Contents

Chapter 1. Introduction

AP4 for RZ is a software tool to generate device driver code for on-chip peripherals. It generates device driver codes using user settings through GUI. Initialize code and API functions are provided.

Chapter 2. Target Devices

Below is a list of devices supported by the AP4 for RZ V1.01.00

<table>
<tr><td colspan="3">RZ/T1 group</td></tr>
<tr><td>PIN</td><td colspan="2">Device name</td></tr>
<tr><td>176pin</td><td colspan="2">R7S910001CFP, R7S910101CFP</td></tr>
<tr><td>320pin</td><td colspan="2">R7S910002CBG, R7S910102CBG, R7S910006CBG, R7S910106CBG
R7S910007CBG, R7S910107CBG, R7S910011CBG, R7S910111CBG
R7S910013CBG, R7S910113CBG, R7S910015CBG, R7S910115CBG
R7S910016CBG, R7S910116CBG, R7S910017CBG, R7S910117CBG
R7S910018CBG, R7S910118CBG</td></tr>
<tr><td colspan="3">Following documents.</td></tr>
<tr><td colspan="2">Manual Name</td><td>Document Number</td></tr>
<tr><td colspan="2" rowspan="2">RZ/T1 Group User's Manual: Hardware</td><td>R01UH0483JJ0080</td></tr>
<tr><td>R01UH0483EJ0080</td></tr>
</table>

Chapter 3. Operating Environment

- Host machine
  - IBM PC/AT compatibles (Windows® 8.1, Windows® 8, Windows® 7, Windows Vista®)
  - Processor: 1 GHz or higher (must support hyper-threading, multi-core CPUs)
  - Memory capacity: 2 GB or more recommended. Minimum requirement is 1 GB or more (64-bit Windows requires 2 G or more)
  - Hard disk capacity: 200 MB or more spare capacity
  - Display: 1024 x 768 or higher resolution, 65,536 or more colors
  - All other necessary software environments in addition to Windows OS
    - .NET Framework version4.5
    - Microsoft Visual C++ 2010 SP1 runtime library

- Development Environments

Product Name	Version
IAR Embedded Workbench for Renesas RZ	V7.30.4 or later
GNUARM-NONE-EABI	V14.02 or later
ARM Development Suite (DS-5™)	V5.21.1 or later

Chapter 4. Changes

This chapter describes change from AP for RZ V1.00.00 to V1.01.00.

4.1 Changes List

No	Description
1	New development Environments supported (ARM Development Suite (DS-5™))
2	Changes of I2C bus interface settings (RIICa)

4.2 Changes Details

4.2.1 New development Environments supported (ARM Development Suite (DS-5™))

Code Generator can be generated control programs for ARM Development Suite (DS-5™).
This issue has been corrected in V1.01.00.

4.2.2 Changes of I2C bus interface settings (RIICa)

When using the I2C bus interface (RIICa) for master reception, the interrupt following sending of the slave address cannot be accepted, since the transmission data empty interrupt (TXI) is in the interrupt-masked state.
This issue has been corrected in V1.01.00.

Chapter 5. Cautions

This section describes cautions for using AP4 for RZ V1.01.00.

5.1 Cautions List

No	Description
1	Cautions of online Help
2	Cautions of User's Manual version
3	List of output files and APIs
4	Addition of Pin View

5.2 Cautions Details

5.2.1 About online Help

AP4 for RZ is not supporting online help.
[Workaround] There is no workaround.

5.2.2 About User's Manual version

AP4 for RZ V1.00.00 refer to preliminary documents.
Please review the latest information published by Renesas Electronics Corp. through various means, including the Renesas Electronics Corp. website (http://www.renesas.com).
[Workaround] There is no workaround.

5.2.3 List of output files and APIs

Below is a list of output files and APIs by AP4 for RZ V1.00.00.
Refer to User's Manual: RZ/T1 API Reference for detail information about the API functions.

Peripheral Function	File Name	API Function Name
Common	r_cg_main.c	main R_MAIN_UserInit
	r_cg_mpc.c	R_MPC_Create R_MPC_Create_UserInit
	r_cg_systeminit.c	R_SystemInit
	r_cg_intprg.c	r_set_exception_handler r_fiq_handler
	r_cg_macrodriver.h	-
	r_cg_userdefine.h	-
	r_cg_interrupthandlers.h	-
	r_cg_mpc.h	-
Clock generator	r_cg_cgc.c	R_CGC_Create
	r_cg_cgc_user.c	R_CGC_Create_UserInit
	r_cg_cgc.h	-
Interrupt Controller	r_cg_icu.c	R_ICU_Create R_ICU_IRQn_Start R_ICU_IRQn_Stop R_ICU_ETHPHYIn_Start R_ICU_ETHPHYIn_Stop
	r_cg_icu_user.c	R_ICU_Create_UserInit r_icu_nmi_interrupt r_icu_irqn_interrupt r_icu_ethphyin_interrupt
	r_cg_icu.h	-

Peripheral Function	File Name	API Function Name
Bus State Controller	r_cg_bsc.c	R_BSC_Create R_BSC_InitializeSDRAM R_BSC_SDRAMPowerDown_Start R_BSC_SDRAMPowerDown_Stop R_BSC_SDRAMDeepPowerDown_Start R_BSC_SDRAMDeepPowerDown_Stop
	r_cg_bsc_user.c	R_BSC_Create_UserInit r_bsc_bsccmi_interrupt
	r_cg_bsc.h	-
DMA Controller	r_cg_dmac.c	R_DMACn_Create R_DMACn_Set_SoftwareTrigger R_DMACm_Cn_Start R_DMACm_Cn_Stop R_DMACm_Cn_Suspend R_DMACm_Cn_SuspendClear
	r_cg_dmac_user.c	R_DMACn_Create_UserInit r_dmaintn_interrupt r_dmac_dmasrqm_interrupt
	r_cg_dmac.h	-
Event Link Controller	r_cg_elc.c	R_ELC_Create R_ELC_Start R_ELC_Stop R_ELC_GenerateSoftwareEvent R_ELC_Get_PortBuffern R_ELC_Set_PortBuffern
	r_cg_elc_user.c	R_ELC_Create_UserInit r_elc_elcirqn_interrupt
	r_cg_elc.h	-
I/O Ports	r_cg_port.c	R_PORT_Create
	r_cg_port_user.c	R_PORT_Create_UserInit
	r_cg_port.h	-

Peripheral Function	File Name	API Function Name
Multi-Function Timer Pulse Unit 3	r_cg_mtu3.c	R_MTU3_Create R_MTU3_Cm_Start R_MTU3_Cm_Stop
	r_cg_mtu3_user.c	R_MTU3_Create_UserInit r_mtu3_tgiam_interrupt r_mtu3_tgibm_interrupt r_mtu3_tgicm_interrupt r_mtu3_tgidm_interrupt r_mtu3_tgie0_interrupt r_mtu3_tgif0_interrupt r_mtu3_tcivm_interrupt r_mtu3_tcium_interrupt r_mtu3_tgiu5_interrupt r_mtu3_tgiv5_interrupt r_mtu3_tgiw5_interrupt r_mtu3_c4_tgia4_interrupt r_mtu3_c4_tgib4_interrupt r_mtu3_c4_tciv4_interrupt r_mtu3_c7_tgia7_interrupt r_mtu3_c7_tgib7_interrupt r_mtu3_c7_tciv7_interrupt
	r_cg_mtu3.h	-
Port Output Enable 3	r_cg_poe3.c	R_POE3_Create R_POE3_Start R_POE3_Stop
	r_cg_poe3_user.c	R_POE3_Create_UserInit r_poe3_oein_interrupt
	r_cg_poe3.h	-
General PWM Timer	r_cg_gpt.c	R_GPT_Create R_GPTn_Start R_GPTn_Stop
	r_cg_gpt_user.c	R_GPT_Create_UserInit r_gtp_etgin_interrupt r_gtp_etgip_interrupt r_gtp_gtcian_interrupt r_gtp_gtcibn_interrupt r_gtp_gtcicn_interrupt r_gtp_gicidn_interrupt r_gtp_gtcien_interrupt r_gtp_gtcifn_interrupt r_gtp_gdten_interrupt r_gtp_gtcivn_interrupt r_gtp_gtciun_interrupt
	r_cg_gpt.h	-

Peripheral Function	File Name	API Function Name
16-Bit Timer Pulse Unit	r_cg_tpu.c	R_TPU_Create R_TPUn_Start R_TPUn_Stop
	r_cg_tpu_user.c	R_TPU_Create_UserInit r_tpu_tgina_interrupt r_tpu_tginb_interrupt r_tpu_tginc_interrupt r_tpu_tgind_interrupt r_tpu_tcinv_interrupt r_tpu_tcinu_interrupt
	r_cg_tpu.h	-
Programmable Pulse Generator	r_cg_ppg.c	R_CMTn_Create R_CMTn_Start R_CMTn_Stop
	r_cg_ppg_user.c	R_CMTn_Create_UserInit r_cmt_cmin_interrupt
	r_cg_ppg.h	-
Compare Match Timer	r_cg_cmt.c	R_CMTn_Create R_CMTn_Start R_CMTn_Stop
	r_cg_cmt_user.c	R_CMTn_Create_UserInit r_cmt_cmin_interrupt
	r_cg_cmt.h	-
Compare Match Timer W	r_cg_cmtw.c	R_CMTWm_Create R_CMTWm_Start R_CMTWm_Stop
	r_cg_cmtw_user.c	R_CMTWm_Create_UserInit r_cmtw_cmwim_interrupt r_cmtw_icnim_interrupt r_cmtw_ocnim_interrupt
	r_cg_cmtw.h	-
Watchdog Timer	r_cg_wdt.c	R_WDTn_Create R_WDTn_Restart
	r_cg_wdt_user.c	R_WDTn_Create_UserInit
	r_cg_wdt.h	-
Independent Watchdog Timer	r_cg_iwdt.c	R_IWDT_Create R_IWDT_Restart
	r_cg_iwdt_user.c	R_IWDT_Create_UserInit
	r_cg_iwdt.h	-

Peripheral Function	File Name	API Function Name
Serial Communications Interface with FIFO	r_cg_scifa.c	R_SCIFAn_Create R_SCIFAn_Start R_SCIFAn_Stop R_SCIFAn_Serial_Send R_SCIFAn_Serial_Receive R_SCIFAn_Serial_Send_Receive
	r_cg_scifa_user.c	R_SCIFAn_Create_UserInit r_scifan_txifn_interrupt r_scifan_rxifn_interrupt r_scifan_brifn_interrupt r_scifan_drifn_interrupt r_scifan_teifn_interrupt r_scifan_erifn_interrupt r_scifan_callback_transmitend r_scifan_callback_receiveend r_scifan_callback_error
	r_cg_scifa.h	-
I2C Bus Interface	r_cg_riic.c	R_RIICn_Create R_RIICn_Start R_RIICn_Stop R_RIICn_Master_Send R_RIICn_Master_Receive R_RIICn_Slave_Send R_RIICn_Slave_Receive R_RIICn_StartCondition R_RIICn_StopCondition
	r_cg_riic_user.c	R_RIICn_Create_UserInit r_riicn_error_interrupt r_riicn_receive_interrupt r_riicn_transmit_interrupt r_riicn_transmitend_interrupt r_riicn_callback_receiveerror r_riicn_callback_transmitend r_riicn_callback_receiveend
	r_cg_riic.h	-

Peripheral Function	File Name	API Function Name
Serial Peripheral Interface	r_cg_rspi.c	R_RSPIn_Create R_RSPIn_Start R_RSPIn_Stop R_RSPIn_Send R_RSPIn_Send_Receive
	r_cg_rspi_user.c	R_RSPIn_Create_UserInit r_rspin_receive_interrupt r_rspin_transmit_interrupt r_rspin_error_interrupt r_rspin_idle_interrupt r_rspin_callback_receiveend r_rspin_callback_error r_rspin_callback_transmitend
	r_cg_rspi.h	-
SPI Multi I/O Bus Controller	r_cg_spibsc.c	R_SPIBSC_Create R_SPIBSC_EAVUpperAddressChange R_SPIBSC_SPIRead R_SPIBSC_SPIWrite R_SPIBSC_SPIRead_Write
	r_cg_spibsc_user.c	R_SPIBSC_Create_UserInit
	r_cg_spibsc.h	-
CRC Operation Units	r_cg_crc.c	R_CRC_SetCRC8_2F R_CRC_SetCRC8_SAE R_CRC_SetCRC16_CCITT R_CRC_SetCRC32_ETHER R_CRC_Input_Data R_CRC_Get_Result
Δ Σ Interface	r_cg_dsmif.c	R_DSMIF_Create R_DSMIF_UVW_Start R_DSMIF_UVW_Stop R_DSMIF_X_Start R_DSMIF_X_Stop
	r_cg_dsmif_user.c	R_DSMIF_Create_UserInit
	r_cg_dsmif.h	-

Peripheral Function	File Name	API Function Name
Error Control Module	r_cg_emc.c	R_ECM_Create R_EMC_Pseudo_WDT0_Error_Start R_EMC_Pseudo_WDT0_Error_Stop R_EMC_Pseudo_WDT1_Error_Start R_EMC_Pseudo_WDT1_Error_Stop R_EMC_Pseudo_IWDTa_Error_Start R_EMC_Pseudo_IWDTa_Error_Stop R_EMC_Pseudo_ADC_Unit0_Error_Start R_EMC_Pseudo_ADC_Unit0_Error_Stop R_EMC_Pseudo_ADC_Unit1_Error_Start R_EMC_Pseudo_ADC_Unit1_Error_Stop R_EMC_Pseudo_DSMIF_UVWovercurrent_Error_Start R_EMC_Pseudo_DSMIF_UVWovercurrent_Error_Stop R_EMC_Pseudo_DSMIF_UVWtotalcurrent_Error_Start R_EMC_Pseudo_DSMIF_UVWtotalcurrent_Error_Stop R_EMC_Pseudo_DSMIF_UVWshortcircuit_Error_Start R_EMC_Pseudo_DSMIF_UVWshortcircuit_Error_Stop R_EMC_Pseudo_DSMIF_Xovercurrent_Error_Start R_EMC_Pseudo_DSMIF_Xovercurrent_Error_Stop R_EMC_Pseudo_DSMIF_Xshortcircuit_Error_Start R_EMC_Pseudo_DSMIF_Xshortcircuit_Error_Stop R_EMC_Pseudo_DOC_Error_Start R_EMC_Pseudo_DOC_Error_Stop R_EMC_Pseudo_BSC_Error_Start R_EMC_Pseudo_BSC_Error_Stop R_EMC_Pseudo_Error35_Error_Start R_EMC_Pseudo_Error35_Error_Stop R_EMC_Pseudo_Error36_Error_Start R_EMC_Pseudo_Error36_Error_Stop R_EMC_Pseudo_Error37_Error_Start R_EMC_Pseudo_Error37_Error_Stop R_EMC_Pseudo_Error38_Error_Start R_EMC_Pseudo_Error38_Error_Stop R_EMC_Pseudo_Error39_Error_Start R_EMC_Pseudo_Error39_Error_Stop R_EMC_Pseudo_Error40_Error_Start R_EMC_Pseudo_Error40_Error_Stop R_EMC_Pseudo_Error41_Error_Start R_EMC_Pseudo_Error41_Error_Stop R_EMC_Pseudo_EMC_CompareError_Error_Start R_EMC_Pseudo_EMC_CompareError_Error_Stop R_EMC_Pseudo_EMC_DelayTimerOverflow_Error_Start R_EMC_Pseudo_EMC_DelayTimerOverflow_Error_Stop
	r_cg_emc_user.c	R_ECM_Create_UserInit r_ecm_nmi_interrupt r_ecm_errd_interrupt
	r_cg_emc.h	-

Peripheral Function	File Name	API Function Name
12-Bit A/D Converter	r_cg_s12ad.c	R_S12ADn_Create R_S12ADn_Start R_S12ADn_Stop R_S12ADn_Get_ValueResult R_S12ADn_Set_CompareValue
	r_cg_s12ad_user.c	R_S12ADn_Create_UserInit r_s12ad_s12adn_interrupt r_s12ad_s12gbadin_interrupt r_s12ad_s12cmpn_interrupt
	r_cg_s12ad.h	-
Data Operation Circuit	r_cg_doc.c	R_DOC_Create R_DOC_SetMode R_DOC_WriteData R_DOC_GetResult R_DOC_ClearFlag
	r_cg_doc_user.c	R_DOC_Create_UserInit
	r_cg_doc.h	-

[Workaround] There is no workaround.

5.2.4 Addition of Pin View

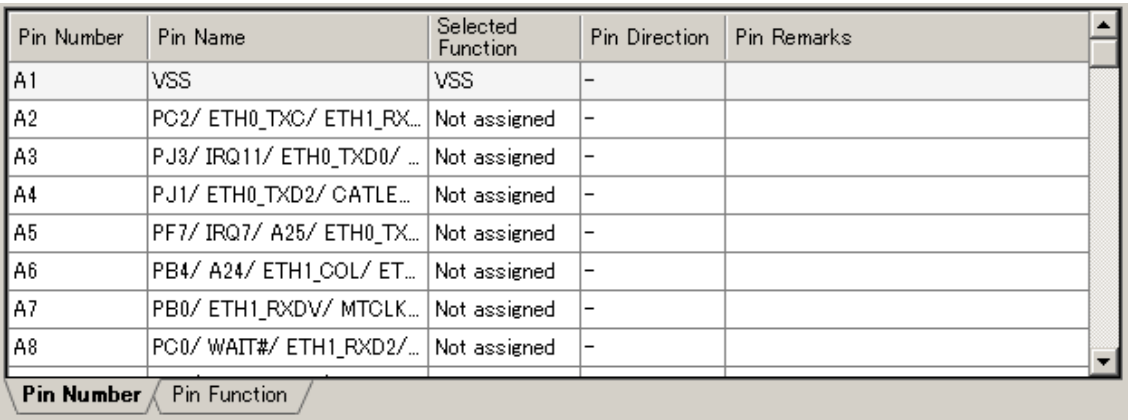
Pin View shows pin settings set by CG and allows user to configure pin settings.
Pin View has two view; Device List View and Device Top View and the two views are linked, so that settings can be made in either of them.

Device List View

Device list View shows the pin settings by the table style. Device list View has two lists; Pin Number and Pin Function.

Pin Number List

Pin Number List shows all assigned pins sorted by the pin number. If pins have multiple functions, Pin Number List allows to user to configure the functions.



If pins have multiple functions, User can select pin functions by configuring the “Selected Function”. For example, when IRQ7 has not been set up in CG and user set A5 as IRQ7, the following warning is shown.

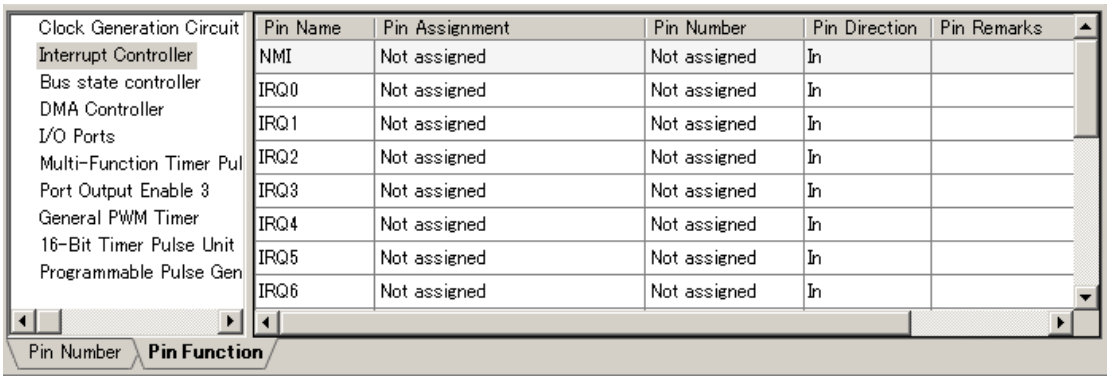
A5	PF7/ IRQ7/ A25/ ETH0_TX...	IRQ7	-	Function is not enabled in peripheral configuration.

After that, IRQ7 has been set in Peripheral Functions (Interrupt Controller), this warning is disappeared and IRQ7 is shown in Selected Function.

A5	PF7/ IRQ7/ A25/ ETH0_TX...	IRQ7	In	

Pin Function List

Pin Function List shows which pins are used by corresponding peripheral module. If multiple pins are selectable for a specific function, the allocation can be changed through this list.



Pin Function List allows user to change a specific pin which has been to set by CG. For example, IRQ7 has been set by CG, an available pin are automatically set.

IRQ7	PF7/ IRQ7/ A25/ ETH0_TXE...	A5	In	

User can change the pin to another available pins by selection “Pin Assignment” or “Pin Number”.

IRQ7	P97/ AN107/ IRQ7/ A25/ AD...	E18	In	

If a pin which has been already set as other function is selected, the warning is shown and the selected pin is not assigned.

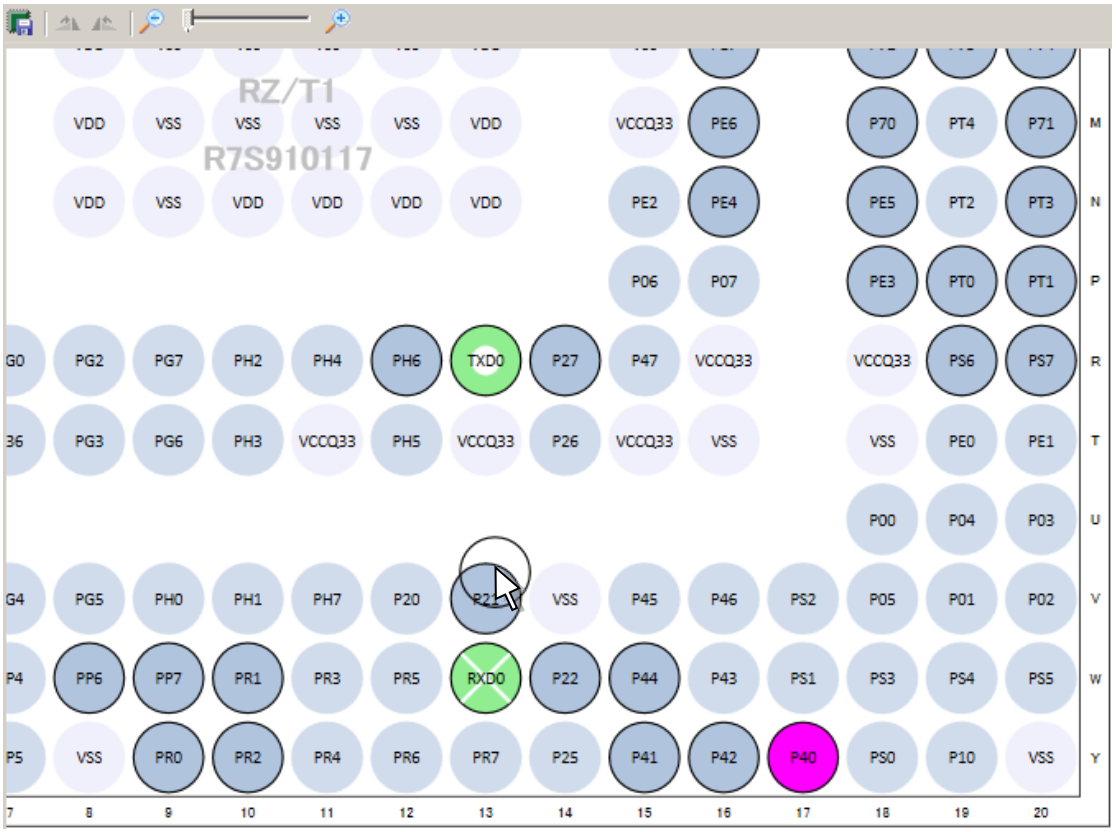
IRQ7	Not assigned	Not assigned	In	Conflict detected in peripheral configuration.

Save Device List View

Clicking the icon above in Device List View, User can save the current pin settings as csv the format.

Device Top View

Device Top View shows which pins are used by corresponding peripheral module in the package view. If pins have multiple functions, this view allows to user to configure the functions and if multiple pins selectable for a specific function, the allocation can be changed through this view.



Highlight Pins by Peripheral

Device Top View highlights the group of pins that belongs to the active CG peripheral functions. The figure above shows Device Top View when Serial Communications Interface with FIFO is being selected by CG.

Assigned Pin (Input)

Shows assigned pins (Input).

Assigned pin (Output)

Shows assigned pins (Output).

Alternative pin selection

If user holds down the “CTRL” key and use mouse “left click” on the pin in use, the other pins with this

same function will change color. For example, R13 is assigned to the function “TXD0”, if user “CTRL + Click” to pin “TXD0”, the pin Y17 (P40) changes color, because it contains the same function “TXD0”. At the same time, while the “CTRL” key is hold down, if user drag and drops the pin to Y17 (P40). Y17 (P40) will be assigned to in use as “TXD0”.

Zoom

Device Top View supports the zoom function by slider controls. After clicking the device top view, user can do this by mouse-wheel.

Drag and Move

Device Top View supports mouse drags actions. Hold down mouse left button on the view and move will drag the view around.

Save Device Top View

Clicking the icon above in Device Top View, User can save the view as PNG format.

Configure Pin View Color

Pin View supports for user to change color, through the property window.
Right click on the Device Top View on project tree, the property window will pop up a right click menu.

[Workaround] There is no workaround.

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