

Functional Safety Ready Microcontrollers

Quick Reference Guide



Product Family	CPU	Performance (MIPS)	Program Memory (KB)	RAM (KB)	Pin Count	AEC Q100	AUTOSAR* MCAL Drivers*	Functional Safety Standards							Development Tools					Example Applications
								ISO 26262 (ASIL) Automotive Applications			IEC 61508 (SIL) Industrial Applications			IEC 60730 Household Appliances						
								FMEDA Report ⁽¹⁾	Safety Manual ⁽¹⁾	Diagnostic Library/ Safety Level ⁽²⁾	FMEDA Report	Safety Manual	Diagnostic Library/ Safety Level ⁽³⁾	Diagnostic Library/ Safety Level	TÜV sÜD Certified XC Compiler	MPLAB® Code Coverage	MPLAB X Integrated Development Environment (IDE/ Microchip Studio Debugger	LDRA Compliance Management Tool Suite		
dsPIC33 Digital Signal Controllers																				
dsPIC33CH512MP508 (M–Main Core, S–Secondary Core)	Dual–Core dsPIC33CH	90 (M) 100 (S)	256–512 (M) 72 (S)	32–48 (M) 16 (S)	48–80	Grade 0	✓	✓	✓	ASIL B and ASIL C	✓	✓	SIL 2 and SIL 3	Class B	✓	✓	MPLAB X IDE	✓	✓	High–performance Real–time Control, Motor Control, Digital Power, Capacitive Sensing, Sensor Interfacing and Measurement Control
dsPIC33CH128MP508 (M–Main Core, S–Secondary Core)	Dual–Core dsPIC33CH	90 (M) 100 (S)	64–128 (M) 24 (S)	16 (M) 4 (S)	28–80	Grade 0	–	✓	✓	Releasing Soon	✓	✓	Releasing Soon	Class B	✓	✓	MPLAB X IDE	✓	✓	High–performance Real–time Control, Motor Control, Digital Power, Capacitive Sensing, Sensor Interfacing and Measurement Control
dsPIC33CK512MP608	dsPIC33CK	100	256 - 512	64	48 - 80	Grade 0	✓	✓	✓	Future	✓	✓	Releasing Soon	Class B	✓	✓	MPLAB X IDE	✓	✓	High–performance Real–time Control, Motor Control, Digital Power, Capacitive Sensing, Sensor Interfacing and Measurement Control
dsPIC33CK256MP508	dsPIC33CK	100	32–256	8–24	28–80	Grade 0	✓	✓	✓	ASIL B and ASIL C	✓	✓	SIL 2 and SIL 3	Class B	✓	✓	MPLAB X IDE	✓	✓	High–performance Real–time Control, Motor Control, Digital Power, Capacitive Sensing, Sensor Interfacing and Measurement Control
dsPIC33CK64MP105	dsPIC33CK	100	32–64	8	28–48	Grade 0	–	✓	✓	ASIL B and ASIL C	✓	✓	SIL 2 and SIL 3	Class B	✓	✓	MPLAB X IDE	✓	✓	High–performance Real–time Control, Motor Control, Digital Power, Capacitive Sensing, Sensor Interfacing and Measurement Control
dsPIC33CK64MC105	dsPIC33CK	100	32–64	8	28–48	Grade 0	–	✓	✓	ASIL B and ASIL C	✓	✓	SIL 2 and SIL 3	Class B	✓	✓	MPLAB X IDE	✓	✓	High–performance Real–time Control, Motor Control, Capacitive Sensing, Sensor Interfacing and Measurement Control
dsPIC33EP128GS808	dsPIC33EP	70	64–128	8	28–80	Grade 1	–	✓	✓	–	–	–	–	Class B	✓	✓	MPLAB X IDE	✓	✓	High–performance Real–time Control, Digital Power, Sensor Interfacing and Measurement Control
dsPIC33EV256GM106	dsPIC33EV	70	32–256	4–16	28–64	Grade 0	✓	✓	✓	–	–	–	–	Class B	✓	✓	MPLAB X IDE	✓	✓	5V Robust Designs, Motor Control, High–performance Real–time Control, Capacitive Sensing, Sensor Interfacing and Measurement Control

Achieving Higher Safety Levels:

ASIL D can be targeted using multiple devices via ASIL decomposition
 ASIL D = ASIL B(D) + ASIL B(D), where the combination of the DSCs enables meeting the ASIL D safety goals.

SIL 3 can be targeted using multiple devices for redundancy
 SIL 3 (System) = SIL 2 (MCU) + SIL 2 (MCU)

⁽¹⁾SGS-TÜV Saar ASIL B Ready Certified FMEDA and Safety Manual for dsPIC33C DSCs

⁽²⁾TÜV Rheinland-certified dsPIC33C DSC Diagnostic Software Libraries for Designs Targeting up to ASIL C

⁽³⁾TÜV Rheinland-certified dsPIC33C DSC Diagnostic Software Libraries for Designs Targeting up to SIL 3

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								ISO 26262 (ASIL) Automotive Applications			IEC 61508 (SIL) Industrial Applications		IEC 60730 Household Appliances					
								FMECA Report ^(1, 2)	Safety Manual ^(1, 2)	Diagnostic Library/ Safety Level ⁽²⁾	FMEA Report	Safety Manual	Diagnostic Library/ Safety Level	VDE- and UL- certified Diagnostic Library/ Safety Level	TÜV SÜD Certified XC Compiler	MPLAB Code Coverage		MPLAB X IDE/ Microchip Studio
PIC [®] and AVR [®] MCUs																		
AVR DA	AVR	24	32–128	4–16	28–64	Grade 1	–	✓	✓	ASIL B	✓	Use ISO 26262 variant	Class B	✓	✓	MPLAB X IDE, Studio	5V Robust Designs, Ultra low-power,, Capacitive Sensing for steering wheel and UI controls, Touch and safety co-processor, White goods, Smoke detector, Board controller	
AVR DB	AVR	24	32–128	4–16	28–64	Grade 1	–	✓	✓	ASIL B	Use ISO 26262 variant		Class B	✓	✓	MPLAB X IDE, Studio	5V Robust Designs, Ultra low-power, MPU co-processor, LIN node, Industrial Sensor, Safety sensor and co-processor, Analog monitoring and processing, Zero-cross detection, Level conversion and dual voltage applications	
ATmega88/168/328PB	AVR	20	8–32	1–2	32	Grade 2	–	✓	✓	ASIL B	Use ISO 26262 variant		–	✓	✓	MPLAB X IDE, Studio	5V Robust Designs, Ultra low-power, Fast start-up, LIN communication	
ATmega324PB	AVR	20	32	2	40–44	Grade 2	–	✓	✓	ASIL B	Use ISO 26262 variant		–	✓	✓	MPLAB X IDE, Studio	5V Robust Designs, Ultra low-power, Fast start-up, LIN communication	
ATtiny45	AVR	20	4	0.25	8	Grade 0	–	✓	✓	ASIL B	Use ISO 26262 variant		–	✓	✓	MPLAB X IDE, Studio	5V Robust Designs, High temperature, Ultra low-power, Fast start-up, fast PWM control. Safety co-processor.	
ATtiny41x/81x	AVR	20	4–8	0.25–0.5	8–24	Grade 1	–	✓	✓	ASIL B	Use ISO 26262 variant		Class B	✓	✓	MPLAB X IDE, Studio	5V Robust Designs, Ultra low-power,, Capacitive Sensing for steering wheel and UI controls, safety co-processor, gas burners, voltage supervisor, RS485, LIN communication	
ATtiny161x/321x	AVR	20	16–32	1–2	14–24	Grade 1	–	✓	✓	ASIL B	Use ISO 26262 variant		Class B	✓	✓	MPLAB X IDE, Studio	5V Robust Designs, Ultra low-power,, Capacitive Sensing for steering wheel and UI controls, gas burners, safety co-processor, Dual-ADC, power monitor, RS485, LIN communication	
ATtiny322/162/82x	AVR	20	8–32	1–2	14–24	Grade 1	–	✓	✓	ASIL B	Use ISO 26262 variant		Class B	✓	✓	MPLAB X IDE, Studio	5V Robust Designs, Ultra low-power,, differential 12-bit ADC with gain stage and hardware oversampling (17-bit), high accuracy safety sensors, battery monitor and management, motion sensor, smoke detector, RS485, LIN communication	
ATtiny40x/80x/160x	AVR	20	4–16	0.25–1	8–24	Grade 1	–	✓	✓	ASIL B	Use ISO 26262 variant		Class B	✓	✓	MPLAB X IDE, Studio	5V Robust Designs, low-cost, Ultra low-power, safety co-processor, RS485, LIN communication	
ATmega80x/160x/320x/480x	AVR	20	8–48	1–6	32–48	Grade 1	–	✓	✓	ASIL B	Use ISO 26262 variant		Class B	✓	✓	MPLAB X IDE, Studio	5V Robust Designs, Ultra low-power, safety co-processor, emergency lighting, Industrial control, real-time CIP, RS485, LIN communication	

(1) SGS-TÜV Saar ASIL B Ready Certified

(2) Available through [Microchip Direct](#)

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								FMECA Report ^(1, 2)	Safety Manual ^(1, 2)	Diagnostic Library/ Safety Level ⁽²⁾	FMEA Report	Safety Manual	Diagnostic Library/ Safety Level	VDE- and UL- certified Diagnostic Library/ Safety Level	TÜV SÜD Certified XC Compiler	MPLAB Code Coverage		MPLAB X IDE/ Microchip Studio
PIC and AVR MCUs																		
PIC16F152xx	PIC16	16	3.5–28	0.25–2	8–40	Grade 1	–	✓	✓	ASIL B	Use ISO 26262 variant	Class B	✓	✓	MPLAB X IDE	✓	5V Robust Designs, low-cost, Ultra low-power, safety co-processor, sensor node, RS485, LIN communication	
PIC16F183xx	PIC16	16	3.5–28	0.25–2	8–20	Grade 1	–	✓	✓	ASIL B	Use ISO 26262 variant	Class B	✓	✓	MPLAB X IDE	✓	5V Robust Designs, ultra low-power, real-time control, sensor node, Automotive interior lighting	
PIC16F184xx	PIC16	16	7–28	0.5–2	14–28	Grade 1	–	✓	✓	ASIL B	Use ISO 26262 variant	Class B	✓	✓	MPLAB X IDE	✓	5V Robust Designs, ultra low-power, IoT sensor nodes, Real-time control, steering wheel and UI capacitive sensing.	
PIC18FxxQ10	PIC18	16	16–128	1–3.6	28–40	Grade 1	–	✓	✓	ASIL B	Use ISO 26262 variant	Class B	✓	✓	MPLAB X IDE	✓	5V Robust Designs, ultra low-power, IoT sensor nodes, Real-time control, steering wheel and UI capacitive sensing, cost-sensitive board controllers	
PIC18F2xK83	PIC18	16	32–64	2–4	28	Grade 1	–	✓	✓	ASIL B	Use ISO 26262 variant	Class B	✓	✓	MPLAB X IDE	✓	5V Robust Designs, ultra low-power, CAN node, sensor nodes, Real-time control, steering wheel and UI capacitive sensing,DMX and DALI interface	
PIC16F188xx	PIC16	16	7–56	0.5–2	28–40	Grade 1	–	✓	✓	ASIL B	Use ISO 26262 variant	Class B	✓	✓	MPLAB X IDE	✓	5V Robust Designs, ultra low-power, real-time control, sensor node, system monitoring and management	
PIC18FxxK42	PIC18	16	16–32	1–8	28–48	Grade 1	–	✓	✓	ASIL B	Use ISO 26262 variant	Class B	✓	✓	MPLAB X IDE	✓	5V Robust Designs, ultra low-power, Real-time Control, Connected applications, Automotive lightning exterior & interior	
PIC18FxxQ43	PIC18	16	32–128	2–8	28–48	Grade 1	–	✓	✓	ASIL B	Use ISO 26262 variant	Class B	✓	✓	MPLAB X IDE	✓	5V Robust Designs, ultra low-power, Real-time Control, Connected applications, Board controller, Emergency Lighting	
PIC18FxxQ8x	PIC18	16	64-128	8-13	28-48	Grade 1	–	✓	✓	ASIL B	Use ISO 26262 variant	Class B	✓	✓	MPLAB X IDE	✓	5V Robust Designs, ultra low-power, CAN node, sensor nodes, real-time control, steering wheel and UI capacitive sensing,DMX and DALI interface	

Achieving Higher Safety Levels:

ASIL D can be targeted using multiple devices via ASIL decomposition

ASIL D Application (ITEM) = ASIL B (MCU) + ASIL B (MCU/sensor)

SIL 3 can be targeted using multiple devices for redundancy

SIL 3 (System) = SIL 2 (MCU) + SIL 2 (MCU)a

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SAM and PIC32 MCUs																					
SAM DA1	Arm [®] Cortex-M0+	48	16-64	4-16	32-64	Grade 2	-	✓	✓	ASIL B (In Development)	-	-	-	-	✓	✓	MPLAB X IDE	✓	✓	✓	General Purpose and Capacitive Touch Applications with LIN Connectivity
PIC32CM MC	Arm Cortex-M0+	48	16-128	8-16	32-48	Grade 1		✓	✓	ASIL B (In Development)	✓	✓	SIL 2/3	Class B	✓		MPLAB X IDE	✓	✓	✓	General Purpose, Motor Control, and ISELED with LIN Connectivity.
SAM D21	Arm Cortex-M0+	48	16-256	4-32	32-64	Grade 1	-	✓	✓	ASIL B (In Development)	✓	✓	SIL 2/3	Class B	✓	✓	MPLAB X IDE	✓	✓	✓	General Purpose, ISELED, and Capacitive Touch Applications with LIN Connectivity
SAM D20	Arm Cortex-M0+	48	16-256	2-32	32-64	Grade 1	-	-	-	-	-	-	-	Class B	✓	✓	MPLAB X IDE	✓	✓	✓	Cost Sensitive General Purpose and Capacitive Touch Applications with LIN Connectivity
SAM C20 (N)	Arm Cortex-M0+	48	32- 256	4-32	32-100	Grade 1	-	✓	✓	ASIL B (In Development)	✓	✓	SIL 2/3	Class B	✓	✓	MPLAB X IDE	✓	✓	✓	5V Robust Designs for Body Electronics, ISELED, Capactive Touch, and General Purpose with LIN and CAN-FD Connectivity
SAM C21 (N)	Arm Cortex-M0+	48	32- 256	4-32	32-100	Grade 1	-	✓	✓	ASIL B (In Development)	✓	✓	SIL 2/3	Class B	✓	✓	MPLAB X IDE	✓	✓	✓	5V Robust Designs for Body Electronics, ISELED, Capactive Touch, and General Purpose with LIN and CAN-FD Connectivity
SAM L21	Arm Cortex-M0+	48	32- 256	4-32	32-64	-	-	-	-	-	✓	✓	SIL 2/3	-	✓	✓	MPLAB X IDE	✓	✓	✓	Ultra Low Power Applications for Industrial Safety which include Smoke Alarms and Battery Powered Applications
SAM D51/E5x	Arm Cortex-M4F	120	512-1024	128-256	48-128	Grade 1	✓	✓	✓	ASIL B (In Development)	Planned			Planned	✓	✓	MPLAB X IDE	✓	✓	✓	AutoSAR based applications with LIN, CAN-FD, and Ethernet Connectivity which include AVAS, ISELED, Capactive Touch, and Infotainment
PIC32MZ EF	MIPS M-Class	252	512-2048	128-256	64-144	Grade 1	✓	-	-	-	-	-	-	Class B	✓	✓	MPLAB X IDE	✓	✓	✓	High Performance with LIN, CAN, Ethernet, and USB Connectivity for In-Cabin Applications
PIC32MZ DA	MIPS M-Class	200	1024-2048	256-640	169-288	Grade 2	-	-	-	-	-	-	-	Class B	✓	✓	MPLAB X IDE	✓	✓	✓	High Performance with LIN, CAN, and Ethernet Connectivity for Graphics Applications including an option with a 32MB SDRAM System In Package
PIC32MK MC/ GP	MIPS32 microAptiv	120	256-1024	12-256	48-100	Grade 1	✓	-	-	-	-	-	-	Class B	✓	✓	MPLAB X IDE	✓	✓	✓	High performance Real-time Control with State-of-the-Art Analog for applications such as Motor Control and Digital Power
SAM V70/V71	Arm Cortex-M7	300	512-2048	256-384	64-100	Grade 2	✓	✓	✓	ASIL B (In Development)	Planned			-	✓	✓	MPLAB X IDE	✓	✓	✓	AutoSAR based applications with LIN, CAN-FD, Ethernet/Ethernet-AVB, and MOST® connectivity ideal for Infotainment and ADAS applications.

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 SIL 3 can be targeted using multiple devices for redundancy
 SIL 3 (System) = SIL 2 (MCU) + SIL 2 (MCU)

⁽¹⁾To access our device-specific safety-related content, all of which are available under NDA, please contact your local Microchip Sales Office
 For any devices that are "In Development" or "Planned," please contact your local Microchip Sales Office for additional information.

Note: Dependant Failure Analysis (DFA) and PIN FMEA available on request.