Specification No. 3-1308-8841-Z1689

PDR-1689 SERIES

MANUAL SWIPE CARD READER

(SPI or UART Interface)

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1. OVERVIEW

PDR-1689 is a set of manual swipe type modules that read magnetically encoded data from full track (1,2,3 track) magnetic stripes that conform to ISO standards via SPI or UART interface.

2. FEATURES

2.1 Decode Full track (1,2,3 track) magnetic stripes
2.2 Silicone rubber-Action Card Guidance System aids Simple and Compact Structure.
2.3 Custom ICs provide 15%: 30% Jitter compensation over a Wide Range of Card Feeding Speeds.
2.4 High Coercive Magnetic Stripe up to 4,000Oe can be read.

3. ENVIRONMENTAL REQUIREMENTS

3.1	Operating Temperature and Humidity	: 0 ~ 50℃ , 20 ~ 90% RH
3.2	Conservation Temperature and Humidity	: -20 ~ 70℃ , less than 95% RH
3.3	Vibration	: Amplitude 2mm , 2 G , 10~55Hz/min in x,y,z direction
3.4	Shock Resistance	: Up to 30 G, 11 msec

4. SPECIFICATIONS

4.1	Card Standard	ISO 7811		
4.2	Track No.	I (IATA)	II (ABA)	III (MINTS)
4.3	Reading Method	F2F (FM)		
4.4	Recording Density	210 BPI	75 BPI	210 BPI
4.5	Recording Capacity	79 Characters (7-bit code)	40 Characters (5-bit code)	107 Characters (5-bit code)
4.6	Card Thickness	0.76 ± 0.08 mm		

4.7	Power Supply	: 3.0V ~ 5V DC ± 5%
4.8	Power Consumption	: Stand by : 2.0mA type / at 5V Operation : Less than 3.3mA / at 5V
4.9	Ripple	: Less than 50mVp-p
4.10	Reading Track Width	: 1.5mm
4.11	Operation Locus	: Indoors only
4.12	Card Feeding Speed	: 15 ~ 95 cm/sec
4.13	Head Life time	: 500,000 passes min.
4.14	Error Rate	: Less than 0.5%
4.15	Weight	: Approx. 25g

5. INTERFACE (SPI or UART)

** ***SPI (Serial Peripheral interface)***
** ***UART (Universal Asynchronous Receiver Transmitter)***

The external data interface either UART or SPI is selected by the state of the SPI_CLK input pin.
The UART interface is selected as long as the SPI_CLK stays at the logical high state (3.3v) after the external reset signal input (RESETB=0V).
The SPI interface is selected if the SPI_CLK is at the logical low state (0V) at least 3usec period after the external reset signal. Once the SPI is chosen, the SPI is assumed until the next external reset signal input
.
The UART interface supports the baud rate of 9600, 192000bps.
The frame structure is shown in Fig. 1. One start bit and at least one stop bit should be included in the frame. The data word consists of 8 bits. The LSB of the data is transmitted first. (1 start bit + 8 data bits, 1 stop bit, none parity).

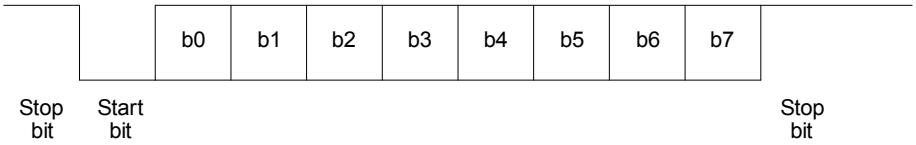


Figure 1: Frame format of UART interface.

The SPI interface uses SPI_CLK input as the timing reference to transmit or receive data through TXD and RXD, respectively. The supported data rate is from 10kbps to 100kbps. The data transmit and receive timing diagrams are shown in Fig. 5 and 6, respectively. The DATA_RDY output pin is asserted to notify the external device of the data availability. Once the DATA_RDY is asserted, the external device provides SPI_CLK to the reader and can latch the TXD signal at the falling edge of SPI_CLK. The reader receives bits through RXD and latches the signal at the falling edge of the SPI_CLK. Note that if there is no SPI_CLK input for 500msec after the DATA_RDY assertion, the DATA_RDY signal is de-asserted.

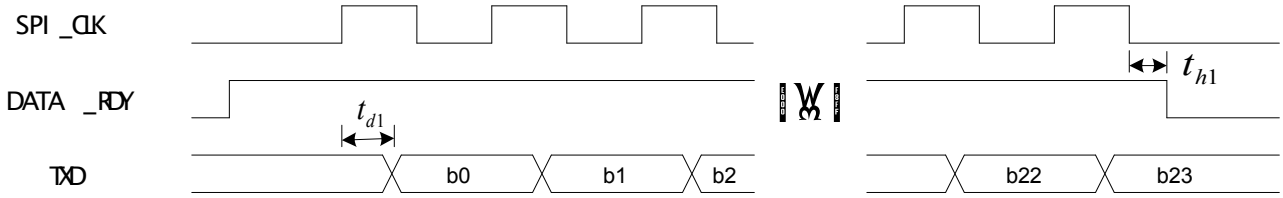


Figure 2: Timing diagram of SPI transmit data.

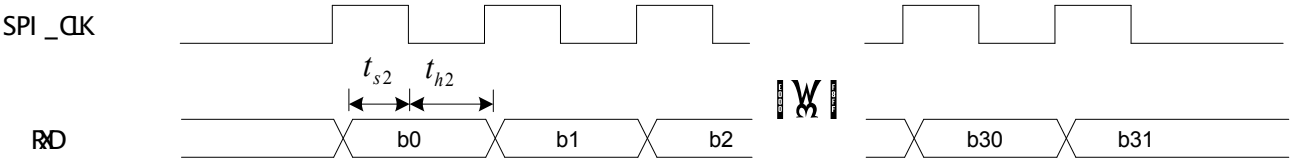


Figure 3: Timing diagram of SPI receive data.

6. PIN DESCRIPTION

12505HS - 06	
1	VDD(3.3V)
2	MISO(TXD)
3	MOSI(RXD)
4	CLK (**High: serial**)
5	DATA_RDY
6	GND

** ***SPI (Serial Peripheral interface)***
** ***UART (Universal Asynchronous Receiver Transmitter)***

* UART interface is possible with serial Baud-rate calibration.

UART Calibration command (9600 or 19200 bps)
⇒ Response
⇒ UART Calibration
⇒ OTP write
(See below 7.Command for details.)

*** ***The HOST connector type & cable length can be customized.***

7. COMMANDS

Command format

STX (1byte)	Class (1byte)	Function (1byte)	Length (1byte)	TX Data (n byte)	ETX (1byte)	BCC (1byte)

* STX : Command Start Character (0x02)
* Class : Class of command
* Function : Requested function for the reader to conduct
* Length : Number of bytes in Data field
* TX Data : Data
* ETX : End Character (0x03)
* BCC : Check Sum (Exclusive OR value from STX to ETX)

Response format

STX (1byte)	Class (1byte)	Function (1byte)	Length (1byte)	Status (1byte)	RX Data (n byte)	ETX (1byte)	BCC (1byte)

* STX : Start Character for Response (0x02)
* Class : Re-transmission of the Class sent in the command
* Function : Re-transmission of the Function sent in the command
* Length : Number of bytes in RX Data field
* Status : Status Check Byte
  ACK (0x06): Successful execution of the command
  NAK (0x15): Failed execution of the command
* RX Data : Response Value and error code as response
* ETX : End Character for response (0x03)
* BCC : Check sum (Exclusive OR value from STX to ETX)

The commands are listed in Table 1.

Table 1: List of commands

Type	Class	Function	Length	Data	Remark
Load User Parameters	0x12	0x31	0x04	TX Mode (1byte) Reserved (1byte) All Track Error (1byte) Reserved (1byte)	Set the operating mode of the reader
UART Calibration	0x13	0x31	0x05	0xAAAAAAAAAA (5byte)	UART calibration
OTP Write (UART calibration)	0x15	0x33	0x00	-	OTP write of UART calibration result **(OTP write maximum 4 times)**
Get Status	0x16	0x31	0x00	-	Get the current setting of the reader
Read Data Retry	0x17	0x31	0x00	-	Re-read the data frame retrieved the most recent
** Software Reset	0x18	0x31	0x00	-	Initialize

*** It takes 50ms to complete the command.*

The responses to the commands are listed in Table 2
.

Table 2: List of responses

Type	Class	Function	Length	Status	Data	Remark
Load User Parameter	0x12	0x31	0x04	0x06	TX Mode (1byte) Reserved (1byte) All Track Error (1byte) Reserved (1byte)	Current operating mode return
			0x01	0x15	Error Code	Error code return
UART Calibration	0x13	0x31	0x01	0x06	Calibration Value (1byte)	UART calibration result return
			0x01	0x15	Error Code	Error code return
OTP Write (User Parameter)	0x15	0x32	0x04	0x06	TX Mode (1byte) Reserved (1byte) All Track Error (1byte) Reserved (1byte)	User parameters OTP write
			0x01	0x15	Error Code	Error code return
OTP Write (UART calibration)		0x33	0x01	0x06	Calibration Value (1byte)	UART calibration result OTP write
			0x01	0x15	Error Code	Error code return

Get Status	0x16	0x31	0x06	0x06	TX Mode (1byte) Reserved (1byte) All Track Error (1byte) Reserved(1byte) Reserved (1byte) UART Calibration (1byte)	Current setting information return
			0x01	0x15	Error Code	Error code return
Read Data Retry	Un-encrypted Most Recent Data Frame					Re-read of the most recent un-encrypted data frame
	0x17	0x31	0x01	0x15	Error Coder	Error code return
Software Reset						No response for successful initialization
	0x18	0x31	0x01	0x15	Error Code	Error code return

- The error codes carried in the response TX Data field are summarized in Table 3.

Table 3: List of error codes

Error Code	Description
0x51	Preamble error in card read data
0x52	Postamble error in card read data
0x53	LRC error in card read data
0x54	Parity error in card read data
0x55	Blank track
0x61	STX/ETX error in command communication
0x62	Class/Function un-recognizable in command
0x63	BCC error in command communication
0x64	Length error in command communication
0x65	No data available to re-read
0x71	No more space available for OTP write
0x72	OTP write try without data
0x73	CRC error in read data from OTP
0x74	No data stored in OTP

- The TX Mode is set as follow.

Table 4: Data transmit mode

TX Mode	Transmit Mode
MODE2(0x02)	Binary data format (binary low data LSB first)

- The all track error field is set as follows

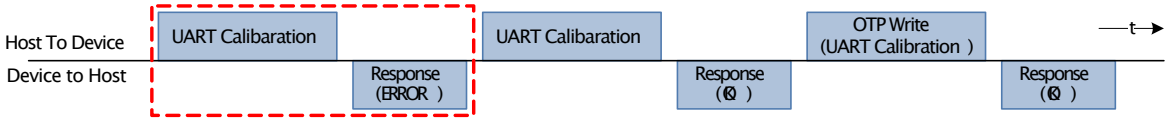
Table 5: all track error response setting

all track error	all track error response setting

0x00	all track error report

- If the “Software Rest” command is issued without any error, all the registers of the reader are set to their initial values and user setting are retrieved from the OTP memory. The error type for the “Software Rest” command is limited to the communication error and unknown command error.

- To set the baud rate of the UART interface, use the “UART calibration” command as the first command after the power-up or reset. The reader will automatically tune the baud rate to the incoming bit period of the data field of the command (9600bps ~ 192000bps).



- The data frame formats are shown in Fig. 4.

						<-LEN1->				<-LEN2->				<-LEN3->		
TX MODE 1 ISO Mode	STX	MODE	1 TRK ID	LEN 1	STATUS	DATA	2 TRK ID	LEN 2	STATUS	DATA	3 TRK ID	LEN 3	STATUS	DATA	ETX	BCC
	0x02	0x31	0x25	n Byte	0x06	MS Data1	0x3F	n Byte	0x06	MS Data2	0x5E	n Byte	0x06	MS Data3	0x03	1 Byte
					0x15	Error Code			0x15	Error Code			0x15	Error Code		

						<-LEN1->				<-LEN2->				<-LEN3->		
TX MODE 2 Binary Mode	STX	MODE	1 TRK ID	LEN 1	STATUS	DATA	2 TRK ID	LEN 2	STATUS	DATA	3 TRK ID	LEN 3	STATUS	DATA	ETX	BCC
	0x02	0x33	0x25	n Byte	0x06	MS Data	0x3F	n Byte	0x06	MS Data	0x5E	n Byte	0x06	MS Data	0x03	1 Byte
					0x15	Error Code			0x15	Error Code			0x15	Error Code		

Figure 4: TX Data frame format

8. NOTES FOR BETTER OPERATION

8.1 The card should be inserted in the specified direction.
8.2 Cards which meet standards should be used.
8.3 Cards should not be dirty, scratched or deformed.
8.4 Cards should not be placed near magnets or damp.
8.5 Standard condition is temperature at 20℃ ± 5℃ and humidity at 35% ~ 60% RH.
8.6 Specification to be changed or revised without notice.

9. OUTLINE DIMENSIONS

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