C2000 ADC Video Series

Analog-to-Digital Converter (ADC)

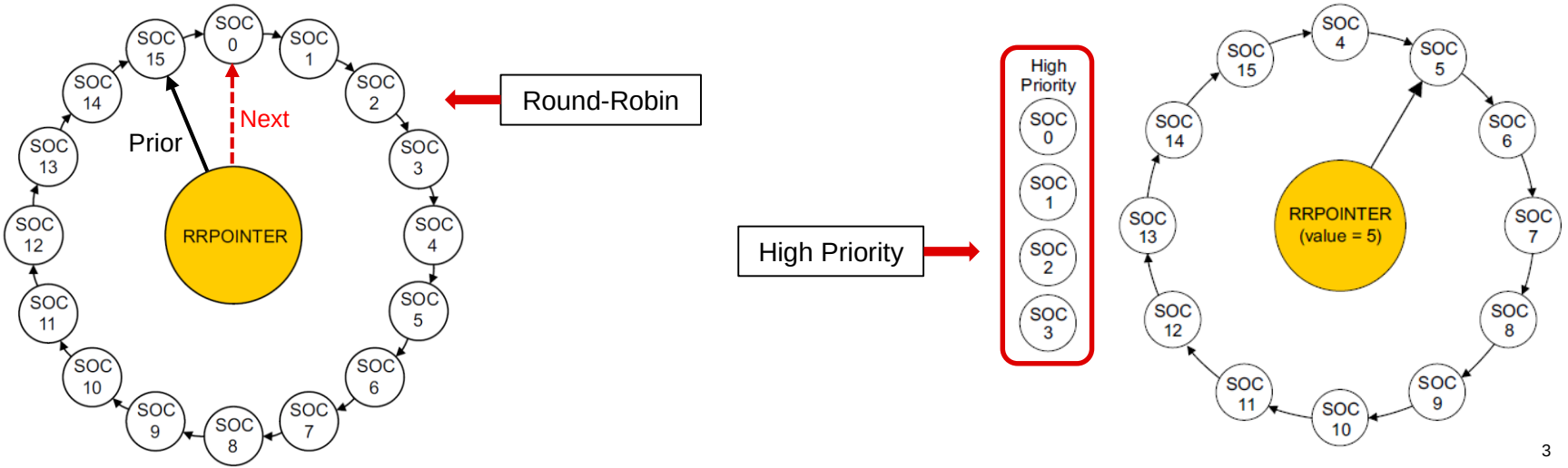
Burst Mode Feature Demonstration

Agenda

- C2000 ADC prioritization scheme
- Burst mode feature
- Burst mode configurations
- C2000Ware reference example
- CCS Demo – ADC Burst Mode Example

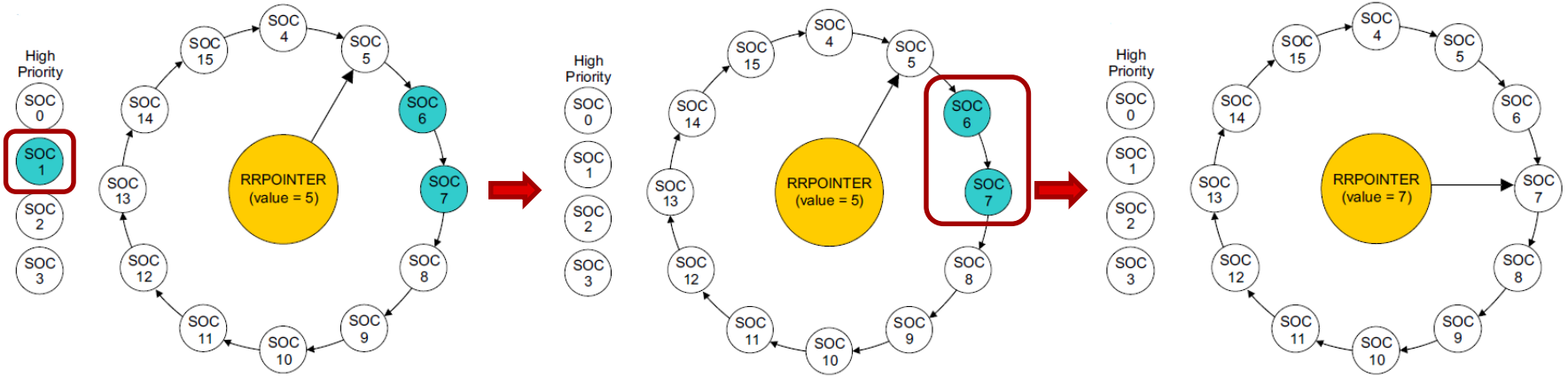
C2000 ADC Prioritization

- ADC SOC priority determines the order of conversion when multiple SOCs are set.
- Two priority modes supported by C2000 ADCs:
  - Round Robin Priority (default)
  - High Priority



Burst Mode

- Uses Round-Robin priority sequence
- Multiple SOCs configured to convert using a common trigger.
- Allows single trigger to walk through one or more SOC in RR wheel.



Burst Mode configuration

- ADC Wrapper register – ADCBURSTCTL
  - BURSTEN = 1: Configures the ADC wrapper for burst mode operation.
  - BURSTSIZE: Determines the number of round-robin SOCs to be converted when burst conversion sequence starts. [ADCBURSTCTL.BURSTSIZE + 1]
  - BURSTTRIGSEL: Configures the trigger that will start the burst conversion sequence.

```
AdcaRegs.BURSTCTL.BURSTEN = 1;              //Enable ADC burst mode
AdcaRegs.BURSTCTL.BURSTTRIG = 3;            //CPU1 Timer 2 will trigger burst of conversions
AdcaRegs.BURSTCTL.BURSTSIZE = 1;            //conversion bursts are 1 + 1 = 2 conversions long
AdcaRegs.SOCPRICTL.bit.SOCPRIORITY = 12;    //SOC0 to SOC11 are high priority
```

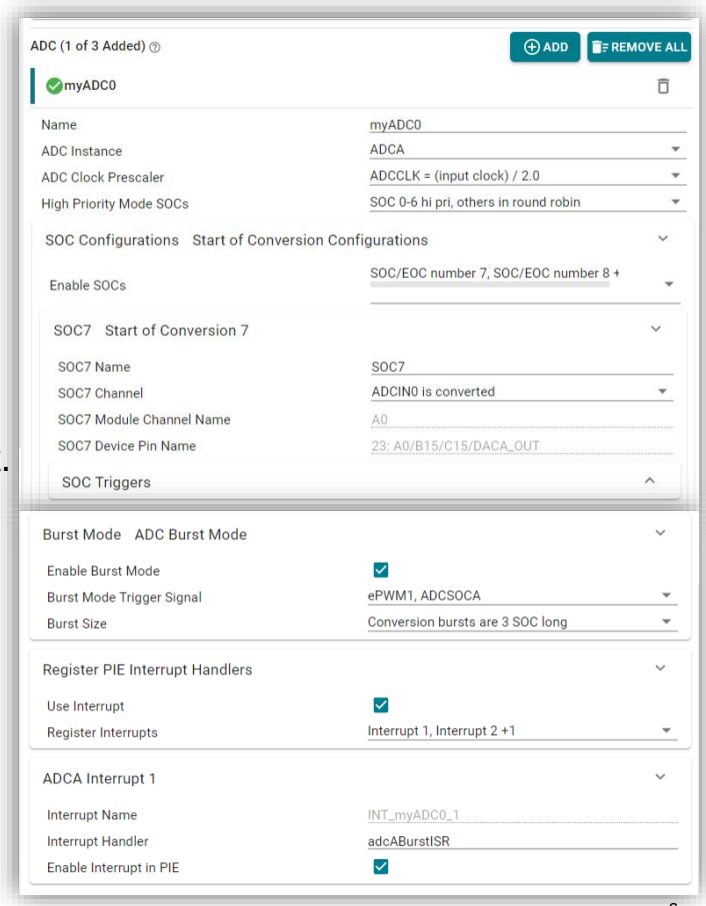
- Corresponding driver functions from C2000Ware[1]:
  - *ADC_enableBurstMode(uint32_t base);*
  - *ADC_setBurstModeConfig(uint32_t base, ADC_Trigger trigger, uint16_t burstSize)*
- Note: For normal burst mode operation, [ADCBURSTCTL.BURSTSIZE + 1] <= No. of SOCs in round robin (exc. High Priority SOCs)
  - If SOCPRIORITY = 12 (SOC0-11 are High Priority), BURSTSIZE should be <= 3 (SOC12-SOC15)

[1] C2000Ware_XX/driverlib/<device#>/driverlib/adc.h

Reference example

- C2000Ware example: *adc_ex11_burst_mode_epwm*[1]
- Uses EPWM1 to periodically trigger ADCA using burst mode @25kHz
- Each burst triggers 3 conversions.
  - Channels A0, A1, A2, A3, A4 are configured to convert.
  - A0, A1 are part of every burst.
  - Third conversion will be from A2, A3, A4 – one in each burst.
  - SOC7 to SOC15 in RR used to achieve the operation.

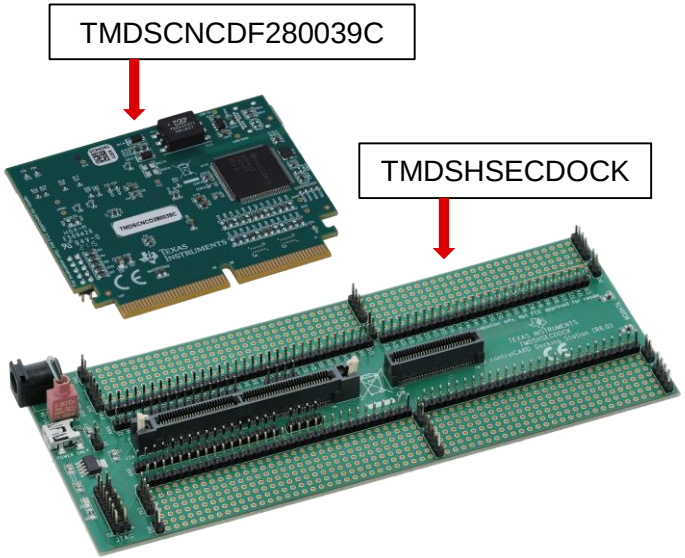
Channels	1st Burst Trigger	2nd Burst Trigger	3rd Burst Trigger
A0	SOC7	SOC10	SOC13
A1	SOC8	SOC11	SOC14
A2	SOC9	-	-
A3	-	SOC12	-
A4	-	-	SOC15
Result	adcABurstISR		



[1] Example location: ~\C2000Ware_XXXX\driverlib\f28003x\examples\adc

Reference example

- External Connections:
  - A0, A1, A2, A3, A4 to be connected to the voltage to be sampled.
- Watch Variables:
  - adcAresult*x* for digital representations of the voltage on input A*x*.



cCARD Pinout: F280039C

	HSEC pin	MCU pin	MCU Usage for Std	HSEC cCARD standard
	1	-		JTAG-EMU1
	3	TMS	TMS	JTAG-TMS
	5	TCK	TCK	JTAG-TCK
	7	VSS		GND
Analog	9	A0, B15, C15, DACA_OUT	Analog	ADC1 (and/or DACA)
Analog	11	A1, B7, DACB_OUT	Analog	ADC1 (and/or DACB)
Analog	13	-		GND
Analog	15	A2, B6, C9	Analog	ADC1 (and/or CMPIN+)
Analog	17	A4, B8	Analog	ADC1
Analog	19	VSS		GND
Analog	21	A5	Analog	ADC1 (and/or CMPIN+)
Analog	23	A6	Analog	ADC1
Analog	25	A10, B1, C10	Analog	ADC (and/or CMPIN+)
Analog	27	A11, B10, C0	Analog	ADC
Analog	29	-		GND
Analog	31	B0, C11	Analog	ADC
Analog	33	A7, C3	Analog	ADC
Analog	35	VSS		GND
Analog	37	A12, C5	Analog	ADC
Analog	39	A3, B9, C7	Analog	ADC
Analog	41	-		Rsv
Analog	43	-		VREFLO
Analog	45	VREFHIABC *	VREFHI	VREFHI
Analog	47	VSS		GND
	49	GPIO-00	EPWM1_A	PWM1A
	51	GPIO-01	EPWM1_B	PWM1B
	53	GPIO-02	EPWM2_A	PWM2A
	55	GPIO-03	EPWM2_B	PWM2B

CCS Demo

Collaterals

- C2000 Academy - Module 6: Analog Subsystem (ti.com)
- TI ADC Training & Videos
  - C2000™ Analog-to-Digital Converter (ADC): Overview | TI.com Video
  - C2000™ Analog-to-Digital Converter (ADC): Core | TI.com Video
  - C2000™ Analog-to-Digital Converter (ADC): Wrapper | TI.com Video
- Sysconfig Overview
  - C2000™ SysConfig: Overview | TI.com Video
- F280039C Device Technical Reference Manual
- TMS320F28003x Real-Time Microcontrollers datasheet
- C2000WARE Software development kit (SDK) | TI.com
- TI E2E support forums
- TI Training & Videos | TI.com