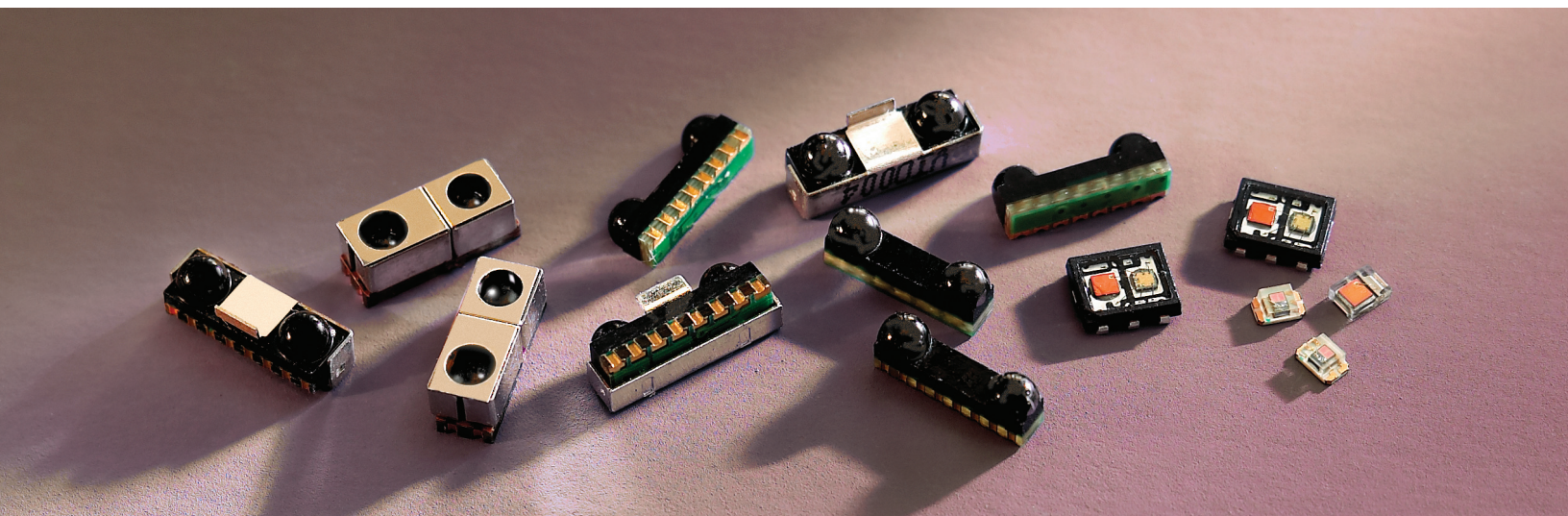


Infrared and Sensing Solutions



Selection Guide

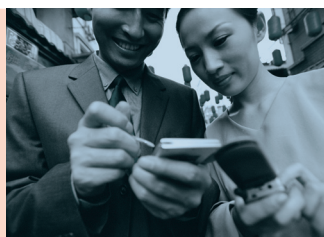
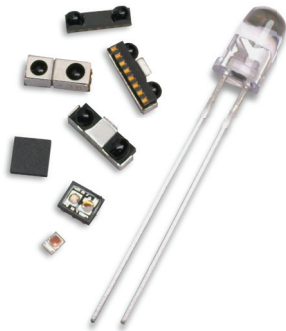
Avago Technologies Infrared and Sensing Solutions



Over the years, Avago Technologies has evolved from supplying traditional Infrared Data Association (IrDA) transceivers to state of the art transceivers and sensor solutions with fully integrated hardware and software. With this advanced technology, Avago is able to significantly improve user experience in office, home, financial, and entertainment-based applications. Avago is transforming the modern lifestyle.

Greater connectivity, remote control and the need to sense proximity or light are key requirements for many current and emerging applications. Agilent's infrared and sensing products provide an optimal means of dealing with these requirements through lower cost, ease of use and ready availability. Also they avoid the interference concerns that often arise from the use of other radio frequency (RF) techniques.

The diversity of Avago's infrared and sensing product offerings allow them to be utilized in a variety of familiar environments and gadgets, such as for the household or small home office.



Our latest products breakthrough include:

- The world's first integrated IrDA solution incorporating both hardware and software (HSDL-S100, HSDL-S300, HSDL-S500, HSDL-S700, HSDL-S900). Avago offers a broad range of transceivers that combine with our latest IrDA Protocol Stack software combine to create a complete solution that helps designers speed time-to-market.
- The industry's first infrared transceiver (HSDL-300X) integrated with Universal Remote control capability that enables mobile phones and PDAs to function as universal IR remote control devices for consumer electronics equipment such as TVs, DVDs, air-conditioners, etc.
- Avago's Ambient Light Photo sensor (HSDL-9000/HSDL-9001 and APDS-9002/APDS-9003) is an innovative solution that detects ambient light to determine whether or not backlighting is needed, thereby saving battery life.
- One of the world smallest transceivers, the HSDL-3208 is housed in a 1.6 mm package. This product was developed at the request of customers and Avago delivered the product within 4 months. The device is now being used in multiple mobile handsets.
- The Avago's HSDL-7002 is a cost-effective SIR Endec chipset with the industry's smallest form-factor package.
- The HSDL-9100 Proximity Sensor allows phone manufacturers to turn on/off speakerphone capability based on how close the phone is to the user's ear.

Products & Services

As the leader in IrDA transceivers, Avago Technologies offers a wide range of products, including innovative new solutions such as IrFM (Infrared Financial messaging), integrated remote control, and unique packaging options for a variety of mobile applications.

IrDA Transceiver Features

- Smallest Form Factor
- Speed ranging from 115kbps(SIR) to 1.15Mbps(MIR) to 4mbps(FIR)
- Low Power consumption
- Adjustable optical power
- Low idle and shutdown current
- Integrated long range (up to 8 meters) remote control function for consumer electronic devices such as TVs and VCRs



Avago's Infrared transceivers are ideal for new IrFM (Infrared Financial Messaging) applications.



Avago's new IR+remote control module is an industry first, combining both IrDA compliant and remote control functions.

Software

Avago Technologies has leveraged its technology leadership to introduce new software products. Now Avago provides integrated IrDA transceivers, protocol stacks, and remote control software solutions to our customers to help them speed time to market, reduce system cost, and provide maximum performance.

Protocol Stack

Avago's HSDL-S100 IrDA basic protocol stack, together with multiple application profiles, provides a very fast and efficient way to implement an IrDA compliant interface in an embedded device. The basic protocol consists of 3 layers; TinyTP, LM-MUX, and IrLAP. Different application profiles can be implemented on the IrDA basic protocol stack, such as IrObex, IrComm, IrTranP etc.

Remote Control Software

Avago's Universal IR Remote control software HSDL-S300 is an application software that uses your mobile and handheld devices as a universal remote control for TV, VCR, DVD and other equipment. It runs on devices with Intel Strong ARM CPU, 206MHz or Intel Xscale to enable a wireless link between handheld devices and consumer electronics systems. The software is a Universal Remote Control Program with a pre-defined RC database and self-teach/learn mode consisting of 8 profiles : TV, DVD, VCR, Air Conditioner, CD, Audio, LD/VCD and others.

Each profile can have up to 10 controls, thus 80 devices can be stored (8 profiles x 10 devices) and each device can have up to 32 button/functions which can be controlled via touch-screen or by using PDA hardware buttons to navigate and control the software features.

Dongle



Avago's IrDA Smart Dongle HSDL-D100/D110 solution offers "plug and play" connectivity, offering easy installation with minimal development resource. It can be customized to implement wireless communication in a

wide range of devices, including point-of-sale terminals to enable IrFM applications.

IrFM

The HSDL-S500 IrFM Protocol Stack provides an IrFM profile, which is a quick and seamless digital payment system for infrared enabled devices and Point of Sales (POS) Terminals. Financial payment is made through beaming of 'soft' credit cards, debit cards or other financial information with Personal Trusted Device (PTD) like from mobile phones and Personal Digital Assistants (PDA).

IrDA Protocol Analyzer

The HSDL-S700 Avago Technologies IrDA Protocol Analyzer is a specialized diagnostic tool for debugging IrDA protocol stack. It picks up IrDA protocol communication and decodes protocol symbols for monitoring. Debugging IrDA protocol stack would otherwise be complex and tedious without such a tool.

The Avago Technologies IrDA Protocol Analyzer listens and records IrDA packets transmitted by communicating devices, at different baud rates, time-stamps every recorded packet, and decodes protocol headers and information for verification. Decoded information is displayed real-time for immediate diagnostic. Recorded frames may also be saved for reports.

Ir Simple Connect

The ASDL-S900 IrSimple Protocol Stack provides a fast connection procedure and effective throughput of approximately 90%. It can be implemented on a standalone basis or can co-exist with existing IrDA protocol. It is backward compatible with current IrDA implementation. More importantly, it can support up to UFIR and also supports both Bi-directional and Uni-directional profiles.

The IrSimple Protocol opens up new applications for consumer electronics particularly mobile phones & digital camera for performing picture transmission to the television at the shortest period of time. IrSimple also allows business users to make slide presentations directly from their PDAs or smart phone to infrared-equipped projectors.

To use IrSimple with existing IrDA protocol, Avago offers its HSDL-S101 (IrOBEX v1.3) and HSDL-S100 IrDA protocol stack, which had been since installed in numerous mobile devices.



Sensing Products

Ambient Light Photo Sensors

Avago Technologies offers Ambient Light Photo Sensors, the HSDL-9000, APDS-9002, APDS-9003 and the new miniature HSDL-9001. All devices detect the amount of light available and signal as to whether or not backlighting is necessary and also control the turning on and off of the lighting system. These devices outperform other light detection solutions because their spectral response peaks at the same frequency as the human eye. Other solutions using a silicon photodiode provide varying degrees of performance, especially in different light sources such as fluorescent and halogen. Avago's Ambient Light Photo Sensor performs equally well with all light sources.

Proximity Sensor

Avago continues to revolutionize the consumer & industrial sensor market through the recent introduction of a miniature surface-mount optical Proximity Sensor. The HSDL-9100 is a complete opto-module that houses both an LED and a photodiode in a specially designed metal-shield to ensure excellent optical isolation. The result is a low-cost analog-output reflective sensor with low optical cross-talk, and excellent power efficiency.

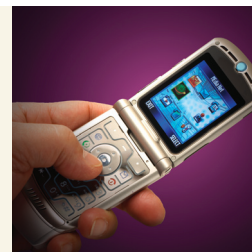
The HSDL-9100 is an analog output reflective sensor in a small form factor SMT package and offers a detection range from near zero to 60mm. It can be used in mobile application such as open-phone detection in clamshell phones, auto-volume adjustment in speaker-phones and can be easily designed into industrial control systems, as well as printers, facsimile machines and photocopiers. The HSDL-9100 proximity sensor complements and adds to Agilent's robust offerings for the mobile market, including infrared transceivers, an innovative ambient light sensor, camera modules, RF components and LEDs.

Proximity Sensor Features

- Detects objects from near zero to 60 mm distance
- Lead-free miniature surface-mount package
- Near zero optical cross-talk
- Low dark current < 2nA typically

Typical Applications

- Motion and Proximity Sensing
- Detection and validation applications
- Retail automation
- Mobile Phones
- Notebooks
- Industrial Control
- Home appliances
- Printers, photocopiers and facsimile machines to perform paper edge detection



Ambient Light Photo Sensor Benefits

High level of integration that brings faster and more accurate response with ambient lighting conditions

- Design to respond closely with human eyes spectral wavelength
- Conserve battery power to many portable devices
- Market Segment
 - Street Lighting
 - ESS
 - Automotive
 - Industrial
 - Handheld devices
 - Mobile Phone



Infrared Product Selection

Device Type	Part Number	Size (HxWxD) (mm)	Link Distance (m)	Supply Voltage (V)	Operating Temp. °C	Idle Current (mA)	Shutdown Current (nA)	Receiver Latency (us)	IO Vcc Interface (V)	Front	Front	Top	Top
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IrDA

115Kbit/s InfraRed Transceiver

Low Power Parts

SIR	HSDL-3200	2.5 x 8.0 x 3.0	0 to 0.3	2.7 to 3.6	-25 to +85	2.5	10	25	No	#021			
SIR	HSDL-3201	2.5 x 8.0 x 3.0	0 to 0.3	2.7 to 3.6	-25 to +85	0.1	20	25	No	#001	#021	#008	#008
SIR	HSDL-3202	2.5 x 8.0 x 3.0	0 to 0.3	2.7 to 3.6	-25 to +85	0.1	10	20	1.8	#021			
SIR	HSDL-3203	1.95 x 8.0 x 3.1	0 to 0.3	2.7 to 3.6	-20 to +70	2.5	10	25	No	-021			
SIR	HSDL-3208	1.6 x 7.0 x 2.8	0 to 0.3	2.4 to 3.6	-25 to +70	0.1	1	70	No	-021			
SIR	HSDL-3209	1.6 x 7.0 x 2.8	0 to 0.3	2.4 to 3.6	-25 to +70	0.1	-	50	1.8	-021			

Standard Power Parts

SIR	HSDL-3000	2.7 x 9.1 x 3.65	0 to 1.0	2.7 to 5.5	-20 to +70	0.29	10	25	No	#007			
SIR	HSDL-3612	4.0 x 12.2 x 5.1	0 to 1.0	2.7 to 5.25	-20 to +70	2.5	10	20	No	-007	-037	-008	-038

IR + Remote Control Transceiver

SIR + RC	HSDL-3002	2.7 x 9.1 x 3.65	0 to 0.5m (SIR)	2.7 to 5.5	-20 to +70	0.29	10	25 (typ)	No	-007			
			6 m (RC)										
SIR + RC	HSDL-3003	2.7 x 8 x 2.95	0 to 0.5m	2.4 to 3.6	-20 to +70	0.50	10	25 (typ)	No	-021			
			8 m (RC)										
SIR + RC	HSDL-3005	2.5 x 8.0 x 3.0 (Front View)	0 to 0.5m	2.4 to 3.6	-25 to +85	0.50	20	25 (typ)	No	-021			
		2.8 x 7.5 x 3.35 (Top view)	7 m (RC)										
SIR + RC	HSDL-3007	1.6 x 7.0 x 2.8	0 to 0.5m (SIR)	2.4 to 3.6	-25 to +85	1.0	10	200 (max)	Yes	-021			
			7 m (RC)										
FIR + RC	HSDL-3020	2.5 x 10.4 x 2.95	0 to 0.5m (FIR)	2.4 to 3.6	-25 to +85	2.0	1000(max)	100 (max)	Yes	-021			
			14 m (RC)										
FIR + RC	HSDL-3021	2.5 x 8.0 x 3.0	0 to 0.5m (FIR)	2.4 to 3.6	-25 to +85	2.0	1000(max)	100 (max)	Yes	-021			
			8 m (RC)										

1.15 Mbit/s InfraRed Transceiver

MIR	HSDL-3210	2.5 x 8.0 x 3.0	0 to 0.3	2.7 to 3.6	-25 to +85	0.3	10	25	1.8	-021			
MIR	HSDL-3211	2.5 x 8.0 x 3.0	0 to 0.3	2.4 to 3.6	-25 to +85	0.4	1	25	1.8	-021			

4 Mbit/s InfraRed Transceiver

FIR	HSDL-3220	2.5 x 8.0 x 3.0	0 to 0.3	2.7 to 3.6	-25 to +70	1.8	100	25	No	-021			
FIR	HSDL-3602	4.0 x 12.2 x 4.9	0 to 1.0	2.7 to 3.6	-20 to +70	2.5	10	40	No	-007	-037	-008	-038
FIR	HSDL-3603	3.9 x 9.8 x 4.65	0 to 1.0	2.7 to 5.25	-25 to +70	1.8	10	10	No	-007			

SIR Interface ICs - Endec

Device type	Part number	Supply Voltage (V)	Output Current (mA)	Operating Temp. °C	Power Dissipation (W)	Internal Clock (V)	Max Clock Frequency (Mhz)	Min Pulse Width (ns)	Packaging Options
CMOS IC	HSDL-7000	2.7 to 5.5	10	-40 to +85	0.22	No	2	250	8 pin SOIC
CMOS IC	HSDL-7001	2.7 to 5.5	-100 to +100	-40 to +85	0.46	Yes	2	1630	16 pin SOIC
CMOS IC	HSDL-7002	2.7 to 5.5	-20 to +15	-40 to +85	0.46	Yes	18	1628	16 pin QFN

Infrared Emitters

Device type	Part Number	Wavelength Typical (nm)	Viewing angle (°)	On-Axis Intensity (mW/sr)	Optical Rise/Fall time (ns)	Operating Temp. (°C)	Packaging Options
T-13/4 Lamp	HSDL-4220	875	30	38	40	0 to 70	Thru-Hole
T-13/4 Lamp	HSDL-4230	875	17	75	40	0 to 70	Thru-Hole
T-13/4 Lamp	HSDL-4250	870	15	180	40	-40 to +85	Thru-Hole
T-13/4 Lamp	HSDL-4251	870	30	100	40	-40 to +85	Thru-Hole
T-13/4 Lamp	HSDL-4260	875	15	200	15	-40 to +85	Thru-Hole
T-13/4 Lamp	HSDL-4261	870	26	36	15	-40 to +70	Thru-Hole
T-13/4 Lamp	HSDL-4270	940	15	100	1300	-40 to +85	Thru-Hole
T-13/4 Lamp	HSDL-4271	940	30	50	1300	-40 to +85	Thru-Hole
2x2 mm SMT	HSDL-4400	875	110	3	40	-40 to +85	Thru-Hole
2x2 mm SMT	HSDL-4420	875	24	17	40	-40 to +85	Thru-Hole

Infrared Detectors

Device Type	Part Number	Wavelength Typical (nm)	Viewing Angle (°)	Photocurrent @ 875 (μA)	Optical Rise/Fall Time (ns)	Operating Temp. (°C)	Forward voltage @IFDC -50mA (V)
2x2 mm SMT	HSDL-5400	875	110	1.6	7.5	-40 to +85	0.8
2x2 mm SMT	HSDL-5420	875	28	6	7.5	-40 to +85	0.8

Sensing Products

Part number	Size (HxWxD) (mm)	Supply Voltage (V)	Operating Temp. °C	Shutdown Current(nA)	Features
HSDL-9000	1.1 x 4 x 3.2	2.7 to 3.6	-40to +85	10 typ	Human luminosity Curve at 550nm
HSDL-9001	0.60 x 2.0 x 1.50	2.7 to 3.6	-40to +85	5 max (Dark), 125typ (Light)	Human luminosity Curve at 550nm
APDS-9002	0.80x 2.0 x 1.25	2.4 to 5.5	-40to +85	50nA typ (Dark),	Human luminosity Curve at 620nm
APDS-9003	0.55 x 1.60 x 1.5	2.4 to 5.5	-40to +85	50nA typ (Dark),	Human luminosity Curve at 620nm

Part number	Size (HxWxD) (mm)	Emitter Continuous Forward Current (mA)	Operating Temp. °C	Coupled Total Power Dissipation(mW)	Dark Current (nA)	Features
HSDL-9100	2.70 x 2.75 x 7.10	50	-40to +85	165 mW (max)	2 (typ)	Detect objects from near zero to 60mm

Software Solutions

Part Number	Description
HSDL-S100	IrDA Protocol Stack
HSDL-S101	IrOBEX
HSDL-S102	IrComm
HSDL-S103	IrTranP
HSDL-S300	Remote control application software
HSDL-S500	Infrared Financial Messaging software
HSDL-S700	IrDA Protocol Analyzer
APDS-S900	Ir Simple Connect

IRDA SMART DONGLE

Part Number	Description	Hardware	Internal Flash Memory	Internal RAM Size	CPU Oper. Speed	Software Embedded	PCB Board Size	Host interface	Remarks
HSDL-D100-001	Low-End Smart Dongle - 2nd level PCB	8 bit CISC MCU	32 KB/64KB(Max - Optional)	2KB/4KB(Max - Optional)	18.432MHz	Basic protocol and IrObex	20mm x 20mm	3 wire asynchronous, Serial interface, Std 2x3 1.27mm pitch, 90 degree Bend Header	Other software customisation is possible
HSDL-D100-002	Mid-End Smart Dongle - 2nd level PCB	32 bit ARM7TDMI MCU	256KB/512KB(Max)	32KB	29.4912MHz	Basic protocol and IrObex	46mm x 65mm (app)	3-wire RS-232 compliance with DB9 Male Connector or Std 2.54mm pitch, 90 degree Bend Header	Other software customisation is possible
HSDL-D110-002	Mid-End Smart Dongle with Casing	32 bit ARM7TDMI MCU	256KB/512KB(Max)	32KB	29.4912MHz	Basic protocol and IrObex	46mm x 65mm(app)	3-wire RS-232 compliance with DB9 Male Connector or Std 2.54mm pitch, 90 degree Bend Header	Other software customisation is possible

About Avago Technologies

Avago Technologies is a leading global supplier of analog, mixed-signal and optoelectronic components and subsystems. The company serves three primary product categories comprising optoelectronics, RF/microwave components and enterprise ASICs.

Avago Technologies' product solutions include fiber optic transceivers and ICs for storage, computing and networking. For mobile handsets, Avago offers RF components, infrared transceivers, light and proximity sensors, CMOS image sensors, and LEDs for camera flash as well as keypad and display backlighting. Avago's optoelectronics solutions include a broad range of LEDs, the world's most comprehensive line of isolation devices, an illumination and color management system for backlighting LCD flat-panel TVs, motion control components for office automation and industrial systems, optical navigation sensors for computer mice, and fiber optics transmitters and receivers for industrial and automotive applications.

Avago Technologies combines the capabilities and track record of an established global leader with the vigor and responsiveness of a startup. Avago's heritage of technical innovation dates back 40 years to its Agilent/Hewlett-Packard roots. During those years, the company amassed more than 2,000 patents and applications, and a reputation for innovation, quality and superior customer service.

For product information and a complete list of distributors, please go to our web site:

www.avagotech.com
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