

# HTPA80x64d Module Specifications and Transferprotocol

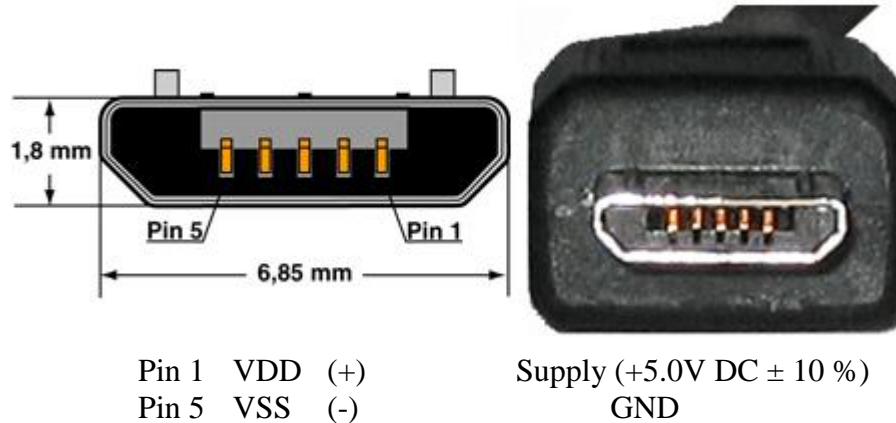
Rev.3: 2017.09.04 Schnorr



## Electrical Specifications:

VDD:	Supply (+5.0V DC via USB)
VSS	GND
<b>Power Supply:</b>	<b>5.0 VDC <math>\pm</math> 10 %</b>
IDD (Operating mode)	180 mA

## Power connection at Ethernet device:



## Ethernet-Interface:

### Protocol Specifications:

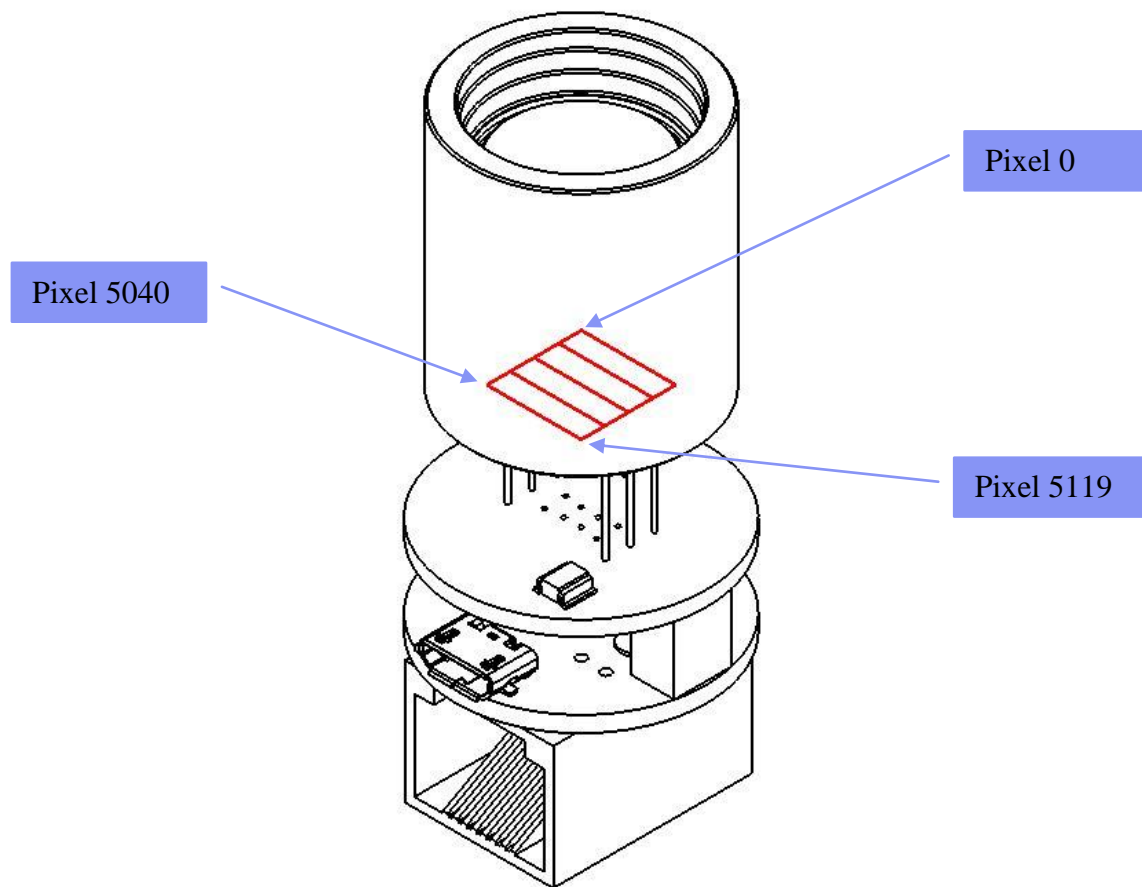
Protocol type:	UDP
All communication on Port:	30444

**HEIMANN Sensor GmbH**  
Maria-Reiche-Str. 1  
D-01109 Dresden / Germany

**Contact / Customer Support**  
Phone 49 (0) 6123 60 50 30  
Fax 49 (0) 6123 60 50 39

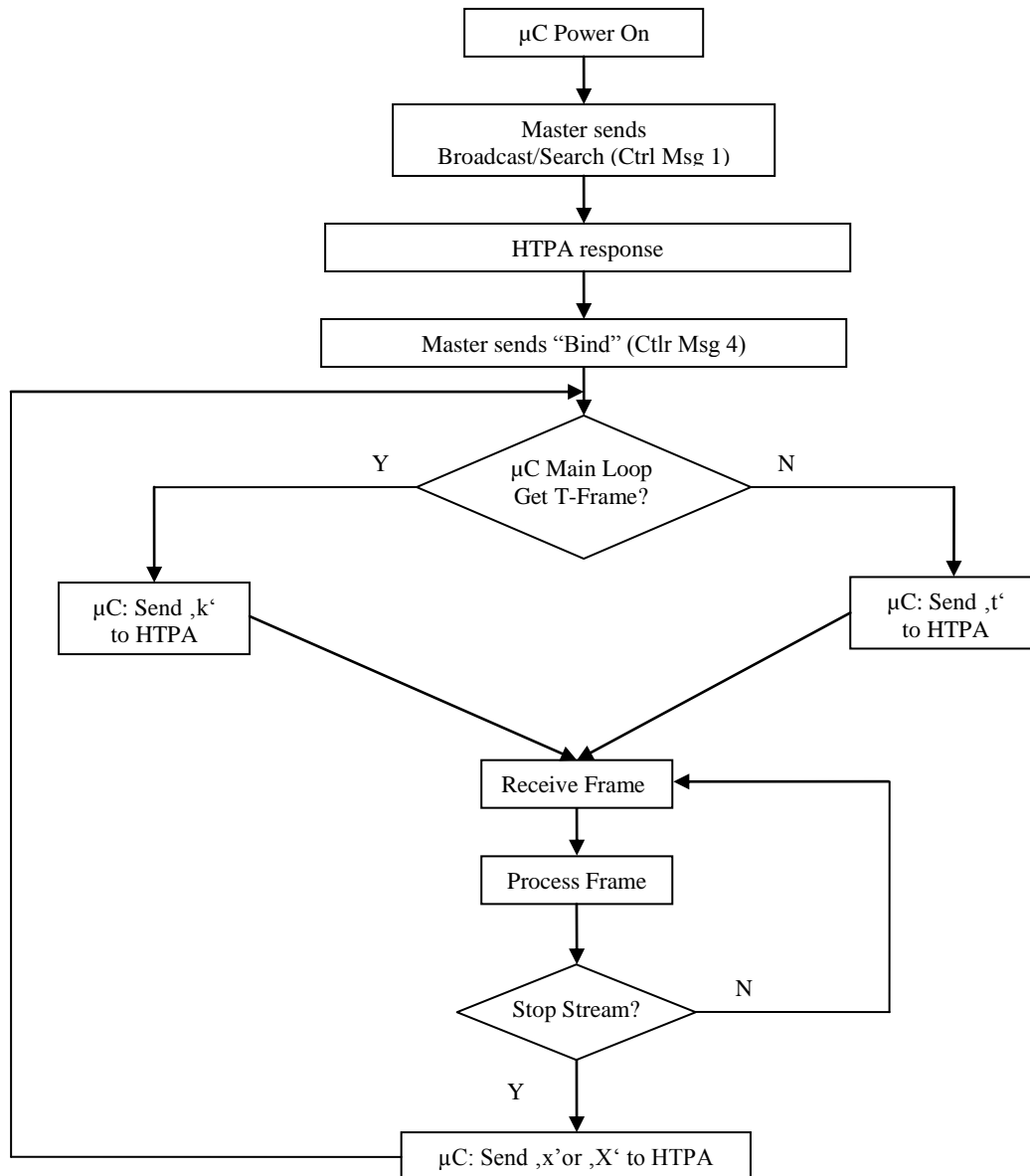
**Internet**  
[www.heimannsensor.com](http://www.heimannsensor.com)  
mail: [info@heimannsensor.com](mailto:info@heimannsensor.com)

## HTPA80x64d UDP Module Optical Orientation of Pixels:



## Communication and Timings:

Proposed flow chart of communication. (Master is referred as  $\mu\text{C}$ , Slave as HTPA module)



## Communication:

Communication via UDP	
Sent Char	Result/Received message
'a'/'A'	decreases / increases CLK setting
'b'	Measure VDD (referenced to VREF1225)
'c'	Capture single voltage frame. Use ADC of $\mu$ C.
'f'	Toggle between sending raw and compensated voltages when sending 't'
'h'	pushes binary EEDATA out
'I'/'T'	decreases / increases BIAS setting
'j'/'J'	decreases / increases BPA setting
'G'	Shows current configuration settings (CLK, BIAS, BPA,...)
'k'	Read single temperature frame. Output in binary format.
'K'	send continous binary temperature datastream( $\mu$ C-ADC)[K*10] Output of a complete cycle <i>For a detailed Description of the serial order see Table2.</i>
'M'	Shows current and calibration settings. Device prints the following stream: "HTPA series responded! I am Arraytype 11 MODTYPE 5" "HTPA80x64d v.X.XX Heimann Sensor GmbH; written by M. Schnorr YYYY-MM-DD" Version information. "I am running on XXXX.X kHz" Actual MCLK-setting in kHz "MAC-ID: X IP: Y DevID: Z\r\n" X= MAC-ID of the device, i.e. "00.97.FF.00.10.08"; Y=current IP of the device, Z=user setable ID, range 00000...65535
'p'	toggle PU (pull-up) setting
'q'/'Q'	Allow Changes (required for Calibration)
'r'/'R'	decreases / increases resolution
't'	Continuous binary voltage data of the sensor is transmitted. Output of a complete cycle <i>For a detailed Description of the serial order see Table2.</i>
'v'	Announce IP (Only Ethernet devices)
'W'	Calibration. ATTENTION! Old Dataset cannot be restored!
'x'	Stops Stream without prompt.
'X'	Stops Stream by sending "STOP!\r\n"

**Table1:** Control Characters

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

## Serial order of data in stream:

HTPA80x64d Temperature Mode		HTPA80x64d Voltage Mode	
Dataset	Value	Dataset	Value
0	Temperature of Pixel0 in K*10	0	absolute Voltage of Pixel0 in digits
1	Temperature of Pixel1 in K*10	1	absolute Voltage of Pixel1 in digits
2	Temperature of Pixel2 in K*10	2	absolute Voltage of Pixel2 in digits
3	Temperature of Pixel3 in K*10	3	absolute Voltage of Pixel3 in digits
...	...	...	...
5119	Temperature of Pixel5119 in K*10	5119	absolute Voltage of Pixel5119 in digits
5120	el. Offset 0	5120	el. Offset 0
5121	el. Offset 1	5121	el. Offset 1
...	...	...	...
6399	el. Offset 1279	6399	el. Offset 1279
6400	VDD	6400	VDD
6401	TAmb	6401	TAmb
6402	PTAT0	6402	PTAT0
6403	PTAT1	6403	PTAT1
6404	PTAT2	6404	PTAT2
6405	PTAT3	6405	PTAT3
6406	PTAT4	6406	PTAT4
6407	PTAT5	6407	PTAT5
6408	PTAT6	6408	PTAT6
6409	PTAT7	6409	PTAT7

**Table2:** Serial order of data in stream

Each dataset consists of a 16 bit value, first the low-Byte is send, then the high-Byte.

## Packets (UDP, only Ethernet device):

Number of packets	Packet size [byte]	HTPA type	Comments
1	144	HTPA8x8	-
1	548	HTPA16x16	-
2	1058+1054	HTPA32x31	see below for details
2	1292+1288	HTPA32x32d	see below for details
8	1101+621	HTPA64x62	see below for details
10	1282	HTPA80x64d	see below for details

Packet details for HTPA80x64d		
Packet No.	Packet size	Packet contains
1	1283	Packet index 1 (8bit), data of Pixel0-Pixel640
2	1283	Packet index 2 (8bit), data of Pixel641-Pixel1281
3	1283	Packet index 3 (8bit), data of Pixel1282-Pixel1922
4	1283	Packet index 4 (8bit), data of Pixel1923-Pixel2563
5	1283	Packet index 5 (8bit), data of Pixel2564-Pixel3204
6	1283	Packet index 6 (8bit), data of Pixel3205-Pixel3845
7	1283	Packet index 7 (8bit), data of Pixel3846-Pixel4486
8	1283	Packet index 8 (8bit), data of Pixel4487-el.Offset7
9	1283	Packet index 9 (8bit), data of el.Offset8-el.Offset648
10	1283	Packet index 10 (8bit), data of el.Offset649 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”.

## Pixelmap:

0	1	2	...	79
80	81	82	...	159
160	161	162	...	239
.	.	.		.
.	.	.		.
.	.	.		.
5040	5041	5042	...	5119

**Table3:** Pixelmap for 80x64

## 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 32x32d                  "10"
	HTPA 64x62                    "5"
	HTPA 80x64d                   "11"
[MCLK]	insert Frequency of MCLK in ASCII format and kHz, i.e.: "1050.1"
[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
[MODT]	insert index of Modultype in ASCII format, i.e.: 005
[ADCRES]	insert ADC resolution in ASCII format, i.e.: "16" Range: 08...16

## 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 responded! I am Arraytype [AT] MODTYPE [MODT]\r\n ADC: [ADCRES]\r\n" Firmware version, date and author information. "I am running on [MCLK] kHz\r\n" "MAC-ID: [MACID] IP: [IP] DevID: [DEVID]\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 <b>Table 1</b> .	
Answer:	"HW Filter is [IP] MAC [MACID]\n\r" Insert in the above string the IP and MAC-ID of the Sender from Message4.	

---

## 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  
HTPA32x31/32x32: 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 Device ID can be used for customer specific purposes.

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

---

## Temperature calculation:

The module is already transmitting calculated temperatures if character "k/K" was sent from the master. For details about the temperature calculation please see the datasheet of the sensor.

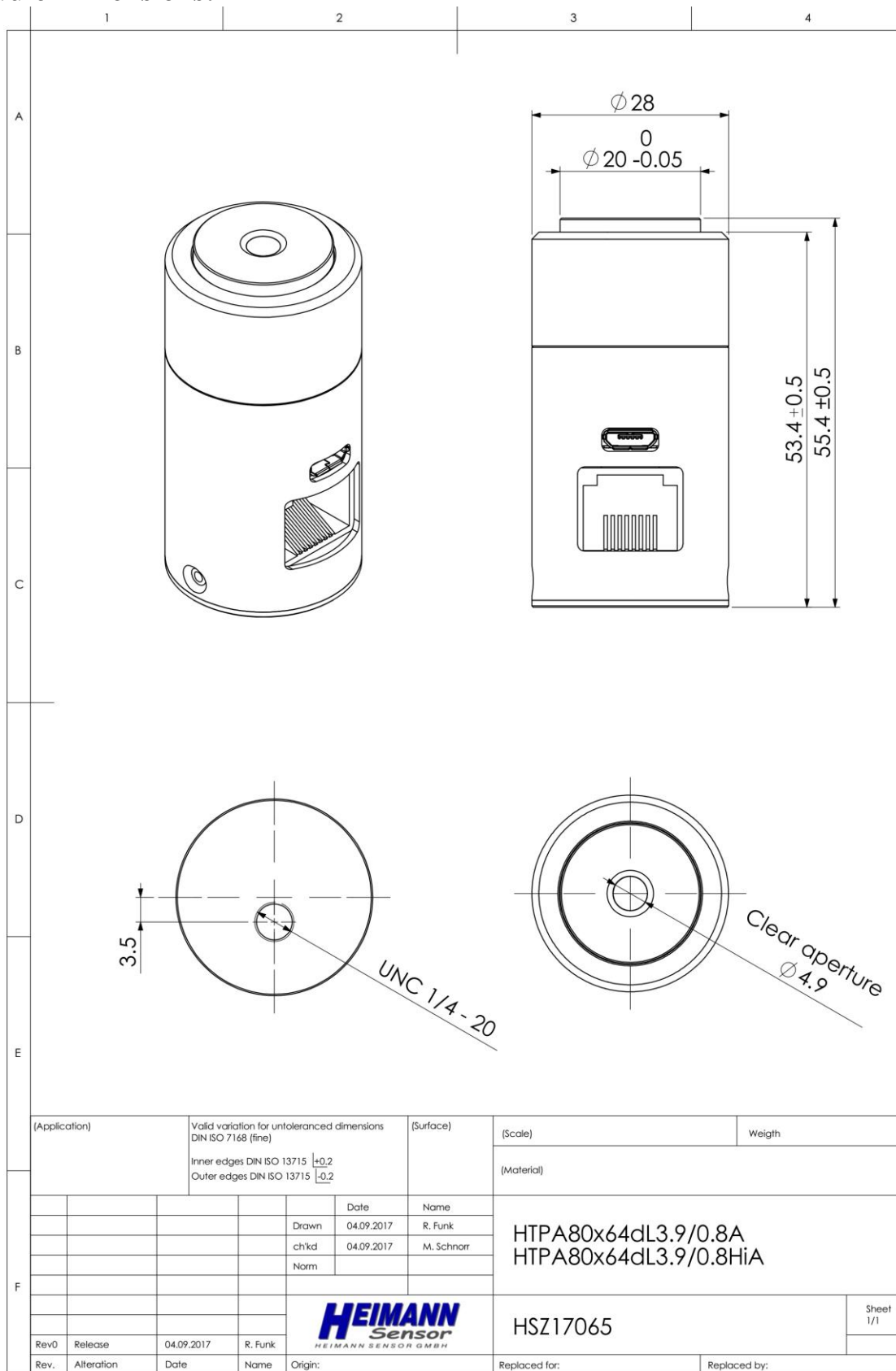


# HTPA80x64d Module Specifications and Transferprotocol

Rev.3: 2017.09.04 Schnorr



## Module Dimensions:



**HEIMANN Sensor GmbH**  
Maria-Reiche-Str. 1  
D-01109 Dresden / Germany

**Contact / Customer Support**  
Phone 49 (0) 6123 60 50 30  
Fax 49 (0) 6123 60 50 39

**Internet**  
[www.heimannsensor.com](http://www.heimannsensor.com)  
mail: [info@heimannsensor.com](mailto:info@heimannsensor.com)

## Rev.3: 2017.09.04 Schnorr

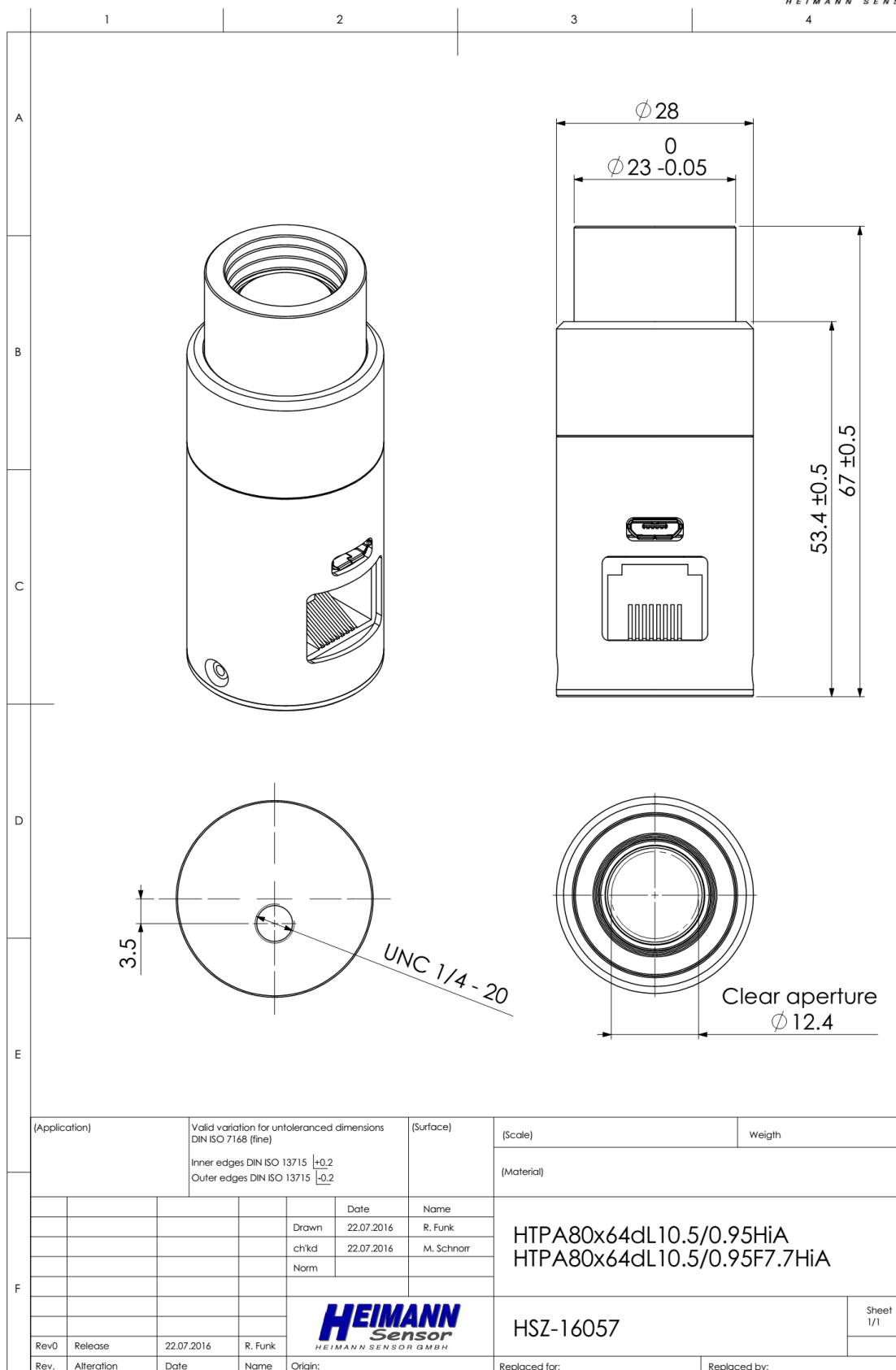


## Rev.3: 2017.09.04 Schnorr



# HTPA80x64d Module Specifications and Transferprotocol

Rev.3: 2017.09.04 Schnorr



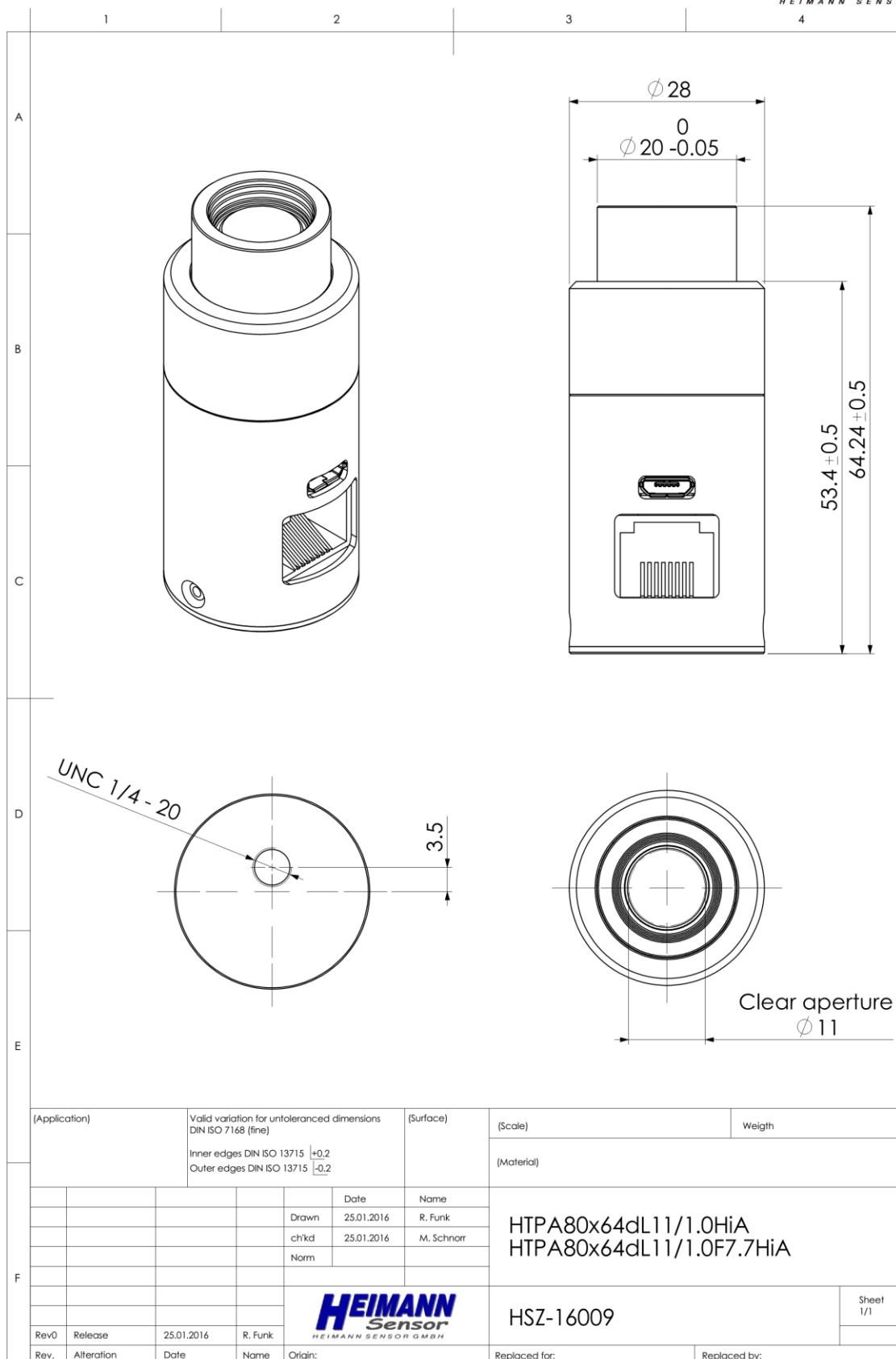
**HEIMANN Sensor GmbH**  
Maria-Reiche-Str. 1  
D-01109 Dresden / Germany

**Contact / Customer Support**  
Phone 49 (0) 6123 60 50 30  
Fax 49 (0) 6123 60 50 39

**Internet**  
[www.heimannsensor.com](http://www.heimannsensor.com)  
mail: [info@heimannsensor.com](mailto:info@heimannsensor.com)

# HTPA80x64d Module Specifications and Transferprotocol

Rev.3: 2017.09.04 Schnorr



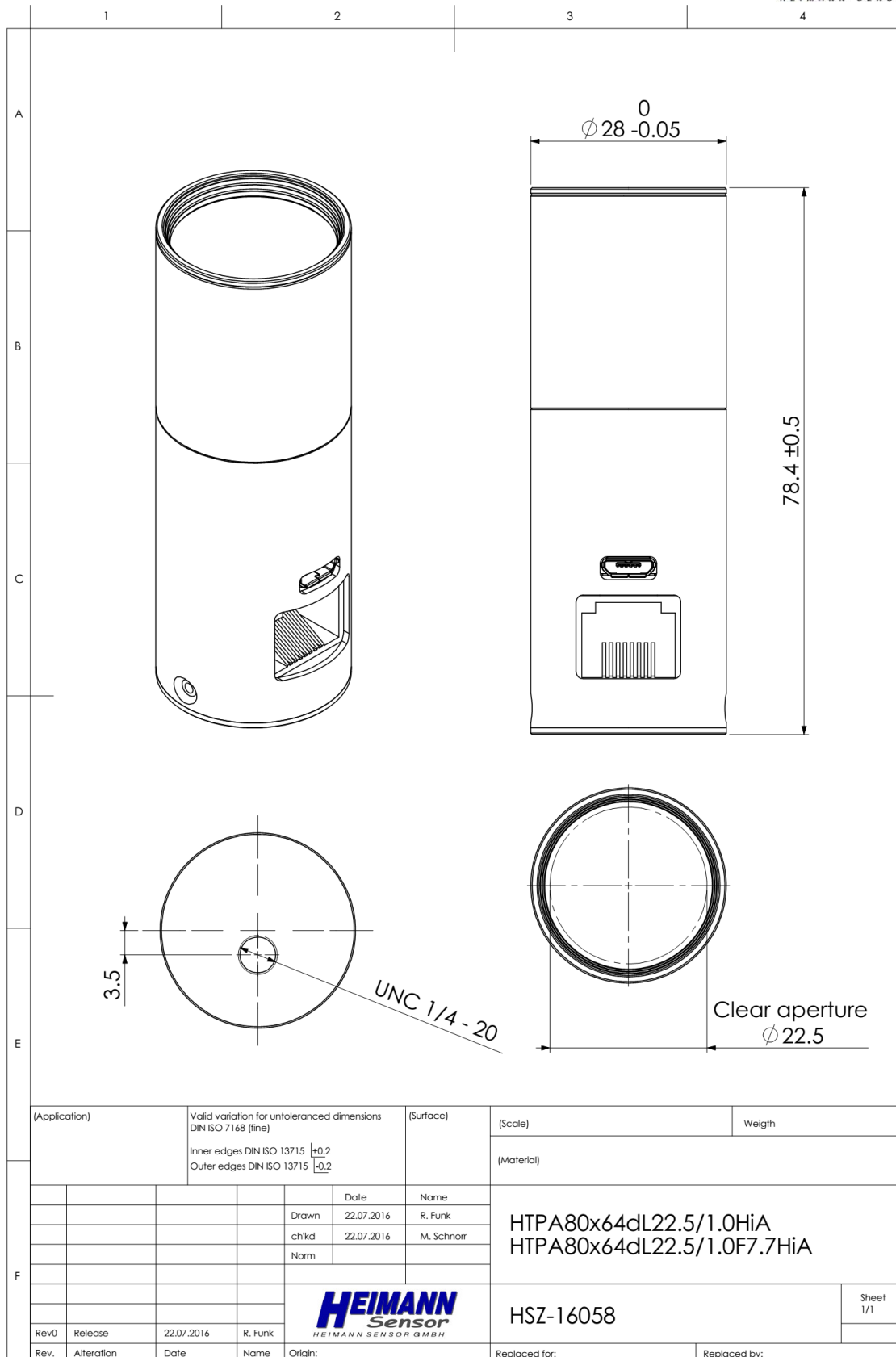
**HEIMANN Sensor GmbH**  
 Maria-Reiche-Str. 1  
 D-01109 Dresden / Germany

**Contact / Customer Support**  
 Phone 49 (0) 6123 60 50 30  
 Fax 49 (0) 6123 60 50 39

**Internet**  
[www.heimannsensor.com](http://www.heimannsensor.com)  
 mail: [info@heimannsensor.com](mailto:info@heimannsensor.com)

# HTPA80x64d Module Specifications and Transferprotocol

Rev.3: 2017.09.04 Schnorr



**HEIMANN Sensor GmbH**  
 Maria-Reiche-Str. 1  
 D-01109 Dresden / Germany

**Contact / Customer Support**  
 Phone 49 (0) 6123 60 50 30  
 Fax 49 (0) 6123 60 50 39

**Internet**  
[www.heimannsensor.com](http://www.heimannsensor.com)  
 mail: [info@heimannsensor.com](mailto:info@heimannsensor.com)