-	Nec	201
µPC1230H2	SIP1-12	9V	16V	20W	4Ω	90mA	-	20Hz-20KHz	-	0.1%	-	Nec	79
µPC1238	TO220-5Z	±6V	±15V	8W	8Ω	60mA	2.5A	20Hz-20KHz	47kΩ	1%	20dB	Nec	7
µPC1238H	TO220-5H	±6V	±15V	8W	8Ω	60mA	2.5A	20Hz-20KHz	47kΩ	1%	20dB	Nec	7
µPC1241H	SIP1-8B	9V	16V	5.8W	4Ω	45mA	-	30Hz-20KHz	-	0.1%	51dB	Nec	87
µPC1242H	SIP1-8B	9V	16V	5.8W	4Ω	45mA	-	30Hz-20KHz	-	0.1%	51dB	Nec	87
µPC1260G	SOP-20	1.8V	5V	2x40mW	32Ω	8mA	-	20Hz-20KHz	-	0.2%	-	Nec	202
µPC1263C2	TABS3-14A	3V	16V	2x2W	8Ω	10mA	-	30Hz-20KHz	5MΩ	0.8%	34dB	Nec	62
µPC1274V	SIP1-14	9V	16V	20W	4Ω	90mA	-	20Hz-20KHz	-	0.2%	-	Nec	202
µPC1277H	SIP2-12	5V	16V	2x4.2W	4Ω	45mA	-	30Hz-20KHz	-	0.2%	-	Nec	202
µPC1278H	SIP2-12	5V	16V	2x2.5W	4Ω	43mA	-	30Hz-18KHz	-	0.2%	-	Nec	202
µPC1280V	SIP1-15	9V	16V	20W	4Ω	90mA	-	20Hz-20KHz	50kΩ	0.2%	51dB	Nec	202
µPC1288V	SIP2-14	6V	20V	2x7W	4Ω	23mA	-	20Hz-20KHz	-	0.5%	-	Nec	87
µPC1308V	SIP3-14A	9V	16V	18W	4Ω	90mA	-	20Hz-20KHz	45kΩ	0.5%	44dB	Nec	202
µPC131	TABS3-14A	6V	13V	2x1.8W	4Ω	20mA	-	30Hz-18KHz	5MΩ	0.4%	34dB	Nec	62
µPC1310V	SIP3-14A	9V	16V	2x5.8W	8Ω	80mA	-	20Hz-20KHz	-	0.2%	-	Nec	203
µPC1316C	TABS3-14A	3V	9V	2x2W	8Ω	16mA	-	30Hz-18KHz	5MΩ	1.6%	41dB	Nec	62
µPC1318AV	SIP3-14A	9V	16V	16W	4Ω	80mA	-	30Hz-18KHz	45kΩ	0.3%	38dB	Nec	203
µPC1321V	SIP6-15A	9V	16V	20W	8Ω	120mA	-	20Hz-20KHz	-	0.2%	-	Nec	203
µPC1331V	SIP2-14	5V	12V	2x2.2W	8Ω	25mA	-	30Hz-18KHz	-	0.2%	-	Nec	203
µPC1332V	SIP2-14	7V	16V	2x4W	8Ω	30mA	-	30Hz-20KHz	-	0.2%	-	Nec	203
µPC1335V	SIP2-14	6V	20V	2x7W	8Ω	23mA	-	20Hz-20KHz	-	0.5%	-	Nec	87
µPC1350C	TABS3-14B	3.5V	10V	450mW	8Ω	20mA	-	30Hz-18KHz	28kΩ	0.8%	46.8dB	Nec	65
µPC2002	TO220-5	8V	18V	8W	2Ω	45mA	3A	30Hz-20KHz	150kΩ	0.1%	40dB	Nec	57
µPC2002H	TO220-5H	8V	18V	8W	2Ω	45mA	3A	30Hz-20KHz	150kΩ	0.1%	40dB	Nec	57
µPC2002V	TO220-5Z	8V	18V	8W	2Ω	45mA	3A	30Hz-20KHz	150kΩ	0.1%	40dB	Nec	57
µPC2005H	SIP1-11Z	8V	18V	2x10W	2Ω	65mA	3.5A	30Hz-20KHz	70kΩ	1%	50dB	Nec	6
µPC2005V	SIP1-11Z	8V	18V	2x10W	2Ω	65mA	3.5A	30Hz-20KHz	70kΩ	1%	50dB	Nec	6
µPC206	TABS3-14A	9V	20V	1.5W	8Ω	4.7mA	-	30Hz-18KHz	60kΩ	3%	42dB	Nec	69
µPC20C	TABS3-14A	9V	20V	1.5W	8Ω	4.7mA	-	30Hz-18KHz	60kΩ	3%	42dB	Nec	69
µPC2500AH	SIP2-12	9V	16V	15W	4Ω	75mA	-	20Hz-20KHz	20kΩ	0.12%	40dB	Nec	204
µPC41C	TABS3-14B	3V	9V	1W	4Ω*	12mA	-	40Hz-16KHz	20kΩ	0.5%	58dB	Nec	70
µPC563	SIP3-10C	4V	20V	6W	4Ω	20mA	-	30Hz-20KHz	-	0.2%	-	Nec	201
µPC571C	SDIP-14A	±7V	±15V	6.5W	8Ω	22mA	2A	20Hz-20KHz	20kΩ	0.5%	46dB	Nec	70
µPC575C2	TABS3-8	9V	17V	2W	8Ω	12mA	1.4A	30Hz-18KHz	-	0.15%	52dB	Nec	65
µPC576H	SIL-10H3	9V	24V	3.5W	8Ω	35mA	1.5A	30Hz-18KHz	20kΩ	0.65%	52dB	Nec	65
µPC578C	PDIP-14	±9V	±15V	7W	8Ω	22mA	2A	30Hz-20KHz	20kΩ	0.5%	45dB	Nec	201
1468	TO3-8	±10V	±45V	50W	4Ω	25mA	-	20Hz-20KHz	-	0.08%	110dB*	Isl	5
3571	TO3-8	±10V	±40V	50W	4Ω	21mA	-	20Hz-20KHz	-	0.06%	92dB	BB	5
3572	TO3-8	±10V	±45V	60W	4Ω	21mA	-	20Hz-20KHz	-	0.06%	88dB	BB	5
3573	TO3-8	±10V	±50V	50W	4Ω	25mA	-	20Hz-20KHz	-	0.06%	88dB	BB	5
5G31A	TABS1-14	6V	12V	400mW	8Ω	15mA	500mA	40Hz-17KHz	-	0.5%	-	-	5
5G31B	TABS1-14	6V	15V	700mW	8Ω	20mA	700mA	40Hz-17KHz	-	0.5%	-	-	5
5G31C	TABS1-14	6V	18V	1W	8Ω	30mA	1A	40Hz-17KHz	-	0.5%	-	-	5
5G37	TABS2-8	6V	18V	2W	8Ω	30mA	1.2A	40Hz-17KHz	-	0.5%	-	-	5
8510	TO3-8	±10V	±25V	50W	4Ω	20mA	-	20Hz-20KHz	-	0.06%	113dB*	Isl	5
8515	TO3-8	±10V	±30V	50W	4Ω	20mA	-	20Hz-20KHz	-	0.06%	113dB*	Isl	5
8520	TO3-8	±12V	±50V	60W	4Ω	18mA	-	20Hz-20KHz	-	0.06%	98dB	Isl	5
8530	TO3-8	±12V	±50V	60W	4Ω	18mA	-	20Hz-20KHz	-	0.06%	98dB	Isl	5







Case drawings
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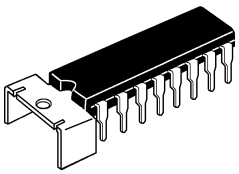
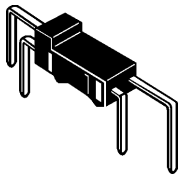
16-DIP-F



206A



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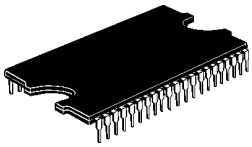

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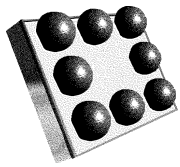
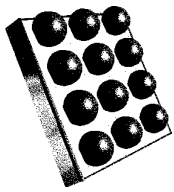


BGA-9
WCSP-9

BGA-12



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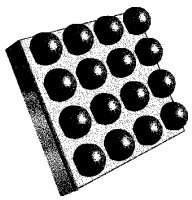

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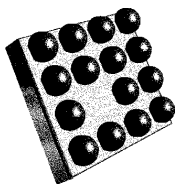

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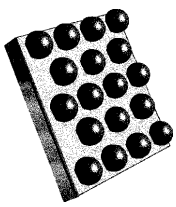

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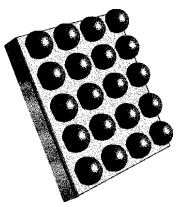

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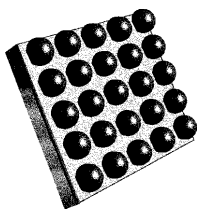
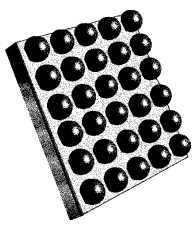


BGA-30



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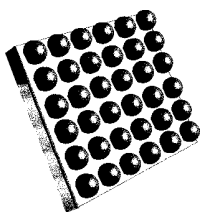

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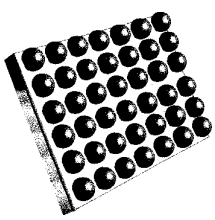

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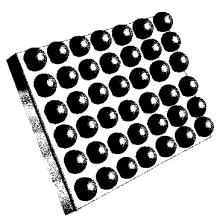

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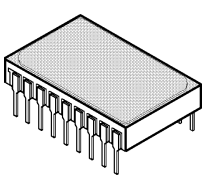

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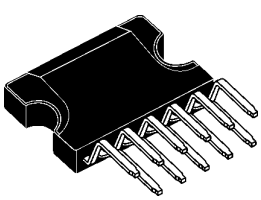

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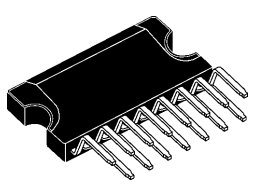

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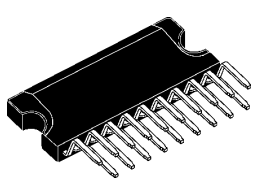

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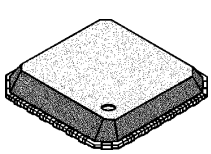
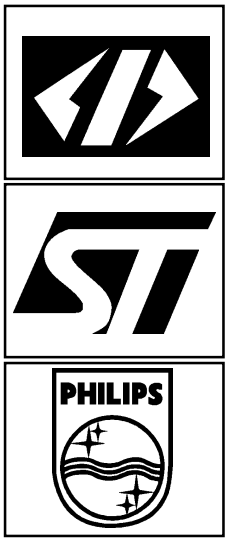




Logos, contact info and web-adresses of integrated circuits-power audio amplifiers manufacturers

AD- Analog Devices
One Technology Way, Norwood, MA 02062, USA. Phone: 781/329-4700
http://www.analog.com

All- Allegro MicroSystems Inc.
115 Northeast Cutoff, Box 15036 Worcester, MA 01615, USA. Phone: +1-508-853-5000
http://www.allegromicro.com

Amc - AMIC Technology, Inc.
No. 2 Li-Hsin 6th Road, Science-based industrial Park, Hsin-Chu City, 300, Taiwan
Phone: +886 3567 9966
www.amictechnology.com

Ana- Anachip Corp.
2F, No.24-2, Industry E. Rd. IV, Science-Based Industrial Park, Hsinchu 300, Taiwan
Phone: +886-3-5678234
www.anachip.com.tw

Ang- Angstrem
Moscow, Zelenograd, 103460, Russia. Phone: (095) 531-49-06
http://www.angstrem.ru

Anp- ANPEC Electronics Corp.
5F, No. 2 Li-Hsin Road, SBIP, Hsin-Chu, Taiwan, R.O.C. Phone: 886-3-5642000
www.anpec.com.tw

Apg- Apogee Technology, Inc.
129 Morgan Drive, Norwood, MA 02062, USA. Phone: (781) 551-9450
http://www.apogeemems.com

Apx- Apex Microtechnology Corp.
5980 North Shannon Road, Tucson, Arizona 85741, USA. Phone: 1 (800) 546-2739
http://www.apexmicrotech.com

Asm- Austria microsystems AG
A-8141 Schloss Premstaetten, Austria. Phone: +43 (0) 3136 500 0
http://www.austriamicrosystems.com

Avi- Avic Electronics Corp.
(There is no accesible padding information)
http://www.avictek.com

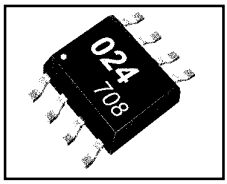
Ban- Baneasa SA (Is not a current ICs manufacturer)
Erou Iancu Nicolae nr.32, sect. 2, Bucuresti, Romania. Phone: 401/230-4050

BB- Burr-Brown Corp. (Merger by Texas Instruments)
PO Box 11400, 6730 S. Tucson Blvd., Tucson, AZ 85706 USA. Phone: 520/746-7365
http://www.burr-brown.com

Chm- Champion Microelectronic Corporation
5F, No. 11, Park Avenue II, Hsinchu Science-based Industrial Park, Hsinchu city, Tiwan
Phone: +886-3-5679979
http://www.champion-micro.com

Crl- Cirrus Logic, Inc.
P.O. Box 17847, Austin, Texas 78760, USA. Phone: (512) 445 7222
http://www.cirrus.com

Csm- Chengdu Sino Microelectronics System Co., Ltd.
2nd floor, Building D, Science & Technology Industrial Park, 11 Gaopeng Avenue, Chengdu High-Tech Zone, Chengdu City, Sichuan Province, P.R.China. Phone: +86-28-8517-7737
http://www.csmsc.com



SMD marking codes for power audio amplifiers in SMD cases

SMD-codes

SMD code	Type	Poutmax	RL	Case	Pag.
005	FAN7005MUX	2x300mW	8-32Ω	MSOP-8	92
005	FAN7005MU	2x300mW	8-32Ω	MSOP-8	92
024	FAN7024MPX	675mW	8Ω	LLP-10	93
024	FAN7024MU	675mW	8Ω	MSOP-8	34
024	FAN7024MUX	675mW	8Ω	MSOP-8	34
1166	LT1166CN8	60W*	4Ω	DIP-8	172
1166	LT1166CS8	60W*	4Ω	SOP-8	172
2000D1	TPA2000D1GQC	2W	4Ω	BGA-48	344
2000D1	TPA2000D1PW	2W	4Ω	SOP-16	344
2000D1	TPA2000D1TPWRQ1	2W	4Ω	SOP-16	344
2000D2	TPA2000D2PWP	2x2W	3Ω	SOP-24	34
2001D1	TPA2001D1GQC	1W	8Ω	BGA-48	344
2001D1	TPA2001D1PW	1W	8Ω	SOP-16	344
2005A	EUA2005JIR1	1.5W	8Ω	DFN-8	345
2131	TA2131FLG	2x8mW	16Ω	QFN-24	274
301	TPA301D	350mW	8Ω	SOP-8	38
311	TPA311D	250mW	8Ω	SOP-8	35
3541	BH3541F	2x62mW	16Ω	SOP-8	38
3544	BH3544F	2x62mW	16Ω	SOP-8	38
3547	BH3547F	2x77mW	16Ω	SOP-8	38
482I	TS482ID	2x100mW	16Ω	SOP-8	38
482I	TS482IT	2x100mW	16Ω	SOP-8	38
482I	TS482IST	2x100mW	16Ω	MSOP-8	38
482I	TS482IQT	2x100mW	16Ω	LLP-8	38
4871	TS4871IS	1W	8Ω	MSOP-8	34
4871	TS4871IST	1W	8Ω	MSOP-8	34
4871	TS4871IQT	1W	8Ω	DFN-8	34
4871I	TS4871ID	1W	8Ω	SOP-8	34
4871I	TS4871IDT	1W	8Ω	SOP-8	34
4872	TS4872IJT	1W	8Ω	BGA-9	35
4890	TS4890ID	1W	8Ω	SOP-8	34
4890	TS4890IDT	1W	8Ω	SOP-8	34
4890	TS4890IQT	1W	8Ω	DFN-8	34
4890I	TS4890IS	1W	8Ω	MSOP-8	34
4890I	TS4890IST	1W	8Ω	MSOP-8	34
4894	NCP4894MNR2G	1.8W	8Ω	DFN-10	40
4894	NCP4894MNR2	1.8W	8Ω	DFN-10	40
4913	LM4913MH	2W	4Ω	SOP-10	166
4914	LM4914MH	1W	8Ω	MSOP-10	166
4972	TS4972IJT	1.2W	8Ω	BGA-9	35
54	LM4854IBL	1.9W+2x85mW	4(8)Ω	BGA-12	159
55	LM4855IBL	1.1W+2x115mW	4(8)Ω	BGA-20	159
56	TS4956EIJT	450+65+2x32mW	8(16)Ω	BGA-18	357
6020A2	TPA6020A2RGW	2x2.8W	3Ω	LLP-20	352
6100A2	TPA6100A2D	2x50mW	16Ω	SOP-8	92
6101A2	TPA6101A2D	2x50mW	16Ω	SOP-8	92
6102A2	TPA6102A2D	2x50mW	16Ω	SOP-8	92
6111A2	TPA6111A2D	2x150mW	16Ω	SOP-8	40
6120A2	TPA6120A2DWP	2x80mW	16Ω	SOP-20	353
62	TS4962MEIJT	3W	4Ω	BGA-9	357
7005	FAN7005MX	2x300mW	8-32Ω	SOP-8	40
7005	FAN7005M	2x300mW	8-32Ω	SOP-8	40
701	TPA701D	700mW	8Ω	SOP-8	38
711	TPA711D	700mW	8Ω	SOP-8	35
721	TPA721D	700mW	8Ω	SOP-8	38
95	TS4995EIJT	1.2W	8Ω	BGA-9	359
A0710	APA0710XA	1.1W	8Ω	MSOP-8-P	35
A0711	APA0711XA	1.1W	8Ω	MSOP-8-P	34
A2	LM4665ITL	1W	8Ω	BGA-9	148
A2	LM4665ITLX	1W	8Ω	BGA-9	148
A2011	EUA2011JIR1	3W	8Ω	DFN-8	345
A3010	APA3010XA	3.3W	3Ω	MSOP-8-P	38
A3011	APA3011XA	3.3W	3Ω	MSOP-8-P	34
A3012	APA3012XA	3W	3Ω	MSOP-8-P	38
A4890	EUA4890MIR1	1W	8Ω	MSOP-8	34

SMD-codes

SMD code	Type	Poutmax	RL	Case	Pag.
A4890	EUA4890MIR0	1W	8Ω	MSOP-8	34
A4890	EUA4890JIR1	1W	8Ω	DFN-8	34
A4890	EUA4890JIR0	1W	8Ω	DFN-8	34
A51	TS4851IJT	1W+2x25mW	8(32)Ω	BGA-16	158
A6019A	EUA6019QIR1	2x3W	3Ω	TSSOP-24	92
A6019A	EUA6019QIT1	2x3W	3Ω	TSSOP-24	92
A6021AA	EUA6021AIIT1	2x2.5W	4Ω	DIP-20	92
A6027A	EUA6027QIR1	2x2W	3Ω	TSSOP-20	36
A6204	EUA6204JIR1	1.6W	3Ω	DFN-8	54
A6204	EUA6204JIR0	1.6W	3Ω	DFN-8	54
A6204	EUA6204MIR0	1.6W	3Ω	MSOP-8	54
A6204	EUA6204MIR1	1.6W	3Ω	MSOP-8	54
A6210	EUA6210MIR1	2x64mW	16Ω	MSOP-8	166
A6278F	KIA6278F	720mW	4Ω	SOP-8	111
A6412A	EUA6412QIR1	2X2.6W	3Ω	TSSOP-24	35
A6412A	EUA6412QIT1	2X2.6W	3Ω	TSSOP-24	35
A72	APA0712HA	1.4W	8Ω	WCSP-9	35
A73	TS4973IJT	1.2W	8Ω	BGA-9	358
A74	TS4974IQT	1W	8Ω	LLP-10	358
A75	TS4975EIJT	2x120mW	16Ω	BGA-16	358
A85	TS4985EIJT	2x1.2W	8Ω	BGA-15	358
A9	LM4855ITL	1.1W+2x115mW	4(8)Ω	BGA-20	159
A90	TS4990IJT	1.2W	8Ω	BGA-9	35
A94	TS4994IJT	1.2W	8Ω	BGA-9	164
AAA	TPA301DGN	350mW	8Ω	MSOP-8	38
AAA	MAX4368ETA	330mW	16Ω	LLP-8	179
AAAA	MAX9718AEUB	1.4W	4Ω	SOP-10	40
AAAB	MAX9718BEUB	1.4W	4Ω	SOP-10	40
AAAC	MAX9718CEUB	1.4W	4Ω	SOP-10	40
AAAD	MAX9718DEUB	1.4W	4Ω	SOP-10	40
AAAP	MAX9716EUA	1.4W	4Ω	SOP-8	34
AAAQ	MAX9717AEUA	1.4W	4Ω	SOP-8	164
AAAR	MAX9717BEUA	1.4W	4Ω	SOP-8	184
AAAT	MAX9717DEUA	1.4W	4Ω	SOP-8	184
AAB	TPA311DGN	250mW	8Ω	MSOP-8	35
AAB	MAX4367ETA	330mW	16Ω	LLP-8	179
AAC	TPA102DGN	2x150mW	8Ω	MSOP-8	92
AAC	MAX4366ETA	330mW	16Ω	LLP-8	38
AACB	MAX9711ETC	3W	4Ω	LLP-12	183
AAD	TPA112DGN	2x150mW	8Ω	MSOP-8	38
AADI	TPA6203A1GQV	1.25W	8Ω	BGA-9	354
AADZ	MAX9721AETC	2x20mW	16Ω	LLP-12A	186
AAE	TPA122DGN	2x150mW	8Ω	MSOP-8	40
AAEA	MAX9721BETC	2x20mW	16Ω	LLP-12A	186
AAEB	MAX9721CETC	2x20mW	16Ω	LLP-12A	186
AAEI	TPA6203A1ZQV	1.25W	8Ω	BGA-9	354
AAFI	TPA2005D1ZQY	1.4W	8Ω	BGA-15	345
AAG	BL6211TLX	1.25W	8Ω	BGA-9	54
AAI	MAX9712ETB	500mW	8Ω	LLP-10	180
AAIK	MAX4337EKA-T	2x40mW	32Ω	SOT23-8	38
AAIO	MAX4366EKA-T	330mW	16Ω	SOP-8	38
AAIP	MAX4367EKA-T	330mW	16Ω	SOP-8	179
AAIQ	MAX4368EKA-T	330mW	16Ω	SOP-8	179
AAK	MAX4366EBL-T	330mW	16Ω	BGA-8	179
AAL	MAX4367EBL-T	330mW	16Ω	BGA-8	179
AAM	MAX4368EBL-T	330mW	16Ω	BGA-8	179
AAN	MAX4369EBL-T	2x120mW	16Ω	BGA-9	179
AANI	TPA6205A1ZQV	1.25W	8Ω	BGA-9	354
AAOI	TPA6205A1DRB	1.25W	8Ω	LLP-8	354
AAPI	TPA6205A1DGN	1.25W	8Ω	SOP-8	354
AAS	MAX9717CEUA	1.4W	4Ω	SOP-8	184
AAV	MAX9718AETB	1.4W	4Ω	LLP-10	40
AAW	MAX4336EXT-T	40mW	32Ω	SOP-6	178
AAW	MAX9718BETB	1.4W	4Ω	LLP-10	40
AAX	MAX9722AETE	2x130mW	32Ω	LLP-16	187

Functional index

Single, < 1W output

Type	P_{out}max	R_L	Case	Page
NJU7081M	100mW	32Ω	SOP-8	215
NJU7081R	100mW	32Ω	MSOP-8	215
NJU7081RB1	100mW	32Ω	MSOP-8	215
NJU7081V	100mW	32Ω	MSOP-8	215
S1531G	100mW	4Ω	SOP-8	227
TDA8558	100mW	32Ω	DIP-8	324
TDA8558T	100mW	32Ω	SOP-8	324
TK17119Y	120mW	32Ω	SOP-8	53
LA4583M	120mW+2x34mW	16Ω	QFP-44	128
ECG1468	150mW	150Ω	SIL-7	81
LA6805M	150mW	16Ω	SOP-14	138
TA7066P	150mW	150Ω	SIL-7	81
TA7140P	150mW	150Ω	SIL-7	81
TA7220P	150mW	150Ω	SIL-10	277
TA7625F	150mW	4Ω	SOP-16	282
ULN3705M	150mW	32Ω	DIP-8	360
ULN3718BM	150mW	32Ω	SOP-8	361
ULN3718M	150mW	32Ω	DIP-8	361
TDA7236	16mW	32Ω	DIP-8	309
TDA7236D	16mW	32Ω	SOP-8	309
MSC1157MS-K	178mW	8Ω	SOP-8	207
MSC1157RS	178mW	8Ω	DIP-8	207
AN7085NS	200mW	8Ω	SOP-20	14
CXA1262N	200mW	32Ω	SOP-24	60
CXA1347N	200mW	32Ω	SOP-24	60
KA8602D	200mW	8Ω	SOP-8	108
KA8602N	200mW	8Ω	DIP-8	108
NJU8711V	200mW	8Ω	SOP-10	216
NJU8713V	200mW	8Ω	SOP-14	216
TA7331F	200mW	4Ω	SOP-16	281
TA7331P	200mW	4Ω	SIL-9	281
TK10417M	200mW	32Ω	SOP-8	334
IL5009D	220mW	32Ω	SOP-8	102
IL5009N	220mW	32Ω	DIP-8	102
M51503L	220mW	8Ω	SIL-8	174
BA515	230mW	4Ω	SIL-12	41
LA4510	240mW	32Ω	SIL-9C	123
µPC1218H	250mW	8Ω	SIL-8	201
BL34119D	250mW	8Ω	SOP-8	53
BL34119DTB	250mW	8Ω	DTB-8	53
BL34119P	250mW	8Ω	DIP-8	53
EA33X8548	250mW	8Ω	DIP-8	66
ECG1467	250mW	8Ω	SIL-8	81
GL386	250mW	8Ω	DIP-8	66
HWD2180M	250mW	8Ω	SOP-8	40
HWD2180N	250mW	8Ω	DIP-8	40
HWD2182M	250mW	8Ω	SOP-8	101
HWD2182MM	250mW	8Ω	MSOP-8	101
IL34119D	250mW	8Ω	SOP-8	53
IL34119N	250mW	8Ω	DIP-8	53
KIA6416F	250mW	16Ω	SOP-8	53
KIA6416P	250mW	16Ω	DIP-8	53
KIA6419F	250mW	16Ω	SOP-8	53
KIA6419P	250mW	16Ω	DIP-8	53
KTA6419F	250mW	16Ω	SOP-8	53
KTA6419P	250mW	16Ω	DIP-8	53
LM386M	250mW	8Ω	SOP-8	66
LM386M-1	250mW	8Ω	SOP-8	66
LM386MM-1	250mW	8Ω	SOP-8	66
LM386N	250mW	8Ω	DIP-8	66
LM386N-1	250mW	8Ω	DIP-8	66
LM4882M	250mW	8Ω	SOP-8	101
LM4882MM	250mW	8Ω	MSOP-8	101
LND386	250mW	8Ω	DIP-8	66
M5118L	250mW	8Ω	SIL-8	174

Single, < 1W output

Type	P_{out}max	R_L	Case	Page
M5218L	250mW	8Ω	SIL-8	174
MC3360P	250mW	16Ω	SIL-9	199
MC34119D	250mW	16Ω	SOP-8	53
MC34119DTB	250mW	16Ω	MSOP-8	53
MC34119P	250mW	16Ω	DIP-8	53
MFC4000B	250mW	16Ω	206A	200
NJM2113D	250mW	32Ω	DIP-8	53
NJM2113L	250mW	32Ω	SIL-8	53
NJM2113M	250mW	32Ω	SOP-8	53
NJM2113V	250mW	32Ω	MSOP-8	53
NJM2135D	250mW	32Ω	DIP-8	53
NJM2135E	250mW	32Ω	SOP-8	53
NJM2135L	250mW	32Ω	SIL-8	53
NJM2135M	250mW	32Ω	MSOP-8	53
NJM2135R	250mW	32Ω	MSOP-8	53
NJM2135V	250mW	32Ω	MSOP-8	53
NJM2149D	250mW	32Ω	DIP-8	53
NJM2149M	250mW	32Ω	SOP-8	53
NJM2149R	250mW	32Ω	MSOP-8	53
NJM2149RB1	250mW	32Ω	MSOP-8	53
NJM2149V	250mW	32Ω	MSOP-8	53
NJM386D	250mW	8Ω	DIP-8	66
NJM386L	250mW	8Ω	SIL-8	66
NJM386M	250mW	8Ω	SOP-8	66
NTE1467	250mW	8Ω	SIL-8	81
NTE823	250mW	8Ω	DIP-8	66
SK4839	250mW	8Ω	SIL-8	81
SK9210	250mW	8Ω	DIP-8	66
SL630C	250mW	40Ω	TO-100	236
TPA311D	250mW	8Ω	SOP-8	35
TPA311DGN	250mW	8Ω	MSOP-8	35
U4083B	250mW	32Ω	SOP-8	53
U4083B-AFP	250mW	32Ω	SOP-8	53
XR-T65119	250mW	32Ω	SOP-8	53
YD34119A	250mW	8Ω	SOP-8	53
YD8602	250mW	32Ω	SOP-8	108
КА1436УН1	250mW	16Ω	DIP-8	53
КР1064УН2	250mW	16Ω	DIP-8	53
КР1436УН1	250mW	16Ω	DIP-8	53
ЭКР1436УН1	250mW	8Ω	SOP-8	53
LM4900LD	265mW	8Ω	LLP-8	34
LM4900M	265mW	8Ω	SOP-8	34
LM4900MM	265mW	8Ω	MSOP-8	34
LM4902LD	265mW	8Ω	LLP-8	34
LM4902MM	265mW	8Ω	MSOP-8	34
TK10416M	280mW	32Ω	SOP-8	334
LM4930ITL	300+2x25mW	8(32)Ω	BGA-36	168
NJM2128M	300mW	8Ω	SOP-16	213
NJM2166E	300mW	8Ω	SOP-14	214
NJM2166EE	300mW	8Ω	SOP-14	214
NJM2166R	300mW	8Ω	SOP-10	214
NJM2166V	300mW	8Ω	MSOP-14	214
BA5386	320mW	8Ω	DIP-8	51
KA386D	325mW	8Ω	SOP-8	66
KA386S	325mW	8Ω	SIL-9D	105
LM389N	325mW	8Ω	DIP-18	144
S1A0386A01-S0B0	325mW	8Ω	SOP-8	66
BA546	330mW	8Ω	SIL-9	42
ECG1627	330mW	8Ω	SIL-9	42
MAX4366EBL-T	330mW	16Ω	BGA-8	179
MAX4366EKA-T	330mW	16Ω	SOP-8	38
MAX4366ETA	330mW	16Ω	LLP-8	38
MAX4366EUA	330mW	16Ω	MSOP-8	38
MAX4367EBL-T	330mW	16Ω	BGA-8	179
MAX4367EKA-T	330mW	16Ω	SOP-8	179

Alphanumeric index

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