Pragmatic
Semiconductor

FlexIC Foundry

A guide

Introducing Pragmatic Semiconductor

Pragmatic Semiconductor is pioneering flexible semiconductor technology, sustainably delivering edge and item-level intelligence at scale.

The Pragmatic FlexIC Foundry operates a unique and innovative process offering sustainable production and rapid innovation cycle times, coupled with a pathway to supply chain resilience.

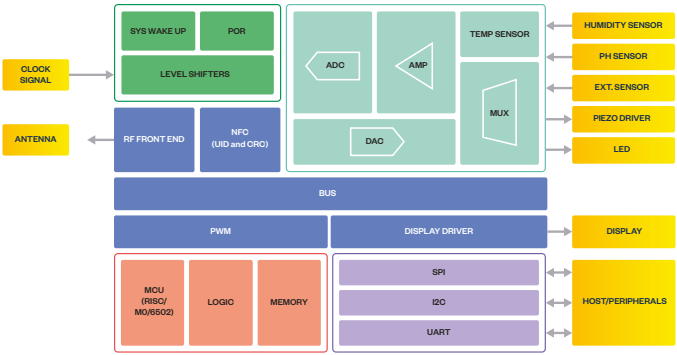
Driven by optimised, purpose-led design, our ultra-thin FlexICs – flexible integrated circuits – empower innovators with connect, sense and compute capabilities to bridge our digital and physical worlds.

What are FlexICs?

Pragmatic FlexICs deliver low-cost, low-carbon, item-level intelligence.They use thin-film transistor (TFT) technology, in combination with conventional semiconductor processing, to deliver connect, sense and compute capabilities. Delivered on state-of-the-art, 300mm wafers, their flexible form factor is unique amongst semiconductors.

FlexICs are ideal for use wherever form factor and cost are critical, and excel where chip size is physically limited by factors such as I/O pads or array size, rather than complexity of logic circuitry.

From memory to connectivity or sensing functionalities, FlexICs can be used in conjunction with devices such as displays and sensors to create novel solutions for countless applications, particularly where simple state machines or small control logic is required.



Pragmatic FlexIC Platform Gen 3

Built on a flexible substrate, Platform Gen 3 technology offers a 600 nm minimum channel dimension metal-oxide thin-film n-type FET, a dedicated resistor layer and metal-insulator-metal capacitors. Four metal layers provide efficient routing forming TFT gate and source-drain regions and interconnects.

The technology is packaged with passivation for protection and isolation, and a redistribution layer (RDL) with aluminium metallisation for compatible attachment methods.

Specifications

Transistors	Metal oxide thin film transistor	n-type FET
	Minimum channel dimension	L= 0.6 µm, W= 1 µm
	Maximum channel dimension	L= 1.2 µm, W= 20 µm
Resistors	Dedicated resistor layer	200 kΩ/sq
	Minimum line width/space	0.6 µm/1.0 µm
Capacitors	High-k dielectric MIMCAP	4.5 fF/µm2
Interconnects	Independent metal routing	Four layers (two dedicated)
	Routing pitch	4 µm
	Aluminium RDL	1.5 µm
Physical	Total thickness	~37 µm
	Minimum bend radius	5 mm
	Wafer size	300 mm

Process Design Kit

FlexIC Platform Gen 3 provides designers with a Process Design Kit (PDK) to efficiently and rapidly design circuitry for bespoke mixed-signal FlexICs on Pragmatic's third- generation metal-oxide thin-film transistor (TFT) technology.

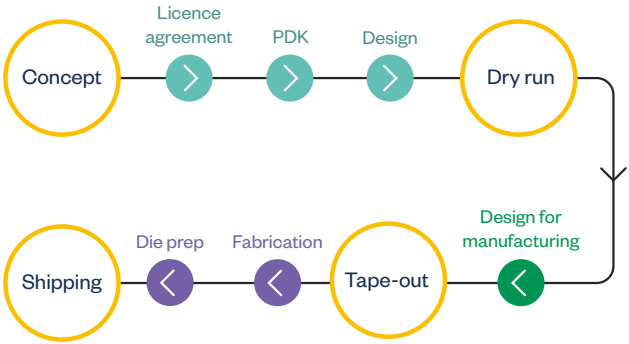
The PDK is fully compatible with industry-standard electronic design automation (EDA) tools, such as Siemens and Cadence, and contains:

- Primitive device library
- SPICE models
- Design rule and layout verification checks
- Parameterised cells (within EDA tools)

A standard cell library is available, providing the building blocks to accelerate design and time to market.

FlexIC Foundry services

Our FlexIC Foundry services take designs from tape-out to delivery within weeks, slashing product development cycle times. Our dedicated team of application engineers are on hand to support you from design, tape out, fabrication to delivery.



Platform Gen 3 is available on 300mm wafers and delivered in the following formats:

Wafer on glass carrier

Wafer diced on frame

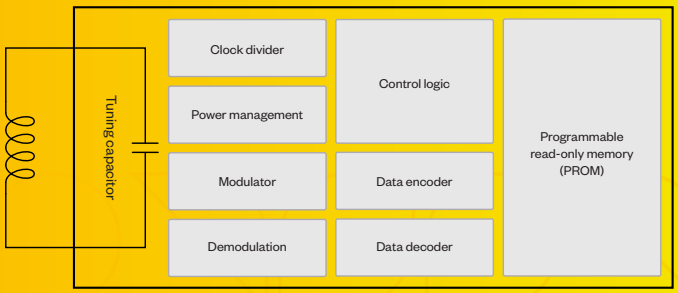
Singulated FlexICs delivered in a gel-box (prototyping only)

Case study: NFC/RFID

FlexICs are ideal for HF RFID near-field communication (NFC) applications.

Used in combination with a single-sided or double-sided HF antenna, as part of a passive NFC inlay, they bring item-level intelligence to everyday objects.

- NFC ISO 15693- compatible design
- Thin form factor, for seamless integration
- Low carbon footprint



These FlexICs have application in areas as diverse as supply chain traceability, product authentication, provenance and consumer engagement within the fast-moving consumer goods, food and beverages, wearable and healthcare markets.

Flexible intelligence

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