VG7050EAN
Evaluation Board Manual

VG7050EAN-EVB

SEIKO EPSON CORPORATION
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1. Overview

VG7050EAN-EVB is an evaluation board which customer can set target frequencies by writing registers’ data of VG7050EAN. This manual describes evaluation board VG7050EAN-EVB’s operation and accompanying software.

1.1. System Configuration

- Hardware : VG7050EAN Eva-Board (VG7050EAN-EVB)
- Software : PLL Oscillator RegWriter

1.2. Features

- VG7050EAN evaluation with registers setting by I²C bus
- Automatic register value calculation from inputted frequencies. (Also user can set registers value directly.)
- Accompanying software (PLL Oscillator RegWriter)
  Windows7, 8, 8.1, 10 (32 bit, 64 bit) compatible
- Power supply (+2.5 V or +3.3 V) available through USB connection
- Easy PC connection through USB cable

1.3. Quick Start

- Install software (PLL Oscillator RegWriter) to PC
- Set jumper evaluation board (VG7050EAN-EVB) jumper pins
- Insert VG7050EAN on the socket
- Connect measurement instruments to VG7050EAN-EVB output terminals
- Connect PC and VG7050EAN-EVB with USB cable.
- Connect external level to Vc terminal (optional)
- Startup PLL Oscillator RegWriter
- Input target frequencies and transmit register data to VG7050EAN-EVB
- Evaluate target frequencies on the system.
1.4. VG7050EAN-EVB Block Diagram

Figure 1  VG7050EAN-EVB Functional Block Diagram
2. Functional Description

VG7050EAN-EVB is an evaluation kits. Output frequencies are set by transmitting register data from PC to VG7050EAN-EVB through I²C bus.

2.1. Power Supply

Two power voltage supply ways (to VG7050EAN device on the boards) are available.

- Way 1: Through USB cable and regulator on board
- Way 2: Direct power supply from external unit

To select supply way, jumpers (JP7, JP8, and JP9) should be set in the proper way.

Figure 2 Jumpers for Power supply
Way1  Through USB cable and regulator on board
- JP8  1-2 short: 2.5V,  2-3 short: 3.3V

Way2  Direct power supply from external unit
- JP7: short
- JP9: open
- CN1: power supply from external unit

Table 1, 2, 3 describe detail power supply condition.

<table>
<thead>
<tr>
<th>Table 1  VG7050EAN GND (PVSS) setting (JP7)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>VG7050EAN GND terminal level (PVSS)</td>
<td>JP7 Jumper Installation</td>
</tr>
<tr>
<td>GND common</td>
<td>Short</td>
</tr>
<tr>
<td>GND separate</td>
<td>Open</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2  Regulator output level (through USB cable) (JP8)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage [V]</td>
<td>JP8 Jumper Installation</td>
</tr>
<tr>
<td>2.5</td>
<td>Connect pin 1 “2.5 V” to center pin 2</td>
</tr>
<tr>
<td>3.3</td>
<td>Connect pin 3 “3.3 V” to center pin 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3  VG7050EAN VDD power supply setting (JP9)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply Source</td>
<td>JP9 Jumper Installation</td>
</tr>
<tr>
<td>USB</td>
<td>Short</td>
</tr>
<tr>
<td>External Power supply</td>
<td>Open (External power supply is connected to CN1)</td>
</tr>
</tbody>
</table>

Caution: It is prohibited that external power supply connection to CN1 during JP9 short connection. If external power supply is connected to CN1 in case of JP9 short, power voltage collision might damage the circuitry on the board and PC.
2.2. Control by PC

Software (PLL Oscillator RegWriter) controls I^2C I/F, OE on VG7050EAN-EVB. Table 4 describes the jumpers' function in connection with PLL Oscillator RegWriter.

Table 4  Jumpers setting

<table>
<thead>
<tr>
<th>Jumper</th>
<th>Pin NO.</th>
<th>Signal name</th>
<th>Initial status</th>
</tr>
</thead>
<tbody>
<tr>
<td>JP1*1</td>
<td>3</td>
<td>SDA/SCL pull up level</td>
<td>1-2 Short (3.3 V)</td>
</tr>
<tr>
<td>JP2</td>
<td>2</td>
<td>OE</td>
<td>Short (Controlled by software)</td>
</tr>
<tr>
<td>JP3</td>
<td>2</td>
<td>SDA</td>
<td></td>
</tr>
<tr>
<td>JP4</td>
<td>2</td>
<td>SCL</td>
<td></td>
</tr>
<tr>
<td>JP7</td>
<td>2</td>
<td>VG7050EAN GND level</td>
<td>Short (Same as GND)</td>
</tr>
<tr>
<td>JP8</td>
<td>3</td>
<td>Regulator output voltage level</td>
<td>3-2 Short (3.3 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Through USB cable)</td>
<td></td>
</tr>
<tr>
<td>JP9</td>
<td>2</td>
<td>Power supply way</td>
<td>Short (Power from USB)</td>
</tr>
<tr>
<td>JP10</td>
<td>2</td>
<td>Vc terminal GND level</td>
<td>Open (GND separate)</td>
</tr>
<tr>
<td>JP11</td>
<td>3</td>
<td>OE terminal VDD/GND level</td>
<td>Open (VDD/GND separate)</td>
</tr>
</tbody>
</table>

*1 JP1 can stay in 1-2 short even VDD voltage drops from 3.3V to 2.5V.
2.3. Typical external measurement instruments connection

Figure 3  Typical measurement instruments connection
3. Board Configuration

3.1. Connection

Table 5  Power Supply

<table>
<thead>
<tr>
<th>Power</th>
<th>Voltage</th>
<th>remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDD</td>
<td>3.3 V or 2.5 V</td>
<td>Connected to VG7050EAN(socket mounted)'s VDD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Connected to CN1 VDD</td>
</tr>
<tr>
<td>GND</td>
<td>0 V</td>
<td>Connected to CN1 GND</td>
</tr>
</tbody>
</table>

Table 6  Connectors, terminals, Socket

<table>
<thead>
<tr>
<th>Connector, Terminal Socket</th>
<th>content</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN1</td>
<td>VDD, GND</td>
<td></td>
</tr>
<tr>
<td>VDD</td>
<td>VDD</td>
<td></td>
</tr>
<tr>
<td>GND</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>CN2</td>
<td>I/F</td>
<td></td>
</tr>
<tr>
<td>VC</td>
<td>VC</td>
<td></td>
</tr>
<tr>
<td>OE</td>
<td>OE</td>
<td></td>
</tr>
<tr>
<td>SMA1</td>
<td>VG7050EAN output (OUT)</td>
<td></td>
</tr>
<tr>
<td>SMA2</td>
<td>VG7050EAN inverse output (XOUT)</td>
<td></td>
</tr>
<tr>
<td>Mini-USB</td>
<td>USB</td>
<td></td>
</tr>
<tr>
<td>U1</td>
<td>VG7050EAN socket</td>
<td></td>
</tr>
</tbody>
</table>
3.2. Board layout

Figure 4  VG7050EAN-EVB Board layout
4. Software

Software (PLL Oscillator RegWriter) should be installed into PC for VG7050EAN-EVB operation.

4.1. Required PC condition

- Microsoft Windows 7, 8, 8.1, 10
- USB2.0
- HDD space 1MB
- 1024 x 768 screen resolution or greater
- Microsoft .NET Framework 3.5
- FTDI D2XX Direct Drivers

4.2. Turn Microsoft .NET Framework 3.5 ON

Microsoft .NET Framework 3.5 is required for PLL Oscillator RegWriter operation.

Microsoft .NET Framework 3.5 is installed in Windows 7 initially and set turn ON. But in case turned OFF, the check box should be ON at Windows Futures. Customer can set by selecting PC control panel and program & function during internet online.

![Figure 5 Microsoft .NET Framework 3.5 Turn ON (Windows 7)]
In case of Windows 8/8.1, Microsoft .NET Framework 3.5 is installed initially, but set turn OFF. Two ways are available to turn ON Microsoft .NET Framework 3.5 during internet on line.

1. Installation of Microsoft .NET Framework 3.5 on demand
   At initial starting time of PLL Oscillator RegWriter, next massage box is shown. Click “Install this feature” for installation during internet on line.

   ![Image of Windows Features dialog box](image)

   **Figure 6**  Microsoft .NET Framework 3.5 turn ON (Windows 8/8.1, on demand)
2. Microsoft .NET Framework 3.5 turn ON with PC control panel
   Customer can set turn ON by selecting PC control panel and program & function during internet on line.

![Image of Windows Features dialog box showing .NET Framework 3.5 under Turn Windows features on or off]

**Figure 7** Microsoft .NET Framework 3.5 turn ON (Windows 8/8.1, Control Panel)

Please refer to Microsoft site Windows 8/8.1  [Microsoft site](#)
4.3. **Installation FTDI D2XX Direct Drivers**

An adequate device driver is automatically installed when VG7050EAN-EVB is connected to PC USB terminal during internet online condition.

If automatic installation is not executed, customers can install the device driver by FTDI setup executable.

1. Disconnect VG7050EAN-EVB from PC USB terminal.
2. Download setup executable on FTDI website [FTDI](#).
3. Click the right mouse button “setup executable” and “Run as administrator”.

![Image](image_url)

**Figure 8** Execution FTDI setup executable

4.4. **Installation PLL Oscillator RegWriter**

Install software (PLL Oscillator RegWriter) to PC by installer (PLL_Oscillator_RegWriter_V1.msi).
4.5. Setting frequencies and registers with PLL Oscillator RegWriter

Product selection
Select VG7050EAN with radio button.

Setting I^C slave address
Input I^C Slave Address with hex format. If it is unknown, press Search Addr button and found automatic search result.

Frequency setting
Input target frequency into Output Frequency column. Registers are calculated automatically.

Kv value selection
Select Kv value (0~11) on Kv column. If larger value (12~) is selected, Vc control function becomes inactive.

Registers' value writing and verification
Registers data is transmitted to VG7050EAN by pressing Write button.
Write and Verify button works register’s data transmission and verifying between PLL Oscillator RegWriter and VG7050EAN device on the board. Result is shown in History column.

OE port control
OE port is controlled by radio button respectively.

Advanced operation
Register reading: VG7050EAN device registers data is transmitted and displayed on Register Read Table.
Frequency calculation from Register: By inputting Register value (hex code), customer can obtain frequency in Output Frequency column.
Reference frequency adjustment: Customer can change any reference frequency by selecting Advanced Mode from Tool pull down menu.
Figure 9  PLL Oscillator RegWriter operation panel
5. Schematic

Figure 10  VG7050EAN-EVB Schematic
## 6. Bill of Materials

<table>
<thead>
<tr>
<th>No</th>
<th>maker</th>
<th>device</th>
<th>code</th>
<th>instance</th>
<th>qty</th>
<th>specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MURATA capacitor</td>
<td>GRM32NF11E106Z</td>
<td>C1, C2, C3</td>
<td>3</td>
<td></td>
<td>3225, 10 µF ±10%, DC10 V</td>
</tr>
<tr>
<td>2</td>
<td>MURATA capacitor</td>
<td>GRM188B31E105K</td>
<td>C4, C5</td>
<td>2</td>
<td></td>
<td>1608, 1 µF ±10%, DC10 V</td>
</tr>
<tr>
<td>3</td>
<td>MURATA capacitor</td>
<td>GRM188B11E104K</td>
<td>C6, C7, C8, C9, C10, C11, C12, C13, C14, C01, C02</td>
<td>11</td>
<td></td>
<td>1608, 0.1 µF ±10%, DC25 V</td>
</tr>
<tr>
<td>4</td>
<td>KOA resistor</td>
<td>RK73H1JTTD5102F</td>
<td>R1A</td>
<td>1</td>
<td></td>
<td>1608, 51 kΩ ±1%</td>
</tr>
<tr>
<td>5</td>
<td>KOA resistor</td>
<td>RK73H1JTTD1003F</td>
<td>R1B</td>
<td>1</td>
<td></td>
<td>1608, 100 kΩ ±1%</td>
</tr>
<tr>
<td>6</td>
<td>KOA resistor</td>
<td>RK73H1JTTD4702F</td>
<td>R1C</td>
<td>1</td>
<td></td>
<td>1608, 47 kΩ ±1%</td>
</tr>
<tr>
<td>7</td>
<td>KOA resistor</td>
<td>RK73H1JTTD1803F</td>
<td>R2</td>
<td>1</td>
<td></td>
<td>1608, 180 kΩ ±1%</td>
</tr>
<tr>
<td>8</td>
<td>KOA resistor</td>
<td>RK73H1JTTD1500F</td>
<td>R3, R4</td>
<td>2</td>
<td></td>
<td>1608, 150 Ω ±1%</td>
</tr>
<tr>
<td>9</td>
<td>KOA resistor</td>
<td>RK73H1JTTD1002F</td>
<td>R5, R6</td>
<td>2</td>
<td></td>
<td>1608, 10 kΩ ±1%</td>
</tr>
<tr>
<td>10</td>
<td>Emerson Network Power Connectivity Solutions</td>
<td>SMA</td>
<td>142-0701-851</td>
<td>SMA1, SMA2</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>11</td>
<td>MIS Technologies</td>
<td>Socket (CXP-A08-11-00 U1</td>
<td>1</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Linear Technology</td>
<td>regulator (LTC3025 U3)</td>
<td>1</td>
<td>2 mm x 2 mm, DFN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Texas Instruments</td>
<td>Level shifter (SN74AVC4T245D U4)</td>
<td>1</td>
<td>SOP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>MAC8 Wrapping terminal</td>
<td>WL-1</td>
<td>CN1, CN2, JP1, JP2, JP3, JP4 TP (SDA, SCL)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>MAC8 Check pin</td>
<td>LC-22-G-red</td>
<td>VDD</td>
<td>1</td>
<td>red</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>MAC8 Check pin</td>
<td>LC-22-G-yellow</td>
<td>PVSS, OE, VC</td>
<td>3</td>
<td>yellow</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>MAC8 Check pin</td>
<td>LC-22-G-black</td>
<td>TP_GND</td>
<td>1</td>
<td>black</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>FTDI</td>
<td>FTDI module UM232H</td>
<td>U2</td>
<td>1</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>RS</td>
<td>spacer</td>
<td>325-659</td>
<td>-</td>
<td>4</td>
<td>M3 x 12.7 mm nylon</td>
</tr>
</tbody>
</table>
7. Caution

It is prohibited that external power supply connection to CN1 during JP9 short connection. If external power supply is connected to CN1 in case of JP9 short, power voltage collision might damage the circuitry on the board and PC.
Evaluation Board Manual

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