



IoT

Power efficiency and performance on silicon-proven technology

The rise of IoT and the Cloud and their associated technologies and platforms are slowly but surely fueling the emergence of new market segments that are shaping our way of life. The versatility of the devices combined with the power of networks and data centers to marshal the data for end-spaces is transforming pervasive computing to intelligent computing.

The IoT applications and use-cases that span clients/devices, networks, and data centers drive new requirements for semiconductors including low power, low leakage, smaller and denser packaging, and cost effectiveness. These requirements are at the heart of the “under-the-hood” differentiated technologies and products developed by GLOBALFOUNDRIES that feature low-power, cost-effective performance, RF, embedded memory, analog/power, and packaging.

By forging long-view relationships with customers and partners to design and develop optimized solutions and driving excellence in execution – high yields and time-to-market, we all have a direct role in delivering enhanced experiences and realizing the full potential of the IoT.

- Low power processes > Optimal power consumption
- Wireless IoT Connectivity > Cellular, WiFi, and emerging communication protocols
- Integrated Sensors and Analog > Smart sensors, on-board analog, embedded memory solutions, energy harvesting, short burst battery usage, solar
- IP Support and Security > ARM cores, foundation IP, and complex cores across multiple technologies. Certified foundry, crypto engines, key vaults
- Multi-chip integration and Packaging > In-house packaging solutions complement OSAT partnerships for smaller, thinner, and simpler form factors

Key Applications



GF PRODUCTS 130nm – 55LPx, 22FDX® (FD-SOI)

40LP, 28SLP, 22FDX (FD-SOI)

14LPP, 12FDX™, 7nm and below

	LOW Sensing & Actuators	MID Collecting & Routing	HIGH Application Compute & Vision
COMPUTE	8/16-bit ARM Cortex M0+ to M3/M4	16/32-bit ARM Cortex M3/M4 to Cortex A9	32/64-bit ARM Cortex A9+
CONNECTIVITY	Bluetooth® Smart (BLE) / 15.4, Zigbee – typically off-chip	BLE /15.4, Zigbee, Wi-Fi – Integrated Cellular LTE Cat 1 / M – External (optional)	BLE / 15.4, Wi-Fi, USB; LTE Cat 1/ M /NB-IoT → 5G – External
ANALOG-POWER	0-100mA, Standalone Linear Regulators	50mA-1A, multi-rail Power Management Units	600mA-8A, PMICs, Smart Power

GF Capabilities for IoT

- Available
- In Development
- External / 3rd Party



Key IoT Requirement	130nm	55nm LPx	40nm LP	28nm SLP	22FDX®	14nm LPP
Compute (MCU class)						
8-/16-bit (ARM Cortex M0+ to M3/M4, up to 250MHz)	●	●	●	●	●	●
16-/32-bit (ARM Cortex M3/M4 to Cortex A9, up to 1GHz)		●	●	●	●	●
32-/64-bit (ARM Cortex A9+, Above 1GHz+)				●	●	●
Memory						
OTP	●	●	●	●	●	●
MTP	●	●	●			
eFuse	●	●	●	●	●	●
eFlash		●	○			
eMRAM					○	○
Stacked die				○	○	○
LV-SRAM		○	○	●	●	●
Battery life						
1-30 days eg. Wearables		●	●	●	●	●
1 year eg. Smoke detector, Building sensor	●	●	●		●	
10 years eg. Water & gas meters	●	●	●			
Connectivity (/w RF integration)						
BLE / 802.15.4		●	○	○	○	○
WiFi 802.11 b/g/n				○	○	○
GNSS/GPS		■	■		○	
NFC	●	■	■	■	○	
LTE Cat M / NB-IoT		■	■	■	○	
5G / mmWave			●		○	● (5G)
Security						
Authorization (RTL)	■	■	■	■	■	■
Crypto (RTL)	■	■	■	■	■	■
Secure key gen and vault	■	■	■	■	■	■
Operating Temperature						
-20C to +65C (medical)	●	●	●	●	●	●
0C to +70C/85C (commercial)	●	●	●	●	●	●
-40C to +85C (industrial)	●	●	●	●	●	●
-40C to +105C (automotive)		●	●	●	●	●
-40C to +125C (automotive extended)		●	●		○	●
Packaging						
2D (FC BGA/ FC CSP)	●	●	●	●	●	●
WLP (Fan-in, Fan-out)	●	●	●	●	●	●
2.5D (SiP)	●	●	●	●	●	●
Active & Standby						
Active power	Ref: for ARM A7 @800MHz, 22FDX is 50% lower vs 28SLP (Source: Verisilicon); For ARM A9/NEON @150-250MHz, 22FDX is 86-88% lower vs 40LP (Source: GF internal)					
Standby power	Ref: 1pA/cell for 22FDX; actual or relative power savings are application dependent					
Sensors, Display	■	■	■	■	■	■
Supply Voltage (Vdd)	1.2V, 1.5V	0.9V, 1.2V	0.9V, 1.1V, 1.2V, 9V, 12V	0.8V, 1.0V, 1.1V	0.4V, 0.5V, 0.65V, 0.8V	0.8V
I/O Voltage	1.5V, 2.5V, 3.3V, 5V, 15V	1.8V, 2.5V, 3.3V, 5V	1.5V, 1.8V, 2.5V, 3.3V	1.5V, 1.8V, 2.5V, 3.3V	1.2V, 1.5V, 1.8V, 2.5V, 3.3V	1.2V, 1.5V, 1.8V
Multiple Vt's		3@1.2V, 2@0.9V	5 @0.9V	5 @1.0V, 4 @0.8V	4	4
Superior Analog/RF integration (high ft/fMAX)			●	●	●	

IoT—GLOBALFOUNDRIES IP Libraries

+ Silicon Validated

● Design Kit Available

○ In Development

Description		130nm	55nm LPx	40nm LP	28nm SLP	22FDX	14nm LPP
Foundation IP	Standard Cells	+	+ G1 8T/9T/12T	+ G1//2 9T/12T (G0-Dev)	+ 7T/9T/12T	● 8T/12T	+ 9T/10.5T (7.5T-Dev)
	Standard Cells—ULP		● 8T/9T/12T	●	+ 8T	○ 7.5T	
	Standard Cells—ULL		●		○ 7T/9T	○ 8T	
	SRAM Compiler: 1P	+	+		+	●	+
	SRAM Compiler: 2P	+	+	+	+	●	+
	ROM Compiler	+	+	+	+	●	●
	Register File:1P	+	+	+	+	●	●
	Register File: 2P	+	+	+	+	○	●
	GPIO	+	+	+	+	●	+
	ESD			+	+	●	+
Non Volatile Memory	Electrical Fuse	+	+	+	+	●	+
	OTP	+	●	+	+	●	●
	eFlash	+	●	○			
	eMRAM					○	Planning
Analog and RF IP	Temp Sensor			+		●	+
	Process Monitor					●	
	PLL	+	+	+	+	●	+
	Video DAC	+		+		●	
	Audio ADC / DAC	+			+	●	
Interface IP	DDR		● 3/2	+ 3/2	+ 3/2 (4-Dev)	○ 4/3	+ 4/3
	LPDDR		● 3/2	+ 3/2	+ 3/2 (4-Dev)	● 4/3	+ 4/3
	USB 2.0/3.x	+	+	+	+	●	+
	PCIe G1/2/3/4	+	● (G1/2)	+ (G1/2)	+	●	+
	SATA I/II/III		● (I/II)	+ (I/II)	+	●	+
	MIPI D-PHY/M-PHY		● (D-PHY)	+	+	●	+
	V-By-One PHY				○		
	HDMI/DP		● (HDMI)	+ (HDMI)	+	○	●
	SerDes (max speed)			+ 6Gbps	+ 6Gbps	● 12.5Gbps	● 56Gbps
RF IP	BLE / 15.4		○		Planning	○	
	WiFi 802.11		○		Planning	○	
	LTE NB-IoT					Planning	
Power Mgmt IP	LDO, DC-DC, RTC					○	

Contact GF for latest IP availability

GLOBALSOLUTIONS® Design and Manufacturing Ecosystem

GLOBALFOUNDRIES offers comprehensive, state-of-the-art design solutions and services that provide a quick, high-quality and cost-effective path to production for your IoT design.

GLOBALFOUNDRIES' Design Enablement team validates our partners' services and solutions with our silicon process technologies to ensure that they meet the highest standards.

Libraries
(Standard Cells,
Memories)

Analog /
Mixed-Signal

Processor
IP

High-speed
Interfaces

Full Suite PDK, Reference Flow

Comprehensive Range of Process Technologies

SoC Packaging

2.5D and 3D Packaging

GF Products – Customer Applications and Solutions

Vision Processors
22FDX

Camera/ISP
28SLP, 22FDX

Voice Processor
28SLP

Industrial/
Smart Meters
40LP

Wearables
40LP, 28SLP



Drone IC
180nm, 130nm, 65/55nm



IoT/RF Transceivers
65RF, 55LPx

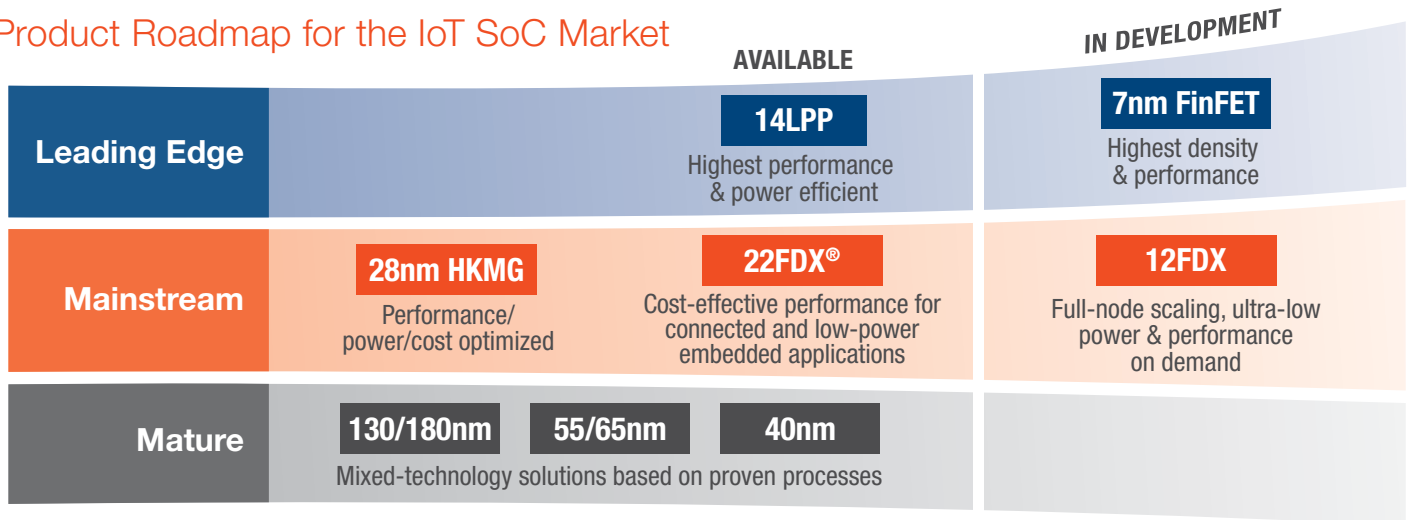
Low-Mid MCU
55LPx, 28SLP, 22FDX

Mid-High MCU/SoC
55LPx, 28SLP, 22FDX

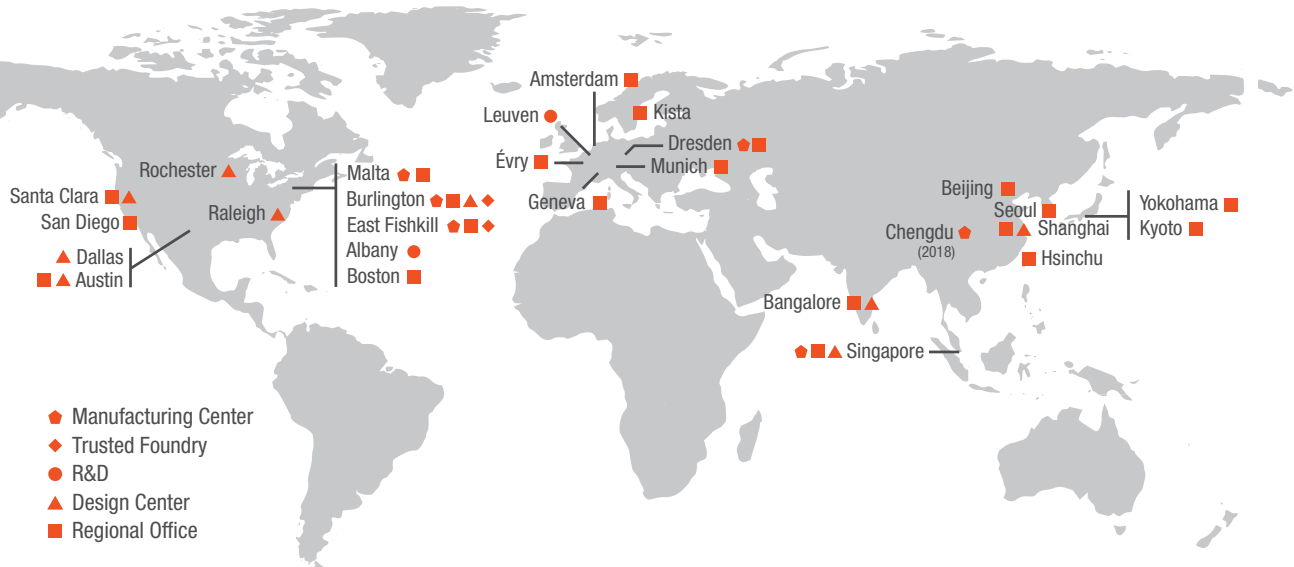
WiFi, BLE, GPS
55LPx, 28SLP

Wireless Sensors
55LPx

Product Roadmap for the IoT SoC Market



Global Presence for Semiconductor Manufacturing



2600 Great America Way, Santa Clara, CA 95054 USA
Tel: +1 408-462-3900 globalfoundries.com/contact-us

This document, including any details regarding GLOBALFOUNDRIES products and services, is current only as of the date of publication and subject to change by GLOBALFOUNDRIES at any time. All information in this document is provided "AS IS" and without any warranty, express or implied, of any kind. GLOBALFOUNDRIES®, the GLOBALFOUNDRIES logo and combinations thereof, and GLOBALFOUNDRIES' other trademarks and service marks are owned by GLOBALFOUNDRIES Inc. in the United States and/or other jurisdictions. All other brand names, product names, or trademarks belong to their respective owners and are used herein solely to identify the products and/or services offered by those trademark owners. ©2017 GLOBALFOUNDRIES Inc. All rights reserved.