



GOWIN Semiconductor Corporation

Corporate Presentation

www.gowinsemi.com

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GMT (UTC) Nov to March
BST (UTC + 1) April to Oct

United Kingdom

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Major R&D Centers

Guangzhou
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Hong Kong
Jinan

International Sales

Guangzhou China (HQ)
United Kingdom
Hong Kong
San Jose USA
Korea
Shandong China
Shenzhen (South China)
Shanghai (East China)
Beijing (North China)
Wuhan (Central & SW China)

Providing easy to use, high performance, low-cost FPGA solutions for consumer, industrial, automotive, and communications applications.

Locations: Guangdong, China (Corp HQ)
San Jose, California (US HQ)
Hong Kong (Asia HQ)
Shandong, Shanghai, Shenzhen

Manufacturing: Scalable manufacturing capabilities with world-class partners.

Founded: 2014 **Silicon:** 2016 **First revenues:** 2017

World's fastest growing FPGA Company

FPGA Devices: Flash and SRAM Based

Low-Density / Low Power (LUTs < 10K): GW1N, GW1NR, GW1NS, GW1NRF

Mid-Density (10K < LUTs < 100K): GW2A, GW2AR, GW2ANR

High-Density (LUTs > 100K): GW5AT, GW4ST

Key Partners



Awards and Recognition

China Annual Creativity in Electronics



Most Remarkable Global Technology Startup

LittleBee FPGAs

High Logic Element Density

Consumer, Mobile and IoT

- As small as 1.8 x 1.8mm
- Interface Bridging and Multiplexing

Industrial, Commercial and Server

- TQFP, QFN and BGA (0.8mm) Packaging
- CPLD Replacement, Power/Platform Management

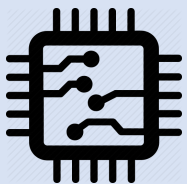
Arora based FPGAs

High Logic Element Density

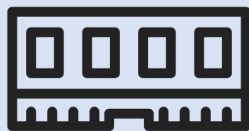
Communications, Industrial and Automotive

- As small as 8x8mm
- Up to 607 user interface pins
- 1.2 Gbps LVDS, DDR3, MIPI D-PHY, PCI
- High Speed Interfacing and IO Expansion

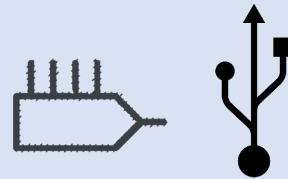
Differentiating FPGA Features



Hardened MCUs
Arm Cortex-M3



On-Chip Memory
Up to 16MB



More Interfaces
ADC, USB, SPMI, I3C



Ultra-Low Power
10μW Sleep

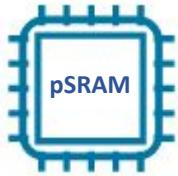


Security
PUF Based RoT

		GOWIN FPGA Family Devices			Product Series	Density (LUTs)	LittleBee	Arora
		 Flash-Based FPGA GW1N* 1-10K Logic Element Density		 SRAM-Based FPGA GW2A* 20-55K Logic Element Density	GW1N	1K, 2K, 4K, 9K	Flash-Based FPGA	N/A
Product Features	Ultra-Low Power SPMI Power Management	*Z		*R	GW1NZ	1K	Ultra-Low Power	
	Hard MCU ARM Cortex-M3 ARC EM4	*S	*SR		GW1NS	2K, 4K	Embedded Hardcore MCU	
	Extended Memory On-Chip SRAM	*R			GW1NR	1K, 4K, 9K	Extended Memory	
	Security SRAM PUF Root-of-Trust	*SE *SER			GW1NSR	2K, 4K	MCU + Memory	
	Bluetooth Low Energy RF Transceiver	*RF			GW1NSE	2K, 4K	MCU + Security	
	Arora plus Flash				GW1NSER	2K, 4K	MCU + Security + Memory	
	Arora plus SRAM & Flash				GW1NRF	4K	MCU + Security + RF Transceiver	
					GW2A	20K, 55K	N/A	RAM-Based FPGA
				GW2AR	20K	On-Chip Memory		
				GW2AN	20K	On-Chip NOR Flash		
			GW2ANR	20K	On-Chip Memory Plus, NOR Flash			

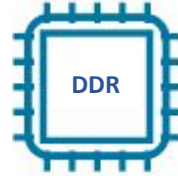
GOWIN FPGA Embedded Processor Options					
Core	Instruction Set	IP Resources (LUTs)	DMIPS/MHz	CoreMark®/MHz	Device Family / CLK Freq (MHz)
PicoRV32	RISC-V	Softcore 2K	0.516	-	GW2A*: 50 GW1N* : 50
Andes N25	RISC-V AndeStar™ V5	Softcore 10K	GW2A18: 1.94 GW2A55: 2.29	-	GW2A*: 50
Cortex M1	ARM Thumb, Thumb-2	Softcore (5K to 21K)	0.8	1.85	GW2A*: 75 GW1N9: 40
Cortex M3	ARM Thumb, Thumb-2	Softcore (18K to 37K)	1.25 to 1.89	3.34	GW2A55: 25
Cortex M3	ARM Thumb, Thumb-2	Hardcore N/A	1.25 to 1.89	3.34	GW1NS*-2C: 30 GW1NS*-4C: 100
ARC EM4	Synopsys ARCV2	Hardcore N/A	1.77	3.41	GW1NRF: 24





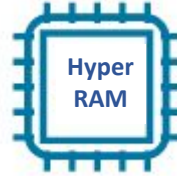
128Mbits DDR

- Data Width: 16-bits
- Clock Freq: 166MHz



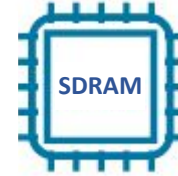
128Mbits DDR

- Data Width: 16-bits
- Clock Freq: 200MHz



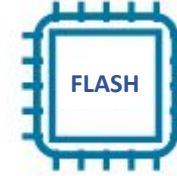
64Mbits DDR

- Data Width: 8-bits
- Clock Freq: 200MHz



64Mbits SDR

- Data Width: 32-bits
- Clock Freq: 166MHz



32Mbits SDR

- Data Width: 1-bit
- Clock Freq: 120MHz

GOWIN FPGA Embedded Memory Options

Device	Memory Technology	Capacity (MBytes)	Clock (MHz)	Data Width (Bits)	Comments
<u>GW1NR</u>	NOR Flash (FN32G)	4	100	1	Additional on-chip FLASH Memory
	SDR SDRAM	8	Up to 200	16	Max Clock Speed depends on package.
	DDR pSRAM	Up to 16	166 (equivalent DDR332)	16 32 (MG100)	Memory Capacity depends on package.
<u>GW1NSR-4C</u>	NOR Flash (QN48G)	4	120	1	Flash Memory supports additional ARM instruction code.
	DDR HyperRAM (QN48P)	Up to 8	200 (equivalent DDR400)	8	Hardcore ARM Cortex M3 Memory Capacity depends upon memory technology & package.
<u>GW1NSR-2/2C</u>	DDR pSRAM	Up to 4	166 (equivalent DDR332)	8	Max Capacity depends upon memory technology & package.
<u>GW1NSR-4/4C</u>	DDR pSRAM	Up to 8	166 (equivalent DDR332)	16	Max Capacity depends upon memory technology & package.
<u>GW2AR</u>	SDR SDRAM	8	166	32	
	DDR SDRAM	16	200/250	16	Max Clock Speed depends on package.
	DDR pSRAM	8	166 (equivalent DDR332)	16	
<u>GW2ANR</u>	SDR SDRAM	8	166	32	
	NOR Flash	4	120	1	Flash Memory

GOWIN FPGAs may be pin-for-pin compatible with similar size devices from Lattice, Intel (Altera) and Xilinx

- LittleBee GW1N-2, GW1N-4 & GW1N-9
- Arora GW2A-18, GW2A-55, GW2AN-18

Manufacturer	Series	Package		Manufacturer	Series	Package		Manufacturer	Series	Package
Lattice	XO2	MG132X		Intel (Altera)	MAX II	PG256		Xilinx	Spartan 6	MG196
	XO2	LQ100X			MAX 10	CS81			Spartan 6	PG256
	XO2	LQ144X			MAX10	UG169			Spartan 6	UG324
	XO2	PG256			Cyclone IV	PG256				
	XO2 / XO3	UG256								
	XO2 / XO3	UG332								

AEC-Q100 Level-2 Certification

- -40°C to +105°C

LittleBee [GW1N-4 QN88](#)

- Qualification Completes Q1 2021

Arora [GW2A18 QN88](#)

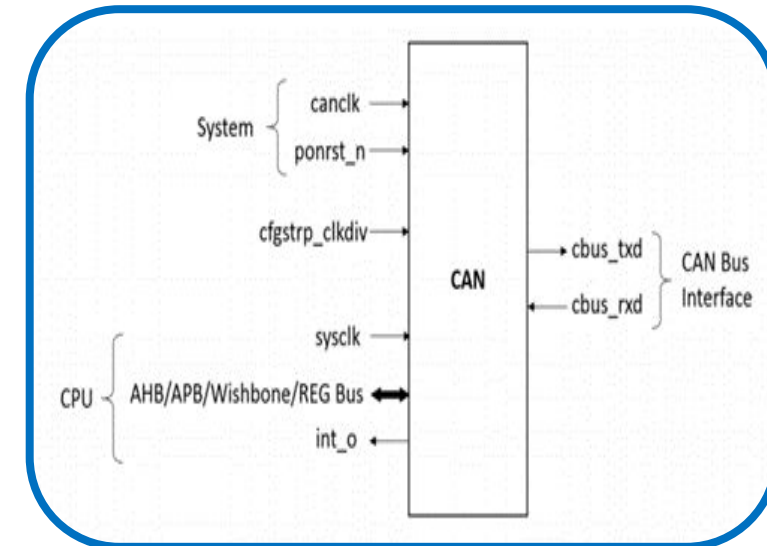
- Qualification Completes Q2 2021

LittleBee [GW1NZ QN48](#)

- Qualification Started

CAN 2.0 Controller IP

- Sensor Interfaces



Display Interfaces & Bridging

- MIPI IP & Ref Designs
- LVDS

Flash-Based, Non-Volatile, Instant On, Low Power, Low Cost, Small Package Options

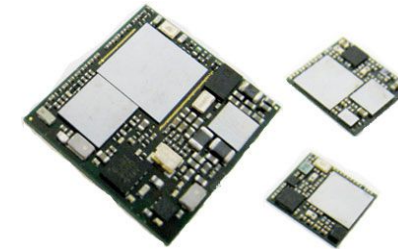
Resource	GW1N-1	GW1N-2 Available Q1-2021	GW1N-4	GW1N-9
LUT4	1152	2304	4608	8640
Flip-Flop	864	2304	3456	6480
Shadow S-SRAM (Bits)	-	-	-	17280
Block B-SRAM (bits)	72K	72K	180K	468K
B-SRAM Blocks	4	4	10	26
User Flash (Bits)	96K	256K	256K	608K
Mult 18x18	-	-	16	20
PLLs	1	1	2	2
I/O Banks	4	6	4	4
Max I/O	120	126	218	276
Core Voltage ZV	-	0.9V	-	-
Core Voltage LV	1.2V	1.2V	1.2V	1.2V
Core Voltage UV	1.8V/2.5V/3.3V Only LQ100X	1.8V/2.5V/3.3V	2.5V/3.3V	2.5V/3.3V



Package	Pitch(mm)	Size(mm)	GW1N-1	GW1N-2	GW1N-4	GW1N-9	GW1N-1S
CS81M	0.4	4.1 x 4.1				55(15)	
CS30	0.4	2.4 x 2.3	24				23
CM64	0.5	4.1 x 4.1				55(16)	
FN32	0.4	4 x 4					25
CS72	0.4	3.6 x 3.3			57(19)		
QN32	0.5	5 x 5	26		24(3)		
QN48	0.4	6 x 6	41		40(9)	40(12)	
QN48F	0.4	6 x 6				39(11)	
QN88	0.4	10 x 10			70(11)	70(19)	
LQ100	0.5	14 x 14	79	80(15)	79(13)	79(20)	
LQ100X	0.5	14 x 14	79				
LQ144	0.5	20 x 20	116	114(27)	119(22)	120(28)	
LQ144X	0.5	20 x 20					
EQ144	0.5	20 x 20				120(28)	
EQ176	0.4	20 x 20				147(37)	
LQ176	0.4	20 x 20				147(37)	
MG100	0.5	5 x 5				87(25)	
MG121X	0.5	6 x 6		100(28)			
MG132X	0.5	8 x 8		105(28)	105(23)		
MG160	0.5	8 x 8			131(25)	131(38)	
MG196	0.5	8 x 8				113(35)	
PG256	1.0	17 x 17			207(32)	207(36)	
PG256M	1.0	17 x 17			207(32)		
UG169	0.8	11 x 11				129(38)	
UG256	0.8	14 x 14				207(36)	
UG332	0.8	17 x 17				273(43)	

On-Chip Memory up to 128Mbits* (16KBytes) *package dependent

Resource	GW1NR-1	GW1NR-4/4B	GW1NR-9
LUT4	1152	4608	8640
Flip-Flop	864	3456	6480
Shadow S-SRAM (Bits)	-	-	17280
Block B-SRAM (Bits)	72K	180K	468K
B-SRAM Blocks	4	10	26
User Flash (Bits)	96K	256K	608K
Memory SDR SDRAM (Bits)	-	64M (QN88)	64M (QN88)
Memory DDR pSRAM (Bits)	-	32M (QN88P) 64M (MG81P)	64M (QN88P/LQ144P/MG100PT/MG100PS) 128M (MG100P/MG100PF/MG100PA)
Memory NOR Flash (Bits)	4M (FN32G)	-	-
Mult 18x18	-	16	20
PLLs	1	2	2
Max I/O	120	218	276
Core Voltage LV	1.2V	1.2V	1.2V
Core Voltage UV	-	2.5V/3.3V	2.5V/3.3V



On-Chip Memory
System-in-Package
(SiP) Technology

Package	Pitch (mm)	Size (mm)	GW1NR-1	GW1NR-4	GW1NR-9
QN88	0.4	10 x 10	-	70(11)	70(19)
QN88P	0.4	10 x 10	-	70(11)	70(17)
MG81P	0.5	4.5 x 4.5	-	68(10)	-
MG100P	0.5	5 x 5	-	-	87(16)
MG100PF	0.5	5 x 5	-	-	87(16)
MG100PA	0.5	5 x 5	-	-	87(17)
MG100PT	0.5	5 x 5	-	-	87(17)
MG100PS	0.5	5 x 5	-	-	87(17)
LQ144P	0.5	20 x 20	-	-	120(20)
FN32G	0.4	4 x 4	26	-	-

ARM Cortex-M3*, USB-PHY*, ADC*, On-Chip Memory* *package dependent

Resource	GW1NS-2 GW1NS-2C*	GW1NSR-2 GW1NSR-2C*	GW1NS-4 GW1NS-4C*	GW1NSR-4 GW1NSR-4C*
LUT4	1728	1728	4608	4608
Flip-Flop	1296	1296	3456	3456
Block B-SRAM (bits)	72K	72K	180K	180K
B-SRAM Blocks	4	4	10	10
User Flash (Bits)	1M	1M	256K	256K
Memory DDR HyperRAM (Bits)	-	-	-	64M (QN48P) *4C Version Only
Memory DDR pSRAM (Bits)	-	32M (QN48P)	-	64M (MG64P)
Memory NOR Flash (Bits)	-	-	-	32M (QN48G) *4C Option Only
Mult 18x18	-	-	16	16
PLLs	1	1	2	2
ARM Cortex-M3	*2C Option	*2C Option	*4C Option	*4C Option
USB PHY	1	1	-	-
ADC	1	1	-	-
Max I/O	102	102	106	106
Core Voltage LV	1.2V	1.2V	1.2V	1.2V



Hardcore
ARM Cortex-M3



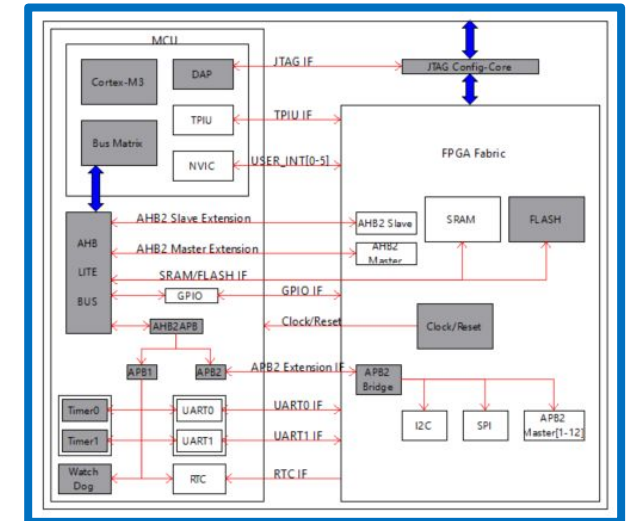
MIPI DPHY
I3C



USB-PHY



ADC
8CH, 12-Bit SAR,
1MSamples/s



Package	Pitch(mm)	Size(mm)	GW1NS-2/ GW1NS-2C	GW1NS-4	GW1NS-4C	GW1NSR-2/ GW1NSR-2C	GW1NSR-4	GW1NSR-4C
CS36	0.4	2.5 x 2.5	30(6)					
CS49	0.4	2.9 x 2.9		42(8)	42(8)			
QN32	0.5	5 x 5	25(4)					
QN32U	0.5	5 x 5	16(2)					
QN48	0.4	6 x 6	38(7)	38(4)	*38(4)			
LQ144	0.5	20 x 20	95(12)					
QN48P	0.4	6 x 6				38(7)		39(4)
QN48G	0.4	6 x 6						39(4)
MG64	0.5	4.2 x 4.2			57(8)			
MG64P	0.5	4.2 x 4.2					55(8)	55(8)

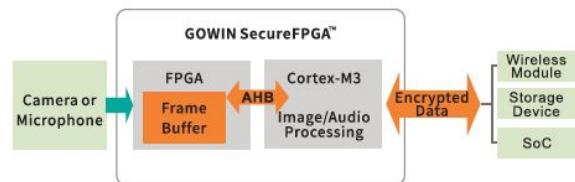
SecureFPGA Root-of-Trust using Physically Unclonable Functionality (PUF) Technology

Applications of LittleBee®GW1NSE

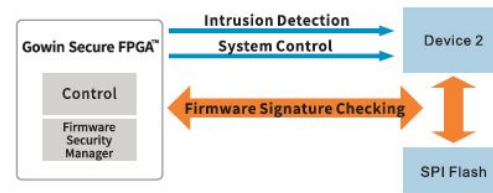


Typical Applications:

IoT camera module or microphone array application:



Firmware encryption application:



Device	GW1NSE-2C	GW1NSE-4C	GW1NSER-4C
LUT4	1728	4608	4,608
Flip-Flop	1296	3456	3,456
B-SRAM (bits)	72K	180K	180K
Number of B-SRAM	4	10	10
S-SRAM (bits)	4608	0	-
User Flash (bits)	1024	256	256K
HyperRAM(bits)	-	-	64M
NOR FLASH(Mbits)	-	-	32M
18 x 18 Multiplier	-	16	16
PLLs	1	2	2
OSC	1, ±5% accuracy	1, ±5% accuracy	1, ±5% accuracy
Hard Core Processor	Cortex-M3	Cortex-M3	Cortex-M3
USB 2.0 PHY	1	0	-
ADC Channels	8	0	-
I/O Banks	4	3	4
Max. I/O on die	102	106	106
Core Voltage	1.2V	1.2V	1.2V

Package	Pitch(mm)	Size(mm)	GW1NSE-2C	GW1NSER-2C	GW1NSER-4C
QN48	0.4	6 x 6	39(7)		
LQ144	0.5	20 x 20	91(11)		
QN48P	0.4	6 x 6			38(4)
QN48G	0.4	6 x 6			38(4)

Ultra-Low Power, Lowest Cost, Flash-Based, Non-Volatile, Instant On



Zero Power



Extremely Small Package
CS16 1.8mm x 1.8mm



Core Voltage

- **LV** 1.2V **ZV** 0.9V

Power

- Standby < 10uW
- Always On < 28uW

Resource	GW1NZ-1
LUT4	1152
Flip-Flop	864
Block B-SRAM (bits)	72K
B-SRAM Blocks	4
User Flash (Bits)	64K
PLLs	1
Max I/O	48
Core Voltage ZV	0.9V
Core Voltage LV	1.2V

Package	Pitch (mm)	Size (mm)	GW1NZ-1
FN32	0.4	4 x 4	25
FN32F	0.4	4 x 4	25
CS16	0.4	1.8 x 1.8	11
QN48	0.4	6 x 6	40

BLE 5.0, 4K LUTs FPGA, Optimized 32-bit Processor



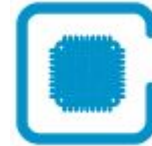
BLE 5.0

- 4K LUT FPGA
- 32-bit Processor
- **Certified BLE Module**



Power Management

- 5nA Standby
- < 1uA Sleep
- < 5mA Active



μSoC

- Step Up/Down Regulator
- Embedded FLASH
- Embedded OTP & RAM



Hardened Security

- TRNG
- AES-128
- ECC-P256 Key Gen

FPGA Feature	GW1NRF-4B	SoC Feature	GW1NRF
LUT4	4,606	Bluetooth 5.0 LE	Up to 8 Simultaneous Connections
Flip-Flop	3,456	32-bit ARC Processor	24MHz
Shadow SRAM S-RAM (bits)	-	Processor ROM (Bytes)	136K
Block SRAM B-SRAM (bits)	180K	Processor OTP (Bytes)	128K
Number of B-SRAM Blocks	10	Processor IRAM/DRAM (Bytes)	48K / 28K
User Flash (bits)	256K	Security Core	TRNG, AES-128, ECC-P256
Multipliers 18 x 18	16	Power Management	Scheduler & Memory Manager
PLLs + DLLs	2 + 2	DC-to-DC Step-Up/ Step-Down Regulator	Supports 1.5V & 3.0V Batteries
I/O Banks	4	Package	Pitch (mm)
Max User I/O	25	QFN48	0.4
FPGA Core Voltage (LV)	1.2V	Size (mm²)	User I/O / True LVDS Pairs
FPGA Core Voltage (UV)	1.8V/2.5V/3.3V	6 x 6	25(4)

55nm SRAM Technology, High Performance DSP, High-Speed LVDS, Abundant B-SRAM



55nm SRAM
Core Voltage: 1.0V

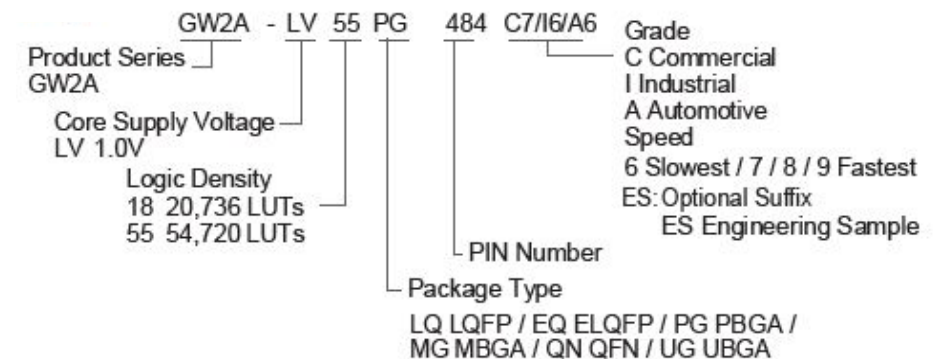


DDR3
RISC-V
CORTEX-M
CAN2.0
Ethernet

Resource	GW2A-18	GW2A-55
LUT4	20,736	54,720
Flip-Flop	15,552	41,040
Shadow S-SRAM (Bits)	41,472	109,440
Block B-SRAM (bits)	828K	2520K
B-SRAM Blocks	46	140
Mult 18x18	48	40
PLLs	4	6
I/O Banks	8	8
Max I/O	384	608
Core Voltage LV	1.0V	1.0V

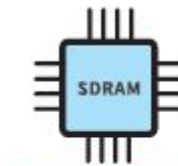
Package	Pitch(mm)	Size(mm)	E-pad Size(mm)	GW2A-18	GW2A-55
QN88	0.4	10 x 10		66(22)	
LQ144	0.5	20 x 20		119(34)	
EQ144	0.5	20 x 20	9.74 x 9.74	119(34)	
MG196	0.5	8 x 8		114(39)	
UG324	0.8	15 x 15		239(90)	240(86)
UG324D	0.8	15 x 15			240(71)
PG256	1.0	17 x 17		207(73)	
PG256S	1.0	17 x 17		192(72)	
PG256C	1.0	17 x 17		190(64)	
PG256E	1.0	17 x 17		182(29)	
PG484	1.0	23 x 23		319(77)	319(75)
PG1156	1.0	35 x 35			607(96)

GW2A Part Numbering



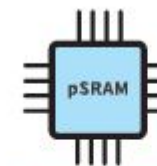
16MB DDR SDRAM or 8MB DDR pSRAM or 8MB SDR SDRAM plus 4MB Non-Volatile NOR FLASH

Resource	GW2AR-18	GW2ANR-18
LUT4	20,736	20,736
Flip-Flop	15,552	15,552
Shadow S-SRAM (Bits)	41,472	41,472
Block B-SRAM (bits)	828K	828K
B-SRAM Blocks	46	46
Memory NOR Flash (Bits)	-	32M (QN88)
Memory SDR SDRAM (Bits)	64M (QN88, LQ144, EQ144)	64M (QN88)
Memory DDR SDRAM (Bits)	128M (LQ176, EQ176)	-
Memory DDR pSRAM (Bits)	64M (QN88P, QN88PF, EQ144P, EQ144PF)	-
Mult 18x18	48	48
PLLs	4	4
I/O Banks	8	8
Max I/O	384	384
Core Voltage LV	1.0V	1.0V



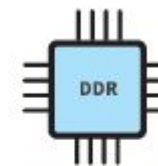
64Mbits SDRAM

Bit Width : 32bits
Clock Frequency : 143MHz



64Mbits pSRAM

Bit Width : 16bits
Clock Frequency : 166MHz
Double edge data



128Mbits DDR

Bit Width : 16bits
Clock Frequency : 200MHz
Double edge data transmission

Package	Pitch(mm)	Size(mm)	E-pad Size(mm)	GW2AR-18	GW2ANR-18
LQ144	0.5	20 x 20		120(35)	
EQ144	0.5	20 x 20	9.74 x 9.74	120(35)	
EQ144P	0.5	20 x 20	9.74 x 9.74	120(35)	
EQ144PF	0.5	20 x 20	9.74 x 9.74	120(35)	
QN88	0.4	10 x 10	6.74 x 6.74	66(22)	66(22)
QN88P	0.4	10 x 10	6.74 x 6.74	66(22)	
QN88PF	0.4	10 x 10	6.74 x 6.74	66(22)	
LQ176	0.4	20 x 20		140(45)	
EQ176	0.4	20 x 20	6 x 6	140(45)	

Note: LQ144 and QN88 integrate 64M SDR SDRAM; LQ176 integrates 128M DDR SDRAM

Adds I²C Configuration, 2MB Non-Volatile NOR FLASH, Supports Background Updates & Programming

Resource	GW2AN-18
LUT4	20,736
Flip-Flop	15,552
Shadow S-SRAM (Bits)	41,472
Block B-SRAM (bits)	540K
B-SRAM Blocks	30
Memory NOR Flash (Bits) 2-bit streams	16Mb
Mult 18x18	48
PLLs	4
LVDS Bandwidth (per lane)	1.25Gbps
MIPI Bandwidth (per lane)	1.2Gbps
I/O Banks	8
Max I/O	384
Core Voltage EV	1.0V
Core Voltage LV	1.2V
Core Voltage UV	2.5V / 3.3V

Adds I²C Programming Support

Supports 5 Configuration Modes

- JTAG, CPU, I²C, SSPI, SERIAL, Autoboot

Dual Partition NOR Flash

- Supports Autoboot (Non-volatile)
- Supports Background Updates & Programming
- Update & Switch Images while device is active

Package	Pitch (mm)	Size (mm)	GW2AN-18
PG256	1.0	17 x 17	206
UG256	0.8	14 x 14	206
UG324	0.8	15 x 15	279
UG332	0.8	17 x 17	278
UG400	0.8	17 x 17	335
UG484	0.8	19 x 19	384

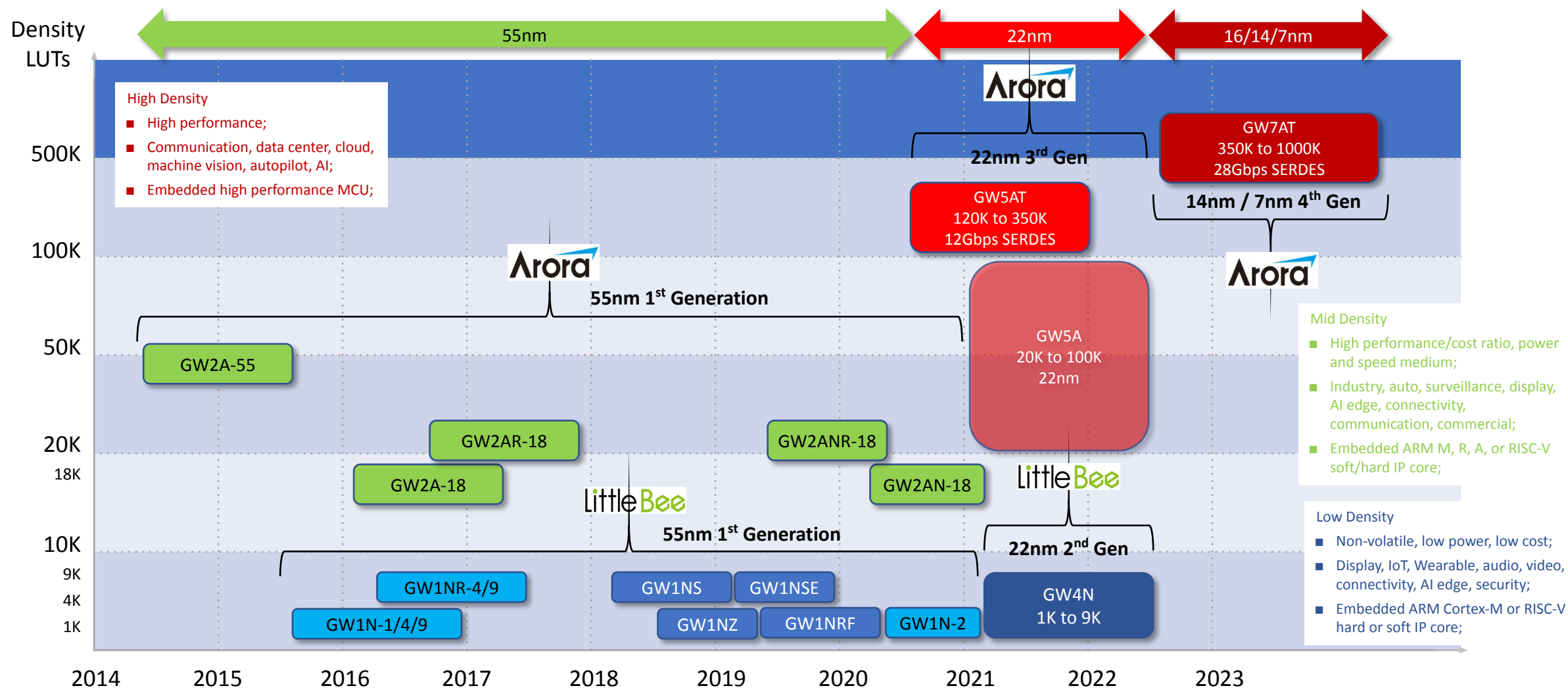
Third Generation, 22nm SRAM Technology, High-Speed Transceivers

Resource	GW5AT-128
LUT4	126.72K
Shadow S-SRAM (Bits)	1013.76K
Block B-SRAM (Total bits)	5400K
B-SRAM Blocks	300 x 18K
DSP	300 (27x18) or 300 (27x36) or 600 (12x12)
PLLs	12
Transceivers 400Mbps to 12.5Gbps	8
PCIe 2.0/1.1 Hardcore	1, x1, x2, x4, x8 PCIe2.0
LVDS Bandwidth (per lane)	1.25Gbps
MIPI Bandwidth (per lane)	2.5Gbps
DDR3 Bandwidth	1.333Gbps
I/O Banks	6
Max I/O	300
Core Voltage Options	1.2/1.35/1.5/1.8/2.5/3.3V

GW5AT Features

- Third Generation High Density (22nm) RAM-based FPGA
- Embedded Microcontroller
- On-Chip Temperature and Voltage Sensors
- New Architecture
 - New DSP 27x18, 27x36, 12x12 and 56-bit Accumulate
- High Performance PLLs x12
 - 16 Global Clocks
 - 4 High-Speed Clocks per Bank
- High-Speed Transceivers x8
- 10 Gigabit Ethernet
- High Performance IO
 - Hardcore MIPI Interfaces 2.5Gbps
 - LVDS up to 1250 Mbps
 - DDR3 up to 1333 Mbps
- Hardcore PCIe2.0/1.1 Hardcore
 - Supports x1, x2, x4, x8 Endpoint and Root Port
- Support ECC correction in SRAM

Package	Pitch (mm)	Size (mm)	GW5A(T)
Flip-Chip BGA 484	1.0	23	285
Flip-Chip BGA 676	1.0	27	300

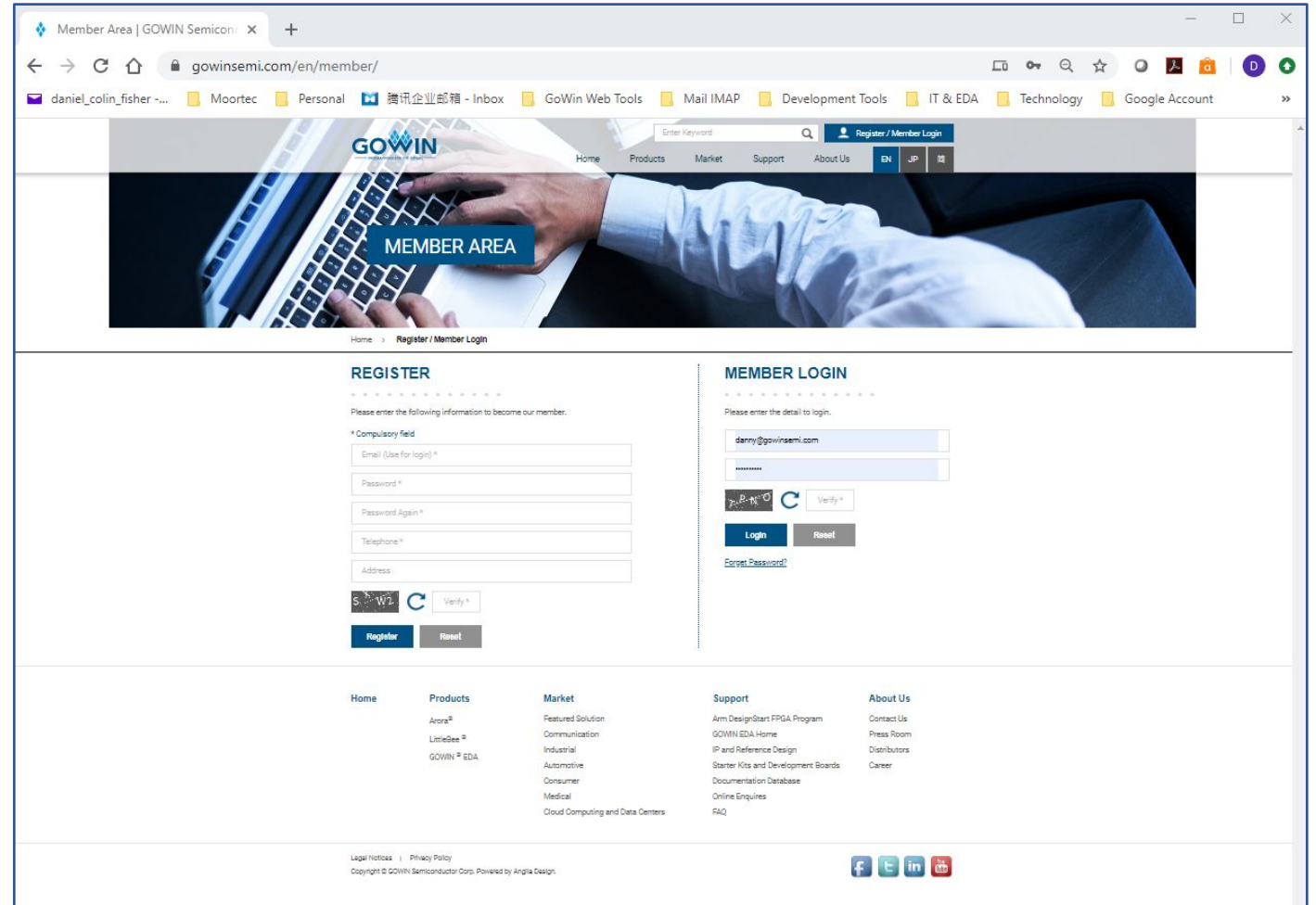


Register as a Member to Access Documents and Download Data

Member Login
Provides Unrestricted Access to the GOWIN Website.

GOWIN Website
<https://www.gowinsemi.com/>

GOWIN Members Area
<https://www.gowinsemi.com/en/member/>



The screenshot displays the 'Member Area' of the GOWIN Semiconductor website. The browser address bar shows 'gowinsemi.com/en/member/'. The page features a navigation bar with links for Home, Products, Market, Support, and About Us, along with language options (EN, JP) and a 'Register / Member Login' button. A large banner image shows a person's hands typing on a laptop keyboard, with the text 'MEMBER AREA' overlaid. Below the banner, there are two main sections: 'REGISTER' and 'MEMBER LOGIN'. The 'REGISTER' section includes fields for Email (marked as compulsory), Password, Password Again, Telephone, and Address, with a 'Verify' button for the email. The 'MEMBER LOGIN' section includes fields for Email and Password, a 'Verify' button, and 'Login' and 'Reset' buttons. A 'Forgot Password?' link is also present. At the bottom, there is a footer with links for Home, Products, Market, Support, and About Us, and a copyright notice for GOWIN Semiconductor Corp.

GOWIN EDA Tool: FPGA Designer, Firmware Development

- [DOWNLOAD GOWIN EDA](#) – Latest Version Gowin®EDA_Gowin V1.9.5.01_win
- Licensed by GOWIN

GOWIN MCU (Microcontroller Unit) Designer: ARM Cortex-M and RISC-V PicoRV32 Processor Software Development

- [ARM DesignStart FPGA](#) – GOWIN MCU Designer (Based on GNU GCC compilation and open-source Eclipse framework).
- Licensed by GOWIN

ARM Keil: ARM Cortex-M processor Development: based on µVision (Windows only)

- [ARM DesignStart FPGA](#) – [ARM Keil Webpage](#)
- Licensed by ARM, MDKLite is free but restricted to 32Kbytes Code Size

RISC-V N25 Core AndeSight RDS Eclipse-based IDE

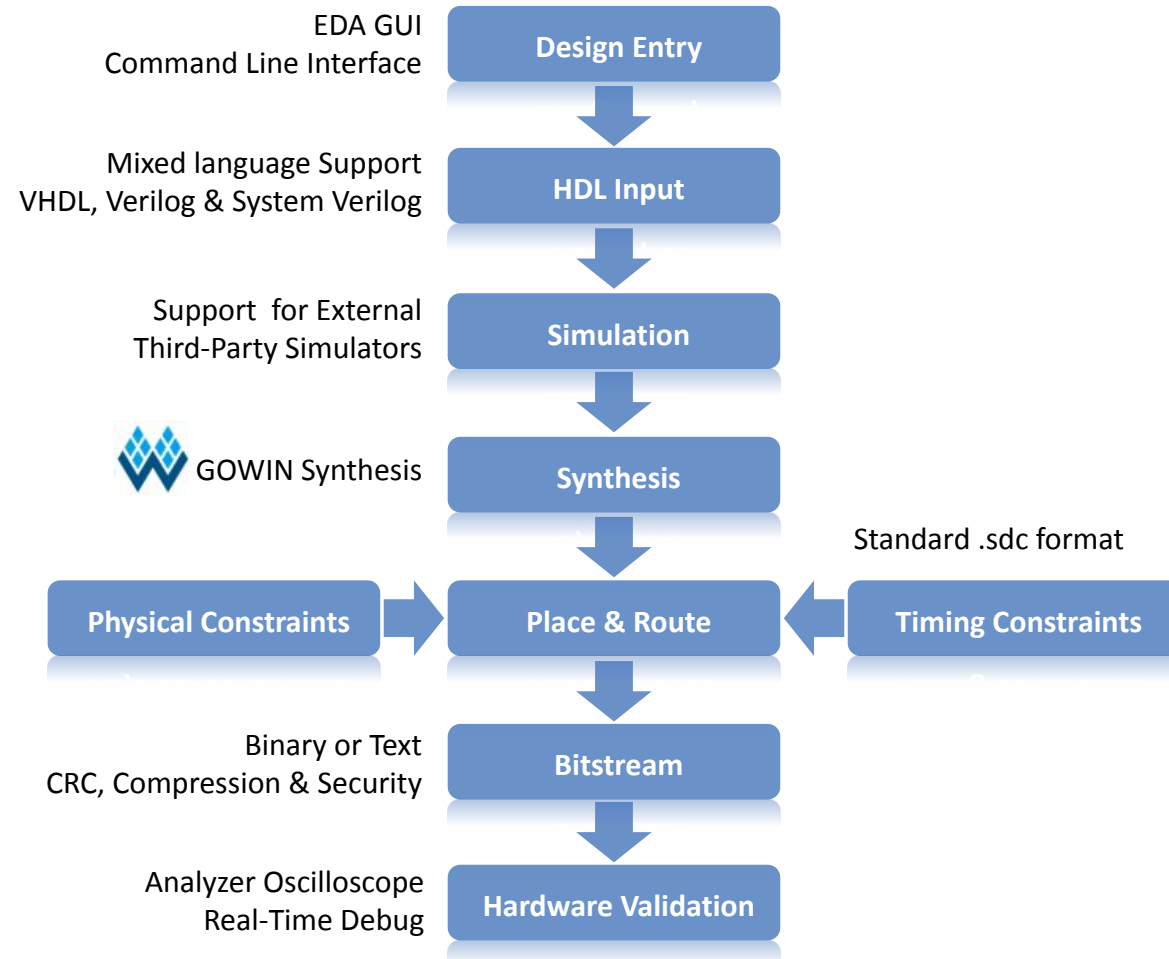
- See [DOWNLOAD GOWIN EDA](#) – Dropbox for RISC-V-for-GW2A-Release package
- Licensed by GOWIN

GOWIN SecureFPGA Package – to support GW1NSE family devices.

- [DOWNLOAD GOWIN EDA](#) – Gowin secureFPGA (IID and SHA3) SDK
- Licensing N/A – Requires GOWIN MCU Designer, GOWIN EDA FPGA Designer

GOWIN GW1NRF Bluetooth BLE

- [DOWNLOAD GOWIN EDA](#) – GW1NRF SoC SDK V1.0 For Windows
- Licensing N/A – Synopsys MetawareLite (freely licensed).



Operating System

- Windows or Linux (inc. Ubuntu)

Freely Licensed

- Fixed or Floating Licenses

Easy-of-Use

- Very Intuitive & Familiar Looking

Fully Featured Tool Chain

- Free IP Core Generator
- Floor-Planner
- Timing Constraints Editor
- Schematic Viewer
- Hierarchy Viewer
- GOWIN Analyzer Oscilloscope
- Project Archiving
- Module Encryption
- Standalone Programmer

IP Cores - <https://www.gowinsemi.com/en/support/ip/>

RISC-V Core	SPMI Master & Slave	SDIO / SPI Bridge
DDR/DDR2/DDR3* Controller	CAN Bus Controller	USB1.1
PCI Controller	AHB Bus Arbiter	Video Frame pSRAM Buffer
pSRAM Controller	SDIO Slave Controller	PCI to CAN Bridge
SDRAM Controller	Video Scaler	SPI NOR Flash Controller
I3C Master & Slave	Colour Space Conversion	FOC Current Loop Control
MIPI-TX-D-PHY	Flash Controller	HyperRAM Memory Interface
MIPI-RX-D-PHY	SPDIF	DVI RX/TX
FIFO/FIFO_SC	CORDIC	Digital Frequency Synthesizer
RAM-Based-Shift-Registers	Adaptive Filters	I2C / UART Bridge
DSP Modules	FFT	SPI / UART Bridge
BSRAM Modules	7:1 LCD Controller	Audio Sample Rate Converter
Clock Modules	XCORR	Wishbone Bridge
PDM2PCM	USB1.1	

Reference Design Examples

Audio Sample Rate Converter (ASRC)
DDR3 Memory Interface
FFT
I2C/SPI/UART
7:1 LVDS RX
1:4 mini LVDS TX
USB 1.0 / 1.1
DVI TX/RX





- Targets Low Cost, Low Power, Edge AI Applications
- Deploy Machine Learning models on GOWIN FPGA
- Based on established Tensorflow Framework
- Up to 80x faster than equivalent standalone microcontrollers

1) Training Framework

- Tensorflow / Keras

2) Testing

- Tensorflow / Keras

3) Optimization

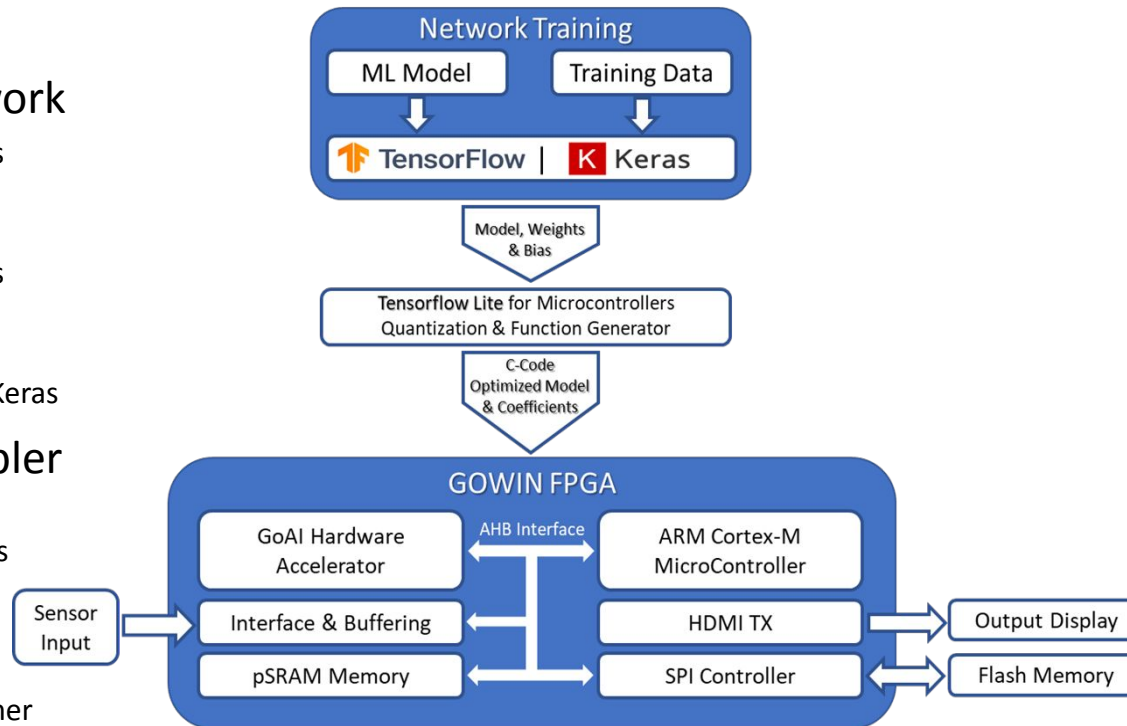
- Tensorflow Lite / Keras

4) GoAI 2.0 Assembler

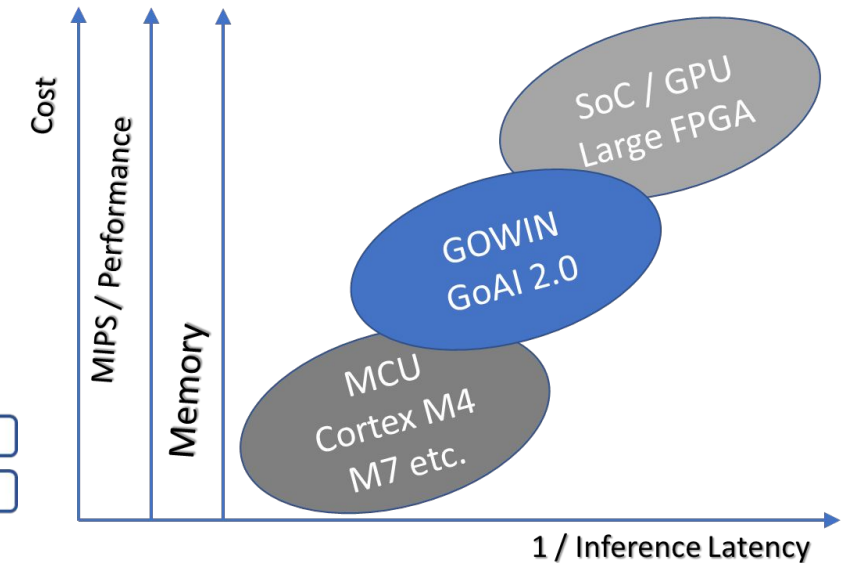
- FPGA Bitstream
- Model Coefficients
- MCU Firmware

5) Deployment

- GOWIN Programmer



GOWIN GoAI 2.0 Market Positioning





- '1-Click' Development Goal (Windows or Linux)
- Classification Algorithms
 - Person Detection, Object Detection, Phrase Detection, Motion Detection
- ARM Cortex Processor plus AI Hardware Accelerator

GOWIN FPGA Devices

- **GW1NSR4P** - QFN48 6x6mm
- **GW2AR18P** - QFN88 10x10mm
- **GW2A55P** - BGA484 23x23mm

Multiple Sensor Types

- Camera Omnivision OV2640
- Microphone SPH0645LM4H-B
- Accelerometer IMU LSM9DS1

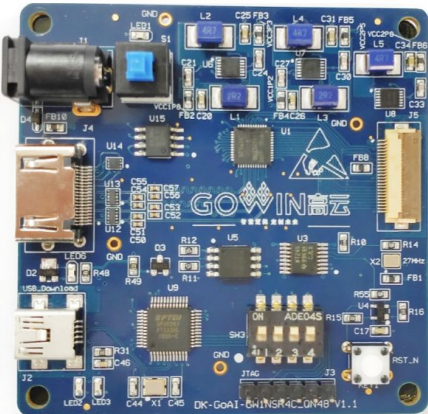
Architecture

- Processor ARM Cortex-M3 or Cortex-M1
- Hardware Accelerator (4-8MB pSRAM Memory)
- Model Coefficient 8MB Flash Memory
- Convolutional Layer Control 2-16KB uProcessor RAM

Evaluation Boards

- DK-GoAI-GW1NSR4C
- DK-GoAI-GW2AR18QN88P
- DK-GoAI-GW2A55PBGA484

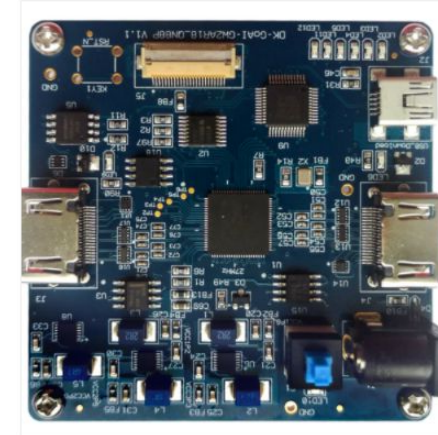
DK-GOAI-GW1NSR4C



GW1NSR-4C-QN48P

- ARM Cortex-M3
- FPGA 4.6K LUTs
- Block-SRAM 180Kbit
- User Flash 256Kbit
- Memory 8MB pSRAM
- QFN48 Package 6x6mm
- HDMI TX
- External 8MB SPI FLASH
- PCB Size: 4cm x 6.5cm

DK-GOAI-GW2AR18QN88P



GW2AR-18-QN88P

- FPGA 21K LUTs
- Block-SRAM 828Kbit
- Memory 2x 4MB pSRAM
- QFN88 Package 10x10mm
- Camera OV2640 1600x1200
- HDMI TX and RX
- External 8MB SPI FLASH
- PCB Size: 6cm x 6.6cm

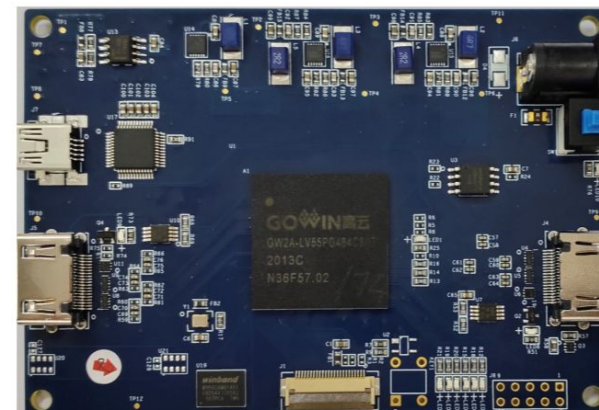
DK-GOAI-GW1NSR4C

DK-GOAI-GW2A55PBGA484

Include the following Sensors

- Camera OV2640 1600x1200
- 2x Microphone I2S SPH0645
- IMU Accelerometer LSM9DS1

DK-GOAI-GW2A55PBGA484

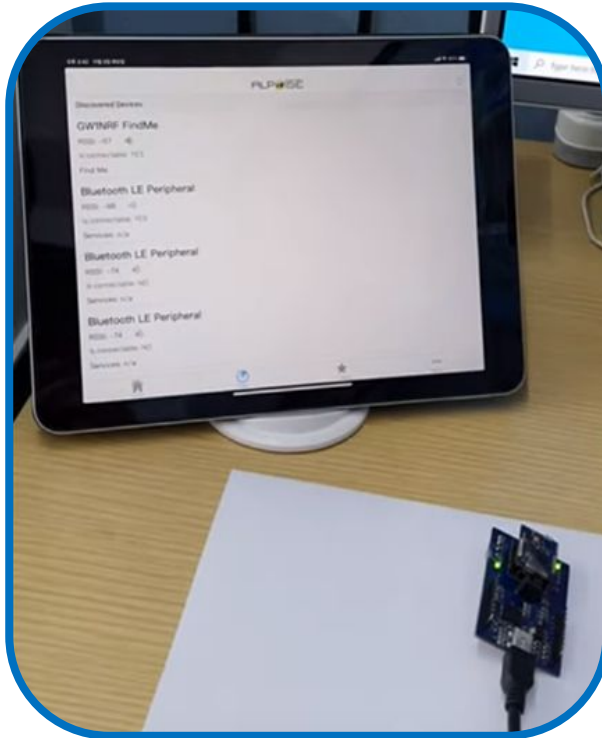


GW2AR-55-BGA484

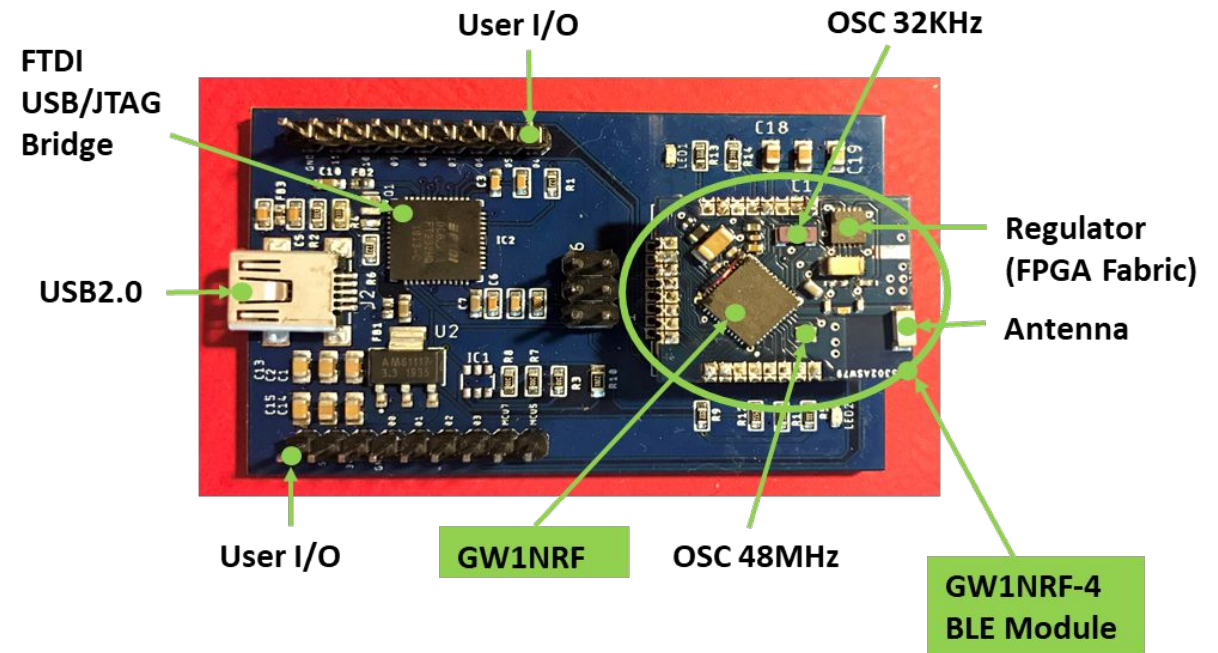
- FPGA 55K LUTs
- Block-SRAM 2,520Kbit
- BGA484 Package 23x23mm
- HDMI TX and RX
- External 8MB pSRAM
- External 8MB SPI FLASH

GW1NRF Eval Board

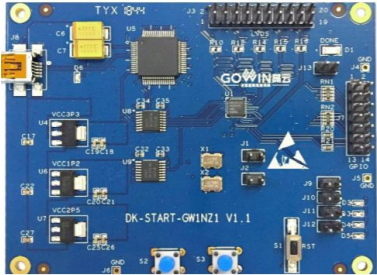
- GW1NRF Single Package Bluetooth 5.0 Low Energy IC Device.
- FCC / SIG Certified Bluetooth 5.0 Low Energy Module.
- Example Application Code.



DK-BLE-CEIT-ASSEM Bluetooth Low Energy Module



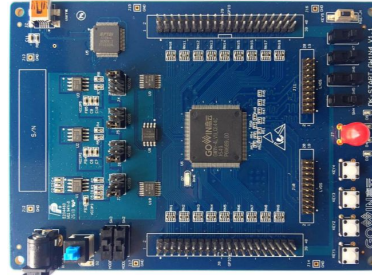
DK-START-GW1NZ



GW1NZ Eval Board

- GW1NZ-LV1FN32
- GW1NZ-ZV1FN32
- LVDS
- GPIO

DK-START-GW1N4



GW1N-4 Eval Board

- GW1N-LV4/4B LQ144
- LVDS
- GPIO
- Serial Flash

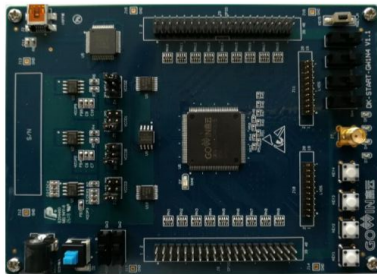
DK-START-GW1NR4



GW1NR-4 Eval Board

- GW1NR-LV4MG81P
- 64Mbits pSRAM
- GPIO

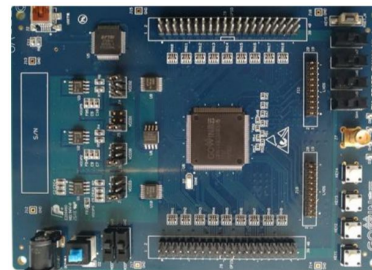
DK-START-GW1N1



GW1N-1 Eval Board

- GW1N-LV1LQ144
- LVDS
- GPIO

DK-START-GW1N9



GW1N-9 Eval Board

- GW1N-LV9LQ144
- LVDS
- GPIO
- Serial Flash

DK-START-GW1NR9



GW1NR-9 Eval Board

- GW1NR-LV9LQ144P
- 64Mbits pSRAM
- LVDS / MIPI
- GPIO

DK-START-GW1NS2



GW1NS-2 Eval Board

- GW1NS-UX2CLQ144
- ARM Cortex-M3
- LVDS
- GPIO

DK-START-GW1NSR2



GW1NSR-2 Eval Board

- GW1NSR-LX2CQN48P
- ARM Cortex-M3
- 32Mbits pSRAM
- LVDS
- GPIO

DK-START-GW1NS4-QN48



GW1NS-4 Eval Board

- GW1NS-LV4CQN48
- ARM Cortex-M3
- LVDS
- GPIO

DK-START-GW1NSR4-QN48



GW1NSR-4 Eval Board

- GW1NSR-LV4CQN48
- ARM Cortex-M3
- 64Mbits pSRAM
- LVDS
- GPIO

DK-START-GW1NSER4-QN48



GW1NSER-4 SecureFPGA

- GW1NSR-LV4CQN48
- ARM Cortex-M3
- 64Mbits pSRAM
- LVDS
- GPIO

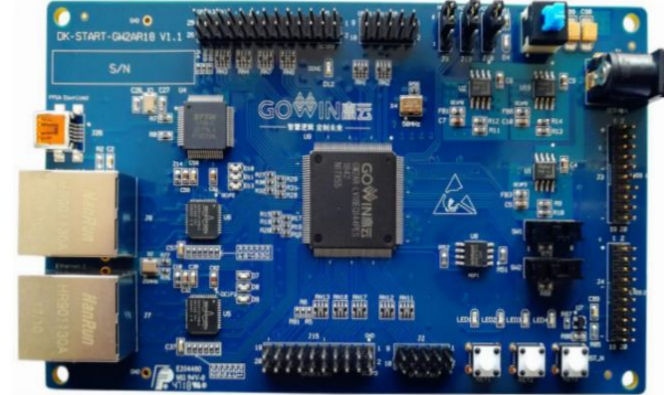
DK-START-GW2A18



GW2A-18 Eval Board

- GW2A-LV18PG256
- 2GB DDR3 External Memory
- Gigabit Ethernet x2
- LVDS TX / RX
- SD Card
- External Flash

DK-START-GW2AR18



GW2AR-18 Eval Board

- GW2A-LV18EQ144
- 64Mb pSRAM On-Chip
- Ethernet x2
- LVDS TX / RX
- External Flash

DK-VIDEO-GW2A18-PG484



GW2A-18 Video Board

- GW2A-LV18PG484
- 2GB DDR3 External Memory
- HDMI RX x2
- HDMI TX x2
- MIPI CSI / DSI
- LVDS TX / RX
- SD Card
- External Flash

DK-START-GW2A55-PG484



GW2A-55 Eval Board

- GW2A-LV55PG484
- 2GB DDR3 External Memory
- Gigabit Ethernet x2
- LVDS TX / RX
- SD Card
- CAN Bus
- MIPI CSI / DSI
- RTC Module
- External Flash

