



LIPE-SL APPLICATION SPECIFIC IP INTERFACE MODULE

Features

- multiple simultaneous TCP/UDP socket connections
- 460.8 kbps interface to any microprocessor on TTL serial
- LIPS protocol support
- web page support with HTTP filtering

Benefits

- easy integration
- fast time to market
- low total cost of ownership

General Description

The LIPE IP interface modules are embedded modules specifically designed for fast development of network interfacing of virtually any MPU with a TTL level serial interface. They include everything to quickly and easily interface your Internet of Things hardware: a 10/100 Base-T phy, TCP/IP v4 stack, web server, and support for creating, configuring, and operating up to 12 TCP/UDP connections in any combination of TCP server, TCP client, or UDP connection.

The built-in TCP stack and firmware eliminates the need for driver or stack development, and the on-module processing leaves the host microprocessor free efficiently to manage its own business without networking overhead.

All LIPS modules communicate with their host microprocessors using LIPSYNC, the simple and efficient LAVA protocol developed for LIPS modules. This protocol multiplexes module configuration and control commands, and TCP and UDP data streams, across the TTL serial-to-LIPE-SL module interface. Commands are structured in a manner similar to Berkeley sockets, with "create", "configure", "open" and similar functionalities; data streams are multiplexed using a variation of SLIP encapsulation. The result is an extremely simple communication protocol, where the MPU simply sends very basic hexadecimal strings to create and operate TCP and UDP connections, and to send data over these ports.

The LIPE-SL modules come in three form factors: DIP mount with RJ-45 Ethernet connector, surface mount with RJ-45 Ethernet connector, and surface mount without RJ-45 connector.

Typical Applications

- IP-enabling any microprocessor with a TTL serial interface
- Switches, relays, sensors, data loggers

The LIPE-SL Development Board provides an easy and effective environment for evaluating and writing control codes using the LAVA IP System protocol used on the LIPE-SL surface mount module.

Hardware Description

Size:

- 62 mm x 25 mm x 15 mm [RJ-45 surface mount]
- 60 mm x 25 mm x 6.5 mm [surface mount, no connector]
- 69 mm x 35 mm x 24 mm [RJ-45, DIP mount]

CPU:

- ASIX AX11015 LF [RJ-45 surface mount][surface mount, no connector][RJ-45, DIP mount]

Operating voltage: +3.3V +/- 10%

Operating humidity: 90% maximum (non-condensing)

Operating temperature range:

Industrial	Commercial
-30°C to +85°C	-20°C to +70°C
-22°F to +185°F	-4°F to +158°F

Power input:

- 3.3V regulated off-board
- Power over Ethernet (PoE) ready [RJ-45 models]

Connection:

- 37 SMT pads [surface mount versions]
- 36 DIP pins [DIP mount version]

Host interface:

- TTL asynchronous serial
- 19.2 kbps, 115.2 kbps, 230.4 kbps, 460.8 kbps [8, N, 1]
- CTS/RTS hardware flow control
- Transmit (TX), receive (RX), request to send (RTS), clear to send (CTS) lines, ground (GND), and two baud rate selection lines.

10/100 Base-T LAN interface: RJ-45 / edge connector

Ethernet Specifications

Standard supported: IEEE 802.3 10 Base-T; 100 Base-TX Auto MDI/MDIX

. Internet Protocols

IP, TCP, UDP, ICMP, ARP, DHCP, DNS, HTTP

Performance Specifications

Host data rate: 460.8 kbps

Serial data format: Asynchronous 8, N, 1

Application Program Interface

LIPSTM modules use the LIPSYNC™ protocol to interface application programs running on a host CPU to a LIPE-SL module.

Warranty

LAVA Lifetime Warranty

Certifications [pending approvals]

EMC

USA

FCC module approval

Canada

Industry Canada module approval

EU

EN 301 489 (EMC Directive 2004/108/EC)

RoHS compliant

Safety

UL 60950

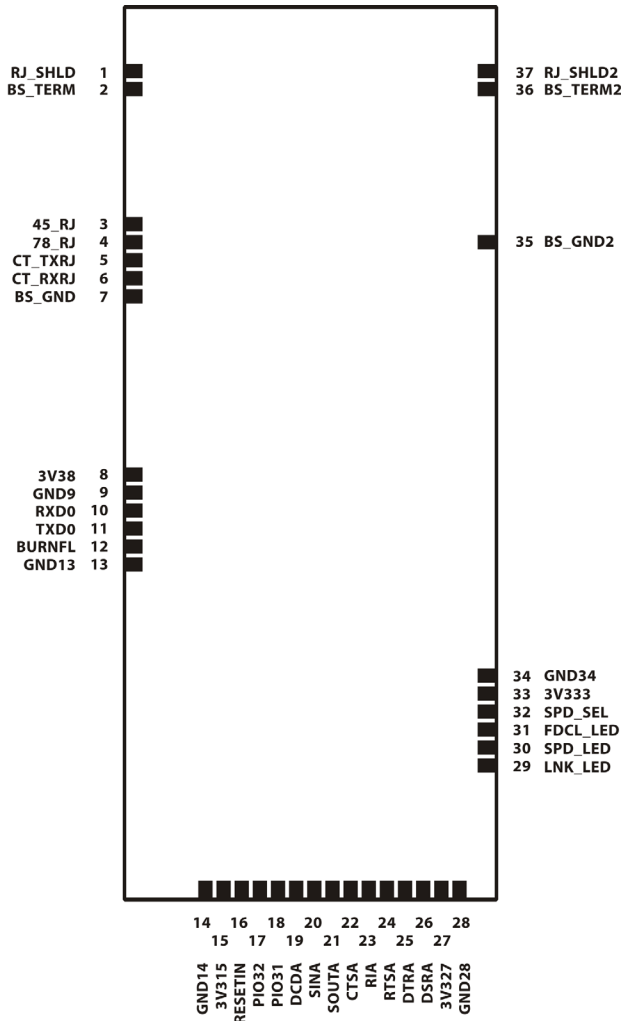
Can/CSA-C22.2 No. 60950

EN 60950, Low Voltage Directive (2006/95/EC)

Pin Assignments (surface mount and DIP mount)

Pin	Signal	Type	Description
1	RJ_SHLD		GND
2	BS_TERM		BS_TERM
3	45_RJ		n.c.
4	78_RJ		n.c.
5	CT_TXRJ		n.c.
6	CT_RXRJ		n.c.
7	BS_GND		GND
8	3V38		3V3
9	GND9		GND
10	RXD0		LIPERXD0
11	TXD0		LIPETXD0
12	BURNFL		LIPE_BFL
13	GND13		GND
14	GND14		GND
15	3V315		3V3
16	RESETIN		LIPE_RST
17	PIO32		LIPE_P32
18	PIO31		LIPE_P31
19	DCDA		n.c.
20	SINA		LIPE_RXD
21	SOUTA		LIPE_TXD
22	CTSA		LIPE_CTS
23	RIA		n.c.
24	RTSA		LIPE_RTS
25	DTRA		n.c.
26	DSRA		n.c.
27	3V327		3V3
28	GND28		GND
29	LNK_LED		LNK_LED
30	SPD_LED		SPD_LED
31	FDCL_LED		FDCL_LED
32	SPD_SEL		SPD_SEL
33	3V333		3V3
34	GND34		GND
35	BS_GND2		GND
36	BS_TERM2		BS_TERM
37	RJ_SHLD2		GND

LIPE-SL pinouts



Module Pin No.	Schematic Symbol Pin No	Pin Name	Pin Type	Description
1	J3.1	3V3_PAS	PI	3.3V power input for RF power amplifier
2	J3.2	3V3_PAS	PI	3.3V power input for RF power amplifier
3	J3.3	GND	G	Ground
4	J3.4	GND	G	Ground
5	J3.5	GND	G	Ground
6	J2.1	GND	G	Ground
7	J2.2	GND	G	Ground
8	J2.3	P20*	B	P20 / LA5 / RXD1 / MDC signals
9	J2.4	P21*	B	P21 / LA6 / TXD1 / MDIO signals
10	J2.5	P22*	B	P22 / LA7 / WRXD0 signals
11	J2.6	P23*	B	P23 / LALE / PCLK / WTXD0 signals
12	J2.7	P24*	B	P24 / LRDY / DVP_RDY / RXD3 / TM0_CK signals
13	J2.8	P25*	B	P25 / LINT / TXD3 / TM0_GT signals
14	J2.9	P26*	B	P26 / LLDS_N / RXD2 / TM1_CK signals
15	J2.10	P27*	B	P27 / LUDS_N / TXD2 / TM1_GT signals
16	J2.11	XTL32KO	O	32.768KHz crystal output
17	J2.12	XTL32KI	I	32.768KHz crystal input
18	J2.13	VCC18A_RTCI	PI	1.8V power input for 32.768KHz crystal I/O and RTC logic
19	J2.14	1V8	PO	1.8V power output

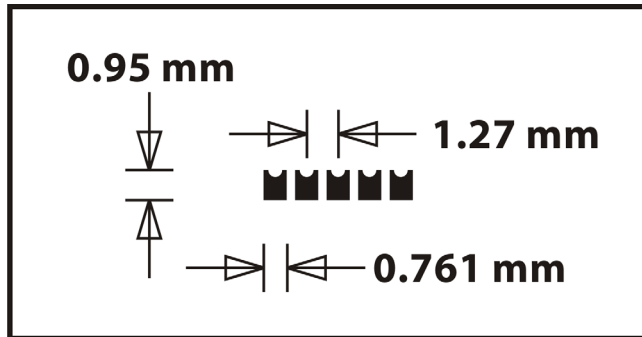
Module Pin No.	Schematic Symbol Pin No	Pin Name	Pin Type	Description
20	J2.15	LB_CLK	B	Local bus clock input or output
21	J2.16	WLED*	O	WiFi link status LED
22	J2.17	SYSCK_SEL	I	Operating system clock frequency selection input
23	J2.18	XDATA1	B	XDATA1 / LB_MOD configuration
24	J2.19	XDATA2	B	XDATA2 / SYNC_BUS configuration
25	J2.20	XDATA4	B	XDATA4 / BURN_FLASH_EN configuration
26	J2.21	XDATA5	B	XDATA5 / BURN_FLASH_921K configuration
27	J2.22	XDATA6	B	XDATA6 / I2C_BOOT_DIS configuration
28	J2.23	RST_N	I	Module reset input
29	J2.24	GND	G	Ground
30	J1.1	XDATA7	B	XDATA7 / REV_EN configuration
31	J1.2	P00*	B	P00 / LA8 / DE3 / TX_CLK / REFCKO signals
32	J1.3	P01*	B	P01 / LA9 / RE3_N / MTXD0 signals
33	J1.4	P02*	B	P02 / LA10 / CTS3 / MTXD1 signals
34	J1.5	P03*	B	P03 / LA11 / DSR3 / TX_EN signals
35	J1.6	P04*	B	P04 / LA12 / RI3 / RX_CLK / REFCKI signals
36	J1.7	P05*	B	P05 / LA13 / DCD3 / MRXD0 signals
37	J1.8	P06*	B	P06 / LA14 / RTS3 / MRXD1 signals
38	J1.9	P07*	B	P07 / LA15 / DTR3 / RX_DV / CRS_DV signals
39	J1.10	P10*	B	P10 / LA0 / MCLK / MTXD2 signals
40	J1.11	P11*	B	P11 / LA1 / BCKT / MTXD3 signals
41	J1.12	P12*	B	P12 / LA2 / WST / TX_ER signals
42	J1.13	P13*	B	P13 / LA3 / DATAT / COL signals
43	J1.14	SDA	B	I2C serial clock
44	J1.15	SCL	B	I2C serial data
45	J1.16	GND	G	Ground
46	J1.17	3V3	PI	3.3V power input
47	J1.18	3V3	PI	3.3V power input
48	J1.19	GND	G	Ground
49	J1.20	GND	G	Ground
50	J4.1	P14*	B	P14 / LA4 / BCKR / MRXD2 signals
51	J4.2	P15*	B	P15 / LRD_N / WSR / MRXD3 signals
52	J4.3	P16*	B	P16 / LWR_N / DATAR / RX_ER signals
53	J4.4	P17*	B	P17 / LCS0_N / HREF / CRS signals
54	J4.5	RXD0	B	MCPU UART 0 serial receive data
55	J4.6	TXD0	O	MCPU UART 0 serial transmit data
56	J4.7	INT0*	B	INT0 / XWKUP / LDA8 / SINT / DB_DI signals
57	J4.8	INT1*	B	INT1 / WINT0 / LDA9 / SRDY / DB_CKO signals
58	J4.9	SS1*	B	SS1 / LDA10 / STPZ / DB_DO signals
59	J4.10	SS2*	B	SS2 / LDA11 / DQ / MINT_N signals
60	J4.11	SS0*	B	SS0 / LDA12 signals
61	J4.12	RSTO_N	O	Reset output
62	J4.13	SCLK*	B	SCLK / LDA13 / WDB_DI signals
63	J4.14	MOSI*	B	MOSI / LDA14 / WDB_CKO signals
64	J4.15	MISO*	B	MISO / LDA15 / WDB_DO signals
65	J4.16	P37*	B	P37 / LDA7 / Y7 / DTR2 / CEX4 signals
66	J4.17	P36*	B	P36 / LDA6 / Y6 / RTS2 / CEX3 signals
67	J4.18	P35*	B	P35 / LDA5 / Y5 / DCD2 / CEX2 signals
68	J4.19	P34*	B	P34 / LDA4 / Y4 / RI2 / CEX1 signals
69	J4.20	P33*	B	P33 / LDA3 / Y3 / DSR2 / CEX0 signals
70	J4.21	P32*	B	P32 / LDA2 / Y2 / CTS2 / ECI signals
71	J4.22	P31*	B	P31 / LDA1 / Y1 / RE2_N / TM2_GT signals
72	J4.23	P30*	B	P30 / LDA0 / Y0 / DE2 / TM2_CK signals

Module Pin No.	Schematic Symbol Pin No	Pin Name	Pin Type	Description
73	J4.24	3V3_RF	PI	3.3V power input for RF circuit
74	J4.25	3V3_RF	PI	3.3V power input for RF circuit
75	J4.26	GND	G	Ground
76	J4.27	GND	G	Ground
77	J4.28	GND	G	Ground
78	J4.29	GND	G	Ground

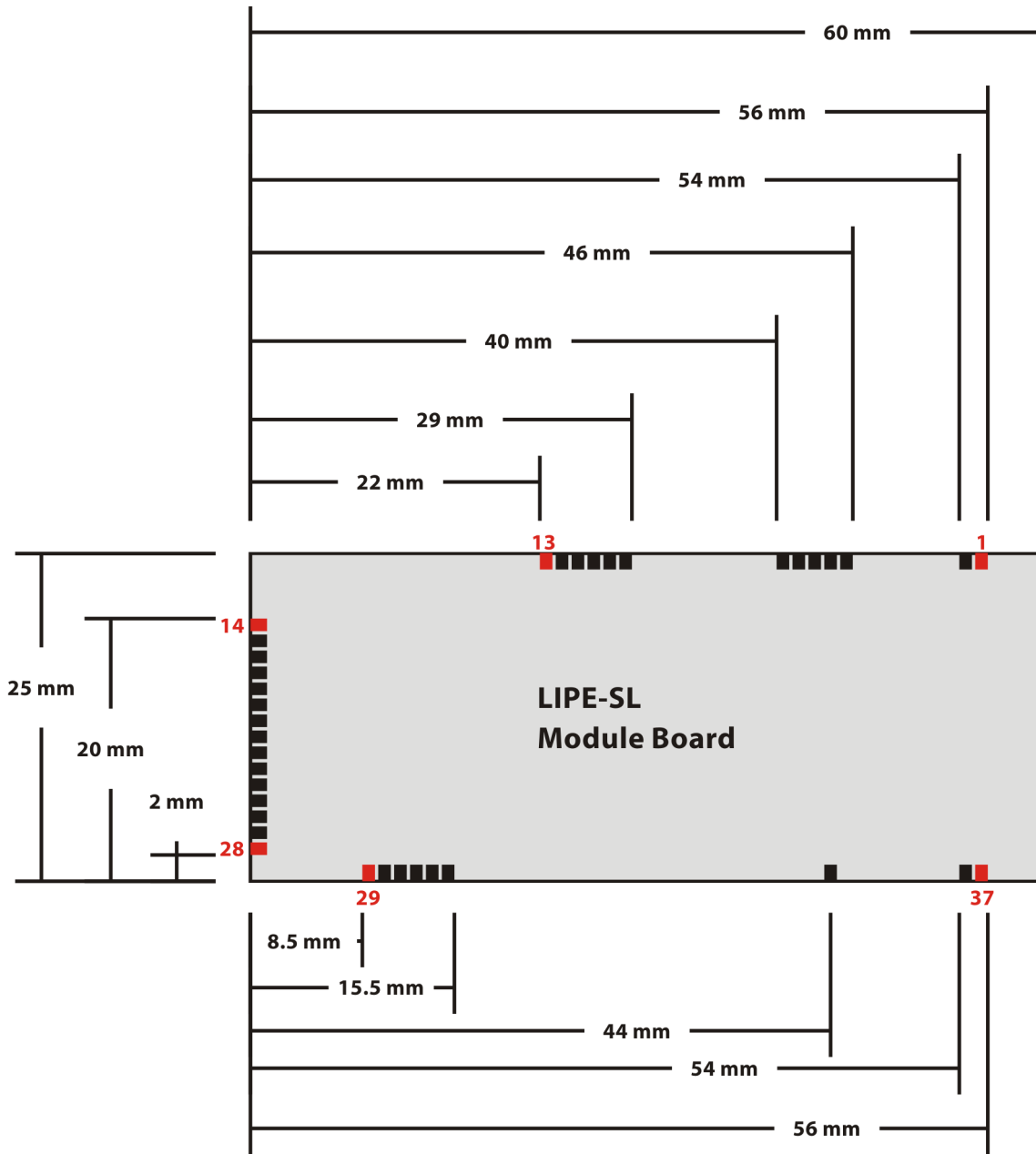
Pin type abbreviations: PI: Power input / PO: Power output / G: Ground / B: Bidirectional signal pin / I: Input signal pin / O: Output signal pin

Note: * These pins are multi-function pins in AX22001.

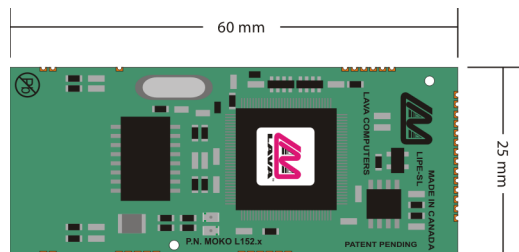
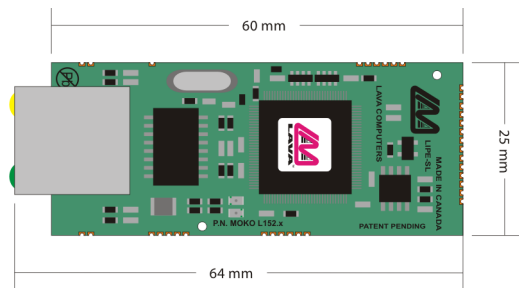
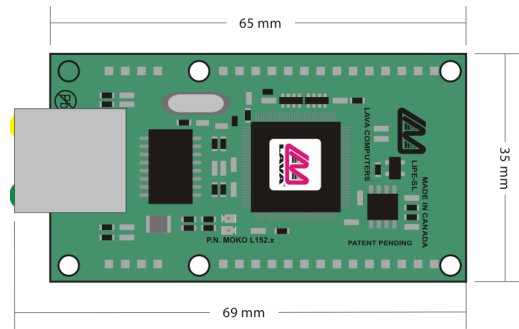
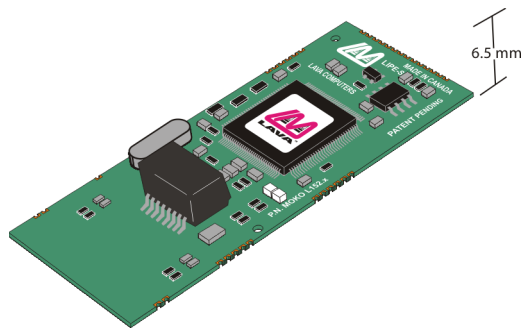
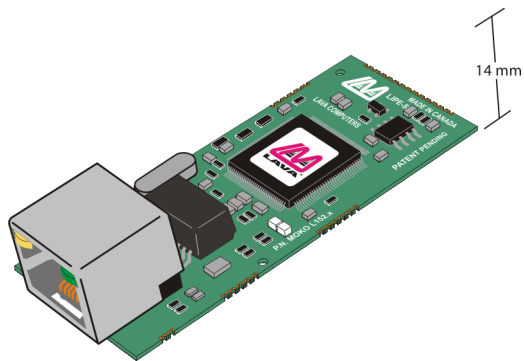
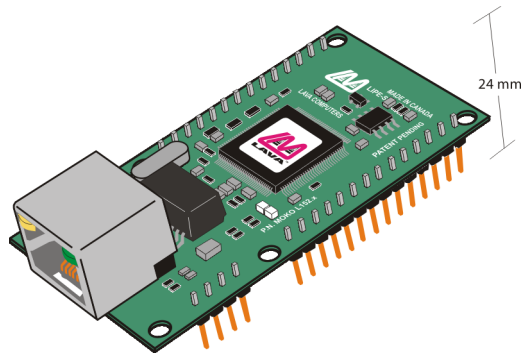
Castellated mounting holes spacing



LIPE-SL Dimensions



Mechanical Views (not to scale)



Ordering Information

Part Number	Description
LIPE-SL Surface mount module RJ-45	MPU TTL serial interface to wired Ethernet; surface mount form factor; RJ-45 Ethernet connector
LIPE-SL Surface mount module	MPU TTL serial interface to wired Ethernet; surface mount form factor
LIPE-SL DIP mount module RJ-45	MPU TTL serial interface to wired Ethernet; DIP mount form factor; RJ-45 Ethernet connector
LIPE-SL ASIC	MPU TTL serial interface to wired Ethernet; ASIC form factor
LIPE-SL PLCC-68 module	MPU TTL serial interface to wired Ethernet; PLCC-68 form factor (JEDEC MO-047)
LIPE-SL Development Board	Development board for LIPE-SL modules; includes software development application. Development board includes one SLIP-SL module, RS-232, TTL, USB interfaces, power supply; 3.3V, 5.0V, Gnd connectors for fast prototyping. RoHS. Optional cable pack is also available.

About LAVA

LAVA designs and manufactures hardware that provides system integrators and end users with simple serial-to-PC, serial-to-Ethernet, and USB-to-serial connectivity. The LAVA product line includes multi-port serial and parallel boards, Ethernet-to-serial device servers, links for legacy payment terminals, and interfaces for embedded networking in the Internet of Things environment headquarters-to-store links for cash register polling.

We serve customers around the globe in a wide array of industries, including Point of Sale, Telecommunications, Light Industrial Automation, Payment Processing, Building Automation, Gaming, and Restaurant & Hospitality. Our connectivity hardware suits designs needing more COM ports or remote monitoring and control of serial equipment over IP (Internet Protocol).

All LAVA hardware is covered by the LAVA Lifetime Warranty: any LAVA product that fails in its intended purpose will be replaced or repaired.

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