SOC Prototype
StarFire Platforms
Agenda

🌿 About HyperSilicon
🌿 Profile of our Prototype Platforms
🌿 StarFire-STK
🌿 StarFire-DPK (Demo Program Kit)
🌿 Each Mainboard introduction
   - StarFire-DA Series
   - StarFire-V820/530/340, H820/530/340, T820/530/340
   - StarFire-M820/530/340
   - StarFire-E820/530/340
   - StarFire-T340/530/820
   - StarFire-V180
   - StarFire-EARM/DARM/CevARM
🌿 StarService
About HyperSilicon – 1/2

- Founded in 2003, private high-tech company
- Headquarter in Beijing China, sales office in Shanghai
- Server for SOC/IP design and verification industry

Our business
- FPGA prototype platform and design service
- Analog IP and design service
- Agent for various EDA & IP selling in China:
  - EDA: ESL SystemVerilog Compiler and Verification tools
  - IP: USB 2.0 PHY, USB 3.0 PHY, ADC/DAC, PCI-E, SATA II, DVB-C/DVB-T/DVB-S2, H.264, MP3/WMA, and OTP memory
About HyperSilicon – 2/2

- No.1 Supplier in China for SOC prototype platform
- First partner of Altera in mainland China
- Partner of Tensilica
- De facto Partner of ARM and CEVA
- Agent for Commsonic, DCD, Kilopass, intoPIX, SiliconOcean, IPGoal, TVS, Chips&Media and DPcontrol
- Innovation, Count on Customers’ requirement
- Good reputation and strong customer base
Profile of Prototype Platform

- Powered by high end FPGA devices from Altera
- Both All-in-one and Modularized boards
  - Only one All-in-one SOC FPGA board supplier
  - Famous for the customizing design of FPGA prototype boards
- We expertise at:
  - Video/Audio consumer SOC prototype
  - Embedded processor flow: ARM, MIPS, CEVA, Tensilica
- Quality Guaranteed:
  - ISO9000 qualified assembly factory
  - Self test Kit
  - Full Demo Programs Kit
Profile of Prototype Platform

- **StarFire** series Platform include:
  - Main boards
    - All in One
    - Modularized
  - STK ---self test kit
  - DPK ---demo program kit
  - Design Service---customizing design service
  - Various daughter boards
    - HSPI Daughter boards
    - HSMC Daughter boards
Profile of Prototype Platform

HyperSilicon Unified Interface Standard ----HSPI

- Mainly for Modularized boards

StarFire Apply with HSPI mainly, and some of the interface apply with HSMC

- HSMC is the Interface Standard of Altera, thus the board with HSMC can connected to most of the Altera’s COTS daughter boards
StarFire Family

**All-in-one Boards:**
- StarFire-V820/530/340
- StarFire-H820/530
- StarFire-T820/530
- StarFire-V180
- StarFire-V120
- StarFire-DP25
- StarFire-DVB4S
- StarFire-I820

**Modularized Boards:**
- StarFire-DA820/530/340
- StarFire-DC820/530/340
- StarFire-E820/530/340
- StarFire-EARM180
- StarFire-DARM180
- StarFire-CevARM180
# StarFire Family – 1/3

<table>
<thead>
<tr>
<th>FPGA Prototype Board</th>
<th>FPGA Devices used X Qty.</th>
<th>ASIC Gates</th>
<th>Structure</th>
<th>Key Features and Application</th>
<th>Stackable</th>
</tr>
</thead>
<tbody>
<tr>
<td>StarFire-DA820//340</td>
<td>StratixIV820/ or Stratix III 340 (1760 pin) x 2</td>
<td>16.4/8.2M Gates</td>
<td>Modularized</td>
<td>600 interconnection between two FPGA devices, DDR2 and DDR3 DIMM slot, HSPI interface</td>
<td>√</td>
</tr>
<tr>
<td>StarFire-E820/530/340</td>
<td>StratixIV820/530 or Stratix III 340 (1760 pin) x 1</td>
<td>8.2/5.3/3.4M Gates</td>
<td>Modularized</td>
<td>General Purpose Board, HSPI and HSMC interfaces</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# StarFire Family – 2/3

<table>
<thead>
<tr>
<th>FPGA Prototype Board</th>
<th>FPGA Devices used X Qty.</th>
<th>ASIC Gates</th>
<th>Structure</th>
<th>Key Features and Application</th>
<th>Stackable</th>
</tr>
</thead>
<tbody>
<tr>
<td>StarFire-M820/530/340</td>
<td>Stratix IV 820/530 or Stratix III 340 (1760 pin) x 1</td>
<td>8.2/5.3/3.4M Gates</td>
<td>All-in-one</td>
<td>DDRII@666MHz, HDMI transmitter for various Video and Audio SOC, like DTV/STB/MID</td>
<td>√</td>
</tr>
<tr>
<td>StarFire-H820/530/340</td>
<td>Stratix IV 820/530 or Stratix III 340 (1760 pin) x 1</td>
<td>8.2/5.3/3.4M Gates</td>
<td>All-in-one</td>
<td>DDRII@666MHz, HDMI transmitter for various Video and Audio SOC, DTV/STB/MID</td>
<td>√</td>
</tr>
<tr>
<td>StarFire-V820/530/340</td>
<td>Stratix IV 820/530 or Stratix III 340 (1760 pin) x 1</td>
<td>8.2/5.3/3.4M Gates</td>
<td>All-in-one</td>
<td>DDRII@666MHz, HDMI transmitter for various Video and Audio SOC, like DTV/STB/MID</td>
<td>√</td>
</tr>
<tr>
<td>StarFire-T820/530/340</td>
<td>Stratix IV 820/530 or Stratix III 340 (1517 pin) x 1</td>
<td>8.2/5.3/3.4M Gates</td>
<td>All-in-one</td>
<td>DDRII@666MHz, HDMI transmitter and receiver, PCI-E, SATA II for various Video and Audio SOC, like DTV/STB/MID and Surveillance</td>
<td>√</td>
</tr>
<tr>
<td>StarFire-I820/530/340</td>
<td>Stratix IV 820/530 or Stratix III 340 (1517 pin) x 1</td>
<td>8.2/5.3/3.4M Gates</td>
<td>All-in-one</td>
<td>PISMO2, DDRIII@666Mhz, DDRII@533Mhz</td>
<td>No</td>
</tr>
<tr>
<td>StarFire-V180</td>
<td>Stratix II 180 (1020 pin) x 2</td>
<td>1.8M Gates</td>
<td>All-in-one</td>
<td>Covering most of the peripheral for STB/DTV</td>
<td>No</td>
</tr>
</tbody>
</table>
# StarFire Family – 3/3

<table>
<thead>
<tr>
<th>FPGA Prototype Board</th>
<th>FPGA Devices used X Qty.</th>
<th>ASIC Gates</th>
<th>Structure</th>
<th>Key Features and Application</th>
<th>Stackable</th>
<th>Processor Test Board Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>StarFire-EARM</td>
<td>StratixII 180 (1020 pin) x 2</td>
<td>3.6M Gates</td>
<td>Modularized</td>
<td>Universal for various SOC</td>
<td>✓</td>
<td>ARM Coretile</td>
</tr>
<tr>
<td>StarFire-DRAM</td>
<td>StratixII 180 x 2</td>
<td>3.6M Gates</td>
<td>Modularized</td>
<td>For Various SOC, PCI/PCI-X slots,</td>
<td>✓</td>
<td>ARM Coretile</td>
</tr>
<tr>
<td>StarFire-CevARM</td>
<td>StratixII 180 x 2</td>
<td>3.6M Gates</td>
<td>Modularized</td>
<td>For various SOC, CEVA and ARM platform</td>
<td>✓</td>
<td>ARM Coretile and CEVA CA at same time</td>
</tr>
<tr>
<td>StarFire-V120</td>
<td>CycloneIII 120 x 2</td>
<td>1.2M Gates</td>
<td>All-in-one</td>
<td>HDMI,SHMC interfaces Low cost solution for Audio/Video</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>StarFire-DP25</td>
<td>CycloneIII 25 x 1</td>
<td>0.25M Gates</td>
<td>All-in-one</td>
<td>LCD panel display verification kit</td>
<td>No</td>
<td>ODM for Altera</td>
</tr>
</tbody>
</table>
HyperSilicon Customers-1

AMD
Fujitsu
Atmel
Rockchip
IPGoal
Haier
AllWinner
Commsonic
NUFRONT
HDIC
Unicore
HyperSilicon Customers-2
HyperSilicon Customers-3
HyperSilicon Customers-4

Tsinghua University
Fudan University
Shanghai Jiao Tong University
Xian Jiaotong University
Harbin Institute of Technology
Souochow University
National University of Defense Technology
Beijing University of Technology
Wuhan University
Tianjin University

and more under NDA...
StarFire-SKT

Self-test kit
Picture of StarFire-SKT

Runtime Software
StarFire-SKT

- Include one set of runtime software, one Test Interface Board (TIB), one JTAG cable, and one Altera USB-Blaster.
- Test any IO through SAMTEC connector
- Check Open, Short, and Bridge
- Check the connection between connectors and FPGA devices
- Check the FPGA device(s)
StarFire-DPK

Self-test kit
StarFire-DPK

- HDMI transmitter demo
  - Showing the video at CIF, three frames
- Video output
  - Showing the picture screen
- DDRII SDRAM interface demo
  - Altera MegaCore of DDRII, running up to 666MHz
- DDR SDRAM test program
- SDRAM test program
- USB, UART, LEDs
- Power debug and JTAG downloading test programs
StarFire-DA820/340 Series
StarFire-DA820/340 Picture
StarFire-DA Series Features

- Two pieces Altera Stratix IV EP4SE820/340, Supporting Verification of design up to 16.4 million ASIC gates
- 600 connections between two FPGAs
- Expand interface suitable for HSPI protocol
- Support 1440 General IO signal
- Redundant FPGA core power supply
- Full DDR2, DDR3 power supply, and DDR2/3 Sodimm Slots
StarFire-DC820/530/340 Series
Picture of StarFire-DC series
Feature of StarFire-DC Series

- Modularized prototype board, 16.4 Million Gates, stackable to meet more capacity, suitable for communication terminal SOC prototyping, such as LTE terminal SOC...
- 692 connection between the two main FPGA chips
- Standard DDR2-Sodimm expansion interface for SDRAM, DDR, DDR2, DDR3 and so on
- DAC/ADC section, DAC part of the maximum sampling rate up to 125Msps, SFDR is 60dB
- ADC’s maximum sampling rate of 105Msps, SFDR is 75dB
- NOR Flash and NAND Flash chips on board
- USB2.0 device and USB PHY interface assembled on board
- 6 coaxial SMA interfaces to provide high-speed differential clock input
StarFire-DC series Chat

Diagram showing various components and connections, including USB, IIC, USB PHY, FPGA_JTAG, FPGA_AS, LEFT UART, RIGHT UART, RF POWER INT, and others.
StarFire-E820/530/340 Series
Picture of StarFire-E820/530/340
Feature of StarFire-E820/530/340

- Lowcost FPGA prototype board
- Altera Stratix III/IV series
  EP3SL340H40/EP4SE530/820 H40 as main process chip
- Memory type contains DDR/DDR2/DDR3-Sodimm Slot
- Configuration type with JTAG/FPP/USBdevice
- USB-OTG PHY, debug device contained
- All Altera HSTC Serials’ daughterboard can be adapted seamless
StarFire-M820/530/340 Series
Picture of StarFire-M820/530/340
Feature of StarFire-M820/530/340

- Altera Stratix III/IV serials
  EP3SL340F43/EP4SE530/820 as main process chip
- Be adept in video process, as video DAC, HDMI transmitter
- Memory type contains DDR/DDR2/DDR3-Sodimm Slot
- Configuration type with JTAG/FPP/USBdevice
- All StarFire-V820/530/340 Serials’ daughterboard can be adapted seamless
StarFire-V820/530/340 Series
Picture of StarFire-V820/530/340
Chart of StarFire-V820/340
StarFire-1820/530/340
Picture of StarFire-I820/530/340
Feature of StarFire-l820/530/340

- Be adept Memory Controller Test, SOC CPU core validation
- Memory type contains DDR2/DDR3-Sodimm Slot
- PISMO standard Memory Expansion Interface
- Configuration type with JTAG/FPP/USBdevice
StarFire-H820/530/340
Picture of StarFire-H820/530/340
Chart of StarFire-H820/530/340

ALTERA
Stratix III/IV
340/530/820

USB PHY
ISP1504

USB Dev
CY7C68013

120

HDMI_P

HDMI_Inter

EXP_CLK

USB PHY
ISP1504

100

1000

SWITCH/Reset/LED

Ethernet PHY

32bits

32bits

Extent IOs

GPIOS

EXP_CLK

EXP_CLK

EXP_CLK

Slow Interfaces

CSI_Interface

EXP_JTAG

HDMI_Inter

FLASH_Inter

JTAG

DDR2

32bits

32bits

32bits

32bits

GPIOS

VGA/RCA

DAC

ADC

VGA/RCA

GPIOS

EXP_CLK

EXP_CLK

EXP_CLK

EXP_CLK

EXP_CLK

EXP_CLK

EXP_CLK

EXP_CLK

EXP_CLK

EXP_CLK

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EXP_CLK

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EXP_CLK

EXP_CLK

EXP_CLK

EXP_CLK
Feature of StarFire-H Series

- Altera Stratix III/IV serials
- On Board DDR/DDR2 support
- HDMI transmitter&receiver Support
- Video DAC Support
- Video ADC Support
- USB Device&PHY support
- 10/100/1000 MEthernet Support
Feature of StarFire-H Series

- UART Support
- SCSI Interface Support
- LCD Interface Support
- High Speed Interface Support
- Low Speed Interface Support
- LED/Reset/Switch Support
StarFire-T820/530/340
Picture of StarFire-T series
Chart of StarFire-T series
Feature of StarFire-T Series

- An Altera Stratix IV EP4SE820F1517 FPGA, to meet at least 8.2 million gate ASIC design verification, rapid growth for the current capacity of the circuit to provide a reliable verification of capacity to ensure.

- With high-speed FPGA transceiver chip and the mother chip interconnect for small FPGA logic capacity to provide large-scale expansion of space, interconnect level using two standard 1.8V and 3.3V, real-time Internet conditions to adjust.

- 5 pieces of DDR II memory chips MT47H64M16 (64Meg × 16bit × 8banks) in parallel, data-bit-wide 32/16-bit, clock speed 333Mhz, up to 512Mbyte of the board DDR II SDRAM (can be backward compatible).

- Integrated 10BASE-T, 100BASE-TX and 1000BASE-T Ethernet PHY physical layer protocol.
Feature of StarFire-T Series

- Two SATAII standard interface, providing up to 3.875Gbps transmission bandwidth of the interface to support high-speed serial design
- PCI-e single-chip PHY support, PCI-e 1.1, optional clock rate 100MHz/125MHz, TI-PIPE MAC Interface
- HDMI transceiver support
- Integrated USB PHY chip, USB controller, the transmission of debugging, the control logic for the user to facilitate
StarFire-V180 Series
StarFire-V180 Picture
StarFire-DARM Series (EARM Series)
Picture of StarFire-DARM
Picture of StarFire-EARM
Architecture

Stratix II

H1
H2
V1
V2
V3
H3
H4
FPGAs and interconnects

- There are two FPGA devices in one board, it is optional to choose only one FPGA mounted
- FPGA device can be selected within ALTERA StratixII series including EP2S60/180, FBGA1020 pinout
- There are 240 interconnects between two FPGA devices, which can also be connected to external through V2 connector
- Interconnects can be expanded via connector-bridges
Stackble

_MUTEX The capacity is unlimited, with the boards stacked one by one.
Stacked StarFire-EARM working
Extendable I/Os

- High performance connectors from SAMTEC Inc.
- Total 7 extension connectors for USER to extend: H1, H2, H3, H4, V1, V2, V3
- Total 1260 IO are usable, with 180 at each connector.
- The delay between any two IO signal lines is no more than 500mil
- The signal maps are exactly same for H1, H2, H3 and H4; The signal maps are exactly same for V1, V2, and V3
ARM™ core supporting

- Suitable for prototype to SOC, which contain any ARM cores
- ARM connection:
  - INTEGRATOR Coretile by ARM can be connected through V1, H1, or V2 connectors, which are compatible both physically and electrically.
PCI slots and others

- There are 3 PCI slots, each are compatible with PCI32/PCI64/PCI-X
  (PCI/PCI-X is only at DARM, no EARM)
- Daughter boards can be connected through PCI slots
- One IDE slot
- HDD power connector
- Some LED lights
- Reset buttons
- POR supporting
Power Levels

All the IOs are divided as 7 groups, VCCIO for each group can be set individually.

- **Group 1**: FPGA1 BANK1&2, FPGA1 BANK5&6
- **Group 2**: FPGA1 BANK3&4
- **Group 3**: FPGA1 BANK7&8
- **Group 4**: FPGA2 BANK1&2
- **Group 5**: FPGA2 BANK3&4
- **Group 6**: FPGA2 BANK5&6
- **Group 7**: FPGA2 BANK7&8

- **VCCIO**
  - 3.3V
  - VCCIO on board
  - VCCIO from Daughter Boards
## DD Daughter Boards (function)

<table>
<thead>
<tr>
<th>DDR Memory</th>
<th>LCD Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDRAM</td>
<td>CCD/CMOS Interface</td>
</tr>
<tr>
<td>SRAM</td>
<td>DVI Input &amp; Output</td>
</tr>
<tr>
<td>DDR SODIMM</td>
<td>UART Interface</td>
</tr>
<tr>
<td>NOR FLASH</td>
<td>10/100M Ethernet PHY</td>
</tr>
<tr>
<td>NAND FLASH</td>
<td>USB1.1/2.0/OTG PHY</td>
</tr>
<tr>
<td>Video Input/Output</td>
<td>USB Device</td>
</tr>
<tr>
<td>Audio Input/Output</td>
<td>PS2 Interface</td>
</tr>
<tr>
<td>HDMI Video Input/Output</td>
<td>Transform Stream (TS) I/O</td>
</tr>
</tbody>
</table>
Daughter Boards - 1

- DD-DDRdevice
  - MT46V16M16 (4Meg X 16bit X 4banks)
  - DDR Devices
  - 64bit
  - Clock 133MHz
Daughter Board - 2

- DD-DDRSODIMM
  - 2.5V DDR SODIM connector
  - 200 pin
  - Up to 1G byte
  - DDR266 or DDR333
Daughter Board - 3

- **DD-MemoryDS**
  - MT48LC8M32 (2MegX32bitX4 banks) SDRAM
    - 32 bit
    - 166MHz
  - IDT71V7160（512KX32bit）ZBT SRAM
    - 32 bit
    - 225MHz
Daughter Board - 4

**DD-Peripheral**
- NAND FLASH (NAND04GW3B2B) 4G bit
- NOR FLASH (TE28F128J3D-75) 128M bit
- Ethernet PHY
- USB 2.0/OTG PHY
- UART
- PS2 X 2
StarFire-CevARM Series
Picture of StarFire-CevARM
Picture of StarFire-CevARM
StarFire-CevARM Basic

- Based on StarFire-DARM
- DD-Daughter boards compatible
- Higher Signal Integration
- Patent Pending
----StarService
StarService

We are pleased to do customizing design for you with EXCELLENT supports!
StarService Basic

❖ Altera FPGA devices Oriented
❖ High end SOC prototype board
  ◆ 8-30 layer PCB, 200MHz+, complex system
❖ SOC embedded processors powered
  ◆ ARM, MIPS, Tensilica, CEVA, ZSP, etc.
  ◆ We can support the software flow of the processors
❖ Focus on the applications of consumer SOCs:
  ◆ DTV, STB, PMP/MP4, various MIDs, and any Audio and Video related products
❖ HyperSilicon have certain capability of software engineering
StarService type

- Half customizing design
  - Modification design based on our off-the-shelf StarFire series prototype boards
  - Daughter boards customizing design
- Full customizing design of the boards
- System design based on customer’s ASIC/SOC after using Hypersilicon’s FPGA based Prototype boards
StarService Schedule

 Modification design based on StarFires
  - 6—15 weeks

 Daughter boards customizing design
  - 1—5 weeks

 Full customizing design of the boards
  - 3—6 months

 System design based on customer’s ASIC/SOC after using Hypersilicon’s FPGA based Prototype boards
  - Depending on the project
StarService
General Flow
Thank You!