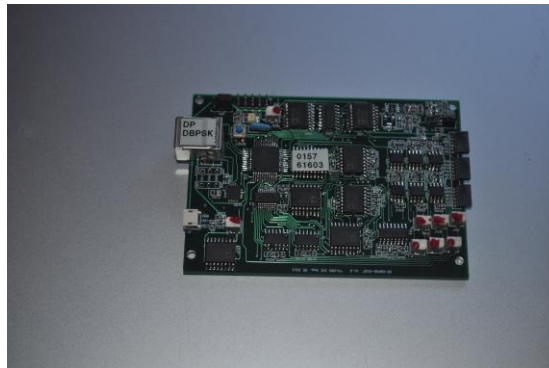




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## Specification of Dual-DPMZ Modulator Bias Controller (0157FSSB) for DP-QPSK/QAM, SSB Application (05/22/2013, V1.0)



DP-QPSK-Modulator Bias Controller model 0157FSSB is a device specially designed to control the bias positions for DP-QPSK -modulator used for 80Gbit DQPSK/QAM and SSB applications. DQPSK( Differential Quadrature Phase-shift keying) modulator can improve optical transmission properties such as total reach, dispersion tolerance, or spectral efficiency. Since the DP-QPSK modulator is a combination of 2 phase modulators and 4 Mach-Zehnder modulators, there are six bias points requiring controllers. YY Labs' DP-QPSK modulator bias controller has been developed especially for this kind of device.

YY Labs' DP-QPSK modulator bias controller (DP-QPSK MBC 0157FSSB) is a full-function miniature OEM version of the Modulator Bias Controller (MBC) family. It simultaneously sets the first and second modulators of each QPSK modulator at Null points and the third modulator of each QPSK modulator at quad point. There are USB and RS232 computer interfaces. The slope of each point is selectable from the computer. **The default status of the board is the first and second modulator of each QPSK modulator are in Null/Peak mode with negative slope, and the third modulator of each QPSK modulator is locked to Quad+ at the assumption that the amplitude of RF driver to each modulator is close to  $V_{2\pi}$ .**

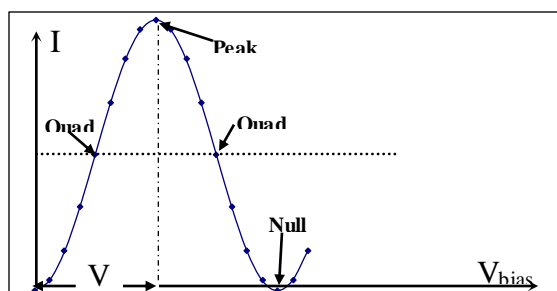


Figure 1. Modulator working function

### Features of DP-QPSK -MBC (0157FSSB)

- Six modulators can be controlled with one controller (1<sup>st</sup>, 2<sup>nd</sup> modulator of each QPSK modulator at Null/peak mode, the 3<sup>rd</sup> at Quad);
- User selectable locking slope (NULL ↔ PEAK) through USB or RS232 interface;
- Differential bias outputs are provided.
- Bias range can expanded to -25 to +25V upon request.
- Calibration-off mode for quick system setup in locking mode;
- All settings are remote controllable through USB or RS232 computer interface
- User can select automation mode or manual mode; user may stop the pilot tone for any or all modulators and manually set the bias through USB or RS232 computer interface.
- The bias voltages can be read and displayed through RS232 commands or GUI.
- Low profile (3.815” \* 2.65” \* 0.65”).

**Table 1. Dual-DPMZ-MBC Specifications**

PARAMETERS	MIN	TYP	MAX	UNITS
<b>Optical Performance</b>				
Detector Input Power <sup>1</sup>	-30		-10	dBm
Optical wavelength	1000		1650	nm
<b>Electrical Performance</b>				
Bias voltage (differential only)	-15		15	V
Null Mode Extinction Ratio <sup>2</sup>		25	40	dB
Locking Slope	Positive or Negative			
Locking Mode	4 Null (Peak) positions, Quad+ or (Quad-) position			
<b>Pilot tone</b>				
Modulation Depth (QUAD) <sup>3</sup>	190mv	1.1 %		
Modulation Depth (Null)			0.2	%
Pilot Tone Frequency		4K/2K*		Hz
<b>Power Supplies</b>				
Positive Power Voltage	14.5	15	15.5	V(DC)
Negative Power Voltage	-15.5	-15	-14.5	V(DC)
Positive Power Current		117		mA(DC)
Negative Power Current		74		mA(DC)
<b>General</b>				
Operating temperature	0		70	Degree C
Storage Temperature	-40		+85	Degree C
Dimension	3.815x2.65x0.65 inch			
Weight	0.2 lb			

\* 4KHz pilot tone is for the 1<sup>st</sup> and 2<sup>nd</sup> of the QPSK modulators and 2KHz pilot tone is for the 3<sup>rd</sup> of the QPSK modulators.

For a given input, detection power refers to the coupled optical power to the photodiode of DP-QPSK-MBC when the modulator output is at its minimum attenuation (The detection power does not describe the detected power at locking status).

In this case, the modulator output power was greater than 0 dBm. 1% coupler was used. The extinction ratio will be close but not exceed the extinction ratio of the modulator. Optical Modulation Index = amplitude of modulation/ $V_{\pi}$ .

### 0157FSSB Layout

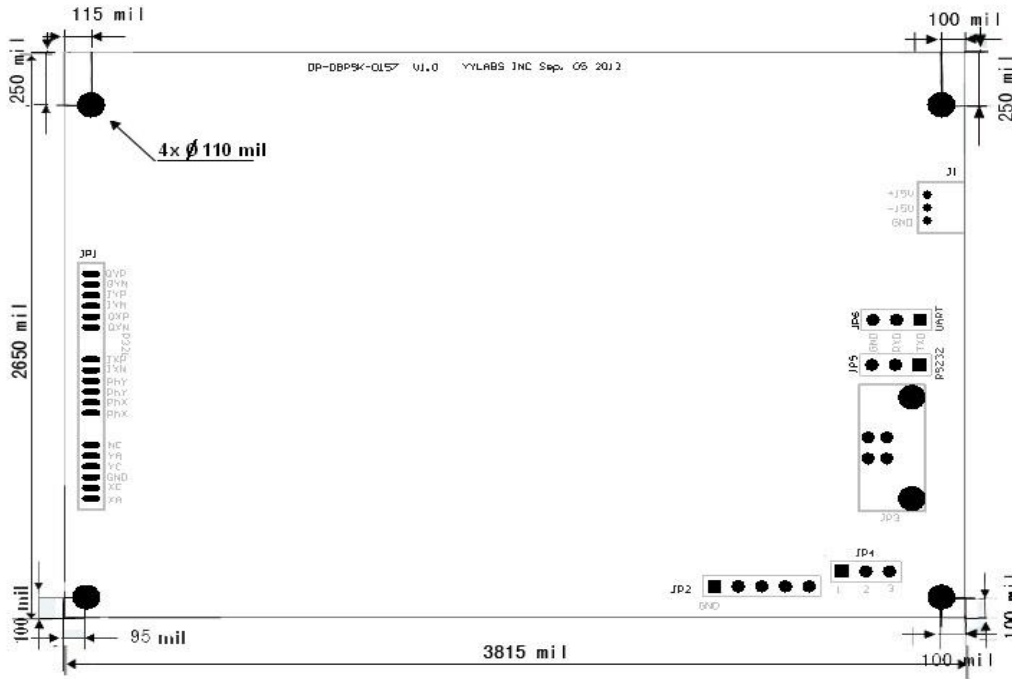


Figure 2. Layout of 0157FSSB DP BPSK MBC

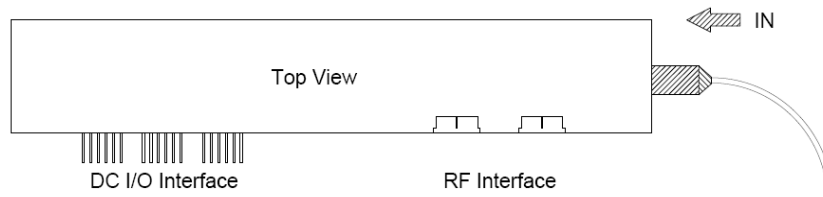


Figure 3. Location of the datum and envelope related Dimensions of related DP QPSK modulator

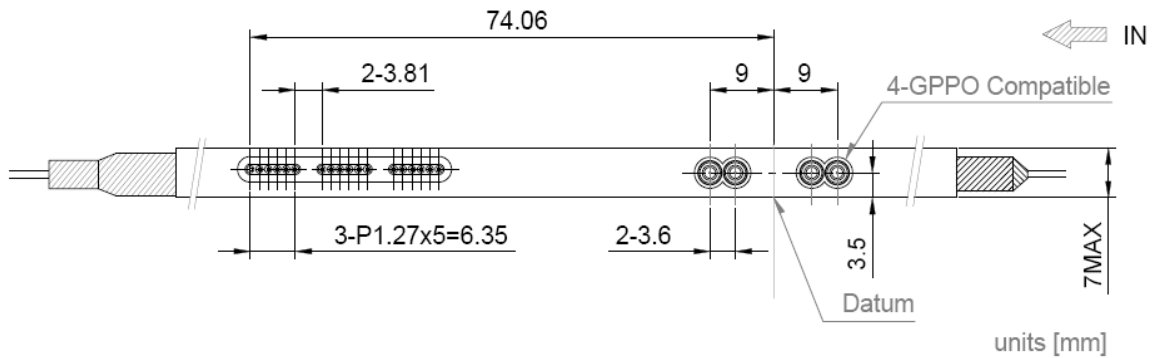
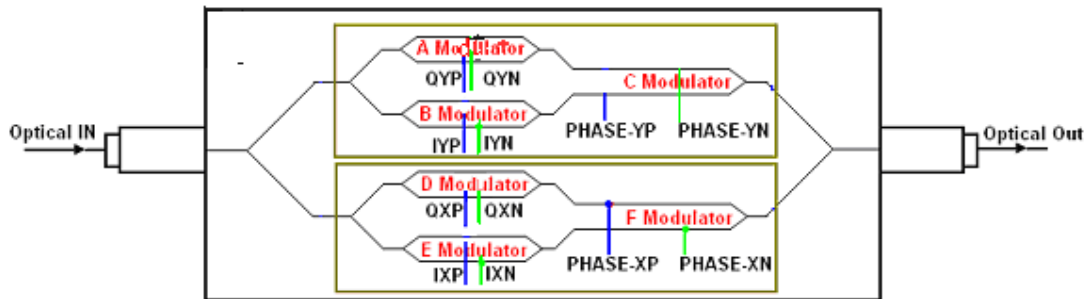


Figure 4. Mechanical specification of DC and GPPO RF interfaces

The pin-out of the Connector of the 0157FSSB MBC is made according to the OIF-2009 specification. The DP-QPSK modulator can be directly plugged into the connector. The mechanical specification of the DP-QPSK modulator with four GPPO high-speed interfaces and 18 low-speed pins is shown in Figure 3. The low-speed pins are grouped in groups of 6 pins.

The pin numbering starts with the first high-speed data interface connector nearest to the input and the pin number increases towards the opposite side. The electrical interface grouping, ordering and functions of commercially available modulators are listed in Table-1.



**Figure-3 DP QPSK modulator numbering for 0157FSSB MBC**