# USB Made EASY

VINCULUM

FTDI Chip

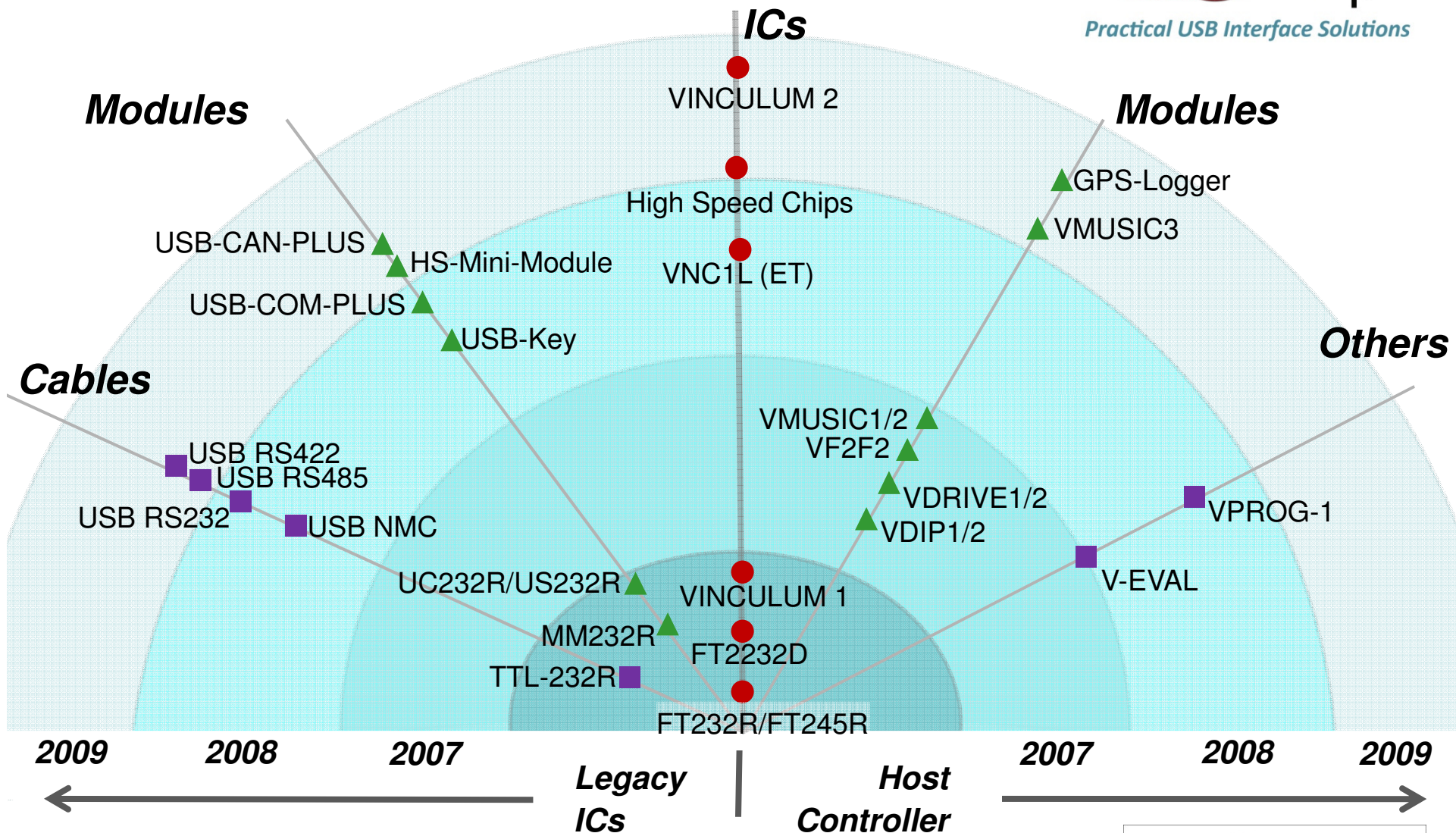Future Technology Devices International Ltd. (FTDI)

# USB Made Easy

Future Technology Devices International Ltd.

# *Company Profile*

- FTDI was founded in Scotland in the early 1990's by CEO Fred Dart, an experienced ASIC designer.
- FTDI has been involved in USB since the inception of the USB specification.
- Initial products were chipsets for PC motherboards.
- Offer a competitive advantage with a total solution of hardware, firmware and royalty free drivers, from one source.
- Growth – Around 30% per annum
  - Highest growth through distribution partners.
- New research and development office in Singapore,
- Regional offices in Portland, Taipei, opening new office in Shanghai in November/ December.

# FTDI Product Portfolio

**FTDI Chip**
Practical USB Interface Solutions

**ICs**
- VINCULUM 2
- High Speed Chips
- VNC1L (ET)
- VINCULUM 1
- FT2232D
- FT232R/FT245R

**Modules** (left)
- USB-CAN-PLUS
- HS-Mini-Module
- USB-COM-PLUS
- USB-Key

**Modules** (right)
- GPS-Logger
- VMUSIC3
- VMUSIC1/2
- VF2F2
- VDRIVE1/2
- VDIP1/2

**Cables**
- USB RS422
- USB RS485
- USB RS232
- USB NMC
- UC232R/US232R
- MM232R
- TTL-232R

**Others**
- VPROG-1
- V-EVAL

2009  2008  2007

Legacy ICs    Host Controller

2007  2008  2009

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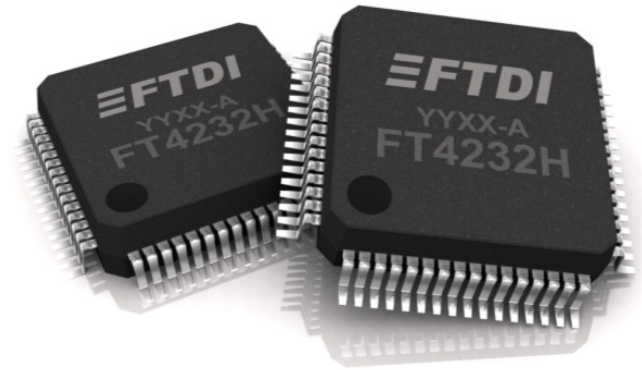
# *New products releases at Electronica 2008*

- FT2232H and FT4232H USB 2.0 High Speed ICs
- USB-RS232-WE cable and
  USB-RS232-PCB
- Vinculum VNC1L (extended temperature)
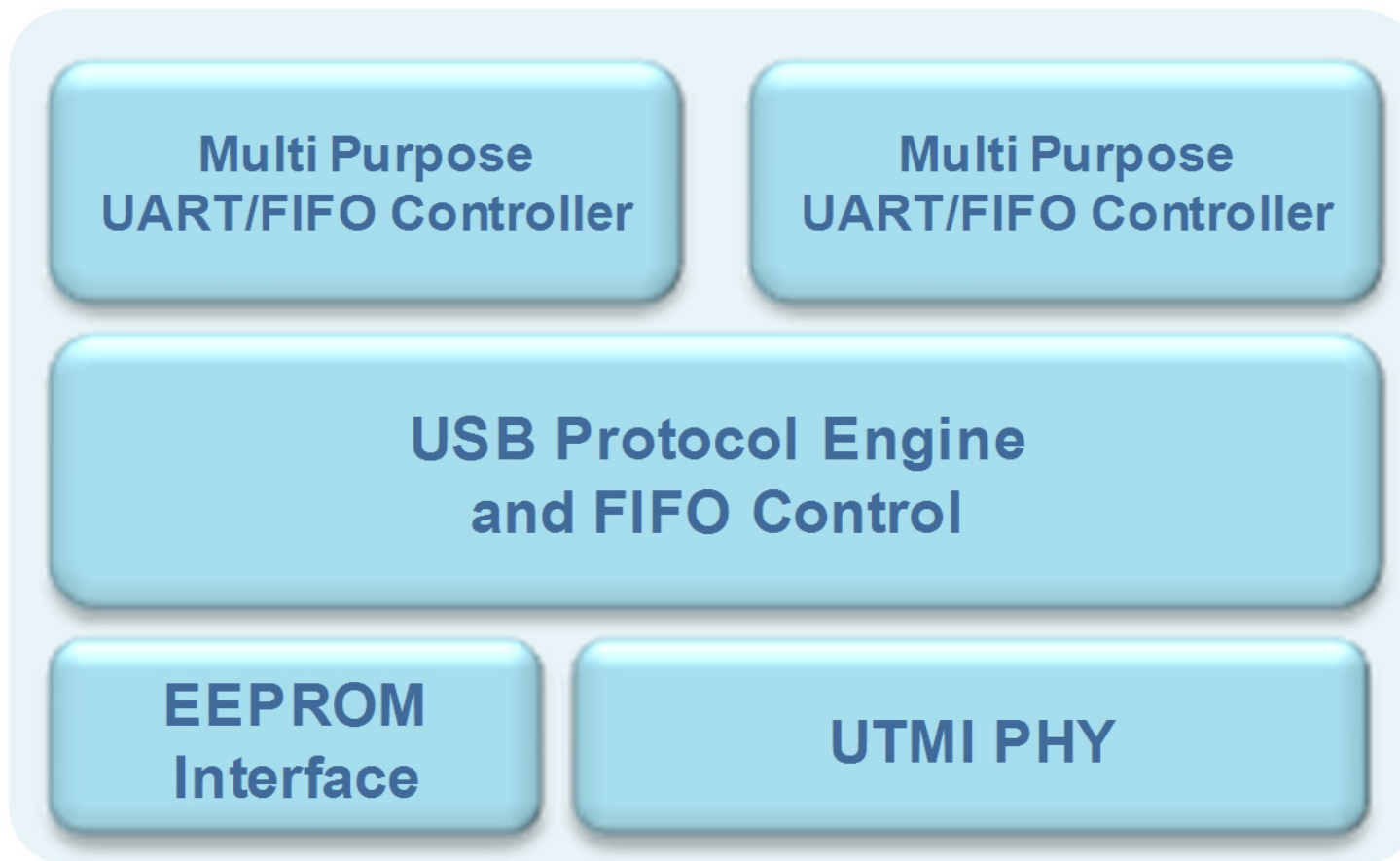
# NEW *FT2232H/ FT4232 IC's*

USB 2.0 High Speed (480Mbits/s) to dual/quad independent configurable parallel/serial interfaces

- FT2232H (Dual High Speed USB to Multipurpose UART/FIFO IC) has 4k bytes Tx and Rx data buffers per interface.
- FT4232H (Quad High Speed USB to Multipurpose UART/MPSSE IC) has 2k bytes Tx and Rx buffers.
- Multi-Protocol Synchronous Serial Engines (MPSSE), capable of speeds up to 30Mbits/s, provide flexible interface configurations.
- Entire USB protocol on a chip with integrated LDO regulator and PLL.
- Extended temperature range (-40ºC to +85ºC).

# *Simple block diagram FT2232H / FT4232H*



Multi Purpose UART/FIFO Controller

Multi Purpose UART/FIFO Controller

USB Protocol Engine and FIFO Control

EEPROM Interface

UTMI PHY

# *Function table FT2232H / FT4232H*



| FUNCTION | FT2232H | | FT4232H | | | |
|---|---|---|---|---|---|---|
| | *Channel A* | *Channel B* | *Channel A* | *Channel B* | *Channel C* | *Channel D* |
| FT232 UART | yes | yes | yes | yes | yes | yes |
| FT245 SYNC FIFO | yes | no | no | no | no | no |
| FT245 ASYNC FIFO | yes | yes | no | no | no | no |
| SPI | yes | yes | yes | no | yes | no |
| I2C | yes | yes | yes | no | yes | no |
| JTAG | yes | yes | yes | no | yes | no |
| Custom Serial | yes | yes | yes | no | yes | no |
| SYNC Bit-Bang | yes | yes | yes | yes | yes | yes |
| ASYNC Bit-Bang | yes | yes | yes | yes | yes | yes |
| CPU Style FIFO Interface | yes | yes | no | no | no | no |
| Fast Serial Interface | no | yes | no | no | no | no |
| Host Bus Emulation | yes, combines both channels | | no | no | no | no |

# *Software Drivers*

The Bus layer of our Driver (D2XX) allows direct access to the chip via the FTD2XX.dll.
The VCP layer is a filter layer to make the device look like a com Port.

```
┌──────────────┐
│     BUS      │── D2XX
└──────┬───────┘
┌──────┴───────┐
│     VCP      │
└──────────────┘
```
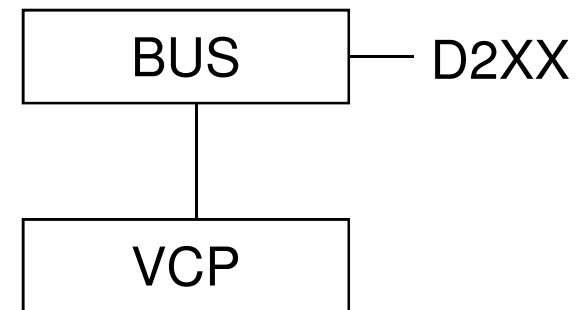
FTDI supports drivers for its products on the following OS's:

- Windows (Vista, Vista x64, XP,XP x64, 2000, Server 2003, Server 2003 x64, Server 2008, Server 2008 x64)

- Windows CE (4.2, 5.0, 5.2, 6.0)

- Mac OS X

- Linux and Linux x86_64

**http://www.ftdichip.com/Drivers/VCP.htm**

# NEW USB-RS232-WE cable/ USB-RS232-PCB

**FTDI Chip**

*Practical USB Interface Solutions*

USB-RS232 converter cable provides a USB to RS232 serial interface with customised end connectors.

- Entire USB protocol handled by the electronics encapsulated in USB connector.
- Data transfer rates from 300 baud to 1 Mbaud.
- Extended temperature range (-40ºC to +85ºC).
- Cable electronics available as separate PCB (USB-RS232-PCB).
- Fully assisted hardware (RTS#/CTS#) or X-On/ X-Off software handshaking.

# *Cables*

### US232R

- Premium class FT232RL based USB-RS232 converter.
- Gold plated USB and RS232 connectors.
- Side-lit blue TX/RX traffic indicators.
- Baud rates to 1 Mbaud.
- High gloss enclosed finish.
- 10cm/ 1m cable length options.

### USB-NMC

- Replacement for traditional serial null modem cable.
- PC to PC networking using USB port.
- USB powered
- Based on back to back FT232RQ devices.
- Entire USB protocol handled by USB connector encapsulated electronics.
- USB "A" connector on both ends of cable.
- Data transfer rates from 300 baud to 3 Mbaud at TTL levels.

### TTL-232R

- Versatile FT232RQ based USB-TTL converter cable.
- Converter electronics encapsulated in USB "A" plug.
- Baud rates to 3Mbaud.
- 3.3V / 5V IO signal level options available.
- Wide selection of cable terminations including audio jack and wire ended.

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# NEW *Vinculum VNC1L*
## *(extended Temperature)*

**FTDI Chip**
Practical USB Interface Solutions

The VNC1L is an embedded USB host controller integrated circuit. It encapsulates certain USB device classes and handles the USB Host Interface and data transfer functions using the in-built V-MCU and embedded Flash memory.

- Handles the entire USB protocol.
- Two USB Host ports.
- 8 or 32-bit V-MCU Core.
- 64k Embedded Flash Program Memory.
- 4k internal Data SRAM.

- Two independent USB 2.0 Slow speed or Full speed Host or Slave ports.
- Extended temperature range (-40ºC to +85ºC).
- Royalty free firmware, field upgradeable over UART or USB.

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# *Vinculum Firmware Drivers*

**Firmware Functionality**
- VDAP (disk and peripherals)
- VDIF (disk and FTDI Interface)
- VMSC (music player)
- VDPS (disk, PC monitor and slave port)
- VCDC (communication class device)
- VF2F (disk to disk copier)

| | BOMS | | FTDI Peripheral | | HID | | Printer | | Hub | | PC Host | | Monitor Port | | CDC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| VDAP | | Y | Y | Y | Y | Y | Y | Y | Y | Y | | | | | Y | Y |
| VDIF | | Y | | Y | | Y | | Y | | | | | Y | | | |
| VMSC | | Y | | Y | | Y | | Y | | Y | | | | | | Y |
| VDPS | | Y | | Y | | Y | | Y | | Y | Y | | | | | |
| VCDC | | Y | | Y | | Y | | Y | | Y | | | | | Y | Y |
| VF2F | Y | Y | | | | | | | | | | | | | | |

# *Vinculum based USB – Host Modules*


**FTDI Chip**
*Practical USB Interface Solutions*

## All Host modules are based on the VNC1L Device









**VDIP1**
- 24 pin 0.6 pitch DIP module
- Type A connector to device USB ch 2
- Support UART / FIFO / SPI controller
- Delivered with VDAP Firmware

**VDIP2**
- 40 pin 0.6 pitch DIP module
- Type A connector to device USB ch 1& 2
- Support UART / FIFO / SPI controller
- Delivered with VDAP Firmware

**VMUSIC2**
- Enclosed module includes VS1003 audio codec
- Type A connector to device USB ch 2
- 3.5mm headphone jack socket
- Support UART / SPI controller
- Delivered with VMUSIC Firmware

**VDRIVE2**
- Enclosed module
- Type A connector to device USB ch 2
- Support UART / SPI controller
- Delivered with VDAP Firmware

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# *Vinculum Development Modules*



## *VPROG-1 (VNC1L Programmer)*

- Quick and easy programming of individual Vinculum host controller.
- Quick and easy programming of VDIP host controller prototyping modules.
- USB controlled and powered.
- Easy to use VNC_PROG software
- Visual indication of programming progress and using LEDs.

## *V-EVAL (VNC1L Development Platform)*

- Inbuilt VNC1L USB device programmer/ terminal emulator/command monitor hardware.
- Two VNC1L USB Host/Slave ports, with generous prototyping area for standard DIP and SIL devices.
- Multiple IO port connectors grouped by port name and/or function.
- Downloadable programming, terminal emulation and debug monitor software.

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# Comparison of FTDI USB Devices

| Part No | FT232/245BL FT232/245BQ | FT232/245RL FT232/245RQ | FT2232D | FT2232H | FT4232H | VINC1L |
|---|---|---|---|---|---|---|
| USB IC Type | CLEINT | CLEINT | CLEINT | CLEINT | CLEINT | HOST |
| USB UART | • | • | • | • | • | • |
| USB FIFO | • | • | • | • | | • |
| Dual channel | | | • | • | | • |
| Quad channel | | | | | • | |
| Internal EEPROM | | • | | | | • |
| Internal OSC | | • | | | | |
| USB 1.1 & 2.0 compliant | • | • | • | • | • | • |
| External components | 12 | 2 | 15 | | | |
| Operating temperature | - 0°C to +70°C | -40°C to +85°C | -40°C to +85°C | -40°C to +85°C | -40°C to +85°C | -40°C to +85°C |
| Power supply | +4.35V to +5.25 V | +3.3V to +5.25 V | +4.35V to +5.25 V | +3.0V to +3.6 V | +3.0V to +3.6 V | +3.0V to +3.6 V |

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