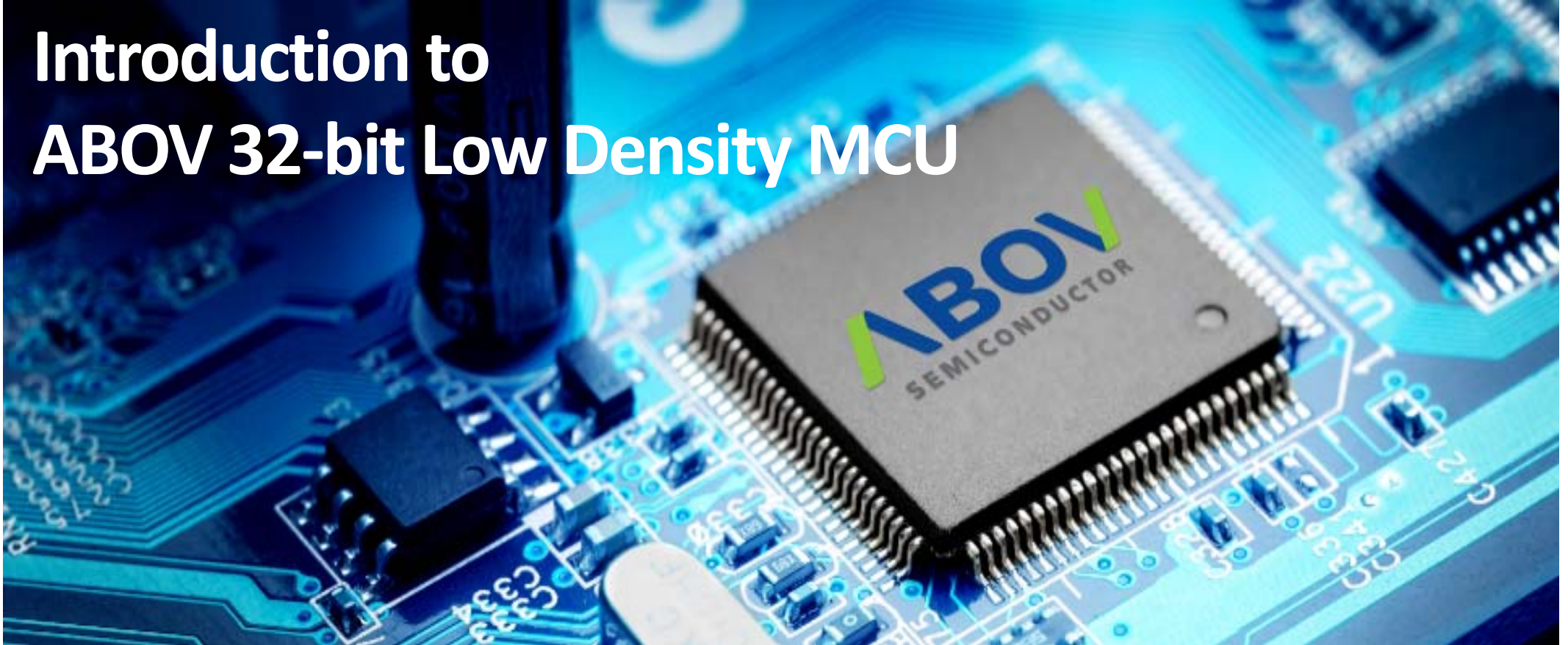


Introduction to ABOV 32-bit Low Density MCU



Dec 2023



Confidential

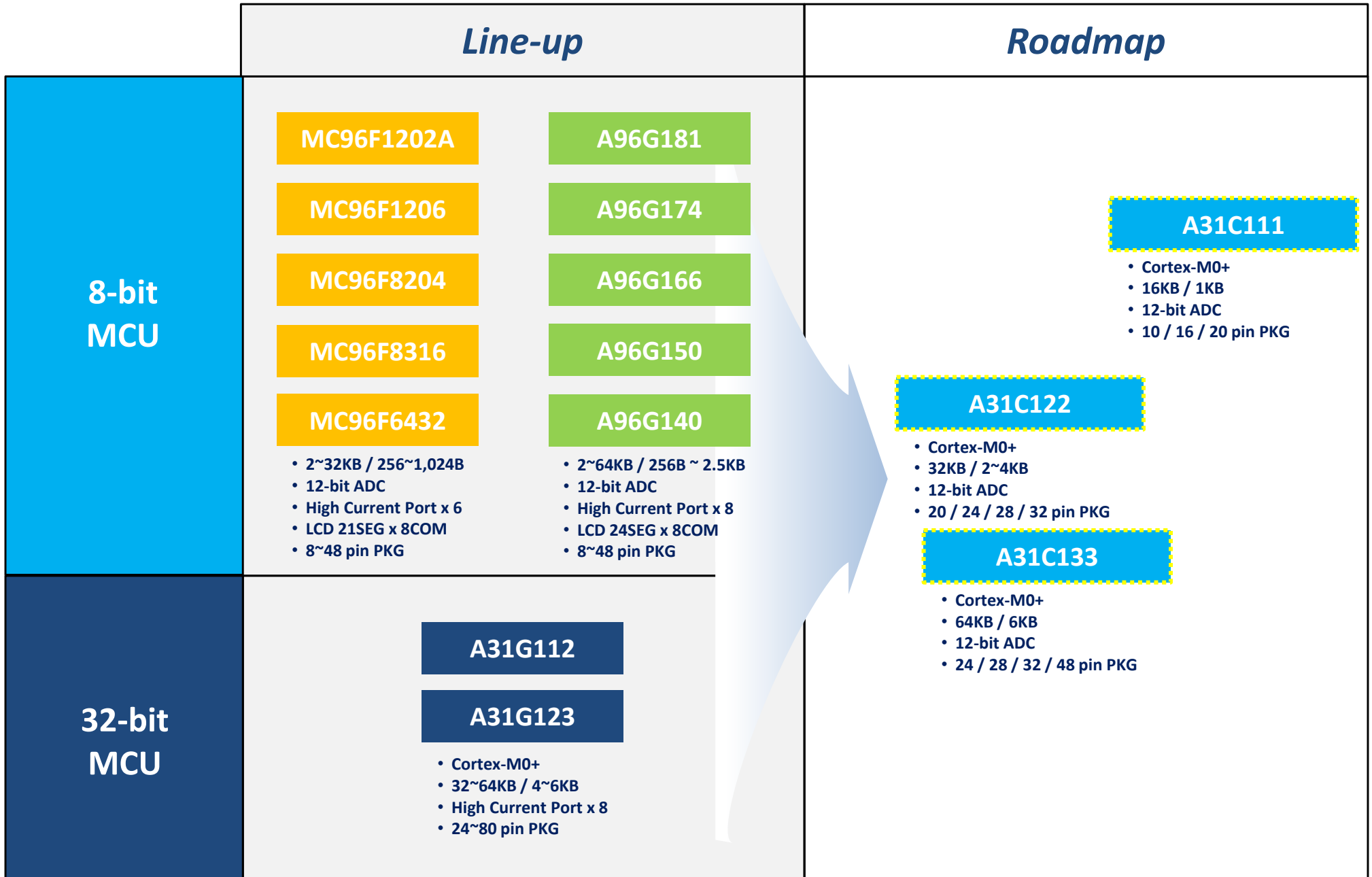
ABOV Low Density MCU Introduction

- **New A31C1 series, connect the gap between 8-bit MCU and higher performance 32-bit MCU**
 - A31C111: 16KB of flash memory, 1KB of SRAM and packages ranging 10~20pin
 - A31C122: 32KB of flash memory, 4KB of SRAM and packages ranging 20~32pin
 - A31C133: 64KB of flash memory, 6KB of SRAM and packages ranging 24~48pin

- **Increasing the scalability of development**
by providing compatibility between upper and lower products
 - H/W compatibility across all products within the A31C1 series
 - Also, A31G112 and A31C1 are H/W compatible, but A96G174 and A31C1 are incompatible

- **A31C111, Super Low-Cost 32-bit MCU**
 - Fits the Philips XLRP/LRP specifications and same price as A96G174

ABOV Low Density MCU Line-up & Roadmap



ABOV MCU Specifications

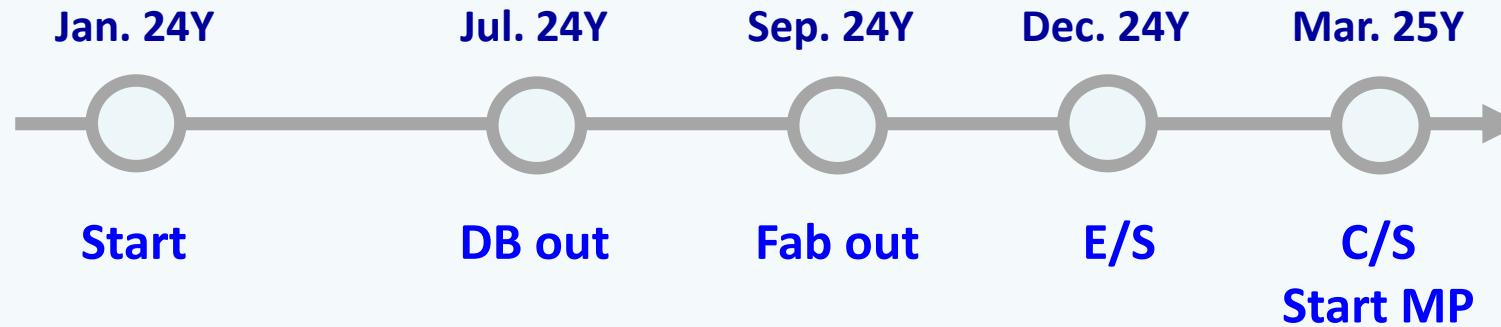
Item	A96G174	A96G166	A31G112	A31G123	A31C111	A31C122	A31C133
CPU Core	8-bit M8051	8-bit M8051	Cortex-M0+	Cortex-M0+	Cortex-M0+	Cortex-M0+	Cortex-M0+
Clock Speed	16 MHz	16 MHz	40 MHz	40 MHz	32 MHz	32 MHz	32 MHz
Code Flash	8 KB	16 KB	32 KB	64 KB	16 KB	32 KB	64 KB
SRAM	512 B	768 B	4 KB	6 KB	1KB	4KB	6 KB
Timer	8-bit GP x 1 16-bit GP x 2	8-bit GP x 1 16-bit GP x 2	16-bit GP x 6	16-bit GP x 10	16-bit GP x 3	16-bit GP x 5	16-bit GP x 6
Motor PWM	-	-	1	1	-	-	-
DMAC	-	-	-	-	-	4	6
UART/SPI/I2C	2 / 1 / 1	2 / 2 / 1	2 / 2 / 2	2 / 4 / 3	- / - / -	2 / 2 / 1	3 / 2 / 2
OPAMP	-	-	-	-	-	-	-
Comparator	-	-	-	-	-	-	-
ADC	12-bit x 1, 133ksps	12-bit x 1, 133ksps	12-bit x 1, 50ksps	12-bit x 1, 50ksps	12-bit x 1, 150ksps	12-bit x 1, 1Msps	12-bit x 1, 1Msps
Comparator	-	-	-	-	-	-	2
Display	-	High Current port x8	LCD 8x23, High Current port x6	LCD 8x39, High Current port x8	-	-	-
GPIO	Up to 18	Up to 30	Up to 45	Up to 77	Up to 18	Up to 28	Up to 46
Current Consumption	1.5uA @Stop	7uA @Stop	0.5uA @Deep sleep	0.5uA @Deep sleep	under 2uA @Stop	under 2uA @Stop	under 2uA @Stop
HSI	32 MHz (±2.5%)	32 MHz (±2.5%)	40 MHz (±3.5%)	40 MHz (±3.5%)	32 MHz (±2%)	32 MHz (±1%)	32 MHz (±1%)
LSI	128 kHz (±5%)	128 kHz (±5%)	40 kHz (±10%)	40 kHz (±10%)	32 kHz (±30%)	32 kHz (±30%)	32 kHz (±30%)
HSE	4 ~ 12 MHz	4 ~ 12 MHz	2 ~ 16 MHz	2 ~ 16 MHz	-	4 ~ 32 MHz	4 ~ 32 MHz
LSE	32.768 kHz	32.768 kHz	32.768 kHz	32.768 kHz	-	32 kHz	32 kHz
Op. Temp.	-40 ~ 85 °C	-40 ~ 85 °C	-40 ~ 85 °C	-40 ~ 85 °C	-40 ~ 85 °C	-40 ~ 105 °C	-40 ~ 105 °C
Op. Voltage	1.8 ~ 5.5 V	1.8 ~ 5.5 V	1.8 ~ 5.5 V	1.8 ~ 5.5 V	1.8 ~ 5.5 V	1.8 ~ 5.5 V	1.8 ~ 5.5 V
PKG (pin)	16 / 20	20 / 24 / 28 / 32	24 / 28 / 32 44 / 48	44 / 48 / 64	10 / 16 / 20	20 / 24 / 28 / 32	24 / 28 / 32 / 48

ABOV vs. Competitor MCU Specifications

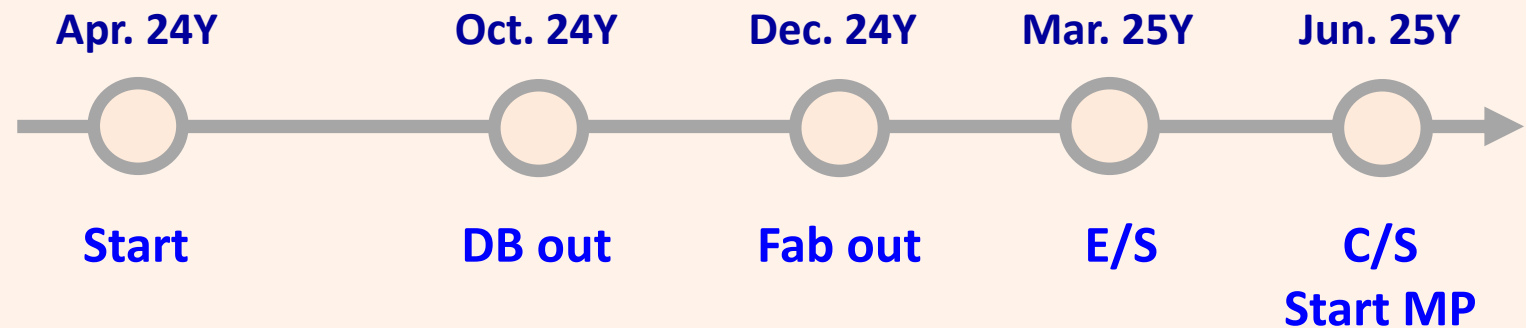
Item	STM32C011	STM32C031	A31C111	A31C122	A31C133	MSPM0C	MSPM0L
CPU Core	Cortex-M0+	Cortex-M0+	Cortex-M0+	Cortex-M0+	Cortex-M0+	Cortex-M0+	Cortex-M0+
Clock Speed	48 MHz	48 MHz	32 MHz	32 MHz	32 MHz	24 MHz	32 MHz
Code Flash	16 KB / 32 KB	16 KB / 32 KB	16 KB	32 KB	64 KB	8 KB / 16 KB	8 KB ~ 64 KB
SRAM	6 KB	12 KB	1KB	4KB	6 KB	1 KB	2 KB / 4 KB
Timer	16-bit Adv. x 1 16-bit GP x 4	16-bit Adv. x 1 16-bit GP x 4	16-bit GP x 3	16-bit GP x 5	16-bit GP x 6	16-bit GP x 2 16-bit Adv. x 1	16-bit GP x 4
Motor PWM	1	1	-	-	-	-	-
DMAC	3	3	-	4	6	1	3
UART/SPI/I2C	2 / 1 / 1	2 / 1 / 1	- / - / -	2 / 2 / 1	3 / 2 / 2	1 / 1 / 1	2 / 1 / 2
OPAMP	-	-	-	-	-	-	2
Comparator	-	-	-	-	-	-	1(integrated 8-bit DAC x 1)
ADC	12-bit x 1, 2.5Msps	12-bit x 1, 2.5Msps	12-bit x 1, 150ksps	12-bit x 1, 1Msps	12-bit x 1, 1Msps	10-bit x 1, 1.7Msps or 12-bit x 1, 1.5Msps	12-bit x 1, 1.68Msps
DAC	-	-	-	-	2	-	-
Display	-	-	-	-	-	-	-
GPIO	Up to 18	Up to 45	Up to 18	Up to 28	Up to 46	Up to 18	Up to 28
Current Consumption	8.1uA @Standby 19nA @Shutdown	8.1uA @Standby 19nA @Shutdown	under 2uA @Stop	under 2uA @Stop	under 2uA @Stop	5uA @Standby 200nA @Shutdown	1uA @Standby 65nA @Shutdown
HSI	48 MHz (±1%)	48 MHz (±1%)	32 MHz (±2%)	32 MHz (±1%)	32 MHz (±1%)	24 MHz (±2.5%)	4 ~ 32 MHz (±1.2%)
LSI	32 kHz (±5%)	32 kHz (±5%)	32 kHz (±30%)	32 kHz (±30%)	32 kHz (±30%)	32 kHz (±5%)	32 kHz (±3%)
HSE	4 ~ 48 MHz	4 ~ 48 MHz	-	4 ~ 32 MHz	4 ~ 32 MHz	4 ~ 24 MHz	4 MHz
LSE	32 kHz	32 kHz	-	32 kHz	32 kHz	32 kHz	32 kHz
Op. Temp.	2.0 ~ 3.6 V	2.0 ~ 3.6 V	-40 ~ 85 °C	-40 ~ 105 °C	-40 ~ 105 °C	1.62 ~ 3.6 V	1.62 ~ 3.6 V
Op. Voltage	-40 ~ 85/105/125 °C	-40 ~ 85/105/125 °C	1.8 ~ 5.5 V	1.8 ~ 5.5 V	1.8 ~ 5.5 V	-40 ~ 125 °C	-40 ~ 105/125 °C
PKG (pin)	8 / 12 / 20	20 / 28 / 32 / 48	10 / 16 / 20	20 / 24 / 28 / 32	24 / 28 / 32 / 48	8 / 16 / 20	16 / 20 / 24 28 / 32

Development Schedule

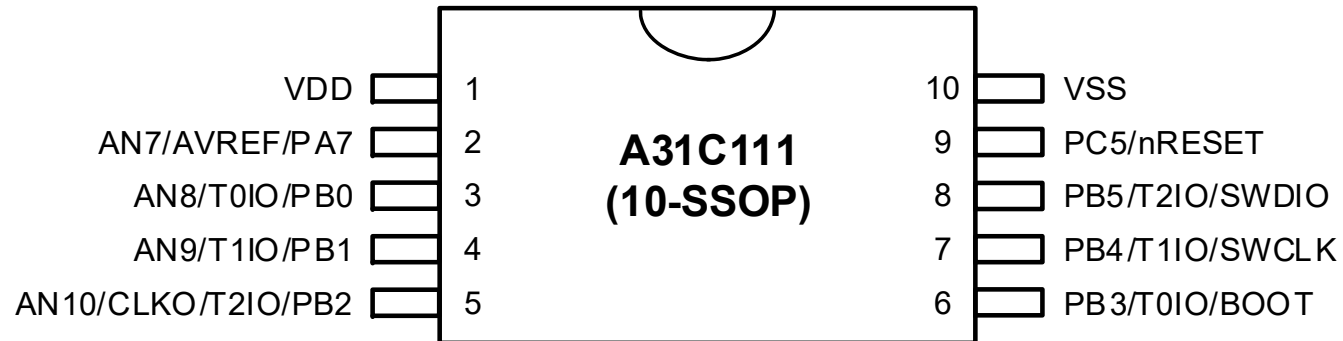
A31C122 (32KB, 32pin)



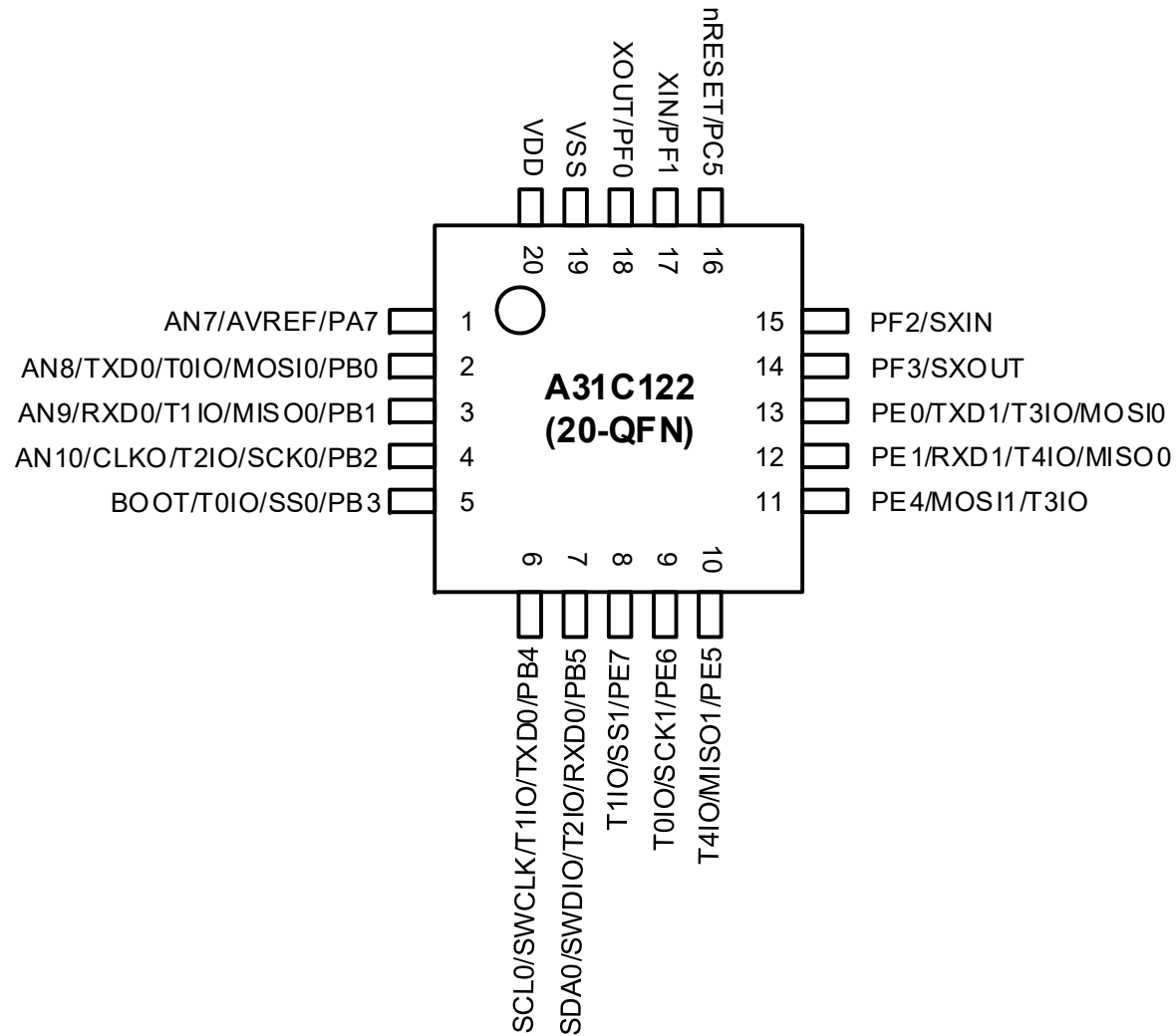
A31C111 (16KB, 20pin) A31C133 (64KB, 48pin)



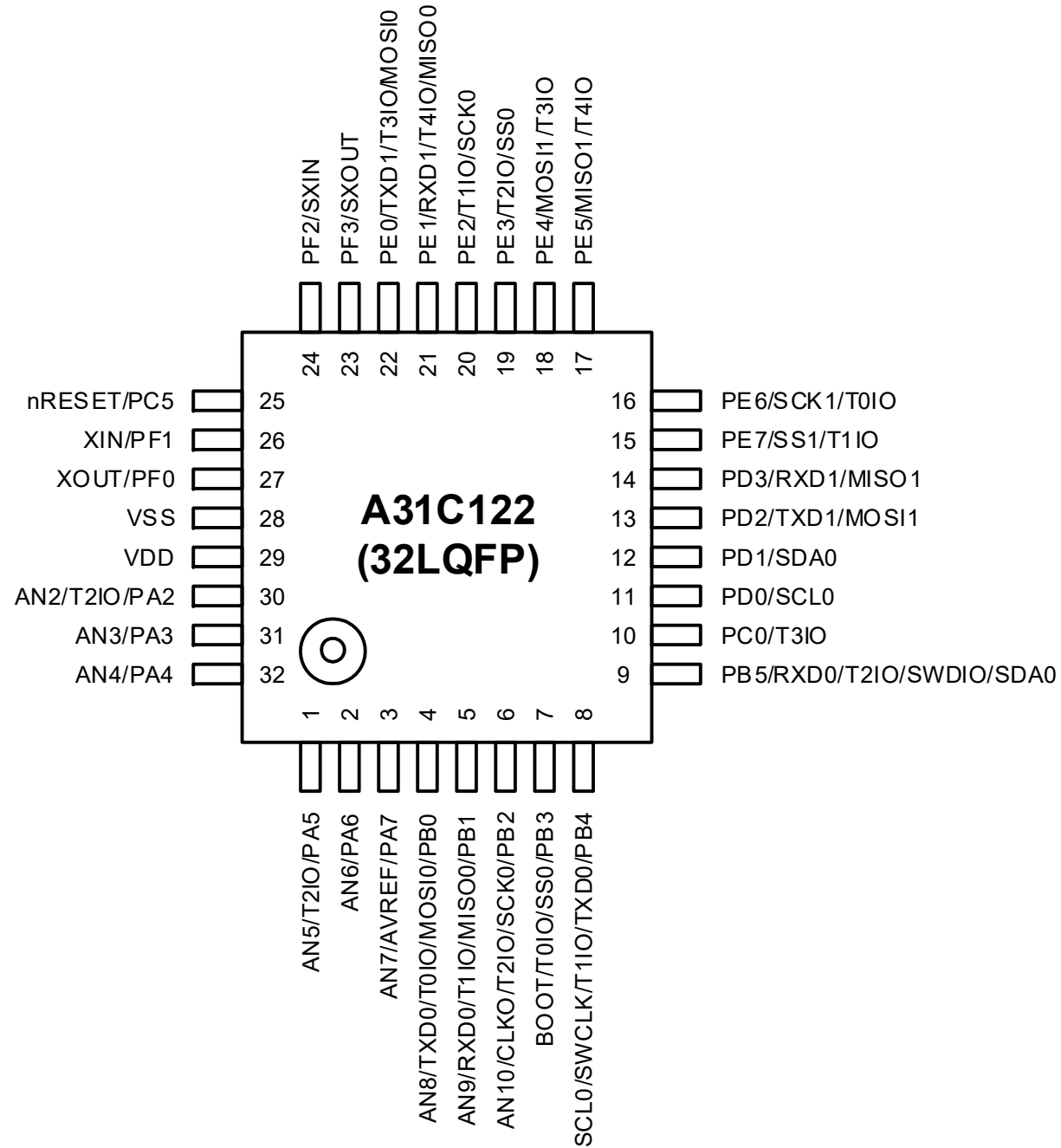
Package Information 10-SSOP



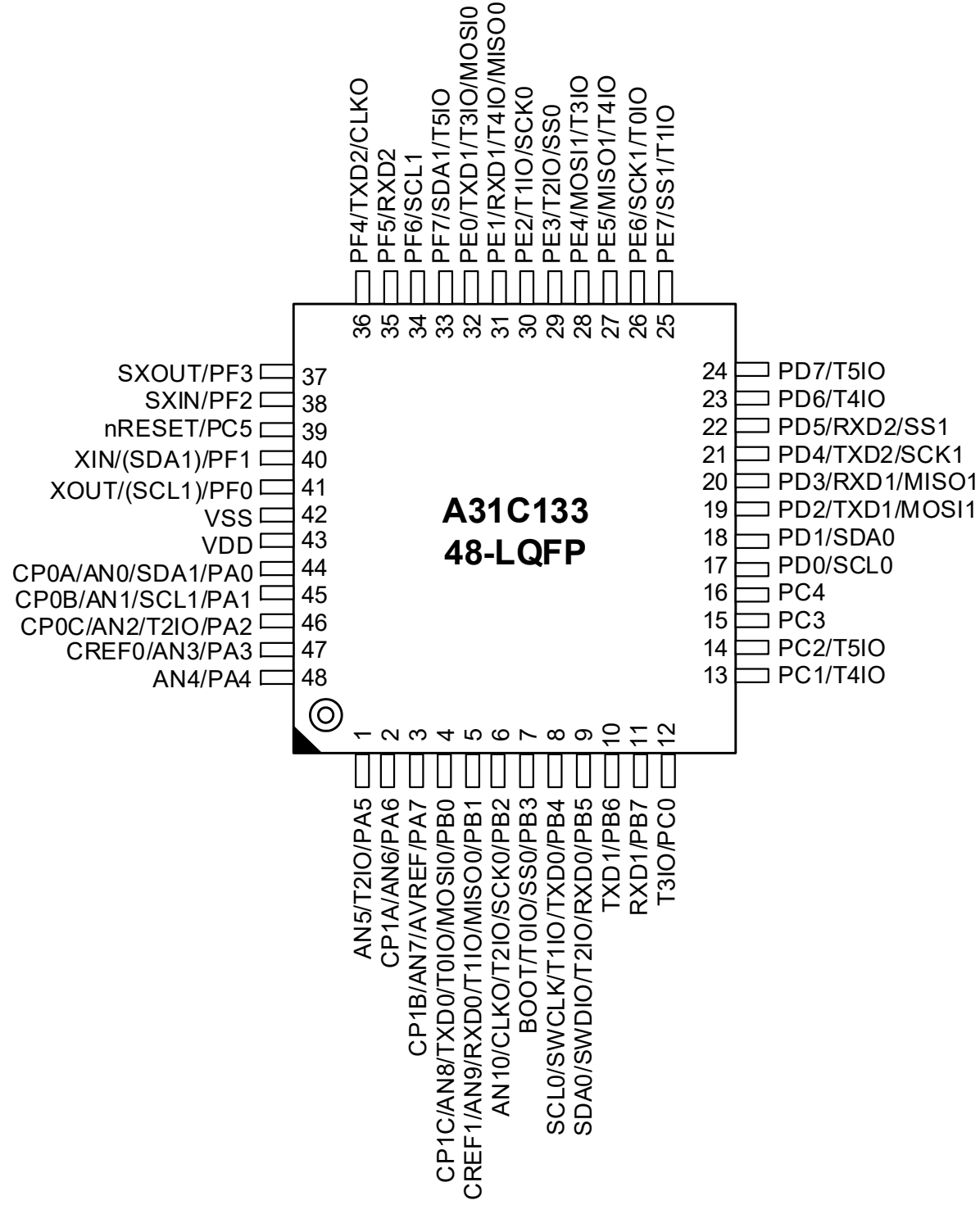
Package Information 20-QFN



Package Information 32-LQFP



Package Information 48-LQFP



Thank you