



Optimized for low bunch charge >50fC
Optimized for low beam current >0.5μA

≈ 10 fC noise for single bunch measurements
≈ 0.1 μArms total wideband noise for average current measurements

80dB dynamic range without range switching
Resolution 1% / accuracy 4% of measured value
DC Output voltage for single pulse charge measurements

5 MHz bandwidth for average current measurements
Logarithmically proportional to input current or charge
USB controls and digital readout up to 1 kS/s
UHV compatible down to 10⁻¹⁰ mbar

Operating principle

The Turbo-ICT is equipped with a narrow band-pass filter at its output. Single pulse induce a short resonance whose amplitude is proportional to the pulse charge. CW beam induce a continuous resonance whose amplitude is proportional to average beam current.

The narrow-band transmission improves immunity against noise.

The BCM-RF-E uses a logarithmic amplifier for detection of resonance envelope. It allows two modes of operation:

- Sample&Hold mode for single bunch.
- Track-Continuous mode for CW beam and long macropulses.

Turbo-ICT can be made with 2 cores adjacent or superposed in a single In-flange package to achieve higher sensitivity.

Turbo-ICT amplifier and RF modulator are powered by the BCM-RF-E via the coaxial transmission cable to avoid ground loops.

Two modes of operation

Single bunch charge measurement

- For sub-nanosecond bunches
- Typical measurement range 50 fC – 300 pC*
- Noise in single bunch measurement 10 fCrms or 1% of the single bunch charge
- Output DC voltage held until next bunch or 100 ms maximum
- Maximum bunch repetition rate 2 MHz

CW and macropulse average current measurement

- Typical measurement range 2.5 μA – 3 mA**
- RF from 75 MHz to 500 MHz
- Output bandwidth >5 MHz
- Total noise ~0.5 μArms over 5 MHz

**Measurement range can be adapted for higher currents

*Measurement range can be adapted for higher charges

MANUFACTURER

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Specifications

Beam type	Single bunch	CW beam and macropulses
BCM-RF-E set to	Sample&Hold Mode	Track-Continuous mode
Typical measurement range	50 fC – 300 pC	2.5 μ A – 3 mA
Bunch repetition frequency	Single bunch < 2 MHz	75 MHz – 500 MHz
Output specifications		
Voltage	0 - +5 V Log of bunch charge	0 - +5 V Log of bunch current
Reaction time	500 ns	\leq 70 ns
Noise	10 fC or 1% of bunch charge	0.5 μ Arms or 0.3% of beam current
Non-linearity	\sim 2%	\sim 2%

All values are typical performance
For special application, please contact us

Order codes

In-flange Turbo-ICT dimensions

In-flange Turbo-ICT sensor order code	Pipe OD	Mating flange	ID (mm)
Turbo-ICT-CF3"3/8-22.2-40-UHV	1"	DN/NW50CF	22.2
Turbo-ICT-CF4"1/2-34.9-40-UHV	1.5"	DN/NW63CF	34.9
Turbo-ICT-CF4"1/2-38.0-40-UHV	40 mm	DN/NW63CF	38.0
Turbo-ICT-CF6"-47.7-40-UHV	2"	DN/NW100CF	47.7
Turbo-ICT-CF6"-60.4-40-UHV	2.5"	DN/NW100CF	60.4
Turbo-ICT-CF6"3/4-96.0-40-UHV	4"	DN/NW130CF	96.0
Turbo-ICT-CF8"-96.0-40-UHV	4"	DN160/NW150CF	96.0
Turbo-ICT-CF10"-147.6-40-UHV	6"	DN/NW200CF	147.6
Turbo-ICT-CF12"-198.4-40-UHV	8"	DN/NW250CF	198.4
		Axial length (mm)	40.0

In-vacuum Turbo-ICT dimensions

In-vacuum Turbo-ICT sensor order code	Outer dimensions (mm x mm)	ID (mm)
Turbo-ICT-VAC-055	175 x 126	22
Turbo-ICT-VAC-082	203 x 154	22
	Axial length (mm)	22

BCM-RF-E electronics

BCM-RF-E: Eurocard format 100 x 160 mm, 20 mm wide to be plugged into BCM-RFC chassis station
May be mixed with BCM-IHR-E in same chassis

BCM-RFC chassis

BCM-RFC/xx: 19"x3U RF-shielded chassis with xx wired stations (max. 10)
AC mains 90-125 Vac or 220-245 Vac, switch selectable 50/60 Hz

Options

- Turbo 2 2 cores option for noise reduction down to 10 fCrms on single bunch charge measurement
- CAL-FO Calibrated fixed charge generator
Triggered by Fiber Optic signal
Mates with 1 mm core plastic fiber
Optical generator and fiber not provided
- H Improved radiation tolerance
- 316LN AISI 316LN instead of AISI 304 stainless steel
- ARBxxx Arbitrary aperture shape



Turbo-ICT is mounted directly on the beam line
UHV compatible to 10^{-10} mbar
Ceramic gap vacuum-brazed over Kovar transitions
Material AISI-304



Turbo-ICT-VAC is installed in a laser-plasma vacuum enclosure
Vacuum compatible to 10^{-7} mbar
Calibrated charge generator option not available

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