See the possibilities

Command List

SW-4000TL-PMCL

High Speed CMOS Trilinear Camera

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Thank you for purchasing this product.

⚠ Be sure to read this manual before use.

This manual includes important safety precautions and instructions on how to operate the unit. Be sure to read this manual to ensure proper operation. The contents of this manual are subject to change without notice for the purpose of improvement.

Communication Protocol for SW-4000TL-PMCL

All configuration of the camera is done via the RS-232C port. The camera can be set up from a PC running terminal emulator software.
Below is the description of the ASCII based short command protocol.

1. Model name

SW-4000TL-PMCL High Speed CMOS Trilinear Camera

2. Communication setting

Baud Rate	9600
Data Length	8bit
Start Bit	1bit
Stop Bit	1bit
Parity	Non
Xon/Xoff Control	Non

3. Protocol(Short ASCII Command)

3.1. Transmit the setting command to camera

NN is any kind of the commands.
NN=[Param.]<CR><LF>
e.g.
Send to camera: GA=0 <CR><LF>
Camera response: COMPLETE<CR><LF>

When camera receives the valid command, camera will return 'COMPLETE'.
If camera receives the command, camera will return following:
e.g.
Send to camera: GAX=0 <CR><LF>
Camera response: 01 Unknown Command!!<CR><LF>
e.g.
Send to camera: GA=1000 <CR><LF>
Camera response: 02 Bad Parameters!!<CR><LF>

3.2. Transmit the request command to camera

The status of camera's settings can be queried by transmitting NN?<CR><LF>, where NN is any kind of the commands.
The camera will return the current setting data.
e.g.
Send to camera: GA? <CR><LF>
Camera response: GA=0<CR><LF>

3.3. Switching baud rate between PC and camera

Camera always starts up with 9600bps. This can be switched to higher baud rates after a communication has been established. When switching to other baud rate the procedure is as follows.

e.g. Change baud rate to 115200bps

1. Confirm baud rates camera supported
   Send to camera: SBDRT? <CR><LF>
   Camera response: SBDRT=31(0x1F)<CR><LF>

2. Request new baud rate
   Send to camera: CBDRT=16(0x10) <CR><LF>
   Camera response: COMPLETE<CR><LF>

(Change baud rate to 115200bps)

3. Rewrite new baud rate again with new baud rate (Confirmation command)
   Send to camera: CBDRT=16(0x10) <CR><LF>
   Camera response: COMPLETE<CR><LF>

   In case the camera does not receive the confirming command with new baud rate within 250ms after sending the acknowledge it falls back to the original baud rate (9600bps).

DeviceControl

Name	Access	Short ASCII	Values	MIN	MAX	DEFAULT	Description
DeviceVendorName	R/O	DVN	"JAI Corporation"	-	-	-	DVN?<CR><LF> Display the manufacture name.
DeviceModelName	R/O	MD	"SW-4000TL-PMCL"	-	-	-	MD?<CR><LF> Display the model name.
DeviceVersion	R/O	DV	Indicate device version (e.g. “0.1.0.0”)	-	-	-	DV?<CR><LF> Display the camera version.
DeviceFirmwareVersion	R/O	VN	"*.*.*.*"	-	-	-	VN?<CR><LF> Display the version of firmware.
DeviceFpgaVersion	R/O	FPVN	"*.*.*.*"	-	-	-	FPVN?<CR><LF> Display the version of fpga.
DeviceSerialNumber	R/O	ID	Serial Number	-	-	-	ID?<CR><LF> Display the device ID.
DeviceUserID	R/W	UD	User can save and load free text. (64 or less characters)				UD=[Param.]<CR><LF> UD?<CR><LF> Set the user ID for the camera
DeviceTempoerature	R/O	TMP0					TMP0?<CR><LF> Display the device temperature in degrees Celsius (C).
DeviceReset	W/O	CRS00	1	-	-	-	CRS00=1<CR><LF> Reset the device.

TechnologySpecificBootstrapRegister

Name	Access	Short ASCII	Values	MIN	MAX	DEFAULT	Description
SupportedBaudrates	R/O	SBDRT	Indicate Support/Non-support status for each baud rate bit0: 9600bps bit1: 19200bps bit2: 38400bps bit3: 57600bps bit4: 115200bps	0x01	0xFF	0x1F	SBDRT?<CR><LF> This camera supports 9600bps, 19200bps, 38400bps, 57600bps, and 115200bps.
CurrentBaudrate	R/W	CBDRT	READ: Indicate current baud rate WRITE: Set any bit of baud rate bit0: 9600bps bit1: 19200bps bit2: 38400bps bit3: 57600bps bit4: 115200bps	0x01	0x80	1 (9600bps)	CBDRT=[Param.]<CR><LF> CBDRT?<CR><LF> In case of WRITE execution (change baud rate), it needs to control in the proper sequence between Host and Camera. (Refer to the section 3.3)

ImageFormatControl

Name	Access	Short ASCII	Values	MIN	MAX	DEFAULT	Description
Width	R/W	WTC	Min～(Max - OffsetX)	16	4096	4096	WTC=[Param.]<CR><LF> WTC?<CR><LF> Set the image width. ※ BinningHorizontal=1:16~4096, Step:16Pix/Step BinningHorizontal=2: 8~2048, Step: 8Pix/Step (The value will be set configuration steps)
OffsetX	R/W	OFC	Min～(Max – Width)	0	4080	0	OFC=[Param.]<CR><LF> OFC?<CR><LF> Set the horizontal offset. ※ BinningHorizontal=1:0~4080, Step:16Pix/Step BinningHorizontal=2:0~2040, Step: 8Pix/Step (The value will be set configuration steps)
BinningHorizontal	R/W	HB	1: Binning Off 2: Binning On	1	2	1	HB=[Param.]<CR><LF> HB?<CR><LF> Set the number of pixels in the horizontal direction for whitch to perform binning.
BinningVertical	R/W	VB	1: Binning Off 2: Binning On	1	2	1	VB=[Param.]<CR><LF> VB?<CR><LF> Set the number of pixels in the vertical direction for which to perform binning.
PixelFormat	R/W	BA	0 : RGB8 1 : RGB10	0	2	0	BA=[Param.]<CR><LF> BA?<CR><LF> Set the pixel format.
TestImageSelector	R/W	TPN	0 : Off 1 : White 2 : Gray Pattern 1 (Ramp) 3 : Gray Pattern 2 (Stripe) 4 : Color Bar	0	4	0	TPN=[Param.]<CR><LF> TPN?<CR><LF> Select the test image.

AcquisitionControl

Name	Access	Short ASCII	Values	MIN	MAX	DEFAULT	Description
AcquisitionLineRate	R/W	LR		1516	1515152	1515152	LR=[Param.]<CR><LF> LR?<CR><LF> Use this command to set the line rate of the camera by specifying the line period. The unit value is 1/100 µs. Example: If you need 65963 Hz = 1516 (15.16 µs line period).
TriggerMode	R/W	TM	0 : Off 1 : On	0	1	0	TM=[Param.]<CR><LF> TM?<CR><LF> Display the Trigger mode.
TriggerSource	R/W	TI	0 : Low 1 : High 10 : PulseGenerator 0 11 : PulseGenerator 1 12 : PulseGenerator 2 13 : PulseGenerator 3 14 : UserOutput 0 15 : UserOutput 1 16 : UserOutput 2 17 : UserOutput 3 20 : Line4 : TTL In1 21 : Line5 : Opt In1 23 : Line7 : :CC1 24 : Line10 : TTL In2 26 : NAND0Out 27 : NAND1Out 28 : Line13 : TTL In3 29 : EncoderTriger	0	29	20	TI=[Param.]<CR><LF> TI?<CR><LF> Select the trigger signal source.
TriggerActivation	R/W	TA	0: RisingEdge 1: FallingEdge 2: LevelHigh 3: LevelLow	0	3	1	TA=[Param.]<CR><LF> TA?<CR><LF> Select the polarity of the trigger signal(i.e., location of signal at which trigger is applied).
ExposureMode	R/W	TR	0 : Off 1 : Timed 2 : TriggerWidth	0	2	1	TR=[Param.]<CR><LF> TR?<CR><LF> Select the exposure mode.
ExposureTime	R/W	PE	300～1514908[0.01us]	300	1514908	27847	PE=[Param.]<CR><LF> PE?<CR><LF> Set the exposure time.
AutoReset	R/W	ARS	0 : Off 1 : On	0	1	0	ARS=[Param.]<CR><LF> ARS?<CR><LF> Set the AutoReset. (When auto reset mode is enabled, LVAL, DVAL, and video are not output while the trigger input is interrupted. When resuming trigger input, output of LVAL, DVAL, and video is resumed.)
AcquisitionLineRateMin	R/O	LRMIN		-	-	-	LRMIN?<CR><LF> Display the minimum value that can be set to [AcquisitionLineRate].
ExposureTimeMin	R/O	PEMIN		-	-	-	PEMIN?<CR><LF> Display the minimum value that can be set to [ExposureTime].
ExposureTimeMax	R/O	PEMAX		-	-	-	PEMAX?<CR><LF> Display the maximum value that can be set to [ExposureTime].
AcquisitionLineRateOption	R/W	LROP	0 : mode1 1 : mode2	0	1	1	LROP=[Param.]<CR><LF> LROP?<CR><LF> Set the [AcquisitionLineRateOption]. If mode2 is selected, the maximum line rate is limited.

AnalogControl

Name	Access	Short ASCII	Values	MIN	MAX	DEFAULT	Description
IndividualGainMode	R/W	GM	0: Off 1: On	0	1	0	GM=[Param.]<CR><LF> GM?<CR><LF> To set Gain individually for RGB, set it to On.
IndividualGainMode = Off							
Gain[DigitalAll]	R/W	GA	100～800	100	800		GA=[Param.]<CR><LF> GA?<CR><LF> Set Gain [DigitalAll], when IndividualMode is Off.
Gain[DigitalRed]	R/W	GAR	40～400	40	400		GAR=[Param.]<CR><LF> GAR?<CR><LF> Set Gain [DigitalRed], when IndividualMode is Off.
Gain[DigitalBlue]	R/W	GAB	40～400	40	400		GAB=[Param.]<CR><LF> GAB?<CR><LF> Set Gain [DigitalBlue], when IndividualMode is Off.
IndividualGainMode = Off							
Gain[DigitalRed]	R/W	GAR	100～1600	100	1600	100	GAR=[Param.]<CR><LF> GAR?<CR><LF> Set Gain [DigitalRed], when IndividualMode is On.
Gain[DigitalGreen]	R/W	GAG	100～1600	100	1600	100	GAG=[Param.]<CR><LF> GAG?<CR><LF> Set Gain [DigitalGreen], when IndividualMode is On.
Gain[DigitalBlue]	R/W	GAB	100～1600	100	1600	100	GAB=[Param.]<CR><LF> GAB?<CR><LF> Set Gain [DigitalBlue], when IndividualMode is On.
AnalogBaseGain[AnalogAll]	R/W	SGA	0 : 0db 1 : 6db 2 : 12db	0	2	0	SGA=[Param.]<CR><LF> SGA?<CR><LF> Set AnalogBaseGain[AnalogAll].
BalanceWhiteAuto	R/W	AWB	0 : Off 2 : Once 5 : Preset 5000K 6 : Preset 6500K 7 : Preset 7500K	0	7	0	AWB=[Param.]<CR><LF> AWB?<CR><LF> Set BalanceWhiteAuto. When IndividualGainMode = On is set, only Off can be selected.
AWBAreaWidth	R/W	AWBW	Binning Horizontal =1 Min: 16 Max: 4096 Inc: 16 Binning Horizontal =2 Min: 8 Max: 2048 Inc: 8	-	-	-	AWBW=[Param.]<CR><LF> AWBW?<CR><LF> Set the Width of the area to reference the level, when BalanceWhiteAuto is Once.
AWBAreaOffsetX	R/W	AWBO	Binning Horizontal =1 Min: 0 Max: 4080 Inc: 16 Binning Horizontal =2 Min: 0 Max: 2040 Inc: 8	-	-	-	AWBO=[Param.]<CR><LF> AWBO?<CR><LF> Set the offset X of the area to reference the level, when BalanceWhiteAuto is Once.
AWBOnceStatus	R/O	AWRS	1=Succeeded. 2=Error1 - G image was too bright. 3=Error2 - G image was too dark. 4=Error3 - Timeout-error occurred. 5=IDEL	1	5	-	AWRS?<CR><LF> Displays the status at the time of execution (BalanceWhiteAuto=Once).
BlackLevel[DigitalAll]	R/W	BL	-133～255	-133	255	0	BL=[Param.]<CR><LF> BL?<CR><LF> Controls the analog black level as an absolute physical value. This represents a DC offset applied to the video signal.

BlackLevel[DigitalRed]	R/W	BLR	-64～64	-64	64	0	BLR=[Param.]<CR><LF> BLR?<CR><LF> Controls the analog black level as an absolute physical value. This represents a DC offset applied to the video signal.
BlackLevel[DigitalBlue]	R/W	BLB	-64～64	-64	64	0	BLB=[Param.]<CR><LF> BLB?<CR><LF> Controls the analog black level as an absolute physical value. This represents a DC offset applied to the video signal.
Gamma	R/W	GMA	40～100	45	100	45	GMA=[Param.]<CR><LF> GMA?<CR><LF> Controls the gamma correction of pixel intensity. This is typically used to compensate for non-linearity of the display system (such as CRT).
LUTMode	R/W	LUN	0: Off 1: Gamma 2: LUT	0	2	0	LUN=[Param.]<CR><LF> LUN?<CR><LF> Select the JAI LUT mode.

LUTControl

Name	Access	Short ASCII	Values	MIN	MAX	DEFAULT	Description
LUTIndex[Red]	R/W	LUTIR	0～256	0	256	0	LUTIR=[Param.]<CR><LF> LUTIR?<CR><LF> Select Index of LUT
LUTIndex[Green]	R/W	LUTIG	0～256	0	256	0	LUTIG=[Param.]<CR><LF> LUTIG?<CR><LF> Select Index of LUT
LUTIndex[Blue]	R/W	LUTIB	0～256	0	256	0	LUTIB=[Param.]<CR><LF> LUTIB?<CR><LF> Select Index of LUT
LUTValue[Red]	R/W	LUTR	0～4095	0	4095		LUTR=[Param.]<CR><LF> LUTR?<CR><LF> Set LUT value
LUTValue[Green]	R/W	LUTG	0～4095	0	4095		LUTG=[Param.]<CR><LF> LUTG?<CR><LF> Set LUT value
LUTValue[Blue]	R/W	LUTB	0～4095	0	4095		LUTG=[Param.]<CR><LF> LUTG?<CR><LF> Set LUT value

ColorTransformationControl

Name	Access	Short ASCII	Values	MIN	MAX	DEFAULT	Description
ColorTransformationMode	R/W	CTM	0 : RGB 1 : XYZ 2 : HIS	0	2	0	CTM=[Param.]<CR><LF> CTM?<CR><LF> Select output format
ColorTransformationRGBMode	R/W	CTRM	0 : Off 1 : sRGB 2 : Adobe RGB 3 : User Custom	0	3	0	CTRM=[Param.]<CR><LF> CTRM?<CR><LF> Select which RGB mode to use, when setting ColorTransformationMode to RGB
ColorMatrixValue[R-R]	R/W	CMVRR	-20000～20000	-20000	20000	-	CMVRR=[Param.]<CR><LF> CMVRR?<CR><LF> ColorTransformationMode = RGB, ColorTransformationRGBMode=UserCustom Individual adjust 9 elements of the 3x3 color matrix (R-R).
ColorMatrixValue[R-G]	R/W	CMVRG	-20000～20000	-20000	20000	-	CMVRG=[Param.]<CR><LF> CMVRG?<CR><LF> ColorTransformationMode = RGB, ColorTransformationRGBMode=UserCustom Individual adjust 9 elements of the 3x3 color matrix (R-G).
ColorMatrixValue[R-B]	R/W	CMVRB	-20000～20000	-20000	20000	-	CMVRB=[Param.]<CR><LF> CMVRB?<CR><LF> ColorTransformationMode = RGB, ColorTransformationRGBMode=UserCustom Individual adjust 9 elements of the 3x3 color matrix (R-B).
ColorMatrixValue[G-R]	R/W	CMVGR	-20000～20000	-20000	20000	-	CMVGR=[Param.]<CR><LF> CMVGR?<CR><LF> ColorTransformationMode = RGB, ColorTransformationRGBMode=UserCustom Individual adjust 9 elements of the 3x3 color matrix (G-R).
ColorMatrixValue[G-G]	R/W	CMVGG	-20000～20000	-20000	20000	-	CMVGG=[Param.]<CR><LF> CMVGG?<CR><LF> ColorTransformationMode = RGB, ColorTransformationRGBMode=UserCustom Individual adjust 9 elements of the 3x3 color matrix (G-G).
ColorMatrixValue[G-B]	R/W	CMVGB	-20000～20000	-20000	20000	-	CMVGB=[Param.]<CR><LF> CMVGB?<CR><LF> ColorTransformationMode = RGB, ColorTransformationRGBMode=UserCustom Individual adjust 9 elements of the 3x3 color matrix (G-B).
ColorMatrixValue[B-R]	R/W	CMVBR	-20000～20000	-20000	20000	-	CMVBR=[Param.]<CR><LF> CMVBR?<CR><LF> ColorTransformationMode = RGB, ColorTransformationRGBMode=UserCustom Individual adjust 9 elements of the 3x3 color matrix (B-R).
ColorMatrixValue[B-G]	R/W	CMVBG	-20000～20000	-20000	20000	-	CMVBG=[Param.]<CR><LF> CMVBG?<CR><LF> ColorTransformationMode = RGB, ColorTransformationRGBMode=UserCustom Individual adjust 9 elements of the 3x3 color matrix (B-G).
ColorMatrixValue[B-B]	R/W	CMVBB	-20000～20000	-20000	20000	-	CMVBB=[Param.]<CR><LF> CMVBB?<CR><LF> ColorTransformationMode = RGB, ColorTransformationRGBMode=UserCustom Individual adjust 9 elements of the 3x3 color matrix (B-B).

DigitalIOControl

Name	Access	Short ASCII	Values	MIN	MAX	DEFAULT	Description
LineInverter[TTLOut1]	R/W	LI0	0 : False 1 : True	0	1	0	LI0=[Param.]<CR><LF> LI0?<CR><LF> Invert the polarity of the signal(TTLOut1).
LineInverter[TTLOut2]	R/W	LI1	0 : False 1 : True	0	1	0	LI1=[Param.]<CR><LF> LI1?<CR><LF> Invert the polarity of the signal(TTLOut2).
LineInverter[TTLOut3]	R/W	LI2	0 : False 1 : True	0	1	0	LI2=[Param.]<CR><LF> LI2?<CR><LF> Invert the polarity of the signal(TTLOut3).
LineInverter[TTLOut4]	R/W	LI3	0 : False 1 : True	0	1	0	LI3=[Param.]<CR><LF> LI3?<CR><LF> Invert the polarity of the signal(TTLOut4).
LineInverter[NANDGate0In1]	R/W	ND0INV1	0 : False 1 : True	0	1	0	ND0INV1=[Param.]<CR><LF> ND0INV1?<CR><LF> Invert the polarity of the signal(NANDGate0In1).
LineInverter[NANDGate0In2]	R/W	ND0INV2	0 : False 1 : True	0	1	0	ND0INV2=[Param.]<CR><LF> ND0INV2?<CR><LF> Invert the polarity of the signal(NANDGate0In2).
LineInverter[NANDGate1In1]	R/W	ND1INV1	0 : False 1 : True	0	1	0	ND1INV1=[Param.]<CR><LF> ND1INV1?<CR><LF> Invert the polarity of the signal(NANDGate1In1).
LineInverter[NANDGate1In2]	R/W	ND1INV2	0 : False 1 : True	0	1	0	ND1INV2=[Param.]<CR><LF> ND1INV2?<CR><LF> Invert the polarity of the signal(NANDGate1In2).
LineSource[TTLOut1]	R/W	LS0	0: Low 1: High 7: ExposureActive 9: LVAL 10: PulseGenerator0 11: PulseGenerator1 12: PulseGenerator2 13: PulseGenerator3 14: UserOutput0 15: UserOutput1 16: UserOutput2 17: UserOutput3 20: Line4 : TTL In1 21: Line5 : Opt In1 23: Line7 - CC1 24: Line10 : TTL In2 26: NAND0 Out 27: NAND1 Out 28: Line13 : TTL In3 29: EncoderTriger 30: EncoderDirection	0	30	0	LS0=[Param.]<CR><LF> LS0?<CR><LF> Select signal to be passed to the Line selected by Line Selector
LineSource[TTLOut2]	R/W	LS1	Same as LI0	0	30	0	LS1=[Param.]<CR><LF> LS1?<CR><LF> Select signal to be passed to the Line selected by Line Selector
LineSource[TTLOut3]	R/W	LS2	Same as LI0	0	30	0	LS2=[Param.]<CR><LF> LS2?<CR><LF> Select signal to be passed to the Line selected by Line Selector
LineSource[TTLOut4]	R/W	LS3	Same as LI0	0	30	0	LS3=[Param.]<CR><LF> LS3?<CR><LF> Select signal to be passed to the Line selected by Line Selector

LineSource[NANDGate0In1]	R/W	ND0IN1	Same as LI0	0	30	0	ND0IN1=[Param.]<CR><LF> ND0IN1?<CR><LF> Select signal to be passed to the Line selected by Line Selector
LineSource[NANDGate0In2]	R/W	ND0IN2	Same as LI0	0	30	0	ND0IN2=[Param.]<CR><LF> ND0IN2?<CR><LF> Select signal to be passed to the Line selected by Line Selector
LineSource[NANDGate1In1]	R/W	ND1IN1	Same as LI0	0	30	0	ND1IN1=[Param.]<CR><LF> ND1IN1?<CR><LF> Select signal to be passed to the Line selected by Line Selector
LineSource[NANDGate1In2]	R/W	ND1IN2	Same as LI0	0	30	0	ND1IN2=[Param.]<CR><LF> ND1IN2?<CR><LF> Select signal to be passed to the Line selected by Line Selector
OptInFilterSelector	R/W	OPTFL	0 : Off 1 : 0.1 us 2: 1 us 3 : 5 us 4 : 10 us 5 : 50 us 6 : 100 us	0	6	0	OPTFL=[Param.]<CR><LF> OPTFL?<CR><LF> Set the noise elimination level of OptIO input signal of DigitalIO
UserOutputValue[UserOutput0]	R/W	USC0	True/False	0	1	0	USC0=[Param.]<CR><LF> USC0?<CR><LF> Sets the value of the bit selected by UserOutputSelector.
UserOutputValue[UserOutput1]	R/W	USC1	True/False	0	1	0	USC1=[Param.]<CR><LF> USC1?<CR><LF> Sets the value of the bit selected by UserOutputSelector.
UserOutputValue[UserOutput2]	R/W	USC2	True/False	0	1	0	USC2=[Param.]<CR><LF> USC2?<CR><LF> Sets the value of the bit selected by UserOutputSelector.
UserOutputValue[UserOutput3]	R/W	USC3	True/False	0	1	0	USC3=[Param.]<CR><LF> USC3?<CR><LF> Sets the value of the bit selected by UserOutputSelector.

CounterandTimerControl

Name	Access	Short ASCII	Values	MIN	MAX	DEFAULT	Description
CounterEventSource[Counter0]	R/W	CE0	0 : Off : stop the counter 1 : LineTrigger : count the number of LineTrigger	0	1	0	CE0=[Param.]<CR><LF> CE0?<CR><LF> Select the events that will be the source to increment the Counter.
CounterEventSource[Counter1]	R/W	CE1	0 : Off : stop the counter 1 : LineStart : count the number of LineStart	0	1	0	CE1=[Param.]<CR><LF> CE1?<CR><LF> Select the events that will be the source to increment the Counter.
CounterEventSource[Counter2]	R/W	CE2	0 : Off : stop the counter 1 : ExposureStart : count the number of ExposureStart	0	1	0	CE2=[Param.]<CR><LF> CE2?<CR><LF> Select the events that will be the source to increment the Counter.
CounterEventSource[Counter3]	R/W	CE3	0 : Off : stop the counter 1 : LineTransferEnd : count the number of LineTransferEnd	0	1	0	CE3=[Param.]<CR><LF> CE3?<CR><LF> Select the events that will be the source to increment the Counter.
CounterReset[Counter0]	R/W	CR0		-	-	-	CR0=0<CR><LF> CR0?<CR><LF> Reset counter value.
CounterReset[Counter1]	R/W	CR1		-	-	-	CR1=0<CR><LF> CR1?<CR><LF> Reset counter value.
CounterReset[Counter2]	R/W	CR2		-	-	-	CR2=0<CR><LF> CR2?<CR><LF> Reset counter value.
CounterReset[Counter3]	R/W	CR3		-	-	-	CR3=0<CR><LF> CR3?<CR><LF> Reset counter value.
CounterValue[Counter0]	R/O	CV0	0～4294967295	-	-	-	CV0?<CR><LF> Display the counter value.
CounterValue[Counter1]	R/O	CV1	0～4294967295	-	-	-	CV1?<CR><LF> Display the counter value.
CounterValue[Counter2]	R/O	CV2	0～4294967295	-	-	-	CV2?<CR><LF> Display the counter value.
CounterValue[Counter3]	R/O	CV3	0～4294967295	-	-	-	CV3?<CR><LF> Display the counter value.

UserSetControl

Name	Access	Short ASCII	Values	MIN	MAX	DEFAULT	Description
UserSetLoad	R/W	LD	0 : Default 1 : UserSet1 2 : UserSet2 3 : UserSet3	0	3	-	LD=[Param.]<CR><LF> Load the User Set specified by UserSetSelector to the device and make it active.
UserSetSave	R/W	SA	1 : UserSet1 2 : UserSet2 3 : UserSet3	1	3	-	SA=[Param.]<CR><LF> Save the User Set specified by UserSetSelector to the non-volatile memory of the device.
Current Area No. request	R/O	EA	0 : Default 1 : UserSet1 2 : UserSet2 3 : UserSet3	0	3	-	EA?<CR><LF> Display current area No.

TranceportLayerControl

Name	Access	Short ASCII	Values	MIN	MAX	DEFAULT	Description
ClConfiguration	R/W	CLCFG	0: Base 1: Medium 2: Full 4: Eighty Bit	0	4	0	CLCFG=[Param.]<CR><LF> CLCFG?<CR><LF> Set the Camera Link configuration.
CameraLinkClockFrequency	R/W	CLCF	0: 85MHz 1: 63.75MHz 2: 42.5MHz 3: 31.875MHz	0	3	0	CLCF=[Param.]<CR><LF> CLCF?<CR><LF> Set Camera Link clock frequency.
SwapBandR	R/W	SWBR	0 : Off 1 : On	0	1	0	SWBR=[Param.]<CR><LF> SWBR?<CR><LF> Swap the output of B, R.
AdditionalInformation	R/W	ADDI	0 : Off 1 : On	0	1	1	ADDI=[Param.]<CR><LF> ADDI?<CR><LF> Add additional information during LVAL Low period.
ExposureActiveSource	R/W	EAS	0 : R 1 : G 2 : B	0	2	0	EAS=[Param.]<CR><LF> EAS?<CR><LF> Select whether the ExposureActive signal is matched with the exposure time of R, G, B lines

PulseGenerators

Name	Access	Short ASCII	Values	MIN	MAX	DEFAULT	Description
ClockPreScaler	R/W	PGDEV	1～4096	1	4096	1	PGDEV=[Param.]<CR><LF> PGDEV?<CR><LF> Set the division value for the prescaler (12 bit) using PixelClock as the base clock.
PulseGeneratorLength[PulseGenerator0]	R/W	PGL0	1～1048575	1	1048575	1000000	PGL0=[Param.]<CR><LF> PGL0?<CR><LF> PulseGeneratorLength in PulseGeneratorClock ticks. This is the total length of the pulse for every time it is repeated.
PulseGeneratorLength[PulseGenerator1]	R/W	PGL1	1～1048575	1	1048575	1000000	PGL1=[Param.]<CR><LF> PGL1?<CR><LF> PulseGeneratorLength in PulseGeneratorClock ticks. This is the total length of the pulse for every time it is repeated.
PulseGeneratorLength[PulseGenerator2]	R/W	PGL2	1～1048575	1	1048575	1000000	PGL2=[Param.]<CR><LF> PGL2?<CR><LF> PulseGeneratorLength in PulseGeneratorClock ticks. This is the total length of the pulse for every time it is repeated.
PulseGeneratorLength[PulseGenerator3]	R/W	PGL3	1～1048575	1	1048575	1000000	PGL3=[Param.]<CR><LF> PGL3?<CR><LF> PulseGeneratorLength in PulseGeneratorClock ticks. This is the total length of the pulse for every time it is repeated.
PulseGeneratorStartPoint[PulseGenerator0]	R/W	PGST0	0～1048575	0	1048575	0	PGST0=[Param.]<CR><LF> PGST0?<CR><LF> PulseGeneratorStartPoint in milliseconds. This specifies the starting point (rising edge) of the pulse within the total pulse length.
PulseGeneratorStartPoint[PulseGenerator1]	R/W	PGST1	0～1048575	0	1048575	0	PGST1=[Param.]<CR><LF> PGST1?<CR><LF> PulseGeneratorStartPoint in milliseconds. This specifies the starting point (rising edge) of the pulse within the total pulse length.
PulseGeneratorStartPoint[PulseGenerator2]	R/W	PGST2	0～1048575	0	1048575	0	PGST2=[Param.]<CR><LF> PGST2?<CR><LF> PulseGeneratorStartPoint in milliseconds. This specifies the starting point (rising edge) of the pulse within the total pulse length.
PulseGeneratorStartPoint[PulseGenerator3]	R/W	PGST3	0～1048575	0	1048575	0	PGST3=[Param.]<CR><LF> PGST3?<CR><LF> PulseGeneratorStartPoint in milliseconds. This specifies the starting point (rising edge) of the pulse within the total pulse length.
PulseGeneratorEndPoint[PulseGenerator0]	R/W	PGEN0	1～1048575	1	1048575	0	PGEN0=[Param.]<CR><LF> PGEN0?<CR><LF> Pulse Generator End Point in Pulse Generator Clock ticks. This specifies the end point (falling edge) of the pulse within the total pulse length.
PulseGeneratorEndPoint[PulseGenerator1]	R/W	PGEN1	1～1048575	1	1048575	0	PGEN1=[Param.]<CR><LF> PGEN1?<CR><LF> Pulse Generator End Point in Pulse Generator Clock ticks. This specifies the end point (falling edge) of the pulse within the total pulse length.
PulseGeneratorEndPoint[PulseGenerator2]	R/W	PGEN2	1～1048575	1	1048575	0	PGEN2=[Param.]<CR><LF> PGEN2?<CR><LF> Pulse Generator End Point in Pulse Generator Clock ticks. This specifies the end point (falling edge) of the pulse within the total pulse length.

PulseGeneratorEndPoint[PulseGenerator3]	R/W	PGEN3	1～1048575	1	1048575	0	PGEN3=[Param.]<CR><LF> PGEN3?<CR><LF> Pulse Generator End Point in Pulse Generator Clock ticks. This specifies the end point (falling edge) of the pulse within the total pulse length.
PulseGeneratorRepeatCount[PulseGenerator0]	R/W	PGRPT0	0～255	0	255	0	PGRPT0=[Param.]<CR><LF> PGRPT0?<CR><LF> PulseGeneratorRepeatCount. 0 is Infinite
PulseGeneratorRepeatCount[PulseGenerator1]	R/W	PGRPT1	0～255	0	255	0	PGRPT1=[Param.]<CR><LF> PGRPT1?<CR><LF> PulseGeneratorRepeatCount. 0 is Infinite
PulseGeneratorRepeatCount[PulseGenerator2]	R/W	PGRPT2	0～255	0	255	0	PGRPT2=[Param.]<CR><LF> PGRPT2?<CR><LF> PulseGeneratorRepeatCount. 0 is Infinite
PulseGeneratorRepeatCount[PulseGenerator3]	R/W	PGRPT3	0～255	0	255	0	PGRPT3=[Param.]<CR><LF> PGRPT3?<CR><LF> PulseGeneratorRepeatCount. 0 is Infinite
PulseGeneratorClearActivation[PulseGenerator0]	R/W	PGCM0	0 : Off 1 : LevelHigh 2 : LevelLow 3 : RisingEdge 4 : FallingEdge	0	4	0	PGCM0=[Param.]<CR><LF> PGCM0?<CR><LF> Selects the activation mode of the input to clear the Pulse Generator.
PulseGeneratorClearActivation[PulseGenerator1]	R/W	PGCM1	Same as PGCM0	0	4	0	PGCM1=[Param.]<CR><LF> PGCM1?<CR><LF> Selects the activation mode of the input to clear the Pulse Generator.
PulseGeneratorClearActivation[PulseGenerator2]	R/W	PGCM2	Same as PGCM0	0	4	0	PGCM2=[Param.]<CR><LF> PGCM2?<CR><LF> Selects the activation mode of the input to clear the Pulse Generator.
PulseGeneratorClearActivation[PulseGenerator3]	R/W	PGCM3	Same as PGCM0	0	4	0	PGCM3=[Param.]<CR><LF> PGCM3?<CR><LF> Selects the activation mode of the input to clear the Pulse Generator.
PulseGeneratorClearSource[PulseGenerator0]	R/W	PGIN0	0: Low 1: High 7: ExposureActive 9: LVAL 10: PulseGenerator0 11: PulseGenerator1 12: PulseGenerator2 13: PulseGenerator3 14: UserOutput0 15: UserOutput1 16: UserOutput2 17: UserOutput3 20: Line4 : TTL In1 21: Line5 : Opt In1 23: Line7 - CC1 24: Line10 : TTL In2 26: NAND0 Out 27: NAND1 Out 28: Line13 : TTL In3 29: Encoder Triger 30: Encoder Direction	0	30	0	PGIN0=[Param.]<CR><LF> PGIN0?<CR><LF> Selects the source to clear the Pulse Generator.
PulseGeneratorClearSource[PulseGenerator1]	R/W	PGIN1	Same as PGIN0	0	30	0	PGIN1=[Param.]<CR><LF> PGIN1?<CR><LF> Selects the source to clear the Pulse Generator.
PulseGeneratorClearSource[PulseGenerator2]	R/W	PGIN2	Same as PGIN0	0	30	0	PGIN2=[Param.]<CR><LF> PGIN2?<CR><LF> Selects the source to clear the Pulse Generator.

PulseGeneratorClearSource[PulseGenerator3]	R/W	PGIN3	Same as PGIN0	0	30	0	PGIN3=[Param.]<CR><LF> PGIN3?<CR><LF> Selects the source to clear the Pulse Generator.
PulseGeneratorClearInverter[PulseGenerator0]	R/W	PGINV0	0 : False 1 : True	0	1	0	PGINV0=[Param.]<CR><LF> PGINV0?<CR><LF> Controls if the pulse generator clear signal is inverted. False means "Active High" and True for "Active Low".
PulseGeneratorClearInverter[PulseGenerator1]	R/W	PGINV1	0 : False 1 : True	0	1	0	PGINV1=[Param.]<CR><LF> PGINV1?<CR><LF> Controls if the pulse generator clear signal is inverted. False means "Active High" and True for "Active Low".
PulseGeneratorClearInverter[PulseGenerator2]	R/W	PGINV2	0 : False 1 : True	0	1	0	PGINV2=[Param.]<CR><LF> PGINV2?<CR><LF> Controls if the pulse generator clear signal is inverted. False means "Active High" and True for "Active Low".
PulseGeneratorClearInverter[PulseGenerator3]	R/W	PGINV3	0 : False 1 : True	0	1	0	PGINV3=[Param.]<CR><LF> PGINV3?<CR><LF> Controls if the pulse generator clear signal is inverted. False means "Active High" and True for "Active Low".
PulseGeneratorClearSyncMode[PulseGenerator0]	R/W	PGSM0	0 : Async Mode 1 : Sync Mode	0	1	0	PGSM0=[Param.]<CR><LF> PGSM0?<CR><LF> Selects the sync mode of the input to clear the Pulse Generator.
PulseGeneratorClearSyncMode[PulseGenerator1]	R/W	PGSM1	Same as PGSM0.	0	1	0	PGSM1=[Param.]<CR><LF> PGSM1?<CR><LF> Selects the sync mode of the input to clear the Pulse Generator.
PulseGeneratorClearSyncMode[PulseGenerator2]	R/W	PGSM2	Same as PGSM0.	0	1	0	PGSM2=[Param.]<CR><LF> PGSM2?<CR><LF> Selects the sync mode of the input to clear the Pulse Generator.
PulseGeneratorClearSyncMode[PulseGenerator3]	R/W	PGSM3	Same as PGSM0.	0	1	0	PGSM3=[Param.]<CR><LF> PGSM3?<CR><LF> Selects the sync mode of the input to clear the Pulse Generator.

JAICustomControlShading

Name	Access	Short ASCII	Values	MIN	MAX	DEFAULT	Description
ShadingCorrectionMode	R/W	SDCM	0 : Flat Shading 1 : Color Shading	0	1	0	SDCM=[Param.]<CR><LF> SDCM?<CR><LF> Select the shading correction method.
ShadingMode	R/W	SDM	0 : Off 1 : User1 2 : User2 3 : User3	0	3	0	SDM=[Param.]<CR><LF> SDM?<CR><LF> Set the area to which to save shading correction data. When this is set to [Off], shading correction data is not saved.
PerformShadingCalibration	W/O	RS		-	-	-	RS=0<CR><LF> Execute shading correction.
ShadingDetectResult	R/W	SDRS	0 : Condition Error 1 : Too Dark 2 : Too Bright 3 : Correction Limit 4 : Complete	0	4	4	SDRS=[Param.]<CR><LF> SDRS?<CR><LF> Display the shading correction results.
ShadingDataSelecter	R/W	SDDS	0 : Green 1 : Red 2 : Blue	0	2	0	SDDS=[Param.]<CR><LF> SDDS?<CR><LF> Read the shading correction data, and set the target sensor for modification.
ShadingDataIndesx	R/W	SDDI	1～1024	1	1024	1	SDDI=[Param.]<CR><LF> SDDI?<CR><LF> Set the number of shading correction index tables.
ShadingData	R/W	SDD	0～32767	0	32767	-	SDD=[Param.]<CR><LF> SDD?<CR><LF> Display or set the shading correction data.
ShadingDataUpdate	W/O	SDDU		-	-	-	SDDU=[Param.]<CR><LF> SDDU?<CR><LF> Make shading data reflect on video.
ShadingDataSave	W/O	SDDA		-	-	-	SDDA=[Param.]<CR><LF> SDDA?<CR><LF> Save data to be stored in Flash in the area specified by ShadingCorrectionMode.

JAICustomControlPixelCorrection

Name	Access	Short ASCII	Values	MIN	MAX	DEFAULT	Description
PixelBlackCorrectionMode	R/W	PBC	0 : Off 1 : Default 2 : User1 3 : User2 4 : User3	0	4	1	PBC=[Param.]<CR><LF> PBC?<CR><LF> Select the user area to which to save the black level correction value.
PerformPixelBlackCalibration	W/O	PBR		-	-	-	PBR=0<CR><LF> Generate black level correction data automatically from the captured image. Caution When [PixelBlackCorrectionMode] is set to [Off] or [Default] and a test pattern is being output instead of an image, this command cannot be executed.
PixelBlackDetectResult	R/O	PBS	1 : Succeeded 2 : Image too bright 3 : Image too dark 4 : Timeout error	1	4	1	PBS?<CR><LF> Display the results of [PerformPixelGainBlackCalibration] execution.
PixelGainCorrectionMode	R/W	PGC	0 : Off 1 : Default 2 : User1 3 : User2 4 : User3	0	4	1	PGC=[Param.]<CR><LF> PGC?<CR><LF> Select the user area to which to save the gain correction value.
PerformPixelGainCalibration	W/O	PGR		-	-	-	PGR=0<CR><LF> Generate gain correction data automatically from the captured image. Caution When [PixelBlackCorrectionMode] is set to [Off] or [Default] and a test pattern is being output instead of an image, this command cannot be executed.
PixelGainDetectResult	R/O	PGS	1 : Succeeded 2 : Image too bright 3 : Image too dark 4 : Timeout error	1	4	1	PGS=[Param.]<CR><LF> PGS?<CR><LF> Display the results of [PerformPixelGainCorrectionCalibration] execution.
FIRFilterMode[Red]	R/W	FFR	0: Off 1: On	0	1	0	FFR=[Param.]<CR><LF> FFR?<CR><LF> Set FIRFilter for Red.
FIRFilterMode[Green]	R/W	FFG	0: Off 1: On	0	1	0	FFG=[Param.]<CR><LF> FFG?<CR><LF> Set FIRFilter for Green.
FIRFilterMode[Blue]	R/W	FFB	0: Off 1: On	0	1	0	FFB=[Param.]<CR><LF> FFB?<CR><LF> Set FIRFilter for Blue.
FIRFilterLeftRatio[Red]	R/W	FFLRR	-200～200	-200	200	0	FFLRR=[Param.]<CR><LF> FFLRR?<CR><LF> Set FIRLeftFilter Ratio for Red.
FIRFilterLeftRatio[Green]	R/W	FFLRG	-200～200	-200	200	0	FFLRG=[Param.]<CR><LF> FFLRG?<CR><LF> Set FIRLeftFilter Ratio for Green.
FIRFilterLeftRatio[Blue]	R/W	FFLRB	-200～200	-200	200	0	FFLRB=[Param.]<CR><LF> FFLRB?<CR><LF> Set FIRLeftFilter Ratio for Blue.
FIRFilterCenterRatio[Red]	R/W	FFCRR	-200～200	-200	200	0	FFCRR=[Param.]<CR><LF> FFCRR?<CR><LF> Set FIRCenterFilter Ratio for Red.

FIRFilterCenterRatio[Green]	R/W	FFCRG	-200～200	-200	200	0	FFCRG=[Param.]<CR><LF> FFCRG?<CR><LF> Set FIRCenterFilter Ratio for Green.
FIRFilterCenterRatio[Blue]	R/W	FFCRB	-200～200	-200	200	0	FFCRB=[Param.]<CR><LF> FFCRB?<CR><LF> Set FIRCenterFilter Ratio for Blue.
FIRFilterRightRatio[Red]	R/W	FFRRR	-200～200	-200	200	0	FFRRR=[Param.]<CR><LF> FFRRR?<CR><LF> Set FIRRightFilter Ratio for Red.
FIRFilterRightRatio[Green]	R/W	FFRRG	-200～200	-200	200	0	FFRRG=[Param.]<CR><LF> FFRRG?<CR><LF> Set FIRRightFilter Ratio for Green.
FIRFilterRightRatio[Blue]	R/W	FFRRB	-200～200	-200	200	0	FFRRB=[Param.]<CR><LF> FFRRB?<CR><LF> Set FIRRightFilter Ratio for Blue.
MedianFilterMode[Red]	R/W	MFR	0: Off 1: On	0	1	0	MFR=[Param.]<CR><LF> MFR?<CR><LF> Set MedianFilterMode for Red.
MedianFilterMode[Green]	R/W	MFG	0: Off 1: On	0	1	0	MFG=[Param.]<CR><LF> MFG?<CR><LF> Set MedianFilterMode for Green.
MedianFilterMode[Blue]	R/W	MFB	0: Off 1: On	0	1	0	MFB=[Param.]<CR><LF> MFB?<CR><LF> Set MedianFilterMode for Blue.

JAICustomControlImageSetup

Name	Access	Short ASCII	Values	MIN	MAX	DEFAULT	Description
HorizontalImageMirroring	R/W	HIM	0: Off 1: On	0	4	1	HIM=[Param.]<CR><LF> HIM?<CR><LF> Specify whether to mirror the image horizontally.
ObjectDirectionMode	R/W	ODM	0: forward direction, 1: reverse direction	0	1	0	ODM=[Param.]<CR><LF> ODM?<CR><LF> Set the direction moving objects.
ObjectDirectionSource	R/W	ODS	0 : Low 1 : High 2: : Line5 : Opt In1 3 : : Line4 : TTL In1 4 : Line10 : TTL In2 5 : Line13 : TTL In3 6 : Encoder Direction	0	6	0	ODS=[Param.]<CR><LF> ODS?<CR><LF> Select the input to use for obtaining the movement direction information for the object.
SpartialCompensationMode	R/W	SPCM	0: Auto 1: Manual	0	1	1	SPCM=[Param.]<CR><LF> SPCM?<CR><LF> Select the spartial compensation method(automatic or manual).
SpartialCompensationR	R/W	SPCR	0～80	0	80	0	SPCR=[Param.]<CR><LF> SPCR?<CR><LF> Set the compensation value for R-Channel.
SpartialCompensationG	R/W	SPCG	0～80	0	80	0	SPCG=[Param.]<CR><LF> SPCG?<CR><LF> Set the compensation value for G-Channel.
SpartialCompensationB	R/W	SPCB	0～80	0	80	0	SPCB=[Param.]<CR><LF> SPCB?<CR><LF> Set the compensation value for B-Channel.
SpartialCompensationDistance	R/W	SPCD	5～20	5	20	10	SPCD=[Param.]<CR><LF> SPCD?<CR><LF> Set "How much to move during one trigger the image is on the sensor pixel".

JAICustomControlVideoProcess

Name	Access	Short ASCII	1: Manual	MIN	MAX	DEFAULT	Description
ChromaticAberrationCorrectionMode	R/W	CACM	0 : Off 1 : Lens1 2 : Lens2 3 : Lens3	0	3	0	CACM=[Param.]<CR><LF> CACM?<CR><LF> Correct the color aberration that occurs at the left and right edges due to lens characteristics.
ChromaticAbberationCorrection[Lens1,R]	R/W	CACR1	-40～40	-40	40	0	CACR1=[Param.]<CR><LF> CACR1?<CR><LF> Set the amount of correction for [Lens1, R].
ChromaticAbberationCorrection[Lens1,B]	R/W	CACB1	-40～40	-40	40	0	CACB1=[Param.]<CR><LF> CACB1?<CR><LF> Set the amount of correction for [Lens1, B].
ChromaticAbberationCorrection[Lens2,R]	R/W	CACR2	-40～40	-40	40	0	CACR2=[Param.]<CR><LF> CACR2?<CR><LF> Set the amount of correction for [Lens2, R].
ChromaticAbberationCorrection[Lens2,B]	R/W	CACB2	-40～40	-40	40	0	CACB2=[Param.]<CR><LF> CACB2?<CR><LF> Set the amount of correction for [Lens2, B].
ChromaticAbberationCorrection[Lens3,R]	R/W	CACR3	-40～40	-40	40	0	CACR3=[Param.]<CR><LF> CACR3?<CR><LF> Set the amount of correction for [Lens3, R].
ChromaticAbberationCorrection[Lens3,B]	R/W	CACB3	-40～40	-40	40	0	CACB3=[Param.]<CR><LF> CACB3?<CR><LF> Set the amount of correction for [Lens2, B].

Encoder Control

Name	Access	Short ASCII	1: Manual	MIN	MAX	DEFAULT	Description
EncoderSourceA	R/W	ENCSA	0: Line5 : Opt In1 1: Line4 : TTL In1 2: Line10 : TTL In2 3: Line13 : TTL In3	0	3	0	ENCSA =[Param.]<CR><LF> ENCSA?<CR><LF> Select where to input the signal from the rotary encoder.
EncoderSourceB	R/W	ENCSB	0: Line5 : Opt In1 1: Line4 : TTL In1 2: Line10 : TTL In2 3: Line13 : TTL In3	0	3	0	ENCSB=[Param.]<CR><LF> ENCSB?<CR><LF> Select where to input the signal from the rotary encoder.
EncoderDivider	R/W	ENCDIV	1～4294967295	1	4294967295	65536	ENCDIV=[Param.]<CR><LF> ENCDIV?<CR><LF> Set the number of triggers to be generated during one pitch of the rotary encoder. The number of triggers is 65536 / (set value).
EncoderFilter	R/W	ENFIL	1～15	0	15	0	ENFIL=[Param.]<CR><LF> ENFIL?<CR><LF> Apply a low-pass filter to prevent noise on the signal from the rotary encoder and stabilize the signal for the specified number of cycles.
EncoderStrobe	R/W	ENSTR	1～256	1	256	1	ENSTR=[Param.]<CR><LF> ENSTR?<CR><LF> Set the strobe length of the Trigger signal generated from the rotary encoder by the number of cycles