

# **MX-BPM** – Multiplexed BPM Electronics



The Beam Position Monitor (BPM) is an all-analog

electronics module with superior performance in a very

On-board microstrip filters eliminate the need for costly

GaAs switches provide superior button-to-button isolation

Automatic Gain Control range >90dB provides optimum

On-board synthesized local oscillator eliminates the

problem of external oscillator signal distribution with

Phase-locked synchronous demodulation gives high

Button signal range -70dBm...+5dBm at selected

X / Y output ±10V, 0V for on-center beam

level for demodulator, independent of beam

Optimized for electron/positron Storage Rings 1µm X and Y resolution Handles >75dB beam intensity range Each button sampled up to 10 000 times per second

#### **Operating principle**

#### Button scanning mode

The signals from the four button electrodes are fed into the BPM module. The module processes the signals sequentially to give 3 analog output voltages: X, Y and Sum.

Four on-board variable 1-dB attenuators are used to equalize the button signals. Four on-board microstrip low-pass filters eliminate the unwanted beam harmonics before the signals are multiplexed by four GaAs switches. The switches close one at a time under the control of a local clock, sampling each button 2000 times per second. An external clock signal can override this onboard clock, to sample every button up to 10 000 times per second. The outputs of the four switches give a sequential signal, which is filtered by an onboard tunable band-pass filter. This filter allows easy selection of the chosen beam harmonic to be used. A low-noise preamplifier amplifies the signal under automatic gain control. A superheterodyne receiver processes the signal.

A mixer gives the intermediate frequency using its own on-board synthesized local oscillator. The LO frequency is given by a string of bits generated by a plug-in programmable frequency key. The automatic gain control of the intermediate frequency amplifier normalizes the sum of all button signals. A PLL synchronous demodulator provides high linearity. The demodulated signal is filtered and memorized by four sample-and-hold circuits under the control of the button scanning clock. The X and Y positions are obtained from the memorized value of the four buttons. Only additions and subtractions are needed to obtain the X and Y positions, because the sum of all four buttons is normalized at all times to a constant value.

## DISTRIBUTORS

**U.S.A**.: GMW Associates www.gmw.com sales@gmw.com

harmonic

small volume

tubular filters

power splitters

and low insertion loss

intensity, number of bunches

linearity and noise suppression

Japan: REPIC Corp. www.repic.co.jp sales@repic.co.jp India: GEEBEE International www.geebeinternational.com info@geebeeinternational.com

China: Beijing Conveyi Limited www.conveyi.com sales@conveyi.com

#### MANUFACTURER

BERGOZ Instrumentation www.bergoz.com Espace Allondon Ouest 01630 Saint Genis Pouilly, France sales@bergoz.com



# Block diagram



## **Specifications**

Beam intensity range Input signals Operating frequency Noise rms

Linearity error

Sensitivity X and Y gain Buttons sampling

Local oscillator Intermediate frequency Outputs

Front panel LED Single button sampling Button address Fast gate mode Fast gate option Power supply Connectors

# Packaging

 19" 3U RF-shielded chassis has up to 16 stations for BPM modules
Includes: ±15V power supply, 100...240Vac mains voltage One test station
DB9 male connector for external commands
DB15 female connector per station, all outputs

PLL in lock

>75dB

60...800MHz

+5dBm...-70dBm, 50Ω

Factory-set frequency

X: ±10V, A-B-C+D, or D-B

Y: ±10V, A+B-C-D, or A-C

Two TTL addressing lines

Enable TTL command

<2mV [0...1 kHz] in +-10V @ +5dBm

<5mV [0...1 kHz] in +-10V @ -35dBm

<50mV [0...1 kHz] in +-10V @ -60dBm

On-center: <5mV [+5dBm...-35dBm]

2-mm off: <20 mV [+5dBm...-35dBm]

2 kSamples/s with internal clock

User's choice. 1 V/mm recommended

factory set according to pickup aperture

Up to 10 kSamples/s with external clock

Sum: A+B+C+D, constant value (≈3V)

NIM (50Ω negative-going –16mA pulse) +15V, <200 mA, –15V, <40 mA

Rear connector: DIN41612-M, 24+8 coax Coaxial connectors: 1.0/2.3 (4 units)

Front panel connectors: DB9 female for test signal

Enable and Reset TTL commands

21.4 MHz or 10.7 MHz, depending on frev.

# Options

Fast NIM gate: to gate out specific bunch or bunch train

# Accessories

Table-top test kit for one BPM. SMA connectors for button inputs, DB9 for external controls and DB15 for output signals.

Module extender for one BPM module. Allows one BPM module to be extended out of the chassis. Includes 1.0/2.3 coaxial connector extensions.

RF service module. Same size as BPM module, without electronics. When inserted in a station, connects the button signals from the chassis to four front-panel BNC. TL controls service module. Same size as BPM module, without electronics. When inserted in a station, connects the external control signals from the chassis to a front panel DB9.

## Order codes

MX-BPM-xxxMHz-	BPM plug-in module, tuned to
-XxxxV/%-YxxxV/% MX-BPM/CUS.xxx	X and Y sensitivity One-time customizing charge fo new frequency
Options:	
MX-BPM-FG	Fast NIM gate
Accessories:	
BPM-RFC/xx	Chassis with xx stations
BPM-KIT	Table-top test kit
BPM-XTD	Module extender card
BPM-SERV/RF	RF service module
BPM-SERV/CMD	TTL controls service module
BPM-LPF/1kHz	X and Y LP-filter
BPM-BPE/500MHz	SMA-SMA RE input BP-filter

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