

## IFEC 2020 Final Round - Submission of Converter Prototypes

(Updated on October 13, 2020. For questions, please contact by [ifec2020@et.aau.dk](mailto:ifec2020@et.aau.dk))

Please mail out your project prototype by **23:59, 9<sup>th</sup> of November 2020** (Central European Time), according to the courier pick up time. Please choose an express service with a tracking number and the expected delivery time no later than 16<sup>th</sup> of November 2020. **Please send the tracking number to the email [ifec2020@et.aau.dk](mailto:ifec2020@et.aau.dk) once it is available.** Each team can get up to USD 200 reimbursement of the shipping costs according to receipts.

### Mailing address

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## IFEC 2020 Final Round - Evaluation Point System

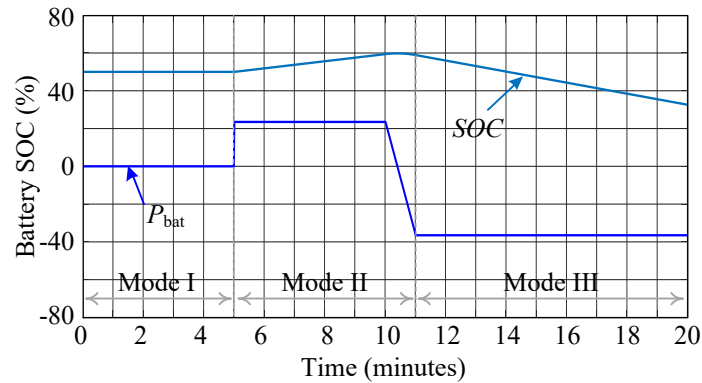
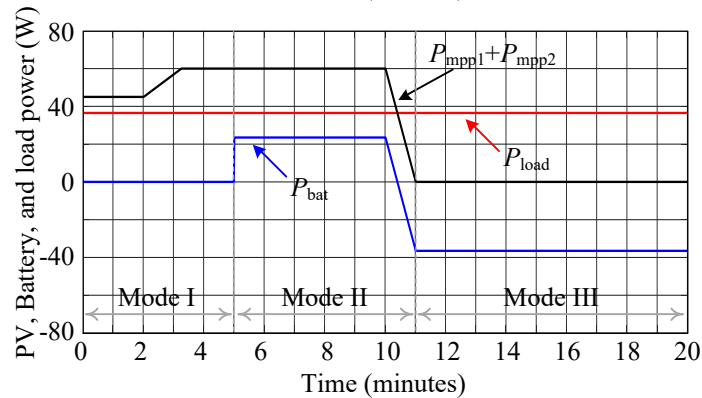
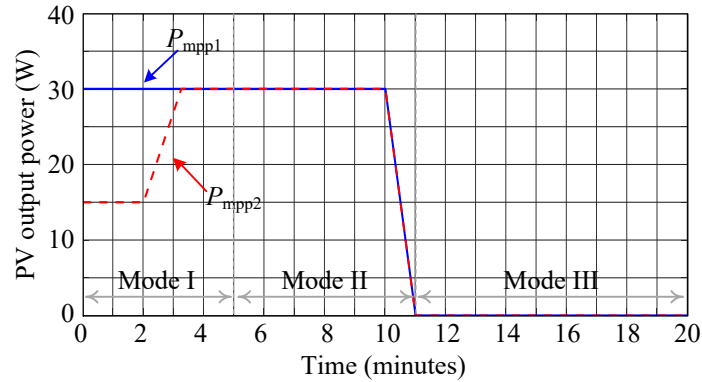
	Points	Point system	Notes
Weight: < 200g	5	Pass/Fail	Points: 5 or 0 for passed or failed prototypes, respectively
Fulfill OUT1 Specification	10	Pass/Fail	Power capability, average voltage, and voltage ripple. Points: 5 or 0 for passed or failed prototypes, respectively
Fulfill OUT2 Specification	10	Pass/Fail	Power capability, average voltage, and voltage ripple. Points: 5 or 0 for passed or failed prototypes, respectively
Fulfill OUT3 Specification	10	Pass/Fail	Power capability, voltage ripple, and current ripple. Points: 5 or 0 for passed or failed prototypes, respectively
Stable static and dynamic operation during the first 10-minute test (00:00:00 – 00:09:59)	7	Pass/Fail	Points: 7 or 0 for passed or failed prototypes, respectively
Stable static and dynamic operation during the second 10-minute test (00:10:00 – 00:20:00)	8	Pass/Fail	Points: 8 or 0 for passed or failed prototypes, respectively
Efficiency	25	Ranked	Energy efficiency, (total output energy)/(total input energy) during the 20-minute test. Ranked points: 25, 20, 14, 12 for the highest to the lowest efficiencies, respectively. If testing is terminated due to malfunction of the prototype within the 20-minute operation, the point is 12.
Power Density	25	Ranked	The volume of the prototype will be ranked. The calculation of the volume is based on the maximum length × maximum width × maximum height. Ranked points: 25, 20, 14, 12 for the highest to the lowest volumes, respectively.
<b>Total (Maximum)</b>	<b>100</b>		

## IFEC 2020 Final Round - Testing Procedure

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Phase	Time	Test items	Details	Actions	Criterion
Initialization (10 mins)	2 mins	Volume and weight measurement	The DUT is measured in weight and volume by the testing personnel	<ul style="list-style-type: none"> <li>The team shall confirm the measurement data</li> <li>The referee shall confirm the measurement data</li> </ul>	
	2 mins	Safety inspection	Testing personnel conduct visual inspection of potential safety hazard of the DUT	<ul style="list-style-type: none"> <li>Safety assessment shall be confirmed with referee</li> </ul>	<ul style="list-style-type: none"> <li>No potential safe hazard should be observed</li> </ul>
	2 mins	Mechanical connection	The input and output terminals of the DUT are connected to the power supplies and load	<ul style="list-style-type: none"> <li>Testing personnel connect the terminals of the DUT according to its label</li> <li>The team shall confirm if the terminal connection is in the correct order</li> </ul>	
	2 mins	Initializing DUT (optional)	The DUT is powered and initialized – ready to be operated (if necessary)	<ul style="list-style-type: none"> <li>Testing personnel energizes and initializes the DUT (without enable the control)</li> </ul>	<ul style="list-style-type: none"> <li>The DUT is stable and ready to operate</li> </ul>
	2 mins	Initializing testing profile	The power supplies and loads are initialized with the testing profile (the power supplies are not energized)	<ul style="list-style-type: none"> <li>Testing personnel activates the program of the power supplies and loads with the testing profile.</li> <li>The PV simulators are enabled</li> <li>The load simulators are enabled</li> <li>The battery simulator is disabled</li> </ul>	
Testing (20 mins)	5 mins	Mode I operation	The DUT supplies the load from the PV panels. The power extraction strategy of each PV panels can be decided by the team (e.g., MPPT or power regulation modes). However, it needs to be ensured that the total PV power extraction is equal to the load demand. During this period, the battery is disabled. Please refers to Fig. A for the exact testing profile.	<ul style="list-style-type: none"> <li>Testing personnel enable the testing profile</li> <li>The DUT operates in mode I</li> </ul>	<ul style="list-style-type: none"> <li>Efficiency of the DUT during the operation is recorded</li> <li>Voltage and current ripple of the load is recorded</li> </ul>
	6 mins	Mode II operation	The DUT supplies the load from both the PV panels (at the MPP). The MPPT control is required to track the	<ul style="list-style-type: none"> <li>The test is automatically executed</li> <li>The battery simulator is enabled</li> <li>The DUT operates in mode II</li> </ul>	<ul style="list-style-type: none"> <li>Efficiency of the DUT during the</li> </ul>

			MPP of the PV panels. The battery is charged and discharged according to the power difference between the PV panels power and the load demand. Please refers to Fig. A for the exact testing profile.		<p>operation is recorded</p> <ul style="list-style-type: none"> <li>• Efficiency of the MPPT during the operation is recorded</li> <li>• Voltage and current ripple of the load is recorded</li> </ul>
	9 mins	Mode III operation	The DUT supplies the load from the battery. The PV panels are disabled during this period. Please refers to Fig. A for the exact testing profile.	<ul style="list-style-type: none"> <li>• The test is automatically executed</li> <li>• The PV panel simulators are disabled</li> <li>• The DUT operates in mode III</li> </ul>	<ul style="list-style-type: none"> <li>• Efficiency of the DUT during the operation is recorded</li> <li>• Voltage and current ripple of the load is recorded</li> </ul>
Post-testing (5 mins)	2 mins	Safe turn-off	The DUT is safely turned off	<ul style="list-style-type: none"> <li>• Testing personnel disable the DUT control and turn-off the power supplies and then turn-off the DUT</li> </ul>	<ul style="list-style-type: none"> <li>• The DUT is safely turned off</li> </ul>
	3 mins	Disconnect DUT	The DUT is disconnected from the test platform	<ul style="list-style-type: none"> <li>• Testing personnel disconnect the DUT from the test platform</li> </ul>	



**Fig. A. Detailed profile during the 20 minutes testing phase.**

**Note:**

- $P_{mpp1}$  and  $P_{mpp2}$  are the available PV powers of the 1<sup>st</sup> and 2<sup>nd</sup> PV panels (not necessary the required operating PV power – depending on the operating mode, e.g., I or II)
- $P_{bat}$  is the battery power
- $P_{load}$  is the load demand/power
- SOC is battery state-of-charge
- Detailed PV characteristic (MPP) during the test can be found on the website

