



**dsPIC33FJXXXGPX06/X08/X10**  
**Data Sheet**

High-Performance,  
16-Bit Digital Signal Controllers

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# MICROCHIP dsPIC33FJXXXGPX06/X08/X10

## High-Performance, 16-Bit Digital Signal Controllers

### Operating Range:

- Up to 40 MIPS operation (at 3.0-3.6V):
  - Industrial temperature range (-40°C to +85°C)

### High-Performance DSC CPU:

- Modified Harvard architecture
- C compiler optimized instruction set
- 16-bit wide data path
- 24-bit wide instructions
- Linear program memory addressing up to 4M instruction words
- Linear data memory addressing up to 64 Kbytes
- 83 base instructions: mostly 1 word/1 cycle
- Sixteen 16-bit General Purpose Registers
- Two 40-bit accumulators:
  - With rounding and saturation options
- Flexible and powerful addressing modes:
  - Indirect, Modulo and Bit-Reversed
- Software stack
- 16 x 16 fractional/integer multiply operations
- 32/16 and 16/16 divide operations
- Single-cycle multiply and accumulate:
  - Accumulator write back for DSP operations
  - Dual data fetch
- Up to  $\pm 16$ -bit shifts for up to 40-bit data

### Direct Memory Access (DMA):

- 8-channel hardware DMA:
- 2 Kbytes dual ported DMA buffer area (DMA RAM) to store data transferred via DMA:
  - Allows data transfer between RAM and a peripheral while CPU is executing code (no cycle stealing)
- Most peripherals support DMA

### Interrupt Controller:

- 5-cycle latency
- Up to 63 available interrupt sources
- Up to five external interrupts
- Seven programmable priority levels
- Five processor exceptions

### Digital I/O:

- Up to 85 programmable digital I/O pins
- Wake-up/Interrupt-on-Change on up to 24 pins
- Output pins can drive from 3.0V to 3.6V
- All digital input pins are 5V tolerant
- 4 mA sink on all I/O pins

### On-Chip Flash and SRAM:

- Flash program memory, up to 256 Kbytes
- Data SRAM, up to 30 Kbytes (includes 2 Kbytes of DMA RAM):

### System Management:

- Flexible clock options:
  - External, crystal, resonator, internal RC
  - Fully integrated PLL
  - Extremely low jitter PLL
- Power-up Timer
- Oscillator Start-up Timer/Stabilizer
- Watchdog Timer with its own RC oscillator
- Fail-Safe Clock Monitor
- Reset by multiple sources

### Power Management:

- On-chip 2.5V voltage regulator
- Switch between clock sources in real time
- Idle, Sleep and Doze modes with fast wake-up

### Timers/Capture/Compare/PWM:

- Timer/Counters, up to nine 16-bit timers:
  - Can pair up to make four 32-bit timers
  - 1 timer runs as Real-Time Clock with external 32.768 kHz oscillator
  - Programmable prescaler
- Input Capture (up to eight channels):
  - Capture on up, down or both edges
  - 16-bit capture input functions
  - 4-deep FIFO on each capture
- Output Compare (up to eight channels):
  - Single or Dual 16-Bit Compare mode
  - 16-bit Glitchless PWM mode

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## Communication Modules:

- 3-wire SPI (up to two modules):
  - Framing supports I/O interface to simple codecs
  - Supports 8-bit and 16-bit data
  - Supports all serial clock formats and sampling modes
- I<sup>2</sup>C™ (up to two modules):
  - Full Multi-Master Slave mode support
  - 7-bit and 10-bit addressing
  - Bus collision detection and arbitration
  - Integrated signal conditioning
  - Slave address masking
- UART (up to two modules):
  - Interrupt on address bit detect
  - Interrupt on UART error
  - Wake-up on Start bit from Sleep mode
  - 4-character TX and RX FIFO buffers
  - LIN bus support
  - IrDA® encoding and decoding in hardware
  - High-Speed Baud mode
  - Hardware Flow Control with CTS and RTS
- Data Converter Interface (DCI) module:
  - Codec interface
  - Supports I<sup>2</sup>S and AC'97 protocols
  - Up to 16-bit data words, up to 16 words per frame
  - 4-word deep TX and RX buffers
- Enhanced CAN (ECAN™ module) 2.0B active (up to 2 modules):
  - Up to eight transmit and up to 32 receive buffers
  - 16 receive filters and three masks
  - Loopback, Listen Only and Listen All Messages modes for diagnostics and bus monitoring
  - Wake-up on CAN message
  - Automatic processing of Remote Transmission Requests
  - FIFO mode using DMA
  - DeviceNet™ addressing support

## Analog-to-Digital Converters (ADCs):

- Up to two ADC modules in a device
- 10-bit, 1.1 Msps or 12-bit, 500 ksps conversion:
  - Two, four or eight simultaneous samples
  - Up to 32 input channels with auto-scanning
  - Conversion start can be manual or synchronized with one of four trigger sources
  - Conversion possible in Sleep mode
  - ±1 LSB max integral nonlinearity
  - ±1 LSB max differential nonlinearity

## CMOS Flash Technology:

- Low-power, high-speed Flash technology
- Fully static design
- 3.3V (±10%) operating voltage
- Industrial temperature
- Low-power consumption

## Packaging:

- 100-pin TQFP (14x14x1 mm and 12x12x1 mm)
- 80-pin TQFP (12x12x1 mm)
- 64-pin TQFP (10x10x1 mm)

<b>Note:</b> See the device variant tables for exact peripheral features per device.
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## dsPIC33F PRODUCT FAMILIES

The dsPIC33F General Purpose Family of devices are ideal for a wide variety of 16-bit MCU embedded applications. The controllers with codec interfaces are well-suited for speech and audio processing applications.

The device names, pin counts, memory sizes and peripheral availability of each family are listed below, followed by their pinout diagrams.

## dsPIC33F General Purpose Family Controllers

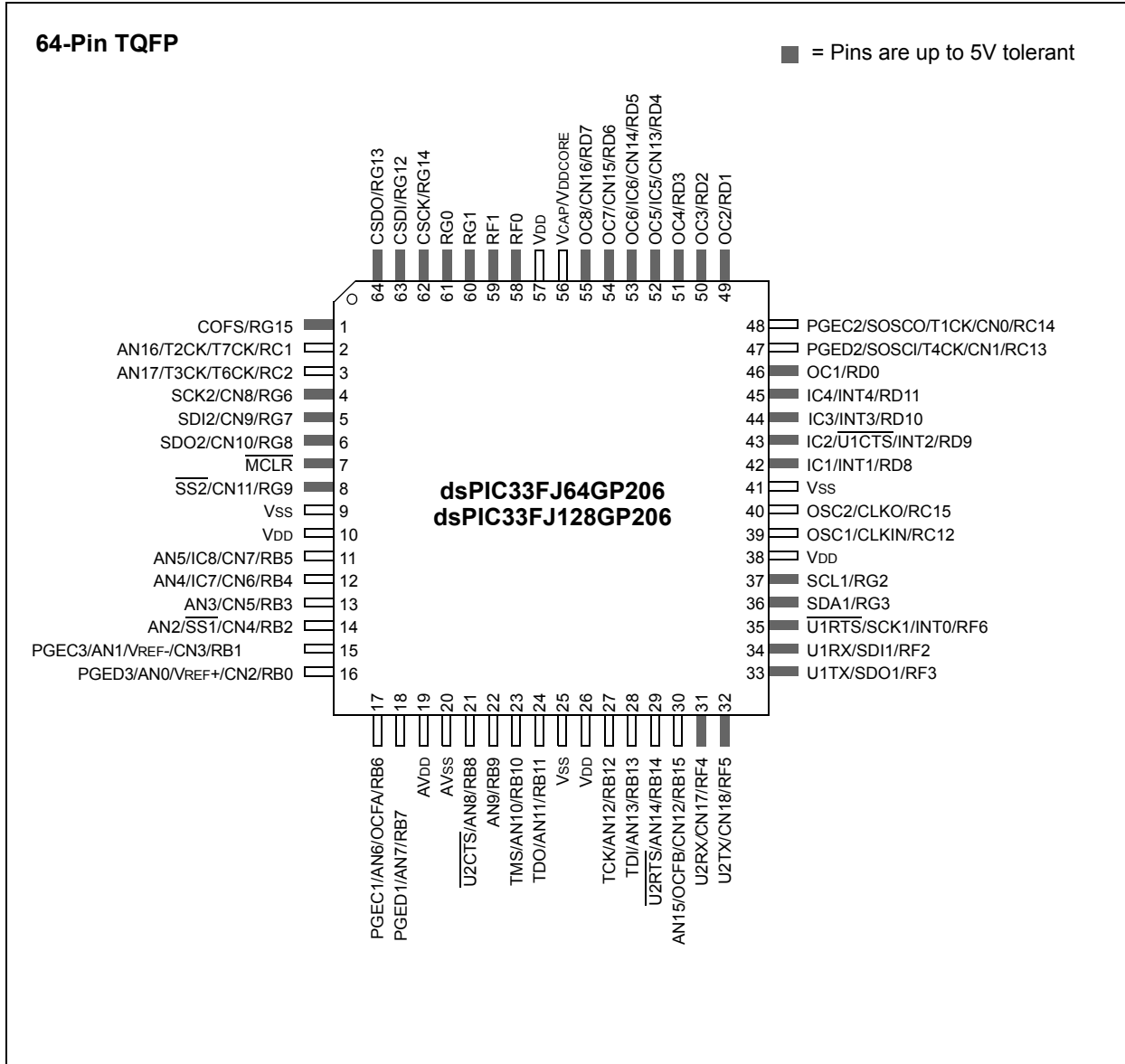
Device	Pins	Program Flash Memory (Kbyte)	RAM (Kbyte) <sup>(1)</sup>	16-bit Timer	Input Capture	Output Compare Std. PWM	Codec Interface	ADC	UART	SPI	I <sup>2</sup> C™	Enhanced CAN™	I/O Pins (Max) <sup>(2)</sup>	Packages
dsPIC33FJ64GP206	64	64	8	9	8	8	1	1 ADC, 18 ch	2	2	1	0	53	PT
dsPIC33FJ64GP306	64	64	16	9	8	8	1	1 ADC, 18 ch	2	2	2	0	53	PT
dsPIC33FJ64GP310	100	64	16	9	8	8	1	1 ADC, 32 ch	2	2	2	0	85	PF, PT
dsPIC33FJ64GP706	64	64	16	9	8	8	1	2 ADC, 18 ch	2	2	2	2	53	PT
dsPIC33FJ64GP708	80	64	16	9	8	8	1	2 ADC, 24 ch	2	2	2	2	69	PT
dsPIC33FJ64GP710	100	64	16	9	8	8	1	2 ADC, 32 ch	2	2	2	2	85	PF, PT
dsPIC33FJ128GP206	64	128	8	9	8	8	1	1 ADC, 18 ch	2	2	1	0	53	PT
dsPIC33FJ128GP306	64	128	16	9	8	8	1	1 ADC, 18 ch	2	2	2	0	53	PT
dsPIC33FJ128GP310	100	128	16	9	8	8	1	1 ADC, 32 ch	2	2	2	0	85	PF, PT
dsPIC33FJ128GP706	64	128	16	9	8	8	1	2 ADC, 18 ch	2	2	2	2	53	PT
dsPIC33FJ128GP708	80	128	16	9	8	8	1	2 ADC, 24 ch	2	2	2	2	69	PT
dsPIC33FJ128GP710	100	128	16	9	8	8	1	2 ADC, 32 ch	2	2	2	2	85	PF, PT
dsPIC33FJ256GP506	64	256	16	9	8	8	1	1 ADC, 18 ch	2	2	2	1	53	PT
dsPIC33FJ256GP510	100	256	16	9	8	8	1	1 ADC, 32 ch	2	2	2	1	85	PF, PT
dsPIC33FJ256GP710	100	256	30	9	8	8	1	2 ADC, 32 ch	2	2	2	2	85	PF, PT

**Note 1:** RAM size is inclusive of 2 Kbytes DMA RAM.

**Note 2:** Maximum I/O pin count includes pins shared by the peripheral functions.

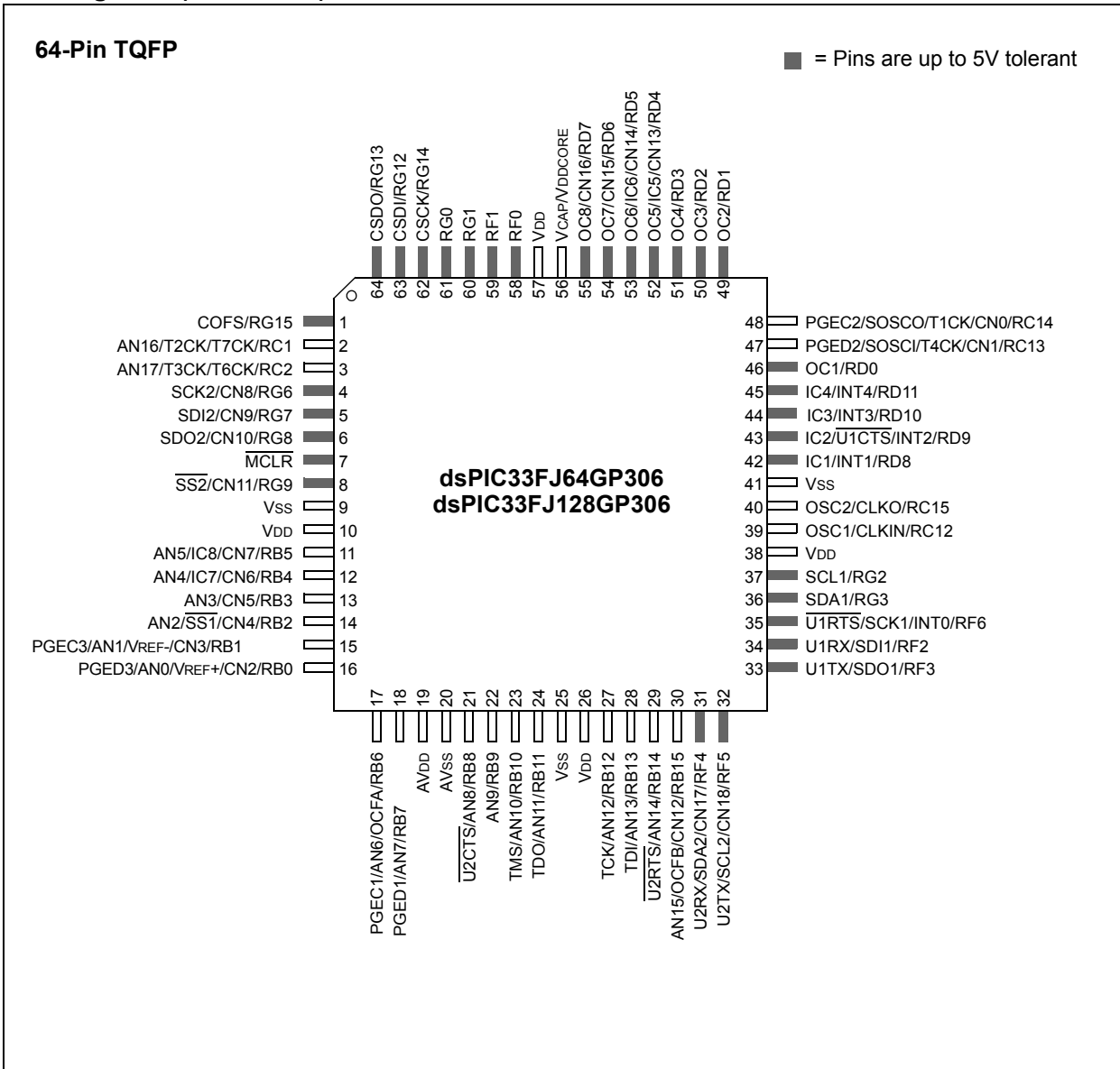
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## Pin Diagrams



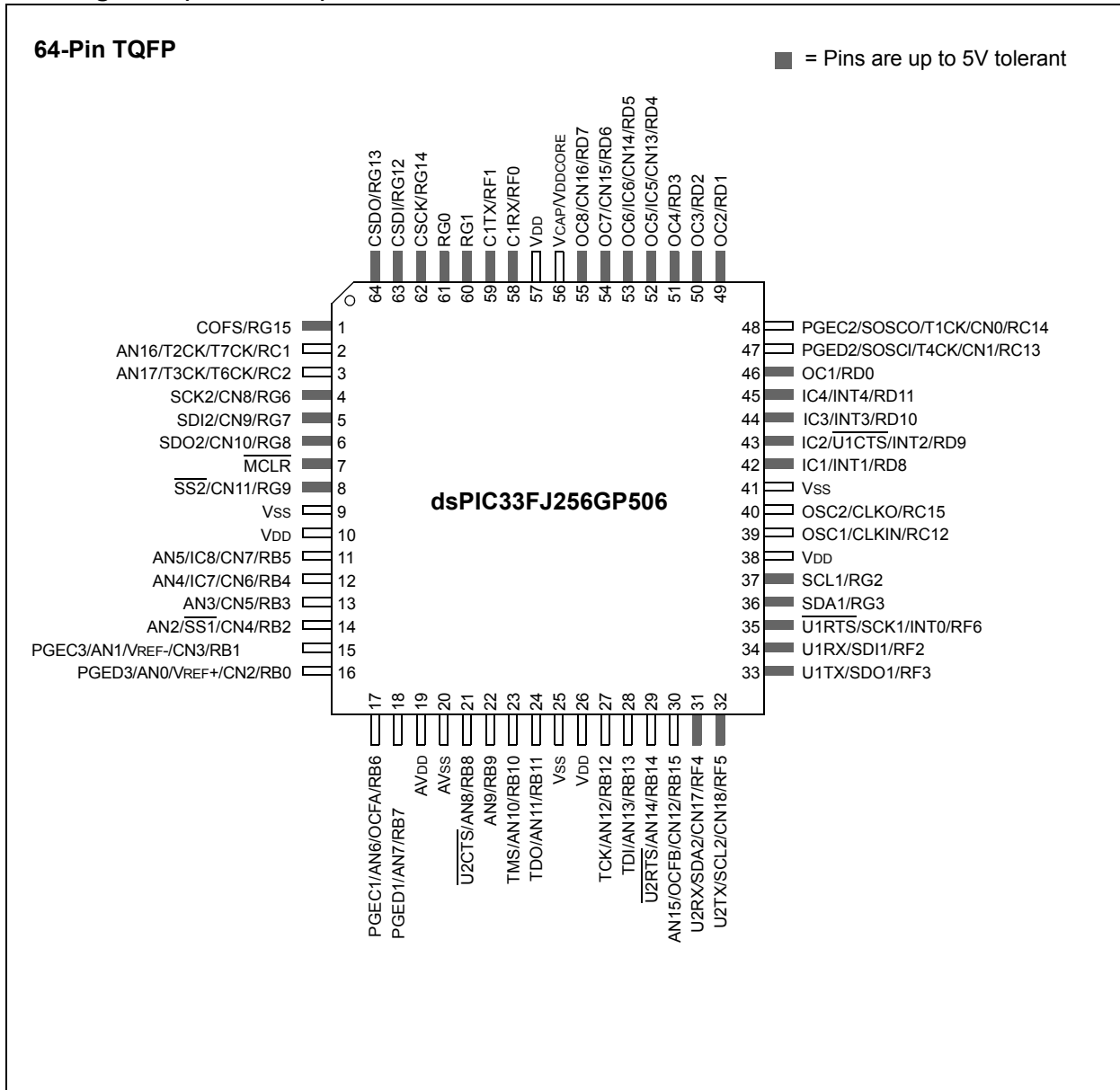
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## Pin Diagrams (Continued)



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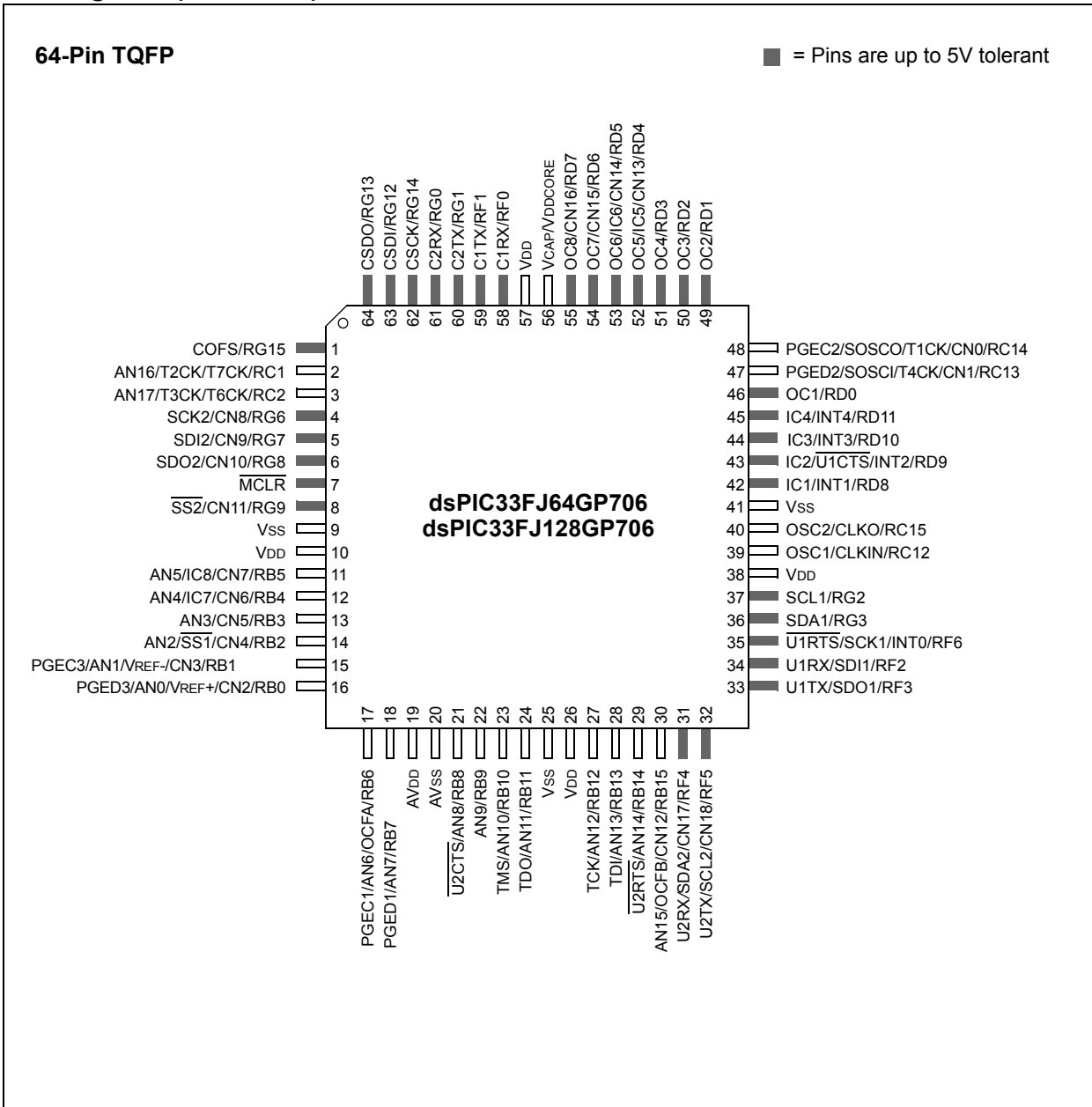
## Pin Diagrams (Continued)





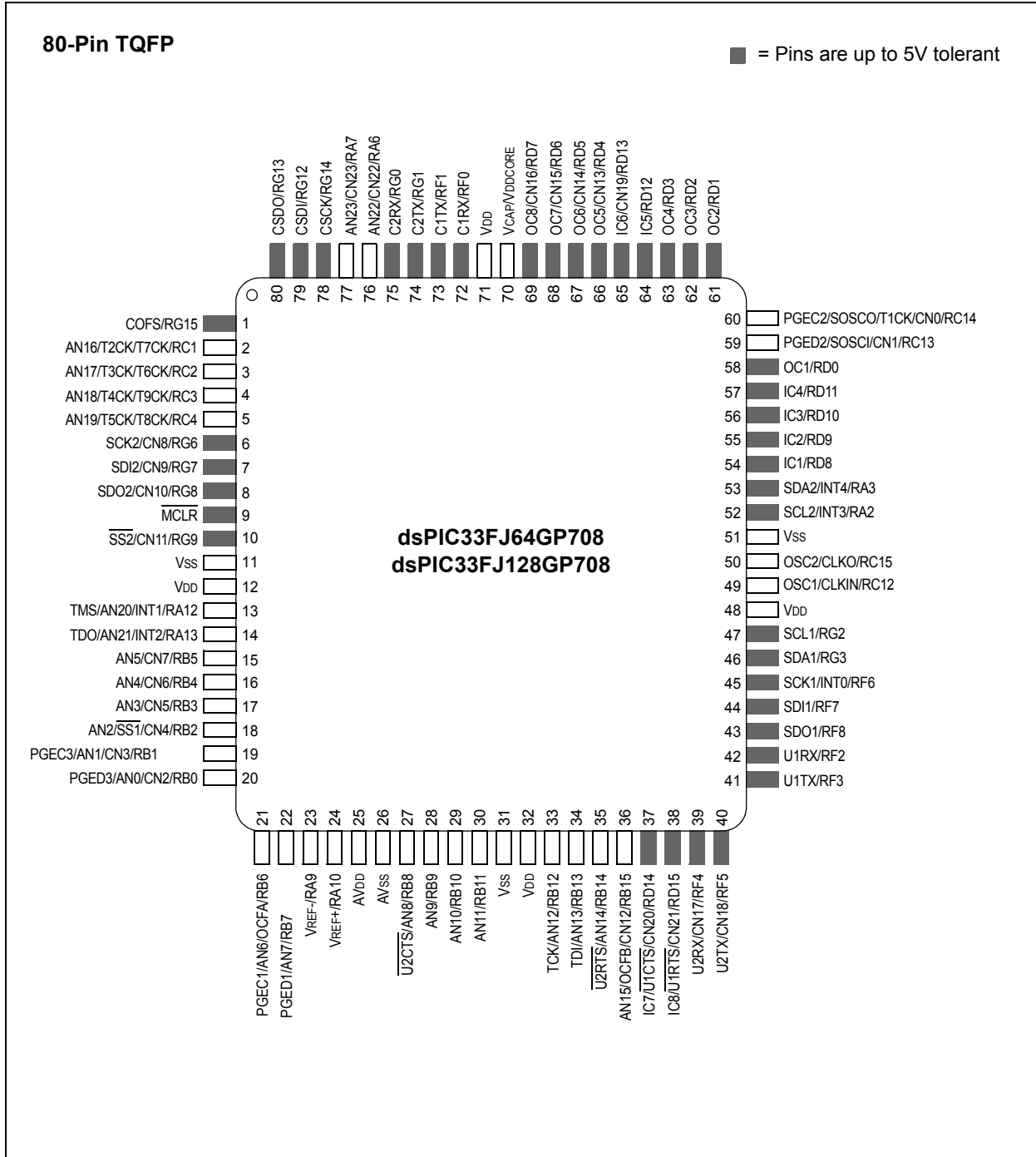
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## Pin Diagrams (Continued)



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## Pin Diagrams (Continued)



# dsPIC33FJXXXGPX06/X08/X10

## Pin Diagrams (Continued)

