##### ex\_trcrawmeminfo

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | SYNC | EMU | ○ | BRK | ○ | TRC | × | TIM | ○ | COV | ／ | HOT | × |
| ASYNC | EMU1 | ○ | EMU2 | ○ | BRK1 | ○ | BRK2 | ○ | TRC1 | × | TRC2 | × |

**[Function]**

Get the information needed for the trace raw data reader.

**[Format]**

int ex\_trcrawmeminfo( EXTRCRAWMEMINFO \*info )

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| type | Argument identifier | Attributes | Description | Target |
| EXTRCRAWMEMINFO | \*info | < O> | Information required for reading raw trace data | ○ |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| typedef struct | |  |  |  |
| { | |  |  |  |
| ULONG | maxsize | < O> | Number of raw data frames stored in trace memory | ○ |
| ULONG | totaltimel | <--> | Not used (0 fixed) | -- |
| ULONG | totaltimeh | <--> | Not used (0 fixed) | -- |
| ULONG | dbg\_mba | < O> | Not used (0 fixed)  Base address of RCU monitor area (debug area)  Moved definition to ex\_rh\_getenv. (This parameter is kept for compatibility, but use ex\_rh\_getenv.) | ○ |
| }EXTRCRAWMEMINFO | |  |  |  |

**[Arguments]**

|  |  |  |
| --- | --- | --- |
| maxsize | | |
|  |  | Number of raw data frames being traced |
|  | | |
| dbg\_mba | | |
|  |  | Base address of RCU monitor area (debug area) |
|  | | |

**[Return Values]**

EX\_NOERROR Successful completion

EX\_FE\_COMM EXEC not started

EX\_SE\_TRACEON Starting trace

EX\_DE\_M\_TRCMEMACCFAILED Trace memory access failed

EX\_DE\_TRCNOMOUNT Trace function is not implemented

EX\_DE\_TRCDISABLE Trace output is invalid

EX\_SE\_ASYNCMODE\_SELPEDSB Unavailable due to non debug target core in asynchronous debug mode

EX\_SE\_USRPGMRUN During execution of user program

EX\_SE\_CANTCALL\_ASPRUNNING During execution of a user program using extended functions

EX\_SE\_SFTTRCRUN Executing user program with external soft trace single line output

EX\_FE\_EMUSTORETRACE The emulator failed to record a trace message

EX\_SE\_STANDBY\_NOSPRT　　　During the applicable standby mode, commands cannot be executed because debugging operations cannot be performed. To continue debugging, perform an operation or a forced reset with the standby mode released.

**[Description]**

[Argument description]

(1)maxsize

Returns the number of valid frames stored in the trace memory.

(2)dbg\_mba

Returns the base address of the RCU monitor area (debug-only area).

The returned value is the value of the DBG\_MBA register of the RCU.

The start address for transition from the user mode to the debug mode during a break operation is a value obtained by adding 0xb0 to this parameter dbg\_mba.

Some devices have different values for each physical CPU (PE). (This is provisional until ex\_rh\_getenv is implemented. After implementing ex\_rh\_getenv, this parameter will be moved there.)

**[Description of operation]**

Returns the number of valid frames stored in the trace memory.

If neither the internal trace nor the external trace is selected as the trace output type, an error (EX\_DE\_TRCDISABLE) is returned.

Note that the trace function (TCU) may not be implemented depending on the device. In this case, an error is returned. For details on returning this error, refer to [Setting target for each I / F] of the trace function.

Also, during trace activation, since trace data cannot be obtained by ex\_trcrawmemread, this I / F also returns an error response (EX\_SE\_TRACEON).

If there is no trace data, maxsize = 0 and no error response.

An EX\_SE\_USRPGMRUN error occurs during hot plug-in RUN (from connection to forced break).  
(As a future specification after the next development version, it can be set during hot plug-in RUN as well as during normal RUN)

An error (EX\_SE\_CANTCALL\_ASPRUNNING) is returned if called while the user program is running with the E2 extended function enabled.

If the user program is called during execution (LPD trace mode) while the external soft trace single-line output function is enabled while the E2 extension function is disabled, an error (EX\_SE\_SFTTRCRUN) is issued. return. For details on the external soft trace single-wire output function, refer to "Operation Specifications for External Soft Trace Single-Line Output Function".

When the IE850A emulator is connected, trace messages may fail to be recorded between the device and the emulator. In this case, an error (EX\_FE\_EMUSTORETRACE) is returned because it cannot be guaranteed that all the recorded trace messages are correct.

[Notes when the initial stop / standby mode debug environment is enabled]

(1) While the user program is running, in the initial stop and standby mode other than the CyclicRun mode, control of the debug module cannot be performed, so an error (EX\_SE\_STANDBY\_NOSPRT) is returned and processing is not performed. However, when ICUM is valid, an error (EX\_SE\_STANDBY\_NOSPRT) is returned and processing is not performed even in CyclicRun mode.

[Notes on multi-core and slave support]

(1) Since the trace memory is commonly used, it is not related to the selection of the physical CPU (PE) and the slave resource. However, since the base address of the monitor area of the RCU may be different for each physical CPU (PE), it is necessary to switch to obtain the information of each PE.

(2) Switching of the physical CPU (PE) is performed by ex\_socunitinfo2 (EX\_UNIT\_COREPESEL).

**[Notes for debugger developers]**

(1) The value specified by ex\_trcrawmemread must be specified not to exceed the value of maxsize of this function.

(2) The frame at the time of reading the raw trace data is not a unit (trace message) in which trace data can be analyzed, but a storage unit in the trace memory, and attention is required.  
The number of frames required for analyzing one trace data varies depending on the trace message, and one to three frames are required. (The number of required frames is determined by checking the trace message head flag and the trace type in the trace packet.)

(3) When the EXEC I / F that changes the setting of the trace function is issued, the trace data is cleared. Therefore, it is necessary to acquire the trace data before changing the setting of the trace function.

##### ex\_trcrawmemread

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | SYNC | EMU | ○ | BRK | ○ | TRC | × | TIM | ○ | COV | ／ | HOT | × |
| ASYNC | EMU1 | ○ | EMU2 | ○ | BRK1 | ○ | BRK2 | ○ | TRC1 | × | TRC2 | × |

[Function]

Trace raw data read

[Format]

int ex\_trcrawmemread( ULONG trcrawmemaddr, ULONG trcrawmemnum, UCHAR \* trcrawmembuf )

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| type | Argument identifier | Attributes | Description | Target |
| ULONG | trcrawmemaddr | <I > | Start address of the trace raw data frame to be read | ○ |
| ULONG | trcrawmemnum | <I > | Number of trace raw data frames to be read | ○ |
| UCHAR \* | trcrawmembuf | < O> | Buffer pointer to return raw trace data | ○ |
|  |  |  |  |  |

[Arguments]

|  |  |  |
| --- | --- | --- |
| trcrawmemaddr | | |
|  |  | Start address of the trace raw data frame to be read |
|  |  |  |
| trcrawmemnum | | |
|  |  | Number of trace raw data frames to be read |
|  |  |  |
| \*trcrawmembuf | | |
|  |  | Buffer pointer to return raw trace data |
|  |  |  |

[Return Values]

EX\_NOERROR Successful completion

EX\_FE\_COMM EXEC not started

EX\_PE\_DATA Setting value is abnormal

EX\_SE\_TRACEON Starting trace

EX\_SE\_NOTRACEBLOCK Trace not found

EX\_DE\_M\_TRCMEMACCFAILED Trace memory access failed

EX\_DE\_TRCNOMOUNT Trace function is not implemented

EX\_DE\_TRCDISABLE Trace output is invalid

EX\_SE\_ASYNCMODE\_SELPEDSB Unavailable due to non debug target core in asynchronous debug mode

EX\_SE\_USRPGMRUN During execution of user program

EX\_SE\_CANTCALL\_ASPRUNNING During execution of a user program using extended functions

EX\_SE\_SFTTRCRUN Executing user program with external soft trace single line output

EX\_FE\_EMUSTORETRACE The emulator failed to record a trace message

EX\_SE\_STANDBY\_NOSPRT　　　During the applicable standby mode, commands cannot be executed because debugging operations cannot be performed. To continue debugging, perform an operation or a forced reset with the standby mode released.

[Description]

[Argument description]

(1)trcrawmemaddr

Specify the start address of the trace raw data frame to be read.  
The address of the trace raw data frame is an address where the oldest data stored in the trace memory is 0.

(2)trcrawmemnum

Specifies the number of trace raw data frames to be read.

(3)trcrawmembuf

Specify the pointer of the buffer to return the raw trace data.  
When TCU trace memory is used, trcrawmembuf stores data of trcrawmemnum × 16 bytes.

[Description of operation]

Trace raw data for trcrawmemnum from the frame specified by trcrawmemaddr is stored in trcrawmembuf. If neither the internal trace nor the external trace is selected as the trace output type, an error (EX\_DE\_TRCDISABLE) is returned.

Note that the trace function (TCU) may not be implemented depending on the device. In this case, an error (EX\_DE\_TRCNOMOUNT) is returned. For details on returning this error, refer to [Setting target for each I / F] of the trace function. In addition, an error response (EX\_SE\_TRACEON) is returned during trace activation because trace data cannot be acquired.

If there is no trace data, an error response (EX\_SE\_NOTRACEBLOCK) is returned.  
An EX\_SE\_USRPGMRUN error occurs during hot plug-in RUN (from connection to forced break).  
(As a future specification after the next development version, it can be set during hot plug-in RUN as well as during normal RUN)

An error (EX\_SE\_CANTCALL\_ASPRUNNING) is returned if called while the user program is running with the E2 extended function enabled.

If the user program is called during execution (LPD trace mode) while the external soft trace single-line output function is enabled while the E2 extension function is disabled, an error (EX\_SE\_SFTTRCRUN) is issued. return. For details on the external soft trace single-wire output function, refer to "Operation Specifications for External Soft Trace Single-Line Output Function".

When the IE850A emulator is connected, trace messages may fail to be recorded between the device and the emulator. In this case, an error (EX\_FE\_EMUSTORETRACE) is returned because it cannot be guaranteed that all the recorded trace messages are correct.

[Precautions when the initial stop / standby mode debug environment is enabled]

(1) While the user program is running, in the initial stop and standby mode other than the CyclicRun mode, control of the debug module cannot be performed, so an error (EX\_SE\_STANDBY\_NOSPRT) is returned and processing is not performed. However, if ICUM is enabled, an error (EX\_SE\_STANDBY\_NOSPRT) is returned and processing is not performed even in CyclicRun mode.

[Precautions for multi-core]

1. Since the trace memory is used in common by all physical CPUs (PEs), it is not related to the selection of the physical CPUs (PEs).

[Notes for debugger developers]

(1) When EX\_NON\_STOP (do not end the trace) is specified in cond.fullstop in ex\_trcmode, overwriting occurs. In this case, care must be taken because the oldest frame may not be a delimited frame where trace data can be analyzed.

(2) The frame at the time of reading raw trace data is not a unit (trace message) in which trace data can be analyzed, but a storage unit in the trace memory, and care must be taken.

The number of frames required for analyzing one trace data varies depending on the trace message, and one to three frames are required. (The number of required frames is determined by checking the trace message head flag and the trace type in the trace packet.)  
When using TCU internal trace memory: 16 bytes / frame

Table 3 18 Configuration of One Frame When Using TCU Internal Trace Memory

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Bit [7: 1] of 1st byte to 8th byte | Bit0 of the 8th byte | 9th byte to 16th byte |
| 1 | Reserve data | Trace message start flag (1: Trace message start 0: Not at the beginning of the trace message) | Trace packet |

(3) When the EXEC I / F that changes the setting of the trace function is issued, the trace data is cleared. Therefore, it is necessary to acquire the trace data before changing the setting of the trace function.

(4) When built-in trace is selected as the trace output type, the format of the trace message read by ex\_trcrawmemread is `` G3 generation trace control unit (TCU) function specification '' `` G4 generation trace control unit ( TCU) Function Specifications ”. Even when the external trace is selected, the format of the trace message is the same as that of the internal trace. However, there are unique messages when using external tracing. See the table below for details. Also, change the trace output type with ex\_socunitinfo2 (EX\_UNIT\_TRCSEL).

Table 3 19 Unique trace message when external trace is selected

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Message name | Message (128-bit notation) | Remarks |
| 1 | Lost off device | 0x0000\_0000\_0000\_0001\_0000\_0000\_FFFF\_FFFF | Issued when a trace message is lost in the POD. \* 1 |
| 2 | Invalid message <For IE850> | 0x0000\_0000\_0000\_0002\_0000\_0000\_0000\_0000 | An invalid message may be issued due to the storage format of the IE850 message. Bit 65 is set as an invalid flag, and all others are set to “0”. |
| 3 | Invalid message <For IE850A> | 0x0000\_0000\_0000\_0003\_0000\_0000\_0000\_0000 | An invalid message may be issued due to the IE850A message storage format. Bit 65 (invalid flag) and bit 64 (head flag) are set to “1”, and all others are set to “0”. |

\* 1 When a “lost outside device” message is received, the trace message immediately preceding that message is invalidated. However, it does not become “invalid message” (bit65 = 1).

##### ex\_rh\_trceventsel2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **SYNC** | **EMU** | **○** | **BRK** | **○** | **TRC** | **×** | **TIM** | **○** | **COV** | **／** | **HOT** | **×** |
| **ASYNC** | **EMU1** | **○** | **EMU2** | **○** | **BRK1** | **○** | **BRK2** | **○** | **TRC1** | **×** | **TRC2** | **×** |

[Function]

Set / refer to whether or not to acquire trace data and the type of trace data to be acquired.

[Format]

int ex\_rh\_trceventsel2( USHORT func, ULONG \*item, USHORT \*trc\_num, EXRHDATTRC2 \*trc\_cond )

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 型 | 引数識別名 | 属性 | 説明 | 対象 |
| USHORT | func | <I > | Operation mode | ○ |
| ULONG | \*item | <IO> | Specification of trace event cause and message selection | ○ |
| USHORT | \*trc\_num | <--> | Not used (may be NULL) | -- |
| EXRHDATTRC2 | \*trc\_cond | <--> | Not used (may be NULL) | -- |
|  |  |  |  |  |

[Arguments]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| func | | | | |
|  | EX\_SET | | | Configuration |
|  | EX\_REF | | | reference |
| \*item | | | | |
|  | Set conditions for recording trace data in bit units | | | |
|  | bit0 |  | Whether to acquire trace data for data read access output from the slave resource specified in ex\_socunitinfo2  0：Do not get (Default)  EX\_RH\_EVN\_SLVRENB：get | |
|  | bit1 |  | Whether to acquire trace data for data write access output from the slave resource specified by ex\_socunitinfo2  0 ：Do not get (Default)  EX\_RH\_EVN\_SLVWENB：get | |
|  | bit2 |  | Whether to acquire the timestamp trace data with the virtualization information added when switching the CPU operation mode output from the CPU trace (TCU\_CPU)  (Only G4 generation. Fixed to 0 for G3 generation.)  0 ：Do not get (Default)  EX\_RH\_EVN\_VMTRANSENB：get | |
|  | bit[8:3] |  | Not used (0 fixed) | |
|  | bit9 |  | Acquisition of trace data of data read access output from CPU trace (TCU\_CPU)  0 ：Do not get  EX\_RH\_EVN\_RDATALL：Get (Default) | |
|  | bit10 |  | Whether to acquire trace data for data write access output from CPU trace (TCU\_CPU)  0 ：Do not get  EX\_RH\_EVN\_WDATALL：Get (Default) | |
|  |  |  |  | |
|  | bit11 |  | Whether to acquire trace data of branch instruction output from CPU trace (TCU\_CPU)  0 ：Do not get  EX\_RH\_EVN\_BRALL：Get (Default) | |
|  | bit[15:12] |  | Specify the trace data output type when accessing data output from the physical CPU (PE) or slave resource specified in ex\_socunitinfo2  ・When CPU trace is selected (corresponds to DMT [2: 0] bits in TRC\_CTRL register)  When the relevant PE of ex\_rh\_getenv-funcinfo [3] = 0  EX\_RH\_EVN\_CPUDTM1\_1 ：See [Operation] (Default)  EX\_RH\_EVN\_CPUDTM2\_2 ：See [Operation]  EX\_RH\_EVN\_CPUDTM1\_35：See [Operation]  EX\_RH\_EVN\_CPUDTM2\_45：See [Operation]  EX\_RH\_EVN\_CPUDTM3\_3 ：See [Operation]  EX\_RH\_EVN\_CPUDTM4\_4 ：See [Operation]  When the relevant PE of ex\_rh\_getenv-funcinfo [3] = 1  EX\_RH\_EVN\_CPUDTM35\_35 ：See [Operation] (Default)  EX\_RH\_EVN\_CPUDTM45\_45 ：See [Operation]  EX\_RH\_EVN\_CPUDTM3\_3 ：See [Operation]  EX\_RH\_EVN\_CPUDTM4\_4 ：See [Operation]  When the relevant PE of ex\_rh\_getenv-funcinfo [3] = 2  EX\_RH\_EVN\_CPUDTM1\_1 ：See [Operation] (Default)  EX\_RH\_EVN\_CPUDTM2\_2 ：See [Operation]  EX\_RH\_EVN\_CPUDTM35\_35：See [Operation]  EX\_RH\_EVN\_CPUDTM45\_45：See [Operation]  EX\_RH\_EVN\_CPUDTM3\_3 ：See [Operation]  EX\_RH\_EVN\_CPUDTM4\_4 ：See [Operation]  ・When TCU\_EMS of slave trace is selected  (Corresponds to the DMT bit in the TRE\_CTRL register)  EX\_RH\_EVN\_EMSDTM1\_1 ：See [Operation] (Default)  EX\_RH\_EVN\_EMSDTM3\_3 ：See [Operation]  ・When TCU\_GRM / TCU\_CRM of slave trace is selected  (Corresponds to the DMT bit in the TRG\_CTRL register)  EX\_RH\_EVN\_GRMDTM1\_1 ：See [Operation] (Default)  EX\_RH\_EVN\_GRMDTM3\_3 ：See [Operation]  ・When TCU\_LRM of slave trace is selected  (Corresponds to the DMT bit in the TRT\_CTRL register)  EX\_RH\_EVN\_LRMDTM1\_3：See [Operation](Default)  EX\_RH\_EVN\_LRMDTM3\_3：See [Operation]  ・When TCU\_GVC / TCU\_KVC / TCU\_AXI of slave trace is selected  (Corresponds to the DMT bit in the TRE\_CTRL register)  EX\_RH\_EVN\_GVCDTM1\_35：See [Operation](Default)  EX\_RH\_EVN\_GVCDTM3\_3 ：See [Operation]  ・When TCU\_DMA of slave trace is selected  (Corresponds to the DMT bit in the TRE\_CTRL register)  EX\_RH\_EVN\_DMADTM35\_35：See [Operation](Default)  EX\_RH\_EVN\_DMADTM3\_3　：See [Operation] | |
|  |  |  |  | |
|  | bit16 |  | Invalidation of data access trace data acquisition based on stack pointer (SP, R3) output from CPU trace (TCU\_CPU)  0 ：Acquisition valid (Default)  EX\_RH\_EVN\_SFTSPD：Invalid | |
|  |  |  |  | |
|  | bit17 |  | Specify the output type of soft trace data (DBTAG instruction) output from CPU trace (TCU\_CPU)  EX\_RH\_EVN\_SFTSMT2：Output only immediate value  EX\_RH\_EVN\_SFTSMT3：Output immediate value + execution PC (Default) | |
|  | bit18 |  | Specifying the output type of the soft trace data (DBPUSH instruction) output from the CPU trace (TCU\_CPU)  EX\_RH\_EVN\_SFTSMT4：Output general register number + general register value  EX\_RH\_EVN\_SFTSMT5：Output general register number + general register value + execution PC value (Default) | |
|  | bit19 |  | Whether to acquire soft trace data (DBCP) output from CPU trace (TCU\_CPU)  0 ：Do not get  EX\_RH\_EVN\_SFTDBCP：Get (Default) | |
|  | bit20 |  | Whether to acquire soft trace data (DBPUSH) output from CPU trace (TCU\_CPU)  0 ：Do not get  EX\_RH\_EVN\_SFTDBPUSH：Get (Default) | |
|  | bit21 |  | Acquisition of soft trace data (DBTAG) output from CPU trace (TCU\_CPU)  0　　　　　　　 　：Do not get  EX\_RH\_EVN\_SFTDBTAG：Get (Default) | |
|  | bit22 |  | Enable / disable designation of time stamp function for internal trace  0 ：Disable time stamp function (Default)  EX\_RH\_EVN\_TIMESTAMPENA：Enable time stamp function  \* If EX\_RH\_EVN\_TIMESTAMPENA is set with unsupported devices fixed at 0, an error (EX\_PE\_SELTRC) is returned.  Whether the time stamp function is supported is as follows.  PFC1A, F1L (v1): Not supported  PFC1B, F1L (v2) or later: Supported | |
|  |  |  |  | |
|  | bit23 |  | ex\_rh\_getenv-funcinfo [0] -b3 = 0  Not used (0 fixed)  \* For devices equipped with both TCU\_GRM / TCU\_CRM and TCU\_GVC / TCU\_KVC / TCU\_AXI / TCU\_DMA, trace messages can be obtained simultaneously from both resources.  ex\_rh\_getenv-funcinfo [0] -b3 = 1 and slave trace TCU\_GRM / TCU\_CRM selected  0：Disable TCU\_GRM / TCU\_CRM, Enable TCU\_GVC / TCU\_KVC / TCU\_AXI / TCU\_DMA (Default)  1：Enable TCU\_GRM / TCU\_CRM, disable TCU\_GVC / TCU\_KVC / TCU\_AXI / TCU\_DMA  \* The trace setting for the disabled slave resource is valid, but no trace message is obtained. \* TCU\_GRM and TCU\_CRM are implemented exclusively. \* TCU\_GVC, TCU\_KVC, TCU\_AXI, TCU\_DMA are implemented exclusively. | |
|  | bit24 |  | Soft trace data (DBCP) output from CPU trace (TCU\_CPU) is always acquired regardless of the status of qualify / section subswitch  0 ：Always disabled (Default)  EX\_RH\_EVN\_SFTDBCP\_ALWAYS ：Always available  (\* When this bit is set to EX\_RH\_EVN\_SFTDBCP\_ALWAYS, it is valid only when bit19 = EX\_RH\_EVN\_SFTDBCP, and when bit19 = 0, this setting is ignored.) | |
|  | bit25 |  | Soft trace data (DBPUSH) output from CPU trace (TCU\_CPU) is always obtained regardless of the status of qualify / section subswitch  0 ：Always disabled (Default)  EX\_RH\_EVN\_SFTDBPUSH \_ALWAYS ：Always available  (\* When this bit is set to EX\_RH\_EVN\_SFTDBPUSH\_ALWAYS, it is valid only when bit20 = EX\_RH\_EVN\_SFTDBPUSH, and this bit is ignored when bit20 = 0) | |
|  | bit26 |  | Soft trace data (DBTAG) output from CPU trace (TCU\_CPU) is always obtained regardless of the status of qualify / section subswitch  0 ：Always disabled (Default)  EX\_RH\_EVN\_SFTDBTAG\_ALWAYS ：Always available  (\* When this bit is set to EX\_RH\_EVN\_SFTDBTAG\_ALWAYS, this bit is valid only when bit21 = EX\_RH\_EVN\_SFTDBTAG.When bit21 = 0, this setting is ignored.) | |
|  | bit[30:27] |  | Not used (0 fixed) | |
|  | bit31 |  | Acquisition of trace data of data access output from CPU trace (TCU\_CPU)  0 ：Do not get  EX\_RH\_EVN\_DATAALL：Get (Default)  \* When this bit is set to EX\_RH\_EVN\_DATAALL, the settings of bits [10: 9] are invalid. When this bit is set to 0, the settings of bits [10: 9] are valid | |

[Return Values]

EX\_NOERROR Successful completion

EX\_FE\_COMM EXEC not started

EX\_PE\_DATA Setting value is abnormal

EX\_SE\_TRACEON Starting trace

EX\_DE\_M\_TRCMEMACCFAILED Trace memory access failed

EX\_PE\_EVNOVER Event setting number exceeded

EX\_DE\_TRCNOMOUNT Trace function is not implemented

EX\_DE\_SELTRCNOMOUNT The selected trace function is not implemented

EX\_DE\_TRCDISABLE Trace output is invalid

EX\_PE\_SELTRC Cannot be set for the selected trace resource

EX\_SE\_ASYNCMODE\_SELPEDSB Unavailable due to non debug target core in asynchronous debug mode

EX\_SE\_USRPGMRUN During execution of user program

EX\_SE\_CANTCALL\_ASPRUNNING During execution of a user program using extended functions

EX\_SE\_SFTTRCRUN Executing user program with external soft trace single line output

EX\_SE\_STANDBY\_NOSPRT　　　 During the applicable standby mode, commands cannot be executed because debugging operations cannot be performed. To continue debugging, perform an operation or a forced reset with the standby mode released.

[Description]

[Argument description]

(1)func

Set / reference the trace event factor and the output trace data type.

func = EX\_SET: Sets the information specified in item.

func = EX\_REF: Returns the currently set information to item.

(2)item

Specifies the conditions for recording trace data in bit units.

0: The condition of the corresponding bit is invalid

1: Setting: The condition of the corresponding bit is valid

(2) item  
Specifies the conditions for recording trace data in bit units.  
0: The condition of the corresponding bit is invalid  
1: Setting: The condition of the corresponding bit is valid

[Description of operation]

Set / refer to the conditions for recording trace data.

The relationship between the setting of bit [15:12] of the item and the output type of the trace data to be recorded is as follows.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Set value | Data write access Output type when | | Data read access Output type when | | Output of program correlation message (\* 1) |
| Address information | Data information | Address information | Data information |
| EX\_RH\_EVN\_CPUDTM1\_1  EX\_RH\_EVN\_EMSDTM1\_1  EX\_RH\_EVN\_GRMDTM1\_1 | ○ | ○ | ○ | ○ | × |
| EX\_RH\_EVN\_CPUDTM2\_2 | ○ |
| EX\_RH\_EVN\_LRMDTM1\_3 | △ | × | × |
| EX\_RH\_EVN\_CPUDTM1\_35  EX\_RH\_EVN\_GVCDTM1\_35 | ▲ | ▲ | × |
| EX\_RH\_EVN\_CPUDTM2\_45 | ○ |
| EX\_RH\_EVN\_CPUDTM35\_35  EX\_RH\_EVN\_DMADTM35\_35 | ▲ | ▲ | × |
| EX\_RH\_EVN\_CPUDTM45\_45 | ○ |
| EX\_RH\_EVN\_CPUDTM3\_3  EX\_RH\_EVN\_LRMDTM3\_3  EX\_RH\_EVN\_EMSDTM3\_3  EX\_RH\_EVN\_GRMDTM3\_3  EX\_RH\_EVN\_GVCDTM3\_3  EX\_RH\_EVN\_DMADTM3\_3 | △ | × | △ | × | × |
| EX\_RH\_EVN\_CPUDTM4\_4 | ○ |

○：Applicable information is output to the same trace data

△：Applicable information is output to separate trace data Applicable information is output to the same trace data

▲：Applicable information is output as separate trace data (association of each information uses the access ID information included in the trace data)

×：The corresponding information is not output to the trace data.

\* 1: Trace data that outputs absolute address information of the instruction that executed data access (output separately from trace data at data access)

If neither the internal trace nor the external trace is selected as the trace output type, an error (EX\_DE\_TRCDISABLE) is returned.

Note that the trace function (TCU) may not be implemented depending on the device. In this case, an error is returned. For details on returning this error, refer to [Setting target for each I / F] of the trace function.

Also, if "Acquire data access" is set with this function when no data access event condition is set as a qualifying trace condition, if there is no unused TEU access event of 1ch or more, Respond with an error.

For details on consuming one channel of events as an internal process of the EXEC, refer to the trace function [Event acquisition and release at data access].

An EX\_SE\_USRPGMRUN error occurs during hot plug-in RUN (from connection to forced break).

(As a future specification after the next development version, it can be set during hot plug-in RUN as well as during normal RUN)

An error (EX\_SE\_CANTCALL\_ASPRUNNING) is returned if called while the user program is running with the E2 extended function enabled.

If the user program is called during execution (LPD trace mode) while the external soft trace single-line output function is enabled while the E2 extension function is disabled, an error (EX\_SE\_SFTTRCRUN) is issued. return. For details on the external soft trace single-wire output function, refer to "Operation Specifications for External Soft Trace Single-Line Output Function".

No error is returned even if the virtualization information at the time of switching the CPU operation mode is obtained for a model or virtual machine that does not support the virtualization support function. Since no CPU operation mode switching occurs, no trace data is acquired.

[Notes when the initial stop / standby mode debug environment is enabled]

(1) While the user program is running, in the initial stop and standby mode other than the CyclicRun mode, control of the debug module cannot be performed, so an error (EX\_SE\_STANDBY\_NOSPRT) is returned and processing is not performed. However, if ICUM is enabled, an error (EX\_SE\_STANDBY\_NOSPRT) is returned and processing is not performed even in CyclicRun mode.

[Notes on multi-core and slave support]

(1) Set the CPU trace and slave trace settings for the currently selected physical CPU (PE) or slave resource.

(2) Switching of physical CPU (PE) or slave resources is performed by ex\_socunitinfo2 (EX\_UNIT\_COREPESEL / EX\_UNIT\_SLAVEIDSEL).

[Notes for debugger developers]

(1) If different parameters are set, clear the trace data.

(2) When the trace output type (external trace, internal trace) is changed, the setting value is initialized. Note that the trace output type is changed using ex\_socunitinfo2 (EX\_UNIT\_TRCSEL).