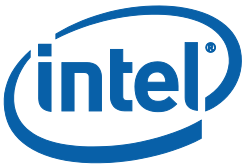

# C-State Test Cases With Intel® SoC Watch

## Server Reference Platform BKC

*May 2020*

**Revision 0.5**

**Intel Confidential**

Document Number: 626226

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# Contents

# Revision History

| Document Number | Revision Number | Description | Date |
|---|---|---|---|
| 626226 | 0.5 | • Initial release of the document. | May 2020 |

# 1 Server Reference Platform BKC C-State Intel® SoC Watch Tests

## 1.1 Test ID : 77682 - G1_PowerManagement_Power_states_socwatch_W

| Field Label | Field Value | Field Label | Field Value |
|---|---|---|---|
| Test Name | G1_PowerManagement_Power_states_socwatch_W | Type | MANUAL |

| Description |
|---|
| **Description:** (Objective of what you are trying to test.)<br>This is a common case template that serves for the other power management domain cases that run on Windows.<br>Do not run this case template directly. This template will be referenced by the other cases that start with prefix "PI_".<br>**Preconditions:** (What conditions must be met or data must exist in the system for this test to be executed?)<br>A server reference platform with up-to-date BKC pacakge should be deployed.<br>**Test Data:** (What test data is required to execute the test case?)<br>**Security:** (List any profiles that will be used to run this test case.)<br>**Downstream Impacts:** (Triggers required or created by the test) |

### 1.1.1 Design Steps

| Step Name | Description | Expected Result |
|---|---|---|
| Step 1 | Power on.<br>Press [F2] to enter into the BIOS configuration interface. | SUT boot up into BIOS config interface successful. |
| Step 2 | Do BIOS configuration (generally C-state, P-state and turbo are default enabled).<br><<<BIOS_Configuration>>> | BIOS setting without error, here is Purley BIOS for reference.<br>[PI_Powermanagement_Cstate_socwatch_L]<br>common = case_common<br>cstate_enable = [ (['EDKII Menu', 'Socket Configuration', 'Advanced Power Management Configuration', 'Package C State Control'], 'Package C State', False → 'Auto'), ] |

| Step Name | Description | Expected Result |
|---|---|---|
| | | cstate_disable = [ (['EDKII Menu', 'Socket Configuration', 'Advanced Power Management Configuration', 'Package C State Control'], 'Package C State', False → 'C0/C1 state') ]<br>cstate_default = [ (['EDKII Menu', 'Socket Configuration', 'Advanced Power Management Configuration', 'Package C State Control'], 'Package C State', False) ]<br><br>[PI_Powermanagement_Turbo_socwatch_L]<br>common = case_common<br>turbo_enable = [ (['EDKII Menu', 'Socket Configuration', 'Advanced Power Management Configuration', 'CPU P State Control'], 'SpeedStep (Pstates)', False → '<Enable>'),<br>(['EDKII Menu', 'Socket Configuration', 'Advanced Power Management Configuration', 'CPU P State Control'], 'P State Domain', False → '<ALL>'),<br>(['EDKII Menu', 'Socket Configuration', 'Advanced Power Management Configuration', 'CPU P State Control'], 'Turbo Mode', False → '<Enable>') ]<br>turbo_disable = [ (['EDKII Menu', 'Socket Configuration', 'Advanced Power Management Configuration', 'CPU P State Control'], 'Turbo Mode', False → '<Disable>') ]<br>turbo_default = [ (['EDKII Menu', 'Socket Configuration', 'Advanced Power Management Configuration', 'CPU P State Control'], 'SpeedStep (Pstates)', False),<br>(['EDKII Menu', 'Socket Configuration', 'Advanced Power Management Configuration', 'CPU P State Control'], 'P State Domain', False) ] |
| Step 3 | Reboot and Enter into OS. | No MCE or OS error. |
| Step 4 | Download the latest Intel SoC Watch.<br>Power on and install Intel SoC Watch on SUT follow the Intel SoC Watch release notes.<br>Currently all the sever reference platforms are supported. | Power on and install without any issue. |
| Step 5 | Wait time <<<Idle_time>>> | Wait time idle without error |

| Step Name | Description | Expected Result |
|---|---|---|
| Step 6 | <<<Workload_time>>><br>Run different workload on different platforms according to the test case. Be aware that there is no need to run any workload when do idle test.<br><br>Stress the SUT by runner.<br># run-threadrunner -s 13 -t 0:Runner_Run_Time:0<br>a. For turbo test, parameter "-s 1" for turbo workload.<br>b. For C-state or P-state test, parameter "-s 13" for normal workload. | Runner can be kicked off and run Runner_run_time successfully, run threadrunner without any issue. |
| Step 7 | Kick off Intel SoC Watch some time to collect data command :<br>C:\> socwatch -m -f cpu-cstate -f cpu-pstate -t <<<Socwatch_run_time>>><br>For ex.<br>"c:\> socwatch -m -f cpu-cstate -f cpu-pstate -t 60" means collect data 1min | The program is run and system information has no error.<br>Generates the result :SoCWatchOutput.csv, SoCWatchOutput.sw2 |
| Step 8 | After Intel SoC Watch stopped (socwatch_run_time).<br>Check CC-state and PC-state residency in the SoCWatchOutput.csv<br><<<Check_Power_States>>> | For turbo:The CPU max. frequecy in P0 must turbo.<br>For C-state, CCstate and PCstate residency must meet design guide.<br>For P-state, P-state must cover all P-states in design guide.<br>The validation owner checks with the platform power and performance architect to know the target for each project. |

## 1.2 Test ID : 77681 - G1_PowerManagement_Power_States_socwatch_L

| Field Label | Field Value | Field Label | Field Value |
|---|---|---|---|
| Test Name | G1_PowerManagement_Power_States_socwatch_L | Type | MANUAL |

| Description |
|---|
| **Description:** *(Objective of what you are trying to test.)*<br>This is a common case template that serves for the other power management domain cases that run on Linux*. |

| Description |
|---|
| Do not run this case template directly. This template will be referenced by the other cases that start with prefix "PI_".<br>**Preconditions:** *(What conditions must be met or data must exist in the system for this test to be executed?)*<br>A server reference platform with an up-to-date BKC pacakge to be deployed.<br>**Test Data:** *(What test data is required to execute the test case?)*<br>**Security:** *(List any profiles that will be used to run this test case.)*<br>**Downstream Impacts:** *(Triggers required or created by test)* |

### 1.2.1 Design Steps

| Step Name | Description | Expected Result |
|---|---|---|
| Step 1 | Power on.<br>Press [F2] to enter into the BIOS configuration interface. | SUT boot up into BIOS config interface successful. |
| Step 2 | BIOS_Configuration<br><<<BIOS_Configuration>>> | BIOS setting without error. Here is Purley BIOS for reference.<br>[PI_Powermanagement_Cstate_socwatch_L]<br>common = case_common<br>cstate_enable =<br>[ ([r'EDKII Menu', r'Socket Configuration', r'Advanced Power Management Configuration', r'Package C State Control'], r'Package C State', False, 'Auto'), ]<br>cstate_disable =<br>[ ([r'EDKII Menu', r'Socket Configuration', r'Advanced Power Management Configuration', r'Package C State Control'], r'Package C State', False, 'C0/C1 state') ]<br>cstate_default =<br>[ ([r'EDKII Menu', r'Socket Configuration', r'Advanced Power Management Configuration', r'Package C State Control'], r'Package C State', False) ]<br>[PI_Powermanagement_Turbo_socwatch_L]<br>common = case_common<br>turbo_enable =<br>[ ([r'EDKII Menu', r'Socket Configuration', r'Advanced Power Management Configuration', r'CPU P State Control'], r'SpeedStep (Pstates)', False, '<Enable>'),<br>([r'EDKII Menu', r'Socket Configuration', r'Advanced Power Management Configuration', r'CPU P State Control'], r'P State Domain', False, '<ALL>'), |

| Step Name | Description | Expected Result |
|---|---|---|
| | | ([r'EDKII Menu', r'Socket Configuration', r'Advanced Power Management Configuration', r'CPU P State Control'], r'Turbo Mode', False, '<Enable>') ]<br>turbo_disable =<br>[ ([r'EDKII Menu', r'Socket Configuration', r'Advanced Power Management Configuration', r'CPU P State Control'], r'Turbo Mode', False, '<Disable>')<br>turbo_default =<br>[ ([r'EDKII Menu', r'Socket Configuration', r'Advanced Power Management Configuration', r'CPU P State Control'], r'SpeedStep (Pstates)', False),<br>([r'EDKII Menu', r'Socket Configuration', r'Advanced Power Management Configuration', r'CPU P State Control'], r'P State Domain', False) ] |
| Step 3 | Reset and boot into Linux OS | There is no MCE or OS error. |
| Step 4 | Download the latest Intel SoC Watch for Linux.<br>Install Intel SoC Watch on SUT follow the Intel SoC Watch user guide.<br>Currently all the server reference platforms are supported. | Power on and install without any issue. |
| Step 5 | Download and install the latest runner tool. | Install without error. |
| Step 6 | keep system idle stable and wait Wait_time<br><<<Wait_Time>>> | System idle without issue |
| Step 7 | <<<Workload_Time>>><br>Run different workload on different platforms according to the test case, PLS be aware that, no need to run any workload for idle test.<br>Stress the SUT by runner tool:<br># run-threadrunner -s 13 -t 0:Runner_Run_Time:0<br>a. For turbo test, parameter "-s 1" for turbo workload<br>b. For C-state or P-state test, parameter "-s 13" for normal workload | Run threadrunner without any issue; in Whitley and following Ice Lake projects, using burn-in or prime95 instead. |
| Step 9 | Waiting until the Intel SoC Watch stop collecting data (socwatch_run_time).<br><br>Check the SoCWatchOutput.csv | For turbo:The CPU max. frequecy in P0 must turbo,<br>For C-state, CCstate and PCstate must meet design guide. |

| Step Name | Description | Expected Result |
|---|---|---|
| | <<<Check_Status>>> | For P-state, Pstate must cover all P-state in design guide.<br>Validation owner to set the target for each project. |
| Step 8 | Run the collect data command:<br># ./socwatch -m -f cpu-cstate -f cpu-pstate -t socwatch_run_time<br><<<socwatch_run_time>>> | Kicked off Intel SoC Watch after runner kicked off and running stable. If burning test is not needed in idle test, can kick off Intel SoC Watch after wait_time idle time.<br>It will generates the result: SoCWatchOutput.csv, S oCWatchOutput.sw2s |

## 1.3 Test ID : 77680 - PI_PowerManagement_Power_PC6_Enable_Stress_W

| Field Label | Field Value | Field Label | Field Value |
|---|---|---|---|
| Test Name | PI_PowerManagement_Power_PC6_Enable_Stress_W | Type | MANUAL |

### 1.3.1 Design Steps

| Step Name | Description | Expected Result |
|---|---|---|
| Call <G1_PowerManagement_Power_states_socwatch_W> | Call <G1_PowerManagement_Power_states_socwatch_W> with the following parameters:<br>BIOS_Configuration = Package C6 enable, Check_Power_States = Check HW PC6, HW CC6, OS PC6, OS CC6,<br>Idle_time = 0 Min,<br>socwatch_run_time = 300 second , Workload_time = 0:10:0 (10min) | HW PC6 residency ~= 0%<br>HW PC0 residency ~= 100%<br>OS PC6 residency ~= 0%<br>OS PC0 residency ~= 100% |

## 1.4 Test ID : 77679 - PI_PowerManagement_Power_PC6_Enable_Idle_W

### 1.4.1 Design Steps

| Step Name | Description | Expected Result |
|---|---|---|
| Call <G1_PowerManagement_Power_states_socwatch_W> | Call <G1_PowerManagement_Power_states_socwatch_W> with the following parameters:<br>BIOS_Configuration = Enable Package C6, Check_Power_States = Check HW Package C6, OS Package C6,<br>Idle_time = 1 Min,<br>socwatch_run_time = 300 second, Workload_time = 0 Min | HW PC6 residency > 80%<br>OS PC6 residency > 85%<br>HW CC6 residency > 90%<br>OS CC6 residency > 90% |

## 1.5 Test ID : 77678 - PI_PowerManagement_Power_Cstate_Disable_socwatch_W

| Field Label | Field Value | Field Label | Field Value |
|---|---|---|---|
| Test Name | PI_PowerManagement_Power_Cstate_Disable_socwatch_W | Type | MANUAL |

### 1.5.1 Design Steps

| Step Name | Description | Expected Result |
|---|---|---|
| Call <G1_PowerManagement_Power_states_socwatch_W> | Call case template <G1_PowerManagement_Power_states_socwatch_W> with the following parameters:<br>BIOS_Configuration = Disable PC6, by browsing BIOS settings in ['EDKII Menu', 'Socket Configuration', 'Advanced Power Management Configuration', 'Package C State Control'], change 'Package C State' to 'C0/C1 State',<br>Check_Power_States = PC6 residency = 0, Idle_time = 5 min,<br>socwatch_run_time = 5 min, Workload_time = 0 min | Package C6 residency = 0%<br>CC6 Residency > 80% |

## 1.6 Test ID : 77676 - PI_PowerManagement_Power_Cstate_Enable_socwatch_W

| Field Label | Field Value | Field Label | Field Value |
|---|---|---|---|
| Test Name | PI_PowerManagement_Power_Cstate_Enable_socwatch_W | Type | MANUAL |

### 1.6.1 Design Steps

| Step Name | Description | Expected Result |
|---|---|---|
| Call <G1_PowerManagement_Power_states_socwatch_W> | Call <G1_PowerManagement_Power_states_socwatch_W> with the following parameters:<br>BIOS_Configuration = enable_cstate, default setting ,<br>Check_Power_States = Cx residency > 0 PC x residency > 0,<br>Idle_time = 5 min,<br>socwatch_run_time = 600 seconds, Workload_time = 5 min | HW Core C6 in design guide residency > 50%<br>OS Core C6 in design guide residency > 50% |

## 1.7 Test ID : 77675 - PI_Powermanagement_PC6_Enable_Stress_socwatch_L

### 1.7.1 Design Steps

| Step Name | Description | Expected Result |
|---|---|---|
| Call <G1_PowerManagement_Power_States_socwatch_L> | Call <G1_PowerManagement_Power_States_socwatch_L> with the following parameters:<br>BIOS_Configuration = enable c-state enable p-state,<br>socwatch_run_time = 5 minutes,<br>Wait_Time = 1 minutes,<br>Workload_Time = 6 minutes | check_status =<br>HW PC6 residency ~= 0%<br>HW PC0 residency ~= 100%<br>OS PC6 residency ~= 0%<br>OS PC0 residency ~= 100% |

## 1.8 Test ID : 77674 - PI_Powermanagement_PC6_Enable_Idle_socwatch_L

| Field Label | Field Value | Field Label | Field Value |
|---|---|---|---|
| Test Name | PI_Powermanagement_PC6_Enable_Idle_socwatch_L | Type | MANUAL |

### 1.8.1 Design Steps

| Step Name | Description | Expected Result |
|---|---|---|
| Call <G1_PowerManagement_Power_States_socwatch_L> | Call <G1_PowerManagement_Power_States_socwatch_L> with the following parameters:<br>BIOS_Configuration = Cstate_enable,<br>socwatch_run_time = 5 minutes,<br>Wait_Time = 1 minute,<br>Workload_Time = 0 minute,<br>check_status = HW PC6 residency > 80%<br>OS PC6 residency > 80%<br>HW CC6 residency > 90%<br>OS CC6 residency > 90% | HW PC6 residency > 80%<br>OS PC6 residency > 80%<br>HW CC6 residency > 90%<br>OS CC6 residency > 90% |

## 1.9 Test ID : 77672 - PI_Powermanagement_Power_Cstate_Disable_socwatch_L

| Field Label | Field Value | Field Label | Field Value |
|---|---|---|---|
| Test Name | PI_Powermanagement_Power_Cstate_Disable_socwatch_L | Type | MANUAL |

### 1.9.1 Design Steps

| Step Name | Description | Expected Result |
|---|---|---|
| Call <G1_PowerManagement_Power_States_socwatch_L> | Call <G1_PowerManagement_Power_States_socwatch_L> with the following parameters: | PC6 residency = 0%<br>CC6 Residency > 80% |

| Step Name | Description | Expected Result |
|---|---|---|
| | BIOS_Configuration = Disable PC6, by browsing BIOS settings in ['EDKII Menu', 'Socket Configuration', 'Advanced Power Management Configuration', 'Package C State Control'], change 'Package C State' to 'C0/C1 State',<br>socwatch_run_time = 10 min,<br>Wait_Time = 5 min,<br>Workload_Time = 5 min,<br>check_status = PC6 residency | |

## 1.10 Test ID : 77671 - PI_Powermanagement_Power_Cstate_Enable_socwatch_L

| Field Label | Field Value | Field Label | Field Value |
|---|---|---|---|
| Test Name | PI_Powermanagement_Power_Cstate_Enable_socwatch_L | Type | MANUAL |

### 1.10.1 Design Steps

| Step Name | Description | Expected Result |
|---|---|---|
| Call <G1_PowerManagement_Power_States_socwatch_L> | Call <G1_PowerManagement_Power_States_socwatch_L> with the following parameters:<br>BIOS_Configuration = By default,<br>socwatch_run_time = 10 min,<br>Wait_Time = 5 min,<br>Workload_Time = 5 min,<br>check_status = C-Cstates and P-Cstates residency | Run low workload(not full loading)<br>C-Cstates C1 residency >0%<br>C-Cstates C6 residency >0%<br>P-Cstates C1 residency > 0%<br>P-Cstates C6 residency > 0% |

## 1.11 Test ID : 77670 - PI_Powermanagement_Turbo_State_enable_socwatch_L

| Field Label | Field Value | Field Label | Field Value |
|---|---|---|---|
| Test Name | PI_Powermanagement_Turbo_State_enable_socwatch_L | Type | MANUAL |

### 1.11.1 Design Steps

| Step Name | Description | Expected Result |
|---|---|---|
| Call <G1_PowerManagement_Power_States_socwatch_L> | Call <G1_PowerManagement_Power_States_socwatch_L> with the following parameters:<br>BIOS_Configuration = By default,<br>socwatch_run_time = 5 min,<br>Wait_Time = 0 min,<br>Workload_Time = 5 min,<br>check_status = P0 | P0 must be turboed. It is possible different CPU SKUs have differnet P0.x states. Enter any of the P0.x state means it can enter P0, and should consider as pass. |