User Guide

RMN: HSN-PD01

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3. Introduction

3.1. Use and disclosure

This document shall apply only to the product(s) identified herein.
This technical specification defines the requirements for a 2 LINES TFT display that uses a USB bus power interface.

4. Specification

4.1. General specifications

Specification	Definition
Product	HSN-PD01
Display method	TFT LCD
Resolution	320 × 32 dots
Display mode	Alphanumeric: 20 digits × 2 lines
Character dot matrix	16 × 16 dots for 2x20
Dot size	0.375 (W) mm × 0.625 (H) mm
Viewing direction	6 o'clock
Average brightness	200 cd/m^2
Character type	Alphanumeric and compound (2-Bytes) words
Character size	6.0 (W) mm × 10.0 (H) mm
User-defined characters	96 characters
Viewing area	123 (W) mm × 22.2 (H) mm
Module dimension	138 (L) mm × 35.5 (W) mm × 12.9(D) mm
Viewing angle	θT Ø =90° (12 o'clock): 35 degree θB Ø=270° (6 o'clock) : 25 degree θL Ø=180° (9 o'clock) : 45 degree θR Ø=0°(3 o'clock) : 45 degree
Net weight	Approx. 539 grams
Commands mode	UITIMATE, Aedex, UTC/S, UTC/E, ADM788, DSP800, CD5220, EMAX, Logical Controls, WD-304
Language	US English, International English, Bosnia, Croatian, Czech, Danish, Dutch, Estonian, Faroese, Finnish, Flemish, French, Fr Canadian, German, Greek, Hebrew, Hungarian, Icelandic, Indonesian, Irish, Italian, Katakana, Latvian, Lithuanian, Norwegian, Polish, Portuguese, Romanian, Russian, Slovene, Slovak, Spanish, Swedish, Traditional Chinese, Simplified Chinese, Japanese, Korean, Arabian, Hebrew
Interface	USB in 5 V only
Baud rate	Direct connection 9600 or 19,200 bps
MTBF	30,000 hours
Power Consumption	5 V–400 mA
EMC / Safety standards	FCC, CE, VCCI, RCM, KCC, ICE, CSA, EAC

4.2. Electrical specifications

4.2.1. Power requirements

- Voltage (typical): 5 V DC +/- 10%
- Current consumption (typical): 400 mA

4.2.2. Communication interface

This product uses a USB (Virtual COM Port) Interface. The default protocol of virtual RS232 port is 9600 bps, non-parity, 8 data bits, and 1 stop bit with DTR/DSR control.

5. Software

5.1. Supported operating systems

Windows

- Windows 10 Pro
- Windows Embedded 8.1 Industry
- Windows Embedded 8 Industry
- Windows 8 Professional (64- and 32-bit)
- Windows 7 Professional (64- and 32-bit)
- Windows Embedded POSReady 7 (64- and 32-bit)
- Windows Embedded POSReady 2009

Linux®

- Red Hat® Enterprise Linux® 6 and higher (64- or 32-bit)
- CentOS 6 and higher (64- or 32-bit)
- SUSE Linux Enterprise Point of Service 11 and higher (64- or 32-bit)
- Ubuntu 12.04 LTS and higher (64- or 32-bit)

Android

- Android 8.0 and higher

5.2. Commands list

5.2.1. ULTIMATE command mode

Command	Hex	Description
HT	09	Moves cursor to the right.
BS	08	Moves cursor to the left.
US LF	1F 0A	Moves cursor up.
LF	0A	Moves cursor down.
US CR	1F 0D	Moves cursor to right-most position.
CR	0D	Moves cursor to left-most position.
HOM	0B	Moves cursor to the home position.
US B	1F 42	Moves cursor to the bottom position.
US $ *x y*	1F 24 *x y*	Moves cursor to the position specified as follows: $1 \le x \le 20$ (column); $1 \le y \le 2$ (row)
US C *n*	1F 43 *n*	Enables or disables the display of the cursor. 0: disabled; 1: enabled
CLR	0C	Clears the screen.
CAN	18	Clears the current line.
US X *n*	1F 58 *n*	Adjusts the brightness where $1 \le n \le 4$.
US E *n*	1F 45 *n*	Blinks the screen at the specified interval. $0 < n < 255$: (n*50 msec) on/(n*50 msec) off 0: disabled 255: display is turned off
ESC @	1B 40	Starts the display.
ESC t *n*	1B 74 *n*	Selects the character code table. See [Table 1 Codepage list].
ESC R *n*	1B 52 *n*	Selects the international character set. See [Table 2 International character set].
US r *n*	1F 72 *n*	Enables or disables the reverse character function. 0: disabled; 1: enabled
US MD1	1F 01	Specifies overwrite mode.
US MD2	1F 02	Specifies vertical scroll mode.
US MD3	1F 03	Specifies horizontal scroll mode.
ESC & *s n m* [*a*(*p*1…*p*5)] (*m*-*n*+1)	1B 26 *s n m* [*a*(*p*1…*p*5)](*m*-*n*+1)	Defines the download characters. s=1; $32 \le n \le m \le 126$; a=5 ($p1$…$p5$=pattern1…pattern5)
ESC ? *n*	1B 3F *n*	Disables user-defined characters. $32 \le n \le 126$ where n equals the character code.
ESC % *n*	1B 25 *n*	Enables or disables download character sets. 0=disabled; 1=enabled

Command	Hex	Description
ESC W *n s* (*x*1 *y*1 *x*2 *y*2)	1B 57 *n s* (x1 *y*1 *x*2 *y*2)	Specifies the window range. *n*=number of windows between 1 and 4; 0=disabled, 1=enabled 1≤*x*1≤*x*2≤20 (column); 1≤*y*1≤*y*2≤2 (row)
ESC = *n*	1B 3D *n*	Selects a peripheral device. 1=printer; 2=display; 3=printer and display
US :	1F3A	Specifies the starting and ending positions of a macro definition.
US ^ *n m*	1F 5E *n m*	Executes and closes a macro using the following syntax: 0≤(*n,m*)≤255 • *n*: specifies the time interval for display of characters in units of [*n** 50 msec] • *m*: specifies the interval of macro execution every [*m**50 msec]
US @	1F 40	Runs a self test.
US T *h m*	1F 54 *h m*	Displays time in the following format: 0≤*h*≤23; 0≤*m*≤59
US U	1F 55	Displays the time counter.
ESC u A..CR	1B 75 41 [data x 20] 0D	Displays the upper line.
ESC u B..CR	1B 75 42 [data x 20] 0D	Displays the lower line.
ESC u D..CR	1B 75 44 [data x 45] 0D	Sets the upper-line message to continuous scroll.
ESC u E..CR	1B 75 45 *hh* ':' *mm* 0D	Sets and displays 24-hour time in the following format: 0≤*h*, *m*≤9
ESC u F..CR	1B 75 46 [data x 45] 0D	Sets the upper-line message to scroll once.
ESC u 1..CR	1B 75 49 [data x 40] 0D	Configures a two-line.
ESC [D	1B 5B 44	Moves cursor to the left.
ESC [C	1B 5B 43	Moves cursor to the right.
ESC [A	1B 5B 41	Moves cursor up.
ESC [B	1B 5B 42	Moves cursor down.
ESC [H	1B 5B 48	Moves cursor to the home position.
ESC [L	1B 5B 4C	Moves cursor to the left-most position.

Command	Hex	Description
ESC [R	1B 5B 52	Moves cursor to the right-most position.
ESC [K	1B 5B 4B	Moves cursor to the bottom position.
ESC l x y	1B 6C *x y*	Moves cursor to the specified position where 1≤*x*≤20 and 1≤*y*≤2.

5.2.2. UTC standard command mode

Command	Hex	Description
BS	08	Performs a back space.
HT	09	Performs a horizontal tab.
LF	0A	Performs a line feed.
CR	0D	Performs a carriage return.
DC0 *p*	10 *p*	Moves cursor to the position specified as follows: 0≤*p*≤39
DC1	11	Enables overwrite display mode.
DC2	12	Enables vertical scroll mode.
DC3	13	Enables the cursor.
DC4	14	Disables the cursor.
ESC d	1B 64	Switches to UTC enhanced mode.
US	1F	Clears the display.

5.2.3. UTC enhance command mode

Command	Hex	Description
ESC u A CR	1B 75 41 [data x 20] 0D	Displays the upper line.
ESC u B CR	1B 75 42 [data x 20] 0D	Displays the bottom line.
ESC u D CR	1B 75 44 [data x 45] 0D	Sets the upper-line message to continuous scroll.
ESC u E CR	1B 75 45 *hh* ':' *mm* 0D	Sets and displays 24-hour time in the following format: 0≤*h*, *m*≤9
ESC u F CR	1B 75 46 [data x 45] 0D	Sets the upper-line message to scroll once.
ESC u H..CR	1B 75 48 *n m* 0D	Switches attention code 32 *n*, *m* ≤ to default attention code *n*=1Bh, *m*=75h.
ESC u 1 CR	1B 75 49 [data x 40] 0D	Configures a two-line display.
ESC RS CR	1B 0F 0D	Switches to UTC standard mode.

5.2.4. AEDEX command mode

Command	Hex	Description
! # 1..CR	21 23 31 [data x 20] 0D	Displays the upper line.
! # 2..CR	21 23 32 [data x 20] 0D	Displays the bottom line.
! # 4..CR	21 23 34 [data x 45] 0D	Sets the upper-line message to continuous scroll.

! # 5..CR	21 23 35 *hh* ':' *mm* 0D	Sets and displays 24-hour time in the following format: 0≤*h*, *m*≤9
! # 5 CR	21 23 35 0D	Displays 24-hour time.
! # 6..CR	21 23 36 [data x 45] 0D	Sets the upper-line message to scroll once.
! # 8..CR	21 23 38 *n m* 0D	Switches attention code 32≤*n*, *m* to default attention code *n*="!", *m*="#"
! # 9..CR	21 23 39 [data x 40] 0D	Configures a two-line display.

5.2.5. ADM788 command mode

Command	Hex	Description
CLR	0C	Clears the display.
CR	0D	Performs a carriage return.
SLE1	0E	Deletes the bottom line and moves the cursor to beginning of the upper line.
SLE2	0F	Deletes the bottom line and moves the cursor to the beginning of the bottom line.
DC0	10 *n*	Sets a period to the last *n* position of the upper line where 1≤*n*≤7.
DC1	11 *n*	Enables line blinking. 1=upper line 2=lower line
DC2	12 *n*	Disables line blinking. 1=upper line 2=lower line
SF1	1E	Clears field 1 and moves cursor to the field 1 fast position.
SF2	1F	Clears field 2 and moves cursor to the field 2 fast position.

5.2.6. DSP800 command mode

Command	Hex	Description
EOT SOH I *n* ETB	04 01 49 *n* 17	Select an international character set. See [Table 3 DSP800 international character set].
EOT SOH P *n* ETB	04 01 50 *n* 17	Moves cursor to the specified position where 49≤n≤88.
EOT SOH C *n m* ETB	04 01 43 *n m* 17	Clears the display range from *n* position to *m* position and moves cursor to n position where 49≤*n*≤*m*≤88.
EOT SOH S *n* ETB	04 01 53 *n* 17	Saves the currently displayed data (40 characters) to the *n*th layer for demo display where 1≤*n*≤3.
EOT SOH D *n m* ETB	04 01 44 *n m* 17	Displays the saved data where 1≤*n*≤3. The *m* value can be ignored.

Command	Hex	Description
EOT SOH A *n* ETB	04 01 41 *n* 17	Adjusts the brightness where 1≤*n*≤4.
EOT SOH = *n* ETB	04 01 3D *n* 17	Selects the peripheral device. 1=printer; 2=display
EOT SOH % ETB	04 01 25 17	Starts the display.

5.2.7. CD5220 command mode

Command	Hex	Description
ESC DC1	1B 11	Enables overwrite mode.
ESC DC2	1B 12	Enables vertical scroll mode.
ESC DC3	1B 13	Enables horizontal scroll mode.
ESC Q A CR	1B 51 41 [N]20 0D	Sets string display mode to write string to upper line.
ESC Q B CR	1B 51 42 [N]20 0D	Sets string display mode to write string to bottom line.
ESC Q D CR	1B 51 44 [N]m20 0D	Sets the upper-line message to continuous scroll where *m*<40.
ESC [D	1B 5B 44	Moves cursor to the left.
BS	08	Moves cursor to the left.
ESC [C	1B 5B 43	Moves cursor to the right.
HT	09	Moves cursor to the right.
ESC [A	1B 5B 41	Moves cursor up.
ESC [B	1B 5B 42	Moves cursor down.
LF	0A	Moves cursor down.
ESD [H	1B 5B 48	Moves cursor to the home position.
HOM	0B	Moves cursor to the home position.
ESC [L	1B 5B 4C	Moves cursor to the left-most position.
CR	0D	Moves cursor to the left-most position.
ESC [R	1B 5B 52	Moves cursor to the right-most position.
ESC [K	1B 5B 4B	Moves cursor to the bottom position.
ESC l *x y*	1B 6C *x y*	Moves cursor to the position specified as follows: 1≤*x*≤20 (column); *y*=1,2 (row)
ESC @	1B 40	Starts the display.
ESC W *s x*1 *x*2 *y*	1B 57 *s x*1 *x*2 *y*	Enables or disables the window range at horizontal scroll mode. 1=disabled; 2=enabled; 1≤*x*1≤*x*2≤20 (column); *y*=1,2 (row)
CLR	0C	Clears the display screen and disables string mode.
CAN	18	Clears the cursor line and disables string mode.
ESC * *n*	1B 2A *n*	Adjusts the brightness where 1≤*n*≤4.

Command	Hex	Description
ESC & *s n m* [*a*(*p1*…*p5*)] (*m*-*n*+1)	1B 26 *s n m* [*a*(*p1*…*p5*)] (*m*-*n*+1)	Defines the download characters as follows: *s*=1; 32≤*n*≤*m*≤126; *a*=5 (*p1*…*p5*=pattern1…pattern5)
ESC ? *n*	1B 3F *n*	Deletes download characters where n is the character code and 32≤*n*≤126.
ESC % *n*	1B 25 *n*	Enables or disables a download character set. 0=disabled; 1=enabled
ESC _ *n*	1B 5F *n*	Enables or disables cursor. 0=disabled; 1=enabled
ESC f *n*	1B 66 *n*	Select an international font set. See [*Table 4 CD5220 international font set*].
ESC c *n*	1B 63 *n*	Selects a font, ASCII code, or JIS code.
ESC = *n*	1B 3D *n*	Selects a peripheral device. 1=printer; 2=display; 3=printer & display

5.2.8. EMAX command mode

Command	Hex	Description
ESC DC1	1B 11	Enables overwrite mode.
ESC DC2	1B 12	Enables vertical mode.
ESC DC3	1B 13	Enables horizontal scroll mode.
ESC [D	1B 5B 44	Moves cursor to the left.
BS	08	Moves cursor to the left.
ESC [C	1B 5B 43	Moves cursor to the right.
HT	09	Moves cursor to the right.
ESC [A	1B 5B 41	Moves cursor up.
ESC [B	1B 5B 42	Moves cursor down.
ESC [H	1B 5B 48	Moves cursor to the home position.
HOM	0B	Moves cursor to the home position.
ESC [L	1B 5B 4C	Moves cursor to the left-most position.
CR	0D	Moves cursor to the left-most position.
ESC [R	1B 5B 52	Moves cursor to the right-most position.
ESC [K	1B 5B 4B	Moves cursor to the bottom position.
ESC l *x y*	1B 6C *x y*	Moves cursor to the position specified as follows: 1≤*x*≤20; 1≤*y*≤2
ESC @	1B 40	Starts the display.
CLR	0C	Clears display screen and disables string mode.
CAN	18	Clears the cursor line and disables string mode.
ESC * *n*	1B 2A *n*	Configures brightness setting from 1≤*n*≤4.
ESC _ n	1B 5F n n = 0,1	Enables or disables the cursor.

Command	Hex	Description
ESC f n	1B 66 n	Selects an international font.
ESC c n	1B 63 n	Selects a font, ASCII code, or JIS code
ESC = *n*	1B 3D	Selects a peripheral device. 1=printer; 2=display; 3=printer & display

5.2.9. LOGIC command mode

Command	Hex	Description
^Q	11	Enables overwrite mode.
^R	12	Enables vertical mode.
^I	09	Performs a horizontal tab.
^H	08	Performs a back space.
^J	0A	Performs a line feed.
^M	0D	Performs a carriage return.
^S	13	Disables the cursor.
^T	14	Enables the cursor.
^P	10	Selects a specified section, such as the following: • 10 00 MSD of upper line • 10 13 LSD of upper line • 10 14 MSD of bottom line • 10 27 LSD of bottom line
^_	1F	Resets the settings to default.
^D *n*	04 *n*	Configures the brightness setting. 04 FF: 100% 04 60: 60% 04 40: 40% 04 20: 20%

5.2.10. LD540 command mode

Command	Hex	Description
HT	09	Moves cursor to the right in overwrite mode.
BS	08	Moves cursor to the left in overwrite mode.
CR	0D	Moves cursor to the left-most position in overwrite mode.
ESC @	1B 40	Starts the customer display, clears the display buffer, sets display mode to shift, and sets current display row to upper line.
ESC U	1B 55	Selects the upper line as current row (default setting).
ESC D	1B 44	Selects the bottom line as current row.
ESC A *n*	1B 41 *n*	Enables or disables the customer display. D=disabled; E=enabled
ESC C *r c*	1B 43 *r c*	Moves cursor to the position specified as follows in overwrite mode: U=upper line; D=bottom line; 1≤*c*≤20 (column)

ESC E *r n*	1B 45 *r n*	Configures a special effect or display mode for the specified row.
ESC R *n*	1B 52 *n*	Selects an international font set. See Table 4 CD5220 international font set.
ESC = *n*	1B 3D *n*	Selects a peripheral. 1=printer;2=display; 3=printer & display

6. Appendix

6.1.1. Table 1 Codepage list

Page		Codepage	Language
Dec	Hex		
0	0x00	PC437	U.S.A., Standard Europe
1	0x01	Katakana	
2	0x02	PC850	Multilingual
3	0x03	PC860	Portuguese
4	0x04	PC863	Canadian-French
5	0x05	PC865	Nordic
11	0x0B	PC851	Greek
12	0x0C	PC853	Turkish
13	0x0D	PC857	Turkish
14	0x0E	PC737	Greek
15	0x0F	ISO8859-7	Greek
16	0x10	WPC1252	
17	0x11	PC866	Cyrillic 2
18	0x12	PC852	Latin2
19	0x13	PC858	Euro
20	0x14	KU42	Thai
21	0x15	TIS11	Thai
26	0x1A	TIS18	Thai
30	0x1E	TCVN-3	Vietnamese
31	0x1F	TCVN-3	Vietnamese
33	0x21	WPC775	Baltic Rim
34	0x22	PC855	Cyrillic
35	0x23	PC861	Icelandic
38	0x26	PC869	Greek
39	0x27	ISO8859-2	Latin 2
40	0x28	ISO8859-15	Latin 9
41	0x29	PC1098	Farsi
42	0x2A	PC1118	Lithuanian
43	0x2B	PC1119	Lithuanian
44	0x2C	PC1125	Ukrainian
45	0x2D	WPC1250	Latin 2
46	0x2E	WPC1251	Cyrillic
47	0x2F	WPC1253	Greek

Page		Codepage	Language
Dec	Hex		
48	0x30	WPC1254	Turkish
51	0x33	WPC1257	Baltic Rim
52	0x34	WPC1258	Vietnamese
53	0x35	KZ1048	Kazakhstan
241	0xF1	CP950	Traditional Chinese
242	0xF2	CP936	Simplified Chinese
243	0xF3	CP949	Korean
244	0xF4	CP932	Japanese Shift JIS

6.1.2. Table 2 International character set

Index *n*		Country	ASCII Code											
Dec	Hex		23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
00	00	U.S.A.	#	$	@	[	\	]	^	`	{	|	}	~
01	01	France	#	$	à	°	ç	§	^	`	é	ù	è	¨
02	02	Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	β
03	03	U.K.	£	$	@	[	\	]	^	`	{	|	}	~
04	04	Denmark I	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
05	05	Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
06	06	Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì
07	07	Spain I	Pt	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
08	08	Japan	#	$	@	[	¥	]	^	`	{	|	}	~
09	09	Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
10	0A	Denmark II	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
11	0B	Spain II	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
12	0C	Latin America	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú
13	0D	Korea	#	$	@	[	₩	]	^	`	{	|	}	~
14	0E	Slovenia/Croatia	#	$	Ž	Š	Đ	Ć	Č	ž	š	đ	ć	č
15	0F	China	#	¥	@	[	\	]	^	`	{	|	}	~
16	10	Vietnam	₫	$	@	[	\	]	^	`	{	|	}	~
17	11	Slavic	#	$	@	[	\	]	^	`	{	|	}	~
18	12	Russia	#	$	@	[	\	]	^	`	{	|	}	~

6.1.3. Table 3 DSP800 international character set

0x30	U.S.A.

0x31	France
0x32	Germany
0x33	U.K.
0x34	Denmark I
0x35	Sweden
0x36	Italy
0x37	Spain
0x38	Japan
0x39	Norway
0x3A	Denmark II

6.1.4. Table 4 CD5220 international font set

n		Country
Hex	**Dec**	
0x41	A	U.S.A.
0x46	F	France
0x47	G	Germany
0x55	U	U.K.
0x44	D	Denmark I
0x57	W	Sweden
0x49	I	Italy
0x53	S	Spain
0x4A	J	Japan
0x4E	N	Norway
0x45	E	Denmark II
0x4C	L	Slavic
0x52	R	Russia