Aemulus

DM280e

User Manual

Version 1.2, 10-2013

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Safety Precautions

A. General Information

- Refer to the User Manual prepared by the manufacturer for proper usage of the instrument.
- If the product is used in a manner not specified, the protection provided by the instrument warranty may be impaired.
- Return the instrument to Aemulus for service and repair to ensure that safety features are maintained.

WARNING

The WARNING heading explains hazards that might occur if an operating procedure, practice, or the like that, if not correctly performed or adhered to might result in personal injury or death. Always read the associated information very carefully and make sure the indicated information is met before performing the indicated procedure.

CAUTION

The CAUTION heading in the user documentation explains hazards that could damage the instrument. Such damage may invalidate the warranty.

B. Identification and Discouragement of Hazardous Applications

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CAUTION

Main Power

- Ensure that the mains power is turned off before plugging or removing the PCIe module into or from the computer.
- Make sure the power cord is plugged properly to the computer before applying power.
- The computer that carries the instrument has to be plugged into a grounded (earthed) power outlet. By not doing so, it will defeat the power cord safety ground feature.
- Ensure that the power is removed from the product before connecting/disconnecting the cables to the product connectors.

WARNING

Instrument Cables / Connectors

- Inspection of the connecting cable and test leads for possible wear, cracks, or breaks must be done before each use.
- Make sure the cables used for the product are rated to the specified voltage and current level.

WARNING

Instrument Output

- Extreme caution is to be practiced when a shock hazard is present. Lethal voltage may be present on cable connector jacks.
- When power is applied to the circuit under test, do not touch the product and test cables or test leads.
- Do not touch the connector jacks or cables when the output of the product is turned on.

WARNING

Operating Temperature

- The fan speed of the chassis that carries the instrument has to be in HIGH speed to allow proper heat ventilation.
- Make sure the product temperature is under 46˚C before operating the product.

C. Identification of Authorized Personnel

End user	Individual or group who is responsible for the use and maintenance of the product, as well as being responsible for ensuring that the product is operated within its specifications. Knowledge on electrical safety procedures and proper use of the product are prerequisite before operating the product.
Maintenance personnel	Individual or group who is responsible for performing routine procedures on the product to keep it operating properly. Any service should only be done by qualified service personnel.
Service personnel	Installation and service procedures may only be carried out by properly trained service personnel. Knowledge on working with live circuits, performing safe installations, and repairing the products are prerequisite for this individual or group.

Section 1: Quick Start

1.1 Product Start-up Configuration

Each product is carefully inspected before it leaves the factory. Upon receipt and before unpacking the product, please inspect the unit for any obvious damage that may occur during shipment. If any damage is found, notify the instrument manufacturer immediately.

Please verify that the following items are included in the original packing of this product. Contact the instrument manufacturer immediately if any of these items are found missing.

- Reference / Drivers CD-ROM

The product is designed to be used in an indoor environment, an area with low condensation and a temperature of between 23°C ± 10°C. Ensure that the area where the product is installed is free from the presence of any explosive or flammable fumes or gases.

CAUTION

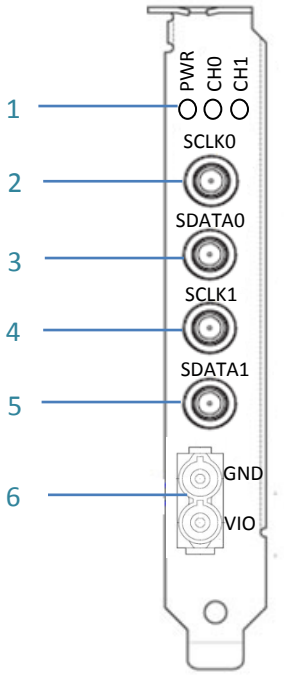
The product is shipped in materials that prevent static damage to the module. The module should only be removed from the packaging in an anti-static area ensuring that correct anti-static precautions are taken. Store all modules in anti-static envelopes when not in use.

1.2 Product Software & Hardware Installation

Refer to DM28oe installation guide.

Section 2: Operation

2.1 Front Panel Connectors



1	VIO	Power LED
	CHo	Channel o active
	CH1	Channel 1 active
2	SCLKo	SCLOCK
3	SDATAo	SDATA
4	SCLK1	SCLOCK
5	SDATA1	SDATA
6	GND	Ground
	VIO	Output Voltage

Figure 1: DM28oe Front Panel

LED	Description
VIO	Light up when power is supplied to the DM28oe
CHo	Light up when Channel o is active
CH1	Light up when Channel 1 is active

Table 1: Status LED

Pin	Signal Name
SCLKo	SCLOCK o
SDATAo	SDATA o
SCLK1	SCLOCK 1
SDATA1	SDATA 1

Table 2: I/O pins

2.2 Soft Front Panel

The soft front panel provides an interface for operating the module. It is intended for testing and diagnosing, for demonstration and training, and for basic operation of the module. It represents most of the functions available in the instrument driver. It is not however a comprehensive application suitable for measurements; for this, remote programming the module.

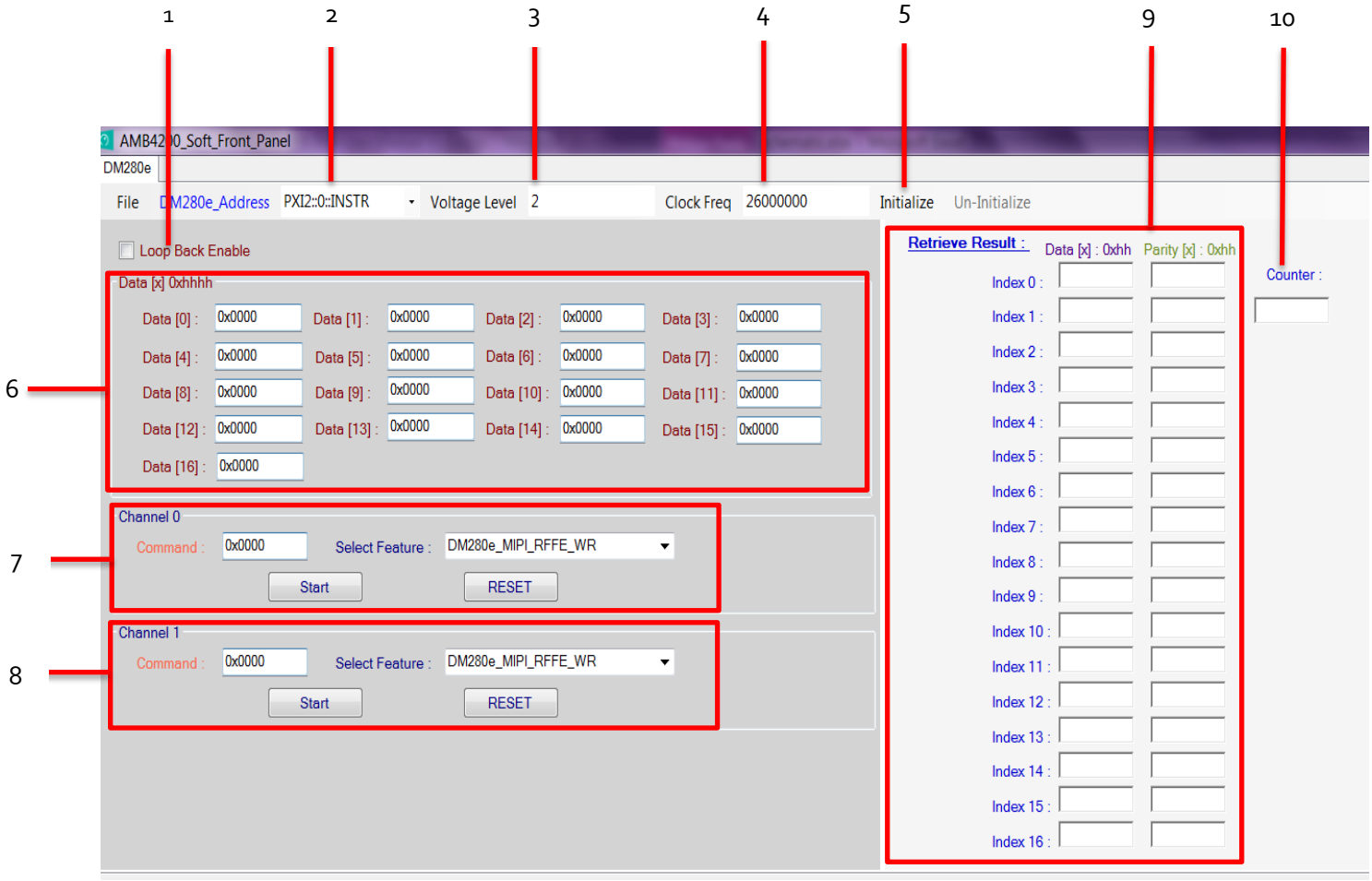


Figure 2: DM28oe Soft Front Panel

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>1</td><td>Tick to enable loop-back[1] operation</td></tr>
<tr><td>2</td><td>Display the address of the module connected. A list of addresses is shown for all detected modules in the computer.</td></tr>
<tr><td>3</td><td>Set/ display the voltage supply of the module</td></tr>
<tr><td>4</td><td>Set/ display the frequency of the MIPI operation</td></tr>
<tr><td>5</td><td>Initialize or un-initialize the module</td></tr>
<tr><td>6</td><td>Data to be written into the module</td></tr>
<tr><td>7</td><td>Channel 0 control panel:

<table><tr><td>a</td><td>Start</td><td>Execute the operation</td></tr><tr><td>b</td><td>Command</td><td>The command to be sent to module for different MIPI operation</td></tr><tr><td>c</td><td>Select Feature</td><td>Select either DM28oe_MIPI_RFFE_WR, DM28oe_MIPI_RFFE_RD and DM28oe_MIPI_RFFE_RETRIEVE</td></tr><tr><td>d</td><td>Reset</td><td>Reset all ports to input, drive logic low. Reset all internal registers</td></tr></table></td></tr>
<tr><td>8</td><td>Channel 1 control panel:

<table><tr><td>a</td><td>Start</td><td>Execute the operation</td></tr><tr><td>b</td><td>Command</td><td>The command to be sent to module for different MIPI operation</td></tr><tr><td>c</td><td>Select Feature</td><td>Select either DM28oe_MIPI_RFFE_WR, DM28oe_MIPI_RFFE_RD and DM28oe_MIPI_RFFE_RETRIEVE</td></tr><tr><td>d</td><td>Reset</td><td>Reset all ports to input, drive logic low. Reset all internal registers</td></tr></table></td></tr>
<tr><td>9</td><td>Display the data after read operation, together with its corresponding parity check bit.</td></tr>
<tr><td>10</td><td>Counter to display the number of data byte read</td></tr>
</table>

Table 3: Soft Front Panel Control

Note:

1. Loop-back – is an operation whereby the routing of signals or flows of items back to their originating devices or facilities without intentional processing or modification. This is used to test the transmission or transportation infrastructure.

Quick steps to configure the module:

1. Select PCIe address of the targeted module from the drop-down list.
2. Set the desired voltage level.
3. Set the desired frequency.
4. Press "Initialize".
5. Set desired operation from the feature in channel 0 or channel 1. For example, DM28oe_MIPI_RFFE_WR.
6. Set the desired operation command, for example, 0x0202.
7. Set the data that should be written to the module at part (6) (refer figure 2).
8. Press "Start" to execute the command.
9. Press "Un-Initialize" to turn off the whole module.

Note:
Retrieve result and counter will be displayed after the operation of DM28oe_MIPI_RFFE_RETRIEVE.

2.3 Remote Operation

Refer to programming manual.

Section 3: Brief Technical Description

DM280e is a controller used to communicate with MIPI (Mobile Industry Processor Interface) RFFE (RF Front End) devices. DM280e consists of 2 RFFE channels. It utilizes a relatively high bus clock frequency of 26MHz and rates down to 32kHz. It is capable of performing register 0 write, register write, extended register write, extended register write long, register read, extended register read as well as extended register read long operations.

3.1 Basic MIPI Operation

The MIPI RFFE Specification defines an interface between RFFE-capable devices, with one master device and up to 15 slaves on a single RFFE bus. The RFFE Interface and bus structure is illustrated below.

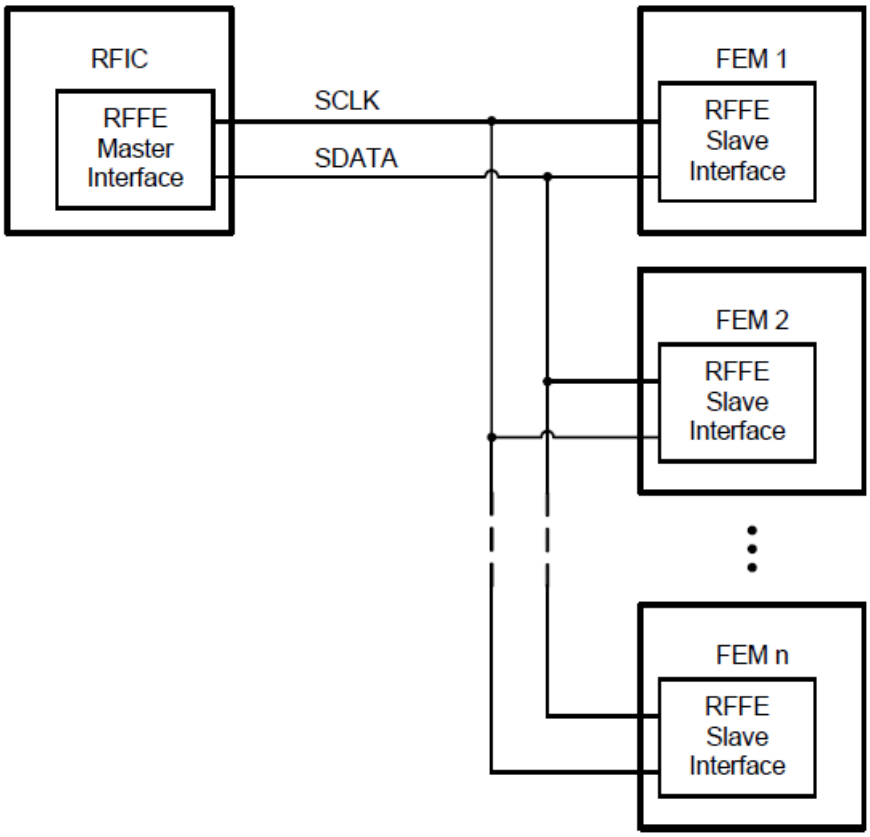


Figure 3: RFFE Interface and Bus Structure

MIPI uses two signal lines, a clock signal (SCLK) controlled by the master, a unidirectional/bidirectional data signal (SDATA), and an I/O supply/reference voltage (VIO).

The choice of SDATA attribute is based on whether a slave device is write-only, or whether it supports read/write capability.

RFFE bus components are connected in parallel to the SCLK and SDATA lines of the bus. Line drivers always exist for both SCLK and SDATA in the master, whereas only slaves supporting read-back functionality need a line driver for SDATA. Each physical slave must have one SCLK input pin, one SDATA input or bidirectional pin, and a VIO pin to ensure signal compatibility between devices. Note that VIO can be supplied externally or it may be sourced from the master device.

Section 4: Maintenance

4.1 Cleaning

Before doing any cleaning to the product, switch off the computer and disconnect it from main power supply.

You can wipe the front panel of the module using a soft cloth moistened in water, taking care not to wet the connectors. Do not use aerosol or liquid solvent cleaners.

You can use a handheld vacuum cleaner to remove any accumulated dust on the product, if necessary.

CAUTION

Be careful NOT to be in direct contact with any circuits on the product to prevent any damages. Contaminants such as oils and salts from the human skin can affect the performance of the product.

Comply with good ESD practice when handling the product during cleaning.

4.2 Servicing

There are no user-serviceable parts in the product; if any attention is needed, return it to instrument manufacturer.

NOTE

Any repair that is not covered in this manual should only be performed by qualified Aemulus personnel.

Section 5: Warranty

Aemulus warrants that the product delivered will be free from defects in material and workmanship for 1 year from the date of delivery order. This warranty does not cover the product if it is damaged in the process of being installed.

This warranty does not cover replacement of products damaged by abuse, accident, misuse, neglect, alteration, repair, improper installation or improper testing. If the product is found to be defective otherwise, Aemulus, at its option, will replace or repair the product at no charge. If you ship the product, you must assume the risk of damage or loss in transit. Aemulus may replace or repair the product with either a new or reconditioned unit, and the product returned becomes Aemulus property.

Section 6: Revision History

1.1	APR 2013	INITIAL RELEASE
1.2	OCT 2013	ADDED OPERATING TEMPERATURE WARNING MESSAGE

Section 7: Contact Us

To obtain service, warranty or technical assistance, please contact Aemulus.

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Product specifications and descriptions in this document are subject to change without prior notice.