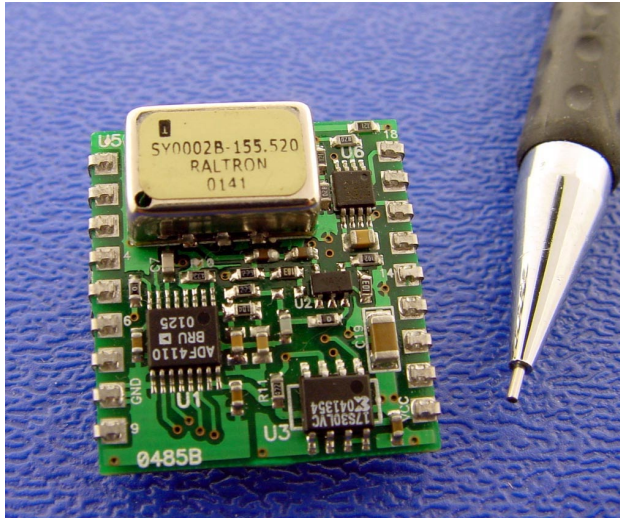


**SY02-HLPL****PRELIMINARY SPECIFICATION**

Date: July 1, 2002



- **INTRODUCTION**

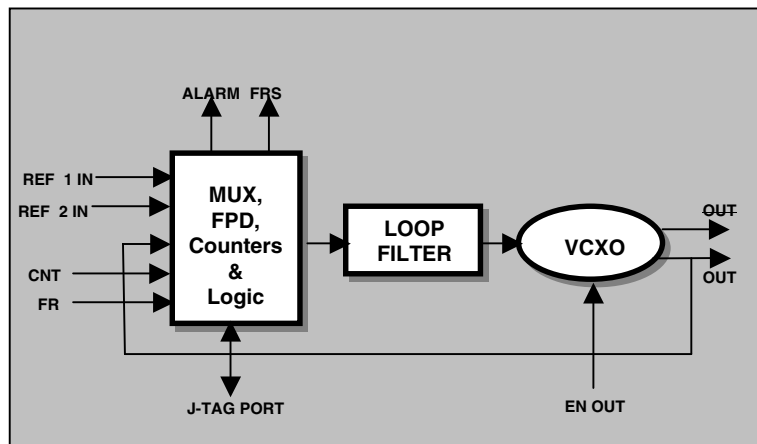
The SY02-HLPL is a dual input reference hitless switching device with high frequency crystal-based PLL synchronizer designed as a subsystem module. Mainly used at high speed Line Interface Cards in telecommunication products mainly related to STN-n or OC-n. The SY02-HLPL is a synchronization solution for timing and jitter topics specified within ITU-T Recommendations G.813, ETSI -ETS 300 462-4, and Bellcore GR-1244-CORE.

- **FEATURES**

- Low jitter output from intrinsically low jitter VCXO or VCSO;
- Two input references from **8KHz to 77.76MHz** (See page 3 for options)
- One high frequency LVPECL output with enable/disable function up to **800MHz** (pre-select frequency value – See page 3 for options)
- Alarms and status;
- Provides free running clock output;
- Provides a manual input frequency selection
- The unit changes timing modes in response to external events;
- J-TAG service port for re-programming and servicing;
- 3.3V DC power supply
- Small dimensions: 0.96" x 1.050"

- **APPLICATIONS**

- ATM
- SDH
- PDH
- SONET
- Other telecommunication equipment.



### DESCRIPTION

The SY02-HLPL synchronization module is a high frequency PLL that performs hitless switching plus additional features necessary for timing at high-speed Line Interface Cards. The functional block diagram is shown in the figure above. The SY02-HLPL receives two reference signals, from 8KHz to 77.76MHz (See page 3 for available options) and using PLL synthesizer generates a high frequency signal necessary for transceivers or framers. The PLL that is complemented by high-speed logic that provide processing, switching between the timing modes, alarm and status messages and etc. A high quality VCXO provides very low jitter at the output.

The SY02-HLPL incorporates a High Frequency Phase Lock Loop has been designed to generate high frequency (up to 800MHz) output from a low jitter VCXO (Crystal Based Oscillator) or VCSO (SAW based oscillators). The output can be disabled externally by setting OUTEN pin high. The module supports a MANUAL operating mode where unit will switch according to a control pin CNT. During an event where the external reference signal disappears, the user instruct a reference change into the module through the control pin. The ALARM output signals monitor the status of the phase loop LOL (Loss of Lock) and LOR (Loss of Reference). If the reference REF IN is absent, the SY02-HLPL will automatically switch to free run mode and FRS output will indicate it. The SY02-HLPL is provided in an SMD package dimensions are 0.96x1.050 inch and power supply is 3.3V.

#### - OUTPUT PROGRAMMING

| OUTEN | FR | OUTPUT              |
|-------|----|---------------------|
| 0     | 0  | Locked to Reference |
| 1     | X  | Output Disabled     |
| 0     | 1  | Free-Run            |

#### - ALARM STATES

| LOL | LOR | ALARM    |
|-----|-----|----------|
| 0   | 0   | No alarm |
| 1   | 0   | 1        |
| 0   | 1   | 1        |

#### - Input Reference Selection

| CNT | Input Reference Selection |
|-----|---------------------------|
| 0   | Ext Ref 1                 |
| 1   | Ext Ref 2                 |

### PIN DESCRIPTION

|    | Name    | Description                                                                                            | Signal Technology     | VL        |             |           | VH/ DC Voltage |           |              |
|----|---------|--------------------------------------------------------------------------------------------------------|-----------------------|-----------|-------------|-----------|----------------|-----------|--------------|
|    |         |                                                                                                        |                       | Min       | Typ         | Max       | Min            | Typ       | Max          |
| 1  | ENABLE  | Output Enable -> the input pin to enable the output, active low                                        | DC                    | 0         | 0.25 (0.15) | 0.5 (0.3) | 4.5 (2.97)     | 5.0 (3.3) | 5.25 (3.465) |
| 2  | TCK     | J-TAG port for factory usage – TCK                                                                     | -----                 | -----     | -----       | -----     | -----          | -----     | -----        |
| 3  | TDO     | J-TAG port for factory usage – TDO                                                                     | -----                 | -----     | -----       | -----     | -----          | -----     | -----        |
| 4  | REFA IN | Reference A Input -> Reference A input signal                                                          | HCMOS (3.3 Tolerable) | 0         | -----       | 0.5 (0.3) | 4.5 (2.97)     | -----     | -----        |
| 5  | SEL     | Select Input Reference -> input to select A (SEL=0) or B (SEL=1)                                       | DC                    | 0         | 0.25 (0.15) | 0.5 (0.3) | 4.5 (2.97)     | 5.0 (3.3) | 5.25 (3.465) |
| 6  | RESET   | Reset input -> Reset active high<br>In normal operation must be Grounded                               | DC                    | 0         | 0.25 (0.15) | 0.5 (0.3) | 4.5 (2.97)     | 5.0 (3.3) | 5.25 (3.465) |
| 7  | REFB IN | Reference B Input -> Reference B input signal                                                          | HCMOS (3.3 Tolerable) | 0         | -----       | 0.5 (0.3) | 4.5 (2.97)     | -----     | -----        |
| 8  | GND     | Ground                                                                                                 | -----                 | -----     | -----       | -----     | -----          | -----     | -----        |
| 9  | FRS     | Free-Run Status -> Output indicates that the module is in free run, active high                        | DC                    | 0         | 0.25 (0.15) | 0.5 (0.3) | 4.5 (2.97)     | 5.0 (3.3) | 5.25 (3.465) |
| 10 | Vcc     | Positive supply voltage                                                                                | DC – 5V (3.3V)        |           |             |           | 4.5 (2.97)     | 5.0 (3.3) | 5.25 (3.465) |
| 11 | NC      | Not Connected                                                                                          | -----                 | -----     | -----       | -----     | -----          | -----     | -----        |
| 12 | ALARM   | Alarm out -> Alarm output indicates loss of reference or loss of lock – High when the unit is Unlocked | DC                    | 0         | 0.25 (0.15) | 0.5 (0.3) | 4.5 (2.97)     | 5.0 (3.3) | 5.25 (3.465) |
| 13 | FR      | Free-Run -> Control input to select free run of the module, active high                                | DC                    | 0         | 0.25 (0.15) | 0.5 (0.3) | 4.5 (2.97)     | 5.0 (3.3) | 5.25 (3.465) |
| 14 | TDI     | J-TAG port for factory usage – TDI                                                                     | -----                 | -----     | -----       | -----     | -----          | -----     | -----        |
| 15 | TMS     | J-TAG port for factory usage – TMS                                                                     | -----                 | -----     | -----       | -----     | -----          | -----     | -----        |
| 16 | OUT     | Oscillator Output -> Output of the module                                                              | LV/PECL               | Vcc-1.680 | Vcc-1.620   | Vcc-1.560 | Vcc-1.085      | Vcc-1.025 | Vcc-0.885    |
| 17 | GND     | Ground                                                                                                 | -----                 | -----     | -----       | -----     | -----          | -----     | -----        |
| 18 | OUT     | Complimentary Output                                                                                   | LV/PECL               | Vcc-1.680 | Vcc-1.620   | Vcc-1.560 | Vcc-1.085      | Vcc-1.025 | Vcc-0.885    |

### ORDERING INFORMATION

- Input Frequencies available;

| Frequency | Suffix | Frequency | Suffix | Frequency | Suffix |
|-----------|--------|-----------|--------|-----------|--------|
| 8KHz      | F8     | 19.44MHz  | O1     | 77.76MHz  | O3     |
| 1.544MHz  | T1     | 24.704MHz | T3     |           |        |
| 2.048MHz  | E1     | 32.768MHz | E4     |           |        |
| 8.192MHz  | E2     | 38.88MHz  | O2     |           |        |
| 12.352MHz | T2     | 51.84MHz  | D1     |           |        |
| 16.384MHz | E3     | 62.50MHz  | G1     |           |        |

- Output Frequencies available (in MHz);

| Frequency | Suffix | Frequency | Suffix |
|-----------|--------|-----------|--------|
| 51.84     | D1     | 156.25    | G4     |
| 62.50     | G1     | 166.328   | C1     |
| 77.76     | O3     | 622.08    | O5     |
| 125       | G2     | 666.513   | C2     |
| 133       | G3     |           |        |
| 155.52    | O4     |           |        |

### ➤ P/N System

**SY02-FEC – IP < Input Frequency> - OU<Output Frequency>-S-T<Temp. Range>-C <Cover Option>**

➤ See above Chart  
If not listed Place **NL** and state the Freq.)

➤ See above Chart  
(If Output Freq. Not applied place **NA** and state the Freq.)

➤ Supply Voltage;  
**2**- 5V  
**4** – 3.3V

➤ Operating Temperature Range;  
**C** - 0°C to 70°C  
**I** -40°C to +85°C

➤ Cover Option;  
**M** – Metal Cover  
**N** - Non Covered unit

➤ For other Options please contact the factory

### • SPECIFICATION

|                            |                            |                                                                             |                                                                                 |
|----------------------------|----------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| General Specifications     | Mechanical                 | 0.96" x 1.050"                                                              | SMT Module FR4 18 pins dual-in-line                                             |
|                            | Power Environment          | 3.3VDC, <200mA<br>Operating Temperature<br>Humidity<br>Internal Oscillators | Regulated<br>0°C to 70°C<br>5% to 95% non-condensing<br>Depend of the frequency |
| Input Signals              | Number of Reference Inputs | 2                                                                           | See page 3 for input frequencies                                                |
|                            | Input reference frequency  | User select                                                                 | See page 3 for input frequencies                                                |
|                            | Signal Level               | LVC MOS                                                                     | Voh; 2.97V min ; Vol; 0.33Vmax                                                  |
| Output Signals             | Number of Outputs          | 1                                                                           |                                                                                 |
|                            | Output 1                   | User select                                                                 | See page 3 for output frequencies                                               |
|                            | Output 1 Signal Level      | LVPECL (W/ Complimentary option)                                            | Voh; 2.272V min ; Vol; 1.68Vmax                                                 |
|                            | Duty Cycle                 | 50+/-10%                                                                    | 50%+/-5% available upon request                                                 |
|                            | Tracking/Capture Range     | ±50ppm APR min                                                              |                                                                                 |
|                            | Free Run stability         | ±30ppm (VCXO)<br>±150PPM(VCXO)                                              | T=+25C; Vcc/load=nominal                                                        |
| Signal Quality Performance | Jitter generation          | <0.001UI RMS<br><0.001UI RMS<br><0.0001 UI RMS<br><0.0001 UI RMS            | HPF 30Hz<br>HPF 500Hz<br>HPF 12KHz<br>HPF 100KHz                                |
|                            | Jitter attenuation         | -40dB<br>-10dB                                                              | Fj=10Hz~1KHz<br>Fj=1KHz~10MHz                                                   |
|                            | Jitter tolerance           | 2 μs, 10 Hz (0.05 UI @ 8KHz)                                                |                                                                                 |

