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A subsidiary of TT electronics plc

Issue 1

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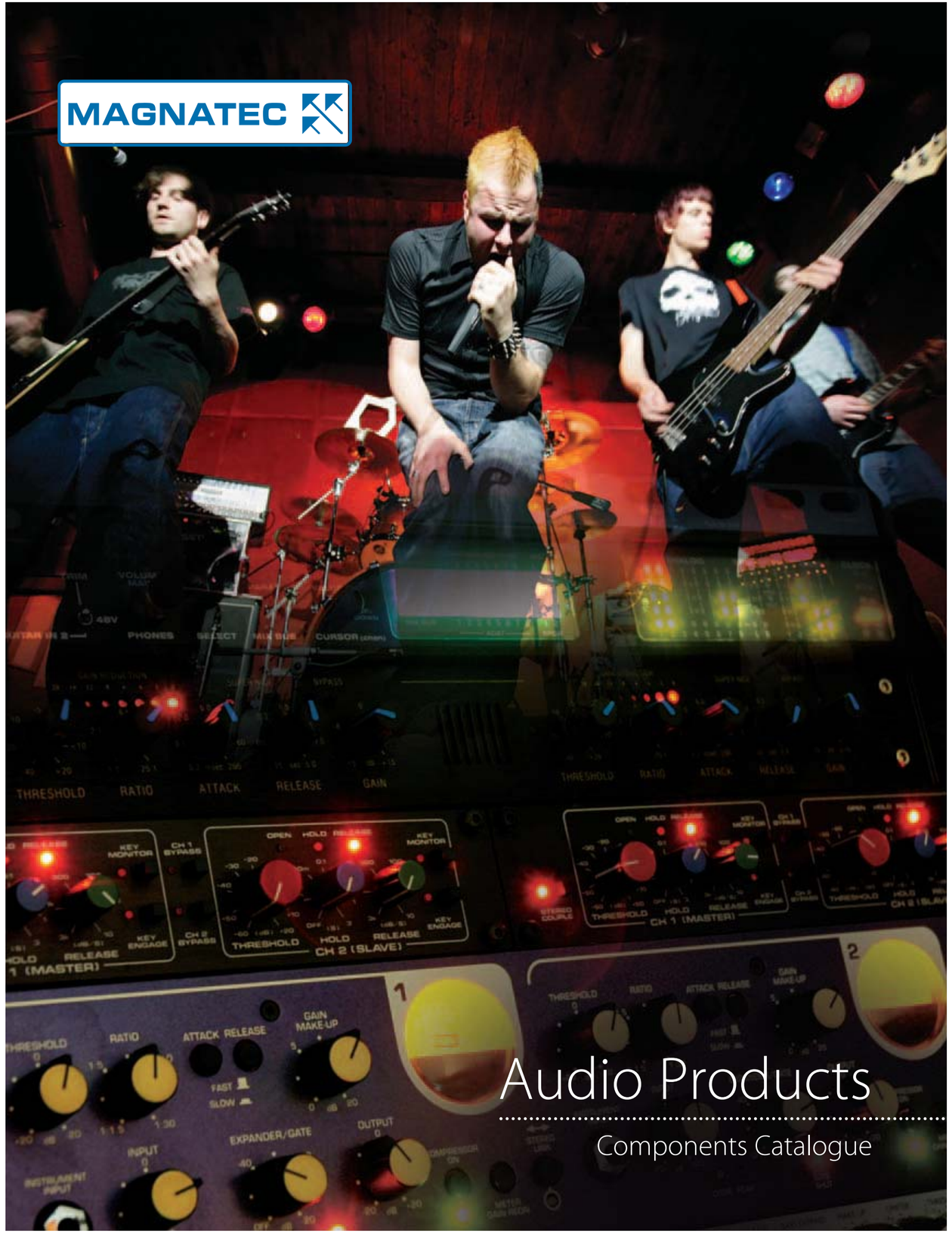


Audio Products

Components Catalogue

Introduction

We have selected the very best components from around the world for this, our latest Audio Catalogue. Our team of designers and engineers have worked extremely hard to ensure that all of the products within represent outstanding performance, value, and in many cases offer unique and exciting solutions for your audio applications.

From outstanding ALFET lateral MOSFETs, to the new contactless TriboLOGIX fader, we are proud to present you with some of the latest, groundbreaking and technological advances in audio design to date.

Whatever your intended application, you can be confident that we have the technology, the knowledge and the support to make it happen.

Our Pedigree:

Magnatec is an applications-focused company and has in-depth knowledge of the power semiconductor market - what device specifications are available, latest product developments, price trends and product availability.

As a result we are able to offer the most suitable part – whether you want a device for a new design, a second source to an existing part or a substitute for a discontinued device, Magnatec can help ensure that the solution is cost-effective, efficient, on-time and 100% reliable in operation.

Magnatec engineers have semiconductor experience as well as power engineering skills, and understand the internal working of each semiconductor component. Because of this we can help troubleshoot system problems in great depth, and can advise when a custom product might best suit your needs. Naturally we can then work with you to define semiconductor specifications and arrange production, if required.

Magnatec holds franchises from the leading manufacturers of power semiconductor products. This means we can supply almost any power system semiconductor, and can offer impartial advice on the best part for your system.

Magnatec also holds extensive product stocks, and offers unrivalled flexibility in delivery. Coupled to an experienced, dedicated customer service and distribution team, we aim to ensure customers get the product they want when they need it - without exception.

Regards,

Andrew Deacon
Managing Director
Semelab Limited

Contents

MAGNATEC

ALFET®

Power Amplification

Lateral Mosfets

Advantages

Specifically designed for audio power amplifier output stage applications, ALFET Mosfets are an exclusive new range of devices with outstanding performance and a minimal footprint. They offer superb sonic characteristics and with the features listed below its not hard to see how we can help you to reduce size, cut costs and add real quality and functionality to your design.

Applications:

- Professional Audio Amplifiers
- Home Cinema
- Active Speakers and subwoofers
- Instrument amplifiers
- High power car audio

ALFET Mosfets have the following advantages:

- A wide safe operating area (SOA) and absence of secondary breakdown
- Reliable and robust performance when compared to bipolar solutions
- Simplified protection saving cost & reducing complexity
- Improvement of amplifier performance with awkward loads
- Oscillation-free operation on double-die devices

ALFET Mosfets also have a negative temperature coefficient and completely thermally stable bias point without the need for emitter resistors, as used in bipolar amplifiers.

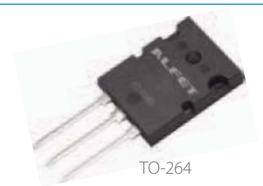
Advanced technical features include:

- Simplified drive circuitry requirements through high impedance gate
- Inherent output anti-parallel diodes
- Excellent thermal characteristics
- Single live heatsink capability (source connected case)
- Very high bandwidth and slew rate
- No high frequency cross conduction
- Easy paralleling (devices available in selected categories to enhance paralleling performance)
- Soft clipping performance

Product Line Up

	Part Number	Polarity	V_{DSS}(V)	Current ID(A)	PD(W)	Package	Comment
	ALF08N16V	N-channel	160	8	125	TO-247	
	ALF08P16V	P-channel	160	8	125	TO-247	
	ALF08N16K	N-channel	160	8	125	TO-3	
	ALF08P16K	P-channel	160	8	125	TO-3	
	ALF16N16W	N-channel	160	16	250	TO-264	
	ALF16P16W	P-channel	160	16	250	TO-264	
	ALF16N16K	N-channel	160	16	250	TO-3	
	ALF16P16K	P-channel	160	16	250	TO-3	
NEW	ALF08NP16V5	N&P	160	+/-8	TBD	TO-247-5L	In Development
	ALF08N20V	N-channel	200	8	125	TO-247	
	ALF08P20V	P-channel	200	8	125	TO-247	
	ALF08N20K	N-channel	200	8	125	TO-3	
	ALF08P20K	P-channel	200	8	125	TO-3	
	ALF16N20W	N-channel	200	16	250	TO-264	
	ALF16P20W	P-channel	200	16	250	TO-264	
	ALF16N20K	N-channel	200	16	250	TO-3	
	ALF16P20K	P-channel	200	16	250	TO-3	
NEW	ALF08NP20V5	N&P	200	+/-8	TBD	TO-247-5L	In Development

Package Styles


TO-264


TO-247


TO-3

Amplifier Modules

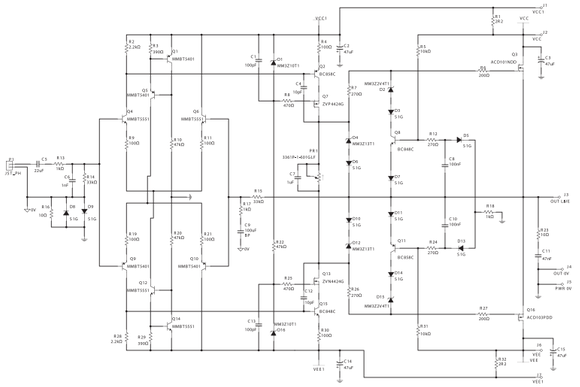
Switched Mode Power Supply

Currently under development are a range of high quality power amplifier modules utilising ALFET lateral MOSFETs. They will be available in a range of power outputs as a built PCB module solution. The initial range will have the following features:

- Power ratings from 100 to 750W rms output
- Excellent THD characteristics
- High reliability through lateral MOSFETs
- Fully protected
- High slew rate & bandwidth
- Small footprint
- Low Cost

In addition, a range of accompanying switched mode power supplies will be available to give a complete amplifier solution as a built PCB module level. This power supply features:

- Planar transformers and low profile capacitors so that a supply for a 2x750rms solution can fit in a 1U size rack
- High efficiency
- High peak current delivery
- Overload protection
- Low cost
- Compact & Lightweight
- EMC approval

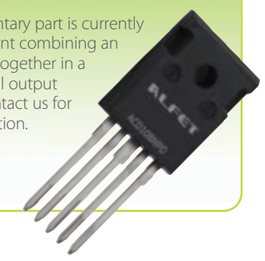


Application circuit available - see Magnatec website
http://www.semelab.com/Magnatec

NEW PRODUCT

New ACD108NPD N + P-channel Device

A new complimentary part is currently under development combining an N and P-channel together in a single symmetrical output device. Please contact us for the latest information.



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Power Amplification

Bipolar Transistors

Output Stage

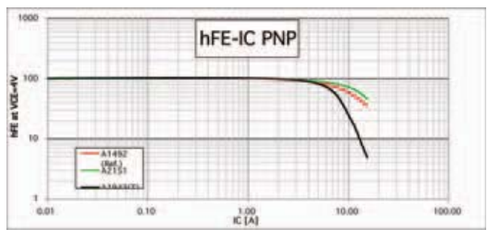
Sanken are the world leader in bipolar power transistors for audio applications. They utilise a number of proprietary technologies to enhance performance beyond that which has been achieved by competing technology. Sanken utilises 3 main technologies to give various device properties. These are single emitter (SE), base island (BI), multi-emitter (ME) which are incorporated in their LAPT range (Linear Amplifier Power Transistor) and a newly developed half thickness BI silicon.

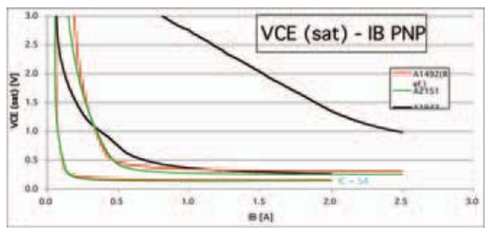
Applications:

- Pro Audio
- Car Audio
- Hi Fi and Home Cinema
- Musical Instrument

Sanken bipolar devices offer the following advantages:

- Extremely wide safe operating areas with excellent secondary breakdown characteristics
- Excellent high frequency operation. LAPT ranges features f_T to 60MHz
- Good thermal performance (more power output in a smaller footprint)
- Unsurpassed linearity in the relationship of h_{FE} to Ic resulting in lower distortion
- Good selection of both standard and fully insulated industry standard packages and their own high power MT-200 package
- Darlington options. The convenience of an included driver transistor.
- Low Saturation Voltage
- New thin base island technology which introduces further advantages:
  - Significantly improved thermal resistance
  - Wider safe operating area
  - Allows a smaller package for a given power
  - Improved sound quality through reduced internal
  - impedance
  - Lower Saturation voltage





Product Line Up

	Part Number	Vceo(V)	Ic(A)	Pc(W)	f_T(MHz)	h_{FE} (min)(1)	Package	Technology
	2SA1725/2SC4511	80	6	30	20	50	TO-220F	SE
	2SA1726/2SC4512	80	6	50	20	50	TO-220	SE
	2SA1693/2SC4466	80	6	60	20	50	TO-3P	BI
	2SA1907/2SC5099	80	6	60	20	50	TO-3PF	BI
	2SA1908/2SC5100	120	8	75	20	50	TO-3PF	BI
	2SB1587/2SD2438	150	8	75	65	5000	TO-3PF	BI (Darl)
	2SA1694/2SC4467	120	8	80	20	50	TO-3P	BI
	2SA1909/2SC5101	140	10	80	20	50	TO-3PF	BI
	2SB1559/2SD2389	150	8	80	65	5000	TO-3P	BI (Darl)
	2SB1588/2SD2439	150	10	80	50	5000	TO-3PF	BI (Darl)
	2SA1860/2SC4886	150	14	80	50	50	TO-3PF	LAPT(ME)
	2SB1649/2SD2562	150	15	85	45	5000	TO-3PF	BI (Darl)
	2SA1673/2SC4388	180	15	85	20	50	TO-3PF	SE
	2SA1695/2SC4468	140	10	100	20	50	TO-3P	BI
	2SA1186/2SC2838	150	10	100	60	50	TO-3P	LAPT(ME)
	2SB1560/2SD2390	150	10	100	50	5000	TO-3P	BI (Darl)
	2SA1303/2SC3284	150	14	125	50	50	TO-3P	LAPT(ME)
	2SB1647/2SD2560	150	15	130	45	5000	TO-3P	BI (Darl)
	2SA1386/2SC3519	160	15	130	40	50	TO-3P	LAPT(ME)
	2SA1492/2SC3856	180	15	130	20	50	TO-3P	SE
	2SA1386A/2SC3519A	180	15	130	40	50	TO-3P	LAPT(ME)
	2SA1294/2SC3263	230	15	130	35	50	TO-3P	LAPT(ME)
	2SB1570/2SD2401	150	12	150	50	5000	MT-200	BI (Darl)
	2SA1215/2SC2921	160	15	150	50	50	MT-200	LAPT(ME)
	2SA1493/2SC3857	200	15	150	20	50	MT-200	SE
NEW	**2SA2151/2SC6011**	**200**	**15**	**160**	**--**	**50**	**TO-3P**	**BI-Thin**
NEW	**2SA2151A/2SC6011A**	**230**	**15**	**160**	**--**	**50**	**TO-3P**	**BI-Thin**
NEW	**2SA2223/2SC6145**	**230**	**15**	**160**	**--**	**--**	**TO-3P**	**LAPT(ME)**
NEW	**2SA2223A/2SC6145A**	**260**	**15**	**160**	**--**	**--**	**TO-3P**	**LAPT(ME)**
	2SB1648/2SD2561	150	17	200	45	5000	MT-200	BI (Darl)
	2SA1216/2SC2922	180	17	200	40	30	MT-200	LAPT(ME)
	2SA1494/2SC3858	200	17	200	20	50	MT-200	SE
	2SA1295/2SC3264	230	17	200	35	50	MT-200	LAPT(ME)

(1) h_{FE} is available banded on most devices. Typical bands are O(50to100), P(70to140) & Y(90to180) for single transistors and O(5000to12000), P(6500to20000) & Y(15000to30000) for darlingtons

(2) The 2SA1943/2SC5200 h_{FE} is measured at 7A whereas at 5A for the Sanken devices. H_{FE} min for the 2SA1943/2SC5200 parts is 55 at 1A

Sanyo Audio Bipolar Power Transistors

Sanyo's adoption of the excellent MBIT bipolar process in a range of power devices designed specifically for audio output stages. This range of products offers excellent performance at a highly competive price.

Product Line Up

Part Number	Vceo(V)	Ic(A)	Pc(W)	f_T(MHz)	h_{FE} (min)	Package	Manufacturer
2SB613P/2SB633P	85	6	60	15	40	TO-220	Sanyo
2SC5774/2SA2062	140	10	110	15(10)	60	TO-3P	Sanyo
2SD1047P/2SB817P	140	12	120	15	60	TO-3P	Sanyo
2SC5775/2SA2063	160	12	130	15(10)	60	TO-3P	Sanyo
2SC5669/2SA2031	230	15	140	15(10)	60	TO-3P	Sanyo

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Bipolar Transistors

Temperature Compensated Darlingtons

The family are enhanced Darlington transistors with built-in drivers and temperature compensation diodes. Manufactured using the unique Sanken thin-wafer production technology, these devices achieve higher power levels through decreased thermal resistance and can withstand higher voltages than similar devices on the market.

Applications:

- General amplifier applications
- Professional audio amplifiers
- Car audio amplifiers
- Hi-fi and home cinema

The temperature compensation diode is integrated on the same chip as the power transistors. By utilising this design, the STD01N and STD01P eliminate delays that would otherwise be induced between thermal sensing at the heat source, and the operation of the compensation circuitry. Thus, these transistors are ideal for applications where enhanced thermal stability is required.

This device is provided in a 5-pin TO-3P plastic package with pin 4 removed. Contact Semelab for application support and additional information on device performance.

Features and Benefits

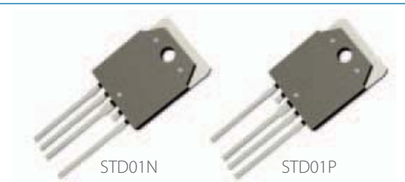
- Built-in temperature compensation diodes
- High power (100 W) handling in a small package (TO-3P), for minimized heat sink requirements
- Built-in drivers and temperature compensation diodes, reducing external component count and simplifying circuit design
- NPN and PNP versions
- Emitter terminals placed symmetrically, pin 5 on NPN and pin 1 on PNP models, allowing adjacent placement on PCB to minimize trace length and output skew when used in pairs
- 180V selected parts available from Magnatec

Product Line Up

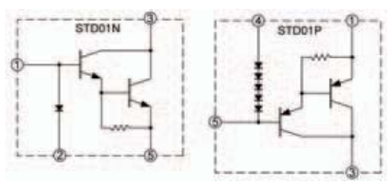
Pc(W)	Ic(A)	Vceo	(V)	Part Number	Package
100	10	150	STD01N	STD01P	TO3P-5Pin
130	12	150	STD02N	STD02P	TO3P-5Pin
160	15	160	STD03N	STD03P	TO3P-5Pin
160	15	180	STD03NY-Red	STD03PY-Red	TO3P-5Pin

Packages

5 pin TO-3P (MT-100)



Equivalent Circuits



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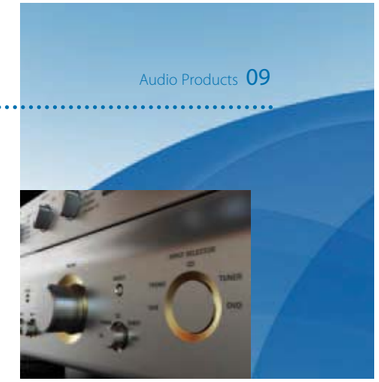


Magnatec Audio Bipolar Power Transistors

Magnatec's range of power bipolar transistors aimed at high performance audio power amplifier applications have the following features:

- High current capability to 30A
- High voltage to 260V for high power applications
- Wide Safe Operating Area (SOA)
- High Power Dissipation
- Excellent $h_{FE\ linearity}$ and high $h_{FE(MIN)}$
- Low saturation voltage
- Low cost
- New 30A part currently under development offers unprecedented power density in amplifier designs not previously available

Product Line Up

	Part Number	Vceo(V)	Ic(A)	Pc(W)	f_T(MHz)	h_{FE}(min)[2]	Package	Manufacturer
	PA004N/PA004P	120	12	90	35	60(2)	TO-3P	Magnatec
	PA003N/PA003P	140	18	120	35	60(2)	TO-3P	Magnatec
	PA002N/PA002P	240	18	150	35	60(2)	TO-3P	Magnatec
STD	2SA1943/2SC5200(1)	230	15	150	30	55(2)	TO-3PBL	Company 'T'
	PA001N/PA001P	240	18	200	35	60(2)	TO-3PBL	Magnatec
	MAG6332/MAG9412	**230**	**30**	**260**	**60**	**50(2)**	**TO-264**	**Magnatec**
	MAG6332A/MAG9412A	260	30	260	60	50(3)	TO-264	Magnatec

STD (1) Industry standard 2SA1943/2SC5200 inserted for comparison purposes.

(2). h_{FE} min measured @ 1A Ic.
(3). h_{FE} min measured @ 5A Ic.

Driver and Temperature Compensation

Bipolar power transistors for power amplifier pre-driver stages

Product Line Up

Part Number	Vceo(V)	Ic(A)	Pc(W)	f_T(MHz)	h_{FE}(min)[1]	Package	Manufacturer
2SA1859/2SC4883	150	2	20	60/120	60	TO-220F	Sanken
2SA1859A/2SC4883A	180	2	20	60/120	60	TO-220F	Sanken
2SA1667/2SC4381	150	2	25	25/15	60	TO-220F	Sanken
2SA1668/2SC4382	200	2	25	25/15	60	TO-220F	Sanken
2SA1668A/2SC4382A	230	2	25	25/15	60	TO-220F	Sanken
2SA1011P/2SC2344P	160	1.5	30	100	60	TO-220	Sanyo
SM2178AFI/SM2177AFI	200	4	25	20	60	TO-220F	Magnatec

Output Stage Temperature Compensation Transistors

Bipolar power transistor developed specifically for temperature compensation. Particularly relevant when using the Sanken darlington transistors to allow stable thermal operation of the output stage

Product Line Up

Part Number	Vceo(V)	Ic(A)	Pc(W)	f_T(MHz)	h_{FE}(min)[1]	Package	Manufacturer
2SC4495	50	3	25	40	500	TO-220F	Sanken

SANYO

Integrated Audio Amplifers

Sanyo IMST Hybrid Amplifiers

SANYO became the first company in the world (in 1969) to develop IMST™, or Insulated Metal Substrate Technology, which forms electronic circuits on plates of aluminium substrate that also incorporate the baseplate layer. The company's hybrid ICs, which enable power output circuits, control circuits and their peripheral circuits to be mounted on the same substrate, are widely known as the STK brand. The company has built up an impressive sale record and a reputation for reliability, particularly in the field of power electronics.

We are living in an age of high-density mounting, which is developing at a rapid rate. IMST™ has succeeded in turning bare chip mounting into an element technology and since the beginnings of its development has continued to evolve as an outstanding mounting technology capable of delivery high density, high performance and high reliability.

The IMST™ substrate, which provides these superlative characteristics, allows a wide range of components to be mounted. These include bare semiconductor chips, all types of SMD components, connectors and other structural components. This capability makes this mounting technology optimally suited for modularizing entire electronic circuit blocks, each with their own functions. Furthermore, since lead-free solder is used both inside the hybrid ICs and for the frame plating, these components are environmentally sound.

Solutions have been developed to offer the following advantages:

- Both linear (Class-AB & Class-H) and switching (Class-D) amplifier topologies
- High power output – range extends to 300Wx2
- Extensive range of multichannel (upto 8) options
- Reduced noise through aluminium substrate
- Improved safety through hollow structure
- Reduced heatsink size compared to IC solutions
- High reliability

Applications of these product families include:

- Home theatre
- Hi Fi amplifiers
- Active speakers and subwoofers
- Instrument amplifiers
- Professional audio

Package

Internal View

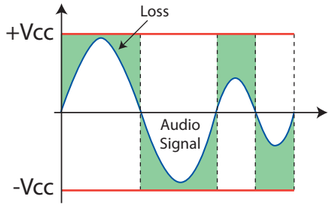
SANYO

Sanyo IMST Hybrid Amplifiers

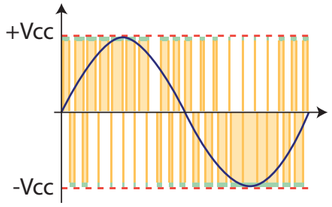
Class-D Audio Power Amplifier

By switching between +Vcc and -Vcc power supplies, a class-D audio power amplifier delivers sound through the speaker by controlling the width of 400 kHz pulses and passing the pulses though an LC filter, which converts them into audio signals. Class-D amplifiers have a higher power conversion efficiency and they generate less heat than the conventional class AB amplifiers. The increasingly smaller sizes being demanded by today's applications mean problems for designers in terms of concentrated heat generation. This is especially true of portable products. Therefore it is expected that class-D amplifiers will increasingly take the place of class AB amplifiers in the products that incorporate them.

Circuit Configuration:



Operational Principle:



Sanyo Class-D Audio Power Amplifiers

This range of products are complete, self contained class-D amplifiers which accept an analogue audio input. They incorporate full protection for over current, over temperature and over voltage and feature pin compatability across the range.

Product Line Up

Part Number	Channels	Po(W) 10% THD	Po(W) 20Hz-20kHz 0.4% THD	Power RL (Ω)	Lead Pitch (mm)	VccMax(V) Signal (No Signal)	Package	Features
STK428-430-E	2	150Wx2	100Wx2	3Ω	2	±75	44-pin	-
STK428-610A-E	2	100Wx2	70Wx2	8Ω	2	±50	28-pin	-
STK428-640A-E	2	200Wx2	150Wx2	8Ω	2	±75	28-pin	-
STK428-910A-E	4	50Wx4	40Wx4	6Ω	2	±30	56-pin	-
STK428-920A-E	4	100Wx4	80Wx4	3Ω	2	±30	56-pin	-
STK428-950A-E	6	50Wx6	40Wx6	6Ω	2	±30	56-pin	-
STK428-960A-E	6	100Wx6	80Wx6	3Ω	2	±30	56-pin	-
STK428-970A-E	8	50Wx8	40Wx8	6Ω	2	±30	56-pin	-
STK428-980A-E	8	100Wx8	80Wx8	3Ω	2	±30	56-pin	-

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SANYO

Integrated Audio Amplifiers

Sanyo IMST Hybrid Amplifiers

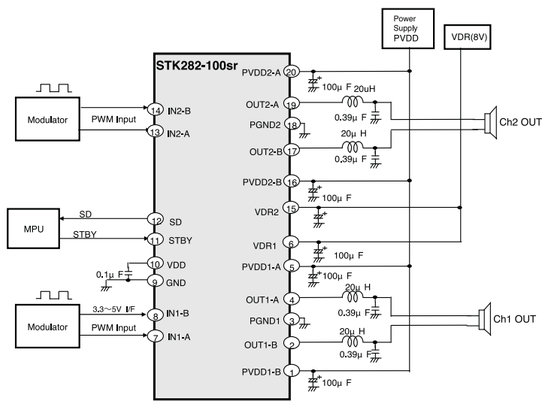
Class-D Power Stages

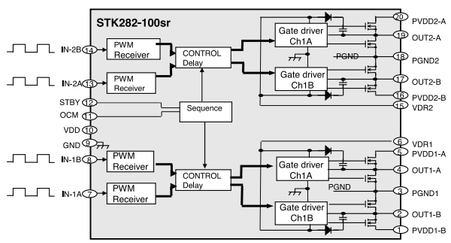
These devices are a self contained output power stage including the output full bridge power mosfets and a newly developed driver stage with the following features:

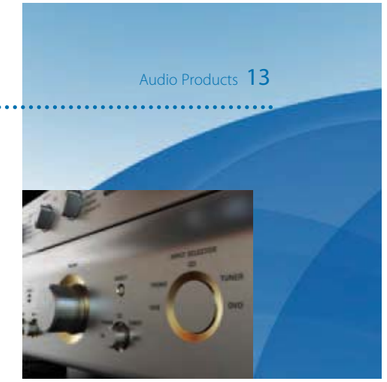
- Total 600W with 1 package (~300W x 2ch at 10% THD)
- 3.3V / 5V PWM Input Interface
- 800kHz frequency operation for true high fidelity class-D solutions
- Easy to design by pin-compatible layout across the series
- High quality sound through discrete power Mosfet
- Over Current Protection (Self Shutdown & Error Signal)
- Small module size - 64.0mmx31.1mmx9.0mm

Product Line Up

Part Number	Channels	Po(W) 10% THD	Po(W) 0.8% THD	Power RL (Ω)	Lead Pitch (mm)	VccMax(V) Signal (No Signal)	Package
STK282-100-E	2	100Wx2	70Wx2	6Ω	2	±40	20-pin
STK282-140-E	2	200Wx2	150Wx2	6Ω	2	±56	20-pin
STK282-170-E	2	300Wx2	200Wx2	6Ω	2	±66	20-pin







SANYO

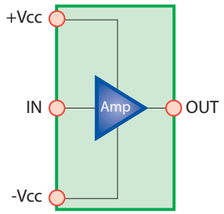
Integrated Audio Amplifiers

Sanyo IMST Hybrid Amplifiers

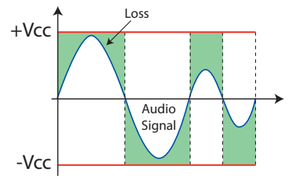
Class-AB

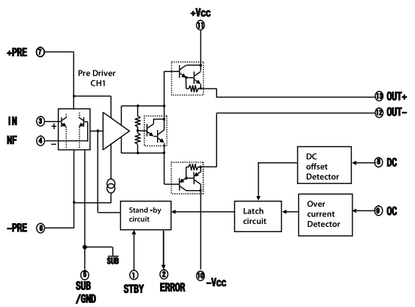
This range of Class-AB audio power amplifiers includes a wide range of devices offering powers to 150W and up to 5 channels in a single package. Some of the range feature internal short circuit protection, dc protection and an on-board thermister for monitoring the substrate temperature.

Circuit Configuration:



Operational Principle:





Class-AB Voltage Amplifier IC

This device currently under development is a front end driver stage for a class-AB power amplifier. It incorporates the voltage amplifier stage so that designers can add their own output stage to customise the power output and design solution.

Product Line Up

Part Number	Channels	Po(W) 10% THD	Po(W) 20kHz 0.4% THD	Lead Pitch (mm)	VccMax(V) Signal (No Signal)	Package	THD(%)
STK350-530T-E	2	-	-	4	±75	15-pin	0.005

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Integrated Audio Amplifiers

Sanyo IMST Hybrid Amplifiers

Class-AB

High quality linear Class-AB amplifiers incorporating Sanyo's IMST technology. These parts give a complete high performance amplifier solution in a compact package, reducing footprint and cost.

Product Line Up

Part Number	Channels	Po(W) 10% THD	Po(W) 20Hz-20kHz 0.8% THD	Power RL (Ω)	Lead Pitch (mm)	VccMax(V) Signal (No Signal)	Package	Features
STK404-090SC-E	1	80	50	6Ω	2.54	±35(±50)	13-pin	-
STK404-100SC-E	1	90	60	6Ω	2.54	±35(±50)	13-pin	-
STK404-200-E	1	100	60	6Ω	2.54	±35(±50)	13-pin	Internal Protection
STK404-120SC-E	1	120	80	6Ω	2.54	±35(±50)	13-pin	-
STK404-130SC-E	1	150	100	6Ω	2.54	±44(±63)	13-pin	-
STK404-230-E	1	150	100	6Ω	2.54	±44(±63)	13-pin	Internal Protection
STK404-140SC-E	1	180	120	6Ω	2.54	±44(±63)	13-pin	-
STK433-030-E	2	30x2	20x2	6Ω	2	±32	15-pin	-
STK433-730-E	2	30x2	20x2	4Ω	2	±25	19-pin	Internal Protection
STK433-040-E	2	40x2	25x2	6Ω	2	±36	15-pin	-
STK433-060-E	2	50x2	35x2	6Ω	2	±40	15-pin	-
STK433-760-E	2	50x2	40x2	4Ω	2	±33	19-pin	Internal Protection
STK433-070-E	2	60x2	40x2	6Ω	2	±44	15-pin	-
STK433-090-E	2	80x2	50x2	6Ω	2	±47	15-pin	-
STK433-100-E	2	100x2	60x2	6Ω	2	±50	15-pin	-
STK433-120-E	2	120x2	80x2	6Ω	2	±57	15-pin	-
STK433-130-E	2	150x2	100x2	6Ω	2	±63	15-pin	-
STK433-230A-E	3	30x3	20x3	6Ω	2	±32	19-pin	-
STK433-240A-E	3	40x3	25x3	6Ω	2	±36	19-pin	-
STK433-260A-E	3	50x3	35x3	6Ω	2	±40	19-pin	-
STK433-270A-E	3	60x3	40x3	6Ω	2	±44	19-pin	-
STK433-290A-E	3	80x3	50x3	6Ω	2	±47	19-pin	-
STK433-300A-E	3	90x3	60x3	6Ω	2	±50	19-pin	-
STK433-320A-E	3	120x3	80x3	6Ω	2	±57	19-pin	-
STK433-330A-E	3	150x3	100x3	6Ω	2	±63	19-pin	-
STK433-830-E	4	30x4	20x4	6Ω	2	±32	23-pin	Standby Circuit
STK433-860-E	4	50x4	35x4	6Ω	2	±40	23-pin	Standby Circuit
STK433-870-E	4	60x4	40x4	6Ω	2	±44	23-pin	Standby Circuit
STK433-890-E	4	80x4	50x4	6Ω	2	±47	23-pin	Standby Circuit
STK433-930-E	5	30x5	20x5	6Ω	2	±34	28-pin	-
STK433-940-E	5	40x5	25x5	6Ω	2	±40	28-pin	-
STK433-970-E	5	60x5	40x5	6Ω	2	±44	28-pin	-

Notes: Devices with protection have the following functions:

- Over current detection
- DC offset detection
- Latch circuit
- Stand-by/Shut-down circuit
- Error signal output

Integrated Audio Amplifiers

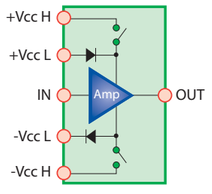
Sanyo IMST Hybrid Amplifiers

Class-H

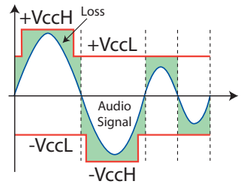
These audio power amplifiers save power by using a high supply voltage when the level of the input audio signal is high, and a low supply voltage when the input audio signal is low. This higher efficiency operation allows the use of smaller heatsinks.

Since two different supply voltages must be switched, their circuitry is complex, and noise problems have resulted. SANYO has developed these hybrid ICs using its IMST™ technology to solve these problems.

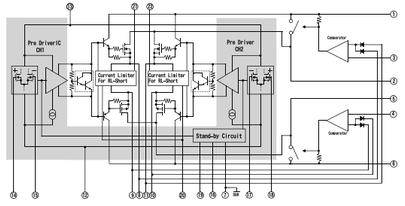
Circuit Configuration:



Operational Principle:



Operational Principle:



Product Line Up

Part Number	Channels	Po(W) 10% THD	Po(W) 0.8% THD	Power RL (Ω)	Lead Pitch (mm)	VccMax(V) Signal (No Signal)	Package	Features
STK415-090-E	2	80Wx2	50Wx2	8Ω	2	±36(53)	19-pin	-
STK415-100-E	2	90Wx2	60Wx2	8Ω	2	±37(57)	19-pin	-
STK415-120-E	2	120Wx2	80Wx2	8Ω	2	±42(65)	19-pin	-
STK415-130-E	2	150Wx2	100Wx2	8Ω	2	±43(75)	19-pin	-
STK415-140-E	2	180Wx2	120Wx2	8Ω	2	±48(78)	19-pin	-
STK412-150-E	2	250Wx2	150Wx2	6Ω	2.54	±55(85)	22-pin	-
STK412-170-E	2	300Wx2	180Wx2	4Ω	2.54	±53(77)	22-pin	-
STK412-740-E	2	200Wx2	140Wx2	6Ω	2.54	TBD	22-pin	Internal Protection
STK412-750-E	2	250Wx2	150Wx2	6Ω	2.54	±85(95)	22-pin	Internal Protection
STK412-770-E	2	300Wx2	180Wx2	4Ω	2.54	±77(95)	22-pin	Internal Protection
STK416-090-E	3	80Wx3	50Wx3	8Ω	2	±36(53)	23-pin	-
STK416-100-E	3	90Wx3	60Wx3	8Ω	2	±37(57)	23-pin	-
STK416-120-E	3	120Wx3	80Wx3	8Ω	2	±42(65)	23-pin	-
STK416-130-E	3	150Wx3	100Wx3	8Ω	2	±43(75)	23-pin	-

SANYO

Integrated Audio Amplifiers

Sanyo IMST Hybrid Amplifiers

Selector Guides

Sanyo Linear Amplifier Module Selection Guide (by Power)

Class-AB

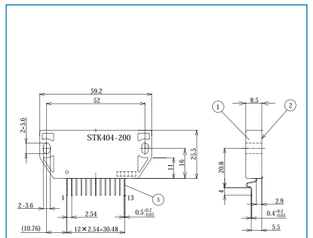
Product Line Up

POWER into 6Ω (W)		1-channel	2-channel		3-channel	4-channel	5-channel
1kHz 10%	20kHz 0.4%	Protection	4Ω & Protection				
30	20		433-030E	433-730-E	433-230A-E	433-930-E	433-830-E
40	25		433-040E		433-240A-E	433-940-E	
45	30					433-960-E	433-860-E
50	35		433-060E	433-760-E	433-260A-E	433-970-E	433-870-E
60	40		433-070E		433-270A-E		433-890-E
80	50	404-090SC-E	433-090E		433-290A-E		
90	60	404-100SC-E	404-200-E	433-100E	433-300A-E		
110	70						
120	80	404-120SC-E		433-120E		433-320A-E	
150	100	404-130SC-E	404-230-E	433-130E		433-330A-E	
180	120	404-140SC-E					

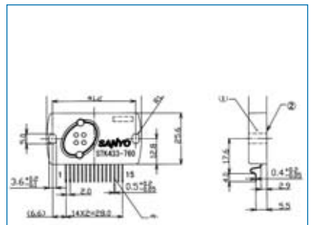
Class-H

Product Line Up

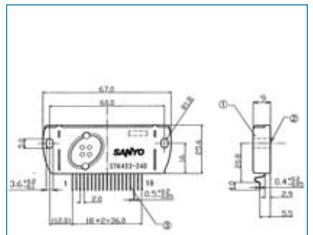
POWER into 6Ω (W)		2-channel		3-channel
1kHz 10%	20kHz 0.4%	Protection		
80	50	415-090-E		416-090-E
90	60	415-100-E		416-100-E
110	70			
120	80	415-120-E		416-120-E
150	100	415-130-E		416-130-E
180	120			
200	140		412-740-E (6Ω)	
250	150	412-150C-E (6Ω)	412-750-E (6Ω)	
300	180	412-170C-E (4Ω)	412-770-E (4Ω)	



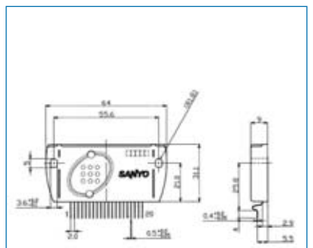
13-pin STK package



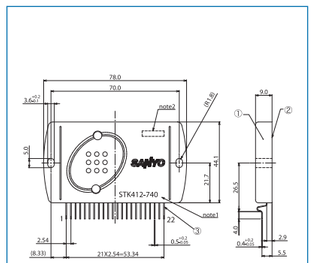
15-pin STK package



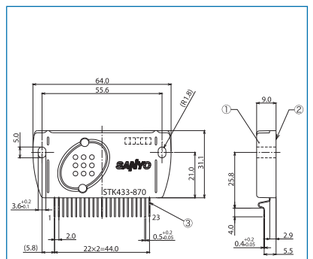
19-pin STK package



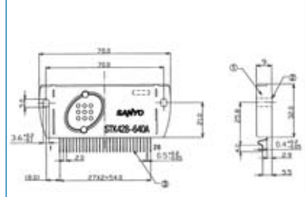
20-pin STK package



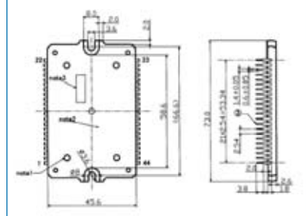
22-pin STK package



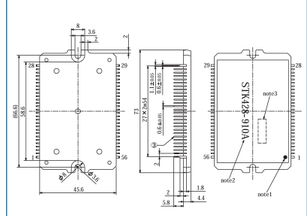
23-pin STK package



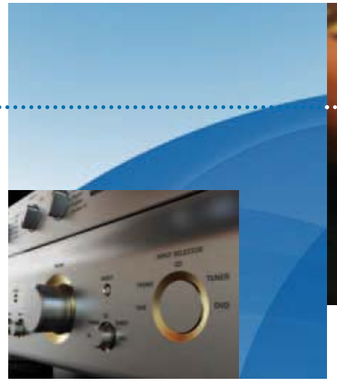
28-pin STK package



44-pin STK package



56-pin STK package



SANYO

Integrated Audio Amplifiers

Power Amplifier ICs

Portable Applications

Sanyo's extensive range of audio power amplifiers for portable applications have the following features for headphone and low power solutions:

- Wide range of surface mount packages
- Extensive Lineup : 2mW to 2W
- High performance Class-D range with unique feedback topology
- New high efficiency and further Class-D devices under development

Analog Power Amplifiers (Class-D) for Portable Electronic Devices

Type No.	Output power1 (THD=10%)			Output power2 (THD=10%)			Output power3 (THD=10%)			Channels	Output method	Input method	Voltage gain [dB]	Package	Features						
	[W]	Vcc/ Vdd [V]	Load [Ω]	[W]	Vcc/ Vdd [V]	Load [Ω]	[W]	Vcc/ Vdd [V]	Load [Ω]						Standby	Mute	H/P amp	Vol	I²C	PLC	Freq variation
LV4910T	2	5	4	1.4	5	8	-	-	-	2	BTL	Analog	24	TSSOP30(275mil)	yes	yes	no	no	-	no	no
LV4911T	2	5	4	1.4	5	8	-	-	-	2	BTL	Analog	24	TSSOP30(275mil)	yes	yes	yes	no	-	no	no
LV4912GP	2	5	4	1.5	5	8	-	-	-	1	BTL	Analog	23.5	VCT24(3.5x3.5)	yes	yes	no	no	-	no	no
LV4912V	2.2	5	4	1.5	5	8	-	-	-	1	BTL	Analog	23.5	SSOP16(225mil)	yes	yes	no	no	-	no	no

Analog Power Amplifiers (Class-AB) for Portable Electronic Devices

Type No.	Output power1 (THD=10%)			Output power2 (THD=10%)			Output power3 (THD=10%)			Channels	Output method	Voltage gain [dB]	Package	Features			
	[W]	Vcc/ Vdd [V]	Load [Ω]	[W]	Vcc/ Vdd [V]	Load [Ω]	[W]	Vcc/ Vdd [V]	Load [Ω]					Standby	Mute	H/P amp	Volume
LA4533M	0.04	3	16	-	-	-	-	-	-	2	SE	32	MFP10S(225mil)	yes	yes	-	no
LA4535M	0.008	1.5	16	-	-	-	-	-	-	2	SE	22	MFP10S(225mil)	yes	yes	-	no
LA4537M	0.008	1.5	16	-	-	-	-	-	-	2	SE	30	MFP10S(225mil)	yes	yes	-	no
LA4809M	0.05	12	16	0.08	12	16	0.05	5	16	2	SE	12	MFP12S(225mil)	yes	no	-	no
LA4810M	0.12	3	8	0.28	4.5	8	0.3	6	16	2	SE	34	MFP16(225mil)	no	VOL-min	no	yes(DC)
LA4814V	0.35	5	4	0.15	3.6	4	0.55	6	4	2	SE	6 to 20	HSSOP14(225mil)	yes	no	no	no
LA4815M	0.23	5	8	0.36	6	8	0.62	6	4	1	SE	26/40	MFP8(225mil)	no	yes	no	no
LA4815VH	1.8	12	8	1.4	9	4	0.36	6	8	1	SE	26/40	HSSOP14(225mil)	no	yes	no	no
LV49821VH	1.4	5	8	0.68	3.6	8	0.46	3	8	2	BTL	0 to 26	HSSOP13(225mil)	yes	no	HP-SW	no
LV4985VH	1.2	5	8	0.8	5	16	-	-	-	2	BTL	10 to 26	HSSOP14(225mil)	yes	VOL-min	HP-SW	yes(DC)
LV4991M	1	5	8	0.7	5	16	0.45	3.6	8	1	BTL	0 to 26	MFP8(225mil)	yes	no	no	no
LV4991TH	1	5	8	0.7	5	16	0.45	3.6	8	1	BTL	0 to 26	HMSOP8(150mil)	yes	no	no	no
LV4991TT	0.45	3.6	8	0.7	5	16	0.25	3	16	1	BTL	0 to 26	MSOP8(150mil)	yes	no	no	no
LV4992TT	0.16	3.6	8	0.34	5	8	0.055	3.6	32	2	SE	0 to 14	MSOP8(150mil)	yes	no	no	no
LV4993TH	0.72	3.6	8	1.5	5	8	0.5	3	8	1	BTL	3 to 26	HMSOP8(150mil)	yes	no	no	no
LV4995TT	0.25	3	8	0.14	2.4	8	-	-	-	1	BTL	3 to 26	MSOP8(150mil)	yes	no	HP-SW	no

SANYO

Integrated Audio Amplifiers

Power Amplifier ICs

Car Audio Applications

Sanyo's range of power amplifier IC's focused on car audio applications incorporate a number of features that optimise them in this environment:

- High Output Powers @ 14.4V supply
- Selection of Bipolar & BiCDMOS technology
- Muting functions
- Standby switch
- Self diagnostics of output offset & short circuit
- Full compliment of protection circuits (shorting to VCC, shorting to ground, load shorting, overvoltage, and thermal protection).
- Electric mirror noise reduction circuit
- Internal oscillation prevention component Analog Power Amplifiers (Class-D) for Portable Electronic Devices

Analog Power Amplifiers (Class-AB) for Car Audio

Type No.	Po max (MAX POWER)		Po1 (THD=10%)		Po2 (THD=1%)		Channels	Output method	Load resistance [Ω] [V]	Voltage gain [dB]	Package	Features				
	[W]	Vcc/ Vdd [V]	[W]	Vcc/ Vdd	[W]	Vcc/ Vdd [V]						Standby	Mute	Short detection	Output offset detection	Electric mirror noise suppression measures
LA4425A	-	-	5	13.2	-	-	1	SE	4	45	SIP5H	no	no	no	no	no
LA4450	-	-	20	26.4	-	-	2	SE	4	51	SIP14H	yes	no	no	no	no
LA47202P	47	14.4	29	14.4	22	14.4	4	BTL	4	26	HZIP25	yes	yes	yes	yes	yes
LA4725	-	-	17	13.2	-	-	2	BTL	4	40	SIP14HZ	yes	no	no	no	no
LA47536	45	14.4	28	14.4	-	-	4	BTL	4	32	HZIP25	yes	yes	no	yes	no
LV47001	47	14.4	29	14.4	22	14.4	4	BTL	4	26	HZIP25	yes	yes	yes	yes	yes
LV47002P	43	14.4	28	14.4	22	14.4	4	BTL	4	26	HZIP25	yes	yes	yes	yes	yes

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Integrated Audio Amplifiers

Power Amplifier ICs

Consumer Applications

Sanyo's line-up of power amplifier IC's targeted at applications like TV and home hifi include devices with a good range of features that will also make them suitable for many other products including musical instrument amplifiers, active speakers and any amplification application where low cost and high integration of features is required. The range features:

- Options of Class-AB and Class-D topologies
- Wide range of both surface mount, DIP and power SIP packages and pin to pin compatibility across some ranges to allow scalable power from a common PCB
- Standby and Mute functions
- Operation from a single power supply rail

Class-D Amplifiers

- Full bridge output class-D amplifiers
- Unique Sanyo feedback topology achieves high audio quality
- High efficiency
- Soft muting reduces impulse noise at power on/off
- Full complement of built in protection circuits: over current, thermal and supply under voltage protection
- Some feature a built in power limiter

Class-AB Amplifiers

- High fidelity, high bandwidth design
- Extremely low impulse noise levels
- Full complement of protection circuits: Short to Vcc & ground, thermal and over voltage

Digital Power Amplifiers (Class-D) for TVs and Home Audio

Type No.	Output power1 (THD=10%) [W]	Vcc/ Vdd [V]	Load [Ω]	Output power2 (THD=10%) [W]	Vcc/ Vdd [V]	Load [Ω]	Output power3 (THD=10%) [W]	Vcc/ Vdd [V]	Load [Ω]	Channels	Output method	Input method	Voltage gain [dB]	Package	Features: Standby	Mute	H/P amp	Vol	I²C	PLC	Freq variation
LV4900H	10	12	8	-	-	-	-	-	-	2	BTL	Analog	29	HSOP36(375mil)	yes	yes	no	no	-	no	no
LV4900HR	10	12	8	-	-	-	-	-	-	2	BTL	Analog	29	HSOP36R(375mil)	yes	yes	no	no	-	no	no
LV4901H	10	12	8	-	-	-	-	-	-	2	BTL	Analog	29	HSOP36(375mil)	yes	yes	yes	no	-	no	no
LV49152V	15	15	8	10	12	8	-	-	-	2	BTL	Analog	30	SSOP44J(275mil)	yes	yes	no	no	-	yes	no
LV4920H	10	13	8	15	16	8	-	-	-	2	BTL	PWM	-	HSOP36(375mil)	yes	yes	no	no	-	no	no

Analog Power Amplifiers (Class-AB) for TV's and Home Audio

Type No.	Output power1 (THD=10%) [W]	Vcc/ Vdd [V]	Load [Ω]	Output power2 (THD=10%) [W]	Vcc/ Vdd [V]	Load [Ω]	Output power3 (THD=10%) [W]	Vcc/ Vdd [V]	Load [Ω]	Channels	Output method	Voltage gain [dB]	Package	Features: Standby	Mute	H/P amp	Volume	Series
LA4525	0.65	6	4	1	9	8	-	-	-	2	SE	40	DIP8(300mil)	no	no	no	no	
LA4600	4	12	4	2	9	4	-	-	-	2	SE	45	SIP10F	yes	no	-	-	
LA4625	13.5	12	4	-	-	-	-	-	-	2	BTL	40	SIP14HZ	yes	no	-	-	
LA4627N	2.5	9	3	2	9	4	-	-	-	2	SE	45	DIP12F(300mil)	yes	no	-	-	
LA4628	20	13.5	4	-	-	-	-	-	-	2	BTL	40	SIP14HZ	yes	no	-	-	
LA4631	5	14	4	2	9	4	-	-	-	2	SE	35	SIP13H	yes	no	-	-	
LA4632	10	13	6	4	9	6	-	-	-	2	BTL	35	SIP12H	yes	yes	-	-	
LA42031	5	11	8	3	9	8	-	-	-	1	BTL	35	SIP13H	yes	yes	no	no	Pin to Pin -1
LA42032	5	11	8	3	9	8	-	-	-	2	BTL	35	SIP13H	yes	yes	no	no	Pin to Pin -1
LA42051	5	18	8	3	14	8	-	-	-	1	SE	35	SIP13H	yes	no	no	no	Pin to Pin -1
LA42052	5	18	8	3	14	8	-	-	-	2	SE	35	SIP13H	yes	no	no	no	Pin to Pin -1
LA42101	10	14	8	-	-	-	-	-	-	1	BTL	35	SIP13H	yes	yes	no	no	Pin to Pin -1
LA42102	10	14	8	-	-	-	-	-	-	2	BTL	35	SIP13H	yes	yes	no	no	Pin to Pin -1
LA42105	5	9.5	8	-	-	-	-	-	-	1	BTL	32	HZIP15	yes	yes	no	no	SP series (Pin to Pin)
LA42152	15	16.5	8	-	-	-	-	-	-	2	BTL	35	SIP12H	yes	yes	no	no	Pin to Pin -1
LA42201	20	13	4	-	-	-	-	-	-	1	BTL	30	220-7H	no	yes	no	no	-
LA42205	5	9.5	8	-	-	-	-	-	-	2	BTL	32	HZIP15	yes	yes	no	no	SP series (Pin to Pin)
LA42207	7	11.5	8	-	-	-	-	-	-	2	BTL	32	HZIP15	yes	yes	no	no	SP series (Pin to Pin)
LA42210	10	13	8	-	-	-	-	-	-	2	BTL	32	HZIP15	yes	yes	no	no	SP series (Pin to Pin)
LA42351	5	18	8	3	14	8	-	-	-	1	SE	34.5	SIP13H	yes	no	no	yes	-
LA42352	5	18	8	3	14	8	-	-	-	2	SE	34.5	SIP13H	yes	no	no	yes	-

BI technologies

A Subsidiary of TT electronics plc

Integrated Audio Amplifiers

Inductors for Class-D Output Filters

BI Technologies offer a range of standard power magnetic components that find application in the output filters of class-d audio amplifiers. They feature compact surface mount footprints and enclosed magnetic fields.

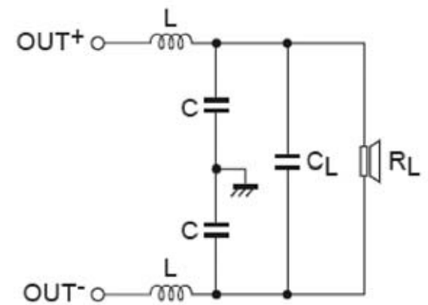
For the range of class-D amplifier devices we offer from Sanyo where a full-bridge output is utilised the cut off frequency fc of the output filter can be be calculated by:

$$f_c = \frac{1}{2\pi\sqrt{2LC_L}}$$

From this the value of L & CL may be calculated by:

$$C_L = \frac{1}{2\sqrt{2}\times\pi R_L f_c}$$

$$L = \frac{\sqrt{2}R_L}{4\pi f_c}$$



In general C_L is set to 20-30% of C. Some example values for a 30KHz cut-off frequency are:

R_L[V]	L[µH]	CL[µF]	C[µF]	Q
4	15	1	0.22	0.650
6	22	0.68	0.15	0.636
8	33	0.47	0.1	0.704
16	68	0.22	0.047	0.739

In addition BI offer custom toroidal inductor design for high power applications. Please contact us to discuss your requirements further.

For more information contact us on **+44 (0)1455 552505**
or at **sales@magnatec-tt.com**

Model	Package	Industry Style	Inductance	DC Resistance Range	Voltage Rating	Core Type	Operating Case Temp. Range	Package Options
HM11		Rod Core Inductor	0.21µH to 28µH	0.9mW to 43mW 5.5A to 31A		Ferrite Rod	-25°C to +105°C	Tray
HM15		Encapsulated Inductor	150µH to 1,000µH	0.5W to 1.7W 0.5A to 1.7A		Toroid	-40°C to +125°C	Tray
HM53		Output Inductor	1.4µH to 1000µH	2.6mW to 680mW 1.9A to 29.5A		Toroid	-40°C to +155°C	Tray
HM55		Power Inductor	0.4µH to 6.0µH	9A to 40A		Shielded Drum		Tray
HM71		Surface Mount Inductor	1.0µH to 1,000µH	0.01Ω to 13.8Ω 0.1A to 20A		Drum	-40°C to +85°C	Tape & Reel
HM77		Surface Mount Inductor	1.0µH to 1,000µH	4.56mΩ to 1,480mΩ 0.71A to 13.3A		Shielded Drum Core	-40°C to +105°C	Tape & Reel
HM78		Surface Mount Inductor		5.2mΩ to 5.2Ω 0.2A to 12A			-40°C to +85°C	Tape & Reel
HM66		Surface Mount Inductor	1.0µH to 330µH	0.008Ω to 1.54Ω 0.22A to 10.0A		Shielded Drum	-40°C to +85°C	Tape & Reel
HM68		Button Inductor	2.2µH to 47µH	0.081Ω to 2.34Ω 0.48A to 1.9A		Drum	-40°C to +100°C	Tape & Reel
HM73		Surface Mount Inductor	.01H to 10µH	0.5M to 23.1mΩ 5.6A to 40A		ER	-40°C to 135°C	Tape & Reel
HM67		Surface Mount CM	5µH to 4.7MH	5.8mΩ to 403mΩ 0.2A to 1.0A	300V	Toroid	-40°C to 125°C	Tape & Reel
HM19		Toroid Style	1mH to 16mH	0.02Ω to 0.24Ω 1.8A to 7.5A	250V	Toroid	-25°C to 105°C	Tray
HM28		Buckle Style	0.45mH to 120mH	0.08Ω to 2.7Ω 0.5A to 4A	250V	Buckle	-25°C to 105°C	Tray/Tube

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FUJI ELECTRIC DEVICE TECHNOLOGY
e-Front runners

Integrated Audio Amplifiers

MOSFETs for Class-D Output Stage

Fuji's super FAP-G range of discrete power mosfets were specifically developed to lower power losses in high speed switching circuits. A Class-D audio power amplifier has some very demanding attributes that these mosfets can meet. The advantages of Fuji's technology are:

- High speed switching
- Low gate charge for easy drive
- Low RDS(on)
- Reduced combined switching & conduction loss resulting in better efficiency
- Wide selection of packages including innovative and low profile TFP:

VDSS	RDS.on (max) [Ω]	QG Typ or Ciss Typ	TFP (SMD)	T-pack (D^2-PAK)	TO-220AB	T0-220F (ISO)	TO-3PF	TO-247 (ISO)
100	0.062	22nC	29A 2SK3601-01	29A 2SK3601-01S	29A 2SK3598-01	29A 2SK3599-01MR		
	0.059	23nC				29A 2SK3771-01MR		
	0.044	32nC	41A 2SK3647-01	41A 2SK3646-01S	41A 2SK3644-01	41A 2SK3645-01MR		
	0.025	52nC	73A 2SK3589-01	73A 2SK3588-01S	73A 2SK3586-01	73A 2SK3587-01MR		
120	0.078	26nC				26A 2SK3770-01MR		
	0.03	52nC	67A 2SK3922-01	67A 2SK3921-01S	67A 2SK3920-01	67A 2SK3886-01MR		
150	0.105	21nC	23A 2SK3605-01	23A 2SK3604-01S	23A 2SK3602-01	23A 2SK3603-01MR		
	0.1	23nC				23A 2SK3769-01MR		
	0.07	34nC	33A 2SK3474-01	33A 2SK3650-01S	33A 2SK3648-01	33A 2SK3649-01MR		
	0.07	46nC				33A 2SK3537-01MR		
	0.041	52nC	57A 2SK3593-01	57A 2SK3592-01S	57A 2SK3590-01	57A 2SK3591-01MR		
	0.026	80nC					92A 2SK3789-01R	92A 2SK3788-01
	0.016	140nC						100A 2SK3882-01
200		0.17	21nC 2SK3609-01	18A 2SK3608-01S	18A 2SK3606-01	18A 2SK3607-01MR	18A	
	0.066	51nC	45A 2SK3597-01	45A 2SK3596-01S	45A 2SK3594-01	45A 2SK3595-01MR		
	0.036	80nC					73A 2SK3781-01R	73A 2SK3780-01
	0.02	140nC						100A 2SK3883-01
230	0.076	42nC		40A 2SK3872-01S	40A 2SK3870-01	40A 2SK3871-01MR		
250	0.26	21nC	14A 2SK3613-01	14A 2SK3612-01S	14A 2SK3610-01	14A 2SK3611-01MR		
	0.19	26nC				18A FMA18N25G		
	0.1	44nC	37A 2SK3535-01	37A 2SK3556-01S	37A 2SK3554-01	37A 2SK3555-01MR	37A 2SK3651-01R	
	0.053	80nC					59A 2SK3779-01R	59A 2SK3778-01
	0.03	140nC						96A 2SK3884-01
280	0.061	80nC					56A 2SK3874-01R	56A 2SK3873-01
300	0.28	23nC				15A 2SK3580-01MR		
	0.13	44.5nC	32A 2SK3775-01	32A 2SK3774-01S	32A 2SK3772-01	32A 2SK3773-01MR		
	0.072	80nC					53A 2SK3777-01R	53A 2SK3776-01
	0.04	140nC						86A 2SK37885-01

L: Logic Level

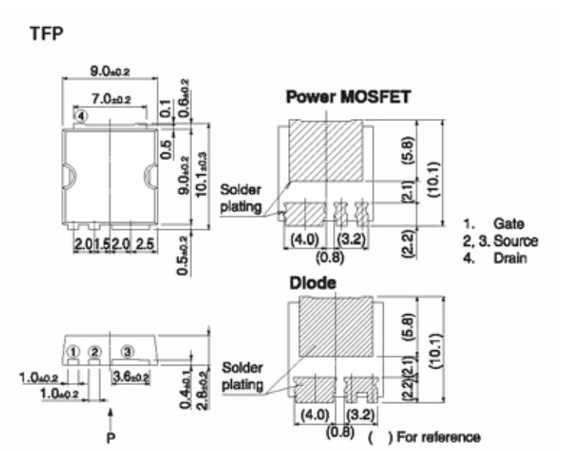
FUJI ELECTRIC DEVICE TECHNOLOGY
e-Front runners

Integrated Audio Amplifiers

MOSFETs for Class-D Output Stage

VDSS	RDS.on (max) [Ω] 25°C V∞=10V	QG Typ or Ciss Typ (D-PAK)	K-pack (SMD)	TFP (D_-PAK)	T-pack	ID TO-220	T0-220F (ISO)	TO-3P	TO-3PF (ISO)	TO-247
100V	0.062	22nC		20A 2SK3601-01	20A 2SK3600-01S	20A 2SK3598-01	20A 2SK3599-01MR			
	0.044	32nC		30A 2SK3647-01	30A 2SK3646-01S	30A 2SK3644-01	30A 2SK3645-01MR			
	0.025	52nC		50A 2SK3589-01	50A 2SK3588-01S	50A 2SK3586-01	50A 2SK3587-01MR			
150V	0.105	21nC		16A 2SK3605-01	16A 2SK3604-01S	16A 2SK3602-01	16A 2SK3603-01MR			
	0.07	34nC 46bC		23A 2SK3474-01	23A 2SK3650-01S	23A 2SK3648-01	23A 2SK3649-01MR			
							23A L 2SK3537-01MR			
	0.041	52nC		40A 2SK3593-01	40A 2SK3592-01S	40A 2SK3590-01	40A 2SK3591-01MR			
200V	0.17	21nC		13A 2SK3609-01	13A 2SK3608-01S	13A 2SK3606-01	13A 2SK3607-01MR			
	0.01	1,700pF					20A L 2SK3262-01MR			
	0.066	51nC		30A 2SK3597-01	30A 2SK3596-01S	30A 2SK3594-01	30A 2SK3595-01MR			
250V	2.0	250pF	2A 2SK2250-01S							
	1.1	230pF	4A 2SK2292-01S							
	0.85	400pF	6A 2SK2099-01S							
	0.26	21nC		10A 2SK3613-01	10A 2SK3612-01S	10A 2SK3610-01	10A 2SK3611-01MR			
	0.105	44nC		50A L 2SK2535-01	50A L 2SK2556-01S	50A L 2SK3554-01	50A L 2SK3555-01MR		25A 2SK3651-01R	

TFP



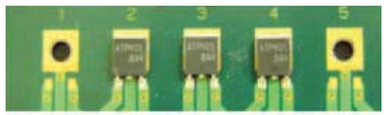
SANYO

Sanyo Power Mosfets

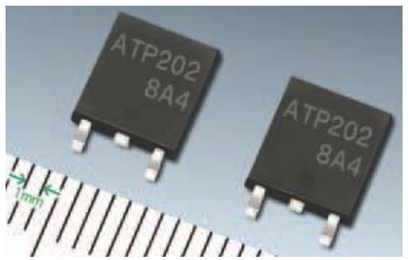
Sanyo Semiconductor has a huge range of switching power mosfets in some very compact packages. A new range of power devices has just been released in their proprietary ATPAK that allows unprecedented power density in a surface mount package that can be heatsinked to increase power handling. Power dissipation capability similar to a TO-220 device can be achieved in a solution requiring only 40% of the space.

Part	VDSS(V)	ID(A)	PD(W)	RDS(on)(mΩ) Typ	RDS(on)(mΩ) max	Ciss	Qg	Gate Drive
ATP206	40	40	40	12	16	1630	27	4.5
ATP207	40	65	50	7	9.1	2710	54	4.5
ATP208	40	90	60	4.6	6	4510	83	4.5
ATP212	60	35	40	17	23	1820	34.5	4.5
ATP213	60	50	50	12	16	3150	58	4.5
ATP404	60	95	70	5.5	7.2	6400	120	4.5
ATP405	100	40	70	25	33	4000	68	10
ATP402 1	00	66	80	12	16	7700	160	4.5

A single device is mounted



Heat sink is mounted 66mm x 7.3mm x 3.0mm



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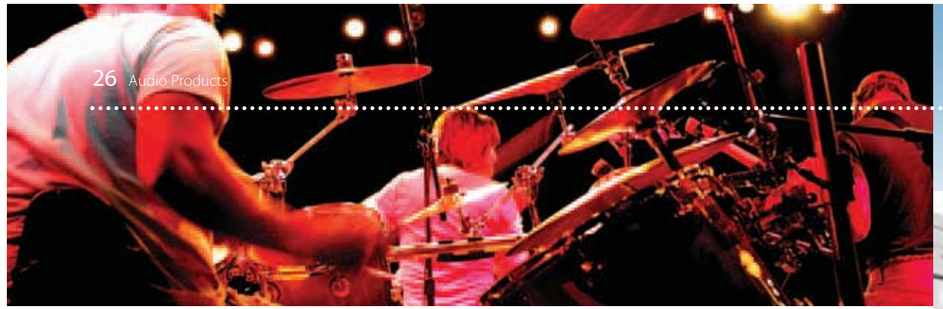


FAGOR
Fagor Electrónica

Diodes & Rectifiers

Bridge Rectifiers

Semelab offer an extensive range of diodes and bridge rectifiers and this section presents a range that fit well in audio applications.

- Fast and soft recovery diodes find applications in bridge rectifiers in high-end audio due to the fact that they generate less switching noise that can interfere with sensitive audio circuits.
- Schottky rectifiers generate less losses and are a good choice in lower voltage applications and are also useful as protection in phantom powered microphone preamplifier circuits

Fast and soft recovery diodes find applications in bridge rectifiers in high-end audio due to the fact that they generate less switching noise that can interfere with sensitive audio circuits. Parts are presented from Fagor & Sanken and all Fagor parts feature glass passivation in their Hyperectifier technology which enhances reliability and product lifetime. Many low cost rectifiers on the market today do not use this technique and their reliability is compromised.

Focus bridge rectifiers from Fagor include the FBI range of in-line devices that are ideal for power amplifier applications. Their wide range of voltages and currents (to 25A) in a compact insulated package with easy heatsink mounting and low cost fit well in modern amplifier solutions.

Bridge Rectifiers

Family	IF(A)	IFSM	Voltage(v)	Vf	Package
FB10/FB10L	10	200A	50-1000	1.10V	Faston/Wire
FB15/FB15L	15	300A	50-1000	1.10V	Faston/Wire
FB15-M	15	300A	50-1000	1.10V	Faston-M
FB25/FB25L	25	300A	50-1000	1.10V	Faston/Wire
FB25-M	25	300A	50-1000	1.10V	Faston-M
FB35/FB35L	35	400A	50-100 0	1.10V	Faston/Wire
FB35-M	35	400A	50-1000	1.10V	Faston-M
FB50	50	500A	50-600	1.10V	Faston

Bridge Rectifiers

Wire

Faston

Faston-M

FAGOR
Fagor Electrónica

Bridge Rectifiers

Family	IF(A)	IFSM	Voltage(v)	Vf	Package
DF1M	0.8-1	50A	200-1000	1.10V	DIL
SDFMS1	1	30A	20-100	0.5V-0.8V	DIL *Schottky
HEDFM1	1	50A	20-1000	1.00V-1.70V	DIL *Ultrafast
DF15M	1.5	50A	600-1000	1.10V	Round
C800	0.8	30A	100-900	1.00V	Round
WL-F	1	30A	50-1000	1.00V	Round
C1000	1	40A	100-900	1.00V	Round
C1500R	1.5	50A	100-900	1.10V	Round
WF	1.5	50A	50-1000	1.2V	Round

DIL

Round

Family	IF(A)	IFSM	Voltage(v)	Vf	Package
ABS	0.8-1	30A	600-1000	0.95V	MINI DIP
RMB-S	0.5-0.8	30A	200-600	1.00V	MBS *Fast
1SMZG	0.8	30A	600-1000	1.50V	MBS
DF1S	0.8-1	50A	200-1000	1.10V	DFS
HEDFS	1	50A	200-1000	1.00V-1.70V	DFS *Ultrafast
DF15S	1.5	50A	600-1000	1.10V	DFS
SDFSS1	2	30A	20-100	0.5V-0.8	DFS *Schottky

Mini DIP

DFS

MBS

Family	$I_{F(AV)}$(A)	I_{FSM}(A)	Voltage(v)	V_f(V)	Package
KBP104-7G	1	30	400-1000	1.0	KBP
KBP154-7G	1.5	50	400-1000	1.1	KBP
D2SBA40-100	1.5	60	400-1000	1.05	GBL
D2SB40-100	1.5	80	400-1000	1.05	GBL
GBL203-7	2	60	200-1000	1.0	GBL
KBP204-7G	2	60	400-1000	1.2	KBP
KBP304-7G	3	80	400-1000	1.1	KBP
D3SBA40-100	4	80	400-1000	1.0	M-Inline
D3SB40-100	4	120	400-1000	1.0	M-Inline
D4SB40-100	4	150	400-1000	1.0	M-Inline
GBL02-10	4	150	200-1000	1,0	GBL
GBU404-7G	4	150	400-1000	1.0	GBU
KBL404-7G	4	150	400-1000	1.0	KBL
KBU404-7G	4	150	400-1000	1.0	KBU
D5XBA40-100	5	150	400-1000	1.0	B-Inline
D5XB40-100	5	180	400-1000	1.0	B-Inline
D5.1XB20-60	5	200	200-600	1.0	B-Inline
D6SB40-100	6	150	400-1000	1.0	M-Inline
D6XBA40-100	6	150	400-1000	1.0	B-Inline
GBU604-7G	6	175	400-1000	1.1	GBU
D6XB40-100	6	180	400-1000	1.0	B-Inline
GBU804-7G	8	200	400-1000	1.0	GBU
D8XB40-100	8	200	400-1000	1.0	B-Inline
D10SB40-100	10	150	400-1000	1.0	M-Inline
D10XB40-100	10	200	400-1000	1.0	B-Inline
KBU1004-7G	10	200	400-1000	1.0	KBU
GBU1004-7G	10	200	400-1000	1.0	GBU
D15XB40-100	15	200	400-1000	1.0	B-Inline
D15XBV40-100	15	200	400-1000	0.92	B-Inline
D20XB40-100	20	250	400-1000	1.0	B-Inline
D25XB40-100	25	300	400-1000	1.1	B-Inline

Small Line

Medium Line

'Big' In line

GBU

GBL

KBL

KBP

KBU

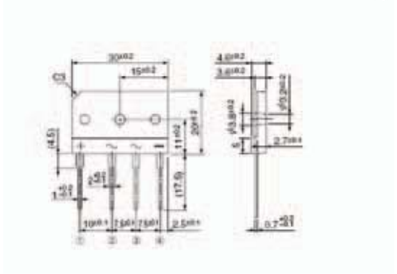
SanKen

Diodes & Rectifiers

Bridge Rectifiers

VRM (V)	IF (AV) (A) Values Parentheses are for the products with heatsinks	Package	Part No.	IFSM (A) 50Hz Single Half Sine Wave	Tj (°C)	Tstg (°C)	VF (V) max	IF (A)	IR (μA) VR=VRM	IR(H) (μA) VR=VRM	Ta (°C)	Rth(j-l) Rth(j-c) (°C/W)	Mass(g)
100	6.0	RBV-60	RBV-601	120	-40 TO +150		1.00	3.0	10	100	100	3.0	6.45
200	6.0	RBV-60	RBV-602L*1	120	-40 TO +150		1.00	3.0	250	1000	100	3.0	6.45
	6.0	RBV-60	RBV-602	120	-40 TO +150		1.00	3.0	10	100	100	3.0	6.45
400	6.0	RBV-60	RBV-604	120	-40 TO +150		1.05	3.0	10	100	100	3.0	6.45
	6.0	RBV-60	RBV-606	120	-40 TO +150		1.05	3.0	10	100	100	3.0	6.45
	6.0	RBV-60	RBV-606H	140	-40 TO +150		1.05	3.0	10	200	100	3.0	6.45
	13	RBV-60	RBV-1306	80	-40 TO +150		1.20	6.5	10	100	100	1.5	6.45
600	15	RBV-60	RBV-1506S	150	-40 TO +150		1.10	7.5	10	200	100	1.5	6.45
	15	RBV-60	RBV-1506J	150	-40 TO +150		1.10	7.5	10	200	150(Tj)	1.5	6.45
	15	RBV-60	RBV-1506	200	-40 TO +150		1.05	7.5	50	200	100	1.5	6.45
	25	RBV-60	RBV-2506	350	-40 TO +150		1.05	12.5	50	200	100	1.5	6.45
800	6.0	RBV-60	RBV-608	170	-40 TO +150		0.95	3.0	100	100	100	3.0	6.45
1000	15	RBV-60	RBV-150C	200	-40 TO +150		1.05	7.5	50	200	100(Tj)	1.5	6.45

*Ultra fast recovery diode - trr = 50nS



FAGOR
Fagor Electrónica

Zener Diodes

P(Watt)	Voltage	Family	Package
1.3W	6.2V-220V	BZX85C-GP	DO-41
1.5W	10V-200V	BZX97C-GP	DO-41
2W	6.2V-220V	ZY-GP	DO-15
5W	8.2V-240V	BZV58C	DO-201AD
5W	7.5V-240V	1N53B	DO-201AD

P(Watt)	Voltage	Family	Package
0.8W	11V-240V	BZD27C	DO219AA
1.3W	6.2V-240V	Z1SMA	SMA
1.5W	6.2V-220V	Z2SMB	SMB

SANYO

Signal Processing & Interfaces

Volume Control ICs

Sanyo's broad range of volume control IC's offer a number of features to give very high levels of integration for audio control.

- Wide range of volume control range & steps with clickless level adjustment through zero-crossing detection
- All devices feature digital control through Sanyo's CCB 3-wire serial control system (very similar to I2C)
- Car devices feature front & rear stereo outputs, fader & balance controls
- General use devices feature stereo outputs & balance control
- Wide Selection of surface mount and through hole parts
- Many devices feature an integrated source selector & tone controls resulting in a one chip solution for audio input processing
- Many devices feature clickless muting, loudness control and bass boost

General Use

	LC75366	LC75392	LC75342	LC75348	LC75343	LC75344	LC75347
INPUTS	1 Stereo	4 Stereo	4 Stereo	4 Stereo	5 Stereo	1 Stereo	6 Channel
graphic Equalizer	-	4 Patterns	2 Band GEQ ±20dB/±10dB	2 Band GEQ ±20dB/±10dB	2 Band GEQ ±20dB/±10dB	-	2 Band GEQ
Loudness	Yes	-	-	-	-	-	-
Voltage Gain	26db	26db	26db	26db	26db	26db	
Bass Boost	-	-	available	available	2dB step ±10dB	-	-
Volume	2dB/step 36 Position	25 Position	1dB/step 81 Position	1dB/step 81 Position	64 Position	66 Position	1dB/step 97 Position
Voice Cancel	-	-	-	-	-	-	
Rec Out Volume	-	-	-	-	-	-	
Zero Crossing Mute	-	-	-	Yes	-	-	Yes
Operating Voltage	4 to 11V	5.5 to 11V	4.5 to 10V	4.5 to 10V	4.5 to 9V	4.5 to 10V	4.5 to 10.5V
Package	DIP20	DIP30SD	DIP30SD	DIP30SD	MFP36S	MFP10S	QIP44MA

Type No.	Package	Volume Block	Fader	Bass/Treble	GEQ	Loudness	Gain Control	Source Selector	Op. Voltage	THD% typ.	External Parts C	R	Op-Amp
LC75366 LC75366M	DIP20 MFP20	0dB to -68dB, 2dB step (36 positions)	-	-	-	Yes	-	-	4 to 11	0.006	12	6	4
LC75392/M	DIP30SD MFP30S	0dB to (25 positions)	-	4 patteras	-	-	-	4x2	5.5 to 11	0.013	33	22	0
LC75342-D/M-D	DIP30SD MFP30S	0dB to -79dB, 1dB step (81 positions)	-	±10dB 2dB step (only TREBLE)	2 Band ±20dB 2dB step (21 positions)	-	0dB to +30dB, 2dB step (16positions)	4x2	4.5 to 10	0.005	19	2	0
LC75343M	MFP36S	0dB to -78dB, (81 positions)	-	±10dB 2dB step	-	Bass Boost	0dB to +30dB, 2dB step (16positions)	5x2	4.5 to 9	0.005	27	4	0
LC75344M	MFP10S	0dB to -78dB, (81 positions)	-	-	-	-	-	-	4.5 to 10	0.005	5	0	0
LC75347E	QIP44MA	0dB to -95dB, (97 positions)	-	-	2 Band ±12dB 2dB step (13 positions)	-	-	6	4.5 to 10.5	0.002	24	4	0
LC75348 LC75348M	DIP30SD MFP30S	0dB to -79dB, 1dB step (81 positions)	-	±10dB 2dB step (only TREBLE)	1 Band ±20dB 2dB step (21 positions)	-	0dB to +30dB, 2dB step (16positions)	4x2	4.5 to 10	0.005	20	3	0

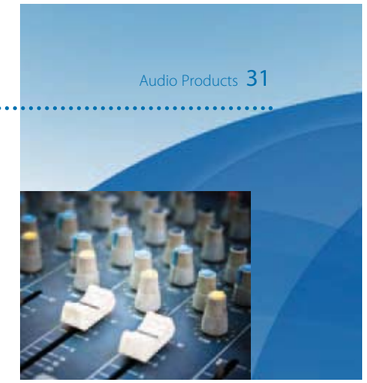
SANYO

Volume Control ICs

Car Use

	LC75421	LC75410	LC75411	LC75412	LV3320	LV3311
INPUTS	5 STEREO	4 STEREO	4 STEREO	5 STEREO	4 STEREO	4 STEREO
Differential Input	-	1 STEREO	-	1 STEREO	1 STEREO	1 STEREO
Input Gain	0 to +18.75dB 1.25dB/step	0 to +18.75dB 1.25dB/step	0 to +18.75dB 1.25dB/step	0 to +18.75dB 1.25dB/step	0 to ±19dB	0 to ±18dB
Bass	±11.9dB 1.7dB/step	±12dB 1dB/step(0 to ±6dB) 2dB/step(±6 to ±12dB)	±12dB 1dB/step(0 to ±6dB) 2dB/step(±6 to ±12dB)	±18dB 2dB/step	Gain:-15 to + 15dB Fo:4 step Q:4 step	Gain:-12 to + 12dB Fo:3 step Q:2 step
Middle	-	±12dB 1dB/step(0 to ±6dB) 2dB/step(±6 to ±12dB)	-	-	Gain:-12.25 to + 12.25dB Fo:4 step Q:4 step	Gain:-12 to + 12dB Fo:3 step Q:2 step
Treble	±11.9dB 1.7dB/step	±12dB 1dB/step(0 to ±6dB) 2dB/step(±6 to ±12dB)	±12dB 1dB/step(0 to ±6dB) 2dB/step(±6 to ±12dB)	±18dB 2dB/step	Gain:-12.25 to + 12.25dB Fo:4 step Q:4 step	Gain:-12 to + 12dB Fo:3 step Q:2 step
EQ	-	-	-	-	Fixed EQ ±12dB 2dB step Low fo: 5 step Q:4 step Mid fo :5 step Q:4 Step High fo: 5 step Q:4 step Low Cut fo: 2 step	-
Loudness	Bass Boost	Yes	Yes	Yes	Yes	Yes
Volume	1dB/step	0.5dB/step	0.5dB/step	1dB/step	1dB/step	1dB/step
Zero Crossing Mute	-	Yes	Yes	Yes	Yes	Yes
Sub Woofer	-	-	-	-	-	Yes
Package	MFP365	QIP64E/SQFP64	QIP44MA	QIP64E/SQFP64	QIP44M	QIP44

Type No.	Package	Volume Block	Fader	Bass/Treble	GEQ	Loudness	Gain Control	Source Selector	Op. Voltage	THD% typ.	External Parts C	R	Op-Amp
LC75410E	QIP64E	0dB to -79.5dB, 0.5dB step (161 positions)	Yes	-	3Band ±12dB 1dB/2dB step (19 positions)	Yes	0dB to + 18.75dB 1.25dB step (16 positions)	5x2	6 to 10.5	0.003	44	4	0
LC75411E/W	QIP44MA SQFP48	0dB to -79.5dB, 0.5dB step (161 positions)	Yes	-	2Band ±12dB 1dB/2dB step (19 positions)	Yes	0dB to + 18.75dB 1.25dB step (16 positions)	4x2	6 to 10.5	0.003	32	4	0
LC75412E/W	QIP64E SQFP64	0dB to -79.5dB, 1dB step (81 positions)	Yes	-	2Band ±11.9dB 1.7dB step (15 positions)	Yes	0dB to + 18.75dB 1.25dB step (16 positions)	6x2	6 to 10	0.004	34	4	0
LC75421M	MFP365	0dB to -79dB, 1dB step (81 positions)	Yes	-	3Band ±12dB 1dB/2dB step (19 positions)	Bass Boost	0dB to + 18.75dB 1.25dB step (16 positions)	5x2	7.5 to 10	0.003	29	4	0
LV3320M	QIP44M	0dB to -79dB, 1dB step (81 positions)	Yes	-	3Band ±15dB(BASS) 12dB(MIDTRE),Fixed _EQ Lowcut fo:2 step Low, Mid, High Gain: ±12dB Fo:5step,Q:4 Step	Yes	0dB to +19dB (13 positions)	5x2	7 to 9	0.01	29	4	0
LV3311PM	QIP44M	+10dB to -79dB, 1dB step (91 positions)	Yes	-	3Band ±12dB 2dB step	Yes	0dB to + 18dB 1dB step	5x2	7 to 9	0.01	29	4	0



SANYO

Tone/Equaliser ICs

Sanyo's range of digital controlled equaliser IC's give a single chip solution to functions normally requiring complex electronics resulting in a high level of integration. The devices feature:

- Parameter control through Sanyo's 3-wire CCB serial interface
- Independent left & right channel control
- Low distortion
- Wide frequency band selection through external capacitors
- Centre frequency & Q are adjustable on the LC75281E

Type No.	Band	Centre Frequency	Q	Gain	Op. Voltage (V)	External Parts C	R	Op-Amp	Package	Remark
LC7527E4	7x2 Fixed	Fixed	Fixed	±12dB/2dB Step	8.0 to 11	32	6	2	Q1P64E	7 Bands Graphic Equalizer
LC75281E	4x2	11 Position	8 Position	±12dB/2dB Step	6.0 to 9.0	33	0	0	Q1P64E	4 Bands Equalize Parametric

Source Selectors

Sanyo's range of source selectors allow serial (3-wire) digitally controlled selection of a number of sources

- 2 devices can be used on the same bus to extend the input count
- ±20V input capability allows wide dynamic range
- Easy microprocessor interface & control
- High audio quality with low distortion

Type No.	Operating Voltage	Audio Video	Control	Analog Switches Channel	Position	LED Driver	Package
LC78211	±6 to ±18.5	Audio	CCB	2	4+2+2	-	DIP30S
LC78212	±6 to ±18.5	Audio	CCB	2	3+3+2	-	DIP30S
LC78213	±6 to ±18.5	Audio	CCB	2	2+2+2+1	-	DIP30S

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Surround Audio Devices

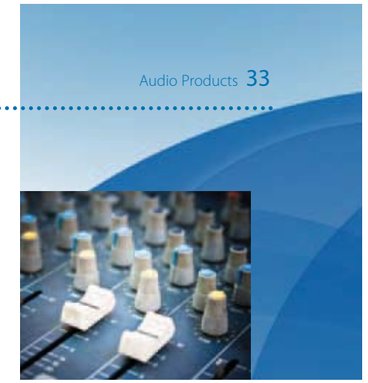
These parts from Sanyo provide pseudo-surround functions based on license free algorithms and also incorporate some other useful features including tone and volume control and input selection.

Part Number	Package	Circuit Functions & Application	Typical Features	Manufacturer
LV1100	DIP24S(300mil)	Digital surround signal processing IC	Delay line, pseudo-surround, microphone echo	Sanyo
LV1115 LV1115M	DIP24S(300mil) MFP24S(300mil)	Surround IC for TV products	AViss (Sanyo-developed surround system), input gain control, 2-band tone control, volume control, I2C bus controller	Sanyo
LV1116N LV1116NV	DIP36S(400mil) SSOP36(275mil)	Surround IC for TV products	AViss (Sanyo-developed surround system), input gain control, 2-band tone control, volume control, I2C bus controller	Sanyo
LV1117N LV1117NV	DIP42S(600mil) SSOP24(275mil)	Surround IC for TV products	Input function switch(4-channel stereo inputs), line output, AViss (Sanyo-developed surround system), input gain control, 2-band tone control, volume control, I²C bus controller, parallel output port (4-pins)	Sanyo
LA2616V	SSOP16(225mil)	Analog surround IC	AViss 3D surround, variable effect level, bypass function, LED drive	Sanyo

Accessories for Audio Devices

The devices highlighted here don't necessarily fit in our other audio categories but nevertheless offer some interesting audio product related functions.

Part Number	Package	Circuit Functions & Application	Typical Features	Manufacturer
LA2655V	SSOP20(225mil)	Clear sound control IC	Corrects for transmission time differences between high & low frequencies for speaker systems	Sanyo
LC75100M	MFP36SD(375mil)	Digital echo IC with microphone preamplifier	Digital echo IC with microphone preamplifier with ALC and vocal cut	Sanyo
LA2900M	MFP20(300mil)	High-output 2-channel line amplifier IC for car audio systems	Gain = 8dB, Vo = 5.3Vrms	Sanyo
LA2901V	SSOP24(275mil)	High-output 2-channel line amplifier IC for car audio systems with reduced number of external components	Gain = 8dB, Vo = 5.3Vrms	Sanyo
LA2902V	SSOP24(275mil)	High-output 2-channel line amplifier IC for car audio systems with reduced number of externa components	Gain = 12dB, Vo = 5.3Vrms	Sanyo



JRC Japan Radio Co., Ltd.

Operational Amplifiers

This selection of operational amplifiers has been chosen specifically for their suitability in audio applications. NJRC offer a wide range of op-amps with many featuring parameters ideal for audio applications at extremely competitive prices. Features of the selected range are:

- Low noise parts including the ultra-low noise NJM2114 offering Ein of just 1.5nV/√Hz
- Low distortion
- Wide range of supply voltages
- Small surface mount package options and SIP inline package
- Low cost

Part No.	No. Opamps	Supply (V)	Icc(mA)	Slew Rate	Noise	Package	Comments
NJM4580D NJM4580M NJM4580E NJM4580L NJM4580V	2	±2 to ±18 Dual	6	5V/µs	3.3 nV/√Hz	DIP8 DMP8 EMP8 SIP8 SSOP8	Good general purpose audio op-amp with low-noise and low THD (0.0005%)
NJM5532D NJM5532M NJM5532L	2	±3 to ±22 Dual	9	8V/µs	5 nV/√Hz	DIP8 DMP8 SIP8	Industry standard low noise audio opamp
NJM5534D NJM5534M	1	±3 to ±22 Dual	4	13V/µs	3.3 nV/√Hz	DIP8 DMP8	Industry standard low noise audio opamp. Lower noise than 5532
NJM2122D NJM2122M	2	±2 to ±10 Dual	7	2.4V/µs	1.5 nV/√Hz	DIP8 DMP8	Ultra low noise, low distortion
NJM2114D NJM2114M NJM2114L	2	±3 to ±22 Dual	9	15V/µs	3.3 nV/√Hz	DIP8 DMP8 SIP8	Low noise, low distortion, high output current (60mA)
NJM072BD NJM072BM NJM072BE NJM072BL NJM072BV	2	±4 to ±18 Dual	3	13V/µs	15 nV/√Hz	DIP8 DMP8 EMP8 SIP8 SSOP8	Low noise, JFET input audio opamp. Industry standard TL072
NJM2737D NJM2737M NJM2737V NJM2737RB1	2	+1.8 to +6 Single	1.2	0.7V/µs	5 nV/√Hz	DIP8 DMP8 SSOP8 TVSP8	Single supply low voltage, rail-to-rail input & output low noise audio opamp
NJM2745D NJM2745M NJM2745E NJM2745V	4	±2V to ±15.5V (DIP/EMP) ±2V to ±9.5V (DMP/SSOP)	12	5V/µs	5 nV/√Hz	DIP14 DMP14 EMP14 SSOP14	Quad opamp. Low noise audio use


NJM4580L


NJM4580V


NJM4580D


NJM4580E


NJM4580M

SANYO

Digital Audio Interfaces

Sanyo's range of digital audio interface IC's that modulate and demodulate data to transfer between devices according to the IEC60958/61937 & EIAJ CP-1201 standards and support sampling rates up to 192kHz. They offer a low cost highly integrated solution and incorporate many functions including clock control, Phase Locked Loops and easy interface to DSP's and microcontrollers.

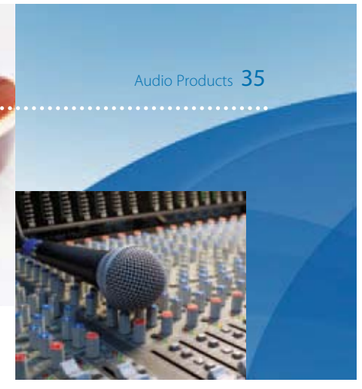
Features include:

- Parts with low power modes giving high suitability in portable applications
- The LC890561W-E utilises a data buffer memory providing a lip-sync function capability by delaying the audio output after demodulation
- Low jitter clocks
- Pin compatibility between some devices in the range

Applications include:

- Home cinema receivers and processors
- CD & DVD players and recorders
- Portable devices including cell phones, PDA's and MP3 players
- Car audio
- Professional audio equipment including mixing desks and instrument amplifiers

Part Number	Package	Circuit Function	Features
LC89052	TA-E TSSOP24(225mil)	Digital Audio Interface Receiver	1 input, 32k to 192kHz reception,128fs/256fs/384fs/512fs master clock output,subcode-Q support, power-down mode
LC890561W-E	SQFP48(7_7)	Digital Audio Interface Receiver with Built-in Data Buffer Memory	3 inputs 1 output, 32k to 192kHz reception,128fs/256fs/38 4fs/512fs master clock output,output data delay function, include built-in oscillation amplifier,pin -compatible with LC89056W
LC89056W-E	SQFP48(7_7)	Digital Audio Interface Receiver	3 inputs 1 output, 32k to 192kHz reception,128fs/256fs/384fs/512fs master clock output,include built-in oscillation amplifier,input fs calculation function, channel status renewal flag output
LC89057W-VF4AE	SQFP48(7_7)	Digital Audio Interface Transceiver	7 inputs 1 output, 32k to 192kHz reception,64fs/128fs/256fs/512fs master clock output,modulation and demodulation function,two clock system outputs, DTS-CD detection,channel status renewal flag output
LC89058W-E	SQFP48(7_7)	Digital Audio Interface Receiver	7 inputs 1 output, 32k to 192kHz reception,64fs/128fs/256fs/512fs master clock output,two clock system outputs,output clock frequency self adjustment pin -compatible with LC89057W



SANYO

Small Signal Transistors

Low-Noise

Sanyo Semiconductor offer a huge range of small signal transistors for a multitude of applications from televisions to digital control but the devices in this section have been specially selected for their suitability in audio applications. These devices offer technical parameters, packages or technologies that make them particularly interesting for audio products and have been split into categories of different technologies.

These bipolar transistors find application in audio in microphone preamplifiers and other designs where low noise is critical:

Package	Part	Vceo(V)	Ic(A)	Pc(W)	h_{FE} min	h_{FE} max	f_T(MHz)	Vcesat(V) Ic(mA)	Vcesat(V) Ib(mA)	Vcesat(V) max	Vno(ave) (mV)	Compliment	Polarity
NP (5.0X19.0X4.0) (TO-92)	2SC3382	50	0.2	0.4	100	560	250	100	10	0.3	40	2SA1391	NPN
	2SC2362	120	0.05	0.4	160	960	130	10	1	0.5	35	2SA1016	NPN
	2SC2362K	120	0.05	0.4	160	960	130	10	1	0.5	35	2SA1016K	NPN
	2SA1391	50	0.2	0.4	100	560	200	100	10	0.3	35	2SC3382	PNP
	2SA1016	100	0.05	0.4	160	960	110	10	1	0.5	35	2SC2362	PNP
	2SA1016K	120	0.05	0.4	160	960	110	10	1	0.5	35	2SC2362K	PNP

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Small Signal Transistors

High-Voltage

These high voltage transistors find particular applications in audio in power amplifiers.
The wide selection of packages provides solutions in any design:

Package	Part	Marking	Vceo(V)	Ic(A)	Pc(W)	h_{FE} min	h_{FE} max	f_T(MHz)	Vcesat(V) Ic(mA)	Vcesat(V) Ib(mA)	Vcesat(V) max	Compliment	Polarity
CP(SOT-23)	2SA1257	G	160	0.08	0.2	60	270	130	30	3	0.7	2SC3143	PNP
2.9x2.5x1.1	2SA1682	CS	300	0.05	0.25	100	320	70	10	1	1	2SC4412	PNP
	2SA1415	AA	160	0.14	1.3	100	400	150	50	5	0.4	2SC3645	PNP
PCP(SOT-89)	2SA1418	AD	160	0.7	1.3	100	400	120	250	25	0.5	2SC3648	PNP4.5x4.25x1.5
4.5x4.25x1.5	2SA1419	AE	160	1.5	0.5	100	400	120	500	50	0.5	2SC3649	PNP
	2SA1740	AK	400	0.2	1.3	60	200 7	0	50	5	0.8	2SC4548	PNP
	2SA1207 -		160	0.07	0.6	100	400	150	30	3	0.4	2SC2909	PNP
NP(TO-92)	2SA1319	-	160	0.7	0.7	100	400	1	20 250	25	0.5	2SC3332	PNP
5.0x19.0x4.0	2SA1689	-	300	0.05	0.6	100	320	70	10	1	1	2SC4449	PNP
	2SA1699	-	400	0.2	0.6	60	200	70	50	5	0.8	2SC4002	PNP
MP(TO-226)	2SA1208	-	160	0.07	0.9	100	400	150	30	3	0.4	2SC2910	PNP
6.0x22.5x4.7	2SA1370	-	200	0.1	1	40	320	150	20	2	0.6	2SC3467	PNP
	2SA1371	-	300	0.1	1	40	320	150	20	2	0.6	2SC3468	PNP
	2SA1768	-	160	0.7	1	100	400	120	250	25	0.5	2SC4612	PNP
NMP	2SA1770	-	160	1.5	1	100	400	120	500	50	0.5	2SC4614	PNP
6.9x8.5x2.5	2SA1785	-	400	1	1	40	200	50	200	20	1	2SC4645	PNP
	2SA1786	-	400	2	1	40	200	40	500	50	1	2SC4646	PNP
	2SA1552	-	160	1.5	1	100	400	120	500	50	0.5	2SC4027	PNP
TP(D-PAK)	2SA1700	-	400	0.2	1	60	200	70	50	5	0.8	2SC4003	PNP
6.5x14.5x2.3	2SA1772	-	400	1	1	40	200	50	200	20	1	2SC4615	PNP
	2SA1773	-	400	2	1	40	200	40	500	50	1	2SC4616	PNP
	2SA1209	-	160	0.14	1	100	400	150	50	5	0.4	2SC2911	PNP
	2SA1248	-	160	0.7	1	100	400	120	250	25	0.5	2SC3116	PNP
TO-126	2SA1249	-	160	1.5	1	100	400	120	500	50	0.5	2SC3117	PNP
8.0x26.5x2.7	2SA1352	-	200	0.1	1.2	40	320	70	20	2	0.6	2SC3416	PNP
	2SA1380	-	200	0.1	1.2	40	320	150	20	2	0.6	2SC3502	PNP
	2SA1353	-	300	0.1	1.2	40	320	70	20	2	0.6	2SC3417	PNP
	2SA1381	-	300	0.1	1.2	40	320	150	20	2	0.6	2SC3503	PNP
	2SA1477	-	160	0.14	1.3	100	400	150	50	5	0.4	2SC3787	PNP
TO-126ML	2SA1507	-	160	1.5	1.5	100	400	120	500	50	0.5	2SC3902	PNP
8.0x26.5x3.3	2SA1478	-	200	0.1	1.3	40	320	150	20	2	0.6	2SC3788	PNP
	2SA1479	-	300	0.1	1.5	40	320	70	20	2	0.6	2SC3789	PNP
	2SA1480	-	300	0.1	1.5	40	320	150	20	2	0.6	2SC3790	PNP
FLP	2SA2168	-	160	1.5	1.5	140	400	120	500	50	0.5	-	PNP
10.5x16.0x4.5	2SA1828	-	200	0.1	1.3	60	320	150	20	2	0.6	2SC4732	PNP
	2SA1830	-	400	2	1.5	40	200	40	500	50	1	2SC4734	PNP
CPH3	CPH3249	-	350	1	0.6	100	200	20	10	100	0.8	-	NPN
2.9x2.8x0.9	CPH3249A	-	400	1	0.6	50	100	20	10	100	0.8	-	NPN
CP(SOT-23)	2SC3143	G	160	0.08	0.2	60	270	150	30	3	0.7	2SA1257	NPN
2.9x2.5x1.1	2SC4412	CS	300	0.05	0.25	100	320	70	10	1	1	2SA1682	NPN
	SC3645	CA	160	0.14	1.3	100	400	150	50	5	0.3	2SA1415	NPN
PCP(SOT-89) 2	2SC3648	CD	160	0.7	1.3	100	400	120	250	25	0.4 2	SA1418	NPN
4.5x4.25x1.5	2SC3649	CE	160	1.5	1.5	100	400	120	500	50	0.45	2SA1419	NPN
	2SC4548	CN	400	0.2	1.3	60	200	70	50	5	0.6	2SA1740	NPN

Small Signal Transistors

Package	Part	Marking	Vceo(V)	Ic(A)	Pc(W)	h_{FE} min	h_{FE} max	f_T(MHz)	Vcesat(V) Ic(mA)	Vcesat(V) Ib(mA)	Vcesat(V) max	Compliment	Polarity
SPA(E-LINE)	2SC6083	-	350	1	0.6	100	200	20	10	100	0.8	-	NPN
4.0x8.0x2.2	2SC6083A	-	400	1	0.6	50	100	20	10	100	0.8	-	NPN
	2SC2909	-	160	0.07	0.6	100	400	150	30	3	0.3	2SA1207	NPN
NP(TO-92)	2SC3332	-	160	0.7	0.7	100	400	120	250	25	0.4	2SA1319	NPN
5.0x19.0x4.0	2SC4449	-	300	0.05	0.6	100	320	70	10	1	1	2SA1689	NPN
	2SC4002	-	400	0.2	0.5	60	200	70	50	5	0.6	2SA1699	NPN
MP	2SC2910	-	160	0.07	0.9	100	400	150	30	3	0.3	2SA1208	NPN
6.0x22.5x4.7	2SC3467	-	200	0.1	1	40	320	150	20	2	0.6	2SA1370	NPN
	2SC3468	-	300	0.1	1	40	320	150	20	2	0.6	2SA1371	NPN
	2SC4612	-	160	0.7	1	100	400	120	250	25	0.4	2SA1768	NPN
	2SC4614	-	160	1.5	1	100	400	120	500	50	0.45	2SA1770	NPN
NMP	2SC4490	-	300	0.1	1	70	280	70	20	2	0.6	2SA1710	NPN
6.9x8.5x2.5	2SC4644	-	400	0.2	1	60	200	70	50	5	0.6	2SA1784	NPN
	2SC4645	-	400	1	1	40	200	70	200	20	1	2SA1785	NPN
	2SC6065	-	400	1.5	0.9	20	50	20	700	140	0.8	-	NPN
	2SC4646	-	400	2	1	40	200	60	500	50	1	2SA1786	NPN
	2SC4027	-	160	1.5	1	100	400	120	500	50	0.45	2SA1552	NPN
	2SC4003	-	400	0.2	1	60	200	70	50	5	0.6	2SA1700	NPN
	2SC4615	-	400	1	1	40	200	70	200	20	1	2SA1772	NPN
TP(D-PAK)	2SC5823	-	400	1.5	1	20	50	20	700	140	0.8	-	NPN
6.5x14.5x2.3	2SC4616	-	400	2	1	40	200	60	500	50	1	2SA1773	NPN
	2SC6106	-	500	4	1	40	80	18	1500	30	1	-	NPN
	2SC5808	-	700	2.5	1	20	50	20	1200	240	0.8	-	NPN
	2SC2911	-	160	0.14	1	100	400	150	50	5	0.3	2SA1209	NPN
	2SC3116	-	160	0.7	1	100	400	120	250	25	0.4	2SA1248	NPN
TO-126	2SC3117	-	160	1.5	1	100	400	120	500	50	0.45	2SA1249	NPN
8.0x26.5x2.7	2SC3416	-	200	0.1	1.2	40	320	70	20	2	0.6	2SA1352	NPN
	2SC3502	-	200	0.1	1.2	40	320	150	20	2	0.6	2SA1380	NPN
	2SC3503	-	300	0.1	1.2	40	320	150	20	2	0.6	2SA1381	NPN
	2SC3787	-	160	0.14	1.3	100	400	150	50	5	0.3	2SA1477	NPN
	2SC4613	-	160	0.7	1.5	100	400	120	250	25	0.4	2SA1769	NPN
TO-126ML	2SC3902	-	160	1.5	1.5	100	400	120	500	50	0.45	2SA1507	NPN
8.0x26.5x3.3	2SC3788	-	200	0.1	1.3	40	320	150	20	2	0.6	2SA1478	NPN
	2SC3789	-	300	0.1	1.5	40	320	70	20	2	0.6	2SA1479	NPN
	2SC3790	-	300	0.1	1.5	40	320	150	20	2	0.6	2SA1480	NPN
	2SC4217	-	300	0.2	1.5	40	200	70	20	2	0.6	-	NPN
FLP	2SC5291	-	160	1.5	1.5	100	400	120	500	50	0.45	2SA2168	NPN
10.5x16.0x4.5	2SC4732	-	200	0.1	1.3	60	320	150	20	2	0.6	2SA1828	NPN

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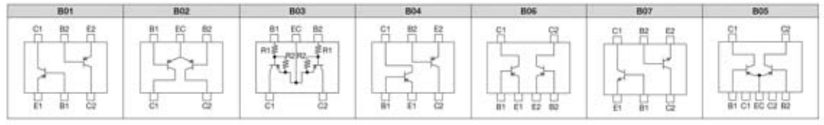
Compound (Arrays)

Sanyo offer a large range of compound transistor arrays in extremely compact packages for small footprint SMT mounting:

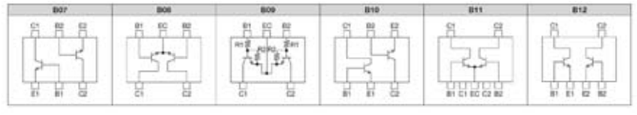
PNP + PNP

Package WxDxH (unit: mm)	Type No.	Marking	Absolute maximum ratings/ Ta=25° C			Electrical characteristics/Ta=25°C						Internal chip equivalent product	Electrical connection
			Vceo [V]	IC [A]	PC [W]	h_{FE} min	h_{FE} max	f_T typ [MHz]	Vce(sat) [V] I_C [A]	Vce(sat) [V] I_B [MA]	Vce(sat) [V] max		
SCH6	SCH2102	EE	12	0.5	0.4	300	700	490	0.2	10	0.3	12A01Sx2	B01
1.6x1.6x0.56	SCH2101	EA	12	0.8	0.4	300	700	450	0.4	20	0.24	12A02Sx2	B01
MCPH6	MCH6533	EF	12	0.5	0.55	300	700	490	0.2	10	0.3	12A01x2	B01
2.0x2.1x0.85	MCH6531	EC	12	1	0.55	300	700	450	0.4	20	0.24	12A02x2	B01
VEC8	VEC2102	AC	30	3	1.1	200	560	380	1.5	30	0.235	CPH3109x2	B07
2.9x2.8x0.75													
CPH5	CPH5505	EE	30	3	0.9	200	560	380	1.5	30	0.23	CPH3109x2	B02
2.9x2.8x0.9	CPH5514	3U	50	0.1	0.35	300	700	450	0.4	20	0.24	2SA1344x2	B03
CPH6	CPH6520	3G	25	0.15	0.35	500	1200	210	0.05	1	0.3	2SA1813x2	B04
2.9x2.8x0.9	CPH6531	ES	50	1	0.9	200	560	420	0.3	6	0.2	CPH3116x2	B01
PCP5	FP208	208	25	2	0.8	140	400	150	1.5	75	0.6	2SB1121x2	B05
4.5x4.25x1.5	FP210	210	50	2	0.8	140	400	150	1	50	0.7	2SB1123x2	B05



NPN + NPN

Package WxDxH (unit: mm)	Type No.	Marking	Absolute maximum ratings/ Ta=25° C			Electrical characteristics/Ta=25°C						Internal chip equivalent product	Electrical connection
			Vceo [V]	IC [A]	PC [W]	h_{FE} min	h_{FE} max	f_T typ [MHz]	Vce(sat) [V] I_C [A]	Vce(sat) [V] I_B [MA]	Vce(sat) [V] max		
SCH6	SCH2202	EF	15	0.6	0.4	300	800	330	0.2	10	0.3	15C01Sx2	B07
1.6X1.6X0.56	SCH2201	EB	15	0.8	0.4	300	800	440	0.4	20	0.28	15C02Sx2	B07
MCPH6	MCH6534	EG	15	0.7	0.55	300	800	330	0.2	10	0.3	15C01x2	B07
2.0X2.1X0.85	MCH6532	EE	15	1	0.55	300	800	440	0.4	20	0.28	15C02x2	B07
CPH5	CPH5503	EC	30	3	0.9	200	560	450	1.5	30	0.18	CPH3209x2	B08
2.9X2.8X0.9	CPH5508	EH	50	1	0.9	200	560	420	0.5	10	0.19	CPH3216x2	B08
	CPH5504	ED	50	3	0.9	200	560	380	1	50	0.12	CPH3205x2	B08
CPH6	CPH6501	EA	30	1.5	0.9	200	560	500	0.75	15	0.225	CPH3215x2	B07
2.9x2.8x0.9	CPH6519	3F	50	0.1	0.35	800	3200	200	0.05	1	0.03	2SC3689x2	B10
	CPH6532	E7	50	1	0.9	200	560	420	0.3	6	0.135	CPH3216x2	B07
PCP5	FP209	209	25	2	0.8	140	400	150	1.5	75	0.4	2SD1621x2	B11
4.5x4.25x1.5	FP211	211	50	2	0.8	140	400	150	1	50	0.4	2SD1623x2	B11
	FP216	216	100	1	0.8	140	400	120	0.4	40	0.4	2SC3646x2	B11



JFETs

Sanyo's range of N-channel J-FETs are ideal for general purpose amplifier applications and some feature very low noise performance in a range of through hole and micro SMD packages.

Package WxDxH (unit: mm)	Type No.	Marking	Absolute maximum ratings/ Ta=25° C				Electrical characteristics/Ta=25°C						Applications
			VDSX [V]	VGDS VGDO [V]	ID [mA]	PD [mW]	IDSS [mA] min	IDSS [mA] max	lyfsl typ(*min) [mS]	Ciss ty [pF]	Crss tp [pF]	NF/NG typ [dB]	
ECSP1006-3													
0.6X1.0X0.5	EC3A03B	JV	40	40	1	100	0.05	0.13	0.13	1.7	0.7	-	Impedance converters IR sensors
ECSP1006-3B	EC3A04B	KC	30	30	10	100	0.6	3	5	4	1.1	-	Low-frequency general-purpose
0.6x1.0x0.5													amplifier, impedance converter
SMCP	2SK3796	K	30	30	10	100	0.6	6	6.5	4	1.1	-	Low-frequency general-purpose
1.6x1.6x0.75													amplifier, impedance converter
MCPH3													
2.0X2.1X0.85	MCH3905	J	15	15	50	400	10	32	35	10	2.9	1	HF low-noise amplifier
CPH6	CPH6901	-	30	30	10	200	1.2	3	4.5	5	0.9	-	Low-frequency general-purpose
2.9X2.8X0.9													Amplifier, Differential Amplifier,
													Analog Switch Application
	2SK932	E	15	15	50	200	5	24	50	10	3	1.5	HF low-noise amplifier
	2SK2394	YJ	15	15	50	200	6	32	38	10	2.9	1	HF low-noise amplifier
CP	2SK2539	AK	15	15	50	200	10	50	29	4.9	1.4	-	High-frequency amplifier,
2.9X2.5X1.1													Analog switches
	2SK3557	IR	15	15	50	200	10	32	35	10	2.9	1	HF low-noise amplifier
	2SK3666	JK	30	30	10	200	0.6	6	6.5	4	1.1	-	Low-frequency general-purpose
													amplifier, impedance converter
	2SK715	-	15	15	50	300	5	24	50	10	3	1.5	AM tuner RF amplifier
SPA	2SK2074	-	15	15	50	300	6	20	30	9.5	2.7	0.5	HF low-noise amplifier
4.0X18.0X2.2	2SK546	-	40	40	1	100	0.03	0.3	0.13	1.9	0.7	-	Impedance converters
	2SK772	-	40	40	20	300	1.2	12	9	9	2.1	1.5	Low-frequency general
													purpose amplifier
NP	2SK937	-	40	40	100	300	40	75	15	11	2.5	1.5	High-frequency general-
5.0X19.0X4.0													purpose amplifier

JFETs for Electret Condenser Microphone

This range from Sanyo of small signal JFET's in small packages are specifically aimed at applications for electret microphones

Package WxDxH (unit: mm)	Type No.	Marking	Absolute maximum ratings/ Ta=25° C				Electrical characteristics/Ta=25°C						
			VDSX [V]	VGDS VGDO [V]	ID [mA]	PD [mW]	IDSS [mA] min	IDSS [mA] max	lyfsl typ(*min) [mS]	Ciss ty [pF]	Crss tp [pF]	GV typ [dB]	VNO max [dB]
USFP	TF246	F	-	20	1	30	0.14	0.35	1	3.5	0.65	-3.0	-110
0.6x1.0x0.27	TF252	D	-	20	1	30	0.14	0.35	1.4	3.1	0.95	1.0	-102
ECSP1006-4-F	EC4A01TF	V	-	20	1	100	0.14	0.35	1	3.5	0.65	-3.0	-110
0.6x1.0x0.35													
TSSFP	TF202C	E	-	20	1	100	0.14	0.35	1.2	3.5	0.65	-3.0	-110
1.2x1.2x0.38													
VTFP	TF218THC	A	-	20	1	100	0.14	0.35	1	3.5	0.65	-3.0	-110
1.4x1.2x0.34	TF252TH	D	-	20	1	100	0.14	0.35	1.4	3.1	0.95	1.0	-102

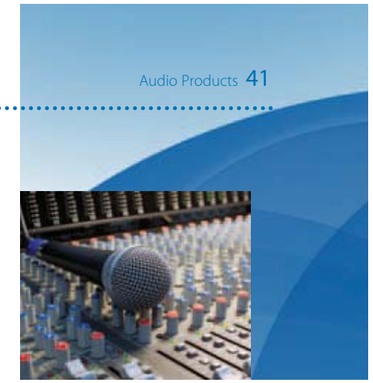
SANYO

High-Gain, High-VEBO & Muting

This range of transistors from Sanyo feature very high reverse breakdown of the base - emitter voltage and low saturation voltages making them ideal for muting circuits and amplifier applications.

PNP

Package	Part	Marking	Vceo (V)	V_{EBO} (V)	I_C (A)	PC (W)	h_{FE} Min	h_{FE} max	Vce(sat) [V] I_C (mA)	Vce(sat) [V] I_B (mA)	Vce(sat) [V] Typ	Vce(sat) [V] max	Applications	Compliment
SSFP 1.4x1.4x0.6	2SA1965-S	KA	10	5	0.1	0.15	200	600	10	1	0.016	0.035	Low-frequency general-purpose amplifier,muting circuit	-
MCP 2.0x2.1x0.75	SA1813	KS	25	15	0.15	0.2	500	1200	50	1	0.15	0.3	High gain muting circuit	-
	2SA1687	D	50	15	0.15	0.15	135	600	50	5	0.25	0.5	High VEBO, low frequency general purpose amplifier	2SC4446
CP 2.9x2.5x1.1	2SA1814	KS	25	15	0.15	0.2	500	1200	50	1	0.15	0.3	High gain muting circuit	-
	2SA1434	FL	50	15	0.1	0.2	500	1200	50	1	0.2	0.5	High gain, low frequency general purpose amplifier	2SC3689
	2SA1252	D	50	15	0.15	0.2	90	600	50	5	-	0.5	High VEBO, low frequency general purpose amplifier	2SC3134
PCP (4.5x4.25x1.5)	2SA1776	`AL	25	15	0.3	1.3	500	1200	200	4	0.12	0.5	High gain, low frequency general purpose amplifier	-
SPA (4.0x18x2.2)	2SA1253	-	50	15	0.2	0.25	100	560	50	5	0.2	0.5	Low-frequency general purpose amplifier	2SC3135
	2SA1435	-	25	15	0.3	0.6	500	1200	200	4	0.18	0.5	High gain, low frequency general purpose amplifier	2SC3068
	2SA1246	-	50	15	0.15	0.4	100	560	50	5	-	0.5	Low frequency general purpose amplifier	2SC3114
	2SA1436	-	50	15	0.2	0.6	500	1200	100	2	0.2	0.5	High gain, low frequency general purpose amplifier	2SC3069
	2SA1437	-	100	15	0.05	0.5	400	1000	10	0.2	0.18	0.5	High gain, low frequency general purpose amplifier	2SC3495
TP (6.5x14.5x2.3)	2SA1562	-	25	15	1.2	15	500	1200	500	10	0.1	0.5	High gain, low frequency general purpose amplifier	-



SANYO

High-Gain, High-VEBO & Muting

NPN

Package	Part	Marking	Vceo (V)	V_{EBO} (V)	I_C (A)	PC (W)	h_{FE} Min	h_{FE} max	Vce(sat) [V] I_C (mA)	Vce(sat) [V] I_B (mA)	Vce(sat) [V] Typ	Vce(sat) [V] max	Applications	Compliment
ECSP1008-4 0.8x1.0x0.6	EC3203C	K	15	5	0.1	0.15	800	3200	10	1	0.014	0.03	High gain muting circuit	-
SSFP 1.4x1.4x0.6	2SC4919-S	DA	15	5	0.1	0.15	800	3200	10	1	0.014	0.03	High gain muting circuit	-
MCP 2.0x2.1x0.75	2SC4851	YT	15	5	0.1	0.2	800	3200	10	1	0.014	0.03	High gain muting circuit	-
	2SC4694	WT	20	25	0.5	0.15	300	1200	100	1	0.12	0.5	High gain muting circuit	-
	2SC4413	GY	50	15	0.1	0.15	800	3200	50	1	0.1	0.5	High gain muting circuit	-
	2SC4446	H	50	15	0.15	0.15	135	600	50	5	0.15	0.5	High VEBO, low frequency general purpose amplifier	2SA1687
CP 2.9x2.5x1.1	2SC3134	H-	50	15	0.15	0.2	90	600	50	5	-	0.5	High VEBO, low frequency general purpose amplifier	2SA1252
	2SC3661	FY	25	15	0.3	0.2	800	3200	200	4	0.12	0.5	High gain muting circuit	-
	2SC3689	GY	50	15	0.1	0.2	800	3200	50	1	0.1	0.5	High gain muting circuit	2SA1434
	2SC4695	WT	20	25	0.5	0.25	300	1200	100	2	0.12	0.5	High gain muting circuit	-
PCP (4.5x4.25x1.5)	2SC4390	CJ	10	15	2	1.3	800	3200	1000	20	0.11	0.3	High gain, low frequency general purpose amplifier	-
	2SC3650	CF	25	15	1.2	1.5	800	3200	500	10	0.12	0.5	High gain, low frequency general purpose amplifier	-
	2SC5069	CU	25	15	2	1.5	800	3200	1000	20	0.15	0.5	High gain, low frequency general purpose amplifier	-
	2SC3651	CG	100	15	0.2	1.3	500	2000	500	2	0.15	0.5	High gain, low frequency general purpose amplifier	-
SPA (4.0x18x2.2)	2SC3576	-	25	15	0.3	0.3	800	3200	200	4	0.12	0.5	High gain muting circuit	-
	2SA1253	-	50	15	0.2	0.25	100	560	50	5	0.2	0.5	High gain, low frequency general purpose amplifier	2SA1253
	2SA1253	-	50	15	0.2	0.25	100	560	50	5	0.2	0.5	Low-frequency general purpose amplifier	-
NP (5.0x19.0x4.0)	2SC3792	`-	20	25	0.5	0.5	300	1200	100	2	0.12	0.5	High gain muting circuit	-
	2SC3068	-	25	15	0.3	0.6	800	3200	200	4	0.12	0.5	High gain, low frequency general purpose amplifier	2SA1435
	2SC4204	-	25	15	0.7	0.6	800	3200	500	10	0.15	0.5	Low frequency general purpose amplifier	-
	2SC3114	-	50	15	0.15	0.4	100	560	50	5	-	0.5	High gain, low frequency general purpose amplifier	2SA1246
	2SC3069	-	50	15	0.2	0.5	800	3200	100	2	0.18	0.5	High gain, low frequency general purpose amplifier	2SA1436
	2SC3495	-	100	15	0.05	0.5	500	2000	10	0.2	0.1	0.5	High gain, low frequency general purpose amplifier	2SA1437
TP (6.5x14.5x2.3)	2SC3070	-	25	15	1.2	1	800	3200	500	10	0.12	0.5	High gain, low frequency general purpose amplifier	-
	2SC3807MP	-	25	17	2	1.1	1000	2000	1000	20	0.135	0.5	25V/2A High HFE low frequency general purpose amplifier	-
	2SC3071	-	100	15	0.2	1	500	2000	500	2	0.15	0.5	High gain, low frequency general purpose amplifier	-
NMP (6.9x8.5x2.5)	2SC4480	-	25	15	2	1	800	3200	1000	20	0.15	0.5	High gain, low frequency general purpose amplifier	-
TO-126LP (8.0x26.5x2.7)	2SC3807	-	25	15	2	15	800	3200	1000	20	0.15	0.5	Low frequency general purpose amplifier, muting circuit	-
	2SC3807C	-	25	17	2	15	1000	2000	1000	20	0.15	0.5	Low frequency general purpose amplifier, muting circuit	-
	2SC3808	-	60	15	2	15	800	3200	1000	20	0.2	0.5	Low frequency general purpose amplifier, muting circuit	-
FLP (10.5x16x4.5)	2SC5070	-	25	15	2	1.5	800	3200	1000	20	0.15	0.5	High gain, low frequency general purpose amplifier	-
	2SC4736	-	60	15	2	1.5	800	3200	1000	20	0.2	0.5	High gain, low frequency general purpose amplifier	-

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Power Resistors

Resistor technology is one of the core technologies of the TT-group of companies and this section highlights a range of parts that find applications in audio. Key application areas include:

- Power amplifier emitter resistors
- Power amplifier zobel networks
- Power supply soft-start circuits
- Loudspeaker crossover networks

Products from BI technologies, IRC and Welwyn cover a wide range of power ratings and packages making them an ideal solution in audio. Ranges are available that feature non-inductive performance that are ideal for high-end no-compromise applications.

Power Resistors

BI technologies
A Subsidiary of TT electronics plc

Power Resistors Moulded Package Non-Inductive

	Model	Power (Watts)	Package Style	Resistance Range
	MHP20S	20	Small, TO-126	0.01 to 51k Ohms
	MHP20	20	TO-220	0.01 to 100k Ohms
	SMP	10	SOIC type package	10 to 10k Ohms
	SMHP	20	TO-263	0.01 to 100k Ohms
	MHP35	35	TO-220	0.01 to 51k Ohms
	MHP50	50	TO-220	0.01 to 51k Ohms
	MHP100	100	TO-247	0.01 to 51k Ohms
	MHP140	140	TO-247	0.01 to 51K Ohms
	BHPR	250,300	TO-227	1 to 1k Ohms

Planar Non-Inductive Power Resistors

	Model	Power (Watts)	Package Style	Resistance Range
	BPC	3 - 10	Planar	0.1 to 200k Ohms
	BPR	3 - 50	Planar	0.1 to 200k Ohms

Current Sense Non-Inductive Power Resistors

	Model	Power (Watts)	Package Style	Resistance Range
	BCS	8	SMT, 5025	0.5m - 5m Ohms

IRC Power Resistors

IRC

Range	Picture	Technology	Power	Package	Tolerance	Value Range	Comments
CMF		Metal Film	1/8 to 3W	Axial	1%	10 to 1M	Noninductive
CMO		Metal Oxide	1/4 to 9W	Axial	2, 5 & 10%	0.3 to 200K	Noninductive available
CCW		Wirewound	1/2 to 9W	Axial	2, 5 & 10%	0.1 to 1.5K	Noninductive available
CAW/CAF		Wirewound/Film	2 to10W	Axial	2, 5 & 10%	0.1 to 200K	Noninductive available
CVW/CVF		Wirewound/Film	2 to10W	Radial	5 & 10%	0.1 to 200K	Noninductive available

Welwyn Power Resistors

Welwyn

MF-S Series

Power Metal Film Resistors

Type	Power (watts)	Res. Range (ohms)	Tolerance %	Max Volts	TCR (ppm/°C)	Dim.(mm) l, dia
MF1/2S	0.5	0R1 - 1M	1,2,5,10	350	150	6.2, 2.5
MF1S	1.0	0R1 - 1M	1,2,5,10	350	150	9, 3.6
MF2S	2.0	0R1 - 470K	1,2,5,10	350	150-350	12.5, 4.2
MF3s	3.0	0R1 - 470K	1,2,5,10	350	150-350	14.5, 5.3

W20 Series

Vitreous Enamelled Wirewound Resistors

Type	Power (watts)	Res. Range (ohms)	Tolerance %	Max Volts	TCR (ppm/°C)	Dim.(mm) l, dia
W21	3.0	0R1 - 10K	1,2,5	100	+75 to 200	12.7, 5.6
W215	5.0	0R1 - 15K	1,2,5	160	+75 to 200	22, 7
W22	7.0	0R1 - 22K	1,2,5	200	+75 to 200	22, 8
W23	10.0	0R1 - 60K	1,2,5	500	+75 to 200	38, 8
W24	14.0	0R1 - 100K	1,2,5	750	+75 to 200	53.5, 8

SQP Series

Ceramic Case Resistors - Wirewound/Metal Oxide

Type	Power (watts)	Res. Range (ohms)	Tolerance %	Max Volts	TCR (ppm/°C)	Dim.(mm) l, dia
SQP2	2	0R1 - 47K	5 (J)	150		18, 7, 7
SQP3	3	0R1 - 47K	5 (J)	300		22, 8, 8
SQP5	5	0R1 - 47K	5 (J)	350	WW types, <0R68	22, 10, 10
SQP7	7	0R1 - 47K	5 (J)	500	1700ppm;>0R68	35, 10, 10
SQP10	10	0R1 - 68K	5 (J)	750	200ppm: MO	48, 10, 10
SQP15	15	0R1 - 68K	5 (J)	1000	types all values 350ppm	48, 13, 13
SQP20	20	0R1 - 100K	5 (J)	1000		60, 14.5, 14.5

V700 Series

Vitreous Enamelled Wirewound Resistors

Type	Power (watts)	Res. Range (ohms)	Tolerance %	Max Volts	TCR (ppm/°C)	Dim.(mm) l, dia
W21	3.0	0R1 - 10K	1,2,5	100	+75 to 200	12.7, 5.6
W215	5.0	0R1 - 15K	1,2,5	160	+75 to 200	22, 7
W22	7.0	0R1 - 22K	1,2,5	200	+75 to 200	22, 8
W23	10.0	0R1 - 60K	1,2,5	500	+75 to 200	38, 8
W24	14.0	0R1 - 100K	1,2,5	750	+75 to 200	53.5, 8

A Subsidiary of TT electronics plc

Control & Switching

Panel Potentiometers

Committed to providing world-class products and service to the Pro Audio market, BI Technologies delivers high quality panel controls, the way you want them, without the wait. With worldwide lead times of two to four weeks for standard or special order items, and no more than eight weeks for custom tooled products, BI Technologies outperforms the competition.

Designed and delivered to your specific requirements, BI Technologies has developed a comprehensive line of panel potentiometers specifically for Pro Audio applications ideal for pre-amps, amplifiers, electric guitars, foot pedals, stomp boxes, digital drums, sound processors, broadcast mixing consoles, electric mixing boards and guitar effect consoles.

BI Technologies panel potentiometers provide the superior performance and customized feel needed for today's generation of products. Constructed with superior materials and built to robust designs, our potentiometers feature life cycles up to 5 million rotations, double the rotational life of competitive products.

Electric Guitars


P160


P230

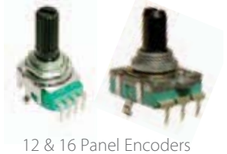

P231


P270

Keyboards


P090S


EN11


12 & 16 Panel Encoders

Foot Pedals


P232


6187

Amplifiers


P160


P260


P270

Superior Quality

Constructed with carbon or conductive plastic elements, metal or plastic shafts on metal bushings, BI panel controls have life cycles of up to 5 million rotations, double the rotational life of competitor models.

Customized Feel

Customized tactile feel for precision tuning

More Playing Time

Longer life means fewer field failures and more playing time

Specials Welcome

Easy availability on most special requests and short lead times on custom tooled products

Faster Delivery Worldwide

With shorter lead times than the competition, BI Technologies delivers the parts you need – fast. With competitors' production lead times at 10-12 weeks, we ship standard and special orders in 4 weeks and special orders in 6-8 weeks, getting you the panel pots you want without the wait

BI Technologies serves the pro audio market better than any other panel potentiometer supplier:

- Shorter lead times
- Superior quality
- Longer rotational life
- Special requirements with standard availability
- Customized feel
- Broad product selection
- Worldwide availability

Model	Style	Package Size	Element	Shaft	Bushing	Power Rating	Rotational Life	Switch	Multi-Ganged
P090L	Side adj.	9 mm	Carbon	Plastic	N/A	0.03W	10K	N/A	N/A
P090S	Top adj.	9 mm	Carbon	Plastic	N/A	0.03W	10K	N/A	N/A
P09x5/N	Side adj.	9 mm	Carbon	Metal	Metal	0.05W	15K	Y	8
P09x5N	Top adj.	9 mm	Carbon	Metal	Metal	0.05W	15K	N/A	2
P110KV/KV1	Side adj.	11 mm	Carbon	Plastic	Metal	0.05W	10K	N/A	N/A
P110KH/KH1	Top adj.	11 mm	Carbon	Plastic	Metal	0.05W	10K	N/A	N/A
P120PK	Top adj.	12 mm	Carbon	Plastic	N/A	0.05W	10K	N/A	2
P120K	Side adj.	12 mm	Carbon	Plastic	N/A	0.05W	10K	N/A	2
P140KH/KH1	Top adj.	14 mm	Carbon	Plastic	Metal	0.05W	10K	N/A	2
P140KV/KV1	Side adj.	14 mm	Carbon	Plastic	Metal	0.05W	10K	N/A	2
	Side adj. PC pin	16 mm	Carbon	Metal	Metal	0.2W	10K	Y	6
P160KNPD	Rear adj. PC pin	16 mm	Carbon	Metal	Metal	0.2W	10K	Y	6
P160KNP	Solder lug	16 mm	Carbon	Metal	Metal	0.2W	10K	Y	6
P170S/N	Solder lug	17 mm	Carbon	Metal	Metal	0.1W	15K	Y	N/A
P170S2/N2	Side adj. PC pin	17 mm	Carbon	Metal	Metal	0.1W	15K	Y	N/A
P170SP1/NP1	Top adj. PC pin	17 mm	Carbon	Metal	Metal	0.1W	15K	Y	N/A
P170SPD/NPD	Rear adj. PC pin	17 mm	Carbon	Metal	Metal	0.1W	15K	Y	N/A
P230	Solder lug	24 mm	Con. Plas.	Metal	Metal	0.5W	100K	N/A	N/A
P231	Solder lug	24 mm	Carbon	Metal	Metal	0.5W	10K	N/A	N/A
P232	Solder lug	24 mm	Con. Plas.	Metal	Metal	0.5W	2,000K	N/A	1
P233	Solder lug	24 mm	Con. Plas.	Metal	Metal	0.5W	2,000K	N/A	2
P260P	Side adj. PC pin	12.7 mm	Con. Plas.	Metal	Metal	0.5W	2,000K	N/A	6
P260S (Switch)	Side adj. PC pin	12.7 mm	Con. Plas.	Metal	Metal	0.5W	2,000K	N/A	5
P260D (Detent)	Side adj. PC pin	12.7 mm	Con. Plas.	Metal	Metal	0.5W	1,000K	Y	6
P260T	Side adj. PC pin	12.7 mm	Con. Plas.	Metal	Metal	0.5W	100K	N/A	2
P261P	Solder lug	12.7 mm	Con. Plas.	Metal	Metal	0.5W	100K	Y	6
P261S	Solder lug	12.7 mm	Con. Plas.	Metal	Metal	0.5W	1,000K	N/A	5
P261D	Solder lug	12.7 mm	Con. Plas.	Metal	Metal	0.5W	1,000K	Y	6
P270	Solder lug	27 mm	Con. Plas.	Metal	Metal	2.0W	1 Million	N/A	N/A
P271	Solder lug	27 mm	Con. Plas.	Metal	Metal	2.0W	1,000K	N/A	2
P272	Solder lug	27 mm	Con. Plas.	Metal	Metal	2.0W	1,000K	N/A	2

BI technologies

A Subsidiary of TT electronics plc

Rotary Encoders

Rotary Encoders find an increasing number of applications in audio products in front panel controls. As more products become digitally controlled and programmable the need for reliable rotary encoders has grown and BI Technologies present this extensive range of devices to suit all applications. Features include:

- Sizes – 11, 12 & 16mm
- Incremental/contacting type with 2-bit gray code output
- Push switch options
- RoHS Compliance
- Good Rotational Feel and Long lifetime

Applications include:

- Musical Instrument Amplifiers
- HiFi & Home Cinema
- Mixers

Encoders Selector Guide

Model	Size	Adjust P	ulses	Detents	Switch	Bushing type	Shaft	Life
EN11-HSM	11mm	Top	20	0, 20	Y	Threaded	Metal	30K
EN11-HNM	11mm	Top	20	0, 20	N	Threaded	Metal	30K
EN11-HSB	11mm	Top	20	0, 20	Y	Plain	Metal	30K
EN11-HNB	11mm	Top	20	0, 20	N	Plain	Metal	30K
EN11-VSM	11mm	Side	20	0, 20	Y	Threaded	Metal	30K
EN11-VNM	11mm	Side	20	0, 20	N	Threaded	Metal	30K
EN11-VSB	11mm	Side	20	0, 20	Y	Plain	Metal	30K
EN11-VNB	11mm	Side	20	0, 20	N	Plain	Metal	30K
EN12-HS	12mm	Top	12, 24	0, 12, 24	Y	Sleeve	Plastic	30K
EN12-HN	12mm	Top	12, 24	0, 12, 24	N	Sleeve	Plastic	30K
EN12-VS	12mm	Side	12, 24	0, 12, 24	Y	Sleeve	Plastic	30K
EN12-VN	12mm	Side	12, 24	0, 12, 24	N	Sleeve	Plastic	30K
EN16-H	16mm	Top	12, 24	0, 12, 24	N	Threaded	Plastic	30K
EN16-V	16mm	Side	12, 24	0, 12, 24	N	Threaded	Plastic	30K

Package Styles

EN11 EN12 EN16

For more information contact us on **+44 (0)1455 552505**
or at **sales@magnatec-tt.com**

BI technologies

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Tactile Switches

BI Technologies range of Tactile Switches offer long life and high reliability and find applications in front-panel controls of audio products which include:

- Hi-Fi and Home Cinema front-panel controls
- Musical Instrument Amplifier panels
- Mixers

Model	Size	Adjust	Mount	Ground	Life Cycles	Stem force	Sealed
SW T8-R *	6.2 x 6.2mm	Side	Thru hole	Y	1Mil, 500K, 300K	100gf - 520gf	N
SW T8-V *	6.2 x 6.2mm	Top	Thru hole	N	1Mil, 500K, 300K	100gf - 520gf	N
SW T8-M *	6.2 x 6.2mm	Top	SMD-G	N	1Mil, 500K, 300K	100gf - 520gf	N
SW T8-C	Cap for Square Stem 2.4x2.4mm						
* = Switch with Square Stem							
SW T7-G	6.2 x 6.2mm	Top	SMD-G	N	100K	260gf	N
SW T7-X	6.2 x 6.2mm	Top	SMD-G	Y	100K	260gf	N
SW T7-J	6.2 x 6.2mm	Top	SMD-J	N	100K	260gf	N
SW T7-Z	6.2 x 6.2mm	Top	SMD-J	Y	100K	260gf	N
SW T6-R	6.0x6.0mm	Side	Thru hole	Y	500K	260gf	N
SW T6-V	6.0x6.0mm	Top	Thru hole	N	500K	260gf	N
SW T6-E	6.0x6.0mm	Top	Thru hole	Y	500K	260gf	N
SW T6-M	6.0x6.0mm	Top	SMD-G	N	500K	260gf	N
SW T6-V-AP	6.0x6.0mm	Top	Thru hole	N	500K	100, 160, 260gf	N
SW T6-E-AP	6.0x6.0mm	Top	Thru hole	Y	500K	100, 160, 260gf	N
AP = Ammo Pack							
SW T5-G	5.1x 5.1mm	Top	SMD-G	N	100K	100, 160gf	N
SW T5-J	5.1x 5.1mm	Top	SMD-J	N	100K	100, 160gf	N
SW T4-J 4.	6x4.6mm	Top	SMD-J	N	50K	260gf	N
SW T3-G	6.0x3.5mm	Top	SMD-G	N	50K	100-520 gf	N
SW T3-X	6.0x3.5mm	Top	SMD-G	Y	50K	100-520 gf	N
SW T3-J	6.0x3.5mm	Top	SMD-J	N	50K	100-520 gf	N
SW T3-Z	6.0x3.5mm	Top	SMD-J	Y	50K	100-520 gf	N
SW TW -H	6.0x6.2mm	Top	Thru hole	N	100k, 500k	160-360gf	Y
SW TW -G	6.0x6.2mm	Top	SMD-G	N	100k, 500k	160-360gf	Y
SW TW -X	6.0x6.2mm	Top	SMD-G	Y	100k, 500k	160-360gf	Y
SW TW -J	6.0x6.2mm	Top	SMD-J	N	100k, 500k	160-360gf	Y
SW TW -S	6.0x6.0mm	Side	SMD-J	N	200k	185gf, 260gf	Y
SW TW -R	8.0x8.0mm	Side	Thru Hole	Y	1Mil	130gf	Y
SW TW -K	8.0x8.0mm	Top	Thru Hole	N	1Mil	130gf	Y

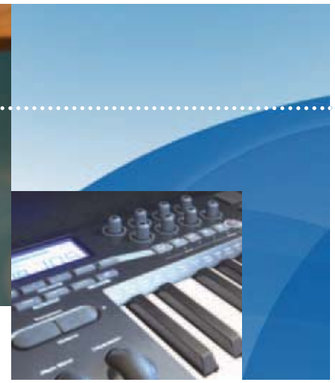
SWT7

SWT5

SWT6

SWT3

SWT3



Capacitive Touch Sensors

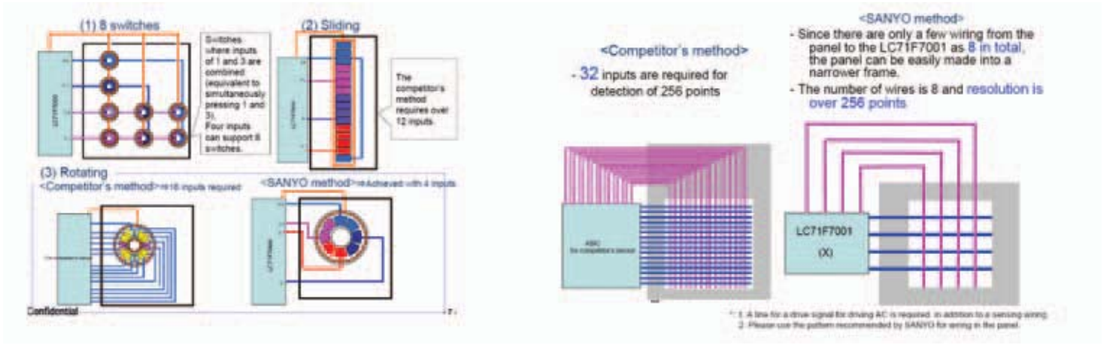
In today's market place for audio products and consumer electronics, product style and usability are increasingly important factors. A number of companies have introduced touch sensor technology for displays and panel controls and there continues to be an increasing number of products appearing with these features. Touch technology as a user interface offers classy controls with a wipe clean surface and hi-tech appearance.

New patent pending capacitive touch sensor technology from Sanyo Semiconductor introduces a number of advantages not previously seen in this marketplace:

- High sensitivity allows the user to operate the sensor even wearing gloves which other technologies struggle to achieve
- No external parts required which other capacitive touch technologies need
- Faster response than other technologies. 1ms in high speed (8-bit) mode and 80ms in high resolution (16-bit) mode
- Highly noise resistant
- Auto calibration
- I2C interface
- Reduced number of I/O lines required for a given number of sensors results in a small package (MSOP10) and simplified PCB layout. The following examples demonstrate the significance of this new technology:
- Significantly lower power consumption than competing technologies – 1uA in sleep mode, 50uA operational and 1mA in high resolution mode.
- Parts under development to integrate the touch sensor technology with a microcontroller

The line-up of available and parts under development is as follows:

Part Number	Power Supply	No of Inputs	Availability
LC71F7000	3.3V	4	Sampling Now! Production June 2009
LC71F7001	3.3V	10	Sampling June 2009 Production Sept 2009
LC71F7002	1.8V	4	Sampling Q3 2009
LC71F7002	5V	4	Sampling Q3 2009



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Tribo Logix Faders

Tribologix TX45 Crossfader Launch - The Science Behind The Mix

The TX45 an all new DJ fader, designed to offer a world of new features, in an easily installable package, and at a highly competitive price. Having watched the fader market develop, Tribologix have seen the features that DJs need, as well as the ones they don't yet have. Tribologix decided that the time was right to pool the considerable resources and knowledge available to them from parent company AB Electronics and bring what they feel is the only fader you'll ever need - the TX45.

The TX45 offers a strong feature set including patent pending next generation features:

- Non-contact technology: No wear and no maintenance
- Tension adjustment: From scratch to mix DJs - tailor the feel to suit your needs and after the TX45 is fitted as well.
- Lag and centre point adjustment: Tweak the finer points of the TX45 to make it match your style after installation. No constant disassembly just to make a minor adjustment.
- 8mm steel stem: Essential for the harshest of DJ beatings!
- Choice of fader caps: One cap doesn't fit all, so the TX45 comes wit 2 popular profiles
- Interface boards: Out of the box, the TX45 aims to fit most popular types, but the interface board can be swapped out to take special designs.
- Simplified installation: With the TX45 you simply install, adjust and mix.
- Modular construction: In the all too likely event of spillage, the TX45 can be completely stripped down for cleaning and any parts replaced as necessary.

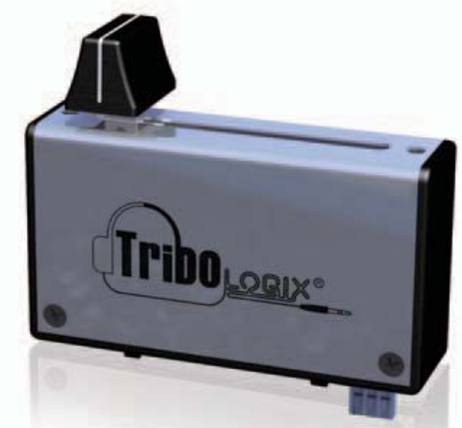
About Tribologix

Tribologix is a small but dedicated group of DJs and engineers, devoted to bringing you the most technologically advanced DJ faders. We're working at a grass roots level - right inside the heart of the scene, talking to you, the end user about exactly what you want from your DJ gear. We're working with key people to ensure that our ideas are what really work for DJs, and will build on the tried and tested experiences of real world usage.

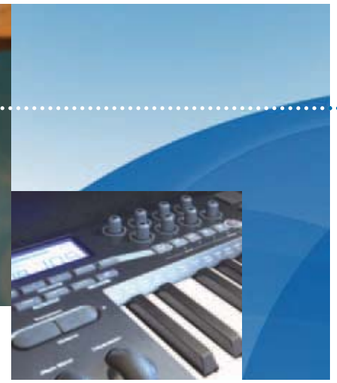
But don't let the size of our team or our niche product approach fool you - we're part of one of the most respected component manufacturers in the world and have the very best knowledge and global resources at our disposal.

Our parent company AB Electronic was born way back in 1927 and rapidly established itself as a serious player in the potentiometer market under the Colvern brand name. Diversifying into new markets in 1984, Colvern was rebranded as AB Electronic in 1997, and has become a force to be reckoned with in the automotive sensors market. AB's quality is such that they have been certified to BS EN ISO 9001:2000 and achieved the automotive TS16949 standard.

So while the small Tribologix team operates right at the frontline of the DJ scene, the backup we have in terms of knowledge, support and resources is of a world class level.



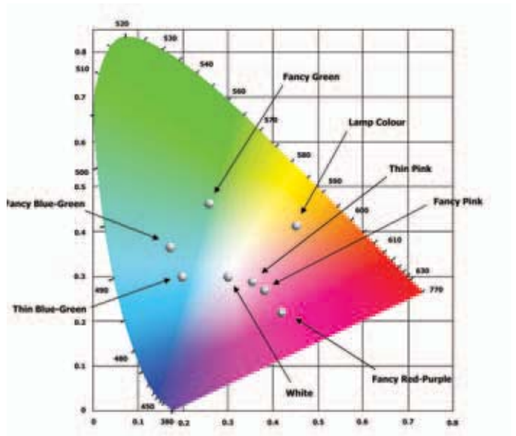
Endorsed by Skratchworx
see **www.skratchworx.com** for details

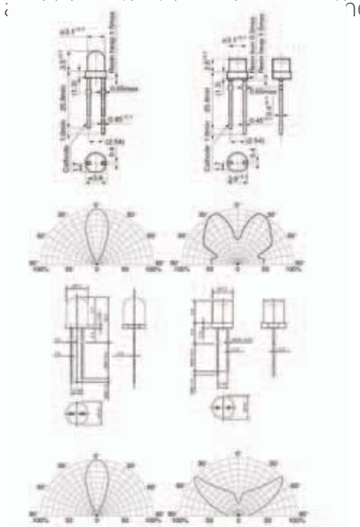


Fancy Colour LED's

Light Emitting Diodes (LED's) are used extensively on almost all audio products today and have become very much a commodity device. However, emerging technologies allow these parts to be available in a very wide range of colours and these parts from Sanken allow companies to differentiate their products through the use of imaginative lighting.

Until recently these exciting colours were not available and they will certainly make a difference from the usual reds, greens, yellows a[illegible]he norm.





Lineup

Emitting color	Chromaticity x	Chromaticity y	Color Code	Part Number (SELT Series) ϕ3 Round type (Fig. 1)	ϕ3 Inverted cone (Fig. 2)	ϕ5 Round type (Fig. 3)	ϕ5 Inverted cone (Fig. 4)
White	0.300	0.295	WA	SELT2WA10C	SELT2WA13C	SELT1WA62CMKT	SELT1WA13CM
bulb color	0.452	0.412	WC	SELT2WC10C	SELT2WC13C	SELT1WC62CMKT	SELT1WC13CM
Fancy blue green	0.170	0.365	WD	SELT2WD10C	SELT2WD13C	SELT1WD62CMKT	SELT1WD13CM
Light pink	0.356	0.289	WE	SELT2WE10C	SELT2WE13C	SELT1WE62CMKT	SELT1WE13CM
Light blue green	0.200	0.300	WF	SELT2WF10C	SELT2WF13C	SELT1WF62CMKT	SELT1WF13CM
Fancy green	0.260	0.460	WH	SELT2WH10C	SELT2WH13C	SELT1WH62CMKT	SELT1WH13CM
Fancy pink	0.382	0.268	WJ	SELT2WJ10C	SELT2WJ13C	SELT1WJ62CMKT	SELT1WJ13CM
Fancy red purple	0.421	0.221	WK	SELT2WK10C	SELT2WK13C	SELT1WK62CMKT	SELT1WK13CM

Bi technologies
A Subsidiary of TT electronics plc

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Welwyn

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IRC

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