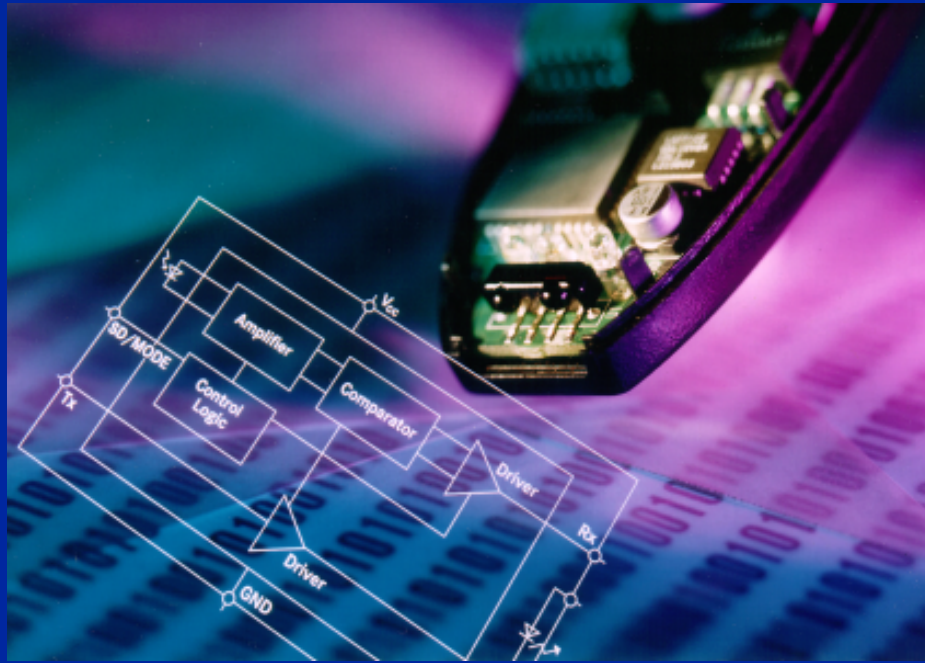
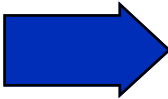


Solutions for IrDA Applications



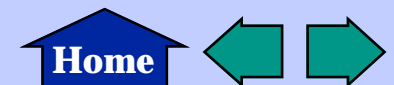
TEMIC is a member of the



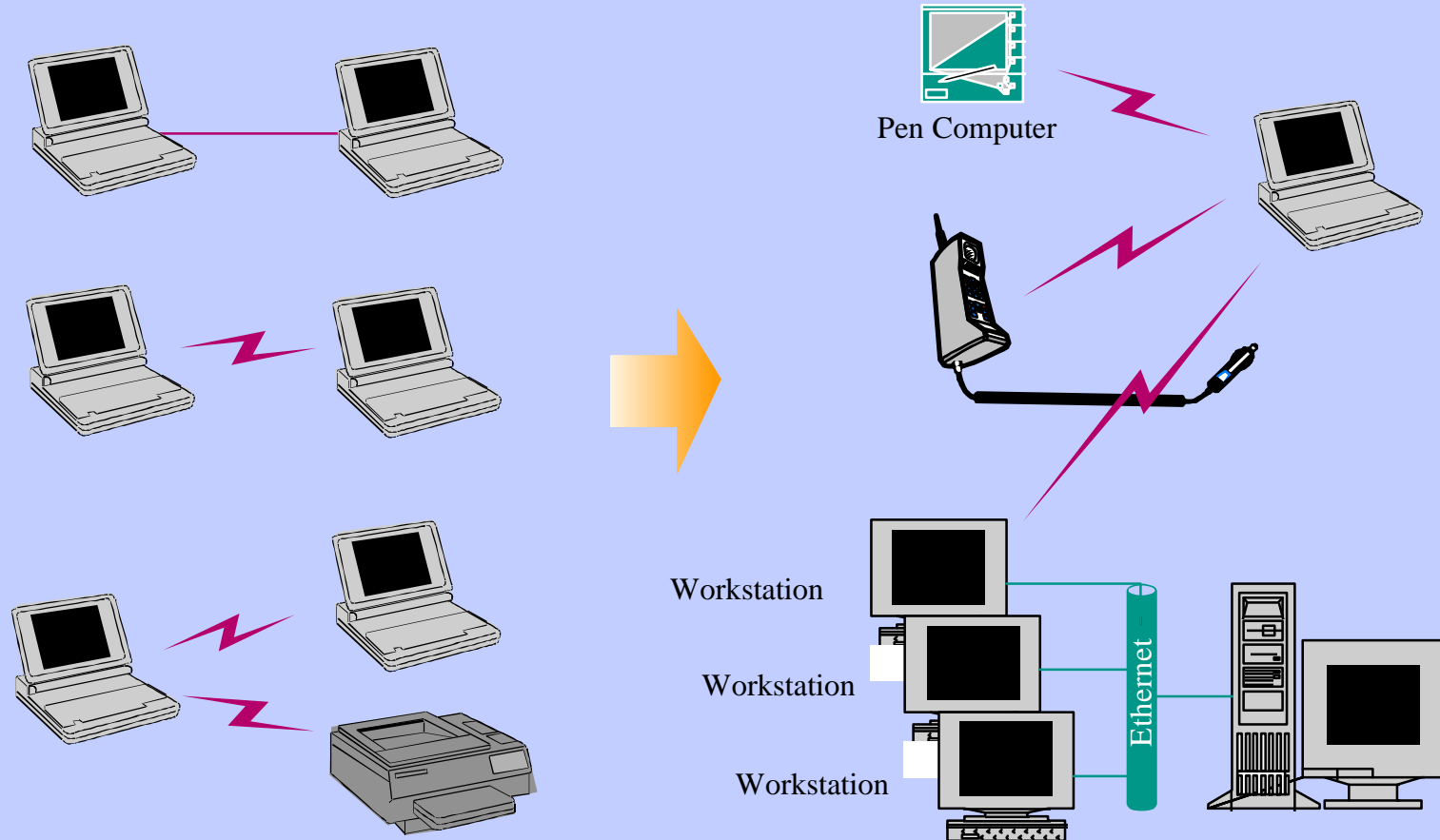
The **Infrared Data Association (IrDA)**

IrDA is a non-profit industry association, created on 6/28/93 to set standards for low cost, low power infrared interconnections between a large variety of mobile devices (“appliances”) and hosts.

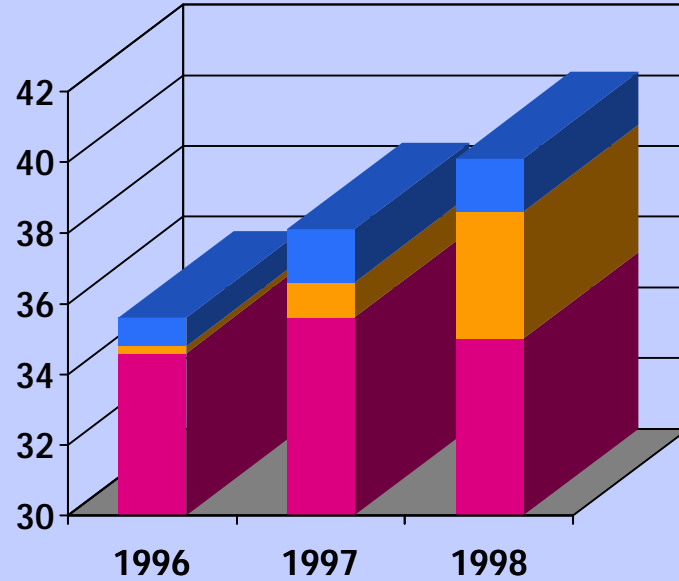
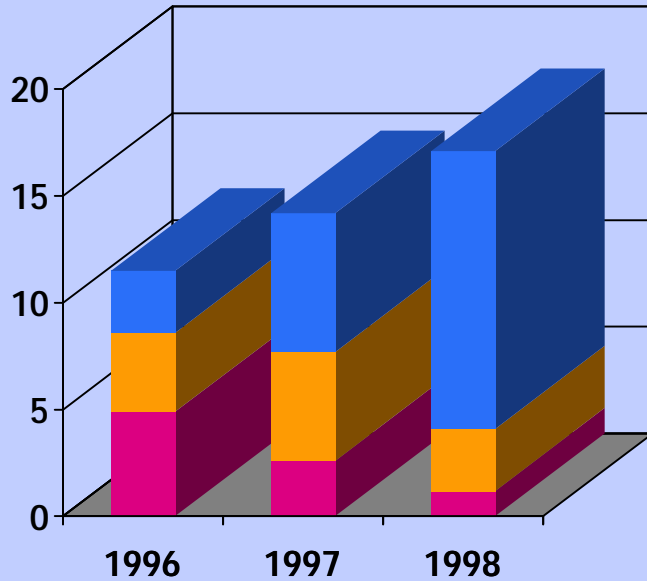
- Evolved from base technology of HP SIR patent
- One of the most quickly accepted standards in the industry
 - » Physical layer approved 9/93
 - » Software protocol Ver. 1.0 approved 4/94
 - » Extensions to 1.1 approved 8/95
- Over 100 active members at present



IrDA Product Evolution

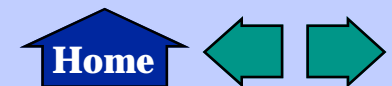


Market Growth Estimates for Two Markets



- IrDA(FIR)
- IrDA(SIR)
- Non-IrDA

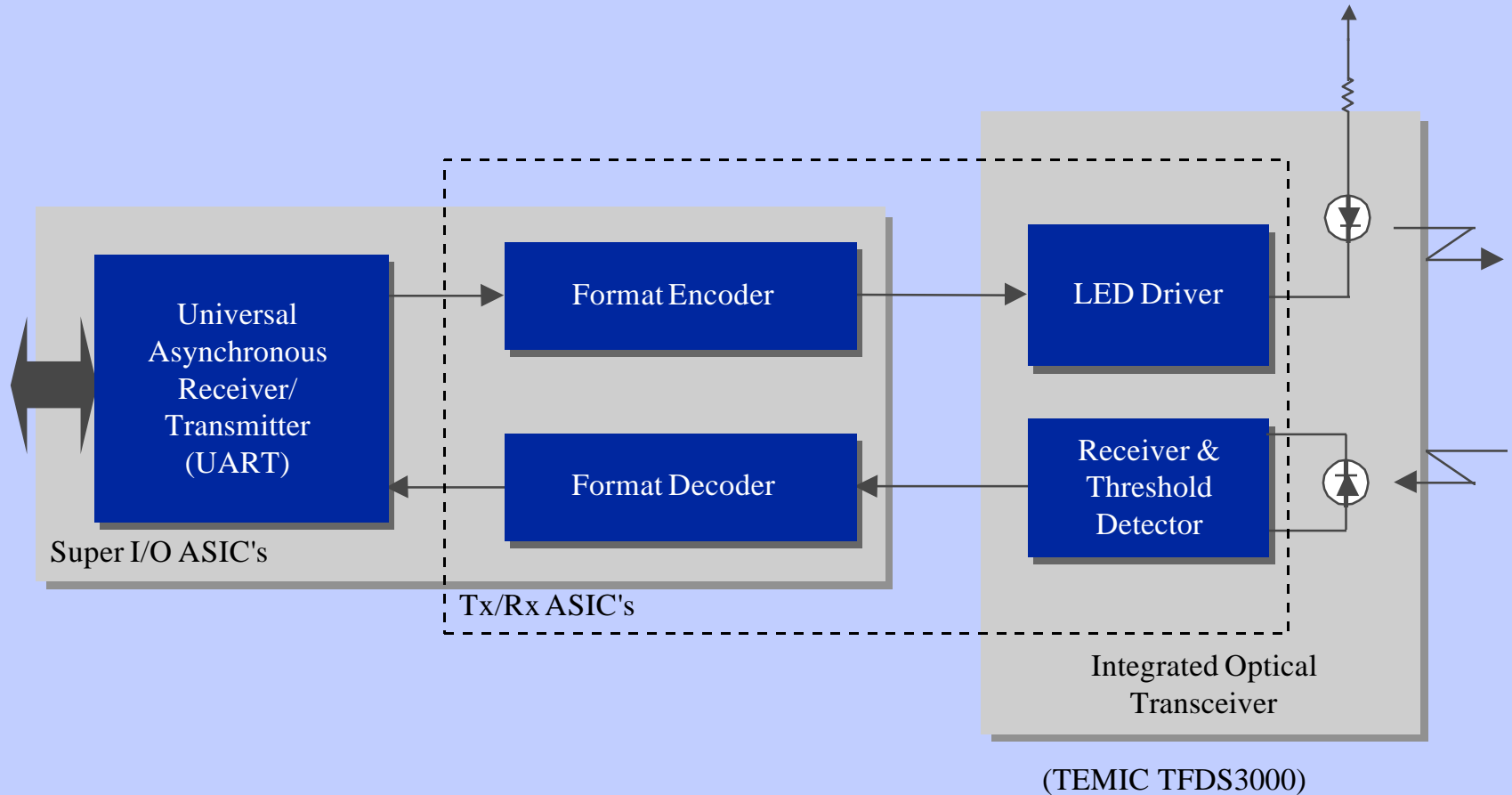
Source: Dataquest, IDC & TEMIC internal estimates



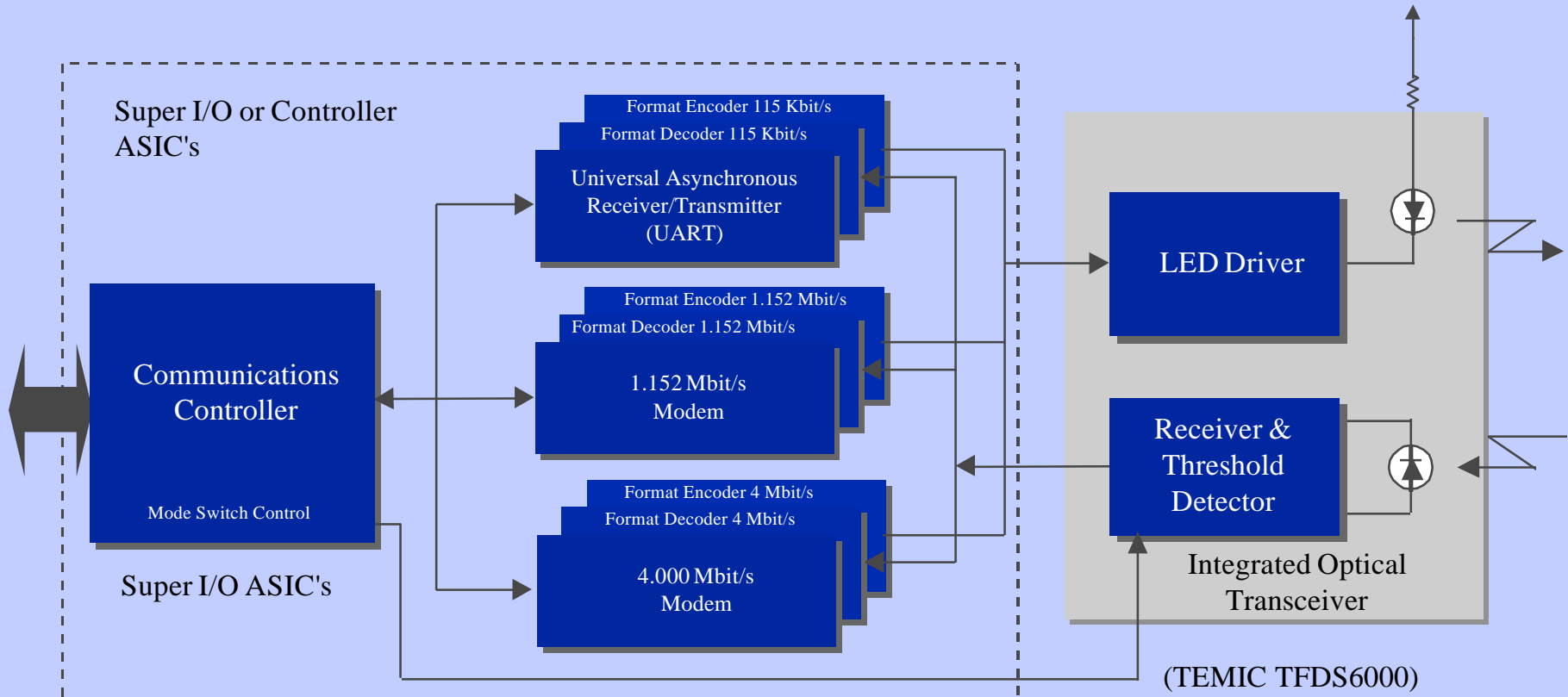
Some Systems Vendors Products

Supplying Company	Product Released (Announced)	Description of Feature
Actisys	IrDA Adapter	External "plug-in" adapter for retrofitting existing PCs/Printers with IrDA capability through the serial port
Acer	Acernote 950 Notebook PC	Internal IrDA port included with notebook
Adaptec	IrDA Adapter	External "plug-in" adapter
Alps		Announced new product at CeBIT '95
AMP	AMP PhasIR (IrDA Adapter)	External "plug-in" adapter
Compaq Computer		Internal IrDA port included
Dell Computer		Internal IrDA port included
Digital Equipment Corporation	HiNote Ultra Notebook PC	Internal IrDA port included
Extended Systems	JetEye IrDA Adapter	External "plug-in" adapter with focus on printers
	JetEye LAN Connect	IrDA LAN Adapter- Supports connect to 1.2Mbps
Gateway 2000	Liberty PC	Internal IrDA port included
IBM	Thinkpad 755 Series Thinkpad 701 Series Serial Infrared PCMCIA Card IrDA Adapter	The Thinkpads include either 1 or 2 internal IrDA ports. The serial infrared PCMCIA card is a standard I/O card with an IrDA option.
Infratec	IrDA Adapter	Extended "plug-in" adapter with additional IR LAN connection feature.
Hewlett-Packard	LaserJet 5P/5MP Printers	Internal IrDA port included with new line of printers
Lexmark	MarkNet IR Infrared Adapter	Printer Adapter
Nokia Mobile Phones	Cellular Phone Adapter	Gives IrDA/Serial Port capabilities to GSM portable cellular phone
Norand	PenKey Handheld Terminal	Internal IrDA port included
Olivetti		Internal IrDA port included
O'Neill	Belthead Printer	Internal IrDA port included for remote verification terminal printing
Sharp	8700 Notebook PC Zaurus Handheld PC (PDA)	Internal IrDA port included. Also, Sharp includes ASK mode
Sun Microsystems	Voyager Mobile Workstation	Internal IrDA port included with 2 side transmit/receive
Texas Instruments	Travelmate 2000 Notebook	Internal IrDA port included
Tulip Computer		Internal IrDA port included

Block Diagram of IrDA 1.0 Architecture



Block Diagram of IrDA 1.1e Architecture



Two Performance Ranges

- IrDA 1.0 Key Features

- 9.6K-115 K Bps
- RS232C or UART
- Point to Point
- 1-3 metres
- 40mw/steradian
- Medium size data packets

- IrDA 1.1e Key Features

- 1.152MBps/4 MBps
- High Speed USART
- Point to Point
- 1-3 metres
- 100mw/steradian
- Large data packets

Different Performance Levels Support Differing Applications

- TFDS3000 for IrDA 1.0

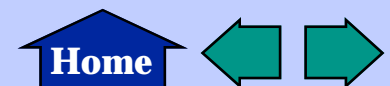
- PDA's
- Handheld Terminals
- Cellular Telephones

- TFDS6000 for IrDA 1.1e

- Printers
- Desktops/High End Notebooks
- Workgroup or LAN Connections

Lowest power & lower performance applications

Highest performance applications



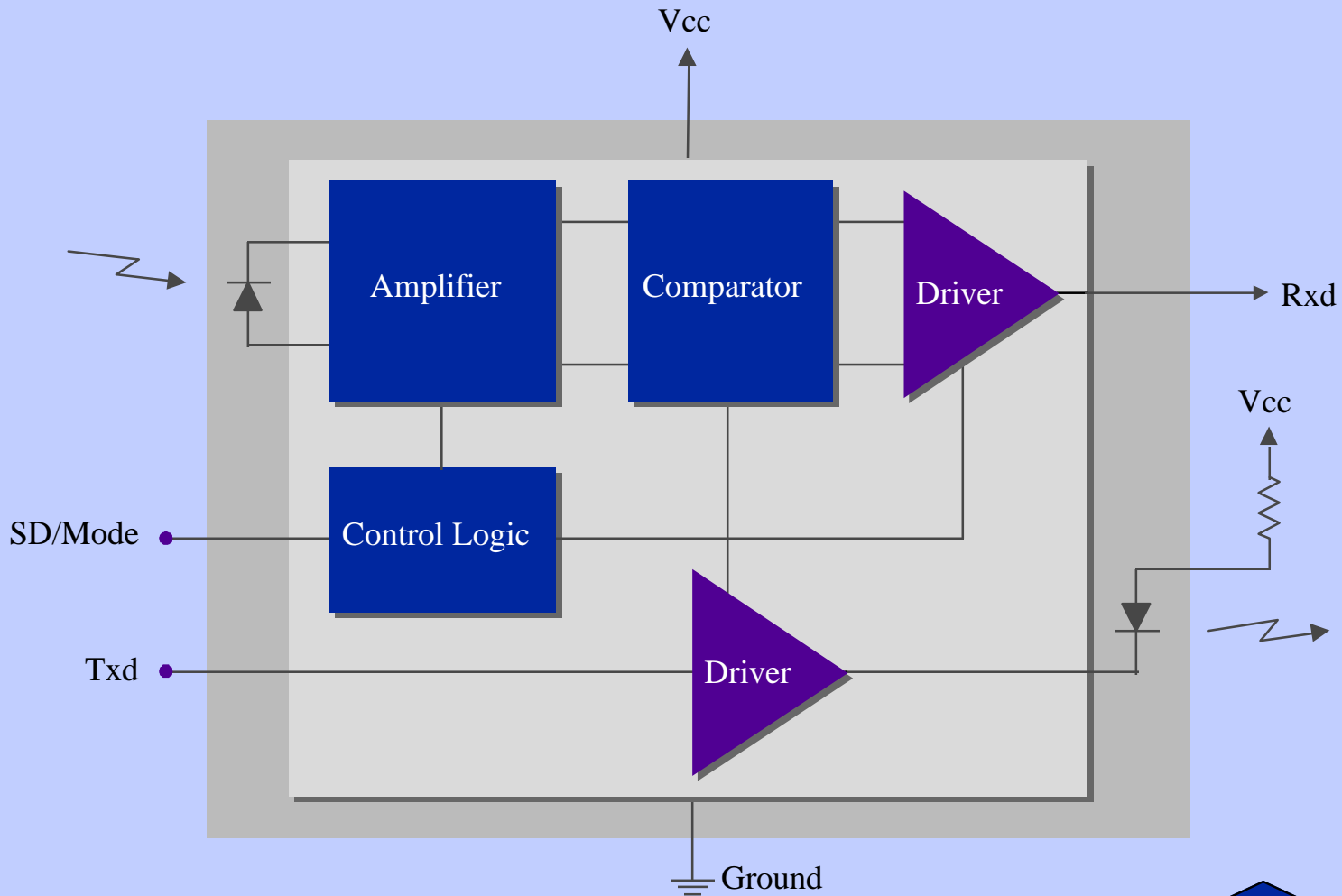
Features of TFDS 3000 Transceiver

- Fully IrDA compliant to 115 Kbps
- Designed for surface mounting
- 3.0 V to 5.5 V supply voltage range
- Low power consumption- 1 ma @ 3.0V
- Requires 2 to 5 external components
- Differential analog design for superior interference rejection

Features of TFDS 6000 Transceiver

- Fully IrDA compliant to 4Mbps
- Supports HP-IR & Sharp ASK modes
- 4.5V to 5.5V supply voltage range
- Low power consumption- 5ma @ 5V
- Requires only 1-4 external components
- Differential analog design for superior interference rejection
- Shutdown pin minimizes power in standby
- Bandwidth programming pin for optimum performance at 4Mbps

TFDS 3000/6000 Block Diagram



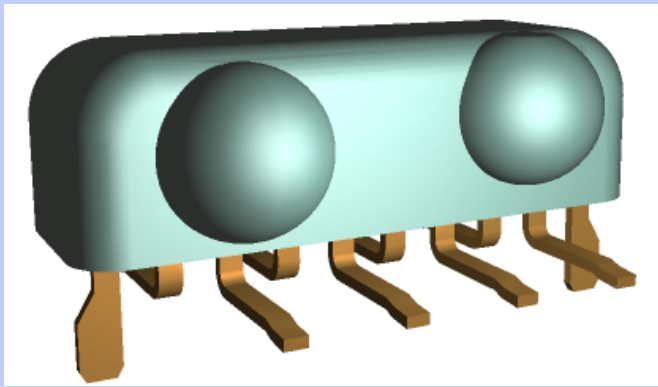
Hardware Solutions for IrDA

Supplying Company	Product Released (Announced)	Description of Feature
Temic	TFDS 3000 IrDA Transceiver(SIR) TFDS 6000 IrDA Transceiver (FIR) TOIM 3000 Former Encoder/Decoder TOIM 3232 Encode/Decode/Baud Rate	TFDS 3000 & TFDS 6000 are fully integrated optical subsystems which include transmit LED and drivers, PIN Photodiode Receiver, receive amplification, comparator, and automatic gain control in a single, low-profile package. The TFDS 6000 adds support for IrDA 1.1 FIR extensions. The TOIM 3000 and TOIM 3232 provide the logic for encoding/decoding and provide baud rate agility for external IrDA adapters.
IBM	IBM31T1100 IrDA Transceiver IBM31T1502 IrDA Receiver/Transmitter	Pin compatible to Temic TFDS 6000 Digital Interface device for IrDA applications
Crystal Semiconductor	CS8130 Infrared Transceiver IC	Single chip IC for connecting between a UART and an LED emitter/detector pair. Includes IrDA 1.0, Sharp ASK and TV Remote modes.
Unitrode	SIRCOMMSIR2IR Receiver IC	Single chip IC for IrDA 1.0 receiver. Interfaces to external PIN Photodiode.
Linear Technology	LT1319 Infrared	Single chip receiver IC. Interfaces with external PIN Photodiode. Operates in IrDA, ASK and TV modes.
National Semiconductor	PC87334V Super I/O Controller PC87108VJE IR Controller	Super I/O includes floppy -disk drive controller, 16550 compliant UARTs, parallel and serial port in single package with the IrDA encode/decode logic. The 108VJE supports the high speed extensions of the IrDA 1.1 spec.
Standard Microsystems (SMC)	FD47C6651R Ultra I/O Controller FD47C666IR Ultra I/O Controller FDL377669Q Ultra I/O Controller FDC37C93XFR Ultra I/O Controller	Ultra I/O's include floppy-disk drive controller, 16550 compliant UARTs, parallel and serial port in single package with the IrDA encode/decode logic. The 93XFR supports the high speed extensions of the IrDA 1.1 spec.
VLSI Technology	VL82C147 PCI to FIR Controller.	Supports IrDA 1.1 interface to PCI bus

Software Solutions for IrDA

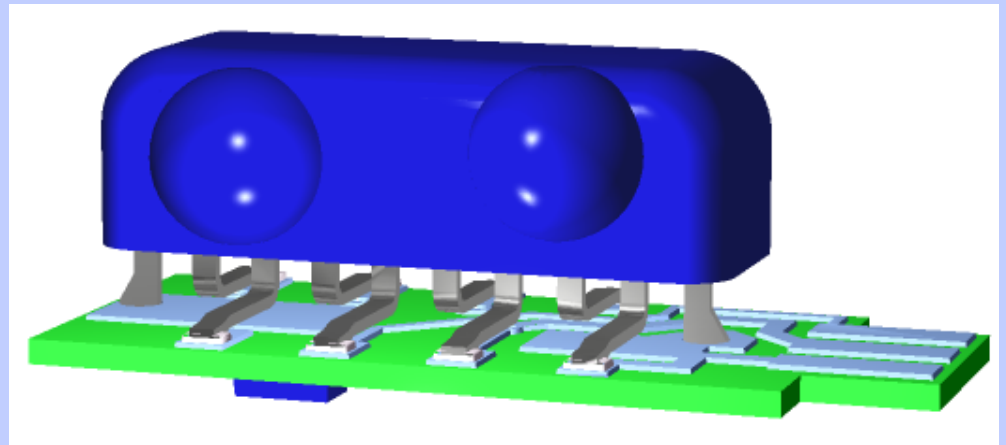
Supplying Company	Product	Description of Feature
Connexus	IrLAP & IrLMP Drivers	Provides versions of the IrDA protocol drivers for Windows platforms. Software also includes utility applications.
Counterpoint Systems Foundry	IrDA Protocol Stack (IrLAP, IrLMP & IrComm/Tiny TP/OBEX, etc.)	Provide x86, 8051, 68K support to designers of PDA's pagers, cell phones, printers, etc.
Genoa Technology	IrLAP & IrLMP Certification Testing	Software and test fixtures for testing IrLAP/IrLMP compliance with IrDA's specification
IBM	Drivers for IrDA 1.1: WIN & WFW 3.11, WIN 3.1, DOS, OS/2, Win NT.	Support IBM "Acadia", SMC, NSC, VLSI and Source code for unannounced devices
Microsoft	Windows 95 IrDA extensions	Disk which when installed offers IR enabling of communications applications.
Puma Technology	TranXit OEM Version	TranXit provides IR and wire file transfer and file synchronization capability with a friendly user interface. TranXit Power Pro adds a variety of features like printing capability.
Versit	Versitcard	PDI specification for "business card of tomorrow."

The TEMIC TFDS 3000 & TFDS 6000 IrDA Integrated Optical Transceivers



Support transfer rates 9.6 Kbps
through 4 Mbps

Designed for Surface
Mount Applications

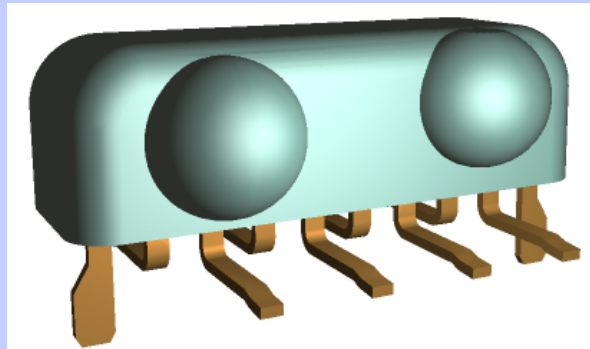


IrDA Compatible Solutions from TEMIC

Discrete/Opto	Optical Transceivers	Digital Logic
BPV10NF	TFDS3000 for IrDA 1.0	TOIM 3000
BPV22NF	TFDS6000 for IrDA 1.1e	TOIM 3232
BPV23NF		TOIM 6000*
TSHA5500		
TSHF5400		
TSSA4500		
TSSF4500		
Si9410DY		
World leader in discrete opto technology & components. Fully IrDA compliant. Used by HP in implementations that formed the basis for IrDA standard.	Full analog IrDA transceivers with opto components built-in. Smallest package available. Lowest external component count. Full AGC and other advanced features. Compatible with digital logic from other major supplies such as IBM, NSC, SMC, Crystal, Unitrode, etc.	Full digital logic to build either an internal IrDA 1.0 or 1.1e implementation or external adapter. Libraries available if required for motherboard ASIC. * Pending release

Proven solutions for IrDA Applications

- **TEMIC first to market with IrDA compliant, manufacturable solutions with the TFDS 3000 and TFDS 6000.**



- » **First totally Integrated Optical Subsystems.**
- » **3 chips in one neat package: emitter, detector and control IC.**
- » **Smallest, requires fewest external components, lowest power.**
- » **Pin-out sets standard- second sourced by IBM & Siemens.**