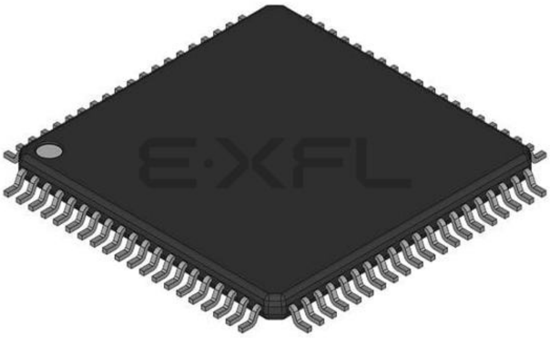

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Applications of "Embedded - Microcontrollers"

Details	
Product Status	Active
Core Processor	ARM® Cortex®-M4
Core Size	32-Bit Single-Core
Speed	120MHz
Connectivity	CANbus, EBI/EMI, I²C, IrDA, SPI, UART/USART, USB, USB OTG
Peripherals	DMA, I²S, LVD, POR, PWM, WDT
Number of I/O	56
Program Memory Size	1MB (1M x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	128K x 8
Voltage - Supply (Vcc/Vdd)	1.71V ~ 3.6V
Data Converters	A/D 27x16b; D/A 1x12b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 105°C (TA)
Mounting Type	Surface Mount
Package / Case	80-LQFP
Supplier Device Package	80-FQFP (12x12)
Purchase URL	https://www.e-xfl.com/pro/item?MUrl=&PartUrl=mk22fn1m0vlk12

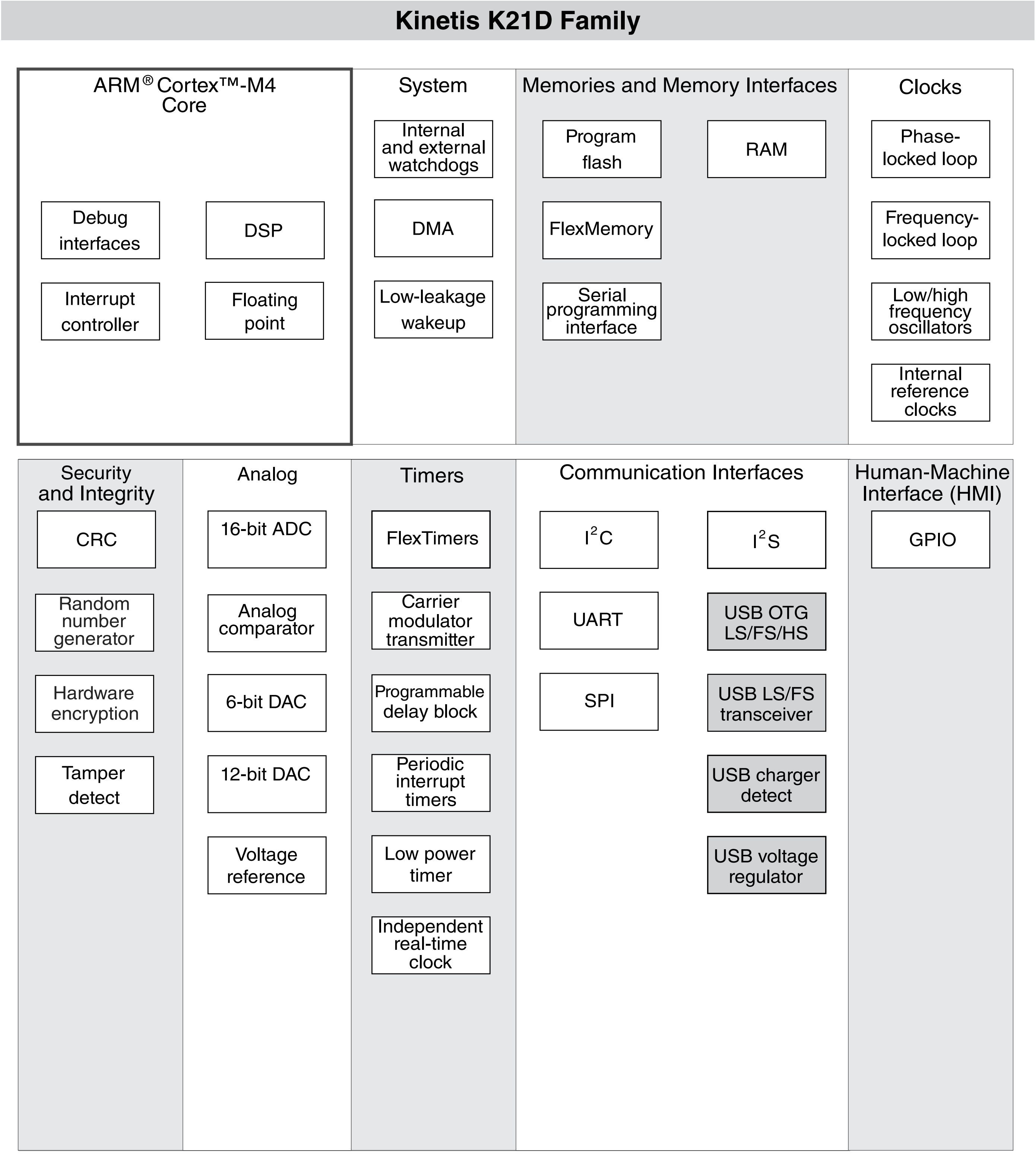

Figure 1. K20 block diagram

3. All analog pins are internally clamped to V_{SS} and V_{DD} through ESD protection diodes. If V_{IN} is less than V_{AIO_MIN} or greater than V_{AIO_MAX}, a current limiting resistor is required. The negative DC injection current limiting resistor is calculated as $R=(V_{AIO\_MIN}-V_{IN})/|I_{ICAIO}|$. The positive injection current limiting resistor is calculated as $R=(V_{IN}-V_{AIO\_MAX})/|I_{ICAIO}|$. Select the larger of these two calculated resistances if the pin is exposed to positive and negative injection currents.
4. Open drain outputs must be pulled to VDD.

2.2.2 LVD and POR operating requirements

Table 2. V_{DD} supply LVD and POR operating requirements

Symbol	Description	Min.	Typ.	Max.	Unit	Notes
V_{POR}	Falling VDD POR detect voltage	0.8	1.1	1.5	V	
V_{LVDH}	Falling low-voltage detect threshold — high range (LVDV=01)	2.48	2.56	2.64	V	
	Low-voltage warning thresholds — high range					1
V_{LVW1H}	• Level 1 falling (LVWV=00)	2.62	2.70	2.78	V	
V_{LVW2H}	• Level 2 falling (LVWV=01)	2.72	2.80	2.88	V	
V_{LVW3H}	• Level 3 falling (LVWV=10)	2.82	2.90	2.98	V	
V_{LVW4H}	• Level 4 falling (LVWV=11)	2.92	3.00	3.08	V	
V_{HYSH}	Low-voltage inhibit reset/recover hysteresis — high range	—	80	—	mV	
V_{LVDL}	Falling low-voltage detect threshold — low range (LVDV=00)	1.54	1.60	1.66	V	
	Low-voltage warning thresholds — low range					1
V_{LVW1L}	• Level 1 falling (LVWV=00)	1.74	1.80	1.86	V	
V_{LVW2L}	• Level 2 falling (LVWV=01)	1.84	1.90	1.96	V	
V_{LVW3L}	• Level 3 falling (LVWV=10)	1.94	2.00	2.06	V	
V_{LVW4L}	• Level 4 falling (LVWV=11)	2.04	2.10	2.16	V	
V_{HYSL}	Low-voltage inhibit reset/recover hysteresis — low range	—	60	—	mV	
V_{BG}	Bandgap voltage reference	0.97	1.00	1.03	V	
t_{LPO}	Internal low power oscillator period — factory trimmed	900	1000	1100	μs	

1. Rising threshold is the sum of falling threshold and hysteresis voltage

Table 3. VBAT power operating requirements

Symbol	Description	Min.	Typ.	Max.	Unit	Notes
V_{POR_VBAT}	Falling VBAT supply POR detect voltage	0.8	1.1	1.5	V	

2.2.3 Voltage and current operating behaviors

Table 4. Voltage and current operating behaviors

Symbol	Description	Min.	Typ	Max.	Unit	Notes
V_{OH}	Output high voltage — high drive strength					
	• $2.7\ V \le V_{DD} \le 3.6\ V$, I_{OH} = -8mA	$V_{DD} - 0.5$	—	—	V	
	• $1.71\ V \le V_{DD} \le 2.7\ V$, I_{OH} = -3mA	$V_{DD} - 0.5$	—	—	V	
	Output high voltage — low drive strength					
	• $2.7\ V \le V_{DD} \le 3.6\ V$, I_{OH} = -2mA	$V_{DD} - 0.5$	—	—	V	
	• $1.71\ V \le V_{DD} \le 2.7\ V$, I_{OH} = -0.6mA	$V_{DD} - 0.5$	—	—	V	
I_{OHT}	Output high current total for all ports	—	—	100	mA	
V_{OL}	Output low voltage — high drive strength					1
	• $2.7\ V \le V_{DD} \le 3.6\ V$, I_{OL} = 9mA	—	—	0.5	V	
	• $1.71\ V \le V_{DD} \le 2.7\ V$, I_{OL} = 3mA	—	—	0.5	V	
	Output low voltage — low drive strength					
	• $2.7\ V \le V_{DD} \le 3.6\ V$, I_{OL} = 2mA	—	—	0.5	V	
	• $1.71\ V \le V_{DD} \le 2.7\ V$, I_{OL} = 0.6mA	—	—	0.5	V	
I_{OLT}	Output low current total for all ports	—	—	100	mA	
I_{IND}	Input leakage current, digital pins • $V_{SS} \le V_{IN} \le V_{IL}$					2, 3
	• All digital pins	—	0.002	0.5	µA	
	• $V_{IN} = V_{DD}$					
	• All digital pins except PTD7	—	0.002	0.5	µA	
	• PTD7	—	0.004	1	µA	
I_{IND}	Input leakage current, digital pins • $V_{IL} < V_{IN} < V_{DD}$					2
	• V_{DD} = 3.6 V	—	18	26	µA	
	• V_{DD} = 3.0 V	—	12	19	µA	
	• V_{DD} = 2.5 V	—	8	13	µA	
	• V_{DD} = 1.7 V	—	3	6	µA	
I_{IND}	Input leakage current, digital pins • $V_{DD} < V_{IN} < 5.5\ V$	—	1	50	µA	
I_{OZ}	Hi-Z (off-state) leakage current (per pin)	—	—	0.25	µA	
R_{PU}	Internal pullup resistors	20	35	50	kΩ	4
R_{PD}	Internal pulldown resistors	20	35	50	kΩ	5

1. Open drain outputs must be pulled to V_{DD}.
2. Measured at VDD=3.6V
3. Internal pull-up/pull-down resistors disabled.
4. Measured at V_{DD} supply voltage = V_{DD} min and Vinput = V_{SS}

5. 25 MHz core and system clock, 25 MHz bus clock, and 12.5 MHz FlexBus and flash clock. MCG configured for FEI mode.
6. 4 MHz core, system, FlexBus, and bus clock and 1 MHz flash clock. MCG configured for BLPE mode. All peripheral clocks disabled. Code executing from flash.
7. 4 MHz core, system, FlexBus, and bus clock and 1 MHz flash clock. MCG configured for BLPE mode. All peripheral clocks enabled but peripherals are not in active operation. Code executing from flash.
8. 4 MHz core, system, FlexBus, and bus clock and 1 MHz flash clock. MCG configured for BLPE mode. All peripheral clocks disabled.
9. Includes 32kHz oscillator current and RTC operation.

2.2.5.1 Diagram: Typical IDD_RUN operating behavior

The following data was measured under these conditions:

- MCG in PEE mode at greater than 100 MHz frequencies
- No GPIOs toggled
- Code execution from flash with cache enabled
- For the ALLOFF curve, all peripheral clocks are disabled except FTFE

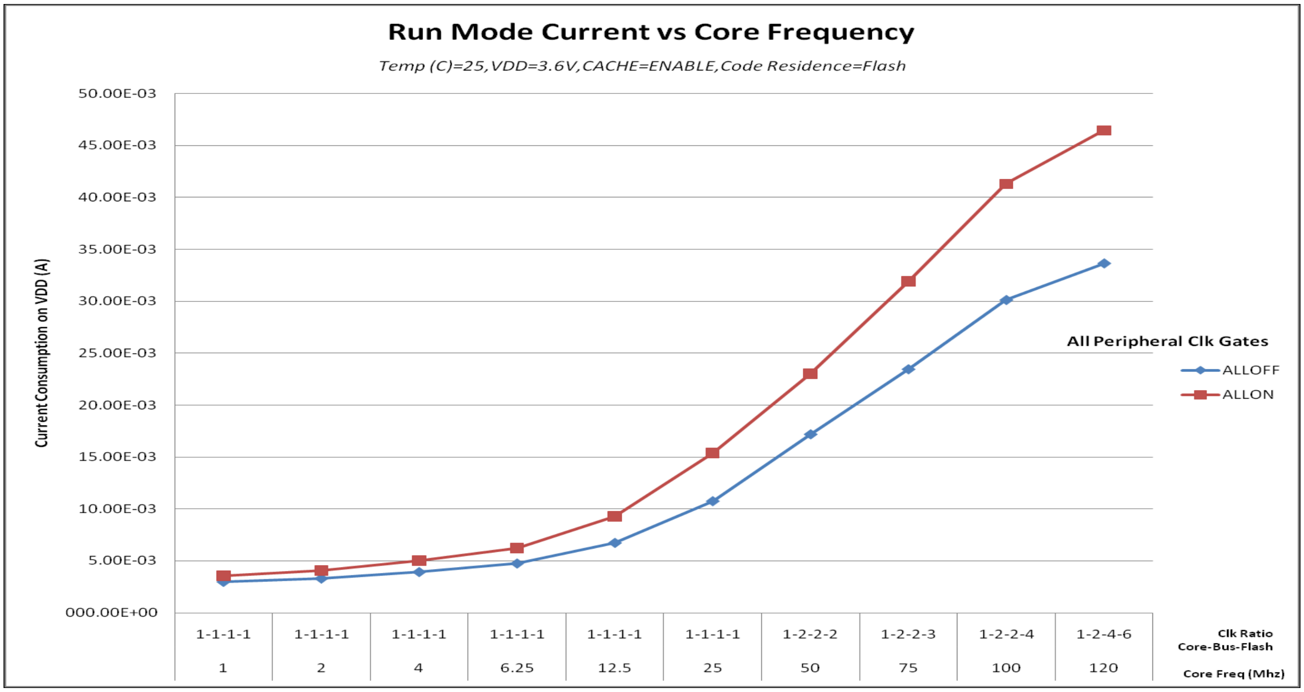

Figure 3. Run mode supply current vs. core frequency

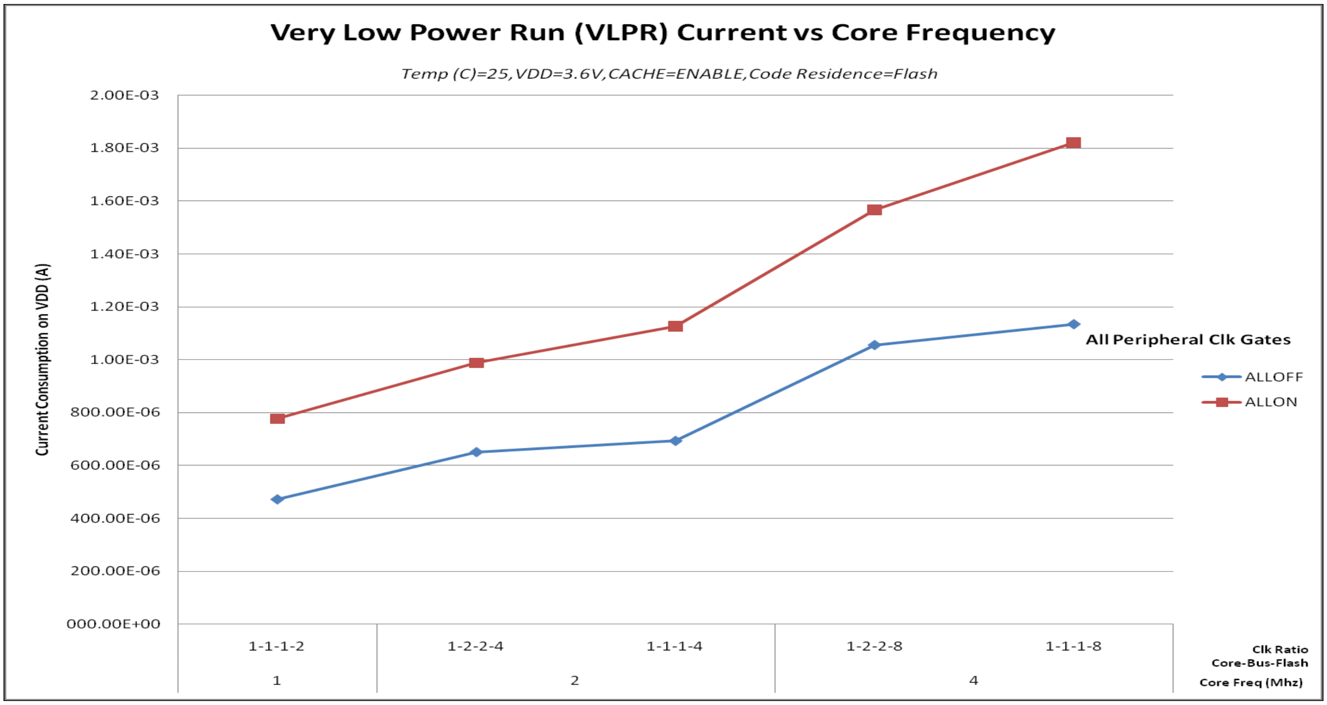

Figure 4. VLPR mode supply current vs. core frequency

2.2.6 EMC radiated emissions operating behaviors

Table 7. EMC radiated emissions operating behaviors

Symbol	Description	Frequency band (MHz)	Typ.	Unit	Notes
V_{RE1}	Radiated emissions voltage, band 1	0.15–50	23	dBμV	1, 2
V_{RE2}	Radiated emissions voltage, band 2	50–150	27	dBμV	
V_{RE3}	Radiated emissions voltage, band 3	150–500	28	dBμV	
V_{RE4}	Radiated emissions voltage, band 4	500–1000	14	dBμV	
V_{RE_IEC}	IEC level	0.15–1000	K	—	2, 3

1. Determined according to IEC Standard 61967-1, *Integrated Circuits - Measurement of Electromagnetic Emissions, 150 kHz to 1 GHz Part 1: General Conditions and Definitions* and IEC Standard 61967-2, *Integrated Circuits - Measurement of Electromagnetic Emissions, 150 kHz to 1 GHz Part 2: Measurement of Radiated Emissions—TEM Cell and Wideband TEM Cell Method*. Measurements were made while the microcontroller was running basic application code.

Table 9. Device clock specifications (continued)

Symbol	Description	Min.	Max.	Unit	Notes
FB_CLK	FlexBus clock	—	4	MHz	
f_{FLASH}	Flash clock	—	0.8	MHz	
f_{ERCLK}	External reference clock	—	16	MHz	
f_{LPTMR_pin}	LPTMR clock	—	25	MHz	
f_{LPTMR_ERCLK}	LPTMR external reference clock	—	16	MHz	
$f_{FlexCAN\_ERCLK}$	FlexCAN external reference clock	—	8	MHz	
f_{I2S_MCLK}	I2S master clock	—	12.5	MHz	
f_{I2S_BCLK}	I2S bit clock	—	4	MHz	

1. The frequency limitations in VLPR mode here override any frequency specification listed in the timing specification for any other module.

2.3.2 General switching specifications

These general purpose specifications apply to all pins configured for:

- GPIO signaling
- Other peripheral module signaling not explicitly stated elsewhere

Table 10. General switching specifications

Symbol	Description	Min.	Max.	Unit	Notes
	GPIO pin interrupt pulse width (digital glitch filter disabled) — Synchronous path	1.5	—	Bus clock cycles	1, 2
	GPIO pin interrupt pulse width (digital glitch filter disabled, analog filter enabled) — Asynchronous path	100	—	ns	3
	GPIO pin interrupt pulse width (digital glitch filter disabled, analog filter disabled) — Asynchronous path	16	—	ns	3
	External reset pulse width (digital glitch filter disabled)	100	—	ns	3
	Mode select ($\overline{\text{EZP\_CS}}$) hold time after reset deassertion	2	—	Bus clock cycles	
	Port rise and fall time (high drive strength)				4
	• Slew disabled				
	• $1.71 \le V_{DD} \le 2.7V$	—	12	ns	
	• $2.7 \le V_{DD} \le 3.6V$	—	6	ns	
	• Slew enabled				
	• $1.71 \le V_{DD} \le 2.7V$	—	36	ns	
	• $2.7 \le V_{DD} \le 3.6V$	—	24	ns	
	Port rise and fall time (low drive strength)				5
	• Slew disabled				

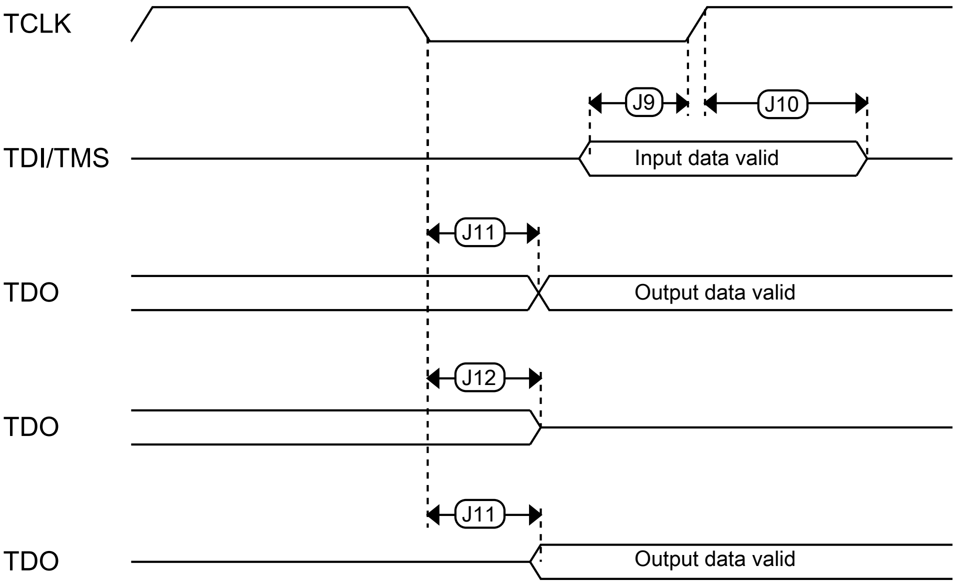

Figure 9. Test Access Port timing

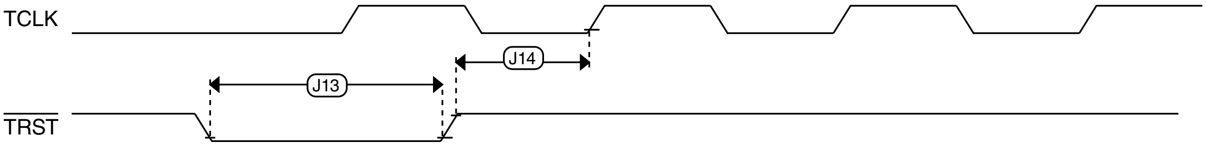

Figure 10. $\overline{\text{TRST}}$ timing

3.2 System modules

There are no specifications necessary for the device's system modules.

3.3 Clock modules

3.3.2 Oscillator electrical specifications

3.3.2.1 Oscillator DC electrical specifications

Table 16. Oscillator DC electrical specifications

Symbol	Description	Min.	Typ.	Max.	Unit	Notes
V_{DD}	Supply voltage	1.71	—	3.6	V	
I_{DDOSC}	Supply current — low-power mode (HGO=0)					1
	• 32 kHz	—	600	—	nA	
	• 4 MHz	—	200	—	μA	
	• 8 MHz (RANGE=01)	—	300	—	μA	
	• 16 MHz	—	950	—	μA	
	• 24 MHz	—	1.2	—	mA	
	• 32 MHz	—	1.5	—	mA	
I_{DDOSC}	Supply current — high gain mode (HGO=1)					1
	• 32 kHz	—	7.5	—	μA	
	• 4 MHz	—	500	—	μA	
	• 8 MHz (RANGE=01)	—	650	—	μA	
	• 16 MHz	—	2.5	—	mA	
	• 24 MHz	—	3.25	—	mA	
	• 32 MHz	—	4	—	mA	
C_x	EXTAL load capacitance	—	—	—		2, 3
C_y	XTAL load capacitance	—	—	—		2, 3
R_F	Feedback resistor — low-frequency, low-power mode (HGO=0)	—	—	—	MΩ	2, 4
	Feedback resistor — low-frequency, high-gain mode (HGO=1)	—	10	—	MΩ	
	Feedback resistor — high-frequency, low-power mode (HGO=0)	—	—	—	MΩ	
	Feedback resistor — high-frequency, high-gain mode (HGO=1)	—	1	—	MΩ	
R_S	Series resistor — low-frequency, low-power mode (HGO=0)	—	—	—	kΩ	
	Series resistor — low-frequency, high-gain mode (HGO=1)	—	200	—	kΩ	
	Series resistor — high-frequency, low-power mode (HGO=0)	—	—	—	kΩ	
	Series resistor — high-frequency, high-gain mode (HGO=1)					

Table continues on the next page...

3.4.1 Flash (FTFE) electrical specifications

This section describes the electrical characteristics of the FTFE module.

3.4.1.1 Flash timing specifications — program and erase

The following specifications represent the amount of time the internal charge pumps are active and do not include command overhead.

Table 20. NVM program/erase timing specifications

Symbol	Description	Min.	Typ.	Max.	Unit	Notes
t_{hvpgm8}	Program Phrase high-voltage time	—	7.5	18	μs	
$t_{hversscr}$	Erase Flash Sector high-voltage time	—	13	113	ms	1
$t_{hversblk128k}$	Erase Flash Block high-voltage time for 128 KB	—	104	904	ms	1
$t_{hversblk512k}$	Erase Flash Block high-voltage time for 512 KB	—	416	3616	ms	1

1. Maximum time based on expectations at cycling end-of-life.

3.4.1.2 Flash timing specifications — commands

Table 21. Flash command timing specifications

Symbol	Description	Min.	Typ.	Max.	Unit	Notes
	Read 1s Block execution time					
$t_{rd1blk128k}$	• 128 KB data flash	—	—	0.5	ms	
$t_{rd1blk512k}$	• 512 KB program flash	—	—	1.8	ms	
$t_{rd1sec4k}$	Read 1s Section execution time (4 KB flash)	—	—	100	μs	1
t_{pgmchk}	Program Check execution time	—	—	95	μs	1
t_{rdrsrc}	Read Resource execution time	—	—	40	μs	1
t_{pgm8}	Program Phrase execution time	—	90	150	μs	
	Erase Flash Block execution time					2
$t_{ersblk128k}$	• 128 KB data flash	—	110	925	ms	
$t_{ersblk512k}$	• 512 KB program flash	—	435	3700	ms	
t_{ersscr}	Erase Flash Sector execution time	—	15	115	ms	2
$t_{pgmsec1k}$	Program Section execution time (1KB flash)	—	5	—	ms	
	Read 1s All Blocks execution time					
$t_{rd1allx}$	• FlexNVM devices	—	—	2.2	ms	
t_{rdonce}	Read Once execution time	—	—	30	μs	1
$t_{pgmonce}$	Program Once execution time	—	90	—	μs	
t_{ersall}	Erase All Blocks execution time	—	870	7400	ms	2
t_{vfykey}	Verify Backdoor Access Key execution time	—	—	30	μs	1

Table continues on the next page...

2. Specification is valid for all FB_AD[31:0] and $\overline{\text{FB\_TA}}$.

Table 26. Flexbus full voltage range switching specifications

Num	Description	Min.	Max.	Unit	Notes
	Operating voltage	1.71	3.6	V	
	Frequency of operation	—	FB_CLK	MHz	
FB1	Clock period	1/FB_CLK	—	ns	
FB2	Address, data, and control output valid	—	13.5	ns	1
FB3	Address, data, and control output hold	0	—	ns	1
FB4	Data and $\overline{\text{FB\_TA}}$ input setup	13.7	—	ns	2
FB5	Data and $\overline{\text{FB\_TA}}$ input hold	0.5	—	ns	2

1. Specification is valid for all FB_AD[31:0], $\overline{\text{FB\_BE/BWE}n}$, $\overline{\text{FB\_CS}n}$, $\overline{\text{FB\_OE}}$, FB_R/$\overline{\text{W}}$,$\overline{\text{FB\_TBST}}$, FB_TSIZ[1:0], FB_ALE, and $\overline{\text{FB\_TS}}$.
2. Specification is valid for all FB_AD[31:0] and $\overline{\text{FB\_TA}}$.

6. V_{DDA} = 3.0 V, reference select set for V_{DDA} (DACx_CO:DACRFS = 1), high power mode (DACx_C0:LPEN = 0), DAC set to 0x800, temperature range is across the full range of the device

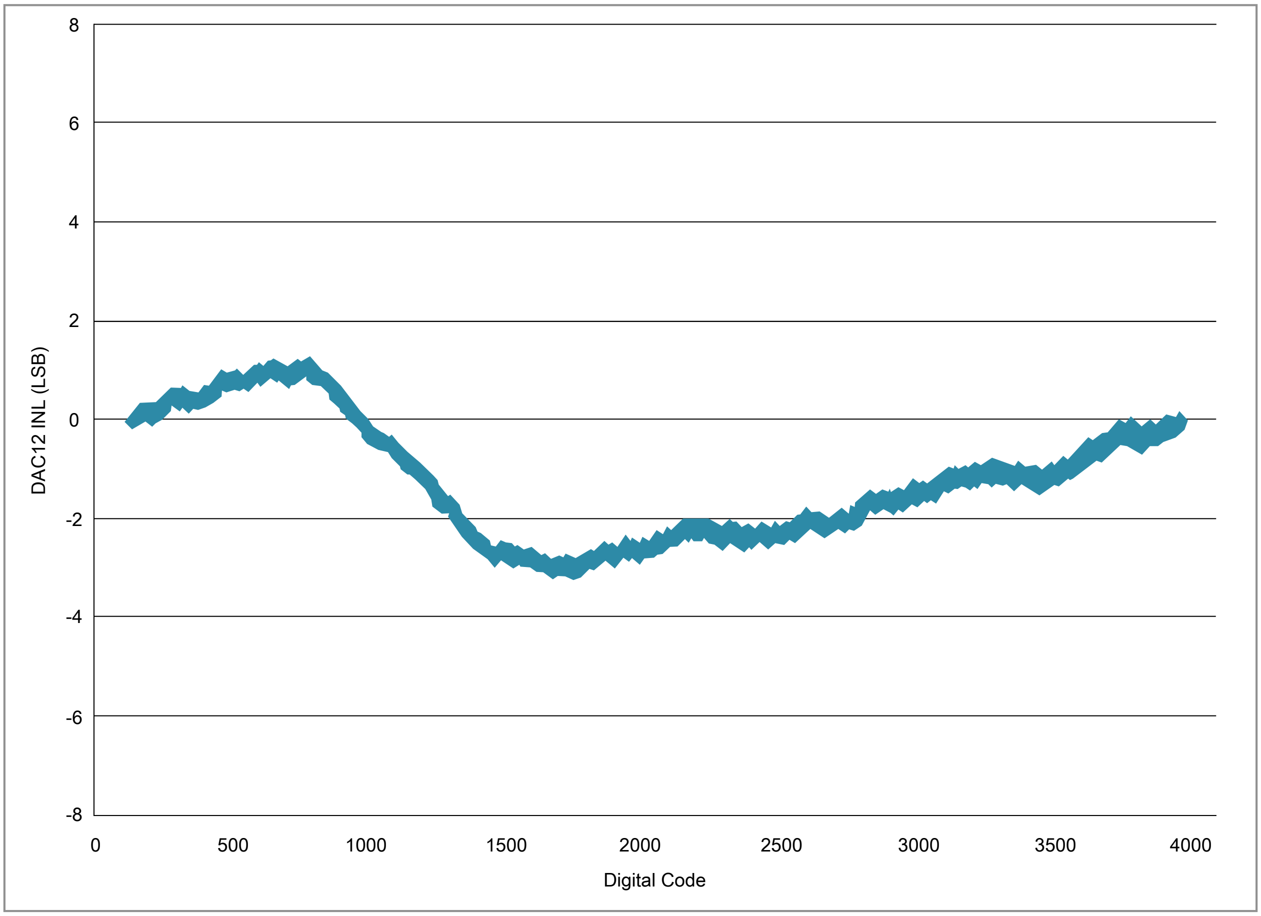

Figure 20. Typical INL error vs. digital code

Table 33. VREF full-range operating behaviors

Symbol	Description	Min.	Typ.	Max.	Unit	Notes
V_{out}	Voltage reference output with factory trim at nominal V_{DDA} and temperature=25C	1.1915	1.195	1.1977	V	1
V_{out}	Voltage reference output — factory trim	1.1584	—	1.2376	V	1
V_{out}	Voltage reference output — user trim	1.193	—	1.197	V	1
V_{step}	Voltage reference trim step	—	0.5	—	mV	1
V_{tdrift}	Temperature drift (Vmax -Vmin across the full temperature range)	—	—	80	mV	1
I_{bg}	Bandgap only current	—	—	80	µA	1
ΔV_{LOAD}	Load regulation				µV	1, 2
	• current = ± 1.0 mA	—	200	—		
T_{stup}	Buffer startup time	—	—	100	µs	—
V_{vdrift}	Voltage drift (Vmax -Vmin across the full voltage range)	—	2	—	mV	1

1. See the chip's Reference Manual for the appropriate settings of the VREF Status and Control register.
2. Load regulation voltage is the difference between the VREF_OUT voltage with no load vs. voltage with defined load

Table 34. VREF limited-range operating requirements

Symbol	Description	Min.	Max.	Unit	Notes
T_A	Temperature	0	50	°C	—

Table 35. VREF limited-range operating behaviors

Symbol	Description	Min.	Max.	Unit	Notes
V_{out}	Voltage reference output with factory trim	1.173	1.225	V	—

3.7 Timers

See General switching specifications.

3.8 Communication interfaces

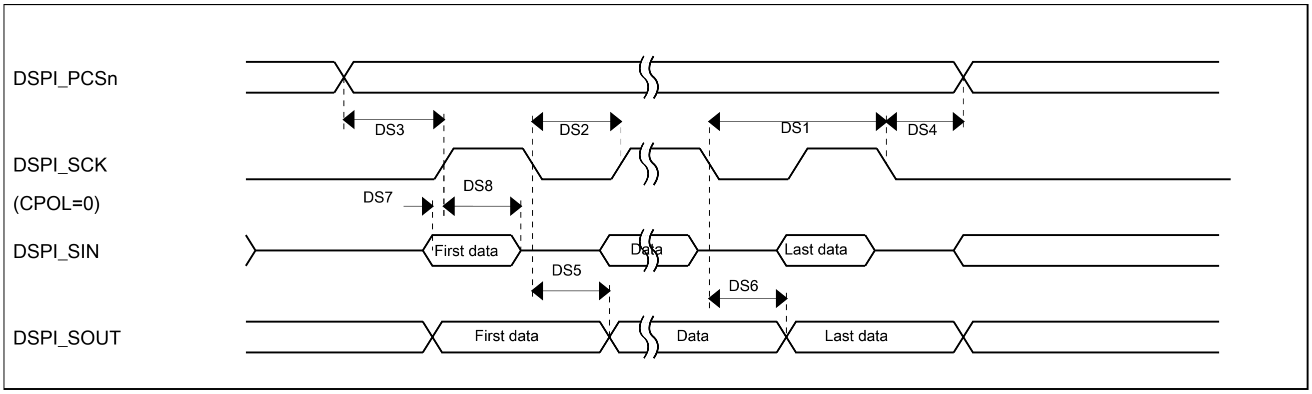

Figure 24. DSPI classic SPI timing — master mode

Table 41. Slave mode DSPI timing (full voltage range)

Num	Description	Min.	Max.	Unit
	Operating voltage	1.71	3.6	V
	Frequency of operation	—	7.5	MHz
DS9	DSPI_SCK input cycle time	8 x t_{BUS}	—	ns
DS10	DSPI_SCK input high/low time	(t_{SCK}/2) - 4	($t_{SCK/2)}$ + 4	ns
DS11	DSPI_SCK to DSPI_SOUT valid	—	20	ns
DS12	DSPI_SCK to DSPI_SOUT invalid	0	—	ns
DS13	DSPI_SIN to DSPI_SCK input setup	2	—	ns
DS14	DSPI_SCK to DSPI_SIN input hold	7	—	ns
DS15	$\overline{\text{DSPI\_SS}}$ active to DSPI_SOUT driven	—	19	ns
DS16	$\overline{\text{DSPI\_SS}}$ inactive to DSPI_SOUT not driven	—	19	ns

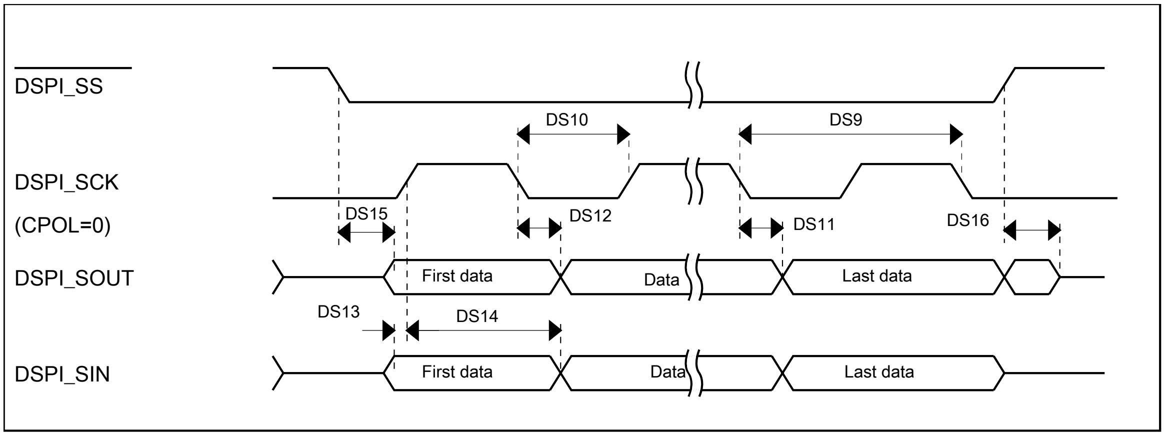

Figure 25. DSPI classic SPI timing — slave mode

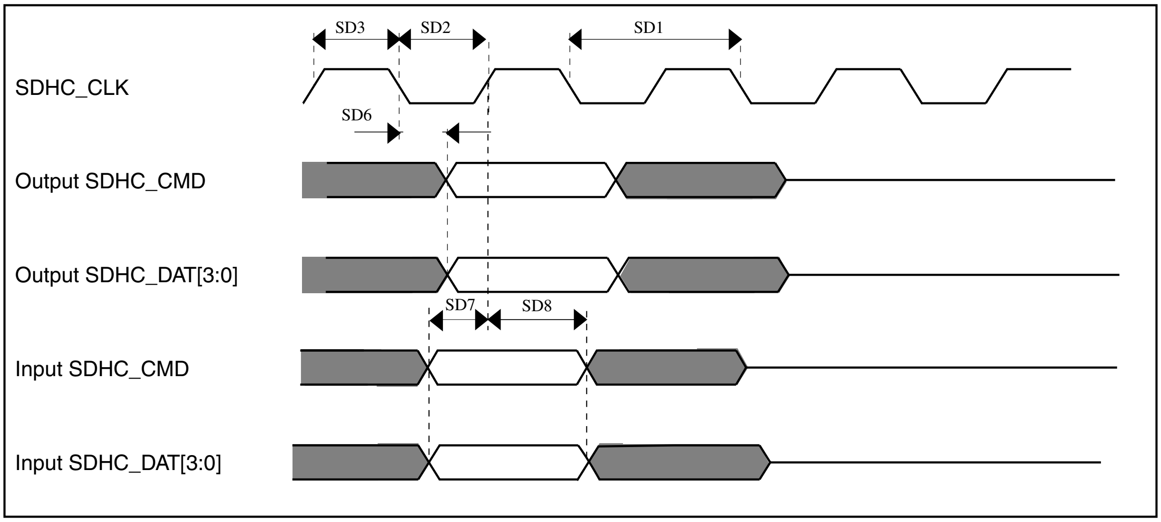

Figure 26. SDHC timing

3.8.10 I²S switching specifications

This section provides the AC timings for the I²S in master (clocks driven) and slave modes (clocks input). All timings are given for non-inverted serial clock polarity (TCR[TSCKP] = 0, RCR[RSCKP] = 0) and a non-inverted frame sync (TCR[TFSI] = 0, RCR[RFSI] = 0). If the polarity of the clock and/or the frame sync have been inverted, all the timings remain valid by inverting the clock signal (I2S_BCLK) and/or the frame sync (I2S_FS) shown in the figures below.

Table 43. I²S master mode timing

Num	Description	Min.	Max.	Unit
	Operating voltage	2.7	3.6	V
S1	I2S_MCLK cycle time	40	—	ns
S2	I2S_MCLK pulse width high/low	45%	55%	MCLK period
S3	I2S_BCLK cycle time	80	—	ns
S4	I2S_BCLK pulse width high/low	45%	55%	BCLK period
S5	I2S_BCLK to I2S_FS output valid	—	15	ns
S6	I2S_BCLK to I2S_FS output invalid	0	—	ns
S7	I2S_BCLK to I2S_TXD valid	—	15	ns
S8	I2S_BCLK to I2S_TXD invalid	0	—	ns
S9	I2S_RXD/I2S_FS input setup before I2S_BCLK	15	—	ns
S10	I2S_RXD/I2S_FS input hold after I2S_BCLK	0	—	ns

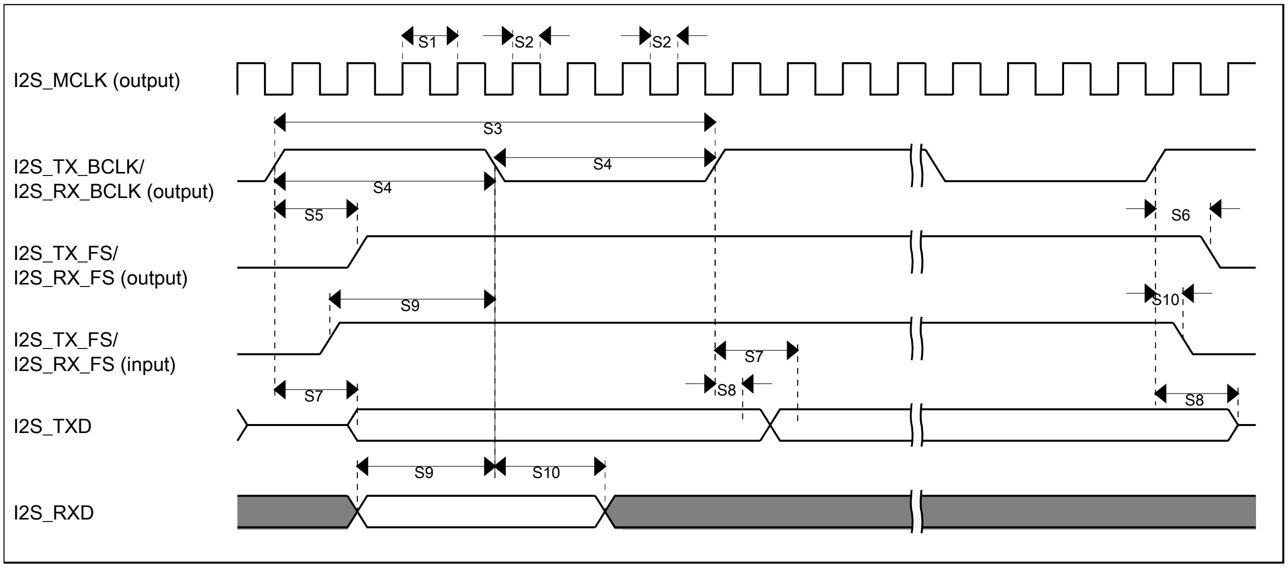

Figure 31. I2S/SAI timing — master modes

Table 48. I2S/SAI slave mode timing in VLPR, VLPW, and VLPS modes (full voltage range)

Num.	Characteristic	Min.	Max.	Unit
	Operating voltage	1.71	3.6	V
S11	I2S_TX_BCLK/I2S_RX_BCLK cycle time (input)	250	—	ns
S12	I2S_TX_BCLK/I2S_RX_BCLK pulse width high/low (input)	45%	55%	MCLK period
S13	I2S_TX_FS/I2S_RX_FS input setup before I2S_TX_BCLK/I2S_RX_BCLK	30	—	ns
S14	I2S_TX_FS/I2S_RX_FS input hold after I2S_TX_BCLK/I2S_RX_BCLK		—	ns
S15	I2S_TX_BCLK to I2S_TXD/I2S_TX_FS output valid	—		ns
S16	I2S_TX_BCLK to I2S_TXD/I2S_TX_FS output invalid	0	—	ns
S17	I2S_RXD setup before I2S_RX_BCLK	30	—	ns
S18	I2S_RXD hold after I2S_RX_BCLK		—	ns
S19	I2S_TX_FS input assertion to I2S_TXD output valid[1]	—	72	ns

[1] Applies to first bit in each frame and only if the TCR4[FSE] bit is clear

Field	Description	Values
Q	Qualification status	- M = Fully qualified, general market flow - P = Prequalification
K##	Kinetis family	- K22
A	Key attribute	- D = Cortex-M4 w/ DSP - F = Cortex-M4 w/ DSP and FPU
M	Flash memory type	- N = Program flash only - X = Program flash and FlexMemory
FFF	Program flash memory size	- 32 = 32 KB - 64 = 64 KB - 128 = 128 KB - 256 = 256 KB - 512 = 512 KB - 1M0 = 1 MB - 2M0 = 2 MB
R	Silicon revision	- Z = Initial - (Blank) = Main - A = Revision after main
T	Temperature range (°C)	- V = –40 to 105 - C = –40 to 85
PP	Package identifier	- FM = 32 QFN (5 mm x 5 mm) - FT = 48 QFN (7 mm x 7 mm) - LF = 48 LQFP (7 mm x 7 mm) - LH = 64 LQFP (10 mm x 10 mm) - MP = 64 MAPBGA (5 mm x 5 mm) - LK = 80 LQFP (12 mm x 12 mm) - LL = 100 LQFP (14 mm x 14 mm) - MC = 121 MAPBGA (8 mm x 8 mm) - DC = 121 XFBGA (8 mm x 8 mm x 0.5 mm) - LQ = 144 LQFP (20 mm x 20 mm) - MD = 144 MAPBGA (13 mm x 13 mm)
CC	Maximum CPU frequency (MHz)	- 5 = 50 MHz - 7 = 72 MHz - 10 = 100 MHz - 12 = 120 MHz - 15 = 150 MHz - 16 = 168 MHz - 18 = 180 MHz
N	Packaging type	- R = Tape and reel - (Blank) = Trays

3.8.10.4.4 Example

This is an example part number:

MK22FN1M0VLK10

80 LQFP	Pin Name	Default	ALT0	ALT1	ALT2	ALT3	ALT4	ALT5	ALT6	ALT7	EzPort
58	PTC3/LLWU_P7	CMP1_IN1	CMP1_IN1	PTC3/LLWU_P7	SPI0_PCS1	UART1_RX	FTM0_CH2	CLKOUT	I2S0_TX_BCLK		
59	VSS	VSS	VSS								
60	VDD	VDD	VDD								
61	PTC4/LLWU_P8	DISABLED		PTC4/LLWU_P8	SPI0_PCS0	UART1_TX	FTM0_CH3	FB_AD11	CMP1_OUT		
62	PTC5/LLWU_P9	DISABLED		PTC5/LLWU_P9	SPI0_SCK	LPTMR0_ALT2	I2S0_RXD0	FB_AD10	CMP0_OUT	FTM0_CH2	
63	PTC6/LLWU_P10	CMP0_IN0	CMP0_IN0	PTC6/LLWU_P10	SPI0_SOUT	PDB0_EXTRG	I2S0_RX_BCLK	FB_AD9	I2S0_MCLK		
64	PTC7	CMP0_IN1	CMP0_IN1	PTC7	SPI0_SIN	USB_SOF_OUT	I2S0_RX_FS	FB_AD8			
65	PTC8	ADC1_SE4b/CMP0_IN2	ADC1_SE4b/CMP0_IN2	PTC8		FTM3_CH4	I2S0_MCLK	FB_AD7			
66	PTC9	ADC1_SE5b/CMP0_IN3	ADC1_SE5b/CMP0_IN3	PTC9		FTM3_CH5	I2S0_RX_BCLK	FB_AD6	FTM2_FLT0		
67	PTC10	ADC1_SE6b	ADC1_SE6b	PTC10	I2C1_SCL	FTM3_CH6	I2S0_RX_FS	FB_AD5			
68	PTC11/LLWU_P11	ADC1_SE7b	ADC1_SE7b	PTC11/LLWU_P11	I2C1_SDA	FTM3_CH7	I2S0_RXD1	FB_RW_b			
69	VSS	VSS	VSS								
70	VDD	VDD	VDD								
71	PTC16	DISABLED		PTC16		UART3_RX		FB_CS5_b/FB_TSIZ1/FB_BE23_16_BLS15_8_b			
72	PTC17	DISABLED		PTC17		UART3_TX		FB_CS4_b/FB_TSIZ0/FB_BE31_24_BLS7_0_b			
73	PTD0/LLWU_P12	DISABLED		PTD0/LLWU_P12	SPI0_PCS0	UART2_RTS_b	FTM3_CH0	FB_ALE/FB_CS1_b/FB_TS_b			
74	PTD1	ADC0_SE5b	ADC0_SE5b	PTD1	SPI0_SCK	UART2_CTS_b	FTM3_CH1	FB_CS0_b			
75	PTD2/LLWU_P13	DISABLED		PTD2/LLWU_P13	SPI0_SOUT	UART2_RX	FTM3_CH2	FB_AD4		I2C0_SCL	
76	PTD3	DISABLED		PTD3	SPI0_SIN	UART2_TX	FTM3_CH3	FB_AD3		I2C0_SDA	
77	PTD4/LLWU_P14	DISABLED		PTD4/LLWU_P14	SPI0_PCS1	UART0_RTS_b	FTM0_CH4	FB_AD2	EWM_IN		
78	PTD5	ADC0_SE6b	ADC0_SE6b	PTD5	SPI0_PCS2	UART0_CTS_b	FTM0_CH5	FB_AD1	EWM_OUT_b		
79	PTD6/LLWU_P15	ADC0_SE7b	ADC0_SE7b	PTD6/LLWU_P15	SPI0_PCS3	UART0_RX	FTM0_CH6	FB_AD0	FTM0_FLT0		
80	PTD7	DISABLED		PTD7	CMT_IRO	UART0_TX	FTM0_CH7		FTM0_FLT1		

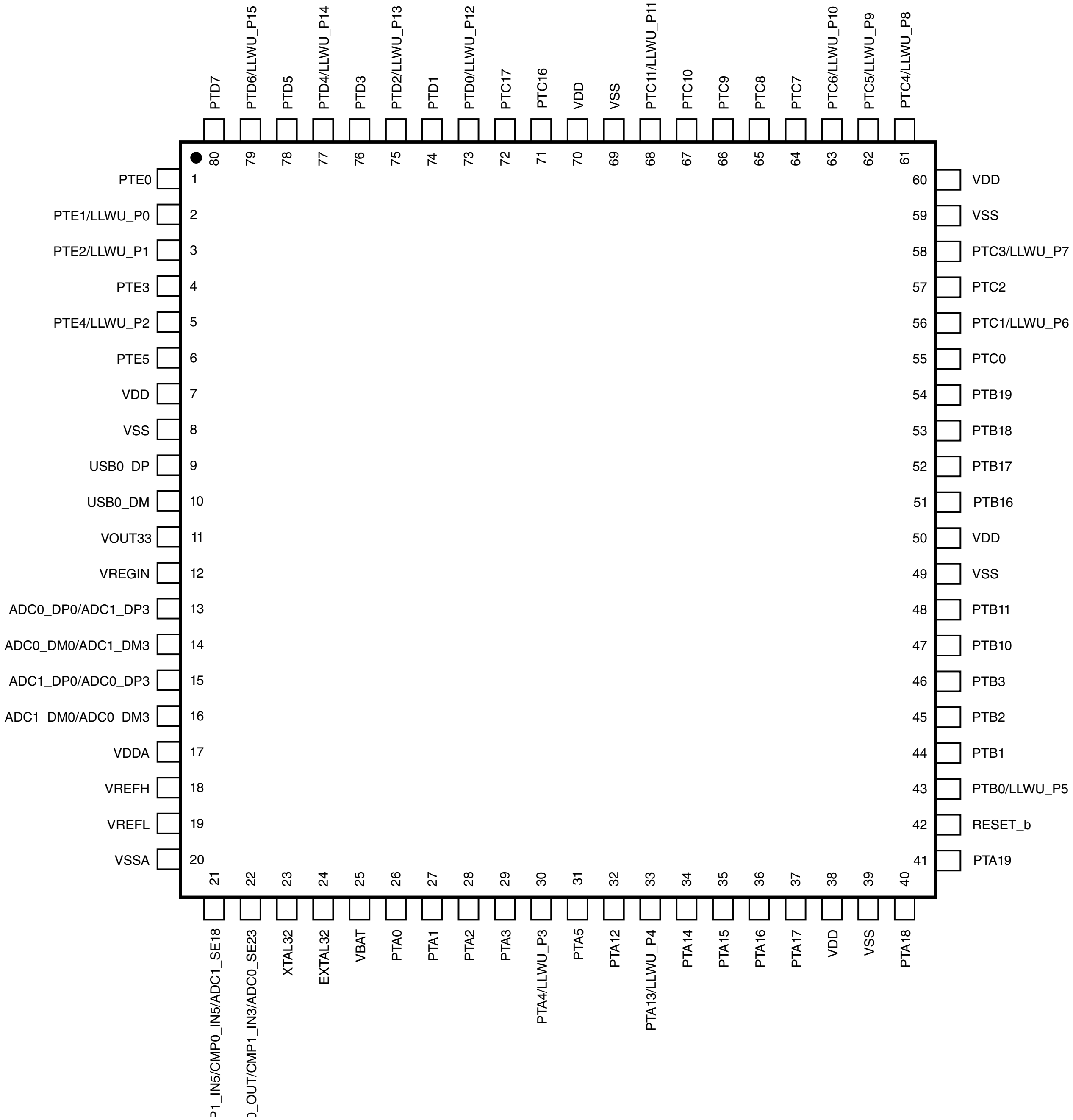

Figure 33. K22 80 LQFP Pinout Diagram

6 Revision History

The following table provides a revision history for this document.

Table 49. Revision History

Rev. No.	Date	Substantial Changes
1	11/2012	Alpha customer release

2	5/2013	• Updated supported part numbers and document number
		• Updated section "Voltage and current operating behaviors"
		• Added the following figures:
		  • Run mode supply current vs. core frequency
		  • VLPR mode supply current vs. core frequency
		• Updated section "Device clock specifications"
		• Updated section "Power consumption operating behaviors"
		• Updated section "Power mode transition operating behaviors"
		• Updated section "JTAG limited voltage range electricals"
		• Updated section "MCG specifications"
		• Updated section "Oscillator DC electrical specifications"
		• Updated section "16-bit ADC operating conditions"
		• Updated the pinouts
		• Added section "Alternate part numbers for small packages"

3	08/2013	• Updated section "Power consumption operating behaviors" • Updated the "Run mode supply current vs. core frequency" figure in section "Diagram: Typical IDD_RUN operating behavior
4	11/2014	• Updated the table "Voltage and current operating behavior" • Format changes

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