

ATLAS ITk Strips Preliminary Power Supply Specs

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ATLAS ITk Strips Plans for Power

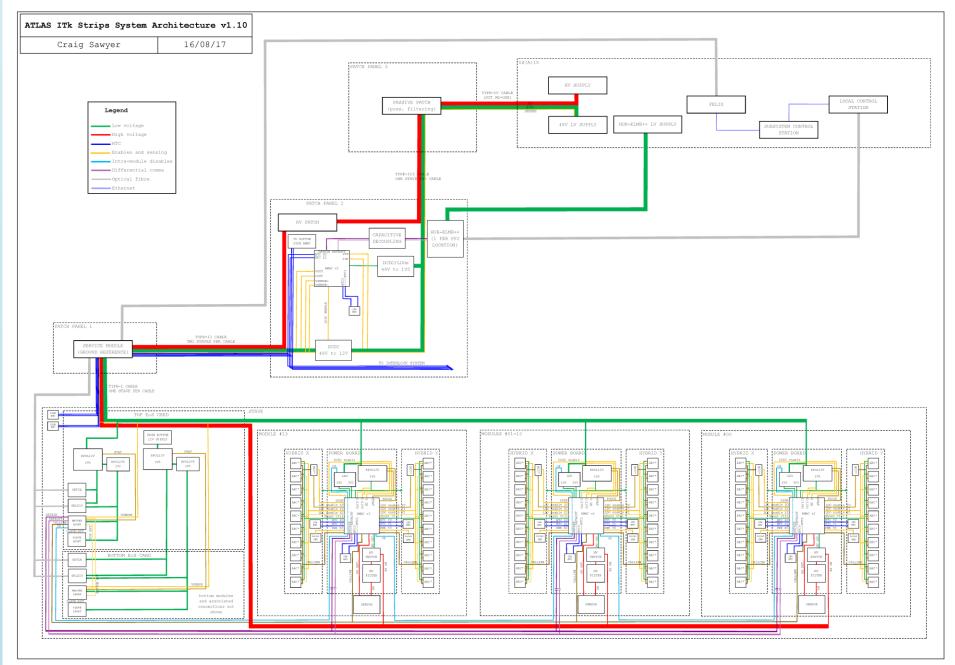
- For LV, two options are currently still being evaluated:
 - A) 48V supplies in the service cavern & DC/DC (12V to 14V out) converters at PP2.
 - B) Low voltage (~20V) in the service cavern with cabling directly to the detector.
- In either case, each power supply channel will power one side of a barrel stave or one side of an end-cap petal.
- There will be DC/DC converters at each module to step down to ASIC voltages.
- Both options will require 14V voltage clamp at PP2 and remote sensing.
- High voltage for sensor bias will be supplied by supplies in the service caverns.
 - Each barrel stave or end-cap petal will have its modules divided into 4 groups.
 - Each HV channel will power one of these groups.
- Both LV and HV supplies will be floating with their reference defined at the single point ground at the detector.





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ATLAS ITk Strips System Diagram assuming DC/DC converter





Direct Low Voltage Power Supply

Parameter	Value	Comment
INPUT		
Input ® oltage	2401VAC	
Input f requency	501Hz,Binglephase	PFC Prequired
ОUТРUТ		
Reference\(\text{Potential} \)	floating@relative@to@thassis@ground@	2
	for ndividual thannels	
Isolation3withstand3voltage	100🛚	
Voltage@ange	0ftof20f3/	depends@pon@turrent@butput
Voltage∄t∄oad	11V	heldfixedfbyfemotesensing
VoltageBettingBesolution	±1%	
Voltage ∄ amping	soft®tart	
Maximumaturrent	5343(1034)	twolversions will be the eded by the large by 20%
Efficiency	min®80%@@AC@to@DC)	averageper arate Including primary power supply 2
		and thannels of ficiency for maximum to utput power
Ripple2and2hoise2for2f2>21.09Hz	<50@mV@pp	
REGULATION, SENSING AND MC	ONITORING BACCURACY	
Remote®ensing@ontrol	yes	up 202/2 Voltage 2 drop 2 and 2 00 2 m 2 long 2 tables
LineBegulation	1%	
Load@egulation	1%	
Voltage∄monitoring	yes,11%	precise@monitoring@by@tusom@ASIC@AMAC"@at@oad
Current@monitoring	yes,📶 🗗	precise@monitoring@by@tusom@ASIC@AMAC"@at@oad
Remote®DN/OFF®tontrol	yes,@ctivellow	
PROTECTION		
Over demperature protection	yes	adjustable
Over3voltage3protection	yes⊡	adjustable
Over@urrent@protection	yes	adjustable
COOLING	external@provided@n@the@tacks	
ENVIRONMENT		
Operating humidity	10%10190%1RH, INon-condensing	
Ambient temperature	0°CIIoBO°C	
Storage@humidity	10%-95% RH Non-condensing	
Storage storage <a< td=""><td>-20°C∄o®0°C</td><td></td></a<>	-20°C∄o®0°C	
MECHANICAL		
Output derminals/connectors	?	Weamayarequestaspecificationnectors
Modularity	suitablefor 19" Trates	
PackingIdensity	to atomply a with a waiable aracks	See®system®description
OTHER		
Communication@rotocols	ethernet, and ustrial aprotocols and a	2
Warranty 3 Maintenance	51years 21.51years	



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48V Supply assuming DC/DC converter at PP2

Parameter	Value	Comment
INPUT		
Input®oltage	240ĒVĒAC	
Input frequency	501Hz,Bingle1phase	PFC⊡equired
OUTPUT		
Reference:potential	floating@relative@to@thassis@ground@	
	for and ividual thannels	
Isolation with stand voltage	100ĒV	
Voltage∄ange	4411o1521V	adjustable
Voltagesettings esolution	±1%	
Voltage ∄ amping	softßtart	
Maximum turrent	23A3(43A)	two 2versions 22 will 2be 2heeded
Efficiency	min280%@2AC@to@DC)	averageper@rateIncludingprimarypowerSupply2
·		and thannels the ficiency for the maximum to the theory of the same and the same and the same are the same ar
Ripple@and@noise@for@f@>@1.0@Hz	<50@mV@pp	
REGULATION, SENSING AND MONI	TORING	
Remote®ensing@control	no	
Line regulation	1%	
Load regulation	1%	
Voltage∄monitoring	no	performedby@tustom@ASIC&AMAC"@at@oad
Current@monitoring	no	performedby@tustom@ASIC@AMAC"@atdoad
Remote®ON/OFF®control	yes,@active@ow	
PROTECTION		
Over demperature protection	yes	adjustable
Over voltage protection	yes?	adjustable
Oversturrent protection	yes	adjustable
COOLING	external@provided@n@the@racks	
ENVIRONMENT		
Operating humidity	10% 10% 10% 10% 10% 10% 10% 10% 10% 10%	
Ambient de mperature	0°C₫o®0°C	
Storage humidity	10%-95% RHINon-condensing	
Storage demperature	-20°C10280°C	
MECHANICAL		
Output derminals/connectors	?	Wellmaylequestspecificstonnectors
Modularity	suitablefor 19 Tetrates	
Packing density	to@tomply@vith@avaiable@racks	See®ystem®description
OTHER		
Communication protocols	ethernet, and ustrial protocols and a	
Warranty⊈⊡Maintenance	5@years@12.5@years	





DC/DC Step Down Converter at PP2

Parameter	Value	Comment
INPUT		
Input₃voltage	44BI52BDC	floating@elative@o@thassis@ground@or@ndividual@
		channels
OUTPUT		
Reference p otential	floating@elative@o@thassis@round@	
,	for Individual It hannels	
Isolation@withstand@voltage	1003/	
Voltage	11@o2.42V	depends@upon@turrent@butput
Voltage@at@oad	11V	heldaixedabyaremotesensing
VoltageBettingBesolution	±1%	
VoltageBamping	soft®tart	Output®hould@rack@nput®by® 21.00@usec
Maximum@urrent	5@A@(10@A)	two@versions@will@be@needed@@Final@spec@may@thange@
		by ∄ 20%
Efficiency	minE85%@@AC@to@DC)	averageper averageper@rate@ncludingprimary@ower@supply@
		and thannels the fficiency for maximum to the put the power
Rippleandanoiseaforata 21.0aHz	<50@mV@pp	
REGULATION, SENSING AND MO	NITORING ACCURACY	
Remote®ensing@control	yes	up2472V0voltage2drop2and2202mdong2tables
Line regulation	1%	
Load@regulation	1%	
Voltage@monitoring	no	precise@monitoring@by@cusom@ASIC@AMAC"@at@oad
Current@monitoring	no	precise@monitoring@by@cusom@ASIC@AMAC"@at@oad
Remote IDN/OFF It ontrol	yes,@ctive®ow	,
PROTECTION		
Over demperature protection	yes	adjustable
Over®voltage®protection	yes?	adjustable
Over@turrent@brotection	yes	adjustable
COOLING	external@provided@n@the@racks	
ENVIRONMENT		
Operating humidity	10%ItoI90%IRH,INon-condensing	
Ambientitemperature	0°C@oB0°C	
Storage humidity	10%-95% IRHINon-condensing	
Storage demperature	-20°C@oß0°C	
Magnetic ∄ ield	0.6፻	
Radiationdevels	TID®20Gy,21MeVNE®4e112cm ⁻² ,	
Tradiation lieuvers	hadron@lux@	
	200 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
MECHANICAL		
Output derminals/connectors	?	Weamayarequestaspecificationnectors
Modularity	suitablefor 19 ftrates	
Packing density		available is pace in in PP2 in a sit of beinde fined
OTHER		
Communication protocols	ethernet, and ustrial aprotocols and on interface	
Warranty Maintenance	2Dears 215Dears	



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High Voltage for Sensor Bias

Parameter	Value	Comment
INPUT		
Input®voltage	240½/@AC	
InputIfrequency	50IHz,BingleIphase	PFC@may@be@required
OUTPUT		
Reference\(\text{Dotential} \)	floating@elative@o@thassis@round@	
	for and ividual thannels	
Isolation\(\text{3} \text{vithstand} \(\text{Voltage} \)	+1@kV	
Voltage@ange	0@to@750@V	programmable, Btable Operation of rom 2.0 V
Voltage®etting@esolution	±1%®of®et®value,®<21®V	
Voltage@amping	programable533503V/s	
Maximum®turrent	6amA	Final®pec@may@thange@by@-20%
Maximum\text{\textsup} urrent\text{\textsup} imit	12cA3363mA	a special spec
Efficiency	minE50%IJBACIIfoIDC)	averageper2trateIncludingprimarypowerSupply2
,	,	and@thannels@tfficiency@for@maximum@butput@power
Ripple@and@hoise@for@f@>@1.0@Hz	<50@mV@pp	
Common@mode@hoise@turrent@beak@		
with 2100 3bhms 3to 3tarth 22		
REGULATION, SENSING AND MONI	TORING	
Remote®ensing	no	
Voltage@measurement@resolution	10 ⁻⁴ B x B /max	Precision@measurement@by@tustom@ASIC@AMAC"@at@
	10 DAEVITIAN	load
Currentmeeasurementmesolution	10 ⁻⁴ 豫周max	Precision@measurement@by@tustom@ASIC@AMAC"@at@
	TO EXEMITED.	load
PROTECTION		
Short@tircuit@protection	yes	
Over demperature protection	yes	adjustable
·	±10EV	
Over(under)-voltageBorotection	110EV	programmable@imit@witn@rogrammable@amp@own
Over(under)-voltage@rotection Over(under)-voltage@rip@eaction2	10@ms	programmable@imit@vith@rogrammable@amp@down will@be@dominated@by@discharge@bf@apacitors
Over(under)-voltage@rotection Over(under)-voltage@rip@eaction time		will®edominated®ydischarge®f@apacitors
Over(under)-voltage 1rip 1reaction 2		
Over(under)-voltage Trip Teaction time	10@ms	will@be@dominated@by@discharge@bf@capacitors
Over(under)-voltage Trip Teaction Time Over-current Protection	10∄ms yes	will@be@dominated@by@discharge@bf@tapacitors programmable@imit@with@programmable@ramp@down
Over(under)-voltage Trip Teaction Time Over-current Trip Teaction Over-current Trip Teaction Time	10@ms yes 10@ms	will be dominated by discharge of tapacitors programmable dimit with programmable damp down will be dominated by discharge of tapacitors
Over(under)-voltage Trip Teaction Time Over-current Protection Over-current Trip Teaction Time Remote TON/OFF	10@ms yes 10@ms active@ow	will be dominated by discharge of tapacitors programmable dimit with programmable damp down will be dominated by discharge of tapacitors
Over(under)-voltagearipaeactionatime Over-currentaripaeactionatime Remoteadn/OFF Remoteadn/OFFaeactionatime	10@ms yes 10@ms activedow 10@ms	will be dominated by discharge bf dapacitors programmable dimit with programmable damp down will be dominated by discharge bf dapacitors
Over(under)-voltagearipaeactionatime Over-currentaripaeactionatime Remoteadn/OFF Remoteadn/OFFBeactionatimeactimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactionatimeactimeactionatimeactionatimeactionatimeactionatimeactionatimeaction	10@ms yes 10@ms active@ow 10@ms external@provided@n@he@acks	will be dominated by discharge bf dapacitors programmable dimit with programmable damp down will be dominated by discharge bf dapacitors
Over(under)-voltagearipaeactionatime Over-currentaripaeactionatime Remoteadn/OFF Remoteadn/OFFBeactionatimea COOLING ENVIRONMENT Operatingahumidity	10@ms yes 10@ms activedow 10@ms	will be dominated by discharge of tapacitors programmable dimit with programmable damp down will be dominated by discharge of tapacitors
Over(under)-voltagearipaeactionatime Over-currentarotection Over-currentaripaeactionatime Remoteany/OFF Remoteany/OFFaeactionatimea COOLING ENVIRONMENT Operatingaumidity Ambientaemperature	10億ms yes 10億ms active園ow 10億ms external@rovided個n種hellacks 10%種o圈0%配H,風Non-condensing 0°C種o圏0°C	will be dominated by discharge of tapacitors programmable dimit with programmable damp down will be dominated by discharge of tapacitors
Over(under)-voltage@rip@eaction@time Over-current@rotection Over-current@rip@eaction@time Remote@DN/OFF Remote@DN/OFF@eaction@time@ COOLING ENVIRONMENT Operating@humidity Ambient@emperature Storage@humidity	10@ms yes 10@ms active@ow 10@ms external@rovided@n@the@acks 10%@to@90%@RH,@Non-condensing 0°C@to@80°C 10%-95%@RH@Non-condensing	will be dominated by discharge of tapacitors programmable dimit with programmable damp down will be dominated by discharge of tapacitors
Over(under)-voltagearipaeactionatime Over-currentaripaeactionatime Remoteany/OFF Remoteany/OFFaeactionatimea COOLING ENVIRONMENT Operatingahumidity Ambientaemperature Storageamperature	10億ms yes 10億ms active園ow 10億ms external@rovided個n種hellacks 10%種o圈0%配H,風Non-condensing 0°C種o圏0°C	will be dominated by discharge of tapacitors programmable dimit with programmable damp down will be dominated by discharge of tapacitors
Over(under)-voltagearipaeactionatime Over-currentaripaeactionatime Remotean/OFF Remotean/OFFaeactionatimea COOLING ENVIRONMENT Operatinganumidity Ambientaemperature Storageanumidity Storagealemperature MECHANICAL	10回ms yes 10回ms activedow 10回ms external即rovided回n理hellacks 10%因の例の後限H,例on-condensing 0°C性の因の°C 10%-95%服HMon-condensing -20°C性の因の°C	willabeadominatedabyadischargeabfacapacitors programmableaimitawithaprogrammableampadown willabeadominatedabyadischargeabfacapacitors 1dineaperathannel
Over(under)-voltage@rip@eaction@time Over-current@rotection Over-current@rip@eaction@time Remote@DN/OFF Remote@DN/OFF@eaction@time@ COOLING ENVIRONMENT Operating@numidity Ambient@emperature Storage@numidity Storage@emperature MECHANICAL Output@erminals/connectors	10回ms yes 10回ms activedow 10回ms external即rovided回n理he日acks 10%目の例の%配H,即on-condensing 0°C目の図の°C 10%-95%配H即on-condensing -20°C目の図の°C	will be dominated by discharge of tapacitors programmable dimit with programmable damp down will be dominated by discharge of tapacitors
Over(under)-voltage@rip@eaction@time Over-current@rotection Over-current@rip@eaction@time Remote@DN/OFF Remote@DN/OFF@eaction@time@ COOLING ENVIRONMENT Operating@numidity Ambient@emperature Storage@numidity Storage@emperature MECHANICAL Output@erminals/connectors Modularity	10回ms yes 10回ms activedow 10回ms external@provided@n@the@acks 10%在0图0%很H,@Non-condensing 0°C性0图0°C 10%-95%很H@Non-condensing -20°C使0图0°C ? suitable@or如9"@rates	willabeadominatedabyadischargeabfacapacitors programmableaimitavithaprogrammableaampadown willabeadominatedabyadischargeabfacapacitors 1dineaperathannel Weamayaequestapecificatonnectors
Over(under)-voltage@rip@eaction@time Over-current@rotection Over-current@rip@eaction@time Remote@DN/OFF Remote@DN/OFF@eaction@time@COOLING ENVIRONMENT Operating@numidity Ambient@emperature Storage@numidity Storage@emperature MECHANICAL Output@erminals/connectors Modularity Packing@density	10回ms yes 10回ms activedow 10回ms external即rovided回n理he日acks 10%目の例の%配H,即on-condensing 0°C目の図の°C 10%-95%配H即on-condensing -20°C目の図の°C	willabeadominatedabyadischargeabfacapacitors programmableaimitawithaprogrammableampadown willabeadominatedabyadischargeabfacapacitors 1dineaperathannel
Over(under)-voltage@rip@eaction@time Over-current@rotection Over-current@rip@eaction@time Remote@DN/OFF Remote@DN/OFF@eaction@time@COOLING ENVIRONMENT Operating@numidity Ambient@emperature Storage@numidity Storage@emperature MECHANICAL Output@erminals/connectors Modularity Packing@density OTHER	10@ms yes 10@ms active@ow 10@ms external@provided@n@the@acks 10%@o@0%@RH,@Non-condensing 0°C@o@0°C 10%-95%@RH@Non-condensing -20°C@o@0°C ? suitable@or@9"@rates to@omply@vith@avaiable@acks	willabeadominatedabyadischargeabfacapacitors programmableaimitawithaprogrammableampadown willabeadominatedabyadischargeabfacapacitors 1aineaperathannel Weamayaequestapecificatonnectors Seesystemadescription
Over(under)-voltage@rip@eaction@time Over-current@rotection Over-current@rip@eaction@time Remote@DN/OFF Remote@DN/OFF@eaction@time@COOLING ENVIRONMENT Operating@numidity Ambient@emperature Storage@numidity Storage@emperature MECHANICAL Output@erminals/connectors Modularity Packing@density	10回ms yes 10回ms activedow 10回ms external@provided@n@the@acks 10%在0图0%很H,@Non-condensing 0°C性0图0°C 10%-95%很H@Non-condensing -20°C使0图0°C ? suitable@or如9"@rates	willabeadominatedabyadischargeabfacapacitors programmableaimitawithaprogrammableampadown willabeadominatedabyadischargeabfacapacitors 1aineaperathannel Weamayaequestapecificatonnectors Seesystemadescription



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