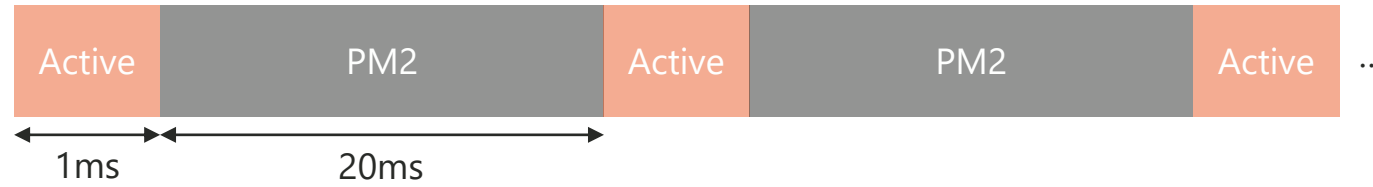


Experiment 1

Internal 32kHz
Enable 32kHz calibration
Active 1ms / PM2 20ms



Problem happens

Experiment 2

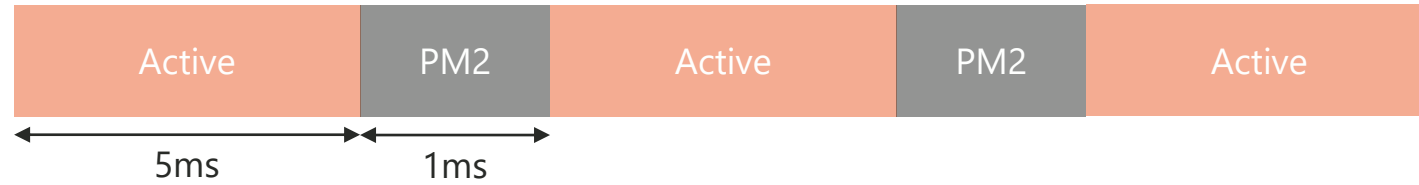
Internal 32kHz
Enable 32kHz calibration
Active 1ms / PM2 1ms



Problem happens
more frequent

Experiment 3

Internal 32kHz
Enable 32kHz calibration
Active 5ms / PM2 1ms



No problem

Experiment 4

Internal 32kHz
Disable 32kHz calibration
Active 1ms / PM2 1ms



No problem

Hypothesis:

Calibration is not completed at Active time, so transition time increases.

Hypothesis:

The above and the guard time (3ms) do not comply with the datasheet, so transition time increases.

Hypothesis:

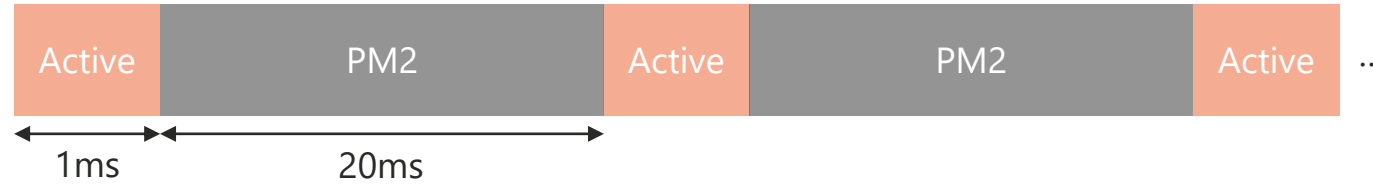
Calibration is completed during Active time because calibration time is typ 3ms.

Hypothesis:

Calibration is not performed, so the transition time is not increased. It works fine.

Experiment 1

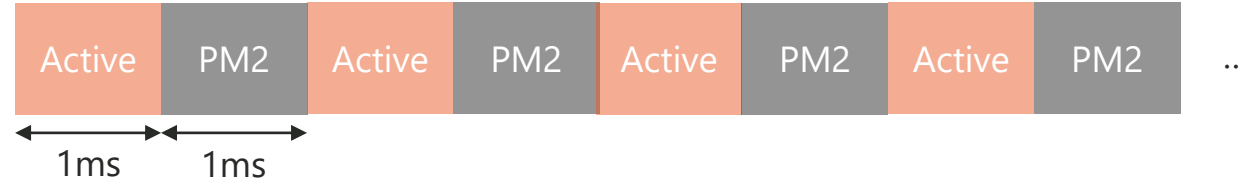
Internal 32kHz
 Enable 32kHz calibration
 Active 1ms / PM2 20ms



Problem happens

Experiment 2

Internal 32kHz
 Enable 32kHz calibration
 Active 1ms / PM2 1ms



Problem happens more frequent

Hypothesis:

Calibration is not completed at Active time, so transition time increases.

Hypothesis:

The above and Guard time (3ms) are not followed, so transition time increases.

If the transition time is increased, interrupt may happen at the "Cannot be interrupted" timing in "Fixed time".

If this happens, the device will miss the compare event and will not wake up from PM2.

Clock was carefully checked, but problems were not found.

If there are any other possible factors, please let me know.

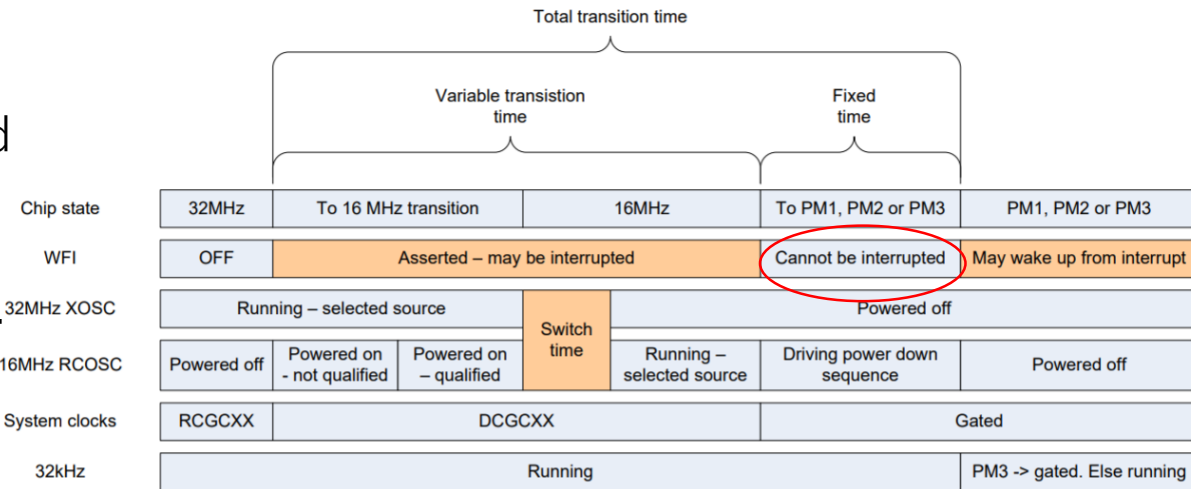


Figure 7-3. Timing Example for Transition from 32 MHz to PM's

5.10 32-kHz RC Oscillator

Measured on TI's CC2538 EM reference design with $T_A = 25^\circ\text{C}$ and $V_{DD} = 3\text{ V}$, unless otherwise noted.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Calibrated frequency ⁽¹⁾			32.753		kHz
Frequency accuracy after calibration			±0.2%		
Temperature coefficient ⁽²⁾			0.4		%/°C
Supply-voltage coefficient ⁽³⁾			3		%/V
Calibration time ⁽⁴⁾			2		ms

5.8 32-MHz Crystal Oscillator

Measured on TI's CC2538 EM reference design with $T_A = 25^\circ\text{C}$ and $V_{DD} = 3\text{ V}$, unless otherwise noted.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Crystal frequency			32		MHz
Crystal frequency accuracy requirement ⁽¹⁾		-40		40	ppm
ESR Equivalent series resistance		6	16	60	Ω
C_0 Crystal shunt capacitance		1	1.9	7	pF
C_L Crystal load capacitance		10	13	16	pF
Start-up time			0.3		ms
Power-down guard time	The crystal oscillator must be in power down for a guard time before using it again. This requirement is valid for all modes of operation. The need for power-down guard time can vary with crystal type and load.	3			ms