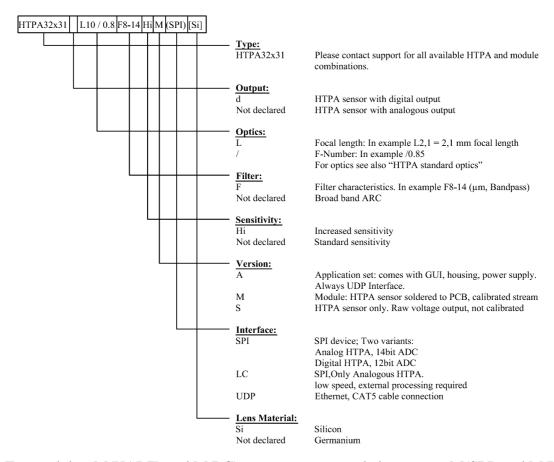
Rev.0: 2013.11.05 Fg



The HTPA8x8L_/_M(UDP) is a fully calibrated, low cost thermopile array module, with fully digital UDP interface. The module delivers an electrical offset and ambient temperature compensated output stream, which can be already used for image processing, pattern recognition and presence detection purposes. Object temperatures can be easily obtained by this data stream.

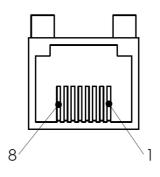
Order Code Example



For modules, M(UART) and M(LC) are not recommended anymore. M(SPI) and M(UDP) offer a wider input voltage range, better ADC resolution and a wider measurement range.

Pinout

Pin A	Pin Assignment HTPA32x31M(UDP)					
Pin	Name	Description	Туре			
1	TPOut+	Differential Signal Output	Digital Output			
2	VDD	Positive supply voltage	Power			
3	TPOut-	Differential Signal Output	Digital Output			
4	TPIn+	Differential Signal Input	Digital Input			
5		not connected				
6	TPIn-	Differential Signal Input	Digital Input			
7		not connected				
8	VSS	Ground reference	Power			



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Rev.0: 2013.11.05 Fg

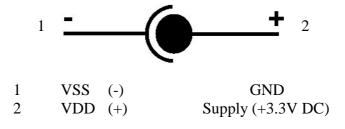


Ethernet-Interface:

Protocol Specifications:

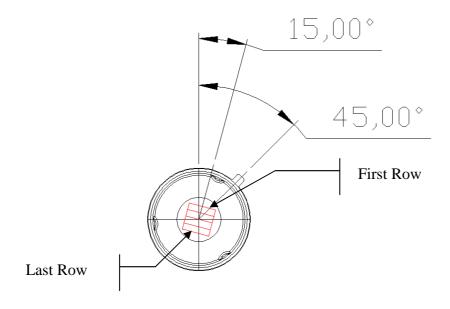
Protocol type: UDP All communication on Port: 30444

Power connection at Ethernet device:



Power Supply: 3.3 VDC +/- 5%, 300mA

HTPA8x8L3.6/0.9M(UDP) Optical Orientation of Pixels:

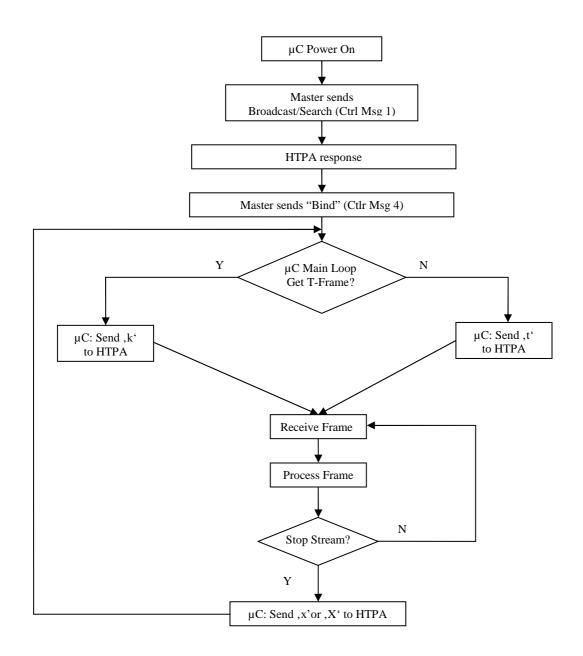


Rev.0: 2013.11.05 Fg



Communication and Timings:

Proposed flow chart of communication. (Master is referred as µC, Slave as HTPA module)



$\begin{array}{l} \textbf{Specification for HTPA8x8L3.6/0.9HiM(UDP)} \\ \text{Rev.0: } 2013.11.05 \ \text{Fg} \end{array}$



Communication:

Sent						Co	mmunication	via Termina	ii / UDP											
Char	HTPA8x8	HTPA16x16	HTPA32x31 HTPA64x62		Result/Received message Decreases the operating frequency of the array															
'a'	X	X	X																	
'A'	X	X	X		the operating f															
'b' 'C'	X		X		/DD (reference		,	>	CCII :f t:	IIADT 1.:	· · · · · · · · · · · · · · · · ·	:- LIDD								
'c'	X	X	X		ngle voltage fi			_												
'd'/'D'	X	X	Λ	Toggle PC	ngle voltage fi	ame. Use A	DC of µC. Ou	tput via ASC	II II sent via c	AK 1, billar	y II sein via	UDP.								
'f'	X	X	X	Toggle Re																
F	X	X			erating point i	s at start of	AD-range, onl	v positive sig	nals convertal	ole										
'G'	X	X			erating point i						table									
'g'	X	X			erating point i															
'h'	X	X	X		ary EEDATA															
'i'			X	Read singl	le voltage fran	e. Output in	ASCII forma	t. Serial order	r: Pixeldata[K	*10], el. Off	sets, Ambier	nt Temperat	ure							
Ί'			X	Read singl	le temperature	frame. Outp	out in ASCII fo	ormat. Serial	order: Pixelda	ta[K*10], el.	Offsets, An	nbient Tem	perature							
'J'	X	X	X	Toggle An	npli fication															
'k'	X	X	X	Read singl	le temperature	frame. Outp	out in binary fo	rmat.												
'K'	X	X	X	send conti	nous binary te	mperature d	atastream(µC-	ADC)[K*10]												
					a complete cy			Discally a	1 Office and 0 and 0	Grant 1 ald	Office AV DTA	TO DTATI	DT AT7							
				111	TPA 8x8 and H	1ΓΑΙΟλΙΟ.	r ixeio,r ixeii,		1.0jjsei0, ei.0j 11: see Table2.	-	Jjj se i 1,F 1 A.	10,F1A11,.	,F I AI L							
							For a detailed				ble2.									
				16x16 Arr	*0***	Q.v.	8 Array:													
				X=255; Y	•		=63; Y=4; Z=4													
					.,		.,, .													
				One datase	et has exactly	2 bytes: first	the low-Byte	is send, then	the high-byte.	Each Datase	et contains th	ne measured	l Temperature i							
				Kelvin*10	The first 4 d	atasets el.Of	fset0el.Offse	t3 after the l	ast Pixel volta	ge PixelX tr	ansmit addit	ional the cu	rrent VDD							
				in the MSl	B's:															
							MDD 1	EA 1 6 TT	TD 4 0 0 1	IITDA 17. 1.										
						L		1	1	1): 	L	VDD and TAmb for HTPA8x8 and HTPA16x16:							
							Bit13						L							
				Dataset	Bit 15	Bit14		Bit12	Bit 11	Bit10	-	B it1	Bit 0							
				elOff0	MSB VDD			Bit12 VDD	MSB elOff0				LSB elOff0							
				elOff0 elOff1	MSB VDD Bit 11 VDD	Bit14		Bit12 VDD Bit8 VDD	MSB elOff0 MSB elOff1			Bit1	LSB elOff0 LSB elOff1							
				elOff0 elOff1 elOff2	MSB VDD Bit 11 VDD Bit 7 VDD			Bit12 VDD Bit8 VDD Bit4 VDD	MSB elOff0 MSB elOff1 MSB elOff2				LSB elOff0 LSB elOff1 LSB elOff2							
				elOff0 elOff1	MSB VDD Bit 11 VDD			Bit12 VDD Bit8 VDD	MSB elOff0 MSB elOff1		 		LSB elOff0 LSB elOff1							
				elOff0 elOff1 elOff2 elOff3	MSB VDD Bit 11 VDD Bit 7 VDD	 	 	Bitl 2 VDD Bit8 VDD Bit4 VDD LSB VDD	MSB elOff0 MSB elOff1 MSB elOff2 MSB elOff3				LSB elOff0 LSB elOff1 LSB elOff2							
				elOff0 elOff1 elOff2 elOff3	MSB VDD Bit 11 VDD Bit 7 VDD Bit 3 VDD	 	 	Bitl 2 VDD Bit8 VDD Bit4 VDD LSB VDD	MSB elOff0 MSB elOff1 MSB elOff2 MSB elOff3				LSB elOff0 LSB elOff1 LSB elOff2							
				elOff0 elOff1 elOff2 elOff3 The Senso	MSB VDD Bit11 VDD Bit7 VDD Bit3 VDD	 is available	 in the datasets	Bit12 VDD Bit8 VDD Bit4 VDD LSB VDD after el.Offse	MSB eloff0 MSB eloff1 MSB eloff2 MSB eloff3	 		 	LSB elOff0 LSB elOff1 LSB elOff2 LSB elOff3							
				elOff0 elOff1 elOff2 elOff3 The Senso Dataset	MSB VDD Bit 11 VDD Bit 7 VDD Bit 3 VDD r temperature Bit 15	 is available	 in the datasets	Bit12 VDD Bit8 VDD Bit4 VDD LSB VDD after <i>el.Offse</i> Bit12	MSB elOff0 MSB elOff1 MSB elOff2 MSB elOff3 et3: Bit 11	 Bit10		 	LSB elOff0 LSB elOff1 LSB elOff2 LSB elOff3							
				elOff0 elOff1 elOff2 elOff3 The Senso Dataset elOff3+1	MSB VDD Bit 11 VDD Bit 7 VDD Bit 3 VDD or temperature Bit 15 MSB TAmb	 is available	 in the datasets	Bit12 VDD Bit8 VDD Bit4 VDD LSB VDD after el. Offse Bit12 Bit12 TAmb	MSB dOff0 MSB dOff1 MSB dOff2 MSB dOff3 et3: Bit 11 MSB dOff3+1	 Bit10		 	LSB elOff0 LSB elOff1 LSB elOff2 LSB elOff3 Bit 0 LSB elOff3+1							
				elOff0 elOff1 elOff2 elOff3 The Senso Dataset elOff3+1 elOff3+2	MSB VDD Bit11 VDD Bit7 VDD Bit3 VDD or temperature Bit15 MSB TAmb Bit11 TAmb	 is available	 in the datasets	Bit 12 VDD Bit8 VDD Bit4 VDD LSB VDD after el.Offse Bit12 Bit12 TAmb Bit8 TAmb	MSB dOff0 MSB dOff1 MSB dOff2 MSB dOff3 Et 3: Bit 11 MSB dOff3+1 MSB dOff3+2	 Bit10		 	LSB elOff0 LSB elOff1 LSB elOff2 LSB elOff3 Bit 0 LSB elOff3+1 LSB elOff3+2							
				elOff0 elOff1 elOff2 elOff3 The Senso Dataset elOff3+1 elOff3+2 elOff3+3 elOff3+4 elOff3+5	MSB VDD Bit11 VDD Bit7 VDD Bit3 VDD T temperature Bit15 MSB TAmb Bit11 TAmb Bit3 TAmb	 is available Bit14 	in the datasets Bit13 0	Bit 2 VDD Bit8 VDD Bit4 VDD LSB VDD after el. Offset Bit 12 TAmb Bit8 TAmb LSB TAmb 0	MSB dOff0 MSB dOff1 MSB dOff2 MSB dOff3 2t3: Bit 11 MSB dOff3+1 MSB dOff3+2 MSB dOff3+2 MSB dOff3+4 0 MSB dOff3+5	Bit10		 	LSB el0ff0 LSB el0ff1 LSB el0ff2 LSB el0ff3 Bit 0 LSB el0ff3+1 LSB el0ff3+2 LSB el0ff3+3							
'l'	X	X	X	elOffi elOffI elOffI elOffI elOffB The Senso Dataset elOffB+1 elOffB+2 elOffB+3 elOffB+4 elOffB+5 Get Ambie	MSB VDD Bit 11 VDD Bit 7 VDD Bit 7 VDD Bit 3 VDD or temperature Bit 15 MSB TAmb Bit 11 Tamb Bit 7 TAmb Bit 3 TAmb Bit 3 TAmb	is available Bit14 o	in the datasets Bit13 0	Bit 2 VDD Bit8 VDD Bit4 VDD LSB VDD after el. Offset Bit12 Bit12 TAmb Bit8 TAmb Bit4 TAmb LSB TAmb 0 t Temperatur	MSB dOff0 MSB dOff1 MSB dOff2 MSB dOff3 2f.3: Bit 11 MSB dOff3+1 MSB dOff3+2 MSB dOff3+2 MSB dOff3+6 MSB dOff3+6 MSB dOff3+6 MSB dOff3+6 To the las	Bit10		Bitl	LSB el0ff0 LSB el0ff1 LSB el0ff2 LSB el0ff3 Bit0 LSB el0ff3+1 LSB el0ff3+2 LSB el0ff3+4 LSB el0ff3+5							
ʻm'	X	X	X	elOff0 elOff1 elOff2 elOff3 The Senso Dataset elOff5+1 elOff5+2 elOff5+2 elOff6+4 elOff6+5 Get Ambid Toggle use	MSB VDD Bit 11 VDD Bit 7 VDD Bit 7 VDD Bit 3 VDD The temperature Bit 15 MSB TAmb Bit 11 TAmb Bit 3 TAmb Bit 3 TAmb Bit 4 TAmb Bit 6 TAmb Bit 7	is available Bit14 o	in the datasets Bit13 0 es the Ambien ffsets (Stack d	Bit 2 VDD Bit8 VDD Bit4 VDD LSB VDD after el. Offset Bit12 Bit12 TAmb Bit8 TAmb Bit4 TAmb LSB TAmb o t Temperaturepth = 64 for	MSB dOff0 MSB dOff1 MSB dOff2 MSB dOff3 2t3: Bit11 MSB dOff3+1 MSB dOff3+2 MSB dOff3+4 0 MSB dOff3+5 e from the las HTPA8x8 and	Bit10		Bitl	LSB el0ff0 LSB el0ff1 LSB el0ff2 LSB el0ff3 Bit0 LSB el0ff3+1 LSB el0ff3+2 LSB el0ff3+3 LSB el0ff3+4							
	_			elofilo elofil elofil elofil elofil The Senso Dataset elofil selofil elofil elofil elofil selofil elofil toggle uss	MSB VDD Bit 11 VDD Bit 7 VDD Bit 3 VDD The temperature Bit 15 MSB TAmb Bit 11 TAmb Bit 7 TAmb Bit 3 TAmb The temperature Bit 2 TAmb The temperature Bit 3 TAmb Bit 1 TAmb Bit 3 TAmb	is available Bit14 0 re (Calculate fer for el. Obration setting	in the datasets Bit13 o es the Ambien ffsets (Stack d gs. Device prin	Bis 12 VDD Bis VDD Bis VDD Bis VDD LSB VDD after el. Offses Bis 12 Bis 12 TAmb Bis TAmb Bis TAmb CSB TAmb Ot Temperatur Epth = 64 for Its the follow	MSB dOff0 MSB dOff1 MSB dOff2 MSB dOff3 Bit11 MSB dOff3+1 MSB dOff3+2 MSB dOff3+4 0 MSB dOff3+5 e from the las HTPA8x8 and ing stream:	Bit10 t measured	16; Stack de	Bit1	LSB el0ff0 LSB el0ff1 LSB el0ff2 LSB el0ff3 Bit0 LSB el0ff3+1 LSB el0ff3+2 LSB el0ff3+3 LSB el0ff3+4 LSB el0ff3+5 HTPA32x31)							
ʻm'	X	X	X	elofilo elofil elofil elofil elofil The Senso Dataset elofil selofil Get Ambid Toggle usa Shows cur "HTPA se	MSB VDD Bit 11 VDD Bit 7 VDD Bit 3 VDD The temperature Bit 15 MSB TAmb Bit 11 TAmb Bit 7 TAmb Bit 3 TAmb ent Temperatur age of µC-Buf trent and calibi eries response	is available Bit14 0 re (Calculate fer for el. Oration setting del I am Ar	in the datasets Bit13 o es the Ambien ffsets (Stack d gs. Device prin raytype X" P	Bit 2 VDD Bit8 VDD Bit4 VDD LSB VDD after el. Offset Bit 2 Bit 12 TAmb Bit8 TAmb Bit4 TAmb LSB TAmb o t Temperatureth = 64 for the follow ossible value	MSB dOff0 MSB dOff1 MSB dOff2 MSB dOff3 Bit11 MSB dOff3+1 MSB dOff3+2 MSB dOff3+4 0 MSB dOff3+5 e from the las HTPA8x8 aning stream: ss for X: "0"=F	Bit10 t measured d HTPA16x	16; Stack dep	Bit1 pth = 32 for	LSB elOff0 LSB elOff1 LSB elOff2 LSB elOff3 Bit0 LSB elOff3+1 LSB elOff3+2 LSB elOff3+4 LSB elOff3+5 HTPA32x31)							
ʻm'	X	X	X	elofilo elofil elofil elofil The Senso Dataset elofis+1 elofis+2 elofis+3 elofis+3 elofis+5 Get Ambid Toggle usa Shows cur "HTPA so	MSB VDD Bit 11 VDD Bit 21 VDD Bit 3 VDD The temperature Bit 15 MSB TAmb Bit 11 TAmb Bit 3 TAmb Bit 3 TAmb Bit at	is available Bit14 o cre (Calculate fer for el. Oration setting del I am Artten by B.F.	in the datasets Bit13 o es the Ambien ffsets (Stack d gs. Device prin raytype X" P lorg; Heiman	Bit 2 VDD Bit8 VDD Bit4 VDD LSB VDD after el. Offset Bit 2 Bit 12 TAmb Bit8 TAmb Bit4 TAmb LSB TAmb of Temperature opth = 64 for the follow ossible value a Sensor Gm	MSB dOff0 MSB dOff1 MSB dOff2 MSB dOff3 Bit11 MSB dOff3+1 MSB dOff3+2 MSB dOff3+4 0 MSB dOff3+5 e from the las HTPA8x8 aning stream: ss for X: "0"=F abH; YYYY-!	Bit10 t measured d HTPA16x	16; Stack dep	Bit1 pth = 32 for	LSB elOff0 LSB elOff1 LSB elOff2 LSB elOff3 Bit0 LSB elOff3+1 LSB elOff3+2 LSB elOff3+4 LSB elOff3+5 HTPA32x31)							
ʻm'	X	X	X	eloff0 eloff1 eloff2 eloff5 The Senso Dataset eloff5+1 eloff5+2 eloff5+3 eloff6+4 eloff6+5 Get Ambio Troggle uss Shows cur "HTPA so "Firmwan "I am rum	MSB VDD Bit 11 VDD Bit 7 VDD Bit 3 VDD or temperature Bit 15 MSB TAmb Bit 11 TAmb Bit 7 TAmb Bit 3 TAmb ent Temperaturage of µC-Buf rent and cali bieries response re v.X.XX writing on XXX	is available Bit14 ore (Calculate fer for el. Of attion setting d! I am Artten by B.F.X.X kHz"	in the datasets Birl3 o es the Ambien iffsets (Stack d gs. Device prin raytype X" P forg; Heimann Actual MCLK	Bit 2 VDD Bit8 VDD Bit4 VDD LSB VDD after el. Offset Bit12 Bit12 TAmb Bit8 TAmb Bit4 TAmb LSB TAmb 0 t Temperatur epth = 64 for tts the follow ossible value n Sensor Gm -setting in kF	MSB doff0 MSB doff1 MSB doff2 MSB doff3 et3: Bit 11 MSB doff3+1 MSB doff3+2 MSB doff3+2 MSB doff3+6 0 MSB doff3+6 e from the las HTPA8x8 and ing stream: es for X: "0"=H abH; YYYY-N Hz	Bit10	16; Stack dep	Bit1 pth = 32 for	LSB el0ff0 LSB el0ff1 LSB el0ff2 LSB el0ff3 Bit0 LSB el0ff3+1 LSB el0ff3+2 LSB el0ff3+3 LSB el0ff3+4 LSB el0ff3+5 HTPA32x31)							
ʻm'	X	X	X	elofilo elofil elofil elofil elofil elofil elofil The Senso Dataset elofil elofil elofil elofil elofil elofil elofil elofil elofil Toggle usi Shows cur "HTPA so "Firmwar "I am rum "Amplific	MSB VDD Bit 11 VDD Bit 7 VDD Bit 7 VDD Bit 3 VDD or temperature Bit 15 MSB TAmb Bit 11 TAmb Bit 7 TAmb Bit 3 TAmb Bit 4 TAmb Bit 3 TAmb Bit 4 TAmb Bit 4 TAmb Bit 4 TAmb Bit 5	is available Bit14 ore (Calculater for el. Of attorn setting d! I am Artten by B.F.X.X kHz" ctual set an	in the datasets sitt3	Bit 2 VDD Bit8 VDD Bit4 VDD LSB VDD after el. Offset Bit12 Bit12 TAmb Bit8 TAmb Bit4 TAmb LSB TAmb 0 t Temperatur cptt = 64 for tts the follow cossible value a Sensor Gm -setting in kH cossible string	MSB doff0 MSB doff1 MSB doff1 MSB doff3 2d3: Bit11 MSB doff3+1 MSB doff3+2 MSB doff3+4 0 MSB doff3+6 e from the las HTPA8x8 and ing stream: ss for X: "0"=1 hbH; YYYY-I dz gs for X: "low"	Bitl0 t measured dHTPA16x HTPA8x8, "ITPA8x8," "IMM-DD" V ' or "high"	16; Stack dep	Bit1	LSB el0ff0 LSB el0ff1 LSB el0ff2 LSB el0ff3 Bit0 LSB el0ff3+1 LSB el0ff3+2 LSB el0ff3+3 LSB el0ff3+4 LSB el0ff3+5 HTPA32x31)							
'm'	X	X	X	elofilo elofil elofil elofil elofil elofil elofil elofis The Senso Dataset elofifi-1 elofifi-2 elofifi-3 elofifi-4 elofifi-4 elofifi-5 Get Ambid Toggle usa Shows cur "HTPA su" "ITPIP usa "ITPIP us	MSB VDD Bit11 VDD Bit7 VDD Bit7 VDD Bit7 VDD Bit3 VDD or temperature Bit15 MSB TAmb Bit11 TAmb Bit7 TAmb Bit3 TAmb ent Temperature age of µC-Buf rent and calibit erries response re v.X.XX writing on XXX eation is X'' A D: X IP: Y De	is available Bit14 or ce (Calculate fer for el. Or ad! I am Ar tten by B.F. X.X kHz'' ctual set an vID: Z\r\n''	in the datasets sitt3 es the Ambien ffsets (Stack d gs. Device prit raytype X'' P org; Heimant Actual MCLK nplification. F (Only Ethern	Bit 2 VDD Bit8 VDD Bit4 VDD LSB VDD after el. Offset Bit12 Bit12 TAmb Bit4 TAmb LSB TAmb 0 t Temperatur epth = 64 for tts the follow cossible value a Sensor Gri -setting in kF cossible string et devices sh	MSB dOff0 MSB dOff1 MSB dOff1 MSB dOff3 2d3: Bit11 MSB dOff3+1 MSB dOff3+2 MSB dOff3+2 MSB dOff3+4 0 MSB dOff3+6 e from the las HTPA8x8 and ing stream: ss for X: "0"—1 hbH; YYYY-I dz gs for X: "low ow a MAC-III	Bitlo t measured dHTPA16x HTPA8x8, "I MM-DD" V ' or "high"), DevID is s	16; Stack dep "=HTPA16 ersion inforr hown in any	Bit1 pth = 32 for x16, "3"=H' nation.	LSB clOff0 LSB clOff1 LSB clOff2 LSB clOff3 Bit0 LSB clOff3+1 LSB clOff3+2 LSB clOff3+4 LSB clOff3+5 HTPA32x31) TPA32x31							
ʻm'	X	X	X	elofilo elofil elofil elofil elofil elofil elofis The Senso Dataset elofis+1 elofis+2 elofis+3 elofis+4 elofis+5 Get Ambid Toggle use Shows cur "HTPA se "Firmwal "I am rur "Amplific "MA C-III X=MAC-III X=MAC-III	MSB VDD Bit 11 VDD Bit 7 VDD Bit 7 VDD Bit 3 VDD or temperature Bit 15 MSB TAmb Bit 11 TAmb Bit 7 TAmb Bit 3 TAmb Bit 4 TAmb Bit 3 TAmb Bit 4 TAmb Bit 4 TAmb Bit 4 TAmb Bit 5	is available Bit14 ore (Calculate fer for el. Or ration setting d' I am Artten by B.F.X.X kHz" ctual set an vID: Z\r\n" ce, i.e. "00.5	in the datasets sit3 es the Ambien ffsets (Stack d gs. Device prin raytype X" P org; Heimann Actual MCLK nplification. F (Only Ethern 17.FF.00.10.08	Bit 12 VDD Bit8 VDD Bit8 VDD Bit4 VDD LSB VDD after el. Offset Bit 12 TAmb Bit3 TAmb Bit4 TAmb LSB TAmb 0 t Temperatur epth = 64 for tist the follow ossible value n Sensor Gm -setting in kF cossible string et devices sh "; Y=current	MSB dOff0 MSB dOff1 MSB dOff2 MSB dOff3 2t3: Bit11 MSB dOff3+1 MSB dOff3+2 MSB dOff3+4 0 MSB dOff3+6 e from the las HTPA8x8 aning stream: se for X: "0"=F thH; YYYY-! Iz gs for X: "low ow a MAC-III IP of the devi	Bido t measured dHTPA16x HTPA8x8, "I MM-DD" V ' or "high" D, DevID is s ce, Z=user se	16; Stack department of the state of the sta	Bit1	LSB el0ff0 LSB el0ff1 LSB el0ff2 LSB el0ff3 Bit0 LSB el0ff3+1 LSB el0ff3+2 LSB el0ff3+4 LSB el0ff3+5 LSB el0ff3+5 LSB el0ff3+5 LSB el0ff3+5							

Table 1a: Control Characters

Rev.0: 2013.11.05 Fg



	Communication via Terminal / UDP												
Sent Char	HTPA8x8	HTPA16x16	HTPA32x31 HTPA64x62	Result/Received message									
'o'		X	X	Use externa	l reference vo	oltages							
'O'		X	X	Use interna	l reference vo	ltages							
'q'/'Q'	X	X	X	Allow Char	nges (required	for Calibrat	ion)						
't'	X	X	X	Continuous	binary voltag	ge data of the	μC-ADC is	transmitted.					
				Output of a	complete cyc	le in this ord	er:						
				HTI	PA 8x8 and H			HTPA32x3	l.Offset0, el.C 31: see Table2 of the serial	2.		AT0,PTAT1,.	,PTATZ
				16x16 Arra	***		Array:	2 escription	oj ure ser ur	0.00.000			
				X=255; Y=	-		53; Y=4; Z=4	ı					
					One dataset has exactly 2 bytes: first the low-Byte is send, then the high-byte. Each Dataset contains the ADC-Data in digits and The first 4 datasets <i>el.Offset0el.Offset3</i> after the last Pixel voltage <i>PixelX</i> transmit additional the current VDD in the MSB's:								
				Dataset	Bit 15	Bit14	Bit13	Bit12	Bit 11	Bit10	1	B it1	Bit 0
				elOff0	MSB VDD	Diti	Ditto	Bit12 VDD	MSB elOff0	Bitto		Ditt	LSB elOff0
				elOffl	Bit 11 VDD			Bit8 VDD	MSB elOff1				LSB elOff1
				elOff2	Bit 7 VDD			Bit4 VDD	MSB elOff2				LSB elOff2
				elOff3	Bit 3 VDD			LSB VDD	MSB elOff3				LSB elOff3
'T'	X	X		Continuous	binary data o	f the ASIC-A	ADC is transi	nitted.			-		
					er is equal to '								
'u'	X	X			binary data o		ADC is transi	nitted. PTAT	-Voltages are	sampled w	ith the uC-A	DC.	
	L_				er is equal to '								
'U'	X	X			gle frame. Us		SIC. Output v	ia ASCII. PI	ΓAT-Voltages	are sample	d with the u	C-ADC.	
'v'	X	X	X		P (Only Ether	,							
'V'	X	X	X		its control me		non-Ethernet	devices)					
'w'	X	X	X		oration-consta			. 11					
'W'	X	X	X		ATTENTIO		set cannot be	restored!					
'x' 'X'	X	X	X		m without pro	•	,						
'v'	X	X	X		m by sending								
'Y'	X	X	X		ASIC-Supply (ASIC-Supply (
ĭ	Λ	Λ	Λ	SWITCH ON A	sic-supply (J V)							

Table 1b: Control Characters (continuation)

Please be aware, that the source and destination port has to be 30444

Rev.0: 2013.11.05 Fg



Serial order of data in stream:

	HTPA8x8 Temperature Mode
Dataset	Value
	0 Temperature of Pixel0 in K*10
	1 Temperature of Pixel1 in K*10
	2 Temperature of Pixel2 in K*10
	3 Temperature of Pixel3 in K*10
6	3 Temperature of Pixel63 in K*10
6	4 4 bits of VDD and elOff0 in digits (refer to Table 1)
6	5 4 bits of VDD and elOff1 in digits (refer to Table1)
6	6 4 bits of VDD and elOff2 in digits (refer to Table 1)
6	7 4 bits of VDD and elOff4 in digits (refer to Table 1)
6	8 4 bits of TAmb and PTAT0 in digits (refer to Table 1)
6	8 4 bits of TAmb and PTAT1 in digits (refer to Table1)
6	8 4 bits of TAmb and PTAT2 in digits (refer to Table 1)
	8 4 bits of TAmb and PTAT3 in digits (refer to Table 1)

		HTPA8x8 Voltage Mode
Dataset		Value
	0	absolute Voltage of Pixel0 in digits
	1	absolute Voltage of Pixel1 in digits
	2	absolute Voltage of Pixel2 in digits
	3	absolute Voltage of Pixel3 in digits
	63	absolute Voltage of Pixel63 in digits
	64	4 bits of VDD and elOff0 in digits (refer to Table1)
	65	4 bits of VDD and elOff1 in digits (refer to Table1)
	66	4 bits of VDD and elOff2 in digits (refer to Table1)
	67	4 bits of VDD and elOff4 in digits (refer to Table1)
	68	4 bits of TAmb and PTAT0 in digits (refer to Table1)
	68	4 bits of TAmb and PTAT1 in digits (refer to Table1)
	68	4 bits of TAmb and PTAT2 in digits (refer to Table1)
	68	4 bits of TAmb and PTAT3 in digits (refer to Table1)

Table 2: Serial order of data in stream

Each dataset consists of a 16 bit value. If a frame consists out of more than one packet, packets are appended.

Rev.0: 2013.11.05 Fg



Pixel Map:

0	1	2	3	4	5	6	7
8	9	10	11	12	13	14	15
					21		
24	25	26	27	28	29	30	31
32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47
48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63

Table 3: Pixelmap

Packets (UDP, only Ethernet device):

Number of packets	Packet size [byte]	HTPA type	Comments
1	144	HTPA8x8	-
1	544	HTPA16x16	-
2	1058+1054	HTPA32x31	see below for details
8	1101+493	HTPA64x62	see below for details

Packet details for HTPA32x31					
Packet No.	Packet size	Packet contains			
1		Data of Pixel0 - Pixel528			
2	1054	Data of Pixel529 to end of frame			

	Packet details for HTPA64x62						
Packet No.	Packet size	Packet contains					
1	1101	Packet index 1 (8bit), data of Pixel0-Pixel550					
2	1101	Packet index 2 (8bit), data of Pixel551-Pixel1101					
3	1101	Packet index 3 (8bit), data of Pixel1102-Pixel1652					
4	1101	Packet index 4 (8bit), data of Pixel1653-Pixel2203					
5	1101	Packet index 5 (8bit), data of Pixel2204-Pixel2754					
6	1101	Packet index 6 (8bit), data of Pixel2755-Pixel3305					
7	1101	Packet index 7 (8bit), data of Pixel3306-Pixel3856					
8	493	Packet index 8 (8bit), data of Pixel3857 to end of frame					

Each dataset (except of packet index) consists out of a 16 bit value. For serial order of the datasets refer to section "serial order in Frame".

Rev.0: 2013.11.05 Fg



Control Messages:

In the set of control messages, expressions in angled braces have to be substituted by following strings:

[**IP**] insert IP in ASCII format, i.e.: "192.168.240.122"

[MACID] insert MAC ID in ASCII format and hexadecimal, i.e.: "00.1A.22.33.44.55"

[AT] insert index of array types in ASCII format

Array type Index HTPA 8x8 "0" HTPA 16x16 "1" HTPA 32x31 "3" HTPA 64x62 "5"

[MCLK] insert Frequency of MCLK in ASCII format and kHz, i.e.: "1050.1"

[AMP] insert state of amplification in ASCII format:

State String Low "low" High "high"

[MSK] insert subnet mask in ASCII format, i.e.: "255.255.255.000"

[DEVID] insert 5 digit device ID in ASCII format, i.e. "00197" Range: 00000... 65535

Set of control messages:

Message1: "Calling HTPA series devices" (only Ethernet device)

Conditions: Can be sent as Broadcast, or if device already known as normal packet.

Answer: "HTPA series responsed! I am Arraytype [AT]"

Firmware version, date and author information.

"I am running on [MCLK] kHz"
"Amplification is [AMP]\r\n"
"MAC-ID: [MACID] IP: [IP]\r\n"

A second packet with calibration depending information is send.

Message2: "x Release HTPA series device" (only Ethernet device)

Result: Device disables hardware IP filter. All packets except ARP's, DHCP requests,

Broadcasts, Message1, Message3 and Message4 are discarded.

Answer: "HW-Filter released\r\n"

Message3: "HTPA device IP change request to [IP].[MSK]." (only Ethernet device)

Result: The device changes the IP and the subnet mask to the given value and writes it

to EEPROM. The IP becomes the default IP, therefore the device will use it at

the next reset, if no DHCP is found.

Answer: "Device changed IP to [IP]. and Subnet to [MSK].\r\n"

Message4: "Bind HTPA series device" (only Ethernet device)

Result: Device enables hardware IP filter. Only packets from sender IP, ARP's, DHCP

requests and Broadcasts are accepted. Device accepts now the control

characters listed in Table 1.

Answer: "HW Filter is [**IP**] MAC [**MACID**]\n\r""

Insert in the above string the IP and MAC-ID of the Sender from Message4.

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Rev.0: 2013.11.05 Fg



Control Messages [continued]:

Message5: "Set EEPROM data"

Conditions: Only possible if Message 4 already successful sent.

ATTENTION! Calibration data is overwritten!!!

Result: Writes the next received packets into EEPROM, if packet size is equal to 1024

bytes. Device writes to EEPROM, until EEPROM is completely filled. EEPROM size depends on Device type: HTPA8x8, HTPA16x16 and

HTPA32x31: 16384 byte; HTPA64x62: 65536 byte.

Answer: "Write was successful.\n\r"

Message6: "Set DeviceID to [**DEVID**]"

Result: The given Device ID [**DEVID**] is written to EEPROM. This ID is shown on

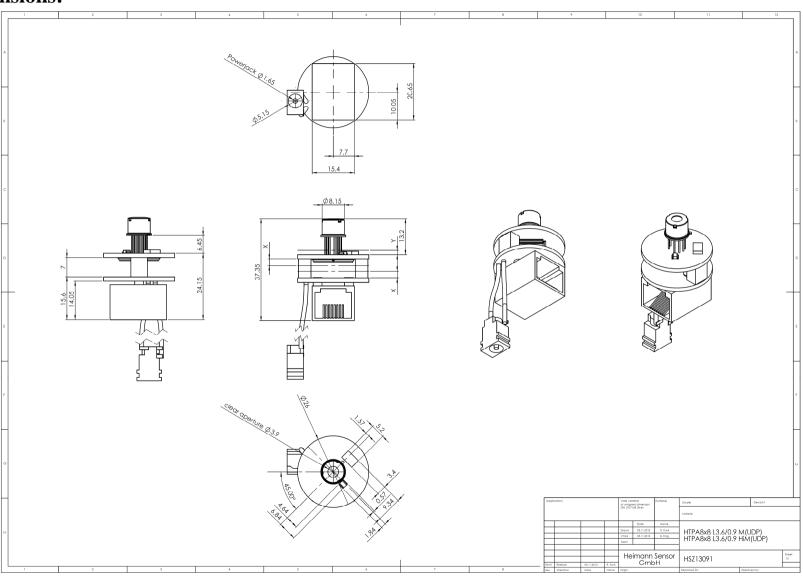
receive of 'M'. The eDevice ID can be used for customer specific purposes.

Answer: "DeviceID changed to [**DEVID**]\r\n"

Specification for HTPA8x8L3.6/0.9HiM(UDP) Rev.0: 2013.11.05 Fg



Dimensions:



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