ispDOWNLOAD® Cables

For Programming Lattice ISP™ Devices

October 2004

Features

- **Support for All Lattice Programmable Products (Including ispPAC® and ORCA® Families)**
  - 1.8V to 5V programming
  - Ideal for design prototyping and debugging

- **Connect to Multiple PC Interfaces**
  - USB (v.1.0, v.2.0 ready)
  - PC Parallel Port

- **Easy-to-Use Programming Connectors**
  - Versatile flywire, 2 x 5 (.100") or 1 x 8 (.100") connectors

- **6 Feet (2 Meters) or More of Programming Cable Length (PC to DUT)**

ispDOWNLOAD Cables

Lattice ispDOWNLOAD cables are designed to facilitate in-system programming for all Lattice Semiconductor ISP™ devices directly from a PC. With in-system programmability, hardware functions can be programmed and modified in real-time on the system board to give additional product features, shorten system design and debug cycle time, enhance product manufacturability and simplify field upgrades.

After you complete your logic design and create a programming file with the ispLEVER® development tools, you can use ispVM® System software to program devices on your board. The ispVM System software automatically generates the appropriate ISP commands, programming addresses and programming data based on information stored in the programming file and parameters you set in ispVM. Programming signals are then generated from the USB or parallel port of a PC and directed through the ispDOWNLOAD Cable to the device, no additional components are required for programming.

ispVM System software is included with all Lattice design tool products and available for download from the Lattice web site at www.latticesemi.com.

ispDOWNLOAD Cable Pin Definitions

The functions provided by of the ispDOWNLOAD cables correspond with available functions on Lattice programmable devices. Since some devices contain different programming features, the specific functions provided by the ispDOWNLOAD cable may depend on the selected target device. ispVM System software will automatically generate the appropriate functions based on the selected device. See Table 1 for an overview of the ispDOWNLOAD cable functions.

Table 1. ispDOWNLOAD Cable Pin Definitions

ispDOWNLOAD Cable Pin	Name	ispDOWNLOAD Cable Input/Output	Description
VCC	Programming Voltage	Input	Connect to V_{CC} or V_{CCJ} plane of the target device. Typical I_{CC} = 10mA. (Note: this may not be the same as a target device's V_{CCO} plane).
SDO/TDO	Test Data Output	Input	Used to shift data out via the IEEE1149.1 (JTAG) programming standard.
SDI/TDI	Test Data Input	Output	Used to shift data in via the IEEE1149.1 programming standard.
ispEN/Enable/PROG	Enable	Output	Enable device to be programmed
TRST/DONE	Test Reset/DONE	Output/Input	Optional IEEE 1149.1 state machine reset. Done indicates status of configuration
MODE/TMS	Test Mode Select Input	Output	Used to control the IEEE1149.1 state machine.
GND	Ground	Input	Connect to ground plane of the target device
SCLK/TCK	Test Clock Input	Output	Used to clock the IEEE1149.1 state machine
INIT	Initialize	Input	Indicates that ORCA device is ready for configuration.

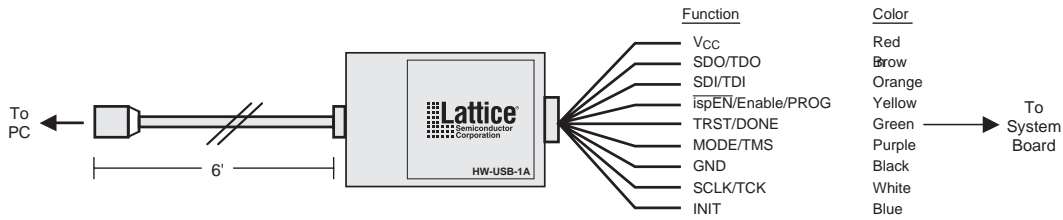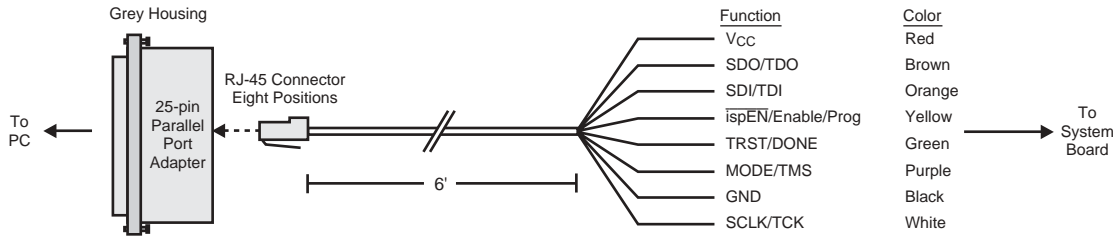*Figure 1. ispDOWNLOAD Cable In-System Programming Interface for the PC (HW-USB-1A)*

Function	Color
V_{CC}	Red
SDO/TDO	Brown
SDI/TDI	Orange
ispEN/Enable/PROG	Yellow
TRST/DONE	Green
MODE/TMS	Purple
GND	Black
SCLK/TCK	White
INIT	Blue

To PC — 6' — Lattice Semiconductor Corporation HW-USB-1A — To System Board

Figure 2. ispDOWNLOAD Cable In-System Programming Interface for the PC (HW7265-DL3 or HW7265-DL3A)*

Grey Housing

25-pin Parallel Port Adapter — RJ-45 Connector Eight Positions — To PC — 6'

Function	Color
V_{CC}	Red
SDO/TDO	Brown
SDI/TDI	Orange
ispEN/Enable/Prog	Yellow
TRST/DONE	Green
MODE/TMS	Purple
GND	Black
SCLK/TCK	White

To System Board

*HW7265-DL3 and HW7265-DL3A are functionally equivalent products.

Figure 3. ispDOWNLOAD Cable In-System Programming Interface for the PC (pDS4102-DL2 or pDS4102-DL2A)
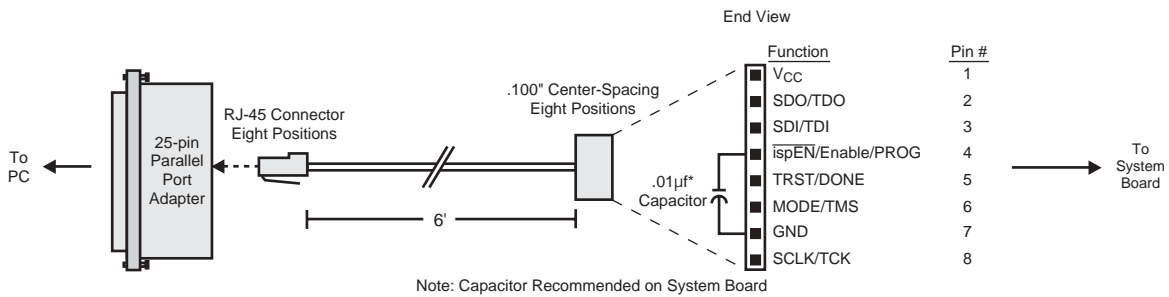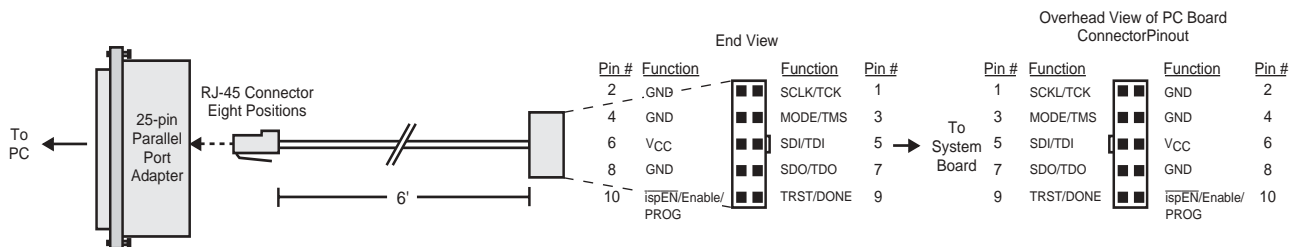
End View

To PC — 25-pin Parallel Port Adapter — RJ-45 Connector Eight Positions — 6' — .100" Center-Spacing Eight Positions — .01µf* Capacitor

Function	Pin #
V_{CC}	1
SDO/TDO	2
SDI/TDI	3
ispEN/Enable/PROG	4
TRST/DONE	5
MODE/TMS	6
GND	7
SCLK/TCK	8

To System Board

Note: Capacitor Recommended on System Board

Figure 4. ispDOWNLOAD Cable In-System Programming Interface for the PC (HW7265-DL2 or HW7265-DL2A)

To PC — 25-pin Parallel Port Adapter — RJ-45 Connector Eight Positions — 6'

End View

Pin #	Function		Function	Pin #
2	GND		SCLK/TCK	1
4	GND		MODE/TMS	3
6	V_{CC}		SDI/TDI	5
8	GND		SDO/TDO	7
10	ispEN/Enable/PROG		TRST/DONE	9

To System Board

Overhead View of PC Board ConnectorPinout

Pin #	Function		Function	Pin #
1	SCKL/TCK		GND	2
3	MODE/TMS		GND	4
5	SDI/TDI		V_{CC}	6
7	SDO/TDO		GND	8
9	TRST/DONE		ispEN/Enable/PROG	10

Refer to the following table when connecting a fly-wire download cable to systems that use the 1 x 8-position or 2 x 5-position connectors.

Table 2. Flywire to 1x8 or 2x5 Conversion Reference

Function	Flywire Cable	8-Position Connector	10-Position Connector
V_{CC}	Red	1	6
SDO/TDO	Brown	2	7
SDI/TDI	Orange	3	5
$\overline{\text{ispEN}}$/Enable/PROG	Yellow	4	10
TRST/DONE	Green	5	9
MODE/TMS	Purple	6	3
GND	Black	7	4
SCLK/TCK	White	8	1
—	—	—	2
INIT	Blue	—	8

Table 3. ispDOWNLOAD Cable Feature Summary

Feature	HW-USB-1A	HW7265-DL3	HW7265-DL3A	HW7265-DL2	HW7265-DL2A	PDS4102-DL2	PDS4102-DL2A
USB	X						
PC-Parallel		X	X	X	X	X	X
1.8V Support	X	X	X		X		X
2.5-5.0V Support	X	X	X	X	X	X	X
2x5 Connector	X	X	X	X	X		
1x8 Connector	X	X	X			X	X
Flywire	X	X	X				

Product Ordering Information

Product Description	Part Number
ispDOWNLOAD cable (USB). Contains 6' USB cable, flywire connectors, 8-position (1x8) adapter and 10-position (2x5) adapter.	HW-USB-1A
ispDOWNLOAD cable (PC only). Contains parallel port adapter, 6' cable with RJ45, flywire connectors, 8-position (1x8) adapter and 10-position (2x5) adapter.	HW7265-DL3A

Technical Support Assistance

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