

CSC Readout Numerology

Data formats are not modelled in detail. Bit rates are therefore approximate.

BCRate	40		MHz
L1Rate	100		kHz
FADCResolution	12		bit
Flux	1500		Hz/cm ²
LayersPerChamber	4		layer/chamber
PrecisionStripsPerLayer	192	$192 = 2^6 * 3$	strip/layer
TransverseStripsPerLayer	48	$48 = 2^4 * 3$	strip/layer
TotalStripsPerLayer	240	$240 = 2^4 * 3 * 5$	strip/layer
PrecisionStripArea	25		cm ² /strip *4
TransverseStripArea	100		cm ² /strip *4, *5
PrecisionStripsPerChamber	768		strip/chamber
TransverseStripsPerChamber	192		strip/chamber
StripsPerASM	192		strip/ASM
ASMPerChamber	5		ASM/chamber

Readout:	Full		Sparse		
OccupancyTimeWindow	-	-	3	2	BC period
PrecisionStripOccupancy	-	-	0.28%	0.19%	
TransverseStripOccupancy	-	-	1.13%	0.75%	
PrecisionSampleWidth	-	-	5	5	sample (in strip dimension) per hit
PrecisionSampleDepth	5	4	4	4	sample (in time dimension) per hit
PrecisionSampleTotal	-	-	20	20	sample/hit
TransverseSampleWidth	-	-	1	1	sample (in strip dimension) per hit
TransverseSampleDepth	5	4	4	4	sample (in time dimension) per hit
TransverseSampleTotal	-	-	4	4	sample/hit
OverheadPerHit	-	-	20	20	bit per hit
PrecisionBitsPerHit	-	-	260	260	bit per hit
TransverseBitsPerHit	-	-	68	68	bit per hit
PrecisionSampleRatePerASM_ID	-	-	57.60	38.40	Msample/s *1
TransverseSampleRatePerASM_ID	-	-	57.60	38.40	Msample/s *1
PrecisionHitRatePerASM	-	-	54.00	36.00	kHit/s
TransverseHitRatePerASM	-	-	216.00	144.00	kHit/s
PrecisionSampleRatePerASM	96	76.8	1.08	0.72	Msample/s *2
TransverseSampleRatePerASM	96	76.8	0.86	0.58	Msample/s *2
PrecisionBitsPerASM	1152	921.6	14.04	9.36	Mbit/s *3
TransverseBitsPerASM	1152	921.6	14.69	9.79	Mbit/s *3
PrecisionSampleRatePerLayer_ID	-	-	57.60	38.40	Msample/s *1
TransverseSampleRatePerLayer_ID	-	-	14.40	9.60	Msample/s *1
PrecisionHitRatePerLayer	-	-	54.00	36.00	kHit/s
TransverseHitRatePerLayer	-	-	54.00	36.00	kHit/s
PrecisionSampleRatePerLayer	96	76.8	1.08	0.72	Msample/s *2
TransverseSampleRatePerLayer	24	19.2	0.22	0.14	Msample/s *2
PrecisionBitsPerLayer	1152	921.6	14.04	9.36	Mbit/s *3
TransverseBitsPerLayer	288	230.4	3.67	2.45	Mbit/s *3
PrecisionHitRatePerChamber	-	-	216	144	kHit/s
TransverseHitRatePerChamber	-	-	216	144	kHit/s
PrecisionSampleRatePerChamber	384	307.2	4.32	2.88	Msample/s *2
TransverseSampleRatePerChamber	96	76.8	0.864	0.576	Msample/s *2
PrecisionBitsPerChamber	4608	3686.4	56.16	37.44	Mbit/s *3
TransverseBitsPerChamber	1152	921.6	14.688	9.792	Mbit/s *3
TotalBitsPerChamber	5760	4608	70.848	47.232	Mbit/s *3

Non-reduced ROD Output:

HalfwordPerROD	28	28	halfword/ROD (fixed overhead)
HalfwordPerChamber	1	1	halfword/chamber (fixed overhead)
HalfwordPerCluster	2	2	halfword/cluster (fixed overhead)
PrecisionHalfwordRawADCPerCluster	20	20	halfword/cluster
TransverseHalfwordRawADCPerCluster	4	4	halfword/cluster
PrecisionClustersPerL1PerChamber	2.16	1.44	cluster
TransverseClustersPerL1PerChamber	2.16	1.44	cluster
TotalHalfwordPerChamberPerL1	61.48	41.32	halfword/chamber/L1
ROLWordRatePerChamber	3.07	2.07	MW/s
ROLBandwidth	40	40	MW/s
ROLHeadroom	10%	10%	%
ROLPerEventOverhead	1.4	1.4	MW/s
ROLUsefulBandwidth	34.6	34.6	MW/s
MaxChambersPerROD	11.3	16.7	chamber

* 1: This sample rate is for samples used to identify hits.

* 2: This sample rate does not include samples used to identify hits.

* 3: These bits are eventually transmitted to the ROD.

* 4: These areas are detector area effectively read out on one strip.

* 5: TransverseStripArea assumes that the total area of all transverse strips equals the total area of all precision strips.