SMU01 APPLICATION NOTES

INFORMATION IN THIS DOCUMENT SHOULD BE USED AS REFERENCE, THEY ARE NOT GUARANTEED VALUES

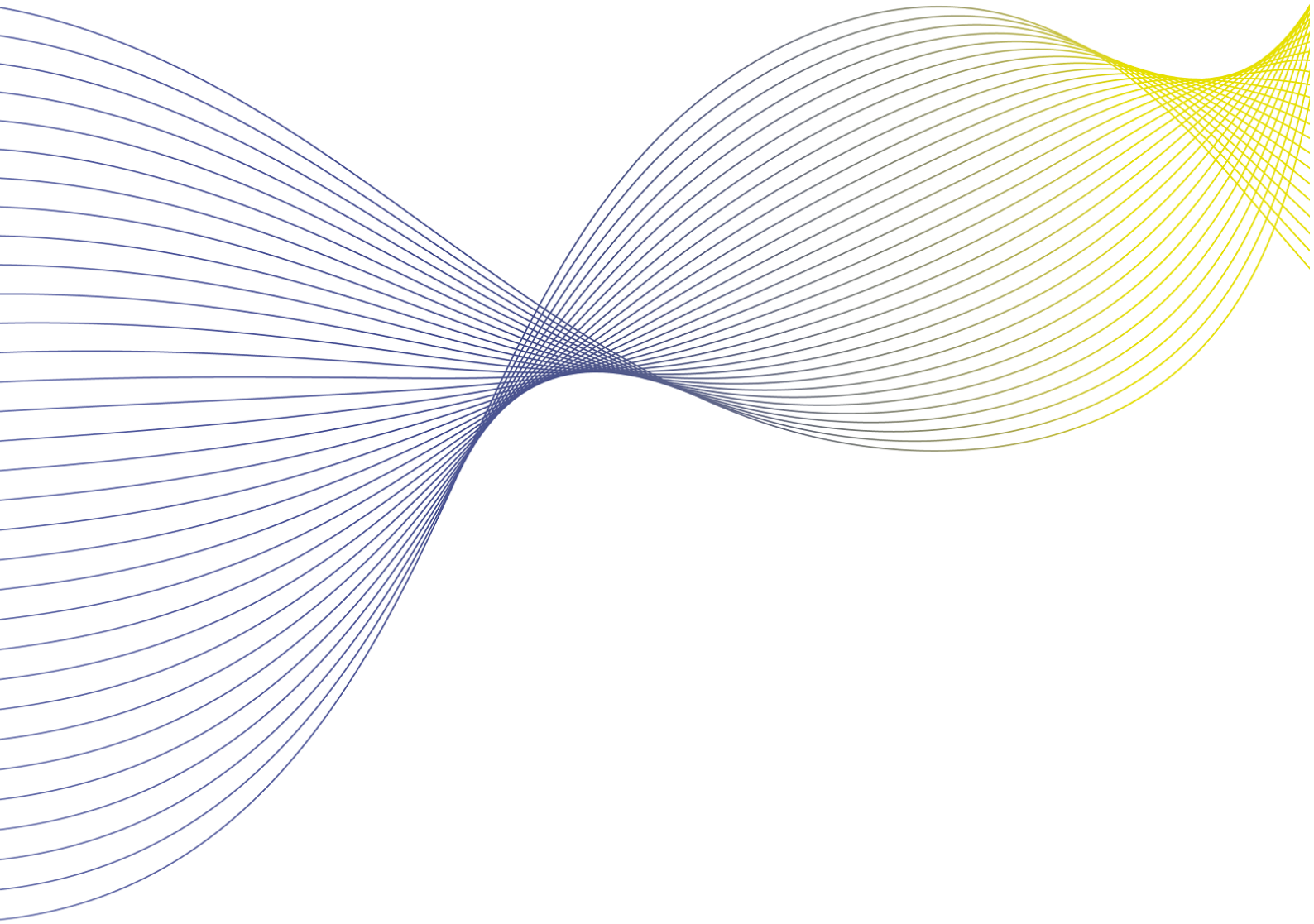


TABLE OF CONTENTS

1 SMU01 2
1.1 Recommendations for use 2
1.1.1 Storage 2
1.1.2 Unpacking 2
1.1.3 Handling 2
1.1.4 Installation 2
1.1.5 Disassembly 2
1.1.6 Mounting 2
1.2 Return busbar disturbance 3
1.2.1 Purpose 3
1.2.2 Return busbar setup 3
1.2.3 Return busbar influence 3
1.2.4 Note 3
1.3 Heating generation on busbar due to primary current 4
1.3.1 Setup 4
1.3.2 Heating generation chart according to condition above 4
1.3.3 Max duration time to reach the limit 150 °C of busbar according to condition above 4
1.4 Max continuous DC current versus ambient temperature 4
1.4.1 Purpose 4
1.4.2 Specific test setup and limits 5
1.4.3 Recommendation of max continuous currents 6
1.4.4 Example of test cases 6

1 SMU01

1.1 RECOMMENDATIONS FOR USE

1.1.1 STORAGE

The LEM transducers must be stored in a dry place, within the following ambient room conditions (< 40 °C and < 60 % RH). The product should be kept closed in its original packing. Ensure during storage and transport, the units are not damaged by applying excess weight to the packages. The transducers mustn't be stored more than 2 years. Ensure during storage and transport, the units are not damaged by applying excess weight to the boxes. Maximal stack-up storage of secondary container (pallet) must not exceed 2.

1.1.2 UNPACKING

When unpacking, care must be taken with cutting tools not to damage the transducer.

1.1.3 HANDLING

LEM transducers must be handled with care and not undergo any shocks or falls (fall=scrap). It is recommended to handle the transducer as long as possible inside its original packages (thermoform tray on customer's assembly station). It is forbidden to handle the transducers by their terminals. To avoid ESD issues, it is recommended not to touch secondary terminals. Any rework operations are forbidden and will be out of LEM warranty.

1.1.4 INSTALLATION

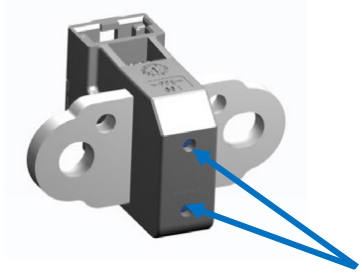
The workshop and the people in contact with the transducers must be ESD protected. Before installing, be sure to check that the transducer corresponds with the required application. Be sure that the air gap between the housing of the transducer and the primary bar is sufficient to avoid damage in case of vibrations.
Do not install (or re-install) a damaged part (broken or crushed element…).
LEM do not recommend customers to make any maintenance on LEM transducers, otherwise it will drive transducers directly out of warranty.

1.1.5 DISASSEMBLY

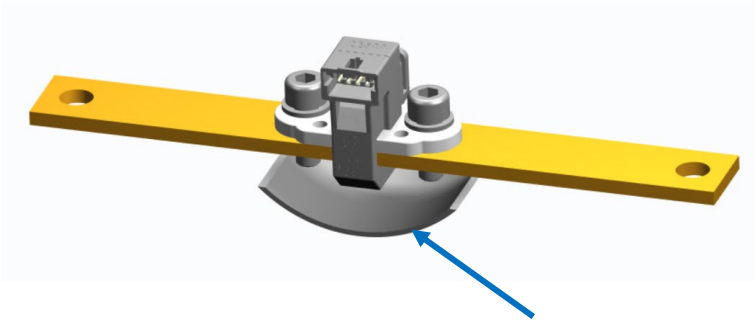
Suppress all electricity power before disassembling the transducer.

1.1.6 MOUNTING

1. It is recommended that customer's busbar is mounted under the transducer, refer to the figure below, to avoid shortening clearance/creepage distance.
2. It is recommended to use insulation layer under SMU if the SMU bottom is close to other metal parts, to avoid potential insulation issue (two auxiliary holes of plastic injection on SMU bottom).



Auxiliary holes



Insulation layer

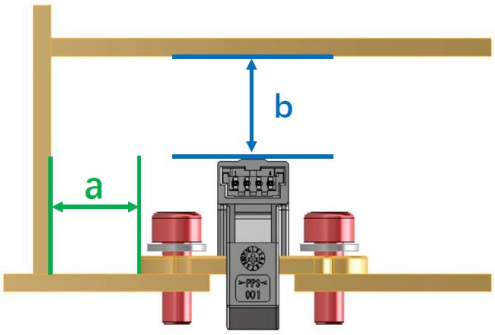
1.2 RETURN BUSBAR DISTURBANCE

1.2.1 PURPOSE

- Present return busbar disturbance based on the busbar shape.
- This can be referred during structure design.

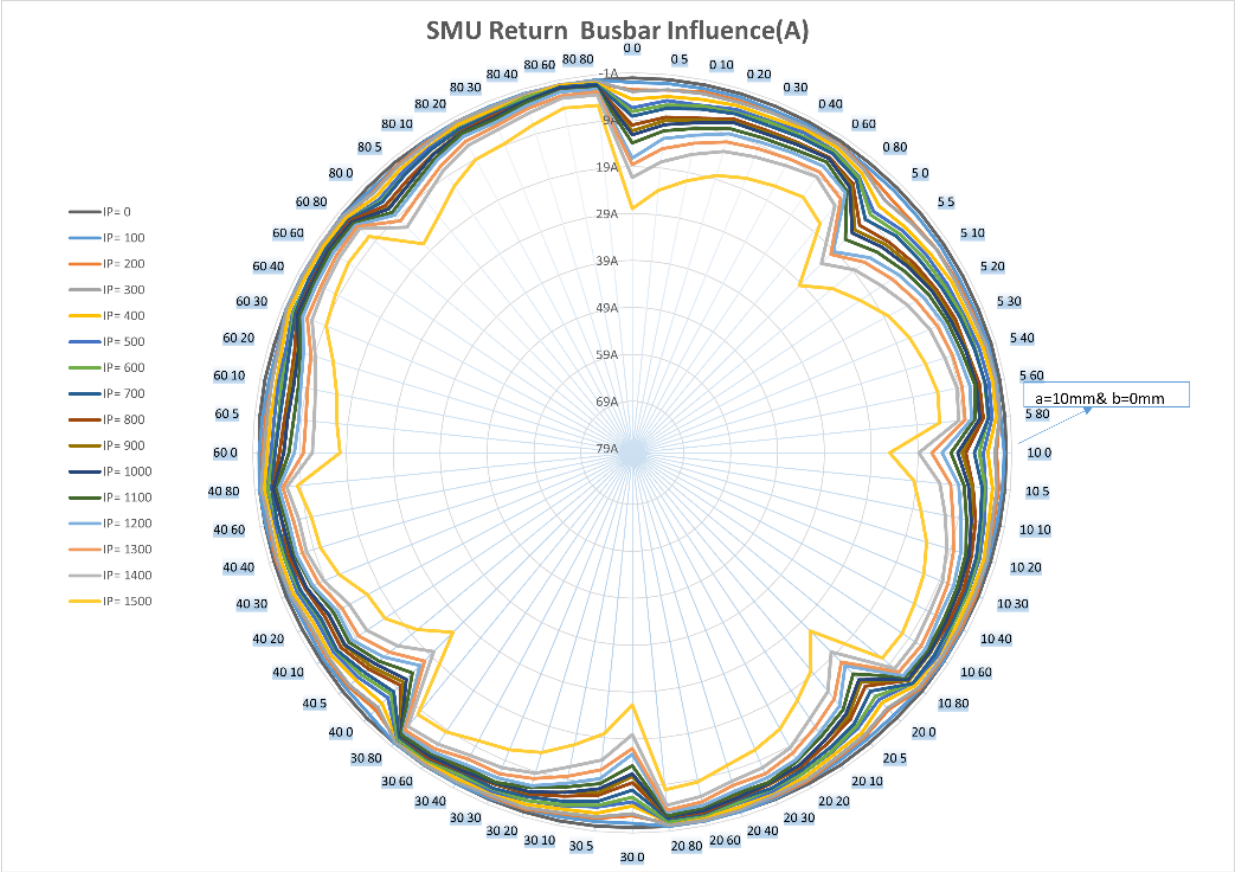
1.2.2 RETURN BUSBAR SETUP

- This shape is the most influential case
- The busbar dimension for test: 22 mm(Width)x4mm(Thickness).
- Environment: 25 ° C.



1.2.3 RETURN BUSBAR INFLUENCE

Difference of the U_{out} between return busbar (C-shape) vs reference (straight busbar)



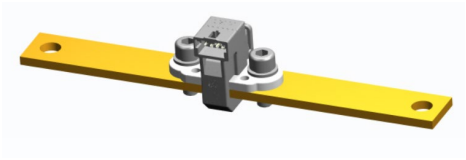
1.2.4 NOTE

- Due to the complexity of application, the examples cannot cover all the application conditions.

1.3 HEATING GENERATION ON BUSBAR DUE TO PRIMARY CURRENT

1.3.1 SETUP

Condition
- Inside climate chamber
- 55 °C setting up in chamber
- I_P range: 100 A -1500 A DC
- Mounting: refer to picture
- Test points: middle of busbar, inside DUT

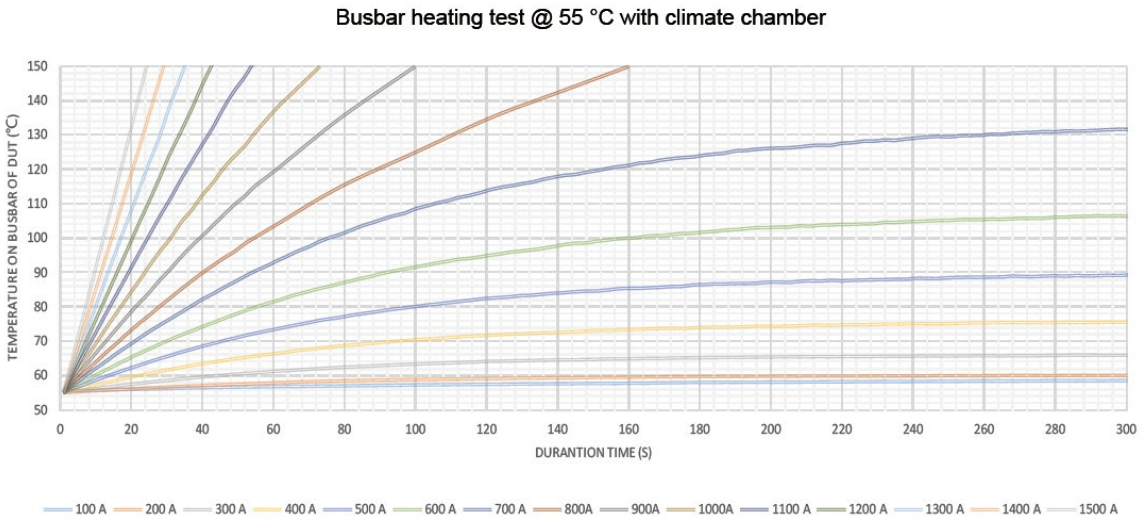


SMU series:
- Cu-ETP
- Section: 3 x 16.7 (mm)
- Length: 39 mm
- Resistance: 20 µΩ

Distribution external busbar:
- Cu-ETP
- Section: 3 x 16.7 (mm)
- Length: 200 mm

* Busbars are designed to simulate the application in customer system

1.3.2 HEATING GENERATION CHART ACCORDING TO CONDITION ABOVE



1.3.3 MAX DURATION TIME TO REACH THE LIMIT 150 °C OF BUSBAR ACCORDING TO CONDITION ABOVE

I_P	≤ 700	800	900	1000	1100	1200	1300	1400	1500
Max duration time (s)	Continue	160	100	73	52	43	34	31	25

- The result is for reference only according to certain condition as above.
- If the profile of primary current is over the limit, please consider enlarging the section of customer external busbar.

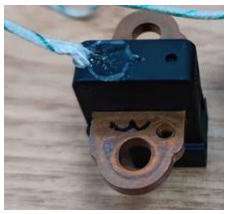
1.4 MAX CONTINUOUS DC CURRENT VERSUS AMBIENT TEMPERATURE

1.4.1 PURPOSE

To verify the maximum continuous I_P value at different ambient temperatures, the typical values of the test can be referred by the customer.

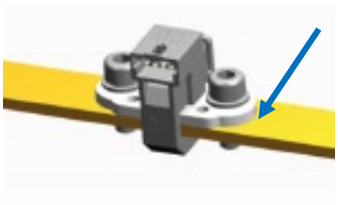
1.4.2 SPECIFIC TEST SETUP AND LIMITS

- Environment: Ambient temperature of transducer inside climate chamber
  25 °C, 45 °C, 65 °C, 85 °C, 105 °C, 125 °C
- Keep ambient temperature stable due to the cooling system of climate chamber.
- I_P range: 100A to 1500A
- Test points: refer to picture below.
  101<core>：Magnetic core temperature monitor point, limited 150 °C
  102<ASIC>：ASIC temperature monitor point, limited 125 °C
  103<busbar>：Extend Busbar temperature monitor point, limited 150 °C



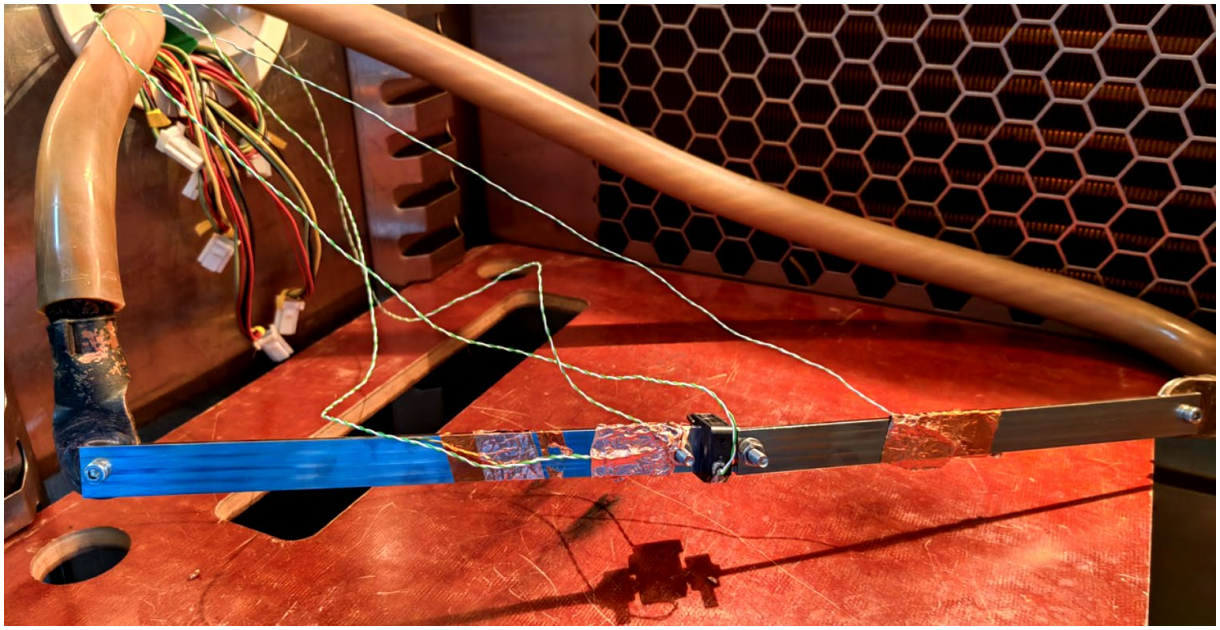
101<core>

102<ASIC>

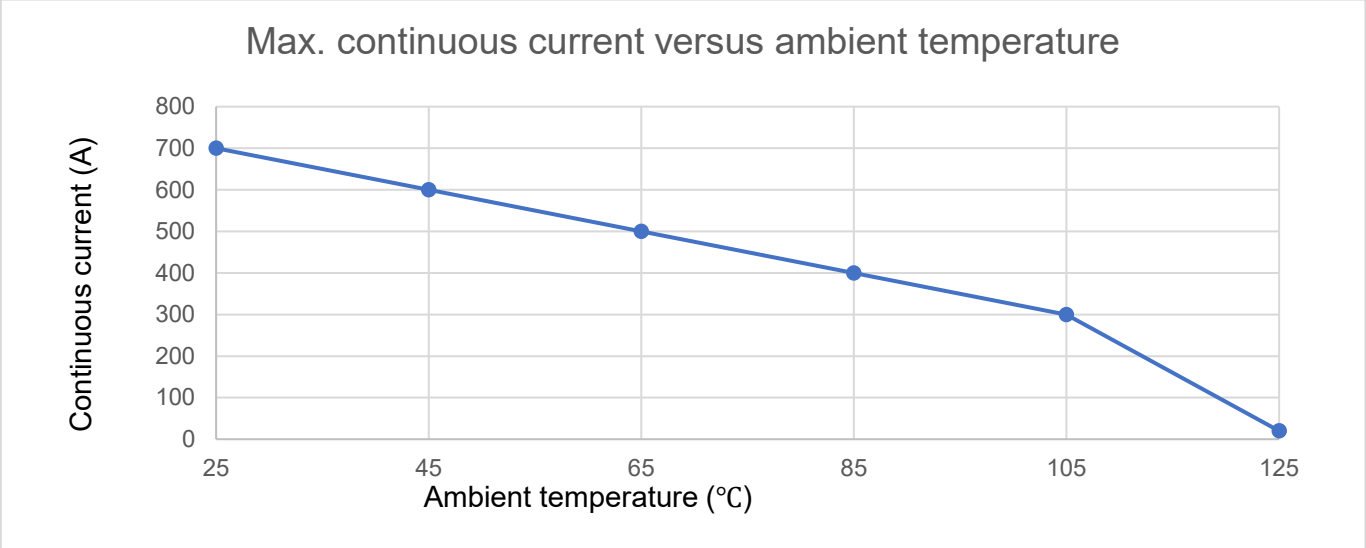


103<busbar>

- Overall setup

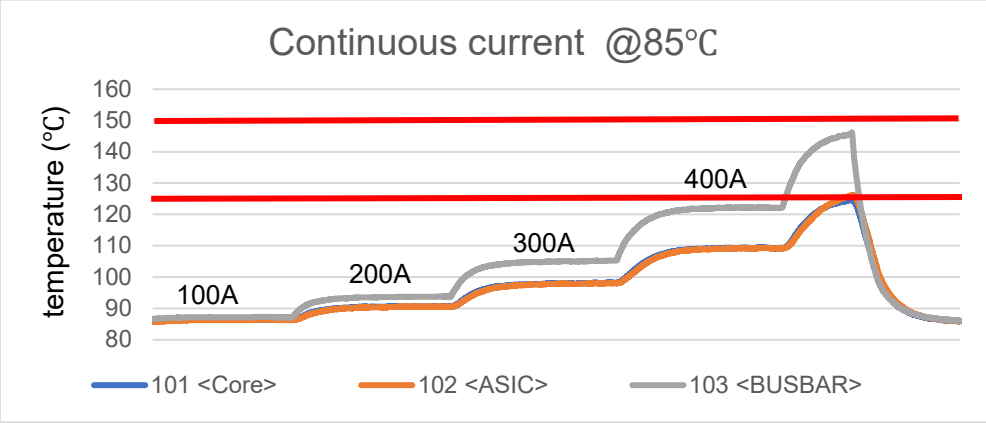


1.4.3 RECOMMENDATION OF MAX CONTINUOUS CURRENTS



1.4.4 EXAMPLE OF TEST CASES

- Max continuous current at 85°C is 400A.



- Max continuous current at 105°C is 300A.