

Readout electronics update 5-May-2020

HV-Mux: production order in preparation through UK, money to be transferred to CERN account

Powerboard: pre-production design (v3.1) complete and under review by ATLAS

ABCStar: pre-production order released to manufacturing with vendor in March 2020

HCCStar and AMAC: pre-production design in progress, estimate finish end of June

- To prepare for FDR, several [technical review meetings](#) with Xavi Llopart, Jaro Ban, Jaya John John, and Hucheng Chen have taken place and are planned
- AMAC
 - Continue self-review all analog blocks (including connectivity and default controls) and overall digital design.
 - Review analog and digital designs with external review group.
 - Continue functional verification and SEE simulations.
 - Place and route, DRC, and verify ASIC. Prepare final GDS for fabrication.
- HCCStar
 - Continue digital design review and implementation of SEE mitigations.
 - Continue functional verification and SEE simulations.
 - Make progress on SEE mitigation vs area constraints trade-offs to achieve high reliability within the fixed area available.

Coils: production order placed on Feb 21 2020, Würth expects first batch shipped from Asia in May

Cost changes (BCP 37)

ASICS updated to costs of masks/wafers from ABCStar preproduction order

Item	P6 task	P6 (Old)	New quote	Change	Change (%)	Attach
ABCStar production	RE310390M	\$833,800	\$1,034,059	\$200,259	24.0%	
ABCStar preproduction	RE310335M	\$152,876	\$178,714	\$25,838	16.9%	
HCCStar production	RE321030M	\$462,176	\$543,750	\$81,574	17.6%	
HCCStar preproduction	RE320650M	\$325,200	\$412,460	\$87,260	26.8%	
Sum of ASICs		\$1,774,052	\$2,168,983	\$394,931	22.3%	9A
HV-Mux	RE140400M	\$849,621	\$552,000	-\$297,621	-35.0%	2A
Coils	RE530450M	\$105,600	\$91,001	-\$14,599	-13.8%	13A
IPB Shield box	RE261370M	\$101,520	\$78,819	-\$22,701	-22.4%	5A
IPB Burn-in (CAEN HV)	RE261430M now 422M	\$158,272	\$189,520	\$31,248	19.7%	14
Readout Electronics		\$2,989,065	\$3,080,323	\$91,258	3.1%	
CD-3a changes		\$2,352,717	\$2,299,628	-\$53,089		

ASICs schedule (April 3rd ASICS meeting)

ABCStar

Item	Date	Notes
ABCStarV1 submitted	14 Feb 2020	
Step plan finalized	19 March	We iterated several times, to try to avoid tooling changes
Release to manufacturing	27 March	
Initial 12 wafers completed	22 May	Holding back 4 wafers before metal deposited
Wafers at CERN	29 May	In May, will see if can subdivide wafers for RAL or reship
Wafers at DA Integrated	5 June	Hopefully at RAL too, or soon after
Complete probing	3 July	
466 die available	3 July	Dicing of first wafer
+ 1864 die available	7 August	4 wafers – will apply yield to all these numbers in future
+ 1864 die available	16 August	4 wafers
+ 1864 irradiated die available	13 October	4 wafer
+ 9320 die available	5 January	20 wafers
+ 1864 irradiated die available	9 Feb 2021	4 wafers
+ 11184 die available	9 April 2021	24 wafers – production priming // depends on SEE tests

Preproduction (5%) from basis of estimate
 15,766 ABCStars including yields
 so minimum 34 wafers diced

HCCStar/AMAC

Item	Date	Notes
HCCStarV1 + AMACStar submitted	1 July 2020	This includes some effect of Covid-19 delays
Fab start	22 July	
Wafers complete	15 Sept	12 wafers
Wafers at CERN	22 Sept	
Wafers at Penn	29 Sept	
Complete probing	27 Oct	
Dice first wafer	27 Oct	Current estimate : 795 HCCStar + 565 AMACStar per wafer
Verify design on SCB	10 Nov	
Dice 4 wafers	24 Nov	Hold 3 wafers for dicing vendor selection / will review this

Preproduction (5%) from basis of estimate
 1722 HCCStar and 1206 AMAC including yields
 so minimum 3 wafers diced