



**1998**

**Data Handbook IC22  
CD-ROM included**

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## **QUALITY ASSURED**

Our quality system focuses on the continuing high quality of our components and the best possible service for our customers. We have a three-sided quality strategy: we apply a system of total quality control and assurance; we operate customer-oriented dynamic improvement programmes; and we promote a partnering relationship with our customers and suppliers.

## **PRODUCT SAFETY**

In striving for state-of-the-art perfection, we continuously improve components and processes with respect to environmental demands. Our components offer no hazard to the environment in normal use when operated or stored within the limits specified in the data sheet.

Some components unavoidably contain substances that, if exposed by accident or misuse, are potentially hazardous to health. Users of these components are informed of the danger by warning notices in the data sheets supporting the components. Where necessary the warning notices also indicate safety precautions to be taken and disposal instructions to be followed. Obviously users of these components, in general the set-making industry, assume responsibility towards the consumer with respect to safety matters and environmental demands.

All used or obsolete components should be disposed of according to the regulations applying at the disposal location. Depending on the location, electronic components are considered to be 'chemical', 'special' or sometimes 'industrial' waste. Disposal as domestic waste is usually not permitted.

# Multimedia ICs

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## DEFINITIONS

<b>Data sheet status</b>	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Short-form specification	The data in this specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.
<b>Limiting values</b>	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

## LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

## PURCHASE OF PHILIPS I<sup>2</sup>C COMPONENTS



Purchase of Philips I<sup>2</sup>C components conveys a license under the Philips' I<sup>2</sup>C patent to use the components in the I<sup>2</sup>C system provided the system conforms to the I<sup>2</sup>C specification defined by Philips. This specification can be ordered using the code 9398 393 40011.

## INDEX

Types added to the range since the last issue of data handbook IC22 (1997) are shown **bold**

FI1216 MK2	Desktop video tuner system CCIR B/G
FI1216MF MK2	Desktop video tuner multi system CCIR L/L' and B/G
FI1236 MK2	Desktop video tuner system RTMA M/N
FI1246 MK2	Desktop video tuner system CCIR I
FI1256 MK2	Desktop video tuner system CCIR D/K
<b>FM1216</b>	Desktop video & FM radio module system B/G
<b>FM1236</b>	Desktop video & FM radio module system M, N
<b>FM1246</b>	Desktop video & FM radio module system CCIR I
OM5610	Multimedia radio tuner
OQ8868	Digital Servo Integrated Circuit Silent (DSICS)
PCA8581; PCA8581C	128 x 8-bit EEPROM with I <sup>2</sup> C-bus interface
PCF8574	Remote 8-bit I/O expander for I <sup>2</sup> C-bus
PCF8584	I <sup>2</sup> C-bus controller
<b>PDI1394L11</b>	1394 AV Link layer controller
<b>PDI1394P11</b>	3-Port physical layer interface
<b>PDIUSBH11</b>	Universal Serial Bus hub
<b>PDIUSBP11</b>	Universal Serial Bus transceiver
PR31500	MIPS Poseidon embedded processor
SAA2502	ISO/MPEG Audio Source Decoder
SAA2503	MPEG2 audio decoder
SAA5249	Integrated VIP and Teletext with Background Memory Controller (IVT1.1BMCX)
SAA5254	Integrated VIP and teletext decoder (IVT1.1X)
SAA5281	Integrated Video input processor and Teletext decoder (IVT1.8*)
<b>SAA5284</b>	Multimedia video data acquisition circuit
SAA5x9x family	Economy teletext and TV microcontrollers
SAA7110; SAA7110A	One Chip Front-end 1 (OCF1)
SAA7111	Video Input Processor (VIP)
SAA7111A	Enhanced Video Input Processor (EVIP)
SAA7112	Decoder with High-Performance Scaler (HPS) for Image Port (PELICAN)
<b>SAA7120; SAA7121</b>	Digital Video Encoder (ConDENC)
SAA7124/25	Digital Video Encoder (ECO-DENC)
SAA7140A; SAA7140B	High Performance Scaler (HPS)
SAA7151B	Digital multistandard colour decoder with SCART interface (DMSD2-SCART)
SAA7152	Digital Video Comb Filter (DCF)
SAA7157	Clock signal generator circuit for digital TV systems (SCGC)
<b>SAA7182; SAA7183</b>	Digital Video Encoder (EURO-DENC)
SAA7182A; SAA7183A	Digital Video Encoder (EURO-DENC2)
SAA7184; SAA7185B	Digital Video Encoders (DENC2-M6)
SAA7185	Digital Video Encoder (DENC2)
SAA7186	Digital video scaler

SAA7187	Digital video encoder (DENC2-SQ)
SAA7191B	Digital Multistandard Colour Decoder, Square Pixel (DMSD-SQP)
<b>SAA7196</b>	Digital video decoder, Scaler and Clock generator circuit (DESCPro)
SAA7197	Clock Generator Circuit for desktop video systems (SCG)
SAA7199B	Digital Video Encoder (DENC), GENLOCK-capable
SAA7201	Integrated MPEG2 AVG decoder
<b>SAA7205H</b>	MPEG-2 systems demultiplexer
SAA7206H	DVB compliant descrambler
SAA7207H	Reed Solomon decoder IC
<b>SAA7348GP</b>	All Compact Disc Engine (ACE)
SAA7360	Bitstream conversion ADC for digital audio systems
SAA7366	Bitstream conversion ADC for digital audio systems
SAA7367	Bitstream conversion ADC for digital audio systems
SAA7370A	Digital servo processor and Compact Disc decoder (CD7)
SAA7385	Error correction and host interface IC for CD-ROM (SEQUOIA)
SAA7388	Error correction and host interface IC for CD-ROM (ELM)
SAA7390	High performance Compact Disc-Recordable (CD-R) controller
TDA1305T	Stereo 1fs data input up-sampling filter with bitstream continuous calibration dual DAC (BBC-DAC2)
TDA1306T	Noise shaping filter DAC
TDA1308	Class AB stereo headphone driver
TDA1309H	Low-voltage low-power stereo bitstream ADC/DAC
TDA1311A	Stereo Continuous Calibration DAC (CC-DAC)
TDA1387T	Stereo Continuous Calibration DAC (CC-DAC)
TDA1388T	Bitstream continuous calibration filter-DAC for CD-ROM audio applications
TDA1517	2 x 6 W stereo car radio power amplifier
TDA1519	2 x 6 W stereo car radio power amplifier
TDA1548T	Bitstream continuous calibration filter-DAC with headphone driver and DSP
TDA2615	2 x 6 W hi-fi audio power amplifier
TDA2616/TDA2616Q	2 x 12 W hi-fi audio power amplifiers with mute
TDA4855	Autosync Deflection Controller ASDC
<b>TDA4858</b>	Economic Autosync Deflection Controller EASDC
TDA4861	Vertical deflection power amplifier for monitors
<b>TDA4866</b>	Full bridge current driven vertical deflection booster
<b>TDA4882</b>	Advanced monitor video controller for OSD
<b>TDA4885</b>	150 MHz video controller with I <sup>2</sup> C-bus
TDA7053A	Stereo BTL audio output amplifier with DC volume control
TDA7057AQ	2 x 5 W stereo BTL audio output amplifier with DC volume control
TDA8040T	Quadrature demodulator
TDA8041H	Quadrature demodulator controller
<b>TDA8042M</b>	Quadrature demodulator

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<b>TDA8043</b>	Satellite Demodulator and Decoder (SDD)
TDA8046H	Multi-mode QAM demodulator
TDA8351	DC-coupled vertical deflection circuit
TDA8444	Octuple 6-bit DAC with I <sup>2</sup> C-bus
TDA8540	4 x 4 video switch matrix
TDA8542	2 x 1 W BTL audio amplifier
TDA8559	Low-voltage stereo headphone amplifier
TDA8705A	6-bit high-speed dual analog-to-digital converter
TDA8707	Triple RGB 6-bit Video analog-to-digital interface
TDA8708A	Video analog input interface
TDA8708B	Video analog input interface
TDA8709A	Video analog input interface
TDA8758	YC 8-bit low-power analog-to-digital Video interface
TDA8771A	Triple 8-bit video Digital-to-Analog Converter (DAC)
TDA8772; TDA8772A	Triple 8-bit video digital-to-analog converter
TDA8785	8-bit high-speed analog-to-digital convertor with gain and offset controls
TDA8786; TDA8786A	10-bit analog-to-digital interface for CCD cameras
TDA8790	8-bit, 40 Msps 2.7 to 5.5 V universal analog-to-digital converter
TDA9819	Multistandard vision and sound-IF PLL with DVB-IF processing
TDA9850	I <sup>2</sup> C-bus controlled BTSC stereo/SAP decoder
TDA9852	I <sup>2</sup> C-bus controlled BTSC stereo/SAP decoder and audio processor
TDA9855	I <sup>2</sup> C-bus controlled BTSC stereo/SAP decoder and audio processor
TEA6300; TEA6300T	Sound fader control circuit
TEA6320	Sound fader control circuit
TEA6330T	Sound fader control circuit for car radios
<b>TZA1015</b>	Data amplifier and laser supply circuit for CD and read-only optical systems (HDALAS)
<b>UCB1100</b>	Advanced modem/audio analog front-end
<b>UDA1309H</b>	Low-power stereo bitstream ADC/DAC
<b>UDA1321</b>	Universal Serial Bus Audio Converter
<b>UDA1340</b>	Low-voltage low-power stereo audio CODEC with DSP features



## **SELECTION GUIDES**

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**AUDIO ANALOG-TO-DIGITAL  
CONVERSION**

SAA7360	Bitstream conversion ADC for digital audio systems
SAA7366	Bitstream conversion ADC for digital audio systems
SAA7367	Bitstream conversion ADC for digital audio systems

**AUDIO DIGITAL-TO-ANALOG  
CONVERSION**

TDA1305T	Stereo 1fs data input up-sampling filter with bitstream continuous calibration dual DAC (BBC-DAC2)
TDA1306T	Noise shaping filter DAC
TDA1311A	Stereo Continuous Calibration DAC (CC-DAC)
TDA1387T	Stereo Continuous Calibration DAC (CC-DAC)
TDA1388T	Bitstream continuous calibration filter-DAC for CD-ROM audio applications
TDA1548T	Bitstream continuous calibration filter-DAC with headphone driver and DSP

**AUDIO POWER AMPLIFIERS**

TDA1308	Class AB stereo headphone driver
TDA1517	2 x 6 W stereo car radio power amplifier
TDA1519	2 x 6 W stereo car radio power amplifier
TDA2615	2 x 6 W hi-fi audio power amplifier
TDA2616/TDA2616Q	2 x 12 W hi-fi audio power amplifiers with mute
TDA7053A	Stereo BTL audio output amplifier with DC volume control
TDA7057AQ	2 x 5 W stereo BTL audio output amplifier with DC volume control
TDA8542	2 x 1 W BTL audio amplifier
TDA8559	Low-voltage stereo headphone amplifier

**AUDIO CODECS**

TDA1309H	Low-voltage low-power stereo bitstream ADC/DAC
UDA1309H	Low-power stereo bitstream ADC/DAC
UDA1340	Low-voltage low-power stereo audio CODEC with DSP features

**AUDIO TONE CONTROL**

TEA6300; TEA6300T	Sound fader control circuit
TEA6320	Sound fader control circuit
TEA6330T	Sound fader control circuit for car radios

**AUDIO STEREO DECODERS**

TDA9850	I <sup>2</sup> C-bus controlled BTSC stereo/SAP decoder
TDA9852	I <sup>2</sup> C-bus controlled BTSC stereo/SAP decoder and audio processor
TDA9855	I <sup>2</sup> C-bus controlled BTSC stereo/SAP decoder and audio processor

**AUXILIARY FUNCTIONS**

PCA8581; PCA8581C	128 x 8-bit EEPROM with I <sup>2</sup> C-bus interface
PCF8574	Remote 8-bit I/O expander for I <sup>2</sup> C-bus
PCF8584	I <sup>2</sup> C-bus controller
TDA8444	Octuple 6-bit DAC with I <sup>2</sup> C-bus
TDA8540	4 x 4 video switch matrix

**CAMERA ICs**

TDA8785	8-bit high-speed analog-to-digital convertor with gain and offset controls
TDA8786; TDA8786A	10-bit analog-to-digital interface for CCD cameras

**CD/DVD SCSI AND IDE INTERFACE ICs**

SAA7370A	Digital servo processor and Compact Disc decoder (CD7)
SAA7385	Error correction and host interface IC for CD-ROM (SEQUOIA)
SAA7388	Error correction and host interface IC for CD-ROM (ELM)
SAA7390	High performance Compact Disc-Recordable (CD-R) controller

**CD/DVD DECODERS AND ASSOCIATED ICs**

SAA7348GP	All Compact Disc Engine (ACE)
OQ8868	Digital Servo Integrated Circuit Silent (DSICS)
TZA1015	Data amplifier and laser supply circuit for CD and read-only optical systems (HDALAS)

**DIGITAL SATELLITE AND CABLE ICs**

SAA7201	Integrated MPEG2 AVG decoder
SAA7205H	MPEG-2 systems demultiplexer
SAA7206H	DVB compliant descrambler
SAA7207H	Reed Solomon decoder IC
TDA8040T	Quadrature demodulator
TDA8041H	Quadrature demodulator controller

TDA8042M	Quadrature demodulator
TDA8043	Satellite Demodulator and Decoder (SDD)
TDA8046H	Multi-mode QAM demodulator
TDA9819	Multistandard vision and sound-IF PLL with DVB-IF processing

**MONITOR ICs**

TDA4855	Autosync Deflection Controller ASDC
TDA4858	Economic Autosync Deflection Controller EASDC
TDA4861	Vertical deflection power amplifier for monitors
TDA4866	Full bridge current driven vertical deflection booster
TDA4882	Advanced monitor video controller for OSD
TDA4885	150 MHz video controller with I <sup>2</sup> C-bus
TDA8351	DC-coupled vertical deflection circuit

**MPEG**

SAA7201	Integrated MPEG2 AVG decoder
SAA2502	ISO/MPEG Audio Source Decoder
SAA2503	MPEG2 audio decoder

**TELETEXT AND CLOSE CAPTIONING**

SAA5249	Integrated VIP and Teletext with Background Memory Controller (IVT1.1BMCX)
SAA5254	Integrated VIP and teletext decoder (IVT1.1X)
SAA5281	Integrated Video input processor and Teletext decoder (IVT1.8*)
SAA5284	Multimedia video data acquisition circuit
SAA5x9x family	Economy teletext and TV microcontrollers

**TUNERS: TV, CABLE TV AND FM RADIO****TV and cable tuners**

F11216 MK2	Desktop video tuner system CCIR B/G
F11216MF MK2	Desktop video tuner multi system CCIR L/L' and B/G
F11236 MK2	Desktop video tuner system RTMA M/N
F11246 MK2	Desktop video tuner system CCIR I
F11256 MK2	Desktop video tuner system CCIR D/K

**TV, cable and radio tuners**

FM1216	Desktop video & FM radio module system B/G
FM1236	Desktop video & FM radio module system M, N
FM1246	Desktop video & FM radio module system CCIR I

**FM radio tuners**

OM5610	Multimedia radio tuner
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**VIDEO ANALOG-TO-DIGITAL CONVERSION**

TDA8705A	6-bit high-speed dual analog-to-digital converter
TDA8707	Triple RGB 6-bit Video analog-to-digital interface
TDA8708A	Video analog input interface
TDA8708B	Video analog input interface
TDA8709A	Video analog input interface
TDA8758	YC 8-bit low-power analog-to-digital Video interface
TDA8785	8-bit high-speed analog-to-digital convertor with gain and offset controls
TDA8786; TDA8786A	10-bit analog-to-digital interface for CCD cameras
TDA8790	8-bit, 40 Msps 2.7 to 5.5 V universal analog-to-digital converter

**VIDEO DIGITAL-TO-ANALOG CONVERSION**

TDA8771A	Triple 8-bit video Digital-to-Analog Converter (DAC)
TDA8772; TDA8772A	Triple 8-bit video digital-to-analog converter

**VIDEO DECODERS**

SAA7110; SAA7110A	One Chip Front-end 1 (OCF1)
SAA7111	Video Input Processor (VIP)
SAA7111A	Enhanced Video Input Processor (EVIP)
SAA7112	Decoder with High-Performance Scaler (HPS) for Image Port (PELICAN)
SAA7151B	Digital multistandard colour decoder with SCART interface (DMSD2-SCART)
SAA7157	Clock signal generator circuit for digital TV systems (SCGC)
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SAA7196	Digital video decoder, Scaler and Clock generator circuit (DESCPro)
SAA7197	Clock Generator Circuit for desktop video systems (SCGC)

**VIDEO ENCODERS**

SAA7120; SAA7121	Digital Video Encoder (ConDENC)
SAA7124/25	Digital Video Encoder (ECO-DENC)
SAA7182; SAA7183	Digital Video Encoder (EURO-DENC)
SAA7182A; SAA7183A	Digital Video Encoder (EURO-DENC2)
SAA7185	Digital Video Encoder (DENC2)
SAA7184; SAA7185B	Digital Video Encoders (DENC2-M6)
SAA7187	Digital video encoder (DENC2-SQ)
SAA7199B	Digital Video Encoder (DENC), GENLOCK-capable

**VIDEO PROCESSING**

SAA7140A; SAA7140B	High Performance Scaler (HPS)
SAA7152	Digital video comb filter (DCF)
SAA7186	Digital video scaler

**PDA/PIC/HPC SOLUTIONS**

PR31500	MIPS Poseidon embedded processor
UCB1100	Advanced modem/Audio analog front-end

**BUS ICs****Universal serial bus ICs**

PDIUSBH11	Universal Serial Bus hub
PDIUSBP11	Universal Serial Bus transceiver
UDA1321	Universal Serial Bus (USB) Digital-to-Analog converter (DAC)r

**IEEE1394 ICs**

PDI1394L11	1394 AV Link layer controller
PDI1394P11	3-port physical layer interface

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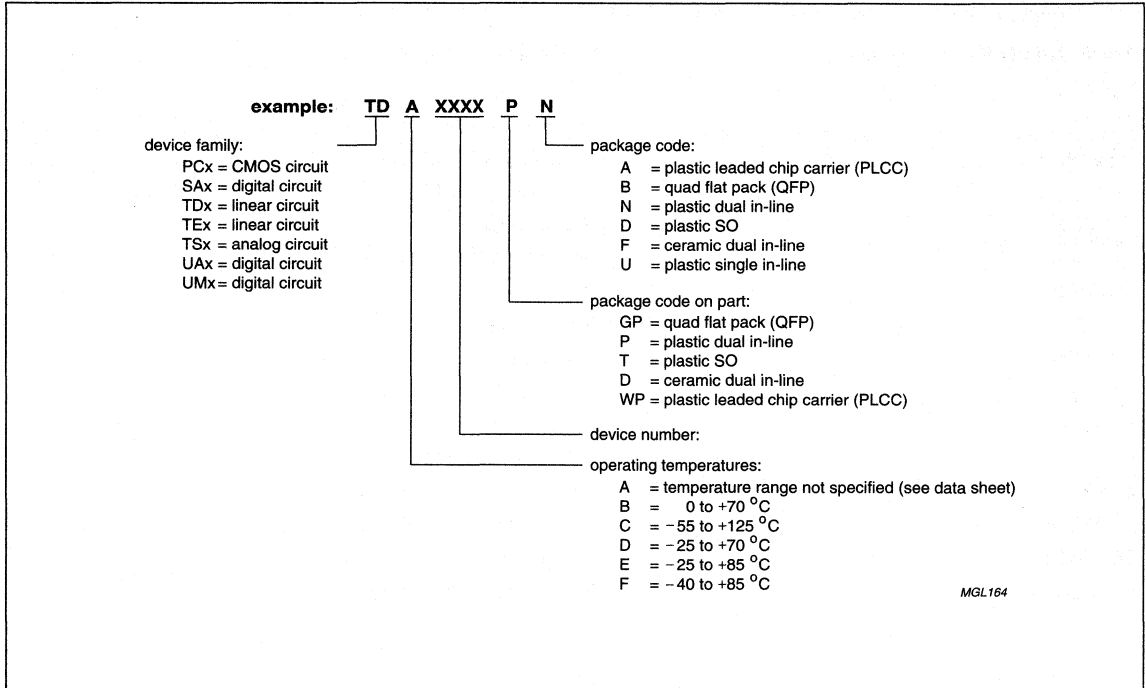
**Replacement list****Selection guide**

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**REPLACEMENT/WITHDRAWAL TYPES**

The following type numbers were in the previous issue of IC22, but not in the current version:

<b>TYPE NUMBER</b>	<b>REASON FOR DELETION</b>
90C24A	Discontinued
FR1216	Replaced by FM1216
FR1236	Replaced by FM1236
FR1246	Replaced by FM1246
FR1256	Discontinued
OM5604	Replaced by OM5610
OM5606	Discontinued
OM5608	Discontinued
SAA5246A	Removed from handbook
SAA5252	Removed from handbook
SAA7146	Removed from handbook
SAA7165	To be discontinued
SAA7167A	Removed from handbook
TDA1396	Removed from handbook
TEA5582	Discontinued
UDA1320	Removed from handbook





## Internet World Wide Web Home Page

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### WHAT IS IT?

Welcome to our place in cyberspace.

The Multimedia Group now has its own home page within Philips Semiconductors. Explore our Web pages and take a look at our product offering of advance High-performance Digital Video and Audio Processing Applications and Products.

In addition we offer you the latest information on Products, News, Support, Employment and Offices.

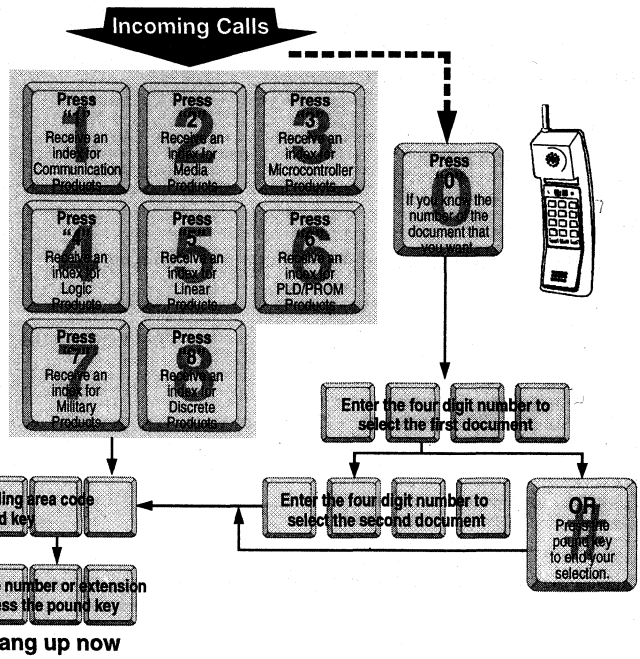
### HOW TO REACH US

For access to the Philips Semiconductors Home Page go to the World Wide Web location:

<http://www.semiconductors.philips.com>

You can find us in the Product category of Multimedia Products.

# FAX-on-DEMAND System



## What is it?

The FAX-on-DEMAND system is a computer facsimile system that allows customers to receive selected documents by fax automatically.

## How does it work?

To order a document, you simply enter the document number. This number can be obtained by asking for an index of available documents to be faxed to you the first time you call the system.

Our system has a selection of the latest product data sheets from Philips with varying page counts. As you know, it takes approximately one minute to FAX one page. This isn't bad if the number of pages is less than 10. But if the document is 37 pages long, be ready for a long transmission!

Philips Semiconductors also maintains product information on the World-Wide Web. Our home page can be located at:  
<http://www.semiconductors.philips.com>

## Who do I contact if I have a question about FAX-on-DEMAND?

Contact your local Philips sales office.

## FAX-on-DEMAND phone numbers:

England (United Kingdom, Ireland)	44-181-730-5020
France	33-1-40-99-60-60
Italy	39-167-295502
North America	1-800-282-2000

## Locations soon to be in operation:

- Hong Kong
- Japan
- The Netherlands

## **GENERAL**

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**TOTAL QUALITY MANAGEMENT**

Philips Semiconductors is a Quality Company, renowned for the high quality of our products and service. We keep alive this tradition by constantly aiming towards one ultimate standard, that of zero defects. This aim is guided by our Total Quality Management (TQM) system, the basis of which is described in the following paragraphs.

**Quality assurance**

Based on ISO 9000 standards, customer standards such as Ford TQE and IBM MDQ. Our factories are certified to ISO 9000 by external inspectorates.

**Partnerships with customers**

PPM co-operations, design-in agreements, ship-to-stock, just-in-time and self-qualification programmes, and application support.

**Partnerships with suppliers**

Ship-to-stock, statistical process control and ISO 9000 audits.

**Quality improvement programme**

Continuous process and system improvement, design improvement, complete use of statistical process control, realization of our final objective of zero defects, and logistics improvement by ship-to-stock and just-in-time agreements.

**ADVANCED QUALITY PLANNING**

During the design and development of new products and processes, quality is built-in by advanced quality planning. Through failure-mode-and-effect analysis the critical parameters are detected and measures taken to ensure good performance on these parameters. The capability of process steps is also planned in this phase.

**PRODUCT CONFORMANCE**

The assurance of product conformance is an integral part of our quality assurance (QA) practice. This is achieved by:

- Incoming material management through partnerships with suppliers.
- In-line quality assurance to monitor process reproducibility during manufacture and initiate any necessary corrective action. Critical process steps are 100% under statistical process control.
- Acceptance tests on finished products to verify conformance with the device specification. The test results are used for quality feedback and corrective actions. The inspection and test requirements are detailed in the general quality specifications.
- Periodic inspections to monitor and measure the conformance of products.

**PRODUCT RELIABILITY**

With the increasing complexity of Original Equipment Manufacturer (OEM) equipment, component reliability must be extremely high. Our research laboratories and development departments study the failure mechanisms of semiconductors. Their studies result in design rules and process optimization for the highest built-in product reliability. Highly accelerated tests are applied to the products reliability evaluation. Rejects from reliability tests and from customer complaints are submitted to failure analysis, to result in corrective action.

**CUSTOMER RESPONSES**

Our quality improvement depends on joint action with our customer. We need our customer's inputs and we invite constructive comments on all aspects of our performance. Please contact our local sales representative.

**RECOGNITION**

The high quality of our products and services is demonstrated by many Quality Awards granted by major customers and international organizations.

## General

## Pro electron type numbering of integrated circuits

### BASIC TYPE NUMBER

This type designation code applies to semiconductor monolithic, semiconductor multi-chip, thin film, thick film and hybrid integrated circuits. The basic type number comprises three letters followed by a serial number.

#### First and second letters

##### DIGITAL FAMILY CIRCUITS

The first two letters identify the family.<sup>(1)</sup>

##### SOLITARY CIRCUITS

The first letter divides solitary circuits into:

- S Solitary digital circuits
- T Analog circuits
- U Mixed analog/digital circuits.

The second letter is a serial letter without any further significance except 'H' which stands for hybrid circuits.<sup>(2)</sup>

##### MICROPROCESSORS

The first two letters identify microprocessors and related circuits:

- MA Microcomputer or central processing unit
- MB Slice processor (functional slice of microprocessor)
- MD Related memories
- ME Other related circuits such as interfaces, clocks, peripheral controllers, etc.

##### CHARGE-TRANSFER DEVICES AND SWITCHED CAPACITORS

The first two letters identify:

- NH Hybrid circuits
- NL Logic circuits
- NM Memories
- NS Analog signal processing using switched capacitors
- NT Analog signal processing using charge-transfer devices
- NX Imaging devices
- NY Other related circuits.

(1) A logic family is an assembly of digital circuits designed to be interconnected and defined by its base electrical characteristics, such as supply voltage, power consumption, propagation delay, noise immunity.

(2) The first letter 'S' should be used for all solitary memories, to which, in the event of hybrids, the second letter 'H' should be added, for example, SH for bubble memories.

### Third letter

The third letter indicates the operating ambient temperature range:

- A temperature range not specified below
- B 0 to +70 °C
- C -55 to +125 °C
- D -25 to +70 °C
- E -25 to +85 °C
- F -40 to +85 °C
- G -55 to +85 °C.

If a device has another temperature range, the letter 'A' or a letter indicating a narrower temperature may be used, for example, the range of 0 to +75 °C can be indicated by 'A' or 'B'. Should two devices with the same basic type number both have temperature ranges other than those specified, one would use the letter 'A' and the other the letter 'X'.

### SERIAL NUMBER

This may be a four-digit number assigned by Pro Electron, or the serial number (which may be a combination of figures and letters) of an existing company type designation of the manufacturer.

### VERSION LETTER

A single version letter may be added to the basic type number. This indicates a minor variant of the basic type or the package. The version letter has no fixed meaning except for 'Z' which means customized wiring. The following letters are recommended for package variants:

- C Cylindrical
- D Ceramic dual in-line (CERDIL, CERDIP)
- F Flat pack (two leads)
- G Flat pack (four leads)
- H Quad flat pack (QFP)
- L Chip on tape (foil)
- P Plastic dual in-line (DIL)
- Q Quad in-line (QUIL)
- T Mini pack (SOL, SO, VSO)
- U Uncased chip.

**TWO-LETTER SUFFIX**

A two-letter suffix may be used instead of a single package version letter to give more information. To avoid confusion with serial numbers that end with a letter, a hyphen should precede the suffix.

**First letter (general shape)**

- C Cylindrical
- D Dual in-line (DIL)
- E Power DIL (with external heatsink)
- F Flat pack (leads on two sides)
- G Flat pack (leads on four sides)
- H Quad flat pack (QFP)
- K Diamond (TO-3 family)
- M Multiple in-line (except dual, triple and quad)
- Q Quad in-line (QUIL)
- R Power QUIL (with external heatsink)
- S Single in-line (SIL)
- T Triple in-line
- W Leaded chip carrier (LCC)
- X Leadless chip carrier (LLCC)
- Y Pin grid array (PGA).

**Second letter (material)**

- C Metal-ceramic
- G Glass-ceramic
- M Metal
- P Plastic.

**EXAMPLES**

PCF1105WP: digital IC; PC family; operating temperature range  $-40$  to  $+85$  °C; serial number 1105; plastic leaded chip carrier.

GMB74LS00A-DC: digital IC; GM family; operating temperature range  $0$  to  $+70$  °C; company number 74LS00A; ceramic DIL package.

TDA1000P: analog IC; operating temperature range non-standard; serial number 1000; plastic DIL package.

SAC2000: solitary digital circuit; operating temperature range  $-55$  to  $+125$  °C; serial number 2000.

**RATING SYSTEMS**

The rating systems described are those recommended by the IEC in its publication number 134.

**Definitions of terms used****ELECTRONIC DEVICE**

An electronic tube or valve, transistor or other semiconductor device. This definition excludes inductors, capacitors, resistors and similar components.

**CHARACTERISTIC**

A characteristic is an inherent and measurable property of a device. Such a property may be electrical, mechanical, thermal, hydraulic, electro-magnetic or nuclear, and can be expressed as a value for stated or recognized conditions. A characteristic may also be a set of related values, usually shown in graphical form.

**BOGEY ELECTRONIC DEVICE**

An electronic device whose characteristics have the published nominal values for the type. A bogey electronic device for any particular application can be obtained by considering only those characteristics that are directly related to the application.

**RATING**

A value that establishes either a limiting capability or a limiting condition for an electronic device. It is determined for specified values of environment and operation, and may be stated in any suitable terms. Limiting conditions may be either maxima or minima.

**RATING SYSTEM**

The set of principles upon which ratings are established and which determine their interpretation. The rating system indicates the division of responsibility between the device manufacturer and the circuit designer, with the object of ensuring that the working conditions do not exceed the ratings.

**Absolute maximum rating system**

Absolute maximum ratings are limiting values of operating and environmental conditions applicable to any electronic device of a specified type, as defined by its published data, which should not be exceeded under the worst probable conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device, taking no responsibility for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the device under consideration and of all other electronic devices in the equipment.

The equipment manufacturer should design so that, initially and throughout the life of the device, no absolute maximum value for the intended service is exceeded with any device, under the worst probable operating conditions with respect to supply voltage variation, equipment component variation, equipment control adjustment, load variations, signal variation, environmental conditions, and variations in characteristics of the device under consideration and of all other electronic devices in the equipment.

**Design maximum rating system**

Design maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electronic device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device, taking responsibility for the effects of changes in operating conditions due to variations in the characteristics of the electronic device under consideration.

The equipment manufacturer should design so that, initially and throughout the life of the device, no design maximum value for the intended service is exceeded with a bogey electronic device, under the worst probable operating conditions with respect to supply voltage variation, equipment component variation, variation in characteristics of all other devices in the equipment, equipment control adjustment, load variation, signal variation and environmental conditions.

**Design centre rating system**

Design centre ratings are limiting values of operating and environmental conditions applicable to a bogey electronic device of a specified type as defined by its published data, and should not be exceeded under normal conditions.

## General

## Rating systems

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These values are chosen by the device manufacturer to provide acceptable serviceability of the device in average applications, taking responsibility for normal changes in operating conditions due to rated supply voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of all electronic devices.

The equipment manufacturer should design so that, initially, no design centre value for the intended service is exceeded with a bogey electronic device in equipment operating at the stated normal supply voltage.



### ELECTROSTATIC CHARGES

Electrostatic charges can exist in many things; for example, man-made-fibre clothing, moving machinery, objects with air blowing across them, plastic storage bins, sheets of paper stored in plastic envelopes, paper from electrostatic copying machines, and people. The charges are caused by friction between two surfaces, at least one of which is non-conductive. The magnitude and polarity of the charges depend on the different affinities for electrons of the two materials rubbing together, the friction force and the humidity of the surrounding air.

Electrostatic discharge is the transfer of an electrostatic charge between bodies at different potentials and occurs with direct contact or when induced by an electrostatic field. All of our MOS devices are internally protected against electrostatic discharge but they **can** be damaged if the following precautions are not taken.

### WORK STATION

Figure 1 shows a working area suitable for safely handling electrostatic sensitive devices. It has a work bench, the surface of which is conductive or covered by an antistatic sheet. Typical resistivity for the bench surface is between 1 and 500 k $\Omega$  per cm<sup>2</sup>. The floor should also be covered with antistatic material. The following precautions should be observed:

- Persons at a work bench should be earthed via a wrist strap and a resistor.
- All mains-powered electrical equipment should be connected via an earth leakage switch.
- Equipment cases should be earthed.
- Relative humidity should be maintained between 50 and 65%.
- An ionizer should be used to neutralize objects with immobile static charges.

### RECEIPT AND STORAGE

MOS devices are packed for dispatch in antistatic/conductive containers, usually boxes, tubes or blister tape. The fact that the contents are sensitive to electrostatic discharge is shown by warning labels on both primary and secondary packing.

The devices should be kept in their original packing whilst in storage. If a bulk container is partially unpacked, the unpacking should be performed at a protected work station. Any MOS devices that are stored temporarily should be packed in conductive or antistatic packing or carriers.

### ASSEMBLY

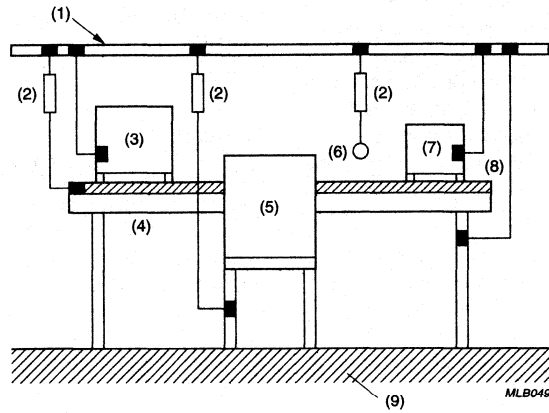
MOS devices must be removed from their protective packing with earthed component pincers or short-circuit clips. Short-circuit clips must remain in place during mounting, soldering and cleansing/drying processes. Do not remove more devices from the storage packing than are needed at any one time. Production/assembly documents should state that the product contains electrostatic sensitive devices and that special precautions need to be taken.

During assembly, ensure that the MOS devices are the last of the components to be mounted and that this is done at a protected work station.

All tools used during assembly, including soldering tools and solder baths, must be earthed. All hand tools should be of conductive or antistatic material and, where possible, should not be insulated.

Measuring and testing of completed circuit boards must be done at a protected work station. Place the soldered side of the circuit board on conductive or antistatic foam and remove the short-circuit clips. Remove the circuit board from the foam, holding the board only at the edges. Make sure the circuit board does not touch the conductive surface of the work bench. After testing, replace the circuit board on the conductive foam to await packing.

Assembled circuit boards containing MOS devices should be handled in the same way as unmounted MOS devices. They should also carry warning labels and be packed in conductive or antistatic packing.



- (1) Earthing rail.
- (2) Resistor ( $500\text{ k}\Omega \pm 10\%$ , 0.5 W).
- (3) Ionizer.
- (4) Work bench.
- (5) Chair.
- (6) Wrist strap.
- (7) Electrical equipment.
- (8) Conductive surface/antistatic sheet.
- (9) Antistatic floor.

Fig.1 Protected work station.

## **DATA HANDBOOK SYSTEM**

**DATA HANDBOOK SYSTEM**

Philips Semiconductors data handbooks contain all pertinent data available at the time of publication and each is revised and reissued regularly.

Loose data sheets are sent to subscribers to keep them up-to-date on additions or alterations made during the lifetime of a data handbook.

Catalogues are available for selected product ranges (some catalogues are also on floppy discs).

Our data handbook titles are listed here.

**Integrated circuits**

<i>Book</i>	<i>Title</i>
IC01	Semiconductors for Radio and Audio Systems
IC02	Semiconductors for Television and Video Systems
IC03	Semiconductors for Wired Telecom Systems
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IC05	Advanced Low-power Schottky (ALS) Logic
IC06	High-speed CMOS Logic Family
IC11	General-purpose/Linear ICs
IC12	I <sup>2</sup> C Peripherals
IC13	Programmable Logic Devices (PLD)
IC14	8048-based 8-bit Microcontrollers
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IC16	CMOS ICs for Clocks and Watches
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IC26	IC Package Databook
IC27	Complex Programmable Logic Devices

**Discrete semiconductors**

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SC01	Small-signal and Medium-power Diodes
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SC14	RF Wideband Transistors
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**Professional components**

PC06	Circulators and Isolators
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Our sister product division, Philips Components, also has a comprehensive data handbook system to support their products. Their data handbook titles are listed here.

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Book	Title
DC01	Colour Television Tubes
DC02	Monochrome Monitor Tubes and Deflection Units
DC03	Television Tuners, Coaxial Aerial Input Assemblies
DC04	Colour Monitor and Multimedia Tubes
DC05	Wire Wound Components

### Magnetic products

MA01	Soft Ferrites
MA03	Piezoelectric Ceramics Specialty Ferrites
MA04	Dry-reed Switches

### Passive components

PA01	Electrolytic Capacitors
PA02	Varistors, Thermistors and Sensors
PA03	Potentiometers
PA04	Variable Capacitors
PA05	Film Capacitors
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PA08	Fixed Resistors
PA10	Quartz Crystals
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