

***** IMPORTANT *****

ERRATA INFORMATION

JANUARY 2008

This erratum contains important information for proper operation of the following product.

Product: EM405-8 User Manual (C&H Part #: 11029384)

Manual Edit:

The following pages contain changes to the referenced sections of the EM405-8 User Manual. Please contact C&H Technologies, Inc for questions at 512-733-2621 or support@chtech.com.

Reg. 10	M-Module 0 Trigger A Control															
Byte	11							10								
Reg. 12	M-Module 1 Trigger A Control															
Byte	13							12								
Reg. 14	M-Module 2 Trigger A Control															
Byte	15							14								
Reg. 16	M-Module 3 Trigger A Control															
Byte	17							16								
Reg. 18	M-Module 4 Trigger A Control															
Byte	19							18								
Reg. 1A	M-Module 5 Trigger A Control															
Byte	1B							1A								
Reg. 1C	M-Module 6 Trigger A Control															
Byte	1D							1C								
Reg. 1E	M-Module 7 Trigger A Control															
Byte	1F							1E								
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Write	TAENx	TAEDGESELx	-	TAPx	TARFx	TAELx	TADx	-	TASTx			-	TASNx			
Read	TAENx	TAEDGESELx	0	TAPx	TARFx	TAELx	TADx	0	TASTx			0	TASNx			

- TAENx ⇒ Enabled (1 = enabled)
 TAEDGESELx ⇒ EDGECLK Number (only used when direction = input)
 TAPx ⇒ Polarity (0 = normal, 1 = invert)
 TARFx ⇒ Rising/Falling Edge (0 = rising, 1 = falling) (only used when Edge Triggering)
 TAELx ⇒ Edge/Level Sensitive (0 = edge, 1 = level) (only used when direction = input)
 TADx ⇒ Direction (0 = input, 1 = output)¹
 TASTx ⇒ Signal Source Type (only used when direction = output)²
 0 0 0 External TTL Trigger
 0 0 1 External LVDS Trigger
 0 1 0 M-Module Trigger A
 0 1 1 M-Module Trigger B
 1 0 0 LAN trigger
 1 0 1 reserved
 1 1 0 reserved
 1 1 1 Controller Software
 TASNx ⇒ Signal Source Number³

Notes:

1. The direction is with respect to the internal trigger logic. For M-modules, setting the direction to input, means the M-module is expected to drive the trigger. The M-module's internal trigger control logic must be set to output the trigger.
2. The specified signal source must be configured as an input for proper operation.
3. Not used for External TTL Trigger or Controller Software signal sources.

Figure 11. EM405-8 Registers (continued)

Reg. 20	M-Module 0 Trigger B Control															
Byte	21								20							
Reg. 22	M-Module 1 Trigger B Control															
Byte	23								22							
Reg. 24	M-Module 2 Trigger B Control															
Byte	25								24							
Reg. 26	M-Module 3 Trigger B Control															
Byte	27								26							
Reg. 28	M-Module 4 Trigger B Control															
Byte	29								28							
Reg. 2A	M-Module 5 Trigger B Control															
Byte	2B								2A							
Reg. 2C	M-Module 6 Trigger B Control															
Byte	2D								2C							
Reg. 2E	M-Module 7 Trigger B Control															
Byte	2F								2E							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Write	TBENx	TBEDGESELx	-	TBPx	TBRFx	TBELx	TBDx	-	TBSTx				-	TBSNx		
Read	TBENx	TBEDGESELx	0	TBPx	TBRFx	TBELx	TBDx	0	TBSTx				0	TBSNx		

- TBENx ⇒ Enabled (1 = enabled)
- TBEDGESELx ⇒ EDGECLK Number (only used when direction = input)
- TBPx ⇒ Polarity (0 = normal, 1 = invert)
- TBRFx ⇒ Rising/Falling Edge (0 = rising, 1 = falling) (only used when Edge Triggering)
- TBELx ⇒ Edge/Level Sensitive (0 = edge, 1 = level) (only used when direction = input)
- TBDx ⇒ Direction (0 = input, 1 = output)¹
- TBSTx ⇒ Signal Source Type (only used when direction = output)²
 - 0 0 0 External TTL Trigger
 - 0 0 1 External LVDS Trigger
 - 0 1 0 M-Module Trigger A
 - 0 1 1 M-Module Trigger B
 - 1 0 0 LAN trigger
 - 1 0 1 reserved
 - 1 1 0 reserved
 - 1 1 1 Controller Software
- TBSNx ⇒ Signal Source Number³

Notes:

1. The direction is with respect to the internal trigger logic. For M-modules, setting the direction to input, means the M-module is expected to drive the trigger. The M-module's internal trigger control logic must be set to output the trigger.
2. The specified signal source must be configured as an input for proper operation.
3. Not used for External TTL Trigger or Controller Software signal sources.

Figure 11. EM405-8 Registers (continued)

Reg. 30	LVDS Trigger 0 Control															
Byte	31								30							
Reg. 32	LVDS Trigger 1 Control															
Byte	33								32							
Reg. 34	LVDS Trigger 2 Control															
Byte	35								34							
Reg. 36	LVDS Trigger 3 Control															
Byte	37								36							
Reg. 38	LVDS Trigger 4 Control															
Byte	39								38							
Reg. 3A	LVDS Trigger 5 Control															
Byte	3B								3A							
Reg. 3C	LVDS Trigger 6 Control															
Byte	3D								3C							
Reg. 3E	LVDS Trigger 7 Control															
Byte	3F								3E							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Write	LTEN _x	LTEDGESEL _x	LTOM _x	LTP _x	LTRF _x	LTEL _x	LTD _x	LBIAS _x	LTST _x				-	LTSN _x		
Read	LTEN _x	LTEDGESEL _x	LTOM _x	LTP _x	LTRF _x	LTEL _x	LTD _x	LBIAS _x	LTST _x				0	LTSN _x		

- LTEN_x ⇒ Enabled (1 = enabled)
- LTEDGESEL_x ⇒ EDGECLK Number (only used when direction = input or output mode = wired-OR)
- LTOM_x ⇒ Output Mode (0 = driven, 1 = wired-OR) (only used when direction = input/output)
- LTP_x ⇒ Polarity (0 = normal, 1 = invert)
- LTRF_x ⇒ Rising/Falling Edge (0 = rising, 1 = falling) (only used when Edge Triggering)
- LTEL_x ⇒ Edge/Level Sensitive (0 = edge, 1 = level) (not used when output mode = driven)
- LTD_x ⇒ Direction (0 = input, 1 = input/output) ¹
- LBIAS_x ⇒ Bias Mode (0 = normal, 1 = Wired-OR bias enabled) ²
- LTST_x ⇒ Signal Source Type (only used when direction = output) ³
- | | |
|-------|-----------------------|
| 0 0 0 | External TTL Trigger |
| 0 0 1 | External LVDS Trigger |
| 0 1 0 | M-Module Trigger A |
| 0 1 1 | M-Module Trigger B |
| 1 0 0 | LAN trigger |
| 1 0 1 | reserved |
| 1 1 0 | reserved |
| 1 1 1 | Controller Software |
- LTSN_x ⇒ Signal Source Number ⁴

Notes:

- The direction is with respect to the internal trigger logic. For LVDS triggers, setting the direction to output means that the LVDS trigger is driven by the carrier.
- When Wired-OR Bias mode is enabled, all other configuration bits are ignored and functionally, the trigger line is input only (non-participating). If you would like to configure the device to act as the wired-or bias and to participate in the triggering, set the BIAS mode bit to '0', set the Direction to 'input/output' and set the output-mode to 'driven.'
- The specified signal source must be configured as an input or wired-OR for proper operation.
- Not used for External TTL Trigger or Controller Software signal sources.

Figure 11. EM405-8 Registers (continued)

External Input TTL Trigger Control

Reg. 50

Byte	51								50							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Write	ITEN	ITEDGESEL	ITLVL	ITP	ITRF	ITEL	ITIMP	-	-	-	-	-	-	-	-	-
Read	ITEN	ITEDGESEL	ITLVL	ITP	ITRF	ITEL	ITIMP	0	0	0	0	0	0	0	0	0

- ITEN ⇒ Enabled (1 = enabled)
- ITEDGESEL ⇒ EDGECLK Number (only used when Edge Triggering)
- ITLVL ⇒ External Input Trigger Threshold Level (0 = +2.5V, 1 = +1.4V)
- ITP ⇒ Polarity (0 = normal, 1 = invert)
- ITRF ⇒ Rising/Falling Edge (0 = rising, 1 = falling) (only used when Edge Triggering)
- ITEL ⇒ Edge/Level Sensitive (0 = edge, 1 = level)
- ITIMP ⇒ External Input Trigger Impedance (0 = high (>900KΩ), 1 = 50Ω)

External Output TTL Trigger Control

Reg. 52

Byte	53								52							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Write	OTEN	-	-	-	OTP	-	-	-	-	OTST			-	OTSN		
Read	OTEN	0	0	0	OTP	0	0	0	0	OTST			0	OTSN		

- OTEN ⇒ Enabled (1 = enabled)
- OTP ⇒ Polarity (0 = normal, 1 = invert)
- OTST ⇒ Signal Source Type¹
 - 0 0 0 External TTL Trigger
 - 0 0 1 External LVDS Trigger
 - 0 1 0 M-Module Trigger A
 - 0 1 1 M-Module Trigger B
 - 1 0 0 LAN trigger
 - 1 0 1 reserved
 - 1 1 0 reserved
 - 1 1 1 Controller Software
- OTSN ⇒ Signal Source Number²

Notes:

1. The specified source must be configured as an input for proper operation.
2. The specific number of the signal source. Not used for External TTL Trigger or Controller Software signal sources.

Figure 11. EM405-8 Registers (continued)

1.1 CONTROLLING THE TRIGGERS

The EM405-8 carrier (-0001 version only) implements flexible trigger control capabilities providing the user with many options for using triggers. Although not all M-Modules support triggers, each M-Module position on the EM405-8 carrier can support both of the possible trigger lines (TRIGA & TRIGB) on an M-Module. The function of each M-Module trigger line is fully dependent upon the M-Module. Refer to the particular M-Module's documentation for details. The carrier also provides external TTL level trigger access through two external BNC connectors and LVDS level triggers through double stacked micro-D connectors

Each trigger can be configured to be either an input or output. **The direction is always referenced with respect to the internal trigger control logic.** For example, a trigger produced by an M-Module is referred to as an **input** trigger, because the trigger is an input to the internal trigger control logic. A trigger received by an M-Module is referred to as an **output** trigger, since it is produced by the internal trigger logic. If the trigger is defined as an input, then it can be used to produce a trigger to an M-Module or an external device. A single input trigger can be used to drive any number of output triggers. If a trigger is defined as an output then the source of the trigger must be specified.

The internal trigger logic provides input conditioning and routing of the trigger signals as shown in Figure 1. Each trigger type (Trig A and B for each M-Module, LVDS Triggers 0-7, External TTL level, LAN, or Software) can be simply passed-through (level triggering) or latched on the rising or falling edge (edge triggering) of another signal (EDGECLK). Up to four EDGECLK's can be specified. An EDGECLK can any signal specified as an input. Optionally, the input signal can be inverted. Any signal defined as an input can be used as an output trigger. In addition, the output trigger can be inverted as shown in Figure 2.

TTL level triggering is provided through two external BNC connectors. One connector is for an input trigger and the other is for an output trigger. The TTL input trigger has a software configurable threshold and input impedance. The input threshold is configurable using the TLVL bit in the *TTL Trigger Control* register and can be set to either +1.4 volts or +2.5 volts. The input impedance is configurable using the TIMP bit in the *TTL Trigger Control* register and can be set to either high impedance (>900K Ω) or 50 Ω . The output trigger line has a set output impedance of 50 Ω and a set output drive level of +5V (typical) into a high impedance load.

Eight LVDS triggers are provided through double stacked micro-D connectors. The stacked configuration allows easy daisy chaining and termination of the LVDS triggers to other modules. There is a one-to-one connection of signals on the connectors (i.e., pin 1 is tied to pin 1, pin 2 is tied to pin 2, and so on). Refer to Appendix A for pin-out details. For proper operation, the LVDS triggers must be properly terminated. Information about connection and termination techniques is available on the LXI Standard website

(www.lxistandard.org). However, the LVDS triggers have currently not been tested for LXI compliance. Use should be limited to non-LXI applications.

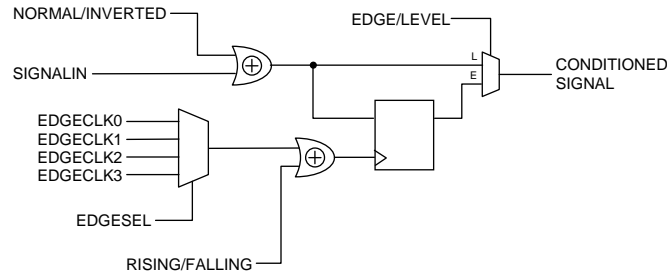


Figure 1. Trigger Logic (Input Direction)

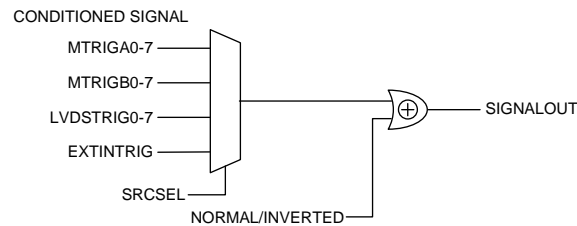


Figure 2. Trigger Logic (Output Direction)

As required by the LXI specification, the EM405-8 is capable of providing the LVDS Wired-Or Bias on any or all of the 8 LVDS trigger lines. Wired-Or is a triggering topology in which more than one device can drive a single LVDS trigger line. Detailed information about using Wired-Or triggers on the LXI Wired Trigger Bus is available on the LXI Standard website (www.lxistandard.org). When the LBIAS bit in the *LVDS Trigger Control* register is set to '1' for a particular LVDS trigger line, the EM405-8 is configured to be the Wired-Or Bias device for that trigger. In this mode, all other bits in the *LVDS Trigger Control* register are ignored and the device is configured to continuously provide the Wired-Or Bias signal. Electrically, Wired-Or BIAS mode is equivalent to the device being in 'driven mode' and continuously driving logic '0'. Therefore, it is not immediately apparent, but it is also possible for the EM405-8 to provide the Wired-Or Bias and participate in the Wired-Or Triggering. To do so, simply leave the LBIAS bit set to '0' and operate the device in 'driven mode'. In this mode, the EM405-8 drives a logic '0' (Wired-Or Bias equivalent) on the trigger line when it does not want to assert the line yet when it does want to assert the line it simply drives a logic '1' like normal. All other participating devices on that trigger line must be set to Wired-Or mode.