Semiconductors

Choice. Performance. Flexibility.

The Philips Portfolio

PHILIPS

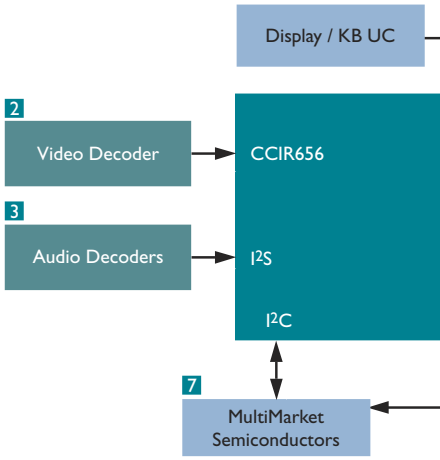
360° vision of multimedia

Semiconductors

Philips delivers consistent quality and value throughout its multi-media portfolio, with a range of media devices as broad and varied as the market itself. From display drivers to connectivity solutions, audio and video converters to complete multimedia processors, you'll find the solution that's right for your application. We can also help you overcome design challenges through our global network of localized support and expertise.

You can choose from some of the foremost products on the market, from the simplest component to the most complex IC — Philips is recognized as one of principal semiconductor specialists in multimedia, a reputation embodied by our Nexperia™ media processors. These powerful solutions strike a perfect balance between cost and performance, resulting in low-cost programmable engines for all your creative multimedia applications.

Introduction to



1 Media processors

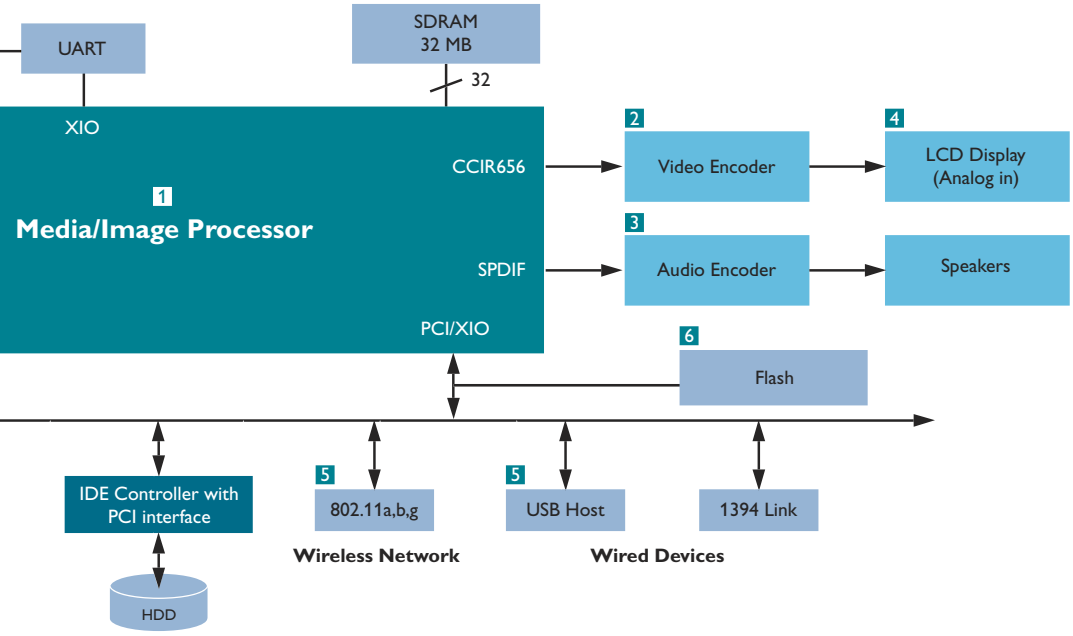
Philips Nexperia PNX1300 family is ideal for simultaneous real-time processing of video, audio, graphics and communications datastreams, and can also improve efficiency in power-constrained multimedia designs. Next to the feature-packed PNX1300, the PNX1500 simplifies design further by offering even more built-in functionality including an advanced TFT LCD controller. We also offer dedicated devices such as the SAA6752 MPEG-2 video encoder with MPEG-audio/AC-3 audio and multiplexer.

Unlike many fixed-function ICs that power today's products, Nexperia media processors integrate a programmable CPU core and on-chip units for video, audio, graphics, communications and control processing — all on a single chip. By reducing external component count they enable advanced configurations and features that are too impractical or cost prohibitive to implement with conventional ICs. Nexperia ICs are supported by complete development solutions at both IC and system level.

2 Digital video encoders / decoders

We offer a comprehensive line of digital video components and support devices, delivering exceptional performance throughout to ensure clear picture quality with low noise. The SAA7119 is the industry's first single-chip video processor and scaler, and brings the sharpness of edge-dependent de-interlacing to small screens.

Media & Image Processing



Integrating high-quality multi-standard video with TV stereo audio decoding, Philips SAA713x PCI decoder family is part of our complete SAA71xx series – your perfect digital gateway to the analog world.

3 Audio DACs and CODECs

As well as our multimedia processor solutions, Philips' families of dedicated audio devices ensure your choice is absolute. The UDA13xx series provides a wide range of DACs and CODECs replete with advanced functionality, and capable of satisfying today's multi-channel, low-power systems.

4 Display drivers

Meeting the growing popularity of flat screens, our SAA6713 FPD (Flat Panel Display) drivers are targeted for use with the latest generation of multisync flat-panel color monitors, LCD projectors and high-resolution TFT displays. The devices convert XGA, RGB or YUV signals to TFT format, and support SXGA as well as true color video. They offer single or dual channel RGB input along with many other advanced features.

5 Connectivity

At the heart of tomorrow's digital lifestyles, Philips Semiconductors has been innovating in wired and wireless connectivity technologies for many years. Augmenting our leadership in USB solutions, we continue to develop future high speed, high bandwidth infotainment networks such as W-1394. And applying our renowned RF expertise, we are growing portfolios of 802.11 and Bluetooth devices.

6 Video ADCs and DACs

An acknowledged leader in high-speed converter design, our TDA99xx range includes state-of-the-art 8- and 10-bit ADCs that deliver outstanding picture performance. For today's flat panel displays, we combine all the necessary features in one chip – simplifying TV, monitor and projector design – while the TDA8754 provides an interface for virtually all analog video / graphic resolutions. Philips also offers a broad selection of products for interfacing CCD or CMOS sensors to the DSP circuit of camcorders, digital still cameras and PC video cameras.

7 Multimarket semiconductors

Our extensive discrete, logic, interface, microcontroller and power device ranges give you total design freedom, either as complete solutions tailored to your own ASIC-based design, or as part of Philips Nexperia System Solutions. Whether a fundamental component of the application or helping add a key differentiating feature, you'll find an answer to meet your design needs.

Audio amplifiers

Our families of audio amplifiers cover any situation and power output. Whether you need a 120 W Class D amplifier (TDA8924TH) for a home theater set-up or a low power 35 mW amplifier for headphones (TDA8559T), Philips offers you a best-in-class solution.

I²C-bus

As you would expect from its inventor, Philips offers a complete range of I²C-bus devices, many of which help free-up CPU time for more important tasks. With enhancements such as fast and high-speed modes, our continued development ensures future-proof solutions.

Microcontrollers

Philips' microcontroller offering combines the highest performance in flash with the lowest power consumption in the smallest packages. A comprehensive portfolio of industry-leading performers includes the latest 32-bit LPC2000 and LPC900 families, offering powerful Flash memory and copious connectivity options. Combining this power with cost-effectiveness, we offer an easy migration path from 8- and 16-bit to 32-bit solutions.

UARTs

A broad selection of high-speed single, dual and quad SC16xxx UARTs that are pin-for-pin compatible with existing 16C devices. Boasting an impressive list of integrated features, a choice of FIFO depths and a wide operating voltage range, this versatile family is ideal for video applications.

Nexperia Media Processors

Features and Specifications for PNX1300 and PNX1500 Families

Description	TriMedia CPU Core	Clock Speed MHz	Process	Functional units	Memory system max / type	Video output	PCI / XIO	LCD Controller	Ethernet 10/100	De-interlacing	DVD	V2F support	HD Support
PNX1500 Family													
PNX1500E	TM3260	240	0.13 CMOS	31	400MHz DDR	up to W-XGA TFT	✓	✓	✓	✓	✓	✓	
PNX1501E		266			400MHz DDR	LCD (1280 x 768 60I)	✓	✓	✓	✓	✓	✓	
PNX1502E		300			400MHz DDR	HD (1920 x 1080 60I)	✓	✓	✓	✓	✓	✓	
PNX1503E		350			400MHz DDR		✓	✓	✓	✓	✓	✓	
PNX1300 Family													
PNX1300EH	TM-DSPCPU	143	0.25 CMOS	27	143MHz SDRAM		✓						
PNX1301EH		190			190MHz SDRAM	up to D1 (720 x 480)	✓						
PNX1302EH		200			190MHz SDRAM		✓						
PNX1311EH		166 (low v)			166MHz SDRAM		✓						

Codec Performance and Availability (Decoding)

Description	Video Decoding								Audio Decoding			
	MPEG-1, MPEG-2	MPEG-4	WM9	H.264	DivX	DV	H.32x	H.263	MP3	AAC	Dolby Pro Logic	Dolby AC-3
PNX 1500 Family												
PNX1500E	480P	SP, MVP, ASP	SD	BL D1	3/4/5/6	✓	✓	✓	✓	✓	✓	✓
PNX1501E						✓	✓	✓	✓	✓	✓	✓
PNX1502E						✓	✓	✓	✓	✓	✓	✓
PNX1503E						✓	✓	✓	✓	✓	✓	✓
PNX 1300 Family												
PNX1300EH	480P	SP, MVP			3/4/5	✓	✓	✓	✓		✓	
PNX1301EH						✓	✓	✓	✓		✓	
PNX1302EH						✓	✓	✓	✓		✓	
PNX1311EH						✓	✓	✓	✓		✓	

Codec Performance and Availability (Encoding)

Description	Video Encoding								Audio Encoding			
	MPEG-1, MPEG-2	MPEG-4	WM9	H.264	DivX	DV	H.32x	H.263	MP3	AAC	Dolby Pro Logic	Dolby AC-3
PNX 1500 Family												
PNX1500E	D1	D1		Simultaneous CIF encode/ decode	3/4/5/6	✓	✓	✓	✓	✓	✓	✓
PNX1501E						✓	✓	✓	✓	✓	✓	✓
PNX1502E						✓	✓	✓	✓	✓	✓	✓
PNX1503E						✓	✓	✓	✓	✓	✓	✓
PNX 1300 Family												
PNX1300EH	D1	SP				✓	✓	✓	✓		✓	
PNX1301EH						✓	✓	✓	✓		✓	
PNX1302EH						✓	✓	✓	✓		✓	
PNX1311EH						✓	✓	✓	✓		✓	

Philips Video Encoders and Decoders

Digital Video Encoders

			Recommended for New Designs		
Device	SAA7128/ SAA7129	SAA7102/ SAA7103	SAA7120/ SAA7121	SAA7128A/ SAA7129A	SAA7104/ SAA7105
Input					
8-bit ITU-656	✓	✓	✓	✓	✓
Dual Input Streams	✓			✓	
12-bit Multi-format (VGA)		✓			Including DVO
Video Resolution	Standard Definition	Up to 800 x 600 VGA	Standard Definition	Standard Definition	Up to 1280 x 1024 VGA, 1080i and 720p HD
Output					
Number of DACs	6	3	3	6	3
DAC resolution	10-bit	10-bit	10-bit	10-bit	10-bit
Type of DAC	Voltage	Current	Voltage	Current	Current
TV Detect					✓
2 x Luma Over-Sampling Rate	✓	✓	✓	✓	✓
Analog CVBS and S-Video	✓	✓	✓	✓	
Analog Component RGB and YPbPr	✓	✓		✓	✓
Programmable RGB Output Levels	✓			✓	
Cross-Color Reduction Filter	✓	✓	✓	✓	✓
HD Output 1080i, 720p					✓
Pixel Accurate H/V Scaler		✓			✓
High Performance Flicker Filter		✓			Enhanced
Video Standards					
NTSC	✓	✓	✓	✓	✓
PAL	✓	✓	✓	✓	✓
SECAM	✓			✓	
Macrovision* Copy Protection					
Version 7.1 and 6.1	SAA7128	SAA7102	SAA7120	SAA7128A	SAA7104
Version 1.03 (525p/625p)					SAA7104
Text & Graphics					
Teletext Insertion	✓	✓	✓	✓	✓
Closed Caption (Line 21)	✓	✓	✓	✓	✓
Color Bar Generator	✓	✓	✓	✓	✓
Wide Screen Signalling	✓	✓	✓	✓	✓
VPS (Video Program Service)	✓	✓		✓	✓
General					
Supply Voltage	3.3 V	3.3 V	3.3 V	3.3 V	3.3 V
Fast I²C Bus (400kHz)	✓	✓	✓	✓	✓
Remote Genlock via RTC Input	✓		✓	✓	✓
Package	QFP44	QFP44, BGA156	QFP44	QFP44	QFP64, BGA156
Availability					
Extended Temp Version				SAF7129A	
Status	Production	Production	Production	Production	Production

** License Required*

Digital Video Decoders

					Recommended for New Designs		
Device	SAA7110A	SAA7111A	SAA7112	SAA7114	SAA7113	SAA7115	SAA7118
Clock							
Simple Rate	Square Pixels	ITU-601	ITU-601	ITU-601	ITU-601	2x ITU-601	2x ITU-601
Line-Locked Clock	✓	✓	✓	✓	✓	✓	✓
MPEG Compatible Clock		✓	✓	✓	✓	✓	✓
Real-Time Control (RTC)	✓	✓	✓	✓	✓	✓	✓
Audio Clock			Field Locked	Filed Locked		Frame, Field Locked	Field Locked
Input							
Analog Inputs	6	4	6	6	4	6	16
Analog-to-Digital Converters (ADCs)	2	2	2	2	2	2 Low Noise	4 Low Noise
ADC Resolution	8-bit	8-bit	8-bit	9-bit	9-bit	9-bit, Over-Sampled	9-bit, Over-Sampled
Analog RGB/YPbPr Component Video Input							✓
Video Standards							
NTSC/PAL/SECAM	✓	✓	✓	✓	✓	✓	✓
Standard Detection	✓	✓	✓	✓	✓	Fully Automatic	Fully Automatic
Feature Processing							
Adaptive 2/4-line NTSC/PAL Comb Filter				✓		Enhanced	✓
Universal VBI Data Slicer		CC only	✓	✓	✓	Including CGMS, Gemstar	✓
I²C VBI Read Back		✓				✓	
Square Pixel Output Rate	✓					Optional	
Fast Field Lock			✓	✓		Ultra	✓
Automatic VCR Detection						✓	
Scaler							
Pixel Accurate H/V Scaler			✓	✓		✓	✓
Output							
Color Format	YUV	YUV, 16/24-bit RGB	YUV	YUV	YUV	YUV Including 10-bit	YUV
Output Port	16-bit 24-bit	8-bit 16-bit	8-bit 16-bit	8-bit 16-bit	8-bit	8-bit 16-bit	8-bit 16-bit
Expansion X-Port			✓	✓		✓	✓
General							
Supply Voltage	5V	3.3V	3.3V	3.3V	3.3V	3.3V	3.3V
I²C Status Interrupt Pin							✓
Macrovision Detection				✓	✓	Enhanced	Enhanced
Package	PLCC68	QFP64, LQFP64	LQFP100	LQFP100	QFP44	LQFP100	BGA156, QFP160
Pin-to-Pin Compatible						SAA7114	
Availability							
Extended Temp Version					SAF7113		SAF7118
Status	Production	Production	Production	Production	Production	Production	Production

Philips Audio DACs and CODECs

Stereo Audio Digital to Analog converters (DACs)

Type Number	Description	Typical Supply Voltage	Number of channels	Data Formats	Typical THD+N at 0dB (dB)	Typical S/N (dB)	System clock	Output (V)	Encapsulation	Power supply (V)	Sound features	Power dissipation (mW)	Operating temp. range °C [1]	Demphasis (kHz)
UDA1330ATS	Low-cost stereo filter DAC	5 V	2	I^2S, MSB justified, LSB justified 16, 18, and 20 bits format compatible, $1f_s$ input format	-90	100	$256f_s$, $384f_s$, $512f_s$	1.45	SSOP16	2.7 to 5.5	8 to 55kHz SRF. Control via L3 mode or static pin control. Dig. Vol. Control, dig. Sil. Detection, mute	75	-40 to +85	32, 44.1, and 48
		3 V			-85	100		1				33		
UDA1334TS	Low-power audio DAC	3 V	2	I^2S, LSB justified 16, 20, and 24 bits format compatible, $1f_s$ input format	-90	100	Automatic system clock vs. sample rate detection	0.75	SSOP16	1.8 to 3.6	8 to 100 kHz SRF.	17.0	-40 to +85	44.1
		2 V			-80	97		0.5				7.0		
UDA1334ATS	Low-power audio DAC including PLL	audio mode	2	I^2S, LSB-justified 16, 20, and 24 bits format compatible, $1f_s$ input format	-90	100	Automatic system clock vs. sample rate detection	0.9	SSOP16	2.4 to 3.6	16 to 100 kHz SRF.	18	-40 to +85	44.1
		video mode					$256f_s$, $384f_s$					24		
UDA1334BTS	Low-power audio DAC	3 V	2	I^2S, LSB-justified 16, 20, and 24 bits format compatible, $1f_s$ input format	-90	100	$128f_s$, $192f_s$, $256f_s$, $384f_s$, $512f_s$, $768f_s$	0.9	SSOP16	1.8 to 3.6	8 to 100 kHz SRF.	17.0	-40 to +85	44.1
		2 V			-80	97		0.6				7.4		
UDA1334BT	Low-power audio DAC	3 V	2	I^2S, LSB-justified 16, 20, and 24 bits format compatible, $1f_s$ input format	-90	100	$128f_s$, $192f_s$, $256f_s$, $384f_s$, $512f_s$, $768f_s$	0.9	SO16	1.8 to 3.6	8 to 100 kHz SRF.	17.0	-40 to +85	44.1
		2 V			-80	97		0.6				7.4		
UDA1351H	IEC958 audio DAC	3 V	2	IEC958, I^2S	-90	100	$256f_s$ out	0.9	QFP44	2.7 to 3.6	Control via static pin or L3; 28 to 100kHz SRF; 5V tolerant inputs; output polarity control, volume control, tone control, lock pin	80	-40 to +85	Automatic selected 32, 44.1, 48, and 96
UDA1351TS	IEC958 audio DAC	3 V	2	IEC958	-90	100	$256f_s$ out	0.9	SSOP28	2.7 to 3.6	Control via static pin or L3; 28 to 100kHz SRF; 5V tolerant inputs; output polarity control, volume control, tone control, lock pin	80	-40 to +85	Automatic selected 32, 44.1, 48, and 96
UDA1352HL	IEC958 audio DAC	3 V	2	IEC958	-90	100	$256f_s$ out	0.9	LQFP48	2.4 to 3.6	Control via static pin, L3, or IIC; 28 to 100kHz SRF; 5V tolerant inputs; output polarity control, volume control, tone control, lock pin	40	-40 to +85	Automatic selected 32, 44.1, and 48
UDA1352TS	IEC958 audio DAC	3 V	2	IEC958	-90	100	$256f_s$ out	0.9	SSOP28	2.4 to 3.6	Control via static pin, L3, or IIC; 28 to 100kHz SRF; 5V tolerant inputs; output polarity control, volume control, tone control, lock pin	38	-40 to +85	Automatic selected 32, 44.1, and 48

1) Characteristics only guaranteed at Tamb = 25° C

Stereo Audio Coder-Decoders (CODECs)

Type Number	Description		Number of channels	Data Formats	Typical THD+N at 0dB (dB)	Typical S/N (dB)	System clock	Input (V)	Output (V)	Encapsulation	Power supply (V)	Sound features	Power dissipation (mW)	Operating temp. range °C [1]	Demphasis (kHz)
UDA1341TS	Low voltage low cost stereo filter ADC/DAC with ADC	ADC	2 (with mux)	I^2S, MSB-justified, LSB-justified 16, 18 and 20 bits format compatible, $1f_s$ input format	-90	100	$256f_s$, $384f_s$, $512f_s$	1.0		SSOP28	2.4 to 3.6	L3 control; 8 to 48 kHz SRF; overload detector; dig. AGC; vol/tone control; soft mute; peak level detector; dig. Mixer; double diff. Input mode; output polarity control; power control	80	-20 to +85	
		DAC	2		-91	100			0.9						32, 44.1, and 48
UDA1342TS	Audio CODEC for MD	ADC	2 (with mux)	I^2S, MSB-justified, LSB-justified 16, 18 and 20 bits format compatible, $1f_s$, $4f_s$ input format	-90	100	$256f_s$, $384f_s$, $512f_s$, $768f_s$	0.9		SSOP28	2.7 to 3.6	Control via: static pin, L3 -or I^2C interface; 16 to 110 kHz SRF. 4 analog inputs with PGA; 2 dig. Mixers,double diff. input mode; 5V tolerant dig. Inputs; dig volume -and tone control; soft or quick mute; output polarity control	105	-20 to +85	
		DAC	2		-90	100			0.9						32, 44.1, 48, and 96
UDA1344TS	Low voltage. low power stereo audio CODEC with DSP features	ADC	2	I^2S, MSB-justified, LSB-justified 16, 18, 20, and 24 bits format compatible, $1f_s$ input format	-85	95	$256f_s$, $384f_s$, $512f_s$	1.0		SSOP28	2.7 to 3.6	Static or L3 control; 8 to 48 kHz SRF; overload detector; dig Vol/tone control; soft mute; power control	69	-20 to +85	
		DAC	2		-90	100			0.9						32, 44.1, and 48
UDA1345TS	Economy audio CODEC	ADC	2	I^2S, MSB-justified, LSB-justified 16, 18, 20, and 24 bits format compatible, $1f_s$ input format	-83	95	$256f_s$, $384f_s$, $512f_s$	1.0		SSOP28	2.4 to 3.6	Static or L3 control; 8 to 100 kHz SRF; 5V tolerant inputs; output polarity control, vol. Control; power control	65	-20 to +85	
		DAC	2		-85	100			0.9						32, 44.1, 48, and 96
UDA1355H	Stereo audio CODEC with SPDIF interface	ADC	2	I^2S, MSB-justified, LSB-justified 16, 18, 20, and 24 bits format compatible, $1f_s$ input format	-77 [2] -85 [3]	92	12.288 MHz Crystal	1.0		QFP44	2.4 to 3.6	Static or L3/I^2C control; 28 to 96 kHz SRF for SPDIF input; 5V tolerant inputs; soft mute; dig.Vol/ tone control; output polarity control; power control	136	-20 to +85	
		DAC	2		-80 [2] -86 [3]	99									32, 44.1, 48, and 96
UDA1380TT	SSA-audio CODEC	ADC	2	I^2S, MSB-justified, LSB-justified 16, 18, 20, and 24 bits format compatible, $1f_s$ input format	-85	97	$256f_s$, $384f_s$, $512f_s$, $768f_s$	1.0		TSSOP32	2.4 to 3.6	L3 or I^2C control; 8 to 100 kHz SRF; 5V tolerant inputs; Mic. input with AGC; head-phone driver; soft mute; dig. Vol/tone control; output polarity control; power control	65	-20 to +85	
		DAC	2		-88	100			0.9						32, 44.1, 48, and 96
UDA1380HN	SSA-audio CODEC	ADC	2	I^2S, MSB-justified, LSB-justified 16, 18, 20, and 24 bits format compatible, $1f_s$ input format	-85	97	$256f_s$, $384f_s$, $512f_s$, $768f_s$	1.0		HVQFN32	2.4 to 3.6	L3 or I^2C control; 8 to 100 kHz SRF; 5V tolerant inputs; Mic. input with AGC; head-phone driver; soft mute; dig. Vol/tone control; output polarity control; power control	65	-20 to +85	
		DAC	2		-88	100			0.9						32, 44.1, 48, and 96
UDA1338H	Multi-channel audio CODEC	ADC	4	Audio Interface: I^2S, MSB-justified, LSB-justified,Voice interface: I^2S	-90	100	$256f_s$, $384f_s$, $512f_s$, or $768f_s$	1.0		QFP44	2.7 to 3.6	Channel independent logarithmic volume, Soft or quick mute, output signal polarity control	270	-20 to +85	
		DAC	6		-100	114			DM 2.0 SE 1.0						32, 44.1, 48, or 96

Stereo Analog to Digital conveters (ADCs)

UDA1361TS	96kHz sampling 24bit stereo audio ADC		2	I^2S, MSBjustified, format compatible	-88	100	$256f_s$, $384f_s$, $512f_s$, $768f_s$	1.1		SSOP16	2.4 to 3.6	Power down mode; input gain switch	42	-20 to +85	

1) Characteristics only guaranteed at Tamb = 25° C 2) FPLL clock 3) Xtal clock

Philips USB Solutions for Distribution

Family	Product	Description	Target Applications	Reference Kits	Application notes	Package(s)	Availability
USB On-The-Go							
Bridge	ISP1261	- [FS, LS] USB to-OTG bridge - Can be added directly onto PCB or externally as a dongle - Core operating voltage 1.8 V - Dual supply voltages: main 2.7 V to 4.5 V, digital I/O interface 1.65 V to 3.6 V - Integrated voltage regulator - Built-in charge pump for VBUS generation - Works with patent-pending software emulated OTG controller (SEOC) technology - 3200 byte buffer - For baseband (BB) with USB SIE & transceiver built-in (USB DP/DM analog interface to BB) - For BB with only USB SIE built-in (USB SIE digital interface to BB)	Mobile phone, PDA, DSC, DVC, portable digital audio player, dongle	- ISP1261 OTG Bridge Ref Kit - USB OTG system kit ISP1261 Bridge and ISP1362 PCI board	ISP1261 USB OTG Bridge Controller and SEOC Protocol	HVQFN32 (SOT617-1)	Now
Transceiver	ISP1301	- [FS, LS] USB OTG transceiver - Dual supply voltages: main 2.7 V to 4.5 V, digital I/O interface 1.65 V to 3.6 V - Charge pump regulator: output VBUS voltage 4.4 V to 5.25 V at current > 8 mA, tunable by external capacitor	Digital camera, PDA, mobile phone, web appliance, portable digital audio player, printer	ISP1301 OTG Transceiver Eval Kit	- Interfacing ISP1301 to QUALCOMM MSM chipsets - Interfacing ISP1301 to Motorola chipsets	HVQFN24 (SOT616-1)	Now
Dual-Role	ISP1362	- [FS, LS] USB OTG single-chip dual-role controller - Built-in charge pump for VBUS generation - Optional support for external VBUS source - Adjustable VBUS output current with external capacitor - Core operating voltage 3.3 V - Single supply voltage 3.0 to 3.6 V	Digital camera, PDA, mobile phone,Web appliance, portable digital audio player, printer	ISP1362 ...OTG kits ...PCI/DOS ...PCI/Linux ...PCI/WinCE .NET ...PXA250/Linux (SW only) ...PXA250/WinCE (SW only)	Simultaneous DMA and PIO access in the ISP116x, ISP118x and ISP136x device controller	LQFP64 (SOT314-2) TFBGA64 (SOT543-1)	Now
	ISP1761	- [HS, FS, LS] Hi-Speed USB OTG host and peripheral controller, memory mapped CPU interface to any 32- or 16-bit interface - One OTG port and two downstream ports - Dual supply voltages: main 3.0 V to 3.6 V, digital I/O interface 1.65 V to 3.6 V - Core operating voltage 1.8 V - Integrated patent-pending Transaction Translator supports single EHCI for HS, FS and LS transfers	STB, DVD recorder, DTV, media player, printer, PDA, DSC, DVC, mobile phone	- ISP1761 PXA255/ Linux ref kit (SW only) - FlexiUSBTM stack for HS host - ISP1761 PCI/Linux ref kit	- Interfacing ISP1760 to Intel PXA255 processor - ISP176x in embedded systems - ISP1761 Device DMA Initialization	LQFP128 (SOT425-1) TFBGA128 (SOT857-1)	Now
USB							
Transceiver	ISP110x	- Advanced USB transceiver for system-on-chip applications - Low power, integrated 5V-to-3.3V voltage regulator - Dual supply voltages: main 3.0 V to 3.6 V, digital I/O interface 1.65 V to 3.6 V	Mobile phone, PDA, digital camera	ISP110x Demo Board ...HBCC version ...HVQFN version	- ISP110x Product Selection Guide - ISP110x Interfacing		
	ISP1102	- [FS] bidirectional input mode only - V_{BUS} detection input, but not in 'suspend' mode - Very good for 3.3 V supply voltage				HBCC16 (SOT639-2) HVQFN14 (SOT773-1)	Now
	ISP1104	- [FS] allows selectable differential or single-ended input mode - V_{BUS} detection input				HBCC16 (SOT639-2)	Now
	ISP1105	- [FS, LS] allows selectable differential or single-ended input mode				HBCC16 (SOT639-2) HVQFN16 (SOT758-1)	Now
	ISP1106	- [FS, LS] allows differential input mode only				TSSOP16 (SOT403-1) HBCC16 (SOT639-2)	Now
Peripheral	PDIUSBD12	- [FS] USB peripheral controller with 8-bit parallel bus, 6 endpoints, 320-byte FIFO, bus-powered - 2 MB/s transfer rate: 1 MB/s in Bulk mode, 1 Mb/s in ISO mode - Single supply voltage 3.0 V to 3.6 V, or 4.0 V to 5.5 V	Digital camera, printer, STB, FDD, PDA, MP3 player, router, modem, USB dongle	- D12 PC Eval Kit - D12 Smart Eval Kit - D12 USB-EPP Eval Kit - D12 USB Mass Storage Eval Kit	- Using PDIUSBD12 in DMA Mode - Interfacing D12 to Hitachi H8S/2357 - USB MP3 Player Using PDIUSBD12	SO28 (SOT136-1) TSSOP28 (SOT361-1)	Now
	ISP1181A ISP1181B	- [FS] USB peripheral controller with 16-bit parallel bus, 16 endpoints, 2462-byte FIFO for ISO transfer, bus-powered, max 11.1 MB/s transfer rate to µC or µP - Supply voltage 3.0 V to 3.6 V, or 4.0 V to 5.5 V - Integrated 5.0 V-to-3.3 V voltage regulator for bus power support	Digital camera, printer, router, modem, CD-RW drive, FDD, MP3 player, STB, PDA, USB dongle, etc.	- ISP1181x PC Eval Kit - ISP1181x Gen µC Eval Kit - ISP1181x USB-to-RS-232 Ref Kit	- Interfacing ISP1181 to Hitachi SH7709 RISC Processor - Interrupt Control in ISP1181x - Simultaneous DMA and PIO access in the ISP116x, ISP118x and ISP136x Device Controller	TSSOP48 (SOT362-1) HVQFN48 (SOT619-2)	Now
	ISP1183	- [FS] USB peripheral controller with 8 bit parallel data bus, 16 endpoints, 2462-byte FIFO for ISO transfer, bus-powered, max 11.1 MB/s transfer rate to µC or µP - Integrated 5.0 V-to-3.3 V voltage regulator for bus-power support - Operating voltage 3.3 V - Dual supply voltages: main 3.0 V to 3.6 V, digital I/O interface 1.65 V to 3.6 V, enabling direct interface to battery-operated devices e.g., mobile phones	Digital camera, mobile phone, printer, STB, FDD, PDA, MP3 player, router, modem, USB dongle	- ISP1183 PC Eval Kit - ISP1183 Gen µC Eval Kit	- Simultaneous DMA and PIO access in the ISP116x, ISP118x and ISP136x Device Controller	HVQFN32 (SOT617-1)	Now
Host	ISP1160/01	- [FS, LS] USB host controller, 2 downstream ports, Host stack written in C - Single supply voltage 3.3 V or 5 V - Integrated 5.0 V-to-3.3 V voltage regulator for bus-power support - Parallel interface between system µP and HC, data transfer rate up to 15 MB/s - Glueless interface to various µC and RISC processors	Digital camera, STB, PDA, mobile phone, web appliance, digital audio jukebox	ISP1160x ... Eval Kit ...ISA/Linux ...PCI/DOS	- Interfacing ISP1160x to ... ...Fujitsu SPARClite® RISC ...Intel StrongARM® SA-1110 ...Hitachi SH7709 RISC Processor ...Motorola DragonBall™ EZ RISC ...NEC V832® RISC Processor - ISP1160x Embedded Programming Guide - ISP1160x Low Power Consumption - Simultaneous DMA and PIO access in the ISP116x, ISP118x and ISP136x Device Controller	LQFP64 (SOT314-2, SOT414-1)	Now

Note: HS, FS, and LS denote Hi-Speed, full-speed, and low-speed data transfer rates, respectively

For more information on Philips USB solutions, visit: www.semiconductors.philips.com/usb

Family	Product	Description	Target Applications	Reference Kits	Application notes	Package(s)	Availability
Host/ Peripheral	ISP1161A ISP1161A1 (for the peripheral controller portion)	- Industry's first USB point-to-point IC - Single supply voltage 3.3 V or 5.0 V - Integrated 5.0 V-to-3.3 V voltage regulator for bus-power support - Single-chip USB host/peripheral controller: can act as peripheral controller (DC) only, host controller (HC) only, or DC+HC simultaneously - DC [FS]: 1 upstream port, 14 programmable endpoints, max 11.1 MB/s transfer rate between µP and DC - HC [FS, LS]: 2 downstream ports, Host stack written in C, max 15 MB/s transfer rate between µP and DC	Digital camera, STB, PDA, mobile phone, web appliance, digital audio jukebox	ISP1161A1...Eval Kit ...ISA/Linux ...PCI/DOS	- Interfacing ISP1161x to ... ...Fujitsu SPARClite RISC ...Intel StrongARM SA-1110 ...Hitachi SH7709 ...Motorola DragonBallTM EZ RISC ...NEC V832® - ISP1161x Embedded Programming Guide - Odd or even byte indicator in the ISP1161A1 - Simultaneous DMA and PIO access in the ISP116x, ISP118x and ISP136x Device Controller	LQFP64 (SOT314-2, SOT414-1)	Now
Hi-Speed USB							
Transceiver	CP2147	- [HS, FS] Companion analog front-end to digital ASICs - 16-bit HS USB non-UTMI-based host & peripheral transceiver - Digital I/O interface voltage: 3.3 V or 5 V - Separate 3.3 V supplies for analog transceiver and digital I/Os minimize crosstalk	Digital camera, printer, scanner, CD-RW drive, DVD drive, STB, PC motherboard, etc.	Hi-Speed USB Transceiver Eval Kit		LQFP48 (SOT313-2)	Now
	ISP1504/5/6	- [HS, FS, LS] UTMI+ Low Pin Interface (ULPI)-based transceiver - Low power operation - Core power 1.8 V			White paper on ULPI		
	ISP1504	- 8-bit data bus - Peripheral, host & OTG capability - Charge pump: embedded & external supported - Digital I/O interface 1.65 V to 3.6 V	Mobile applications or standalone host & peripheral applications	ISP1504 ULPI Transceiver Eval Kit		HVQFN32 (SOT617-1)	Mass prod. Dec 2004
	ISP1505	- 8-bit data bus - peripheral, host capability - OTG support: SRP - Digital I/O interface 1.65 V to 3.6 V	Standalone host & peripheral applications e.g., STB	ISP1505 ULPI Transceiver Eval Kit		HVQFN24 (SOT616-1)	Mass prod. Dec 2004
	ISP1506	- 4-bit double data rate (DDR) bus - peripheral, host & OTG capability - Embedded charge pump - Digital I/O interface 1.65 V to 1.95 V	Mobile applications	ISP1506 ULPI Transceiver Eval Kit		HVQFN24 (SOT616-1)	Mass prod. Jan 2005
Peripheral	ISP158x	- [HS, FS] peripheral controller - 14 configurable USB endpoints					
	ISP1581	- Supports Generic Mode and Split bus CPU interfaces - Supports direct interface to any ATA/ATAPI device - Core operating voltage 3.3 V - Single supply voltage 3.0 V to 3.6 V, or 4.0 V to 5.5 V - Integrated 5.0 V-to-3.3 V voltage regulator for bus-power support	Conference camera, printer, scanner, STB, PDA, router, Hi-Speed USB-to-Ethernet dongle, CD-RW drive, DVD drive, tape backup, etc.	ISP1581 Hi-Speed USB MPEG2 Encoder Reference Kit	- Interfacing to 8051, an 8-bit µC - Interfacing to 8051 XA, a 16-bit µP bus - Using the DMA Controller - Power-Up Considerations in ISP1581 - Using the Odd Bit Indicator for DMA	LQFP64 (SOT314-2)	Now
	ISP1582	- Supports only generic-mode CPU interface - Operating voltage 1.8 V - Dual supply voltages: main 3.0 V to 3.6 V, digital I/O interface 1.65 V to 3.6 V - Can be bus-powered (with external voltage regulator): supports current < 100 mA - Low-power consumption very suitable for portable devices	Portable applications: PDA, DSC, DVC, MP3 player, external storage, printer, scanner, STB	ISP1582 Hi-Speed USB PCI Generic/ Mass Storage Eval Kit	- Special Function Registers: Differences Between ISP1581 and ISP1582/83 - ISP1582/83 Control Pipe - Interfacing ISP1582 to PXA255 processor	HVQFN56 (SOT684-1)	Now
	ISP1583	- Supports Generic Mode and Split bus mode CPU interfaces - Supports direct interface to any ATA/ATAPI device - Operating voltage 1.8 V - Dual supply voltages: main 3.0 to 3.6 V, digital I/O I/F 1.65 to 3.6 V - Low-power consumption very suitable for portable devices - Can be bus-powered (with external voltage regulator): supports current < 100 mA	Portable applications with embedded HDD: PDA, DSC, DVC, MP3 player, external storage, printer, scanner, STB	ISP1583 Hi-Speed USB ... Eval Kit ... Split Bus ... Mass Storage	- Special Function Registers: Differences Between ISP1581 and ISP1582/83 - ISP1582/83 Control Pipe	HVQFN64 (SOT804-1)	Now
Host	ISP1561	- [HS, FS, LS] PCI-based Hi-Speed USB host, direct interface to any 32-bit, 33 MHz interface, - Single supply voltage 3.0 V to 3.6 V - Integrates two Original USB: OHCI and one Hi-Speed USB EHCI host controllers - 4 downstream ports - Core operating voltage 3.3 V	PC motherboard, notebook, PCI host addon card, STB, web appliance	ISP1561 Hi-Speed USB Host PCI Eval Kit		LQFP128 (SOT420-1)	Now
	ISP1760	- [HS, FS, LS] Embedded Hi-Speed USB host, memory mapped CPU interface to any 32-bit or 16-bit interface, - Three downstream ports - Dual supply voltages: main 3.0 V to 3.6 V, digital I/O interface 1.65 V to 3.6 V - Core operating voltage 1.8 V - Integrated patent-pending Transaction Translator supports single EHCI for HS, FS and LS transfers	Printer, STB, DVD recorder, DTV, media player, PDA	- ISP1761 PXA255 Linux ref kit (SW only) - FlexiUSB stack for HS host - ISP1761 PCI/Linux ref kit (SW only)	- Interfacing ISP1760 to Intel PXA255 processor - ISP176x in embedded systems	LQFP128 (SOT425-1) TFBGA128 (SOT857-1)	Now
OTG Dual-Role	ISP1761	See On-The-Go					
Hub	ISP152x	- [HS, FS, LS] Standalone single-chip pure hardware hub - Dual supply voltages 3.3 and 5.0 V	Monitor, device bay, docking station, hub box				
	ISP1520	4 downstream ports		ISP1520 Hi-Speed USB Hub Demo Board		LQFP64 (SOT314-2)	Now
	ISP1521	7 downstream ports		ISP1521 Hi-Speed USB Hub Demo Board		LQFP80 (SOT315-1)	Now

Philips Audio Amplifiers

Digital Amplifiers (DVD receiver, home theater, flatscreen TV, home audio systems, subwofers)

	Description	# Channels	Supply voltage	Po(W)@ 10 % (SE)	Po(W)@ 10% (BTL)	Iout, max	Zero Dead Time	Efficiency (system)	THD (1kHz, 1 W)	Gain (dB) SE/BTL	SVRR (dB)	Offset SE (mV)	Noise (µV), RS=0, F <20 kHz	fosc (kHz)	Rthj-c	Mute/Standby	Differential Inputs	Packages	
TDA8920TH	1 Chip Class D 2x80W	2 x SE, 1 x BTL	± 12.5 V ..30 V	2x80 (4Ω, 27V)	150 (8Ω, 27V)	7.5A	NO*	0.90	0.01%	30/36	> 40	< 150	220	210 ..317 ..600	1.3	1-pin	Y	HSOP24	1 Chip Class D (pin compatible)
TDA8921TH	1 Chip Class D 2x50W	2 x SE, 1 x BTL	± 12.5 V ..30 V	2x50 (4Ω, 22V)	100 (8Ω, 22V)	6A	NO*	0.90	0.01%	30/36	> 40	< 150	220	210 ..317 ..600	1.3	1-pin	Y	HSOP24	
TDA8922TH/J	1 Chip Class D 2x25W	2 x SE, 1 x BTL	± 12.5 V ..30 V	2x25 (6Ω, 17V)	50 (8Ω, 16V)	4A	YES	0.90	0.01%	30/36	> 40	< 150	220	210 ..317 ..600	1.3	1-pin	Y	HSOP24	
TDA8924TH	1 Chip Class D 2x120W	2 x SE, 1 x BTL	± 12.5 V ..30 V	2x120 (2Ω, 25V)	240 (4Ω, 24V)	11.3A	YES	0.90	0.01%	30/36	> 40	< 150	220	210 ..317 ..600	1.3	1-pin	Y	HSOP24/ DBS23P	
TDA8925ST	Class D 2x15W	2 x SE, 1 x BTL	± 7.5 V ..30 V	2x15 (8Ω, 19V)	30 (8Ω, 19V)	3A	NA	0.94	0.05%	30/36	> 40	< 150	80	210 ..600	1.5	Power up	NA	DBSR17P	Self Oscillating Class D (pin compatible)
TDA8926TH/J	Class D 2x50W	2 x SE, 1 x BTL	± 7.5 V ..30 V	2x50 (4Ω, 22V)	100 (8Ω, 22V)	5A	NO	0.92	0.01%	30/36	> 40	< 150	80	210 ..600	1.5	1-pin	NA	HSOP24/ DBSR17	
TDA8927TH/J	Class D 2x80W	2 x SE, 1 x BTL	± 7.5 V ..30 V	2x80 (4Ω, 27V)	150 (8Ω, 27V)	7.5A	NO	0.92	0.01%	30/36	> 40	< 150	80	210 ..600	1.3	1-pin	NA	HSOP24/ DBSR17	
TDA8929T	PWM Controller	2 ch.	± 15 V ..30 V	NA	NA	NA	NA	0.92	NA	NA	NA	< 150	NA	210 ..317 ..600	60 (j-a)	1-pin	Y	SO24	

** ZDT planned for 2004*

Multi-purpose amplifiers (mainstream TV, general audio, speaker systems)

	Description	# Channels	Supply Voltage	1 supply (STBY)	1 supply (ON)	Po(W)@ 10%	Volume control	THD typical (1W/4Ω)	Gain (dB) (SE/BTL)	SVRR typical (dB)	Offset (mV)	Noise (µV)	Standby/ mute/on	Differential inputs	Package	Rth
TDA8941P	MPA 1 x 1.5W	1 x BTL	6 ..9 ..18V	<10µA	14mA	1.5W 16Ω, VP=9V	N	0.03%	32	65	<200mV	90µV	Y low = 'on'	Y	DIP8	100K/W
TDA8942P	MPA 2 x 1.5W	2 x BTL	6 ..9 ..18V	<10µA	22mA	1.5W 16Ω, VP=9V	N	0.03%	32	65	<200mV	90µV	Y low = 'on'	Y	DIP16	57K/W
TDA8943SF	MPA 1 x 6W	1 x BTL	6 ..12 ..18V	<10µA	15mA	6.5W 8Ω, VP=12V	N	0.03%	32	65	<200mV	90µV	Y low = 'on'	Y	SIL9MP	18K/W
TDA8944J	MPA 2 x 7W	2 x BTL	6 ..12 ..18V	<10µA	24mA	7W 8Ω, VP=12V	N	0.03%	32	65	<200mV	90µV	Y low = 'on'	Y	SIL17P-glue	6.9K/W
TDA8944AJ	MPA 2 x 7.5W DC vol. control	2 x BTL	4.5 ..9 ..18V	<20µA	40mA	7W 8Ω, VP=12V	-50dB to 30dB floating:24dB	0.20%	30	55	170	120µV	Y low = 'on'	Y	SIL17P-glue	4.5K/W
TDA8945S	MPA 1 x 15W	1 x BTL	6 ..12 ..18V	<10µA	18mA	15W 8Ω, VP=12V	N	0.03%	32	65	<200mV	90µV	Y low = 'on'	Y	Rail to rail Vout	9K/W
TDA8946J	MPA 2 x 15W	2 x BTL	6 ..12..18V	<10µA	28mA	15W 8Ω, VP=12V	N	0.03%	32	65	<200mV	90µV	Y low = 'on'	Y	SIL17P-sold	4.5K/W
TDA8946AJ	MPA 2 x 15W DC vol. control	2 x BTL	4.5 ..16 ..18V	<20µA	45mA	15W 8Ω, VP=18V	-50dB to 30dB floating:24dB	0.20%	30	55	250mV	120µV	Y low = 'on'	Y	SIL17P-sold	2.5K/W
TDA8947J	MPA 2.1	2 x SE +1 x BTL 2 x BTL 4 x SE	6 ..12 ..26V	<20µA	80mA (4ch)	SE: 8.5 W (4 ,VP=18V) BTL 17W	N	0.20%	30	55	170 mV	170µV	Y low = 'on'	Y	BTL:Y SE: quasi differential	2K/W

Multimedia / PC Speaker amplifiers (PC speakers, LCD TVs, desktop computers)

	Description	Vp (V)	Po (W) 10% THD;Vp=14.4V		THD (%) 1 kHz	Iq (mA) Vp= 24V	Gain(dB) (BTL/SE)	SVRR (dB)	Rth j-a (K/W)	Rth j-c (K/W)	Mute & Standy	BTL	SE	Package
TDA1516CQ	24W	8.5 - 18	24 (4Ω)		0.05	40	26	>48		2	Y	Y (mono)		SIL13P
TDA1518BQ	24W 2 x 12W	8.5 - 18	24 (4Ω)	2*12 (2Ω)		40	46/40	>48		2	Y	Y (mono)	Y (stereo)	SIL13P
TDA1517(P)	2 x 6W	8.5 - 18	6 (4Ω)		0.1	40	20	>48		8	Y		Y (stereo)	SIL9MPF/HDIP18
TDA1517ATW	8W 2 x 4W	6.0 - 18	4 (4Ω)		0.1	40	26/20	>50	37		Y	Y (mono)	Y (stereo)	HTSSOP20
TDA7056AT	3W	4.5 - 18	3.5 (12V,16Ω)	5.2 (12V,8Ω)	0.3	8	36	>46	55	10	DC Volume CTRL	Y (mono)	N	SIL9MPF
TDA1554Q	2 x 22W 4 x 11W	8.5 - 18	22 (4Ω)	4*11 (2Ω)	0.1	80	26/20	>48		1.5	Y	Y (stereo)	Y (quad)	SIL17P
TDA1557Q	2 x 22W	8.5 - 18	2 x 22 (4Ω)	Distortion det. Pin	0.1	80	46	>48		1.5	Y	Y (stereo)		SIL13P
TDA8510J	26W 2 x 13W	6.0 - 18	BTL: 26 (4Ω)	SE: 7(4Ω) - 13 (2Ω)	0.06	80	26/20	>46	4	1.3	Y	Y (mono)	Y (stereo)	SIL17P
TDA8511J	4 x 13W SE	6.0 - 18	7(4Ω)	13 (2Ω)	10	80	20	>46	4	1.3	Y		Y	SIL17P
TDA8512J	26W + 2 x 13W or 4 x 13W SE	6.0 - 18	BTL: 26 (4Ω)	SE: 7(4Ω) - 13 (2Ω)	0.06	80	26/20	>46	4	1.3	Y	Y (mono)	Y (stereo/ quad)	SIL17P

TV/Hi-FI amplifiers (High-end TV, Hi-Fi systems)

	Description	Vp (V)	Po(W) 0.5% THD	Po(W) 10% THD	THD 1KHz	Iq (mA) Vp=24V	Gain (dB)	SVRR (dB)	Channel sep. (dB)	Vnoise (µV) (20-20KHz)	DC output offset (mV)	ZI (KΩ)	Input (Vrms)	Rth j-c (K/W)	Rth j-a (K/W)	Symm. & Asymm. Supply	HIFI IES268 & DIN45500	Thermal Protection	Missing Current Limiter	DC Volume Control	Internal mute	External mute	Package	Remarks
TDA1013B	4W	10.0- 40.0	3.3 (8Ω)	4.2 (8Ω)	0.15% (2.5W)	25	90																SIL9MPF	DC volume
TDA1521A	2x6W HIFI	7.5- 21	6 (12V, 8Ω)	8 (12V, 8Ω)	0.15% (4W)	40	30	60	70	70				6		Y	Y				Y		SIL9MPF	
TDA2614	6W HIFI	15- 42	6.5 (±12V, 8Ω)	8.5 (±12V, 8Ω)	0.15% (4W)	20	30	45		70				8		Y	Y				Y	Y	SIL9MPF	
TDA2615	2x6W HIFI	7.5- 21	6.0 (±12V, 8Ω)	8.0 (±12V, 8Ω)	0.15% (4W)	40	30	60	70	70				6		Y	Y				Y	Y	SIL9MPF	
TDA2616	2x12W HIFI	7.5- 21	12.0 (±16V, 8Ω)	15.0 (±16V, 8Ω)	0.15% (6W)	40	30	60	70	70					2.5	Y	Y				Y	Y	SIL9P	20W (BTL)
TDA2616Q	2x12W HIFI	7.5- 21	12.0 (±16V, 8Ω)	15.0 (±16V, 8Ω)	0.15% (6W)	40	30	60	70	70					2.5	Y	Y				Y	Y	DBS9P	20W (BTL)
TDA7052	1W (0.5)	3.0- 18	1.2 (6V, 8Ω)		0.2% (0.1W)	4	40	50			<100	100			110								DIL8	
TDA7052A(T)	1W (0.5)*	4.5- 18	1.1 (6V, 8Ω)		0.3% (0.5W)	7	36	46			<150	20	0.65		100 (155)			Y	Y	Y 120dB		Y (0.3V)	DIL/SO8	
TDA7052B(T)	1W (0.5)*	4.5- 18	1.0 (6V, 8Ω)		0.3% (0.5W)	9.2	40	38			<200	20	1		100 (155)			Y	Y	Y 73.5dB		Y (0.4V)	DIL/SO8	
TDA7053A(T)	2*1W (0.5)*	4.5- 18	2*1.0 (6V, 8Ω)		0.3% (0.5W)	15	40	38			<200	20	1		50 (95)			Y	Y	Y 73.5dB		Y (0.4V)	DIL/SO16	
TDA7056	3W	3.0- 18	3 (11V, 6Ω)		0.25% (0.5W)	5	40	38			<200	100		10	55								SIL9MPF	
TDA7056A(T)	3W*	4.5- 18	3.5 (12V, 16Ω)	5.2 (12V, 8Ω)	0.3% (0.5W)	8	36	46			<150	20	0.65	10	55			Y	Y	Y 120dB		Y (0.3V)	SIL9MPF/ SO20	Rail to rail
TDA7056B	5W	4.5- 18	3.5 (12V, 16Ω)	5.2 (12V, 8Ω)	0.3% (0.5W)	9.2	40	38			<200	20	1	10	55			Y	Y	Y 73.5dB		Y (0.4V)	SIL9MPF	
TDA7057AQ	2*8W*	4.5- 18	2*3.5 (12V, 16Ω)	2*5 (12V, 8Ω)	0.2% (0.5W)	15	40	38			<200	20	1	4	40			Y	Y	Y 73.5dB		Y (0.4V)	SIL13P	

* *DC volume control*

Philips Audio Amplifiers

Headphone/Low-power amplifiers (Home audio systems, Laptop computers, Portable audio, MP3 players)

	Description	Vp (V)	Po(W) 10% THD: BTL	THD (%) 1KHz	Iq (mA) Vp=24V	Gain (dB)	SVRR (dB)	Zi (KΩ)	ISB (µA) Vp=3V	Rth ja (K/W)	DQC	Buffer Output (0.5Vp)	Thermal Protection	Mute & Standby	Differential Inputs	Stabilizer (18V)	Package	Remarks
TDA7050(T)	Headphone BTL & SE	1.6-6.0	140 (3V, 32Ω)		3.2 (Vp=3V)	32		1000		110 (160)							DIL/SO8	
TDA7037A(T)	Dual BTL Power driver	3.0-18		0.3 (0.1)		32.5-34.5	55	100		50 (95)							DIL/SO16	No external components
TDA8551T	1W BTL	2.7-5.5	1.4 (5V, 8Ω)	0.15	6 (Vp=5V)	20	>48	20	<10	160							SO8	
TDA8552T(S)	2x1.4W BTL	2.7-5.5	1.4 (5V, 8Ω)	20-30	BTL:14 (Vp=5V) BTL:10 (Vp=3.3V) SE:8.5 (Vp=5V) SE:5 (Vp=3.3V)	20-30	>50		<10	60 (110)							SO/SSOPP20	
TDA8559 (T)	Headphone BTL & SE	1.9-30	140 (3V, 25Ω)	0.05 (70 mW)	2.75 (Vp=3V)	32 (26)	49	50	<10	52 (105)	Y	Y	Y	Y	Y	Y	SIL/SO16	Nearly external components
TDA8559(T)	Line Driver	1.9-30			2.75 (Vp=3V)	26		100	<10	52 (105)	Y	Y	Y	Y	Y	Y	DIL/SO16	Rail to rail output voltage

Amplifiers Listed by Power Rating

	Description	# Channels	Supply voltage	Pl(W) @ 10% (SE)	Pl(W) @ 10% (BTL)	Mute/Standby	Differential Inputs	Packages
TDA8924TH	1 chip Class D 2x120W	2xSE, 1xBTL	+/-12.5V ..30V	120 W	240W	1-pin	Y	HSOP24
TDA8920TH	1 chip Class D 2x80W	2xSE, 1xBTL	+/-12.5V ..30V	80 W	150W	1-pin	Y	HSOP24
TDA8927TH/J	Class D 2x80W	2xSE, 1xBTL	+/-7.5V ..30V	80 W	150W	1-pin	Y	HSOP24/DBS17
TDA8921TH	1 chip Class D 2x50W	2xSE, 1xBTL	+/-12.5V ..30V	50 W	100W	1-pin	Y	HSOP24
TDA8926TH/J	Class D 2x50W	2xSE, 1xBTL	+/-7.5V ..30V	50 W	80W	1-pin	Y	HSOP24/DBS17
TDA8922TH/J	1 chip Class D 2x25W	2xSE, 1xBTL	+/-12.5V ..30V	25 W	50W	1-pin	Y	HSOP24
TDA8925ST	Class D 2x15W	2xSE, 1xBTL	+/-7.5V ..30V	15W	30W	1-pin	Y	DBSR17P
TDA8947J	MPA 2.1 Robot	2xSE + 1xBTL 2xBTL, 4xSE	6 -- 12 --25V	13W	29W	Mute / Standby	BTL:Y / SE: Quasi	SIL17P-sold
TDA2616	2x12W HIFI	2xSE, 1xBTL	7.5-21V	15W	26W	Mute	Y	SIL9P
TDA2616Q	2x12W HIFI	2xSE, 1xBTL	7.5-21V	15W	26W	Mute	Y	DBS9P
TDA8510J	MultiMedia 2.1ch	2xSE + 1xBTL	6.0-18V	13W	26W	1-pin	N	SIL17P
TDA8512J	MultiMedia 2.1, 4ch	2xSE + 1xBTL 4XSE	6.0-18V	13W	26W	1-pin	N	SIL17P
TDA1516CQ	MultiMedia 20dB	2xSE + 1xBTL	8.5-18V	12W	24W	Mute / Standby	N	SIL13P
TDA118BQ	MultiMedia 40dB	2xSE + 1xBTL	8.5-18V	12W	24W	Mute / Standby	N	SIL13P
TDA1557Q	MM 2x22W	2 x BTL	8.5 - 18V		22W	Mute / Standby	N	SIL13P
TDA1554Q	MM 2x22W, 4x11W	2 x BTL, 4 x SE	8.5 - 18V	11W	22W	Mute / Standby	N	SIL17P
TDA8945S	MPA 1x15W	1 x BTL	6 -- 12 -- 18V		15W	Mute / Standby	Y	SIL9P
TDA8946J	MPA 2x15W	2 x BTL	6 -- 12 -- 18V		15W	Mute / Standby	Y	SIL17P-sold

	Description	# Channels	Supply voltage	PI(W) @ 10% (SE)	PI(W) @ 10% (BTL)	Mute/Standby	Differential Inputs	Packages
TDA8946AJ	MPA 2x15W DC CTRL	2 x BTL	4.5 -- 16 -- 18V		15W	Mute / Standby	Y	SIL17P-sold
TDA8511J	MultiMedia 4ch	4 x SE	6.0 - 18V	13W		1-pin	N	SIL17P
TDA1013B	TV 4-10W DC Vol CTRL	1 x SE	10 - 40V	10W			Volume CTRL	SIL9MPF
TDA2614	6W HIFI	1 x SE	15 - 42V	8.5W		Mute	Y	SIL9MPF
TDA1521A	2x6W HIFI	2 x SE	7.5 - 21V	8W				SIL9MPF
TDA2615	2x6W HIFI	2 x SE	7.5 - 21V	8W		Mute	Y	SIL9MPF
TDA7057AQ	TV DC Vol CTRL	2x8W 2 x BTL	4.5 - 18V		8W	NA		SIL13P
TDA1517ATW	MultiMedia SO	2x4W 1 x BTL, 2 x SE	6.0 - 18V	4W	8W		N	HTSSOP20
TDA8944AJ	MPA 2x7.5W DC CTRL	2 x BTL	4.5 -- 9 -- 18V		7.5W	Mute / Standby	Y	SIL17P-glue
TDA8944J	MPA 2x7W	2 x BTL	6 -- 12 -- 18V		7W	Mute / Standby	Y	SIL17P-glue
TDA1517(P)	MultiMedia 2x6W	2 x SE	8.5 - 18V	6W			N	SILMPF/HDIP18
TDA8943SF	MPA 1x6W	1 x BTL	6 -- 12 -- 18V		6W	Mute / Standby	Y	SIL9MP
TDA7056A(T)	TV BTL DC Vol CTRL 3W	1 x BTL	4.5 - 18V		5W	NA		SIL9MPF/SO20
TDA7056B	TV BTL DC Vol CTRL 5W	1 x BTL	4.5 - 18V		5W	NA		SIL9MPF
TDA7056	TV BTL Amplifier 1x3W	1 x BTL	3.0 - 18V		3W	NA		SIL9MPF
TDA8551T	MM BTL DIG Vol CTRL	1 x BTL	2.7 - 5.5V		2W	1-pin		SO8
TDA8552T(S)	MM 2xBTL DIG Vol CTRL	2 x BTL	2.7 - 5.5V		2W	1-pin		SO/SSOP20
TDA8941P	MPA 1x1.5W	1 x BTL	6 -- 9 -- 18V		1.5W	Mute / Standby	Y	DIP8
TDA8942P	MPA 2x1.5W	2 x BTL	6 -- 9 -- 18V		1.5W	Mute / Standby	Y	DIP16
TDA7052 TV	BTL Amplifier 1x1W	1 x BTL	3.0 - 18V		1W	NA		DIL8
TDA7052A(T)	TV BTL DC Vol CTRL	1 x BTL	4.5 - 18V		1W	NA		DIL/SO8
TDA7052B(T)	TV BTL DC Vol CTRL	1 x BTL	4.5 - 18V		1W	NA		DIL/SO8
TDA7053A(T)	TV 2 x BTL DC Vol CTRL	2 x BTL	4.5 - 18V		1W	NA		DIL/SO16
TDA7050(T)	Headphone amp 2x75mW	2 x SE, 1 x BTL	1.6 - 6.0V	0.075W	0.15W		Y	DIL/SO8
TDA8559(T)	Headphone BTL & SE	2 x SE, 1 x BTL	1.9-30V	0.035W	0.14W	1-pin	Y	SIL/SO16
TDA8929T	PWM Controller	2 channels +/-15V .. 30V				1-pin	Y	SO24

Philips I²C Bus Solutions

	Type of function in device										Features																						
															V_{CC} Range (V)					Freq. (kHz)		Temp °C			Packages									
	I/O Expander (bits)	LED Blinker bits	MUX/Latch/EEPROM (Bits-latched bits-registered)	MUX/Switch (In/Out Segments)	Repeater/Hub (in/out segments)	Bus Controller	Temperature Sensor	Voltage Measurement	RAM/EEPROM (kbits)	A/D Converter	# of Addresses	Interrupt (In/Out)	Hardware Reset	Current (per bit/total mA)	Internal Pull-up Current Source/Resistor on I/O	2.5	3.3	5	5V Tolerant	100	400	0 to 70	-40 to 85	-55 to 125	Pin Count	DIP	SO (narrow)	SO (wide)	SSOP	QSOP	TSSOP	HVFN
LM75A							2°C				8	0-1				2.8	•	•		•	•			•	8		D				DP	
NE1617A							3°C				9						•	•		•		0 to 125			16					DS		
NE1618							1°C				9						•		•	•		0 to 125			16					DS		
NE1619							3°C	•			2						•	•	•	•	•	0 to 125			16					DS		
P82B715					•						NA							•	•	•	•		•		8	PN	TD					
P82B96					•						NA					•	•	•	•	•	•		•		8	PN	TD				DP	
PCA24S08									8		1					•	•			•	•		•		8		D				DP	
PCA8550			4-1-1								1						•		•	•	•	•			16		D		DB		PW	
PCA8581C									1		8					•	•	•	•	•		-25 to 85			8	PN	TD					
PCA9500	8								2	2-8				25-100	•		•		•	•	•		•		16			D			PW	BS
PCA9501	8								2		2-64	0-1		25-100	•		•		•	•	•		•		20			D			PW	BS
PCA9510/11/ 11A/12/13/14					1-1						NA						•	•	•	•	•		•		8		D				DP	
PCA9515/ 15A					1-1						NA						•		•	•	•		•		8		D				DP	
PCA9516/ 16A					1-4						NA						•		•	•	•		•		16		D				PW	
PCA9517					1-1						NA					•	•	•	•	•	•		•		8		D				DP	
PCA9518					1-4xN						NA						•		•	•	•		•		20			D			PW	
PCA9530/50		2									2		•	25-50		•	•	•	•	•	•		•		8		D				DP	
PCA9531/51		8									8		•	25-100		•	•	•	•	•	•		•		16		D				PW	BS
PCA9532/52		16									8		•	25-200		•	•	•	•	•	•		•		24			D			PW	BS
PCA9533/ 01/02		4									1			25-100		•	•	•	•	•	•		•		8		D				DP	
PCA9534	8										8	0-1		25-100		•	•	•	•	•	•		•		16			D			PW	BS
PCA9535	16										8	0-1		25-200		•	•	•	•	•	•		•		24			D			PW	BS
PCA9536	4										1			25-100	•	•	•	•	•	•	•		•		8		D				DP	
PCA9537	4										1	0-1	•	25-100		•	•	•	•	•	•		•		8		D				DP	
PCA9538	8										8	0-1	•	25-100		•	•	•	•	•	•		•		16			D			PW	BS
PCA9539	16										8	0-1	•	25-200		•	•	•	•	•	•		•		24			D			PW	BS
PCA9540/ 40A				1-2							1					•	•	•	•	•	•		•		8		D				DP	
PCA9541/01 /02/03				2-1							16	1-2	•			•	•	•	•	•	•		•		20			D			PW	BS
PCA9542/ 42A				1-2							8	2-1				•	•	•	•	•	•		•		14		D				PW	
PCA9543/ 43A				1-2							4	2-1	•			•	•	•	•	•	•		•		14		D				PW	
PCA9544/ 44A				1-4							8	4-1				•	•	•	•	•	•		•		20			D			PW	BS

	Type of function in device										Features																						
															V_{CC} Range (V)					Freq. (kHz)		Temp °C			Packages									
	I/O Expander (bits)	LED Blinker bits	MUX/Latch/EEPROM (Bits-latched bits-registered)	MUX/Switch (In/Out Segments)	Repeater/Hub (in/out segments)	Bus Controller	Temperature Sensor	Voltage Measurement	RAM/EEPROM (kbits)	A/D Converter	# of Addresses	Interrupt (In/Out)	Hardware Reset	Current (per bit/total mA)	Internal Pull-up Current Source/Resistor on I/O	2.5	3.3	5	5 V Tolerant	100	400	0 to 70	-40 to 85	-55 to 125	Pin Count	DIP	SO (narrow)	SO (wide)	SSOP	QSOP	TSSOP	HVFN
PCA9545/ 45A				1-4							4	4-1	•			•	•	•	•	•	•		•		20			D			PW	BS
PCA9546/ 46A				1-4							8		•			•	•	•	•	•	•		•		16		D				PW	BS
PCA9547				1-8							8		•			•	•	•	•	•	•		•		24			D			PW	BS
PCA9548/ 48A				1-8							8		•			•	•	•	•	•	•		•		24			D			PW	BS
PCA9554/ 54A	8										8	0-1		25-100	•	•	•	•	•	•	•		•		16			D	DB		PW	BS
PCA9555	16										8	0-1		25-200	•	•	•	•	•	•	•		•		16			D	DB		PW	BS
PCA9556	8										8		•	20-80			•	•		•		•			16						PW	
PCA9557	8										8		•	25-100		•	•	•	•	•	•		•		16		D				PW	BS
PCA9558	8		5-1-1						2		2			25-100			•		•	•	•	•			28						PW	
PCA9559			5-1-1								4			20-80			•		•	•	•	•			20						PW	
PCA9560			5-1-2								4			25-100			•		•	•	•		•		20			D			PW	
PCA9561			6-0-4								4			25-100			•		•	•	•		•		20			D			PW	
PCA9564						•					128	0-1	•			•	•		•	•	•		•		20			D			PW	BS
PCF85102C-2									2		8					•	•	•	•	•			•		8	N	D					
PCF85103C-2									2		8					•	•	•	•	•			•		8	N	D					
PCF85116-3									16		8						•	•	•	•	•		•		8	N	D					
PCF8574/74A	8										4	0-1		20-100	•	•	•	•	•	•			•		16	PN		TD	TDK			
PCF8575	16										8	0-1		20-100	•	•	•	•	•	•	•		•		24				TSDB			
PCF8575C	16										8	0-1		20-100		•	•	•	•	•	•		•		24				TSDB			
PCF8582C-2									2		8					•	•	•	•	•			•		8	N	D					
PCF8584						•					128	0-1	•		•			•	•	•			•		20	PN		TD				
PCF8591										8	8					•	•	•	•	•			•		16	PN		TD				
PCF8594C-2									4		8					•	•	•	•	•			•		8	N	D					
PCF8598C-2									8		8					•	•	•	•	•			•		8	N	D					
SAA1064		4x8									4			21 mA				•	•	•			•		24	P		T				
SA56004-X							1°C				8	0-1					•	•	•	•	•		0 to 125		8		D				DP	
SE95							1°C				8	0-1				2.8	•	•	•	•	•			•	8		D				DP	

Data sheets can be downloaded at: www.philipslogic.com/i2c or www.semiconductors.philips.com/i2c

Philips Integrated Power / Management

LFPAK MOSFET Portfolio

Type Number	V_{DS} (V)	Max $R_{DS(on)}$ (mΩ)			Q_{GD} (nC)
		V_{GS} = 10 V	V_{GS} = 4.5 V	V_{GS} = 2.5 V	
PH2520U	20		2.5	3.2	18
PH3120L	20	2.35	3.4		13
PH2925U	25		2.9	3.7	20
PH3230S	30	3.2	6.5		13
PH3830L	30	3.8	4.9		11
PH7030L	30	7.9	10		3.2
PH8230E	30	8.2	13.2		5
PH4530L	30	6.3	8		4.1
PH5330E	30	5.7	8.5		6
PH4840S	40	4.1	4.8 (7V)		16
PH1955L	55	16	21		7

µTrenchMOS Portfolio

Type Number	Max V_{DS} (V)	Typical $R_{DS(on)}$ (mΩ)				V_{GS}	I_D max
		V_{GS} = 10 V	V_{GS} = 4.5 V	V_{GS} = 2.5 V	V_{GS} = 1.8 V		
PMN34UN	30		38	45	54	8	4.9
PMN45EN	30	32	42			20	5.2
PMN40LN	30	32	40			15	5.4
PMN55LN	20	55	70			15	4.1
PMN34LN	20	28	34			15	5.7
PMN23UN	20		23	28	36.4	8	6.4
PMN27UN	20		27	32	39	8	5.7
PMN28UN	12		28	32	39	8	5.7

40 V Range MOSFETs

$R_{DS(on)}$ (MΩ)	TO220	D²PAK
2.8	PHP222NQ04LT	PHB222NQ04LT
3.1	PHP225NQ04T	PHB225NQ04T
4.0	PHP174NQ04LT	PHB174NQ04LT
4.3	PHP176NQ04T	PHB176NQ04T
5.0	PHP129NQ04LT	PHB129NQ04LT
5.2	PHP143NQ04T	PHB143NQ04T
7.0	PHP95NQ04LT	PHB95NQ04LT
8.0	PHP101NQ04T	PHB101NQ04T

55 V Range MOSFETs

$R_{DS(on)}$ (MΩ)	TO220	D²PAK
3.7	PHP191NQ06LT	PHB191NQ06LT
4.0	PHP193NQ06T	PHB193NQ06T
5.4	—	PHB146NQ06LT
6.0	—	PHB145NQ06T
7.0	PHP110NQ06LT	PHB110NQ06LT
7.1	PHO119NQ06T	PHB119NQ06T

75 V Range MOSFETs

$R_{DS(on)}$ (MΩ)	TO220	D²PAK
5.0	PSMN005-75P	PSMN005-75B
5.6	PHP160NQ08T	PHB160NQ08T
6.1	PHP153NQ08LT	PHB153NQ08LT
9.0	PHP110NQ08LT PHP110NQ08T	PHB110NQ08LT PHB110NQ08T

100 V Range MOSFETs

$R_{DS(on)}$ (MΩ)	TO220	D²PAK
8.8	PSMN009-100P	PSMN009-100B
15.0	PSMN015-100P	PSMN015-100B

Low V_F (MEGA) Schottky rectifier portfolio

I_F max. (A)	V_R max. (V)	V_F max. (mV)	SOT457 (SC-74)	SOT23	SOD123F	SOD323 (SC-76)	SOD323F	SOT666	SOD523 (SC-79)	SOD882
0.2	30	480							PMEG3002AEB	PMEG3002AEL
	40	600							PEMG4002EB	PMEG4002EL
0.5	20	390		PMEG2005ET	PMEG2005EH	PMEG2005AEA		PMEG2005AEV		
		440								PMEG2005AEL
		480							PMEG2005EB	
		500								PMEG2005EL
	30	430		PMEG3005ET	PMEG3005EH	PMEG3005AEA		PMEG3005AEV	PMEG3005EB	
	40	470		PMEG4005ET	PMEG4005EH	PMEG4005AEA		PMEG4005AEV	PMEG4005EB	
1.0	20	500		PMEG2010ET	PMEG2010EH	PMEG2010BEA	PMEG2010EJ	PMEG2010BEV		
		550				PMEG2010EA		PMEG2010EV		
		620							PMEG2010AEB	
	30	560		PMEG3010ET	PMEG3010EH PMEG2510AEH	PMEG3010BEA	PMEG3010EJ	PMEG3010BEV		
	40	640		PMEG4010ET	PMEG4010EH PMEG4010AEH	PMEG4010BEA	PMEG4010EJ	PMEG4010BEV		
	60	650	PMEG6010AED	PMEG6010ET	PMEG6010AEH					
1.5	20	660				PMEG2015EA		PMEG2015EV		
	30	500		PMEG3015ET		PMEG3015EA		PMEG3015EV		
	40	550		PMEG4015ET						
	60	570		PMEG6015ET						
2.0	10	460			PMEG1020EH	PMEG1020EA	PMEG1020EJ	PMEG1020EV		
	20	525			PMEG2020EH	PMEG202AEA	PMEG2020EJ			
	30	TBD			PMEG3020EH		PMEG3020EJ			
3.0	10	TBD			PMEG1030EH		PMEG1030EJ			
	20	TBD			PMEG2030EH					

released *under development* *planned*

Low V_F (MEGA) Schottky rectifiers / Low V_{CEsat} (BISS) transistor module portfolio

Transistor			Schottky rectifier			SOT96-1 (SO8)	SOT457 (SC-74)	SOT353 (SC-88A)
I_C max. (A)	V_{CEO} max. (V)	R_{CEsat} max. (mΩ)	I_F max. (A)	V_R max. (V)	V_F max. (mV)			
Configuration						NPN	NPN	NPN
0.5	15	500	0.5	20	390			PMEM1505NG
1.0	40	220	1	20	550		PMEM4010ND	
2.0	40	190	1	20	550		PMEM4020ND	
2.0	40	190	1	40	640		PMEM4020AND	
3.0	40	130	1	40	500	PMEM4030NS		
5.0	40	TBD	TBD	TBD	TBD	PMEM4050NS		
Configuration						PNP	PNP	PNP
0.5	15	500	0.5	20	390			PMEM1505PG
1.0	40	340	1	20	550		PMEM4010PD	
2.0	40	280	1	20	550		PMEM4020PD	
2.0	40	280	1	40	640		PMEM4020APD	
3.0	40	135	1	40	500	PMEM4030PS		
5.0	40	TBD	TBD	TBD	TBD	PMEM4050PS		

released *under development*

Logic Competitive Cross Reference Guide

Family	Package	Philips	TI	Fairchild	ON Semi	Toshiba	ST Micro
5V CMOS							
HEF4000B	DIP	HEF4xxxBPN	CD4xxxBE	CD4xxxBN	MC14xxxBP	TC4xxxBP	HCF4xxxBEY
	SOIC	HEF4xxxBTD	CD4xxxBM	CD4xxxBM/WM	MC14xxxBD	TC4xxxBFN	HCF4xxxBM1/M013TR
	SSOP I					TC4xxxFS	
	SSOP II	HEF4xxxDB					
	TSSOP			CD4xxxMTC	MC14xxxDT		
HC(T) T=TTL	DIP	74HC(T)xxxN	SN74HC(T)xxxN	MM74HC(T)xxxN	MC74HC(T)xxxN	TC74HC(T)xxxAP	M74HCxxxB1R
	SOIC	74HC(T)xxxD	SN74HC(T)xxxD/DW	MM74HC(T)xxxM/WM	MC74HC(T)xxxD	TC74HC(T)xxxAFW	M74HCxxxM1R/RM13TR
	SSOP II	74HC(T)xxxDB	SN74HC(T)xxxDB				
	TSSOP	74HC(T)xxxPW	SN74HC(T)xxxPW	MM74HC(T)xxxMTC	MC74HC(T)xxxDT		M74HCxxxTTR
	DQFN	74HC(T)xxxBQ		74HC(T)xxxBQ			
AHC(T) T=TTL	SOIC	74AHC(T)xxxD	SN74AHC(T)xxxD/DW	MM74VHC(T)xxxM/WM	MC74VHC(T)xxxD	TC74VHC(T)xxxAFN/FW	74VHCxxxTTR/ATTR
	TSSOP	74AHC(T)xxxPW	SN74AHC(T)xxxPW	MM74VHC(T)xxxMTC	MC74VHC(T)xxxDT	TC74VHC(T)xxxAFT	74VHCTxxxTTR/ATTR
	DQFN	74AHC(T)xxxBQ		MM74VHC(T)xxxBQ			
Low Voltage CMOS							
LVC(H) H=bushold Feature	SOIC	74LVC(H)xxxAD	SN74LVC(H)xxxAD/DW	74LCXxxxM/WM	MC74LCXxxxD	TC74LCXxxxFN/FW	74LCXxxxM/MTR
	SSOP II	74LVC(H)xxxADB	SN74LVC(H)xxxADB	74LCXxxxMSA	MC74LCXxxxSD		
	TSSOP I	74LVC(H)xxxAPW	SN74LVC(H)xxxAPW	74LCXxxxMTC	MC74LCXxxxDT	TC74LCXxxxFT	74LCXxxxTTR
	DQFN	74LVC(H)xxxABQ		74LCXxxxBQ			
	SSOP III	74LVC(H)16xxxADL	SN74LVC(H)16xxxADL	74LCX16xxxMEA			
	TSSOP II	74LVC(H)16xxxADGG	SN74LVC(H)16xxxADGG	74LCX16xxxMTD	MC74LCX16xxxDT	TC74LCX16xxxFT	74LCX(H)16xxxM/MTR
	LFGBA	74LVC(H)32xxxAEC	SN74LVC(H)32xxxAGKE				
	VFBGA	74LVC(H)32xxxAEV	SN74LVC(H)32xxxAGQL				
ALVC(H)	SO	74ALVCxxxD	SN74ALVCxxxD/DW	74VCXxxxM			
	TSSOP	74ALVCxxxPW	SN74ALVCxxxPW	74VCXxxxMTC			
	DQFN	74ALVCxxxBQ		74VCXxxxBQ			
	SSOP III	74ALVC(H)16xxxDL	SN74ALVC(H)16xxxDL	74VCX16xxxMEA			
	TSSOP II	74ALVC(H)16xxxDGG	SN74ALVC(H)16xxxDGG	74VCX16xxxMTD		TC74VCX16xxxFT	74VCX(H)16xxxTTR
	LFBGA	74ALVC(H)32xxxEC	SN74ALVC(H)32xxxGKE				
LV	SOIC	74LVxxxD	SN74LVxxxD/DW	74LVXxxxM/WM	MC74LVXxxxD	TC74LVXxxxFN/FW	
	SSOP II	74LVxxxDB	SN74LVxxxDB	74LVXxxxMSA		TC74LVXxxxFS	
	TSSOP I	74LVxxxPW	SN74LVxxxPW	74LVXxxxMTC	MC74LVXxxxDT	TC74LVXxxxFT	
AUC	TSSOP II	74AUC16xxxDGG	SN74AUC16xxxDGG				
5V BiCMOS							
ABT(H) H=bushold Feature	DIP	74ABTxxxN	SN74ABTxxxN	74ABTxxxPC			
	SOIC	74ABTxxxD	SN74ABTxxxD/DW	74ABTxxxSC			
	SSOP II	74ABTxxxDB	SN74ABTxxxDB	74ABTxxxMSA			
	TSSOP	74ABTxxxPW	SN74ABTxxxPW	74ABTxxxMTC			
	SSOP III	74ABT(H)16xxxDL	SN74ABT(H)16xxxDL	74ABT16xxxSSC			
	TSSOP II	74ABT(H)16xxxDGG	SN74ABT(H)16xxxDGG	74ABT16xxxMTD			

Family	Package	Philips	TI	Fairchild	ON Semi	Toshiba	ST Micro
Low Voltage BiCMOS							
LVT Philips – Bushold is built in	SOIC	74LVTxxxD	SN74LVTHxxxD/DW	74LVTHxxxM/WM			
	SSOP II	74LVTxxxDB	SN74LVTHxxxDB	74LVTHxxxMSA			
	TSSOP	74LVTxxxPW	SN74LVTHxxxPW	74LVTHxxxMTC			
	DQFN	74LVTxxxBQ					
	SSOP III	74LVT16xxxDL	SN74LVTH16xxxDL	74LVTH16xxxMEA			
	TSSOP II	74LVT16xxxDGG	SN74LVTH16xxxDGG	74LVTH16xxxMTD			
	VFBGA	74LVT16xxxEV	SN74LVTH16xxxGQL				
	LFBGA	74LVT32xxxEC	SN74LVTH16xxxGKE				
ALVT (Bushold is built in)	SSOP III	74ALVT16xxxDL	SN74ALVT16xxxDL				
	TSSOP II	74ALVT16xxxDGG	SN74ALVT16xxxDGG				
BIPOLAR							
FAST	DIP	N74FxxxN	SN74FxxxN	74FxxxPC/SPC			
	SOIC	N74FxxxD	SN74FxxxD/DW	74FxxxSC			
	SSOP II	N74FxxxDB	SN74FxxxDB	74FxxxMSA			

HEF4000 Family
Features:
- All parts available in DIP and SO
- Compatible with CD4000
- Committed to supply well into the next decades
- Low power, low speed
- Power supply 3 to 15 V
- Easy to design

HC/T Family
Features:
- All parts available in HC and HCT (TTL input)
- 74HCTxxx replaces LS-TTL (74LSxxx)
- Low power, high speed
- Power supply 2.0 to 6.0 V
- Analog switches 2.0 to 10 V
  - 74HC4051, 4052, 4053
  - 74HC4351, 4352, 4353
  - 74HC4066, 4067, 4316
- Phase-Locked-Loop (PLL) experts
  - 74HC4046A, 7046A 9046A
  - Free design software
  - Extensive application notes
- Available in 1, 2 & 3 gate functions

AHC/T Family
Features:
- 4 ns propagation delays
- 2x faster than HCMOS
- Operation 2.0 to 5.0 V
- 16% less signal noise
- Low static power
- Full selection of functions are available
- All parts available in SO and TSSOP
- Available in 1, 2 & 3 gate functions

PicoGate Logic Families
Features:
- All parts available in HC/HCT, AHC/AHCT & LVC
- Low power, high speed
- Power supply 2.0 to 6.0 VHC/AHC
- Analog switches 2.0 to 10V
  - 74HC1G66/74HCT1G66
- Extended temperature range from –40 to 125°C
- Great for ASIC repairs
- Ideal selection when space is a concern
- Multiple package options
- LVC PicoGate Logic operates up to 5.5 V

AVC Family
Features:
- 1.0ns performance
- Optimized for 2.5 V output
- -8/8mA static output drive
- High dynamic drive
- 20µA standby current
- V_{CC}: 1.2 – 3.3 V
- 3.6 V tolerant I/Os
- Live insertion
- Bus hold option

LVC Family
Features:
- Low Voltage CMOS
- 74LVCxxx 3.3 V equivalent of FAST
- High speed, medium drive
- 5 V tolerant I/Os
- Direct interface with TTL levels
- Power supply 1.2 to 3.6 V
- PicoGate Logic to 5.5 V
- Live insertion
- Bus hold option
- Damping resistor option
- Many functions support partial power down
- Analog switches 1.65 to 5.5 V

ALVC Family
Features:
- Fastest CMOS based family
- 2 ns propagation delays
- Power supply 1.2 to 3.6 V
- -24/24mA drive capability
- 40µA standby current
- Bus hold option
- Termination resistor option
- Bus interface functions

Supports memory interfacing. Frequently used in high-speed telecom applications.

LV Family
Features:
- 74LVxxx replaces 74HCxxx at V_{CC} = 3.3 V
- Low power, high speed
- Low EMI (radiation)
- Power supply 1.0 to 5.5 V
- Operates @ V_{CC} = 5V
  - Speed 2x HCMOS
  - Drive 2x HCMOS
- Analog switches 1.0 to 6.0 V
  - At V_{CC} = 5 V R-ON 50% of HCMOS
  - 74LV4051, 4052, 4053
  - 74LV4066, 4067, 4316

ABT/ABT-16 5 V Family
Features:
- 3 ns performance
- 32-64mA drive
- 250µA Standby current
- Power supply 4.5 V – 5.5 V
- Live insertion
- Power up 3-state
- Bus hold option
- Termination resistor option

LVT/LVT-16 3V Family
Features:
- Power up 3-state
- Clock speeds 125 MHz
- High drive 64mA output drive
- Standard TTL functions and pin outs
- -45 to 85°C operating range
- Live insertion
- Bus hold standard
- Termination resistor option
- Pin compatible with existing ABT
- Mixed I/O compatible from 2.5 to 5 V
- Same as T.I.'s LVTH
- 16/32-bit functions available

ALVT16 Family
Features:
- World's fastest LVTTL logic
- 64 mA drive
- 2.3 to 3.6 V_{CC}
- Power up 3-state
- 250 MHz min. clock speeds
- 5 V I/O capable
- Same as T.I.'s ALVTH family

FAST Family
Features:
- More than 90 functions available
- Standard TTL functions and pin outs
- High speed 3ns propagation delay
- Power supply 5V +/- 10%

Innovation Leader in Microcontrollers

LPC2000 Family

Type	Memory				Timers			Serial Interface				ADC bits/channels	Analog Comparators	I/O pins	Program Security	Max. Freq. [MHz]	Temp. range options	Package
	RAM	EEPROM	Flash	OTP/ROM	# of Timers	PWM	RTC/System Timer	UART	I^2C	CAN	SPI							
LPC2200 Family is based on the ARM7TDMI-S core and offers up to four CAN channels as well as eight 10-bit ADC channels																		
LPC2294	16K	—	256K	—	4	6 ch.	✓	2	✓	4	2	8/10	—	112	✓	60	J, H	LQFP144
LPC2292	16K	—	256K	—	4	6 ch.	✓	2	✓	2	2	8/10	—	112	✓	60	F	LQFP144
LPC2290	16K	—	—	—	4	6 ch.	✓	2	✓	2	2	8/10	—	76	—	60	F	LQFP144
LPC2214	16K	—	256K	—	4	6 ch.	✓	2	✓	—	2	8/10	—	112	✓	60	F	LQFP144
LPC2212	16K	—	128K	—	4	6 ch.	✓	2	✓	—	2	8/10	—	112	✓	60	F	LQFP144
LPC2210	16K	—	—	—	4	6 ch.	✓	2	✓	—	2	8/10	—	76	—	60	F	LQFP144
LPC2100 Family is based on the ARM7TDMI-S core and offers 60 MHz operation, up to four CAN channels, up to four 10-bit ADC channels, on-chip Real-Time Monitor and Trace.																		
LPC2194	16K	—	256K	—	4	6 ch.	✓	2	✓	4	2	4/10	—	46	✓	60	J, H	LQFP64
LPC2138	32K	—	512K	—	4	6 ch.	✓	2	2	2	2	2/8	1	47	✓	60	F, H	HVQFN64, LQFP64
LPC2136	32K	—	256K	—	4	6 ch.	✓	2	2	2	2	2/8	1	47	✓	60	F	LQFP64
LPC2134	16K	—	128K	—	4	6 ch.	✓	2	2	2	2	2/8	1	47	✓	60	F	LQFP64
LPC2132	16K	—	64K	—	4	6 ch.	✓	2	2	2	2	1	1	47	✓	60	F, H	HVQFN64, LQFP64
LPC2131	8K	—	32K		4	6 ch.	✓	2	2	2	2	—	—	47	✓	60	F	LQFP64
LPC2129	16K	—	256K	—	4	6 ch.	✓	2	✓	2	2	4/10	—	46	✓	60	F	LQFP64, HVQFN
LPC2124	16K	—	256K	—	4	6 ch.	✓	2	✓	—	2	4/10	—	46	✓	60	F	LQFP64, HVQFN
LPC2119	16K	—	128K	—	4	6 ch.	✓	2	✓	2	2	4/10	—	46	✓	60	F	LQFP64
LPC2114	16K	—	128K	—	4	6 ch.	✓	2	✓	—	2	4/10	—	46	✓	60	F	LQFP64
LPC2106	64K	—	128K	—	4	6 ch.	✓	2	✓	—	✓	—	—	32	—	60	B, F	LQFP48
LPC2105	32K	—	128K	—	4	6 ch.	✓	2	✓	—	✓	—	—	32	—	60	B	LQFP48
LPC2104	16K	—	128K	—	4	6 ch.	✓	2	✓	—	✓	—	—	32	—	60	B	LQFP48

ACRONYM LEGEND:
IAP = In-Application Programmable Flash
ISP = In-System Programmable Flash
PP = Parallel Programmable Flash (via parallel programer)
OTP = One-Time Programmable (EPROM)
ICP = In-Circuit Programmable (using off-board programmer)
POR = Power-On Reset
KBI = Keyboard Interrupt Inputs
BOD = Brown-out detect
I^2C = Inter-Integrated Circuit Bus
CAN = Controller Area Network
PCA = Programmable Counter Array
ADC = Analog-to-Digital Converter
DAC = Digital-to-Analog Converter
PWM = Pulse Width Modulation
AC = Analog Comparator

TEMPERATURE LEGEND:
Temperature Range Options:
B = 0 to +70°C
F = -40 to +85°C
H = -40 to +125°C
J = -40 to +105°C.

Not all package/temperature/voltage/frequency combinations are available. For most parts "3 V" voltage range is 2.7 V – 5.5 V and "5 V" voltage range is 4.5 V – 5.5 V. Check data sheet for details.

LPC900 Family

Type	Memory				Timers			Serial Interface				ADC bits/channels	Analog Comparators	I/O pins	Program Security	Max. Freq. [MHz]	Temp. range options	Package
	RAM	EEPROM	Flash	OTP/ROM	# of Timers	PWM	RTC/System Timer	UART	I²C	CAN	SPI							
LPC900 Family integrates a new 2-clock core, 3 V low-power Flash, EEPROM, as well as important systems functions, making it a complete single-chip solution for many embedded applications.																		
P89LPC938	768B	512B	8K	—	5	CCU	✓	✓	✓	—	✓	8	—	26	✓	18	F	TSSOP28, PLCC28, HVQFN28
P89LPC936	768B	512B	16K	—	5	CCU	✓	✓	✓	—	✓	2/4	2/8	26	✓	18	F	TSSOP28
P89LPC935	768B	512B	8K	—	5	CCU	✓	✓	✓	—	✓	8/8	2	26	—	18	F	TSSOP28, PLCC28, HVQFN28
P89LPC933/934	256B		4/8K	—	4	2 ch.	✓	✓	✓	—	✓	4/8	2	26	✓	18	F	TSSOP28
P89LPC932A1	768B	512B	8K	—	5	CCU	✓	✓	✓	—	✓	—	2	26	✓	18	F	PLCC28, HVQFN28, TSSOP28
P89LPC930/931	256B		4/8K	—	4	2 ch.	✓	✓	✓	—	✓	—	2	26	✓	18	F	TSSOP28
P89LPC924/925	256B		4/8K	—	4	2 ch.	✓	✓	✓	—	—	4/8	2	18	✓	18	F	TSSOP20
P89LPC921/922	256B		4/8K	—	4	2 ch.	✓	✓	✓	—	—	—	2	18	✓	18	F	TSSOP20, DIP20
P89LPC920	256B		2K	—	4	2 ch.	✓	✓	✓	—	—	—	2	18	✓	18	F	TSSOP20
P89LPC917	256B		2K	—	4	2 ch.	✓	✓	✓	—	—	4/8	2	12	✓	18	F	TSSOP16
P89LPC916	256B		2K	—	4	1 ch.	✓	✓	✓	—	✓	4/8	2	14	✓	18	F	TSSOP16
P89LPC915	256B		2K	—	4	1 ch.	✓	✓	✓	—	—	4/8	2	14	✓	18	F, H	TSSOP14
P89LPC914	128B		1K	—	4	1 ch.	✓	✓	—	—	✓	—	2	12	✓	IRC	F	TSSOP14
P89LPC913	128B		1K	—	4	—	✓	✓	—	—	✓	—	2	12	✓	18	F	TSSOP14
P89LPC912	128B		1K	—	4	1 ch.	✓	—	—	—	✓	—	2	12	✓	18	F	TSSOP14
P89LPC9107	128B		1K	—	4	2 ch.	✓	✓	—	—	—	4/8	1	10	✓	18	F	TSSOP14
P89LPC9103	128B		1K	—	4	—	✓	✓	—	—	—	4/8	1	8	✓	18	F	HVSON10
P89LPC9102	128B		1K	—	4	2 ch.	✓	—	—	—	—	4/8	1	8	✓	18	F	HVSON10
P89LPC908	128B		1K	—	4	—	✓	✓	—	—	—	—	1	6	✓	IRC	F	SO8
P89LPC907	128B		1K	—	4	—	✓	✓*	—	—	—	—	1	6	✓	IRC	F	SO8
P89LPC906	128B		1K	—	4	1 ch.	✓	—	—	—	—	—	1	6	✓	18	F	SO8
P89LPC904	128B		1K	—	4	—	✓	✓	—	—	—	2/8	2	6	✓	18	F	SO8
P89LPC903	128B		1K	—	4	—	✓	✓	—	—	—	—	2	6	✓	IRC	F	SO8
P89LPC902	128B		1K	—	4	—	✓	—	—	—	—	—	2	6	✓	IRC	F	SO8, DIP8
P89LPC901	128B		1K	—	4	1 ch.	✓	—	—	—	—	—	1	6	✓	18	F	SO8, DIP8

* *Transmit function only*

Philips UARTs Product Line

16CxxxB UARTs

# Ch	FIFO # bytes	Exar	TI	National	Temp	Package*	Philips	Key Features
1	0	ST16C450CP40 ST16C450IP40	TL16C450N —	— —	C I	DIP40	SC16C550BIN40	• SC16C550B starts up in 16C450 (non FIFO) mode • 3 Mbps transmit/receive operation • 16 byte transmit and receive FIFO • Programmable receive FIFO interrupt trigger levels • Automatic hardware flow control
		ST16C450CJ44 ST16C450IJ44	TL16C450FN —	— —	C I	PLCC44	SC16C550BIA44	
		ST16C450CQ48 ST16C450IQ48	— —	— —	C I	LQFP48	SC16C550BIB48	
	16	ST16C550CP40 ST16C550IP40	TL16C550CN —	PC16550DN —	C I	DIP40	SC16C550BIN40	• 3 Mbps transmit/receive operation • 16 byte transmit and receive FIFO • Programmable receive FIFO interrupt trigger levels • Automatic hardware flow control
		ST16C550CJ44 ST16C550IJ44	TL16C550CFN TL16C550CIFN	PC16550DV —	C I	PLCC44	SC16C550BIA44	
		— —	TL16C550CPT/DPT TL16C550CIPT/DIPT	— —	C I	LQFP48	SC16C550BIB48	
		ST16C550CQ48 ST16C550IQ48	TL16C550CPFB —	— —	C I	LQFP48	SC16C550BIB48	
	32	ST16C650ACP40 ST16C650AIP40	— —	— —	C I	DIP40	SC16C650BIN40	• 3 Mbps transmit/receive operation • 32 byte transmit and receive FIFO • Programmable receive and transmit FIFO interrupt trigger levels • Xon/Xoff in band flow control • Automatic hardware and software flow control • Standard mode • IrDA interface
		ST16C650ACJ44 ST16C650AIJ44	— —	— —	C I	PLCC44	SC16C650BIA44	
		ST16C650ACQ48 ST16C650AIQ48	— —	— —	C I	LQFP48	SC16C650BIB48	
		—	—	—	I	HVQFN32	SC16C650BIBS	
	64	—	TL16C750FN	—	C	PLCC44	SC16C750BIA44	• 3Mbps transmit and receive operation • 64 byte transmit and receive FIFOs • Programmable Interrupt trigger levels • Hardware (RTS/CTS) flow control • Power down mode (sleep) • Prioritized Interrupt System control
		— —	TL16C750PM TL16C750IPM	— —	C I	LQFP64	SC16C750BIB64	
		—	—	—	I	HVQFN32	SC16C750BIBS	
2	0	ST16C2450CP40 ST16C2450IP40	— —	— —	C I	DIP40	SC16C2550BIN40	• SC16C2550B starts up in 16C2450 (non FIFO) mode. • 5 Mbps transmit/receive operation • 16 byte transmit and receive FIFO • Programmable receive FIFO interrupt trigger levels
		ST16C2450CJ44 ST16C2450IJ44 XR16L2450IJ	— — —	— — —	C I I	PLCC44	SC16C2550BIA44	
		ST16C2450CQ48 ST16C2450IQ48 XR16L2450IM	— — —	— — —	C I I	LQFP48	SC16C2550BIB48	
	16	ST16C2550CP40 ST16C2550IP40	— —	— —	C I	DIP40	SC16C2550BIN40	• Two channel version of the SC16C550B • 5 Mbps transmit/receive operation • 16 byte transmit and receive FIFO • Programmable receive FIFO interrupt trigger levels
		ST16C2550CJ44 ST16C2550IJ44	— —	— —	C I	PLCC44	SC16C2550BIA44	
		ST16C2550CQ48 ST16C2550IQ48	— —	— —	C I	LQFP48	SC16C2550BIB48	
		ST16C2552CJ44 ST16C2552IJ44	— —	PC16552DV —	C I	PLCC44	SC16C2552BIA44	• Two channel version of the SC16C550B • Registers for channel A and B can be written concurrently • 5 Mbps transmit and receive operation
	32	—	—	—	I	LQFP48	SC16C652BIB48	• Two channel version of the SC16C650B
		—	—	—	I	HVQFN32	SC16C652BIBS	
	64	—	TL16C752BPT	—	I	LQFP48	SC16C752BIB48	• Two channel version of the SC16C750B
		—	—	—	I	HVQFN32	SC16C752BIBS	
4	0	ST16C454CJ68 ST16C454IJ68 ST68C454CJ68 ST68C454IJ68	— — — —	— — — —	C I C I	PLCC68	SC16C554DBIA68	• SC16C554B starts up in 16C454 (non FIFO) mode. • See SC16C554B features
	16	ST16C554CJ68 ST16C554IJ68 ST68C554CJ68 ST68C554IJ68	— — — —	— — — —	C I C I	PLCC68	SC16C554BIA68	• Four channel version of the SC16C550B • 5Mbps transmit/receive operation • 16 byte transmit and receive FIFOs • Programmable interrupt trigger levels (receiver only) • Intel/Motorola (A68 version only) interface • SC16C554D provides continuous interrupt • SC16C554 provides tri-stateable interrupt
		ST16C554DCJ68 ST16C554DIJ68	TL16C554FN/AFN TL16C554IFN/AIFN	— —	C I	PLCC68	SC16C554DBIA68	
		— —	TL16C554PN/APN TL16C554IPN/AIPN	— —	C I	LQFP80	SC16C554BIB80	
		ST16C554CQ64 ST16C554IQ64 ST68C554CQ64 ST68C554IQ64	— — — —	— — — —	C I C I	LQPF64	SC16C554BIB64	
		ST16C554DCQ64 ST16C554DIQ64	— —	— —	C I	LQPF64	SC16C554DBIB64	
	64	ST16C654CQ64 ST16C654IQ64	— —	— —	C I	LQPF64	SC16C654BIB64	• Four channel version of the SC16C650B with 64 byte FIFOs • Motorola and Intel Interface (A68 version only) • 5Mbps transmit and receive operation • IrDA interface • Sleep mode • Programmable interrupt trigger levels • SC16C654D provides continuous interrupt • SC16C654 provides tri-stateable interrupt
		ST16C654DCQ64 ST16C654DIQ64	— —	— —	C I	LQPF64	SC16C654DBIB64	
		ST16C654CJ68 ST16C654IJ68	— —	— —	C I	PLCC68	SC16C654BIA68	
		—	TL16C754BFN	—	I	PLCC68	SC16C754BIA68	• Four channel version of the SC16C750B • 5Mbps transmit and receive operation • 64 byte transmit and receive FIFOs • Programmable interrupt trigger levels • Hardware (RTS/CTS) and software (XON/XOFF) flow control • Power down mode (sleep)
		—	TL16C754BPN	—	I	LQFP80	SC16C754BIB80	

Industrial UARTs

# Ch.	Part (Technology)	Rx/Tx FIFO Bytes	Speed (max @16x)	Interrupt	Vcc	Key Features	Package	Part number Temp Range 0° to 70° C	Part number Temp Range -40° to 85° C
1	SCC2691 (CMOS)	3/1	125 kbps	Normal	5V	- Single channel version of SCC2692 - Intel bus interface compatible	DIL24	SCC2691AC1N24	SCC2691AE1N24
							SOL24	SCC2691AC1D24	—
							PLCC28	SCC2691AC1A28	SCC2691AE1A28
1	SC28L91 (CMOS)	16/16 or 8/8	1000 kbps	Normal Multi level Vectored IACK/DACK	5V or 3.3V	- Single channel version of SC28L92 - Pin select for Intel or Motorola buses interface compatible	PLCC44	—	SC28L91A1A
							QFP44	—	SC28L91A1B
2	SCC2681 (CMOS)	3/1	125 kbps	Normal	5V	- CMOS version of SCN2681	DIL28	SCC2681AC1N28	SCC2681AE1N28
							DIL40	SCC2681AC1N40	SCC2681AE1N40
							PLCC44	SCC2681AC1A44	SCC2681AE1A44
2	SCC68681 (CMOS)	3/1	125 kbps	Normal Vectored	5V	- CMOS version of SCN68681	DIL40	SCC68681AC1N40	SCC68681AE1N40
							PLCC44	SCC68681AC1A44	SCC68681AE1A44
2	SCC2681T (CMOS)	3/1	500 kbps	Normal	5V	- CMOS version of SCN2681T	PLCC44	SCC2681TC1A44	—
2	SCC2692 (CMOS)	3/1	125 kbps	Normal	5V	- Intel bus interface compatible	DIL28	SCC2692AC1N28	SCC2692AE1N28
							DIL40	SCC2692AC1N40	SCC2692AE1N40
							PLCC44	SCC2692AC1A44	SCC2692AE1A44
							QFP44	SCC2692AC1B44	SCC2692AE1B44
2	SCC68692 (CMOS)	3/1	125 kbps	Normal Vectored IACK/DACK	5V	- Motorola bus interface compatible	DIL40	SCC68692C1N40	SCC68692E1N40
							PLCC44	SCC68692C1A44	SCC68692E1A44
2	SC26C92 (CMOS)	8/8	1000 kbps	Normal Multi level	5V	- Enhanced faster version of SCC2692 - Intel bus interface compatible	DIL40	SC26C92C1N	SC26C92A1N
							PLCC44	SC26C92C1A	SC26C92A1A
							QFP44	SC26C92C1B	SC26C92A1B
2	SC28L92 (CMOS)	16/16 or 8/8	1000 kbps	Normal Multi level Vectored IACK/DACK	5V or 3.3V	- Enhanced faster low voltage version of SC26C92 - Pin select for Intel or Motorola buses interface compatible	PLCC44	—	SC28L92A1A
							QFP44	—	SC28L92A1B
2	SC28L202 (CMOS)	256/256	3125 kbps	Normal Multi level IACK/DACK I2A	5V or 3.3V	- Enhanced faster version of SC28L92 - Advanced feature set - Pin select for Intel or Motorola buses interface compatible - Asynchronous bus operation up to 50Mhz (5V) and up to 34MHz (3.3V) - Character count mode - Programmable FIFO interrupt level - Real time data error detection	TSSOP56	—	SC28L202A1DGG
4	SC28C94 (CMOS)	8/8	1000 kbps	Normal Multi level IACK/DACK I2A	5V	- Enhanced Quad version of SC26C92 - Intel or Motorola buses interface compatible - Versatile, programmable high speed interrupt controller	PLCC52	—	SC28C94A1A
4	SC28L194 (CMOS)	16/16	1000 kbps	Normal Multi level IACK/DACK I2A	5V or 3.3V	- Enhanced faster low voltage version of SC28C94 - Advanced feature set - Asynchronous bus operation up to 33Mhz (5V) and up to 20MHz (3.3V)	PLCC68	—	SC28L194A1A
							LQFP80	—	SC28L194A1BE
8	SCC2698B (CMOS)	3/1	125 kbps	Normal	5V	- Equivalent of four SCC2692 in a single package - Intel bus interface compatible	PLCC84	SCC2698BC1A84	SCC2698BE1A84
8	SC28L198 (CMOS)	16/16	1000 kbps	Normal Multi level IACK/DACK I2A	5V or 3.3V	- Enhanced faster low voltage version of SCC2698 - Advanced feature set - Asynchronous bus operation up to 33Mhz (5V) and up to 20MHz (3.3V)	PLCC84	—	SC28L198A1A
							LQFP100	—	SC28L198A1BE

Notes:
*TQFP and LQFP packages have the same footprint.
- The TQFP package is 1 mm, the LQFP package is 1.4 mm height.
- The Philips parts are available only in the LQPF version.
- All Philips parts operate at: 2.5 V, 3.3 V, and 5 V
- Philips UARTs are available in commercial and industrial temperature ranges.

Basic feature applies to all industrial UARTs
- Full duplex on all channels
- Receivers and transmitters are fully independent with respect to clock speed, clock source and operation mode
- 14.4, 28.8, 57.6, 115.2K baud
- Individual interrupt status
- Counter timers have independent programmable clock source and dual mode
- Modem or flow control pins with change of state detectors
- Wake-up mode for auto RS485 support
- Devices have power-down mode
- Programmable data formats and channel modes

Advanced feature set
- Intel and Motorola buses interface compatible
- Xon/Xoff in band flow control
- Three bytes character recognition
- Intelligent Interrupt Arbitration (I2A)
- Two 16-bit custom baud rate generators

Send technical questions to our email address at:
datacom.tech-support@philips.com

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VCO Varicap Diodes

Type	Package	Cd@Vr (pF)			Cd@Vr (pF)			Tunning Range Cd Over Voltage Range (V)			rs (Ω)	Notes
		Min	Max	(V)	Min	Max	(V)	Ratio (min)	V1 to V2		Typ.	
BB140L***	SOD882	2.48	2.69	1	1.27	1.38	3	1.88-2.04	1	3	1.2	
BB141	SOD523	3.9	4.5	1	2.22	2.55	4	1.76	1	4	0.4	
BB142	SOD523	4	4.9	1	1.85	2.35	4	2.2	1	4	0.5	
BB143	SOD523	4.75	5.75	1	2.05	2.55	4	2.35	1	4	0.5	
BB145	SOD523	6.4	7.4	1	2.75	3.25	4	2	1	4	0.6	
BB145B	SOD523	6.4	7.4	1	2.55	2.95	4	2.2	1	4	0.6	
BB145C	SOD523	6.4	7.2	1	2.55	2.85	4	2.39-2.53	1	-	0.6	
BB202**	SOD523	28.2	33.5	0.2	7.2	11.2	2.3	2.5	0.2	2.3	0.35	
BB202L**	SOD882	28	33.5	0.2	7.2	11.2	2.3	2.5	0.2	2.3	0.4	New Product
BB151	SOD323	15.4	17	1	9 typ.		4	1.8	1	4	0.4	
BB156	SOD323	14.4	17.6	1	7.6	9.6	4	1.86	1	4	0.4	
BB198	SOD523	25	28.5	0.5	4.8	6.8	2	-	-	-	0.8 max	New Product
BB199	SOD523	36.5	42.5	0.5	11.8	13.8	2	-	-	-	0.25	
BB208-02*	SOD523	19.9	23.2	1	4.5	5.4	7.5	4.3	1	7.5	0.35	
BB208-03*	SOD323	19.9	23.2	1	4.5	5.4	7.5	4.3	1	7.5	0.35	

ad* = including special design for FM car radio (CREST-IC:TEF6860)
ad** = including special design for mobile phone tuner IC's
ad*** = Not yet released, samples available

Radio Varicap Diodes FM Radio Tuning

Type	Package	Cd@Vr (pF)			Cd@Vr (pF)			Tunning Range Cd Over Voltage Range (V)			rs (Ω)	Notes
		Min	Max	(V)	Min	Max	(V)	Ratio (min)	V1 to V2		Typ.	
BB804	SOT23	42	46.5	2	26 typ.		8	1.75	2	8	0.2	
BB200	SOT23	65.8	74.2	1	12	14.8	4.5	5	1	4.5	0.43	
BB201	SOT23	89	102	1	25.5	29.7	7.5	3.1	1	7.5	0.3	
BB202**	SOD523	28.2	33.5	0.2	7.2	11.2	2.3	2.5	0.2	2.3	0.35	
BB202L**	SOD882	28	33.5	0.2	7.2	11.2	2.3	2.5	0.2	2.3	0.4	New Product
BB156	SOD323	14.4	17.6	1	7.6	9.6	4	3.3	1	7.5	0.4	
BB207*	SOT23	76	86	1	25.5	29.7	7.5	2.6	1	7.5	0.2	

ad = including special design for FM car radio (CREST-IC:TEF6860)*
*ad** = including special design for mobile phone tuner ICs*

Band Switch Diodes

Type	Package	Maximum Ratings		Characteristics; maximals					
		VR (V)	IF (mA)	Rd @ IF and f			Cd @ VR and f		
				Ω	(mA)	(MHz)	(pF)	(V)	(MHz)
BA277	SOD523	35	100	0.7	2	100	1.2	6	1
BA278	SOD523	35	100	0.7	2	100	1.2	6	1
BA891	SOD523	35	100	0.7	3	100	0.9	3	1
BA591	SOD323	35	100	0.7	3	100	0.9	3	1
BA792	SOD110	35	100	0.7	3	200	1.1	3	1 to 100
BAT18	SOT23	35	100	0.7	5	200	1	20	1

TV & Satellite Varicap Diodes - UHF Tuning

Type	Package	Cd@Vr (pF)			Tuning Range Cd over voltage range (V)			rs (Ω)	Matched Sets	Typical Applications				Notes
		Min	Max	(V)	Ratio	V1 to V2		Max	%	TV	VCO	SAT.	STB	
Matched														
BB134	SOD323	1.7	2.1	28	10	0.5	28	0.75	0.5	✓	—	✓	✓	
BB146	SOD323	1.7	2.1	28	23	0.5	28	1.4	1.6	✓	—	—	✓	
BB149	SOD323	1.9	2.25	28	9	1	28	0.75	1	✓	—	—	✓	
BB149A	SOD323	1.95	2.22	28	9.7	1	28	0.75	2	✓	—	—	✓	
BB149A/TM	SOD323	1.95	2.22	28	9.7	1	28	0.75	2	✓	—	—	✓	
BB179	SOD523	1.95	2.22	28	9.7	1	28	0.75	2	✓	✓	—	✓	
BB179L	SOD882	1.95	2.22	28	9.7	1	28	0.75	2	✓	✓	—	✓	New product
BB179B	SOD523	1.9	2.25	28	9.2	1	28	0.75	2	✓	—	—	✓	
BB179BL	SOD882	1.9	2.25	28	9.2	1	28	0.75	2	✓	—	—	✓	New product
BB184	SOD523	1.87	2.13	10	6	1	10	0.65 typ.	2	✓	✓	—	—	
Unmatched														
BB135	SOD323	1.7	2.1	28	10	0.5	28	0.75	—	✓	✓	—	—	
BB159	SOD323	1.9	2.25	28	9	1	28	0.75	—	✓	—	—	—	
BBY31 BBY31	SOT23	1.6	2.00	28	8.3	1	28	1.2	—	✓	—	—	✓	
BBY62	SOT143													

TV & Satellite Varicap Diodes - VHF Tuning

Type	Package	Cd@Vr (pF)			Tuning Range Cd over voltage range (V)			rs (Ω)	Matched Sets	Typical Applications				Notes
		Min	Max	(V)	Ratio	V1 to V2		Max	%	TV	VCO	SAT.	STB	
Matched														
BB132	SOD323	2.3	2.75	28	26	0.5	28	2	1	✓	—	—	✓	
BB133	SOD323	2.2	2.75	28	16	0.5	28	0.9	0.7	✓	—	—	✓	
BB147	SOD323	2.4	2.8	28	40	0.5	28	2.8	2	✓	—	—	✓	
BB148	SOD323	2.4	2.75	28	15	1	28	0.9	1	✓	—	—	✓	
BB152	SOD323	2.48	2.89	28	>20.6	1	28	1.2	2	✓	—	—	✓	
BB153	SOD323	2.36	2.75	28	>13.5	1	28	0.8	2	✓	—	—	✓	
BB157	SOD323	2.57	2.92	25	11	2	25	0.75	2	✓	—	—	✓	
BB157/TM	SOD323	2.57	2.92	25	11	2	25	0.75	2	✓	—	—	✓	
BB164	SOD323	2.9	3.4	28	>19.5	1	28	1.4	2	✓	—	—	✓	
BB178	SOD523	2.36	2.75	28	>13.5	1	28	0.8	2	✓	—	—	✓	
BB178L	SOD882	2.36	2.75	28	>13.5	1	28	0.8	2	✓	—	—	✓	New product
BB182	SOD523	2.48	2.89	28	>20.6	1	28	1.2	2	✓	—	—	✓	
BB182L	SOD882	2.48	2.89	28	>20.6	1	28	1.2	2	✓	—	—	✓	New product
BB187	SOD523	2.57	2.92	25	11	2	25	0.75	2	✓	—	—	✓	
BB187L	SOD882	2.57	2.92	25	11	2	25	0.9	2	✓	—	—	✓	New product
Unmatched														
BB131	SOD323	0.7	1.055	28	14	0.5	28	3	—	—	—	✓	—	
BB1518	SOD323	2.4	2.75	28	15	1	28	0.9	—	✓	—	✓	—	
BB181	SOD523	0.7	1.055	28	14	0.5	28	3	—		—	✓	—	
BB181L	SOD882	0.7	1.055	28	14	0.5	28	3	—		—	✓	—	New product
BBY40	SOT23	4.3	6	25	5.5	3	25	0.7	—	✓	—	—	✓	

Philips RF Integrated Circuits

Pin Diodes

Type	Package	Conf	Limits		RD (-) typ @			Cd (pF) type @			Notes
			Vr (V)	If (mA)	0.5mA	1 mA	10 mA	0 V	1 V	20 V	
BAP142L	SOD882	S	60	60	5.5	3.6	1.5	0.4	0.3	0.2 @ 5V	
BAP50-02	SOD523	S	50	50	25	14	3	0.4	0.3	0.22 @ 5V	
BAP50-03	SOD323	S	50	50	25	14	3	0.4	0.3	0.2 @ 5V	
BAP50-04	SOT23	SS	50	50	25	14	3	0.45	0.35	0.3 @ 5V	
BAP50-04W	SOT323	SS	50	50	25	14	3	0.45	0.35	0.3 @ 5V	
BAP50-05	SOT23	CC	50	50	25	14	3	0.45	0.35	0.3 @ 5V	
BAP50-05W	SOT323	CC	50	50	25	14	3	0.45	0.35	0.3 @ 5V	
BAP51L	SOD882	S	60	60	5.5	3.6	1.5	0.4	0.3	0.2 @ 5V	
BAP51-02	SOD523	S	60	60	5.5	3.6	1.5	0.4	0.3	0.2 @ 5V	
BAP51-03	SOD323	S	60	60	5.5	3.6	1.5	0.4	0.3	0.2 @ 5V	
BAP51-04W	SOD323	S	50	50	5.5	3.6	1.5	0.4	0.3	0.2 @ 5V	
BAP51-05W	SOT323	CC	60	60	5.5	3.6	1.5	0.4	0.3	0.2 @ 5V	
BAP51-06W	SOT323	CA	50	50	5.5	3.6	2	0.4	0.3	0.2 @ 5V	
BAP55L	SOD882	S	50	100	3.4	2.3	1	0.27	0.23	0.18 @ 5V	New product
BAP63-02	SOD523	S	50	100	2.5	1.95	1.17	0.36	0.32	0.25	
BAP63-03	SOD323	S	50	100	2.5	1.95	1.17	0.4	0.35	0.27	
BAP63-05W	SOT323	CC	50	100	2.5	1.95	1.17	0.4	0.35	0.3	
BAP64-02	SOD523	S	200	175	20	10	2	0.52	0.37	0.23	
BAP64-03	SOD323	S	200	175	20	10	2	0.52	0.37	0.23	
BAP64-04	SOT23	SS	200	175	20	10	2	0.52	0.37	0.23	
BAP64-04W	SOT323	SS	200	100	20	10	2	0.52	0.37	0.23	
BAP64-05	SOT23	CC	200	175	20	10	2	0.52	0.37	0.23	
BAP64-05W	SOT323	CC	200	100	20	10	2	0.52	0.37	0.23	
BAP64-06	SOT23	CA	200	175	20	10	2	0.52	0.37	0.23	
BAP64-06W	SOT323	S	100	100	20	10	2	0.52	0.37	0.23	
BAP65-02	SOD523	S	30	100	—	1	0.56	0.65	0.6	0.375	
BAP65-03	SOD323	S	30	100	—	1	0.56	0.65	0.6	0.375	
BAP65-05	SOT23	CC	30	100	—	1	0.56	0.65	0.6	0.375	
BAP65-05W	SOT323	CC	30	100	—	1	0.56	0.65	0.6	0.375	
BAP70-02	SOD523	S	70	100	70	27	4.5	0.29	0.2	0.125	
BAP70-03	SOD323	S	70	100	70	27	4.5	0.29	0.2	0.125	
BAP70-04W	SOD323	S	70	100	70	27	4.5	0.29	0.2	0.125	
BAP70-05	SOD323	S	70	100	70	27	4.5	0.29	0.2	0.125	
BAP1321-02	SOD523	S	60	100	3.4	2.4	1.2	0.4	0.35	0.25	
BAP1321-03	SOD323	S	60	100	3.4	2.4	1.2	0.4	0.35	0.25	
BAP1321-04	SOT23	SS	60	100	3.4	2.4	1.2	0.4	0.35	0.25	

MMIC: General Purpose Medium Power Amplifiers, 50 Ohm Blocks

Type	Package	@		@ 900 MHz				@ 1800 MHz				Gain[3]	f_U[1]	Limits		
		VS (V)	Is (mA)	NF (dB)	Gain[3] (dB)	OIP_3 (dBm)	P_1dB (dBm)	NF (dB)	Gain[3] (dB)	OIP_3 (dBm)	P_1dB (dBm)	2.5 GHz	@ -3dB (MHz)	VS (V)	Is (mA)	Ptot (mW)
BGA6289	SOT89	3.8	83	3.8	15	31	17	4.1	13	4.1	15	12	4000	6	120	480
BGA6489	SOT89	5.1	83	3.1	20	33	20	3.3	16	3.3	17	15	4000	6	120	480
5BGA6489	SOT89	4.8	83	3	22	33	21	3.3	17	3.3	20	15	4000	6	120	480

Notes : (1) Determined by return loss (> 10 dB) (3) $|S_{21}|^2$

MMIC: General Purpose Wideband Amplifiers, 50 Ohm Gain Blocks

Type	Package	@		f_U[1]	@ 1 GHz					Gain[3] (dB) @				Limits		
		VS (V)	Is (mA)	@-3dB (GHz)	NF (dB)	Psat (dBm)	Gain[3] (dB)	P_1dB (dBm)	OIP[3] (dBm)	100 MHz	2.2 GHz	2.6 GHz	3.0 GHz	Vs (V)	Is (mA)	Ptot (mW)
BGA2711	SOT363	5	12	3.6[2]	4.7	2	12.9	-2	10	13	14.1	13.8	12.8	6	20	200
BGA2748	SOT363	3	5.7	1.9	1.8[2]	-4	21.3	-10	-2	14.8	17.6	14.2	11.3	4	15	200
BGA2771	SOT363	3	33	2.4	4.4	12[2]	21	11	22	20.3	20.4	17.5	15.2	4	50	200
BGA2776	SOT363	5	23.8	2.8	4.7	8	22.8[2]	5.5	17	22.2	23.2	20.8	18.7	6	34	200
BGA2709	SOT363	5	23.5	2.8	4	12.4	22.7	8.3	24	22.6	22.7	22	21.1	6	35	200
BGA2712	SOT363	5	12.5	2.8	3.9	4.8	21.3	0	12	20.9	21.9	20.8	18.6	6	25	200
BGM1011	SOT363	5	25.5	-	4.7	13.8	30	12.2	23	25	37	32	28	6	35	200
BGM1012	SOT363	3	14.6	3.6	4.8	9.7	20.1	6	18	19.5	20.4	19.9	18.7	4	50	200
BGM1013	SOT363	5	27.5	2.1	4	15	35	12	24	34.4	31	28.2	25.3	6	35	200
BGM1014	SOT363	5	21	2.5	4.2	12.9	32.3	11.2	20.5	30	34.1	30.5	26.4	6	30	200
BGA2715	SOT363	5	4.3	3	2.6	-5	22	-9	14	14	22	21	19	6	8	200
BGA2716	SOT363	5	15.9	3.6	4.9	11	24	7	24	24	24	24	23	6	25	200
BFA2717	SOT363	5	8	3	2.1	1	23	-3	20	20	23	23	20	6	15	200

Notes: (1) Upper -3 dB point to gain at 1 GHz (2) Optimized parameter (3) Gain = $|S_{21}|^2$

MMIC: Two Stage Variable Gain Linear Amplifier

Type	Package	@		Frequency Range (MHz)	@ 900 MHz				@ 1900 MHz				Limits		
		VS (V)	Is (mA)		Gain[1] (dB)	DG[2] (dB)	P1dB (dBm)	ACPR (dBc)	Gain[1] (dB)	DG[2] (dB)	P1dB (dBm)	ACPR (dBc)	Vs (V)	Is (mA)	Ptot (mW)
BGA2031/1	SOT363	3	51	800-2500	24	62	11	49	23	56	13	49	3.3	50	200

Notes: (1) Gain = Gp power gain (2) DG = Gain control range

MMIC: Wideband Linear Mixer

Type	Package	@		RF Input Freq. Range (MHz)	RF Output Freq. Range (MHz)	@ 880 MHz			@ 1900 MHz			Limits		
		VS (V)	Is (mA)			NF (dB)	Gain1 (dB)	OIP3 (dBm)	NF (dB)	Gain1 (dB)	OIP3 (dBm)	VS (V)	Is (mA)	Ptot (mW)
BGA2022	SOT363	3	51	800-2500	50-500	9	5	4	9	6	10	4	20	40

Note: (1) Gain = Gc, Conversion gain

MMIC: Low Noise Wideband Amplifiers

Type	Package	@		@ 900 MHz			@ 1800 MHz			Gain[3] (dB) @				Limits		
		VS (V)	Is (mA)	NF (dB)	Gain (dB)	IIP_3 (dBm)	NF (dB)	Gain (dB)	IIP_3 (dBm)	100 MHz	1.0 GHz	2.6 GHz	3.0 GHz	Vs (V)	Is (mA)	Ptot (mW)
BGA2001	SOT343R	2.5	4	1.3	22[1]	–7.4	1.3	19.5[1]	–4.5	20	17.1	11.6	10.7	4.5	30	135
BGA2003	SOT343R	2.5	10[2]	1.8	24[1]	–6.5	1.8	16[1]	–4.8	26	18.6	11.1	10.7	4.5	30	135
BGA2004[4]	SOT363	2.7	6	—	—	—	1.4	18	–5	—	—	—	—	3.3	15	50
BGA2011	SOT363	3	15	1.5	19[3]	10	—	—	—	24	14.8	8	6.5	4.5	30	135
BGA2012	SOT363	3	7	—	—	—	1.7	16[3]	10	22	18.2	11.6	10.5	4.5	15	70
BGU2003	SOT343R	2.5	10[2]	1	23	–6	1.1	18	–5	25	19	12.3	11.6	4.5	30	135

Notes : (1) MSG (2) Adjustable bias (3) $|S_{21}|^2$ (4) Switched LNA with internal match for 1.8 GHz. Objective Data

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Wideband Transisitors (RF small signal)

Type	Curve	Package	Ft (GHz)	Vceo (V)	Ic (mA)	Ptot (mW)	Polarity	Gum (dB)	F (dB)	@ (MHz)	Gum (dB)	F (dB)	@ (MHz)	Vo 1 (mV)	PI (dBm)	ITO (dBm)	@Ic & (mA)	Vce (V)
			Typical	Maximum Values														
BFG10(X)	—	SOT143	—	8	250	250	NPN	—	—	—	7	—	1900	—	—	—	—	—
BFG10W/X	—	SOT343	—	10	250	400	NPN	—	—	—	7	—	1900	—	—	—	—	—
BLT80	—	SOT223	—	10	250	2000	NPN	>6	—	900	—	—	—	—	—	—	—	—
BLT81	—	SOT223	—	9.5	500	2000	NPN	>6.5	—	900	—	—	—	—	—	—	—	—
BLT50	—	SOT223	—	10	500	2000	NPN	>7	—	900	—	—	—	—	—	—	—	—
BLT70	—	SOT223	—	8	250	2100	NPN	>6	—	900	—	—	—	—	—	—	—	—
PMBHT10	—	SOT23	0.65	25	40	400	NPN	—	—	—	—	—	—	—	—	—	—	—
BFS17	3	SOT23	1	15	25	300	NPN	—	4.5	500	—	—	—	—	—	—	—	—
BFS17W	3	SOT323	1.6	15	50	300	NPN	—	4.5	500	—	—	—	—	—	—	—	—
BFT25	1	SOT23	2.3	5	6.5	30	NPN	18	3.8	500	12	—	800	—	—	—	—	—
BFT25	1	SOT23	2.3	5	6.5	30	NPN	18	3.8	500	12	—	800	—	—	—	—	—
BFS17A	4	SOT23	2.8	15	25	300	NPN	13.5	2.5	800	—	—	—	150	—	—	14	10
BFG35	11	SOT223	4	18	150	1000	NPN	15	—	500	11	—	800	750	—	—	100	10
BFQ18	11	SOT89	4	18	150	1000	NPN	—	—	—	—	—	—	—	—	—	—	—
BFQ34/01	11	SOT122	4	18	150	2700	NPN	16.3	8	500	—	—	—	1200	26	45	120	15
BFQ68	12	SOT122	4	18	300	4500	NPN	13	—	800	—	—	1600	1600	28	47	240	15
BFG25A/X	18	SOT143	5	5	6.5	32	NPN	18	1.8	1000	—	—	—	—	—	—	—	—
BFG25W(/X)	18	SOT343	5	5	6.5	500	NPN	16	2	1000	8	—	2000	—	—	—	—	—
BFG31	10	SOT223	5	15	100	1000	PNP	16	—	500	12	—	800	550	—	—	70	10
BFG590(/X)	22	SOT143	5	15	200	400	NPN	13	—	900	7.5	—	2000	—	—	—	—	—
BFG590W/X	22	SOT343	5	15	200	500	NPN	13	—	900	7.5	—	2000	—	21	—	80	5
BFG92A(/X)	7	SOT143	5	15	25	400	NPN	16	2	1000	11	3	2000	—	—	—	—	—
BFQ149	10	SOT89	5	15	100	1000	PNP	12	3.75	500	—	—	—		—	—	—	—
BFR106	10	SOT23	5	15	100	500	NPN	11.5	3.5	800	—	—	—	350	—	—	50	9
BFR92A	7	SOT23	5	15	25	300	NPN	14	2.1	1000	8	3	2000	150	—	—	14	10
BFR92AW	7	SOT323	5	15	25	300	NPN	14	2	1000	—	3	2000	—	—	—	—	—
BFR93AW	8	SOT323	5	12	35	300	NPN	13	1.5	1000	8	2.1	2000	—	—	—	—	—
BFS25A	18	SOT323	5	5	6.5	32	NPN	13	1.8	1000	—	—	—	—	—	—	—	—
BFT25A	18	SOT323	5	5	6.5	32	NPN	15	1.8	1000	—	—	—	—	—	—	—	—
BFT92	7	SOT23	5	15	25	300	PNP	18	2.5	500	—	—	—	150	—	—	14	10
BFT92W	7	SOT323	5	15	35	300	PNP	17	2.5	500	11	3	1000	—	—	—	—	—
BFT93	9	SOT23	5	12	35	300	PNP	16.5	2.4	500	—	—	—	300	—	—	30	5
BFT93W	9	SOT323	5	12	50	300	PNP	15.5	2.4	500	10	3	1000	—	—	—	—	—
BFG97	10	SOT223	5.5	15	100	1000	NPN	16	—	500	12	—	800	700	—	—	70	10
BFQ19	10	SOT89	5.5	15	100	1000	NPN	11.5	3.3	500	7.5	—	800	—	—	—	—	—
BFG93A	8	SOT143	6	12	35	300	NPN	16	1.7	1000	10	2.3	2000	—	—	—	—	—
BFG94	8	SOT223	6	12	60	700	NPN	—	2.7	500	13.5	3	1000	500	21.5	34	45	10
BFR93A	8	SOT23	6	12	35	300	NPN	13	1.9	1000	—	3	2000	425	—	—	30	8
BFQ135	16	SOT172	6.5	19	150	270	NPN	17	—	500	13.5	—	800	1200	—	—	120	18
BFG135	16	SOT223	7	15	150	1000	NPN	16	—	500	12	—	800	850	—	—	100	10

Wideband Transisitors (RF small signal)

Type	Curve	Package	Ft (GHz)	Vceo (V)	Ic (mA)	Ptot (mW)	Polarity	Gum (dB)	F (dB)	@ (MHz)	Gum (dB)	F (dB)	@ (MHz)	Vo 1 (mV)	PI (dBm)	ITO (dBm)	@Ic & (mA)	Vce (V)
			Typical	Maximum Values														
BFG591	22	SOT223	7	15	200	2000	NPN	13	—	900	7.5	—	2000	—	—	—	—	—
BFQ591	22	SOT89	7	15	200	2000	NPN	13	—	900	7.5	—	2000	—	—	—	—	—
BFG198	15	SOT223	8	10	100	1000	NPN	18	—	500	15	—	800	700	—	—	70	8
BFG67(/X)	14	SOT143	8	10	50	380	NPN	17	1.7	1000	10	2.5	2000	—	—	—	—	—
BFQ67	14	SOT23	8	10	50	300	NPN	14	1.7	1000	8	2.7	2000	—	—	—	—	—
BFQ67W	14	SOT323	8	10	50	300	NPN	13	2	1000	8	2.7	2000	—	—	—	—	—
PBR941	—	SOT23	8	10	50	360	NPN	15	1.4	1000	9.5	2	2000	—	—	—	—	—
PBR951	—	SOT23	8	10	100	365	NPN	14	1.3	1000	8	2	2000	—	—	—	—	—
PRF947	—	SOT323	8.5	10	50	250	NPN	16	1.5	1000	10	2.1	2000	—	—	—	—	—
PRF957	—	SOT323	8.5	10	100	270	NPN	15	1.3	1000	9.2	1.8	2000	—	—	—	—	—
BFG505(/X)	19	SOT143	9	15	18	150	NPN	20	1.6	900	13	1.9	2000	—	4	10	5	6
BFG520(/X)	20	SOT143	9	15	70	300	NPN	19	1.6	900	13	1.9	2000	275	17	26	20	6
BFG520W(/X)	20	SOT343	9	15	70	500	NPN	17	1.6	900	11	1.85	2000	275	17	26	20	6
BFG540W(/X)	21	SOT343	9	15	120	500	NPN	16	1.9	900	10	2.1	2000	500	21	34	40	8
BFG541	21	SOT223	9	15	120	650	NPN	15	1.9	900	9	2.1	2000	500	21	34	40	8
BFM505	19	SOT363	9	8	18	500	NPN	17	1.4	900	10	1.9	2000	—	—	—	—	—
BFM520	20	SOT363	9	8	70	1000	NPN	15	1.7	900	9	1.9	2000	—	—	—	—	—
BFQ540	21	SOT89	9	12	120	1200	NPN	—	1.9	900	—	—	—	500	—	—	40	8
BFR505	19	SOT23	9	15	18	150	NPN	17	1.6	900	10	1.9	2000	—	4	10	5	6
BFR505T	19	SOT416	9	—	18	150	NPN	17	1.2	900	—	—	—	—	—	—	—	—
BFR520	20	SOT23	9	15	70	300	NPN	15	1.6	900	9	1.9	2000	—	17	26	20	6
BFR520T	20	SOT416	9	—	70	150	NPN	15	1.6	900	9	1.9	2000	—	17	26	—	—
BFR540	21	SOT23	9	15	120	500	NPN	14	1.9	900	7	2.1	2000	550	21	34	40	8
BFS505	19	SOT323	9	15	18	150	NPN	17	1.6	900	10	1.9	2000	—	4	10	5	6
BFS520	20	SOT323	9	15	70	300	NPN	15	1.6	900	9	1.9	2000	—	17	26	20	6
BFS540	21	SOT323	9	15	120	500	NPN	14	1.9	900	8	2.1	2000	—	21	34	40	8
PRF949	—	SOT416	9	10	50	150	NPN	16	1.5	1000	—	—	—	—	—	—	—	—
BFG310W/XR	4, 5	SOT343XR	14	6	10	60	NPN	18	1.1	1000	—	—	—	—	1.8	8	5	3
BFG310/XR	4, 5	SOT143XR	14	6	10	60	NPN	18	1.1	1000	—	—	—	—	1.8	8	5	3
BFG325W/XR	4, 5	SOT343XR	14	6	35	210	NPN	18	1.1	3000	—	—	—	—	8.7	19	15	3
BFG325/XR	4, 5	SOT143XR	14	6	35	210	NPN	18	1.1	3000	—	—	—	—	8.7	19	15	3
BFG403W	25	SOT343	17	4.5	3.6	16	NPN	—	1	900	—	1.6	2000	—	5	6	1	1
BFG21W	21	SOT343	18	4.5	200	600	NPN	—	—	—	10	—	1900	—	—	—	—	—
BFG480W	29	SOT343	21	4.5	250	360	NPN	—	1.2	900	—	1.8	2000	—	—	28	80	2
BFG410W	26	SOT343	22	4.5	12	54	NPN	—	0.9	900	—	1.2	2000	—	5	15	10	2
BFG424F	27	SOT343F	25	4.5	30	135	NPN	—	0.8	900	—	1.2	2000	—	12	22	25	2
BFG425W	27	SOT343	25	4.5	30	135	NPN	—	0.8	900	—	1.2	2000	—	12	22	25	2
BFU510	SiGe	SOT343	45	2.5	15	38	NPN	—	0.6	900	20	0.9	2000	—	—	—	—	—
BFU540	SiGe	SOT343	45	2.5	50	125	NPN	—	0.6	900	20	0.9	2000	—	—	—	—	—

Philips RF Integrated Circuits

N-channel Junction Field-Effect Transistors for Switching

				Characteristics										
		V_{DS} (V)	I_G	I_{DSS} (mA)		$V_{(P)GS}$		R_{DSON} (Ω)	Crs (pF)		t_{on} (ns)		t_{off} (ns)	
Type	Package	max	max	min	max	min	max	max	min	max	typ	max	typ	max
BSR56	SOT23	40	50	50	—	4	10	25	—	5	—	—	—	25
BSR57	SOT23	40	50	20	100	2	6	40	—	5	—	—	—	50
BSR58	SOT23	40	50	8	80	0.8	4	60	—	5	—	—	—	100
PMBFJ108	SOT23	25	50	80	—	3	10	8	—	15	4	—	6	—
PMBFJ109	SOT23	25	50	40	—	2	6	12	—	15	4	—	6	—
PMBFJ110	SOT23	25	50	10	—	0.5	4	18	—	15	4	—	6	—
PMBFJ111	SOT23	40	50	20	—	3	10	30	—	typ. 3	13	—	35	—
PMBFJ112	SOT23	40	50	5	—	1	5	50	—	typ. 3	13	—	35	—
PMBFJ113	SOT23	40	50	2	—	0.5	3	100	—	typ. 3	13	—	35	—
J108	SOT54	25	50	80	—	3	10	8	—	15	4	—	6	—
J109	SOT54	25	50	40	—	2	6	12	—	15	4	—	6	—
J110	SOT54	25	50	10	—	0.5	4	18	—	15	4	—	6	—
J111	SOT54	40	50	20	—	3	10	30	—	typ. 3	13	—	35	—
J112	SOT54	40	50	5	—	1	5	50	—	typ. 3	13	—	35	—
J113	SOT54	40	50	2	—	0.5	3	100	—	typ. 3	13	—	35	—
PMBF4391	SOT23	40	50	50	150	4	10	30	—	3.5	—	15	—	20
PMBF4392	SOT23	40	50	25	75	2	5	60	—	3.5	—	15	—	35
PMBF4393	SOT23	40	50	5	30	0.5	3	100	—	3.5	—	15	—	50

P-channel Junction Field-Effect Transistors for Switching

				Characteristics										
		V_{DS} (V)	I_G	I_{DSS} (mA)		$V_{(P)GS}$		R_{DSON} (Ω)	Crs (pF)		t_{on} (ns)		t_{off} (ns)	
Type	Package	max	max	min	max	min	max	max	min	max	typ	max	typ	max
PMBFJ174	SOT23	30	50	20	135	5	10	85	typ. 4		7	—	15	—
PMBFJ175	SOT23	30	50	7	70	3	6	125	typ. 4		15	—	30	—
PMBFJ176	SOT23	30	50	2	35	1	4	250	typ. 4		35	—	35	—
PMBFJ177	SOT23	30	50	1.5	20	0.8	2.25	300	typ. 4		45	—	45	—
J174	SOT54	30	50	20	135	5	10	85	typ. 4		7	—	15	—
J175	SOT54	30	50	7	70	3	6	125	typ. 4		15	—	30	—
J176	SOT54	30	50	2	35	1	4	250	typ. 4		35	—	35	—
J177	SOT54	30	50	1.5	20	0.8	2.25	300	typ. 4		45	—	45	—

N-channel Junction Field-Effect Transistors

		Characteristics									
		V_{DS}	I_G	I_{DSS} (mA)		$V_{(p)GS}$ (V)		|Yfs| (mS)		Crs (pF)	
Type	Package	(V)	(Ma)	min	max	min	max	min	max	min	max
DC, LF and HF amplifiers											
BF245A	SOT54	30	10	2	6.5	<8		3	6.5	1.1	-
BF245B	SOT54	30	10	6	15	<8		3	6.5	1.1	-
BF245C	SOT54	30	10	12	25	<8		3	6.5	1.1	-
BF545A	SOT23	30	10	2	6.5	0.4	7.5	3	6.5	0.8	-
BF545B	SOT23	30	10	6	15	0.4	7.5	3	6.5	0.8	-
BF545C	SOT23	30	10	12	25	0.4	7.5	3	6.5	0.8	-
BF556A	SOT23	30	10	3	7	0.5	7.5	4.5		0.8	-
BF556B	SOT23	30	10	6	13	0.5	7.5	4.5		0.9	-
BF556C	SOT23	30	10	11	18	0.5	7.5	4.5		0.8	-
Preamplifiers for AM tuners in car radios											
BF861A	SOT23	25	10	2	6.5	0.2	1	12		2.1	2.7
BF861B	SOT23	25	10	6	15	0.5	1.5	16		2.1	2.7
BF861C	SOT23	25	10	12	25	0.8	2	20		2.1	2.7
BF862	SOT23	20	10	13	25	<20		35		2.5	-
RF stages FM portables, car radios, main radios & mixer stages											
BF510[1)]	SOT23	20	10	0.7	3	typ 0.8		2.5		0.4	0.5
BF511[1)]	SOT23	20	10	2.5	7	typ 1.5		4		0.4	0.5
BF512[1)]	SOT23	20	10	6	12	typ 2.2		6		0.4	0.5
BF513[1)]	SOT23	20	10	10	18	typ 3		7		0.4	0.5
Low level general purpose amplifiers											
BFR30	SOT23	25	5	4	10	<5		1	4	1.5	-
BFR31	SOT23	25	5	1	5	<2.5		1.5	4.5	1.5	-
General purpose amplifiers											
BFT46	SOT23	25	5	0.2	1.5	<1.2		>1		1.5	-
AM input stages UHF/VHF amplifiers											
PMBFJ308	SOT23	25	50	12	60	1	6.5	>10		1.3	2.5
PMBFJ309	SOT23	25	50	12	30	1	4	>10		1.3	2.5
PMBFJ310	SOT23	25	50	24	60	2	6.5	>10		1.3	2.5
PMBFJ620	SOT363	25	50	24	60	2	6.5	>10		1.3	2.5

Philips RF Integrated Circuits

N-channel, Single MOS-FETS for Switching

Type	Package	V_{DS} (V)	I_D mA	I_{DSS} (mA) min	I_{DSS} (mA) max	$V_{(p)GS}$ min	$V_{(p)GS}$ max	R_{DSON} (Ω) max	Crs (pF) min	Crs (pF) max	t_{on} (ns) typ	t_{on} (ns) max	t_{off} (ns) typ	t_{off} (ns) max	$\|S_{21(on)}\|^2$ (dB) max	$\|S_{21(off)}\|^2$ (dB) min	Mode
				Characteristics													
BSD22	SOT143	20	50	—	—	—	2	30	typ. 0.6		—	1	—	5	—	—	depl.
BSS83	SOT143	10	50	—	—	0.1[2]	2[1]	45	typ. 0.6		—	1	—	5	—	—	enh.
Silicon RF Switches																	
BF1107	SOT23	3	10	—	100[3]	—	7[4]	20	—	—	—	—	—	—	2.5	30	depl.
BF1108[5]	SOT143B	3	10	—	100[3]	—	7[4]	20	—	—	—	—	—	—	3	30	depl.
BF1108R[5]	SOT143R	3	10	—	100[3]	—	7[4]	20	—	—	—	—	—	—	3	30	depl.

N-channel, Dual Gate MOS-FETS

Type	Package	V_{DS} (V)	I_D (mA)	I_{DSS} (mA) min	I_{DSS} (mA) max	$V_{(p)GS}$ (V) min	$V_{(p)GS}$ (V) max	|Yfs| (mS) min	|Yfs| (mS) max	Cis (pF) typ.	Cos (pF) typ.	F @ 800 MHz typ.	VHF	UHF
				Characteristics										
With external bias														
BF901	SOT143	12	30	2	18	—	0.7[6]	25	—	2.35	1.4	1.7	✓	✓
BF901R	SOT143R	12	30	2	18	—	0.7[6]	25	—	2.35	1.4	1.7	✓	✓
BF908	SOT143	12	40	3	27	—	2	36	—	3.1	1.7	1.5	✓	✓
BF908R	SOT143R	12	40	3	27	—	2	36	—	3.1	1.7	1.5	✓	✓
BF908WR	SOT343R	12	40	3	27	—	2	36	—	3.1	1.7	1.5	✓	✓
BF991	SOT143	20	20	4	25	—	2.5	10	—	2.1	1.1	0.7[7]	✓	—
BF992	SOT143	20	40	—	—	—	1.3	20	—	4	2	1.2[7]	✓	—
BF994S	SOT143	20	30	4	20	—	2.5	15	—	2.5	1	1[7]	✓	—
BF964S	SOT143	20	30	4	20	—	2.5	15	—	2.3	0.8	1.8	✓	—
BF998	SOT143	12	30	2	18	—	2.5	21	—	2.1	1.05	1	✓	✓
BF998R	SOT143R	12	30	2	18	—	2.5	21	—	2.1	1.05	1	✓	✓
BF998WR	SOT343R	12	30	2	18	—	2.5	22	—	2.1	1.05	1	✓	✓
Fully internal bias														
BF1105	SOT143	7	30	8	16	—	—	25	—	2.2[9]	1.2[8]	1.7	✓	✓
BF1105R	SOT143R	7	30	8	16	—	—	25	—	2.2[9]	1.2[8]	1.7	✓	✓
BF1105WR	SOT343R	7	30	8	16	—	—	25	—	2.2[9]	1.2[8]	1.7	✓	✓
BF1109	SOT143	11	30	8	16	—	1.2[6]	24	—	2.2[9]	1.2[8]	1.5	✓	✓
BF1109R	SOT143R	11	30	8	16	—	1.2[6]	24	—	2.2[9]	1.2[8]	1.5	✓	✓
BF1109WR	SOT343R	11	30	8	16	—	1.2[6]	24	—	2.2[9]	1.2[8]	1.5	✓	✓
Partly internal bias														
BF904(A)	SOT143	7	30	8	13	—	1[6]	22	—	2.2	1.3	2	✓	✓
BF904(A)R	SOT143R	7	30	8	13	—	1[6]	22	—	2.2	1.3	2	✓	✓
BF904(A)WR	SOT343R	7	30	8	13	—	1[6]	22	—	2.2	1.3	2	✓	✓
BF909(A)	SOT143	7	40	12	20	—	1[6]	36	—	3.6	2.3	2	✓	✓
BF909(A)R	SOT143R	7	40	12	20	—	1[6]	36	—	3.6	2.3	2	✓	✓

N-channel, Dual Gate MOS-FETS for Switching

Type	Package	V_{DS} (V)	Characteristics											
			I_D (mA)	I_{DSS} (mA)		$V_{(P)GS}$ (V)		|Yfs| (mS)		Cis (pF)	Cos (pF)	F @ 800 MHz		
				min	max	min	max	min	max	typ.	typ.	typ.	VHF	UHF
Partly internal bias														
BF1100	SOT143	14	30	8	13	—	1[6]	24	—	2.2	1.4	2	✓	✓
BF1100R	SOT143R	14	30	8	13	—	1[6]	24	—	2.2	1.4	2	✓	✓
BF1100WR	SOT343R	14	30	8	13	—	1[6]	24	—	2.2	1.4	2	✓	✓
BF1101	SOT143	7	30	8	16	—	1[6]	25	—	2.2	1.2[8]	1.7	✓	✓
BF1101R	SOT143R	7	30	8	16	—	1[6]	25	—	2.2	1.2[8]	1.7	✓	✓
BF1101WR	SOT343R	7	30	8	16	—	1[6]	25	—	2.2	1.2[8]	1.7	✓	✓
BF1102(R)	SOT343	7	40	12	20	—	1.2[6]	36	—	2.8	1.6[8]	2	Note 10	
BF1201	SOT143	10	30	11	19	—	1.2[6]	23	—	2.6	0.9	1.9	✓	✓
BF1201R	SOT143R	10	30	11	19	—	1.2[6]	23	—	2.6	0.9	1.9	✓	✓
BF1201WR	SOT343R	10	30	11	19	—	1.2[6]	23	—	2.6	0.9	1.9	✓	✓
BF1202	SOT143	10	30	8	16	—	1.2[6]	25	—	1.7	0.85	1	✓	✓
BF1202R	SOT143R	10	30	8	16	—	1.2[6]	25	—	1.7	0.85	1	✓	✓
BF1202WR	SOT343R	10	30	8	16	—	1.2[6]	25	—	1.7	0.85	1	✓	✓
BF1203[11]	SOT363	10	30	11	19	—	1.2[6]	23	—	2.6	0.9	1.8	✓	✓
BF1204[11]	SOT363	10	30	8	16	—	1.2[6]	25	—	1.7	0.85	1	✓	✓
BF1205C[11] [12] [13]	SOT363	6	30	14	24	0.3	1	26	41	2.2	0.75	1.4	✓	—
		6	30	9	17	0.3	1	28	43	2	0.85	1.4	—	✓
BF1205[11] [12] [13]	SOT363	10	30	8	16	0.3	1	26	40	1.8	0.75	1.2	✓	—
		7	30	8	16	0.3	1	26	40	2	0.85	1.4	—	✓
BF1206[11]	SOT363	6	30	14	23	0.3	1	33	45	2.6	1.1	1.6	✓	—
		6	30	9	17	0.3	1	29	41	1.9	0.85	1.4	—	✓
BF1207[11] [12] [13]	SOT363	6	30	13	23	0.3	1	30 typ	—	2.2	0.9	1.4	✓	—
		6	30	8	18	0.3	1	32 typ	—	2	0.85	1.4	—	✓
BF1207F[11] [12] [13]	SOT666	6	30	13	23	0.3	1	30 typ	—	2.2	0.9	1.4	✓	—
		6	30	8	18	0.3	1	32 typ	—	2	0.85	1.4	—	✓
BF1211	SOT143	6	30	11	19	0.3	1	25	40	2.1	0.9	1.4	✓	—
BF1211R	SOT143R	6	30	11	19	0.3	1	25	40	2.1	0.9	1.4	✓	—
BF1211WR	SOT343	6	30	11	19	0.3	1	25	40	2.1	0.9	1.4	✓	—
BF1212	SOT143	6	30	8	16	0.3	1	28	43	1.7	0.9	1.1	—	✓
BF1212R	SOT143R	6	30	8	16	0.3	1	28	43	1.7	0.9	1.1	—	✓
BF1212WR	SOT343	6	30	8	16	0.3	1	28	43	1.7	0.9	1.1	—	✓

1) *Asymmetrical*
2) *VGS(th)*
3) *ID*
4) *VSG*
5) *Depletion FET plus diode in one package*
6) *VGS(th)*
7) *@ 200 MHz*
8) *COSS*
9) *Ciq*
10) *Two equal dual gate MOS-FETs in one package*
11) *Two low noise gain amplifiers in one package*
12) *Transistor A: fully internal bias, transistor B: partly internal bias*

Philips RF Power and RF Small Signal

HF, VHF, and UHF Power Transistors

Type	F (MHz)	PL (W)	V (V)	Gp (dB)	nD (%)	Application
UHF LDMOS						
BLF861A	470-860	150	32	15	55	TV transmitter
BLF647	0-600	150	32	16	55	Various, e.g. Mil. Comms
BLF2045	0-2000	30	26	>10	>30	Various
BLF1822-10	0-2200	10	26	>11	>30	Various
BLF1043	0-960	10	26	>16	>45	Various
UHF VDMOS						
BLF548	500	150	28	11	55	Various, e.g. PMR
BLF546	500	80	28	13	60	Various, e.g. PMR
BLF544	500-960	20	28	14	60	Various, e.g. PMR
BLF542	500	5	28	16.5	60	Various, e.g. PMR
BLF404	500	4	12.5	11.5	55	Various, e.g. PMR
BLF521	500	2	12.5	13	60	Various, e.g. PMR
UHF BIPOLAR						
BLV862	860	150	28	9	52	UHF TV transmitter
BLV57	860	38	25	605	—	UHF TV transmitter
BLW34	860	2.15*	25	10.2	—	UHF TV transmitter
BLW33	860	1.15*	25	10.2	—	UHF TV transmitter
VHF LDMOS						
BLF647	600	150	32	16	55	VHF transmitter
VHF VDMOS						
BLF368	225	300	32	13.5	62	VHF transmitter
BLF268	225	250	50	16	55	VHF transmitter
BLF248	225	300	28	13	67	VHF transmitter
BLF177	28-108	150	50	19	70	VHF transmitter
BLF147	28-108	150	28	18	70	VHF transmitter
BLF246	108	80	28	18	65	VHF transmitter
BLF246B	175	60	28	19	65	VHF transmitter
BLF346	225	30*	28	16.5	-	VHF transmitter
BLF245B	175	30	28	18	65	VHF transmitter
BLF245	175	30	28	15.5	65	VHF transmitter
BLF175	28-108	30	50	20	65	VHF transmitter
BLF244	175	15	28	17	65	VHF transmitter
BLF242	175	5	28	16	60	VHF transmitter
BLF404	500	4	12.5	11.5	55	VHF transmitter
BLF202	175	2	12.5	13	55	VHF transmitter
HF LDMOS						
BLF647	600	150	32	16	55	HF transmitter
HF VDMOS						
BLF177	28-108	150	50	19	70	HF transmitter
BLF175	28-108	30	50	20	65	HF transmitter
BLF145	28	30	28	27	40	HF transmitter
BLF242	175	5	28	16	60	HF transmitter
BLF202	175	2	12.5	13	55	HF transmitter

* *Class-A operation*

Avionics, L-Band and S-Band Radar Power Transistors

Type	F (MHz)	P_L (W)	V (V)	Tp (us)	Duty cycle (%)	G_P (dB)	n_D (%)	Application
Avionics LDMOS								
BLA1011-200	1030-1090	200	36	50	2	15	50	TCAS, IFF, Mod-S
BLA1011-10	1030-1090	10	36	50	2	18	50	TCAS, IFF, Mod-S
BLA1011-2	1030-1090	2	36	50	2	18	-	TCAS, IFF, Mod-S
Avionics BIPOLAR								
MX0912B351Y	960-1215	375	50	10	10	7.5	45	TACAN, JTIDS, DME
MX0912B251Y	960-1215	275	50	10	10	7.5	45	TACAN, JTIDS, DME
MX0912B100Y	960-1215	115	50	10	10	7.5	45	TACAN, JTIDS, DME
MZ0912B100Y	960-1215	115	50	10	10	7.5	45	TACAN, JTIDS, DME
MZ0912B50Y	960-1215	60	50	10	10	8	45	TACAN, JTIDS, DME
MF1011B900Y	1030-1090	900	50	10	1	6.5	45	TCAS, IFF, Mod-S
MX1011B700Y	1030-1090	740	50	10	1	7	45	TCAS, IFF, Mod-S
MX1011B200Y	1030-1090	220	50	10	1	8	50	TCAS, IFF, Mod-S
L-Band Radar LDMOS								
BLL1214-35	1200-1400	35	36	1000	10	14	45	L-Band Radar
BLL1214-250	1200-1400	35	250	1000	10	13	50	L-Band Radar
L-Band Radar BIPOLAR								
RX1214B350Y	1200-1400	280	50	130	6	8	45	L-Band Radar
RX1214B300Y	1200-1400	250	50	150	5	8	40	L-Band Radar
RX1214B170W	1200-1400	170	42	500	10	7	45	L-Band Radar
RX1214B130Y	1200-1400	140	50	150	5	7.5	40	L-Band Radar
RZ1214B65Y	1200-1400	80	50	150	5	8	40	L-Band Radar
RZ1214B35Y	1200-1400	40	50	150	5	8	35	L-Band Radar
S-Band BIPOLAR								
BLS2731-110	2700-3100	110	40	100	10	8	40	S-Band Radar
BLS2731-50	2700-3100	60	40	100	10	8	40	S-Band Radar
BLS2731-20	2700-3100	25	40	100	10	9	40	S-Band Radar
BLS2731-10	2700-3100	125	40	100	10	9	45	S-Band Radar
BLS3135-65	3100-3500	65	40	100	10	8	40	S-Band Radar
BLS3135-50	3100-3500	50	40	100	10	8	40	S-Band Radar
BLS3135-20	3100-3500	20	40	100	10	8	40	S-Band Radar
BLS3135-10	3100-3500	10	40	100	10	9	40	S-Band Radar

Philips RF Power and RF Small Signal

RF Power Transistors and Modules for All Cellular Standards

Type	Package	Mode of Operation	F (MHz)	P_L (W)	G_P (dB)	n (%)	V (V)	Notes
LDMOS RF Power Modules								
BGF802-20	SOT365C	CW CDMA	869-894	25 3 avg	30	50 18	28	
BGF844	SOT365C	CW EDGE	869-894	23 2.5 avg	30	50 16	26	
BGF944	SOT365C	CW EDGE	920-960	17 2.5 avg	30	50 16	26	
BGF1801-10	SOT365C	CW EDGE	1805-1880	10 3.5	26	35 20	26	
BGF1901-10	SOT365C	CW EDGE	1930-1990	10 3.5	26	35 20	26	
BIPOLAR RF Power Modules								
BGY916	SOT365A	CW	920-960	16	30	40	26	
BGY915/5	SOT365A	CW	920-960	16	30	40	26	
BGY925	SOT365A	CW	920-960	23	30	30	26	
BGY925/5	SOT365A	CW	920-960	23	30	30	26	
BGY2016	SOT365A	CW	1800-2000	16	30	30	26	
LDMOS RF Power Transistors								
BLF1043	SOT538A	CW, class AB	800-1000	10	18.5	55	26	
BLF1046	SOT467C/B	CW, class AB	HF-1000	50	16	60	26	
BLF2043	SOT538A	CW, class AB	HF-2000	12	12	40	26	
BLF1822-10	SOT467C/B	CW, class AB	HF-2200	12	13	40	26	
BLF1820-90	SOT502A/B	2-Tone, class AB	1800-2000	90	12	40	26	
Ultra Linear LDMOS Drivers — IMD3 < -50dB @ P_{obo} > 6dB								
BLF3G21-6	SOT538A	2-Tone, class AB PHS, class A*	HF-2200	6 2	13.5 16	35 20	26	
BLF3G21-30	SOT467C/B	2-Tone, class AB PHS, class A*	HF-2200	30 9	13.5 16	35 20	26	
BLF3G22-30	SOT608A/B	2-Tone, class AB PHS, class A* W-CDMA/UMTS	2000-2200	30 10 6.5	14 16 15	34 20 21	26	

**ACPR< -75 DBC @ 600 kHz*

Type	Package	Mode of Operation	F (MHz)	P_L (W)	G_p (dB)	n (%)	V (V)	Notes
High Efficiency LDMOS Transistors								
BLF4G10-120	SOT502A/B	CW, class AB EDGE	800-1000	120 50 avg	19	57 41	28	
BLF4G10-160	SOT502A/B	CW, class AB EDGE	800-1000	210 80 avg	18	57 43	28	
BLF4G20-110B	SOT502A/B	CW, class AB EDGE	1800-2000	110 50 avg	12.2 13	47 38	28	
BLF4G20-130	SOT502A/B	CW, class AB EDGE	1800-2000	150 55	13 14	55 37	28	
BLF4G22-45	SOT608A/B	W-CDMA/UMTS	2000-2200	10 avg	13.5	26	28	
BLF4G22-100	SOT502A/B	W-CDMA/UMTS	2000-2200	25 avg	13.5	26	28	
BLF4G22-130	SOT502A/B	W-CDMA/UMTS	2000-2200	33 avg	13.5	26	28	
BLC5G10-120	SOT502A/B	CW, class AB EDGE	800-1000	135 50 avg	22	60 40	28	Preliminary data
BLC5G20-75	SOT502A/B	CW, class AB EDGE	1800-2000	75 30 avg	18	60 40	28	Preliminary data
BLC5G20-110	SOT502A/B	CW, class AB EDGE	1800-2000	120 50 avg	18	60 40	28	Preliminary data
BLC5G20-130	SOT502A/B	CW, class AB EDGE	1800-2000	135 55 avg	17.5	60 40	28	Preliminary data
BLC5G22-100	SOT502A/B	W-CDMA/UMTS	2000-2200	26 avg	18.5	30	28	Preliminary data
BLC5G22-130	SOT502A/B	W-CDMA/UMTS	2000-2200	31 avg	17	30	28	Preliminary data
LDMOS MMIC								
BLM4G10-30	SOT822/HSOP20	EDGE CDMA	800-1000	5 avg	29 30	18	26	Preliminary data
BLM4G20A-18	SOT822/HSOP20	EDGE	1800-2000	5 avg	24	20	26	Preliminary data
BLM4G22-30	SOT822/HSOP20	W-CDMA/UMTS	2100-2200	2-3 (TBD)	23-24	11@2W	28	Preliminary data
BLM4G22-45	Ceramic TBD	W-CDMA/UMTS	2100-2200	4-5 (TBD)	23-24	18	28	Preliminary data

Philips Small Signal Portfolio

Single Low V_{CEsat} (BISS) transistors — PNP

		Leaded	SMD								Leadless			
P_{tot} max.		SOT54 (TO-92)	SOT223 (SC-73)	SOT89 (SC-62)	SOT457 (SC-74)	SOT23	SOT346 (SC-59)	SOT323 (SC-70)	SOT363 (SC-88)	SOT490 (SC-89)	SOT666	SOT883 (SC-101)	$[R_{CEsat}]$ = MΩ	$[V_{CEsat}]$ = mV $I_C / I_B = 10$	
$[I_C]$ = A	$[V_{CEO}]$ = V	830 mW	2,000 mW	1,300 mW	750 mW	480 mW	250 mW	350 mW	430 mW	250 mW	300 mW	250 mW		I_C=500 mA	I_C Max
0.5	15									PBSS3515F		PBSS3515M	< 500	< 250	
	40									PBSS3540F		PBSS3540M	< 700	< 350	
1.0	20					PBSS5120T							< 250	< 125	< 250
	30					PBSS5130T							< 220	< 110	
	40										PBSS5140V		< 340	< 170	< 310
		PBSS5140S			PBSS5140D	PBSS5140T		PBSS5140U					< 500	< 250	< 500
	60					PBSS5160T	PBSS5160K	PBSS5160U			PBSS5160V		< 330	< 175	< 330
	100	PBSS9110S	PBSS9110Z		PBSS9110D	PBSS9110T			PBSS9110Y				< 320	< 180	< 320
2.0	20					PBSS5220T							< 113	< 80	< 225
						PBSS5320T							< 105	< 70	< 300
	30					PBSS5230T							< 220	< 110	< 350
	40										PBSS5240V		< 250	< 145	< 530
						PBSS5240T			PBSS5240Y				< 220	< 110	< 350
	50					PBSS5250T							< 150	< 90	< 300
						PBSS5350T							< 135	< 90	< 390
				PBSS5250X									< 160	< 90	< 320
3.0	20			PBSS5320X									< 105	< 70	< 300
					PBSS5320D								< 133	< 80	< 400
	30			PBSS5330X									< 107	< 70	< 320
	50			PBSS5350X									< 135	< 90	< 390
		PBSS5350S	PBSS5350Z		PBSS5350D								< 150	< 100	
4.0	20				PBSS5420D								< 50	< 60	< 200
	40				PBSS5440D								< 75	< 60	< 300
			PBSS5540Z	PBSS5540X									< 80		< 375
	80		PBSS5480Z	PBSS5480X									< 75	< 55	< 300
5.0	20		PBSS5520Z	PBSS5520X									< 54	< 70	< 270

new products released planned

Double Low V_{CEsat} (BISS) transistors

P_{tot} max.		Polarity	SOT457 (SC-74)	SOT363 (SC-88)	SOT666	$[R_{CEsat}]$ =mΩ	$[V_{CEsat}]$ = mV $I_C / I_B = 10$	
$[I_C]$ = A	$[V_{CEO}]$ = V		750 mW	430 mW	300 mW		I_C=500 mA	I_C Max
0.5	15	2 x PNP			PBSS3515VS	< 500	< 250	< 250
		NPN / PNP		PBSS2515YPN	PBSS2515VPN	< 500	< 250	< 250
		2 x NPN			PBSS2515VS	< 500	< 250	< 250
1.0	40	NPN / PNP	PBSS4140DPN				< 250	< 500
2.0	40	NPN / PNP	PBSS4240DPN			< 200 / 260	< 100 / 145	< 400 / 530

Single Low V_{CEsat} (BISS) transistors — NPN

		Leaded	SMD								Leadless			
P_{tot} max.		SOT54 (TO-92)	SOT223 (SC-73)	SOT89 (SC-62)	SOT457 (SC-74)	SOT23	SOT346 (SC-59)	SOT323 (SC-70)	SOT363 (SC-88)	SOT490 (SC-89)	SOT666	SOT883 (SC-101)	$[R_{CEsat}]$ = mΩ	$[V_{CEsat}]$ = mV I_C / I_B = 10	
$[I_C]$ = A	$[V_{CEO}]$ = V	830 mW	2,000 mW	1,300 mW	750 mW	480 mW	250 mW	350 mW	430 mW	250 mW	300 mW	250 mW		I_C=500 mA	I_C Max
0.5	15									PBSS2515F		PBSS2515M	< 500	< 250	
	40									PBSS2540F		PBSS2540M	< 500	< 250	
1.0	20					PBSS4120T							< 200	< 110	< 250
	30					PBSS4130T							< 220	< 120	< 270
	40										PBSS4140V		< 190	< 110	< 190
		PBSS4140S				PBSS4140T		PBSS4140U					< 500	< 250	< 500
	60					PBSS4160T	PBSS4160K	PBSS4160U			PBSS4160V		< 250	< 140	< 250
	100	PBSS8110S	PBSS8110Z		PBSS8110D	PBSS8110T			PBSS8110Y				< 200	< 120	< 200
2.0	20					PBSS4320T							< 105	< 70	< 310
	30					PBSS4230T							< 200	< 100	< 320
	40										PBSS4240V		< 190	< 100	< 400
						PBSS4240T			PBSS4240Y				< 200	< 100	< 320
	50			PBSS4250X									< 160	< 90	< 320
						PBSS4350T							< 130	< 80	< 370
3.0	20			PBSS4320X									< 105	< 70	< 310
	30			PBSS4330X									< 100	< 60	< 300
	50			PBSS4350X									< 130	< 80	< 370
		PBSS4350S	PBSS4350Z		PBSS4350D								< 145	< 90	
4.0	20				PBSS4420D								< 50	< 50	< 200
	40				PBSS4440D								< 75	< 50	< 300
			PBSS4540Z	PBSS4540X									< 71		< 355
	80		PBSS4480Z	PBSS4480X									< 54	< 40	< 216
5.0	20		PBSS4520Z	PBSS4520X									< 44	< 50	< 220

new products released planned

Philips Small Signal Portfolio

ESD Potection Diodes

Number of lines Uni-	Bi-directional	I_{RM} @ V_{RWM} max [µA]	[V]	C max [pF]	P_{PP} * max [W]	P_{ZSM} ** max [W]	Types	Package
4	3	2	3	240		24	BZA456A	SOT457 (SC-74)
4	3	0.7	4	200		24	BZA462A	
4	3	0.075	14	48		19.6	BZA418A	
4	3	0.1	15	48		19.6	BZA420A	
4	3	2	3	240		24	BZA856A	SOT353 (SC-88A)
4	3	0.7	4	200		24	BZA862A	
4	3	0.2	4.3	180		24	BZA868A	
4	3	0.1	15	50		17	BZA820A	
4	3	1	3	125		16	BZA856A	
4	3	0.5	4	105		15	BZA862AL	
4	3	0.1	4.3	90		14	BZA868AL	
4	3	0.3	3.3	28	30		PESD3V3L4UG	
4	3	0.025	5	19	30		PESD5V0L4UG	
4	3	1	3	125		16	BZA956A	SOT665
4	3	0.5	4	105		15	BZA962A	
4	3	0.1	4.3	90		14	BZA968A	
4	3	0.3	3.3	28	30		PESD3V3L4UW	
4	3	0.025	5	19	30		PESD5VOL4UW	
	4	0.1	5	75		20	BZA408B	SOT457 (SC-74)
5	4	0.3	3.3	28	25		PESD3V3L5UY PESD5V0L5UY	SOT363 (SC-88)
5	4	0.025	5	19	25		PESD3V3L5UV PESD5V0L5UV	SOT666
6	5	0.025	5	19	35		PESD5V0L6US	SOT96-1 (SO8)
							PESD5V0L6UAS***	SOT505-1 (TSSOP8)
	7	0.025	5	10	35		PESD5V0L7BS	SOT96-1 (SO8)
							PESD55V0L7BAS***	SOT505-1 (TSSOP8)
18	17	1	5.2	100	100	27.5	BZA100	SOT163 (SO20)
							PESD5V2S18U	SOT339-1 (SSOP20)
	1	0.1	5	45		120	PESD5V0S1BA	SOD323 (SC-76)
	1	0.1	5	45		120	PESD5V0S1BB	SOD523 (SC-79)
	1	0.1	5	45		120	PESD5V0S1BL	SOD882
2	1	2	3.3	300		330		SOT23
2	1	1	5	200		260	PESD5V2S2UAT	
2	1	0.05	12	75		180	PESD12VS2UAT	
2	1	0.05	15	70		160	PESD15VS2UAT	
2	1	0.05	24	50		160	PESD24VS2UAT	
2	1	1	3.3	300		330	PESD3V3S2UT	SOT23
2	1	1	5.25	200		260	PESD5V2S2UT	
2	1	1	12	75		180	PESD12VS2UT	
2	1	1	15	70		160	PESD15VS2UT	
2	1	1	24	50		160	PESD24VS2UT	
2	1	3	3.3	275		110	PESD3V3S2UQ	SOT663
2	1	0.3	5	215		110	PESD5V0S2UQ	
2	1	0.03	12	100		110	PESD12VS2UQ	
2	1		15	70			PESD15VS2UQ***	
2	1		24	50			PESD24VS2UQ***	
2	1	0.3	3.3	28		30	PESD3V3L2UM	SOT883
2	1	0.025	5	19		30	PESD5V0L2UM	
	2	0.1	5	45		120	PESD5V0S2BT	SOT23

** 8/20 µs surge pulse acc. to IEC61000-4-5 **square pulse; tp = 1 ms *** device is under development*

Single Resistor-Equipped Transistors (RET)

Package				SOT346 (SC-59)		SOT23		SOT323 (SC-70)		SOT416 (SC-75)		SOT490 (SC-89)		SOT883 (SC-101)		SOT54 (TO-92)	
P_{tot}				250 mW		250 mW		200 mW		150 mW		250 mW		250 mW		500 mW	
		R1 (kΩ)	R2 (kΩ)	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP
I_C = 100 mA	V_{CEO} = 50 V	1	1	PDTC113EK	PDTA113EK	PDTC113ET	PDTA113ET	PDTC113EU	PDTA113EU	PDTC113EE	PDTA113EE	PDTC113EEF	PDTA113EEF	PDTC113EM	PDTA113EM	PDTC113ES	PDTA113ES
	R1 = R2	2.2	2.2	PDTC123EK	PDTA123EK	PDTC123ET	PDTA123ET	PDTC123EU	PDTA123EU	PDTC123EE	PDTA123EE	PDTC123EEF	PDTA123EEF	PDTC123EM	PDTA123EM	PDTC123ES	PDTA123ES
		4.7	4.7	PDTC143EK	PDTA143EK	PDTC143ET	PDTA143ET	PDTC143EU	PDTA143EU	PDTC143EE	PDTA143EE	PDTC143EEF	PDTA143EEF	PDTC143EM	PDTA143EM	PDTC143ES	PDTA143ES
		10	10	PDTC114EK	PDTA114EK	PDTC114ET	PDTA114ET	PDTC114EU	PDTA114EU	PDTC114EE	PDTA114EE	PDTC114EEF	PDTA114EEF	PDTC114EM	PDTA114EM	PDTC114ES	PDTA114ES
		22	22	PDTC124EK	PDTA124EK	PDTC124ET	PDTA124ET	PDTC124EU	PDTA124EU	PDTC124EE	PDTA124EE	PDTC124EEF	PDTA124EEF	PDTC124EM	PDTA124EM	PDTC124ES	PDTA124ES
		47	47	PDTC144EK	PDTA144EK	PDTC144ET	PDTA144ET	PDTC144EU	PDTA144EU	PDTC144EE	PDTA144EE	PDTC144EEF	PDTA144EEF	PDTC144EM	PDTA144EM	PDTC144ES	PDTA144ES
		100	100	PDTC115EK	PDTA115EK	PDTC115ET	PDTA115ET	PDTC115EU	PDTA115EU	PDTC115EE	PDTA115EE	PDTC115EEF	PDTA115EEF	PDTC115EM	PDTA115EM	PDTC115ES	PDTA115ES
	R1 ≠ R2	1	10	PDTC113ZK	PDTA113ZK	PDTC113ZT	PDTA113ZT	PDTC113ZU	PDTA113ZU	PDTC113ZE	PDTA113ZE	PDTC113ZEF	PDTA113ZEF	PDTC113ZM	PDTA113ZM	PDTC113ZS	PDTA113ZS
		2.2	10	PDTC123YK	PDTA123YK	PDTC123YT	PDTA123YT	PDTC123YU	PDTA123YU	PDTC123YE	PDTA123YE	PDTC123YEF	PDTA123YEF	PDTC123YM	PDTA123YM	PDTC123YS	PDTA123YS
		2.2	47	PDTC123JK	PDTA123JK	PDTC123JT	PDTA123JT	PDTC123JU	PDTA123JU	PDTC123JE	PDTA123JE	PDTC123JEF	PDTA123JEF	PDTC123JM	PDTA123JM	PDTC123JS	PDTA123JS
		4.7	10	PDTC143XK	PDTA143XK	PDTC143XT	PDTA143XT	PDTC143XU	PDTA143XU	PDTC143XE	PDTA143XE	PDTC143XEF	PDTA143XEF	PDTC143XM	PDTA143XM	PDTC143XS	PDTA143XS
		4.7	47	PDTC143ZK	PDTA143ZK	PDTC143ZT	PDTA143ZT	PDTC143ZU	PDTA143ZU	PDTC143ZE	PDTA143ZE	PDTC143ZEF	PDTA143ZEF	PDTC143ZM	PDTA143ZM	PDTC143ZS	PDTA143ZS
		10	47	PDTC114YK	PDTA114YK	PDTC114YT	PDTA114YT	PDTC114YU	PDTA114YU	PDTC114YE	PDTA114YE	PDTC114YEF	PDTA114YEF	PDTC114YM	PDTA114YM	PDTC114YS	PDTA114YS
		22	47	PDTC124XK	PDTA124XK	PDTC124XT	PDTA124XT	PDTC124XU	PDTA124XU	PDTC124XE	PDTA124XE	PDTC124XEF	PDTA124XEF	PDTC124XM	PDTA124XM	PDTC124XS	PDTA124XS
		47	10	PDTC144VK	PDTA144VK	PDTC144VT	PDTA144VT	PDTC144VU	PDTA144VU	PDTC144VE	PDTA144VE	PDTC144VEF	PDTA144VEF	PDTC144VM	PDTA144VM	PDTC144VS	PDTA144VS
		47	22	PDTC144WK	PDTA144WK	PDTC144WT	PDTA144WT	PDTC144WU	PDTA144WU	PDTC144WE	PDTA144WE	PDTC144WEF	PDTA144WEF	PDTC144WM	PDTA144WM	PDTC144WS	PDTA144WS
	Only R1	4.7	—	PDTC143TK	PDTA143TK	PDTC143TT	PDTA143TT	PDTC143TU	PDTA143TU	PDTC143TE	PDTA143TE	PDTC143TEF	PDTA143TEF	PDTC143TM	PDTA143TM	PDTC143TS	PDTA143TS
		10	—	PDTC114TK	PDTA114TK	PDTC114TT	PDTA114TT	PDTC114TU	PDTA114TU	PDTC114TE	PDTA114TE	PDTC114TEF	PDTA114TEF	PDTC114TM	PDTA114TM	PDTC114TS	PDTA114TS
		22	—	PDTC124TK	PDTA124TK	PDTC124TT	PDTA124TT	PDTC124TU	PDTA124TU	PDTC124TE	PDTA124TE	PDTC124TEF	PDTA124TEF	PDTC124TM	PDTA124TM	PDTC124TS	PDTA124TS
		47	—	PDTC144TK	PDTA144TK	PDTC144TT	PDTA144TT	PDTC144TU	PDTA144TU	PDTC144TE	PDTA144TE	PDTC144TEF	PDTA144TEF	PDTC144TM	PDTA144TM	PDTC144TS	PDTA144TS
		100	—	PDTC115TK	PDTA115TK	PDTC115TT	PDTA115TT	PDTC115TU	PDTA115TU	PDTC115TE	PDTA115TE	PDTC115TEF	PDTA115TEF	PDTC115TM	PDTA115TM	PDTC115TS	PDTA115TS

Release Q1 2004 *Types under development*

Double Resistor-Equipped Transistors

Package				SOT457 (SC-74)		SOT363 (SC-88)			SOT666		
P_{tot}				600 mW		300 mW					
		R1 (kΩ)	R2 (kΩ)	NPN	NPN/PNP	NPN	NPN/PNP	PNP	NPN	NPN/PNP	PNP
I_C = 100 mA	V_{CEO} = 50 V	2.2	2.2			PUMH20	PUMD20	PUMB20	PEMH20	PEMD20	PEMB20
	R1 = R2	4.7	4.7			PUMH15	PUMD15	PUMB15	PEMH15	PEMD15	PEMB15
		10	10			PUMH11	PUMD3	PUMB11	PEMH11	PEMD3	PEMB11
		22	22		PIMD2	PUMH1	PUMD2	PUMB1	PEMH1	PEMD2	PEMB1
		47	47			PUMH2	PUMD12	PUMB2	PEMH2	PEMD12	PEMB2
		100	100			PUM24	PUMBD4	PEMB24	PEM24	PEMD24	PEMB24
	R1 ≠ R2	2.2	47			PUMH10	PUMD10	PUMB10	PEMH10	PEMD10	PEMB10
		4.7	10			PUMH18	PUMD18	PUMB18	PEMH18	PEMD18	PEMB18
		4.7	47			PUMH13	PUMD13	PUMB13	PEMH13	PEMD13	PEMB13
		10	47	PIMH9		PUMH9	PUMD9	PUMB9	PEMH9	PEMD9	PEMB9
		22	47			PUMH16	PUMD16	PUMB16	PEMH16	PEMD16	PEMB16
		47	22			PUMH17	PUMD17	PUMB17	PEMH17	PEMD17	PEMB17
		47/22	47/47				PUMD48			PEMD48	
	Only R1	4.7	—			PUMH7	PUMD6	PUMB3	PEMH7	PEMD6	PEMB3
		10	—			PUMH4	PUMD4	PUMB4	PEMH4	PEMD4	PEMB4
		22	—			PUMH19	PUMD19	PUMB19	PEMH19	PEMD19	PEMB19
		47	—			PUMH14	PUMD14	PUMB14	PEMH14	PEMD14	PEMB14

types under development

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