SDFM – Type 0 Overview

C2000 Sigma Delta Filter Module (SDFM) Series



What is SDFM?

- Four-channel configurable Digital Low pass Filter based on Sinc filters
- Filter channels are identical and independently configurable
- Each filter channel has comparator filter and data filter which work on same bit stream





Block Diagram of One Filter Module





PWM Sync (SDSYNC)

Provide ability to use PWM to reset / synchronize data filter for exact phase adjustment



SDFM Noise immunity

Layout Guidelines: Best Practices for clock and data line routing and termination

Application Report

Achieving Better Signal Integrity With Isolated Delta-Sigma Modulators in Motor Drives

Improper routing schemes of clock and data signals on the PCB can create signal-integrity issues and sample and hold violations.

Additional C2000 HW Protection: GPIO 3-sample QUAL feature provides protection against occasional random noise glitches





SDFM Interrupt

Each SDFM instance can generate one CPU interrupt





SDFM Sysconfig support

SDFM (1 of 2 Added)		⊕ ADD	
SDFM_1		Ô	Provides ability to
Name	SDFM_1		select the filter
Use Filter Channel 1			
Use Filter Channel 2	\checkmark		channels to be used
Use Filter Channel 3	\checkmark		
Use Filter Channel 4	\checkmark		
FILTER Configurations		~	Each filter channel has be
Filter1 Configure Filter1		^	independently configured
Filter2 Configure Filter2		^	
Filter3 Configure Filter3		^	
Filter4 Configure Filter4		^	
Interrupt Configurations		~	
Use SDFM interrupts			
Register Interrupts	None	·	
PinMux Use Case	ALL	Ψ	
PinMux Peripheral and Pin Configuration		^	



SDFM Sysconfig support

Filter1 Configure Filter1 So Modulator mode (Model) Modulator clock is identical to the data rate Enable Data Filter ComparatorFilter Settings Sind Structure 92 CosR Data rate (us) Latency (us) High Level Threshold Dota rate (us) Latency (us) Data filter Settings FilterType Dota rate (us) Latency (us) Min (Data filter output) Ma (Data filter output) Ma (Data filter output) Data Filter Output Representation Shift 32 to filter Output to Sto-modulator (V) Differential clipping voltage (V) Diff			
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Theoritical Data filter Output	Bitstream 1's density	0.5	
	Theoritical Data filter Output	0	
Theoritical Comparator filter Output 16384	Theoritical Comparator filter Output	16384	



SDFM Sysconfig support

Interrupt Configurations		~	
Use SDFM interrupts			
SDFM interrupt Configure SDFM interrupt		~	Enable / Disable
Modulator Clock failure	None		SDFM interrupts for
Low Threshold interrupt		*	each filter channel
High Threshold interrupt		.	
Data Acknowledge		•	
Register Interrupts	None	•	
PinMux Use Case	ALL	•	
PinMux Peripheral and Pin Configuration		~	Configure SDFM pins
Sigma-Delta Peripheral	Any(SD2)	•	
SD_C1	Any(GPI025)	•	
SD_D1	Any(GPI024)	•	
SD_C2	Any(GPI0133)	*	
SD_D2	Any(GPI026)	•	
SD_C3	Any(GPI029)	•	
SD_D3	Any(GPI028)	•	
SD_C4	Any(GPI031)	•	
SD_D4	Any(GPI030)	•	



Additional SDFM Resources

Foundational Materials

- How delta-sigma ADCs work, Part 1
- How delta-sigma ADCs work, Part 2
- Nuts and Bolts of the Delta-Sigma Converter (video)
- <u>C2000 Academy</u> with Hands-on Labs
- **Expert Materials**
 - <u>Achieving Better Signal Integrity With Isolated Delta-Sigma Modulators in Motor Drives</u>
 - <u>C2000 DesignDRIVE</u> Development Kit for Industrial Motor Control
 - Isolated Current Shunt and Voltage Measurement Kit
 - Three Phase Power Factor Correction Reference Design Using C2000 MCU

Check Video Description for Additional Resources

