Metrology firmware 3.04.00 Test Report (PIC32CXMT Family)

A Leading Provider of Smart, Connected and Secure Embedded Control Solutions

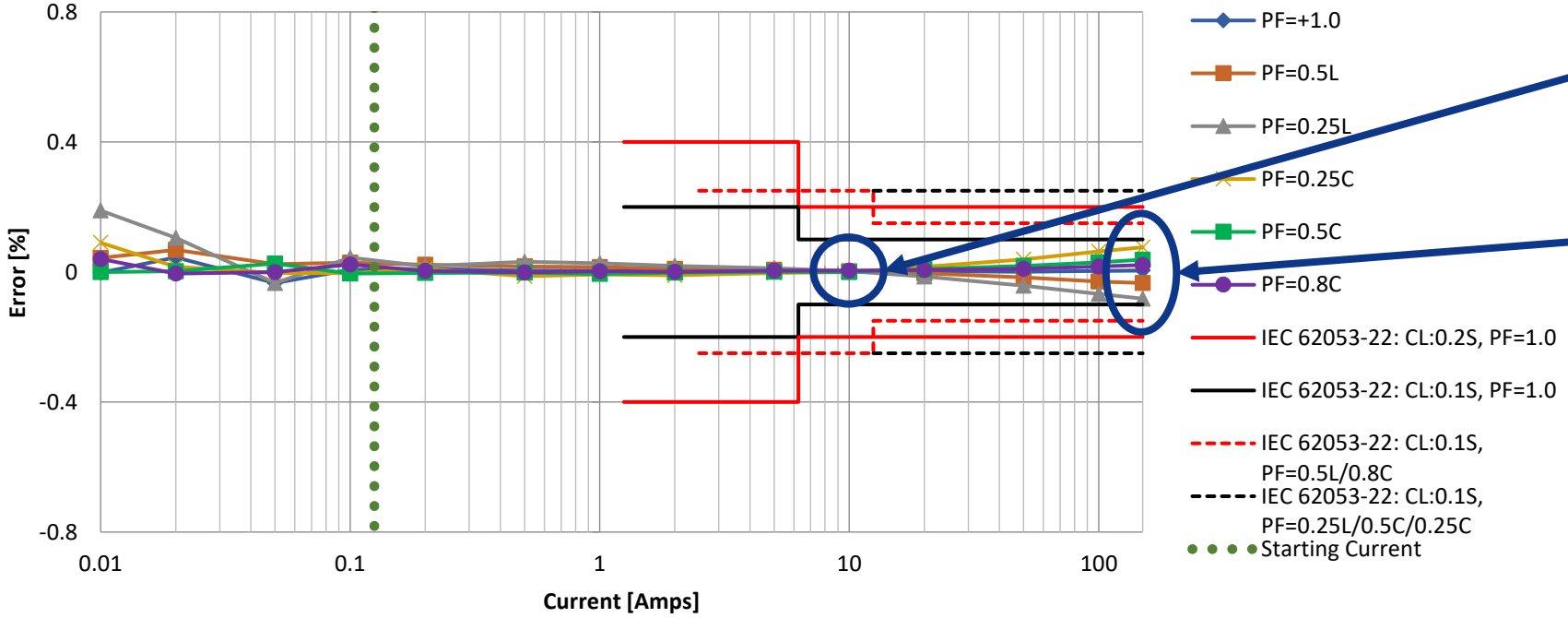
Metrology Laboratory

18/12/2025

Contents

Scope

- This report presents the metrology accuracy performance of Microchip's metrology evaluation boards.
- The objective is to demonstrate that Microchip solutions meet the stringent IEC and ANSI accuracy requirements, even when using standard sensors.
- Due to the exceptional accuracy of the Microchip Metrology Library and the high-performance Sigma-Delta converters, lower-cost sensors can be used to comply with less demanding accuracy classes, such as 0.5 or higher, thereby reducing the overall solution cost.
- Some measurements in this report reflect the non-ideal effects of the sensors used during testing:



Calibration point: 10A

Effect of approx. 0.012º non-linear phase-shift (current sensor)

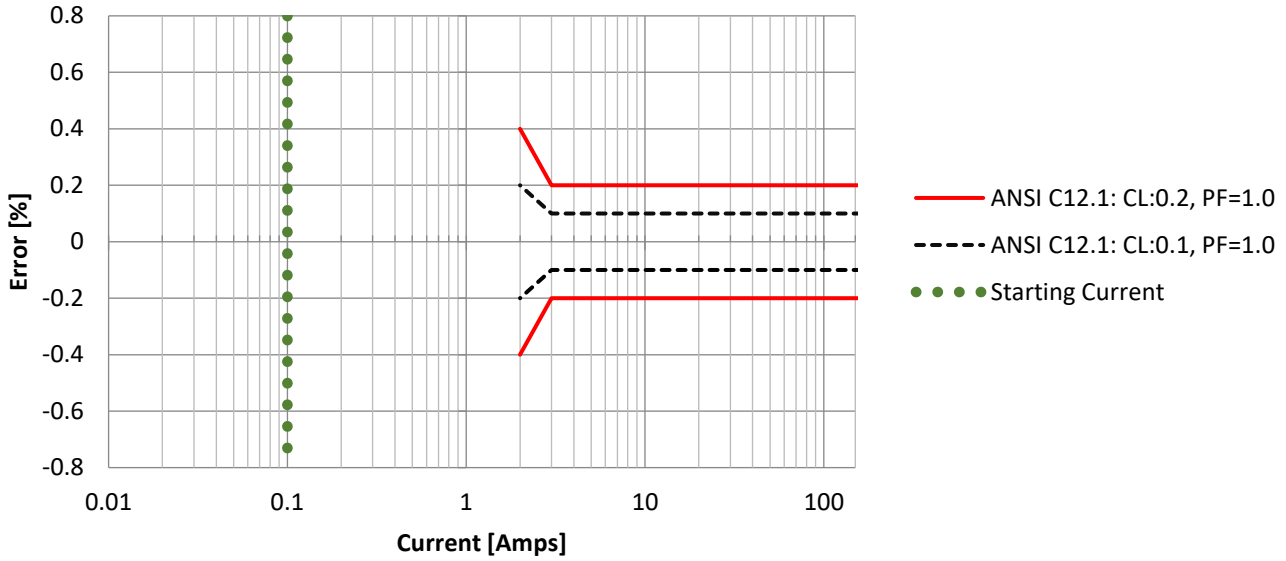
(*) For the sake of clarity, only the more stringent restrictions (PF=1.0) as outlined in the regulations are displayed.

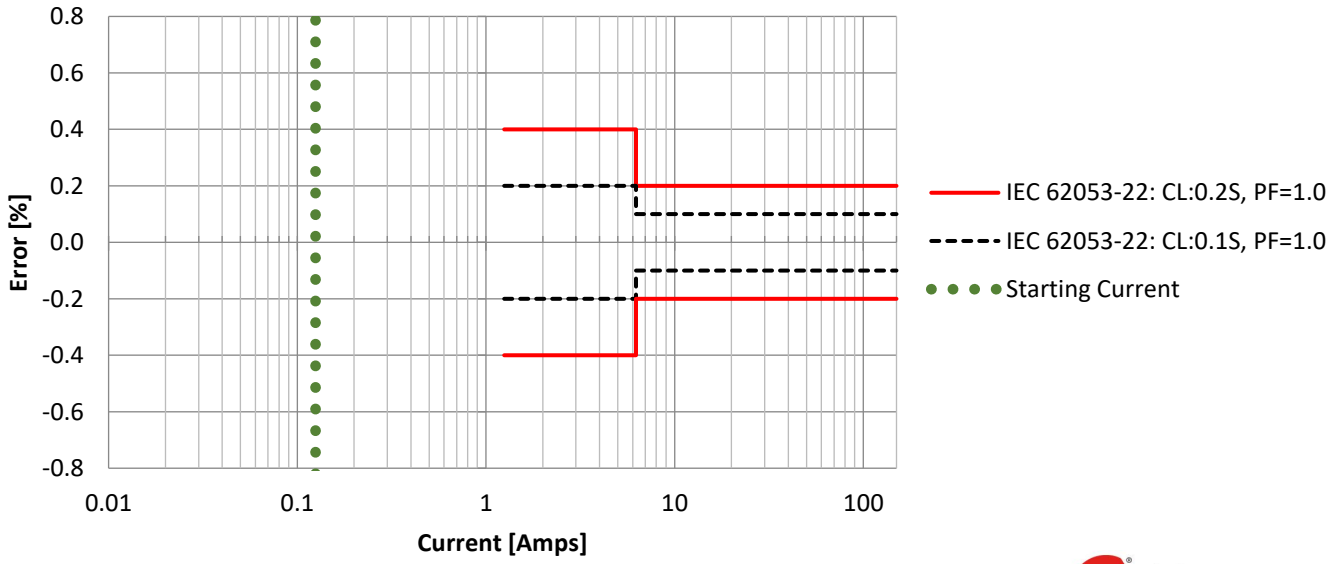
Measurement Conditions

- **Meter Tester: WECO 4330**
- **Sensors: CT VAC 4629-X040**
- **Metrology Firmware: 3.04.00**
- **AFE/Board:**
  - ATSENSE203/PIC32CXMTSH-DB Rev2
  - ATSENSE301/PIC32CXMTC-DB Rev2
  - MCP3912/(PIC32CXMTC-DB Rev2 + MCP3912 Evaluation Board)
  - MCP3913/Multichannel Board
  - MCP3914/Multichannel Board
- **Calibration:**
  - Only a single-point calibration is required: PF = 0.5L, Voltage = 220V, Current = 10 or 30A, Frequency = 50Hz
  - Minor phase correction adjustments are applied to the calibration in the case of the 60Hz measurements to compensate for the phase shift in the current sensor

Load curves information and Related Standards

- **This report contains metrology measurements, which may include load curve representations for enhanced understanding.**
- **The report typically reflects the limits set by ANSI (ANSI C12.1-2024) or IEC (IEC 62052-11:2021, IEC 62053-22:2021, IEC 62053-23:2021 and 2021IEC 62053-24:2021) regulations. As an example, the top chart shows the constraints in accordance with ANSI C12.1 (200A, 0.1%/0.2%); and the bottom one considers IEC 62053-22 (1.25-125(150A) Class 0.1S/0.2S).**
- **For the sake of clarity:**
  - The charts may feature data across various power factors.
  - Only the more stringent restrictions (PF=1.0) as outlined in the regulations are displayed in some measurements.

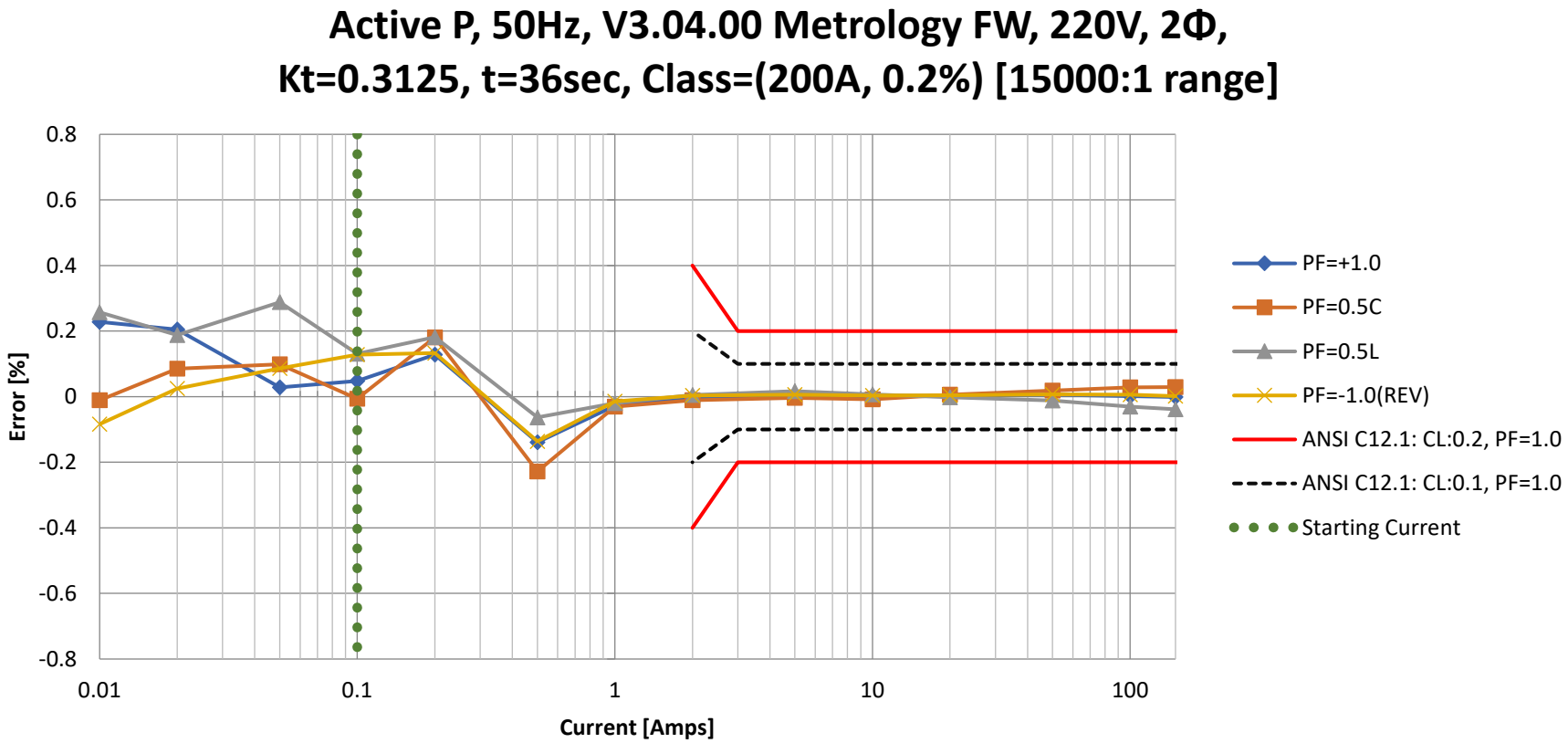




MICROCHIP

Active Power Load Curves

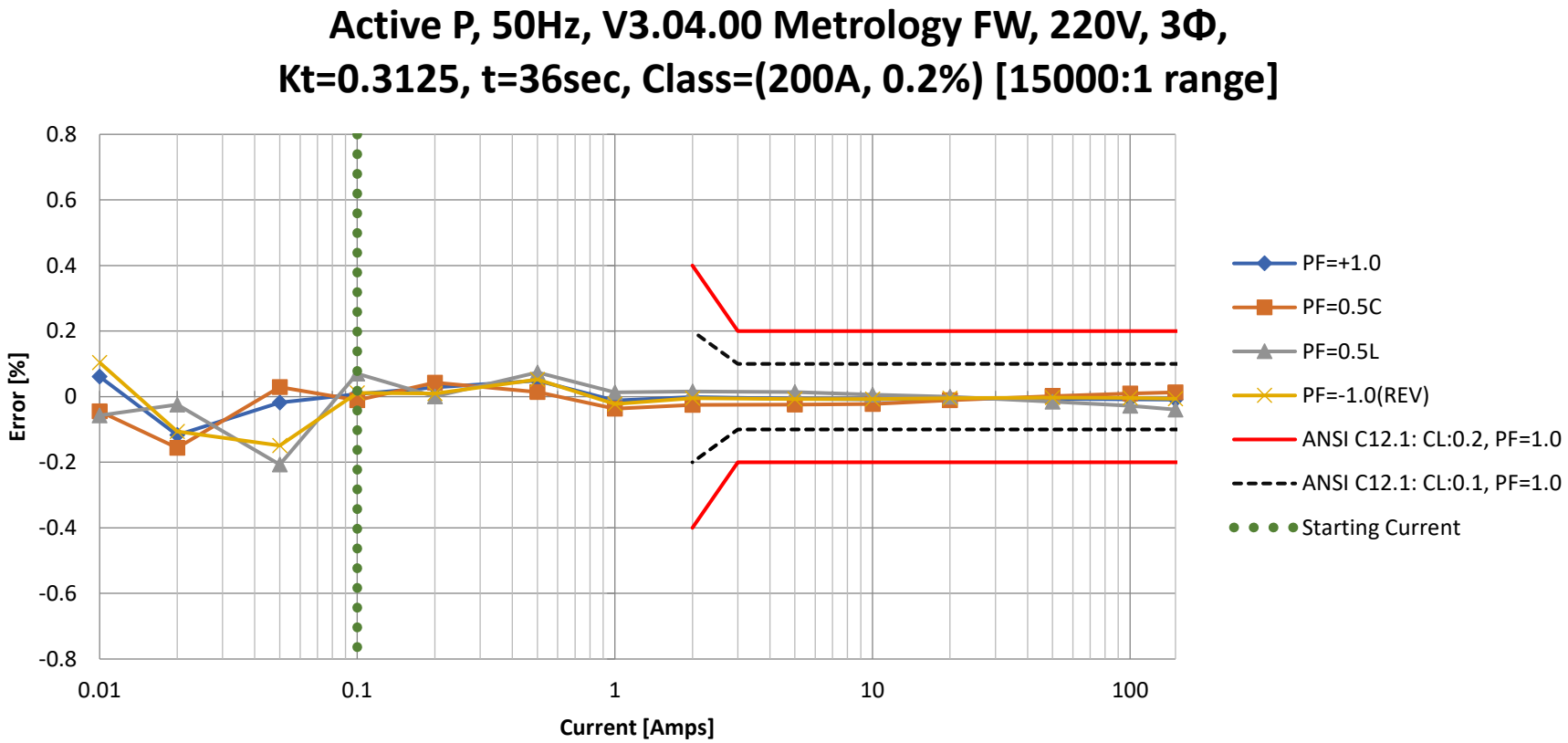
PIC32CXMTSH-Rev2. 50Hz.



Active Power offset enabled (0.043Wh/cycle).
Meter scaled to 240A. Integration period: 1 second.

Active Power Load Curves

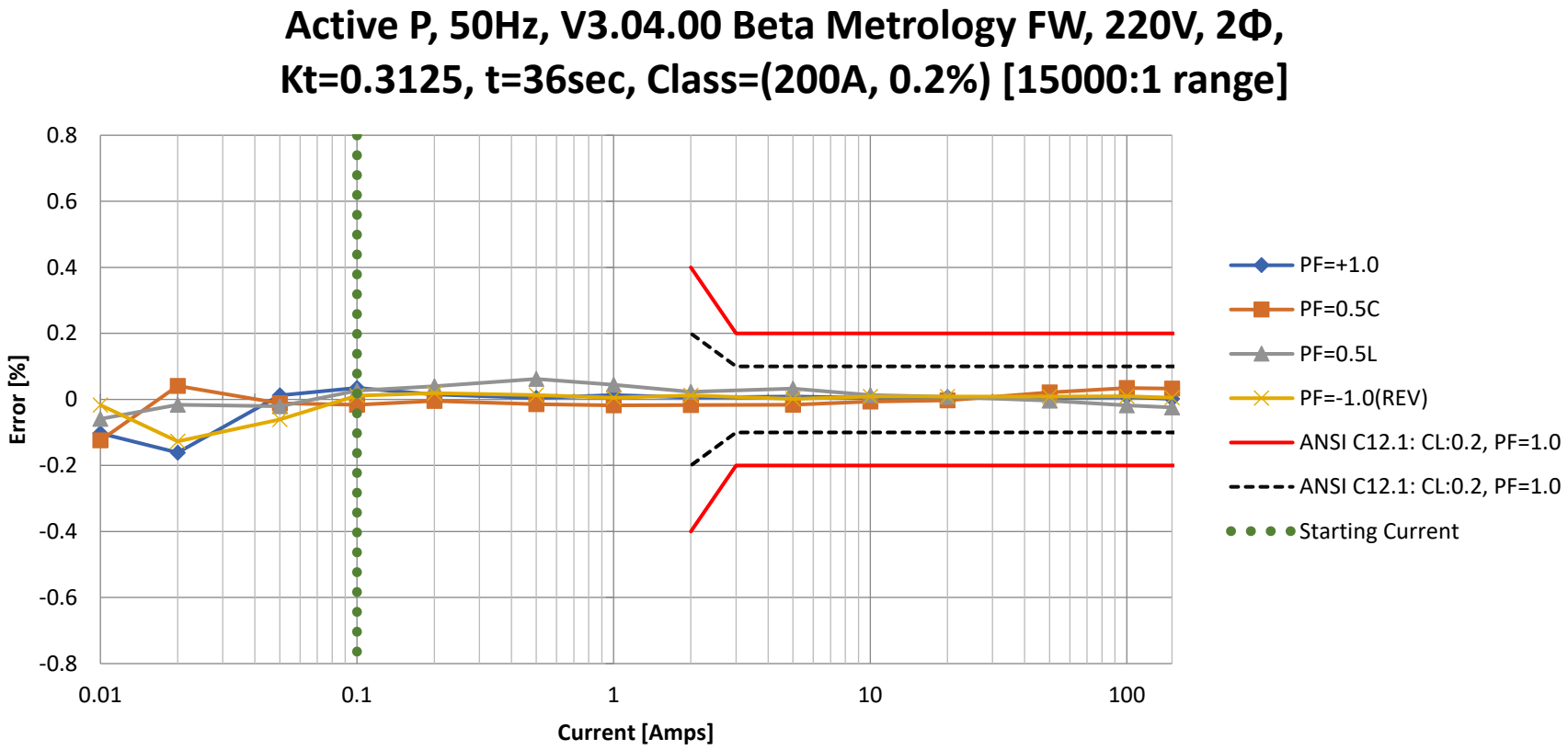
PIC32CXMTC-Rev2. 50Hz.



Active Power offset disabled.
Meter scaled to 240A. Integration period: 1 second.

Active Power Load Curves

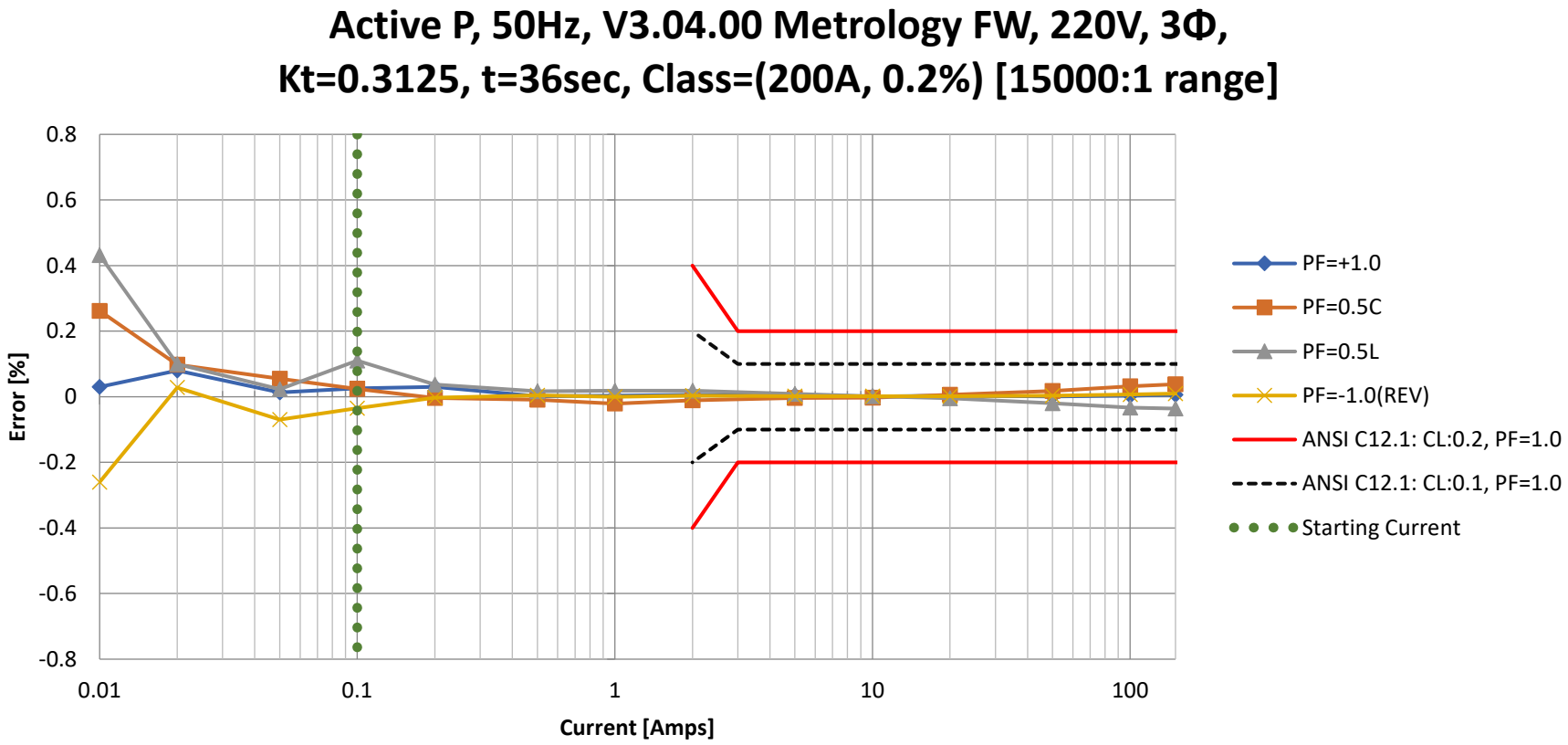
PIC32CXMTC-Rev2 + MCP3912 (flying wires). 50Hz.



Active Power offset enabled (0.018Wh/cycle).
Meter scaled to 260A. Integration period: 1 second.

Active Power Load Curves

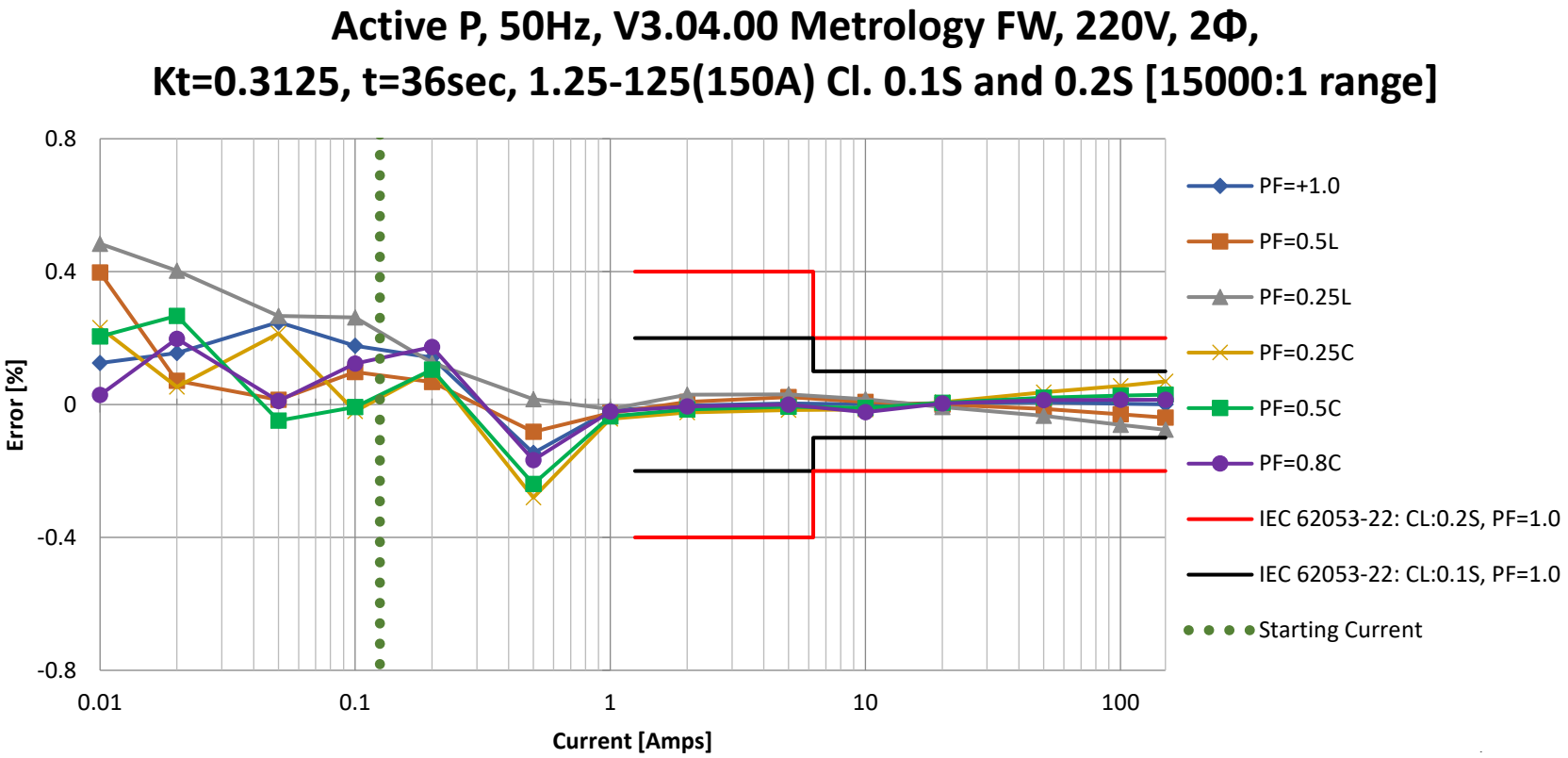
PIC32CXMTC (Multichannel board) + MCP3914. 50Hz.



Active Power offset disabled
Meter scaled to 260A. Integration period: 1 second.

IEC Active Power Load Curves

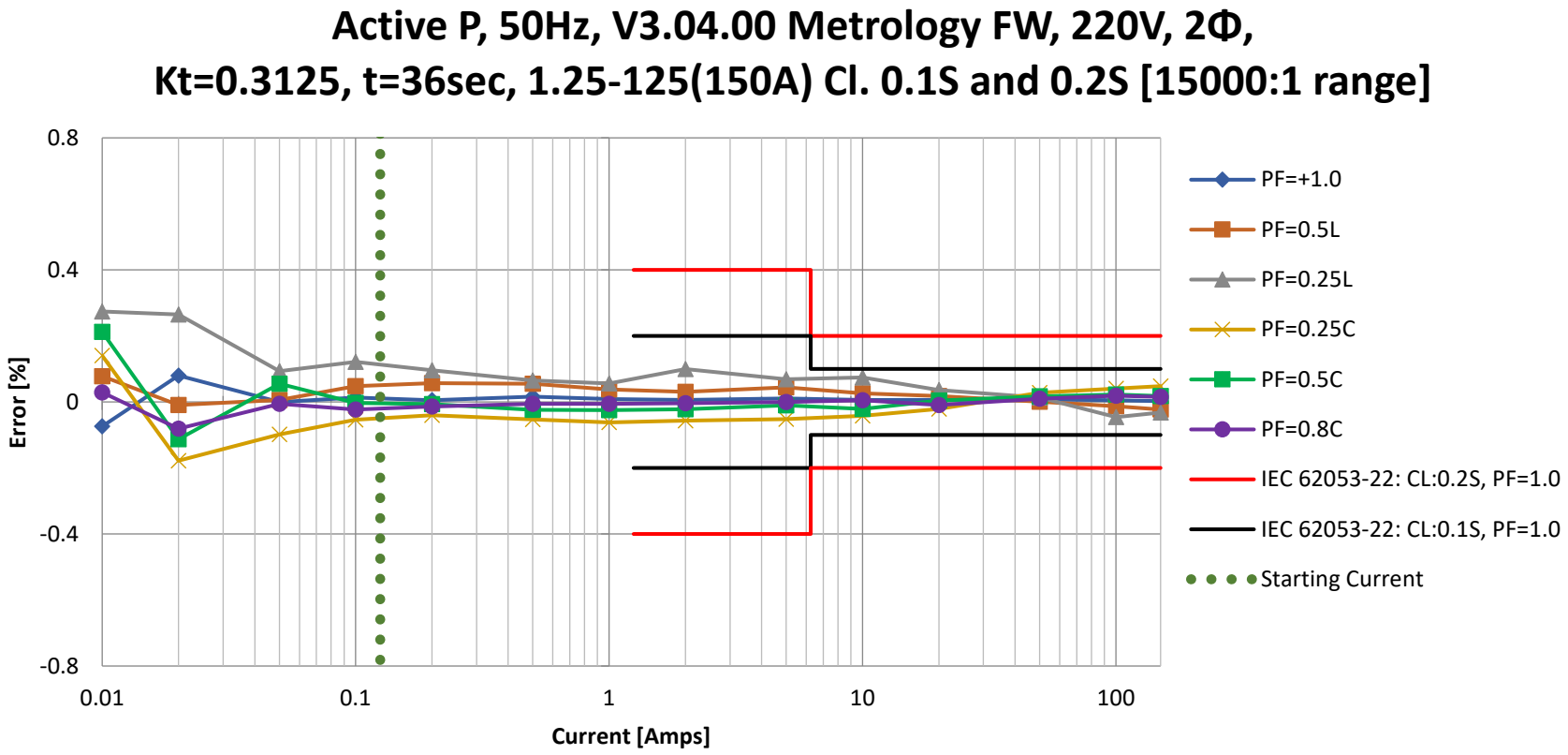
PIC32CXMTSH-Rev2. Forward. 50Hz.



Active Power offset enabled (0.043Wh/cycle).
Meter scaled to 240A. Integration period: 1 second.
For the sake of clarity, only the more stringent restrictions (PF=1.0) as outlined in the regulations are displayed.

IEC Active Power Load Curves

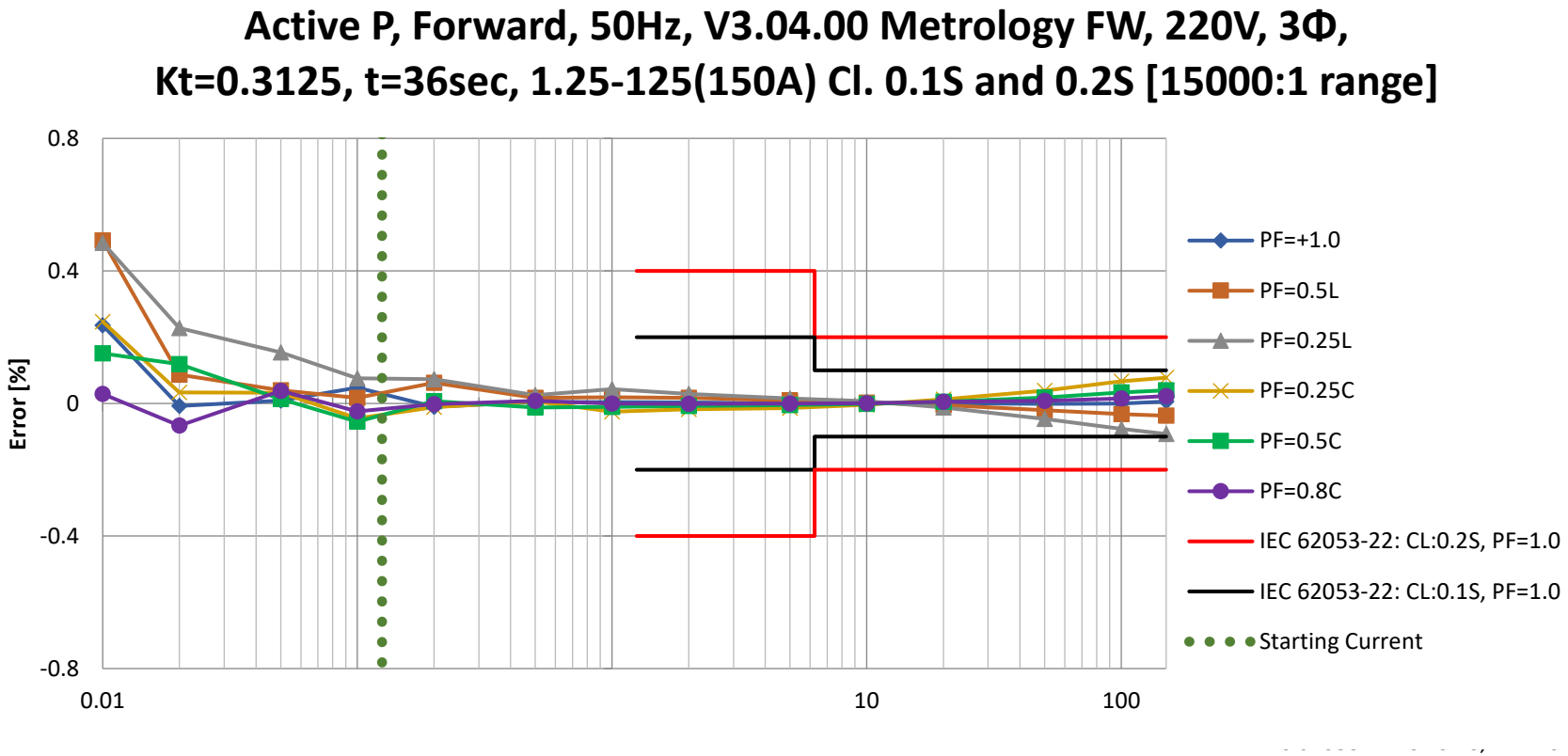
PIC32CXMTC-Rev2 + MCP3912 (flying wires). 50Hz.



Active Power offset enabled (0.018Wh/cycle).
Meter scaled to 260A. Integration period: 1 second.

IEC Active Power Load Curves

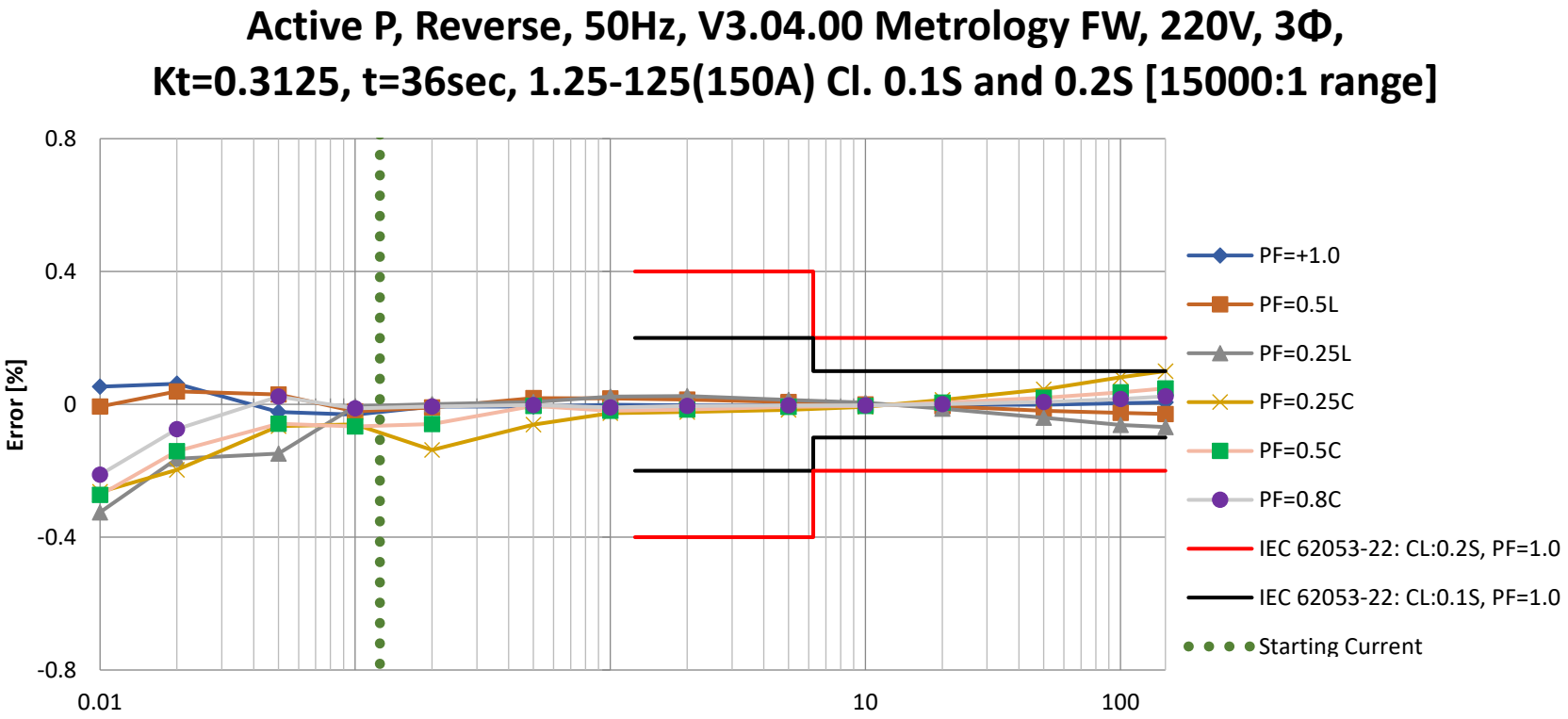
PIC32CXMTC (Multichannel board) + MCP3914. Forward. 50Hz.



Active Power offset disabled.
Meter scaled to 260A. Integration period: 1 second.
For the sake of clarity, only the more stringent restrictions (PF=1.0) as outlined in the regulations are displayed.

IEC Active Power Load Curves

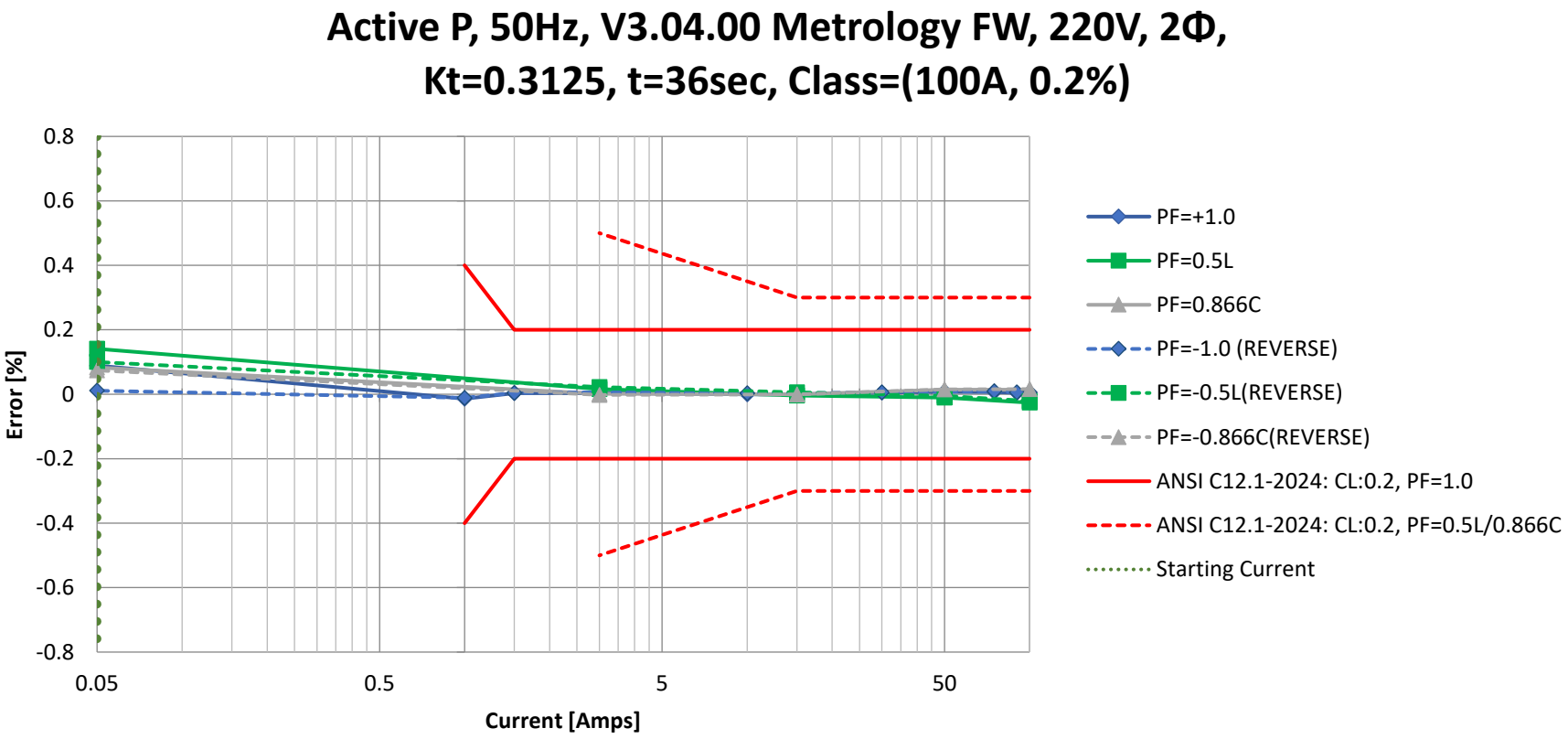
PIC32CXMTC (Multichannel board) + MCP3914. Reverse. 50Hz.



Active Power offset disabled.
Meter scaled to 260A. Integration period: 1 second.
For the sake of clarity, only the more stringent restrictions (PF=1.0) as outlined in the regulations are displayed.

ANSI Active Power Load Curves

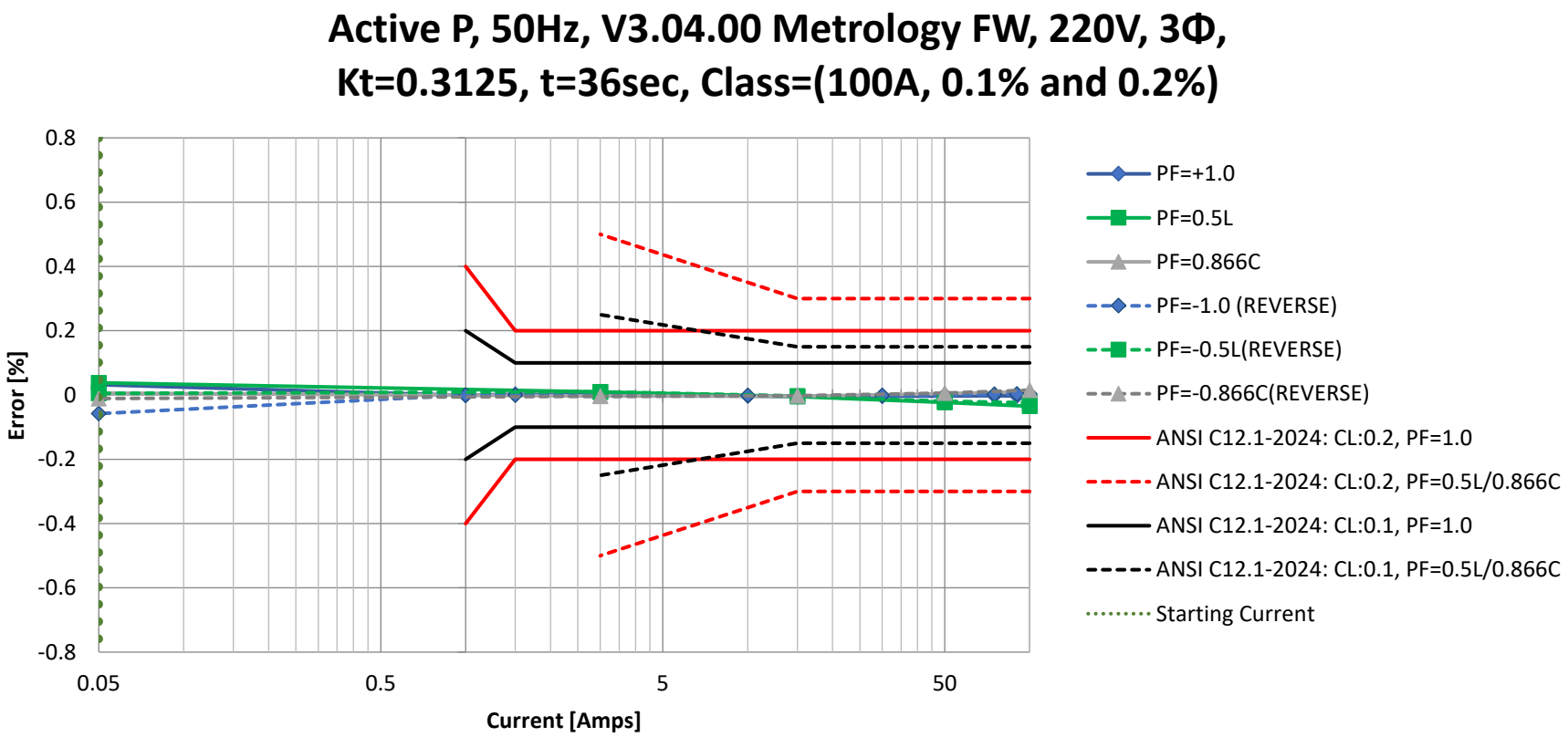
PIC32CXMTSH-Rev2. 50Hz.



Active Power offset enabled (0.043Wh/cycle).
Meter scaled to 240A. Integration period: 1 second.

ANSI Active Power Load Curves

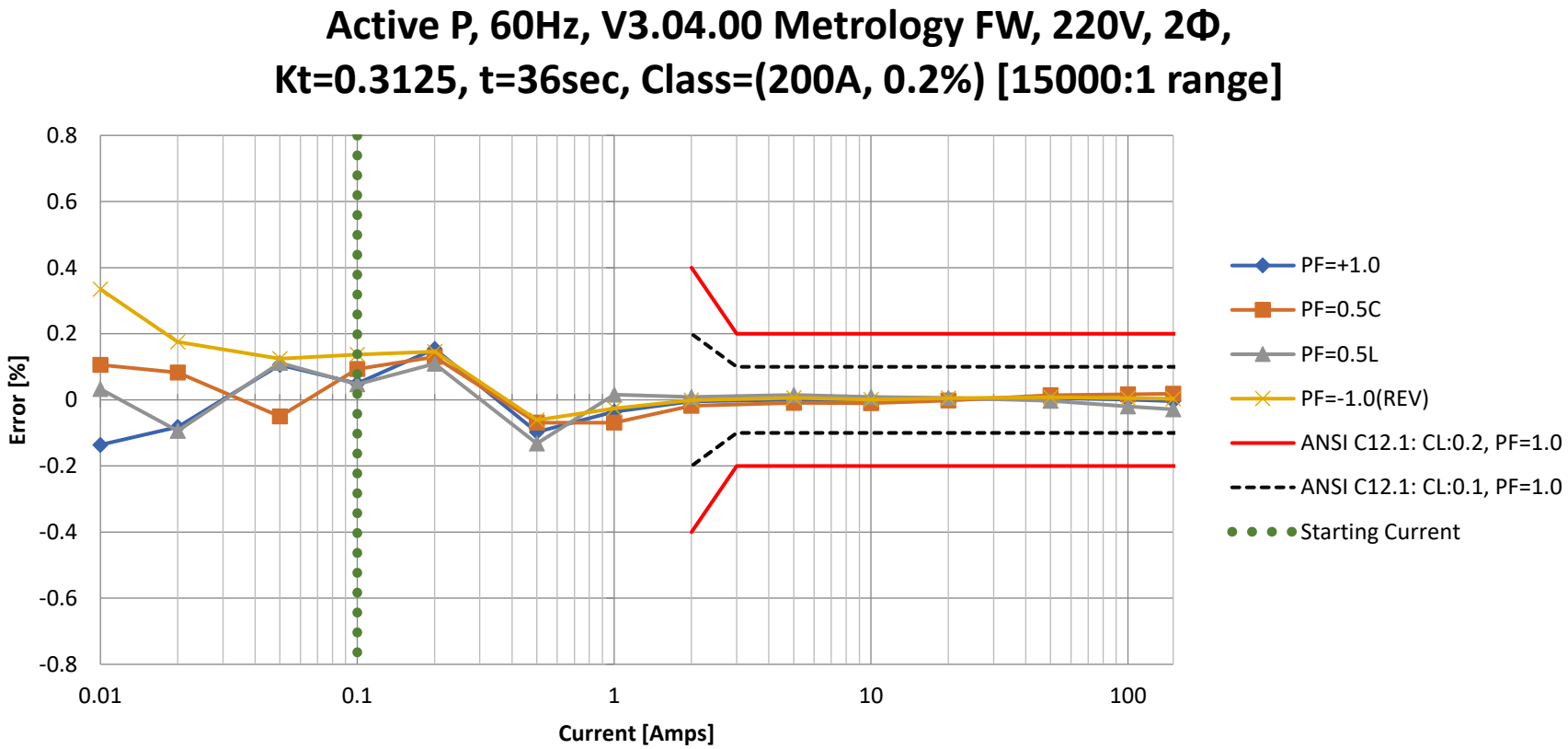
PIC32CXMTC (Multichannel board) + MCP3914. 50Hz.



Active Power offset enabled (0.009Wh/cycle).
Meter scaled to 260A. Integration period: 1 second.

Active Power Load Curves

PIC32CXMTSH-Rev2. 60Hz.

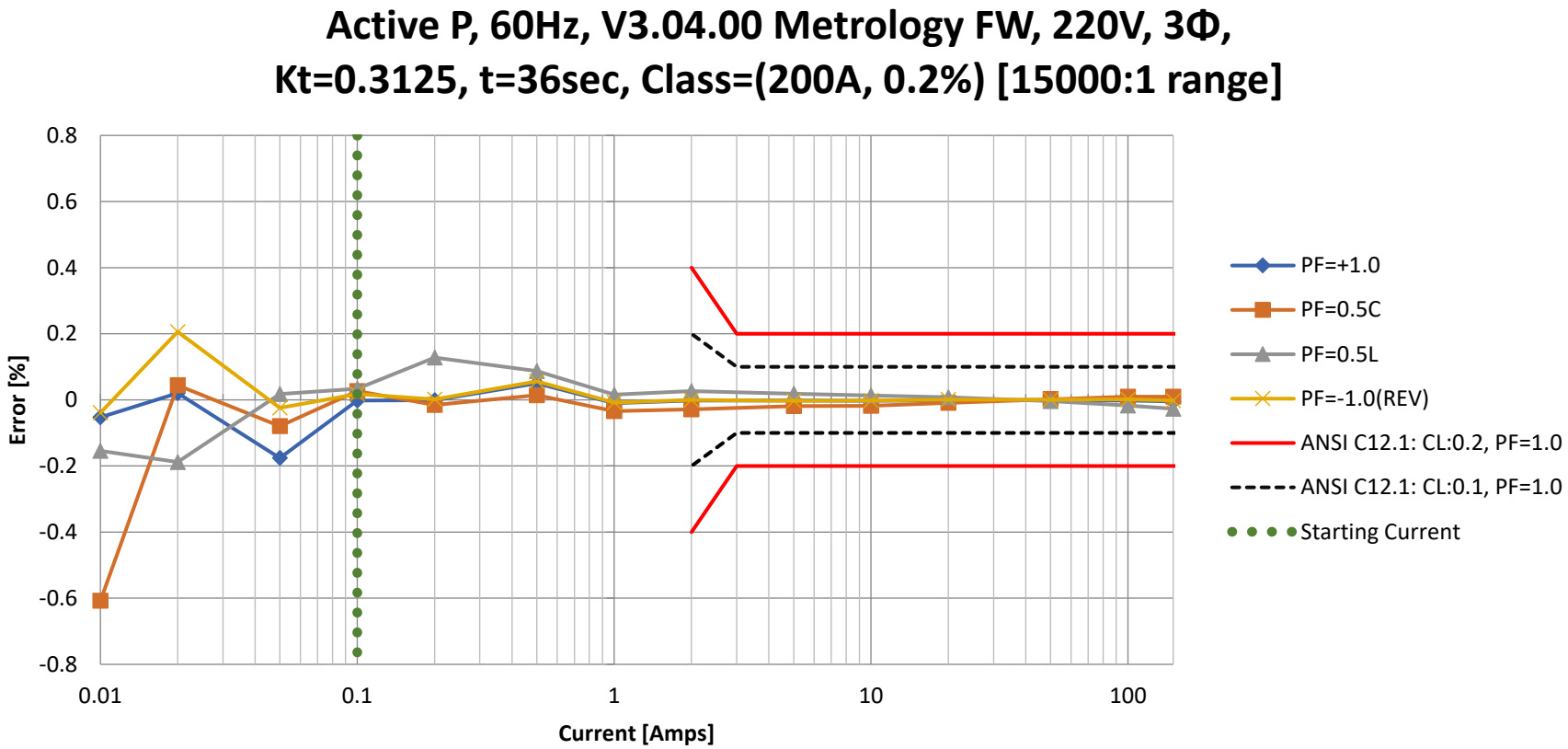


Active Power offset enabled (0.03Wh/cycle).
Meter scaled to 240A. Integration period: 1 second.

MICROCHIP

Active Power Load Curves

PIC32CXMTC-Rev2. 60Hz.

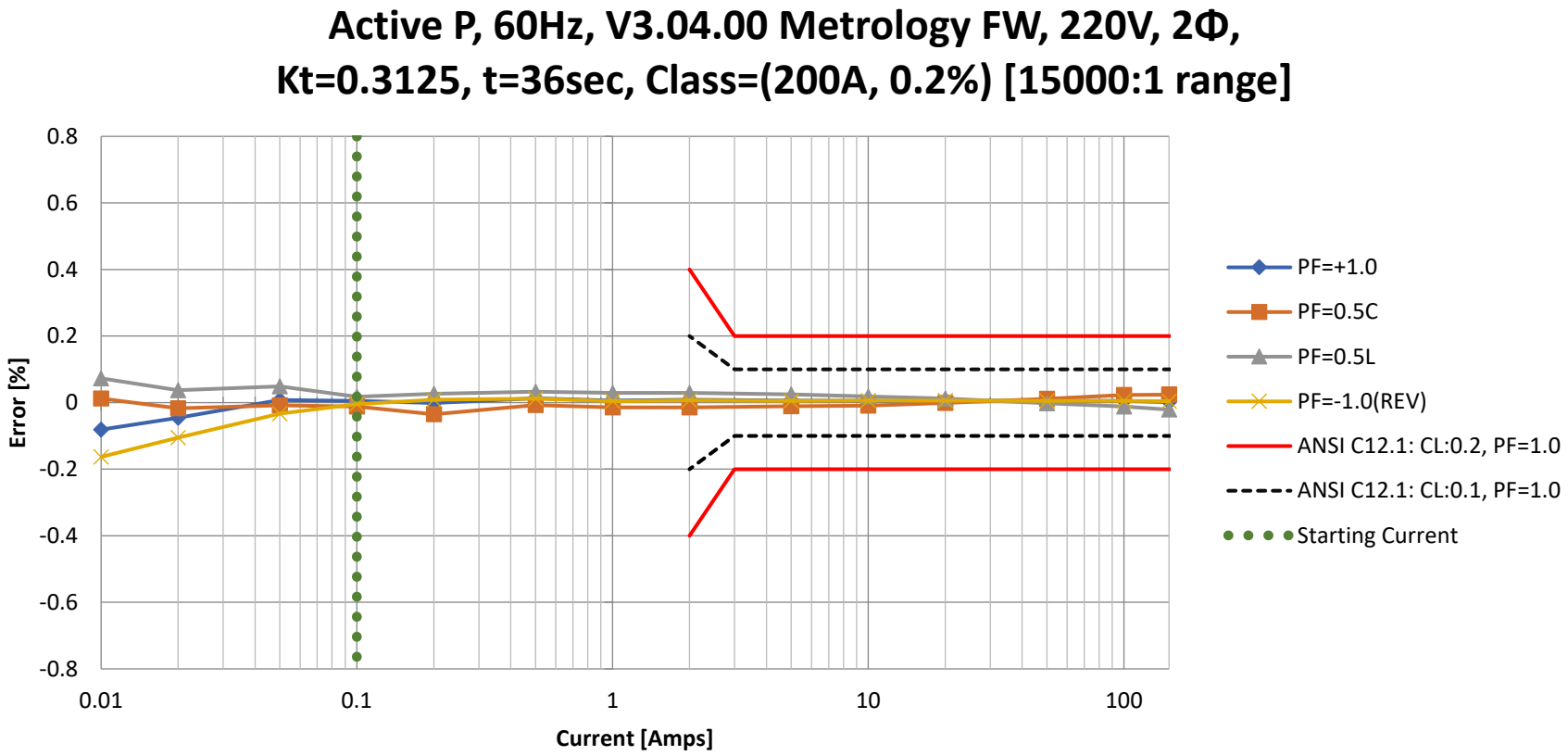


Active Power offset enabled (0.01Wh/cycle).
Meter scaled to 240A. Integration period: 1 second.

MICROCHIP

Active Power Load Curves

PIC32CXMTC-Rev2 + MCP3912 (flying wires). 60Hz.

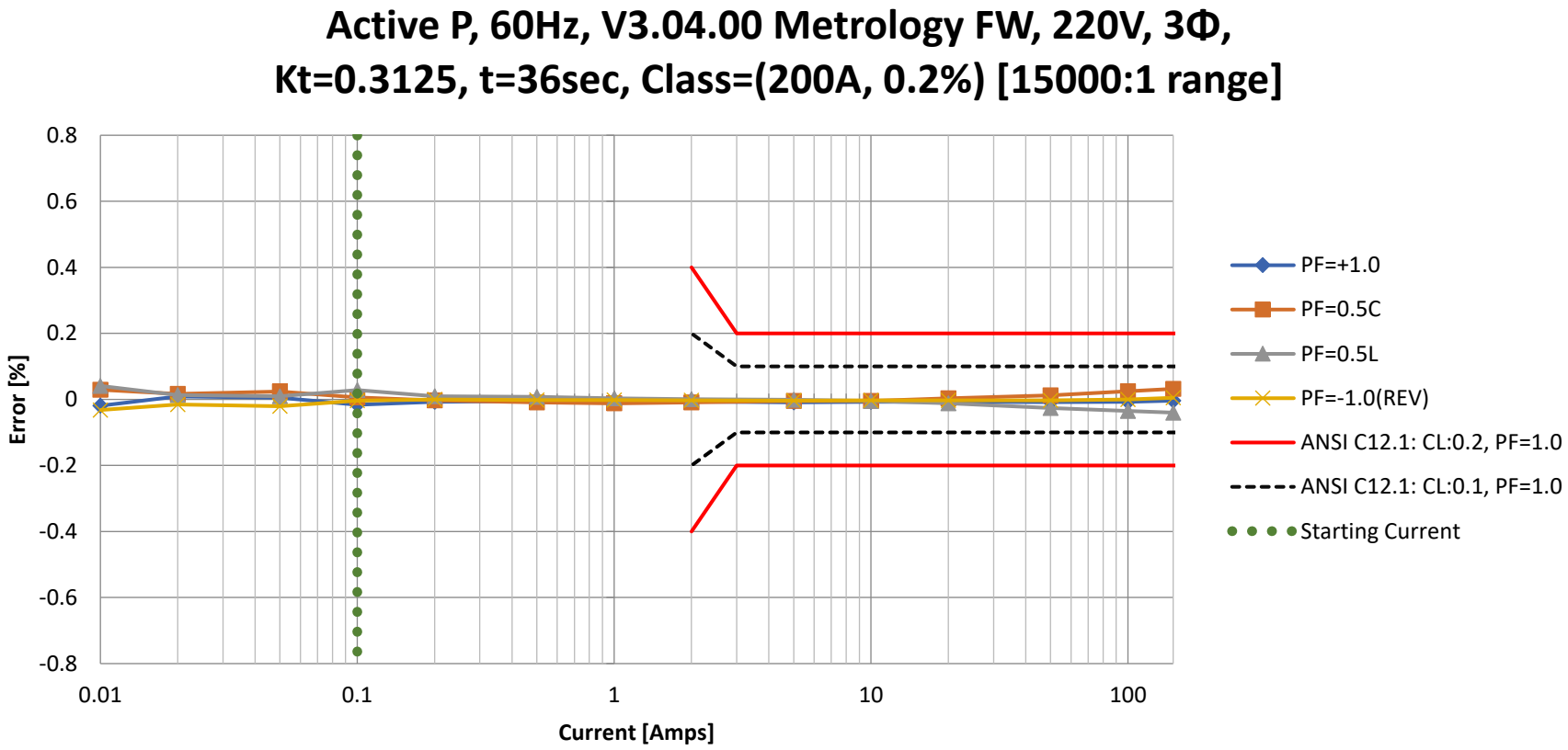


Active Power offset enabled (0.02Wh/cycle).
Meter scaled to 260A. Integration period: 1 second.

MICROCHIP

Active Power Load Curves

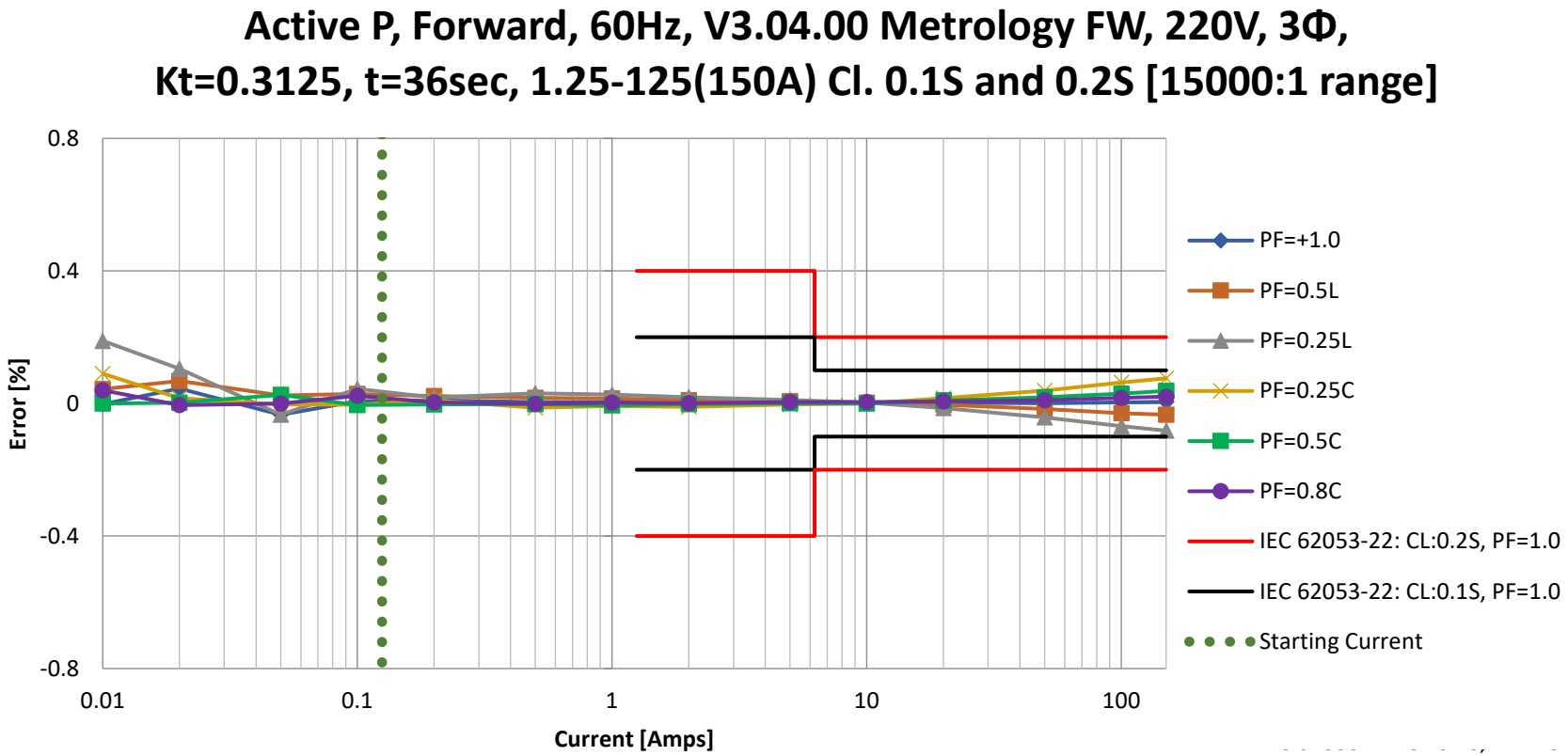
PIC32CXMTC (Multichannel board) + MCP3914. 60Hz.



Active Power offset enabled (0.009Wh/cycle).
Meter scaled to 260A. Integration period: 1 second.

IEC Active Power Load Curves

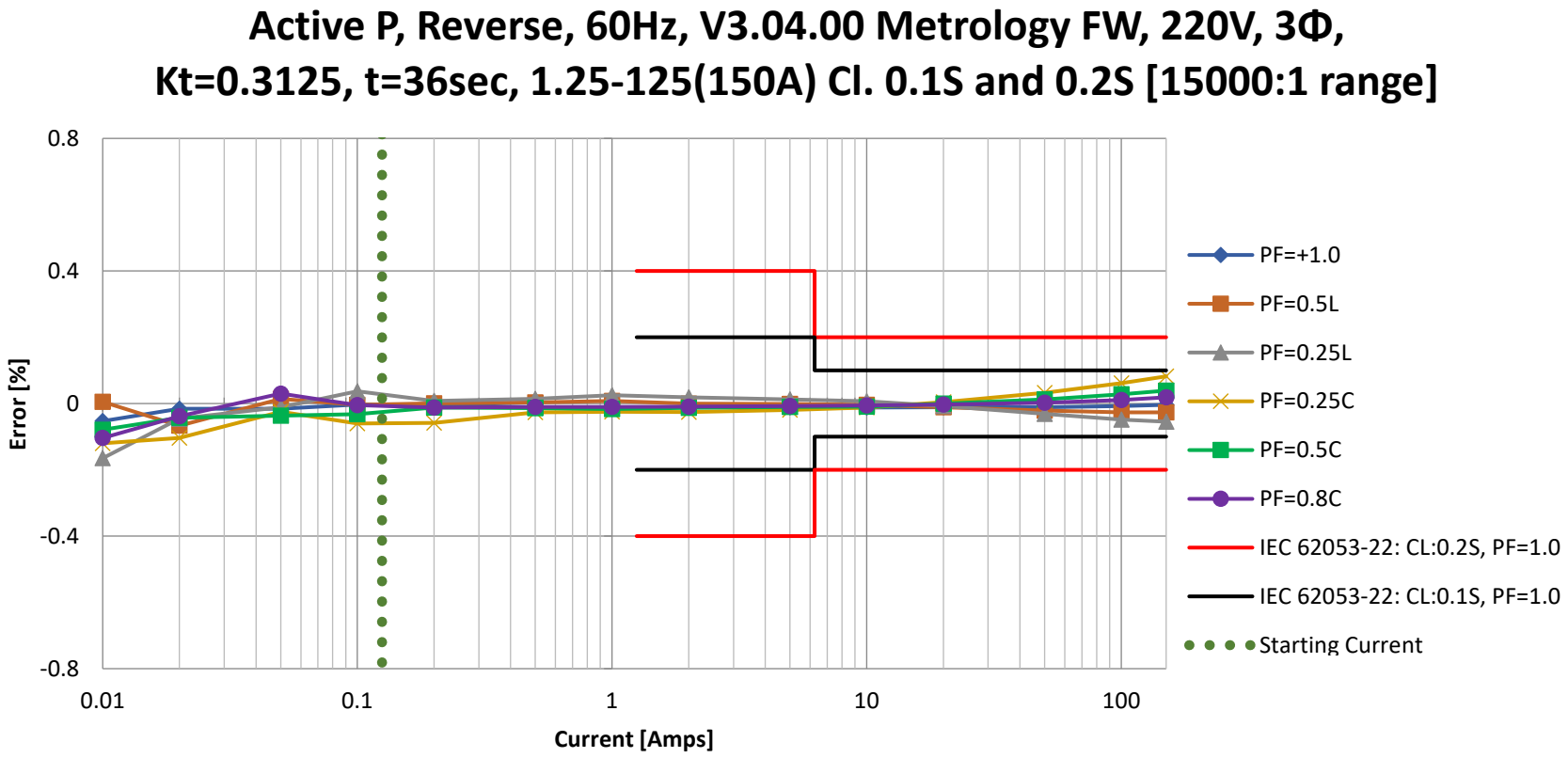
PIC32CXMTC (Multichannel board) + MCP3914. 60Hz. Forward.



Active Power offset enabled (0.009Wh/cycle).
Meter scaled to 260A. Integration period: 1 second.

IEC Active Power Load Curves

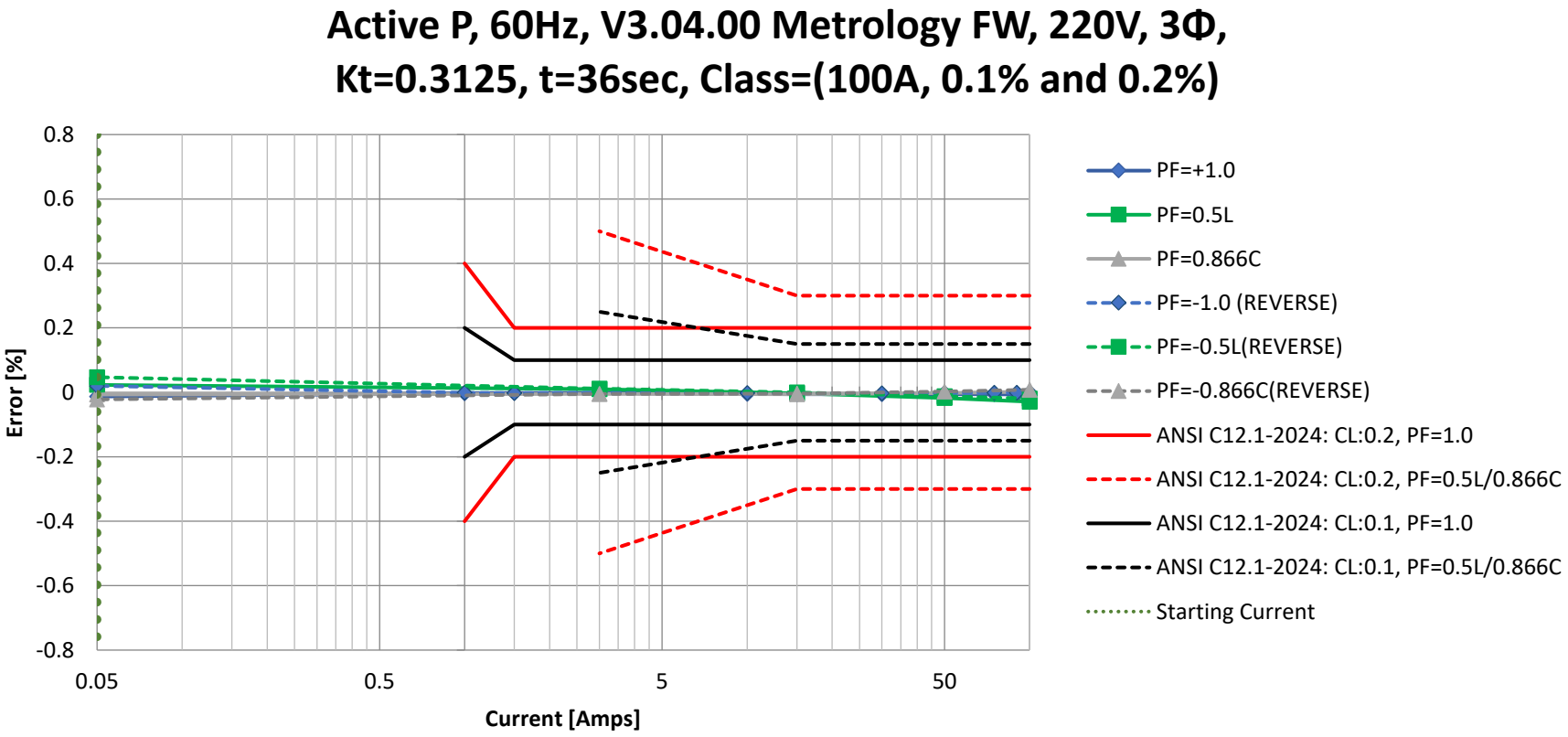
PIC32CXMTC (Multichannel board) + MCP3914. 60Hz. Reverse.



Active Power offset enabled (0.009Wh/cycle).
Meter scaled to 260A. Integration period: 1 second.

ANSI Active Power Load Curves

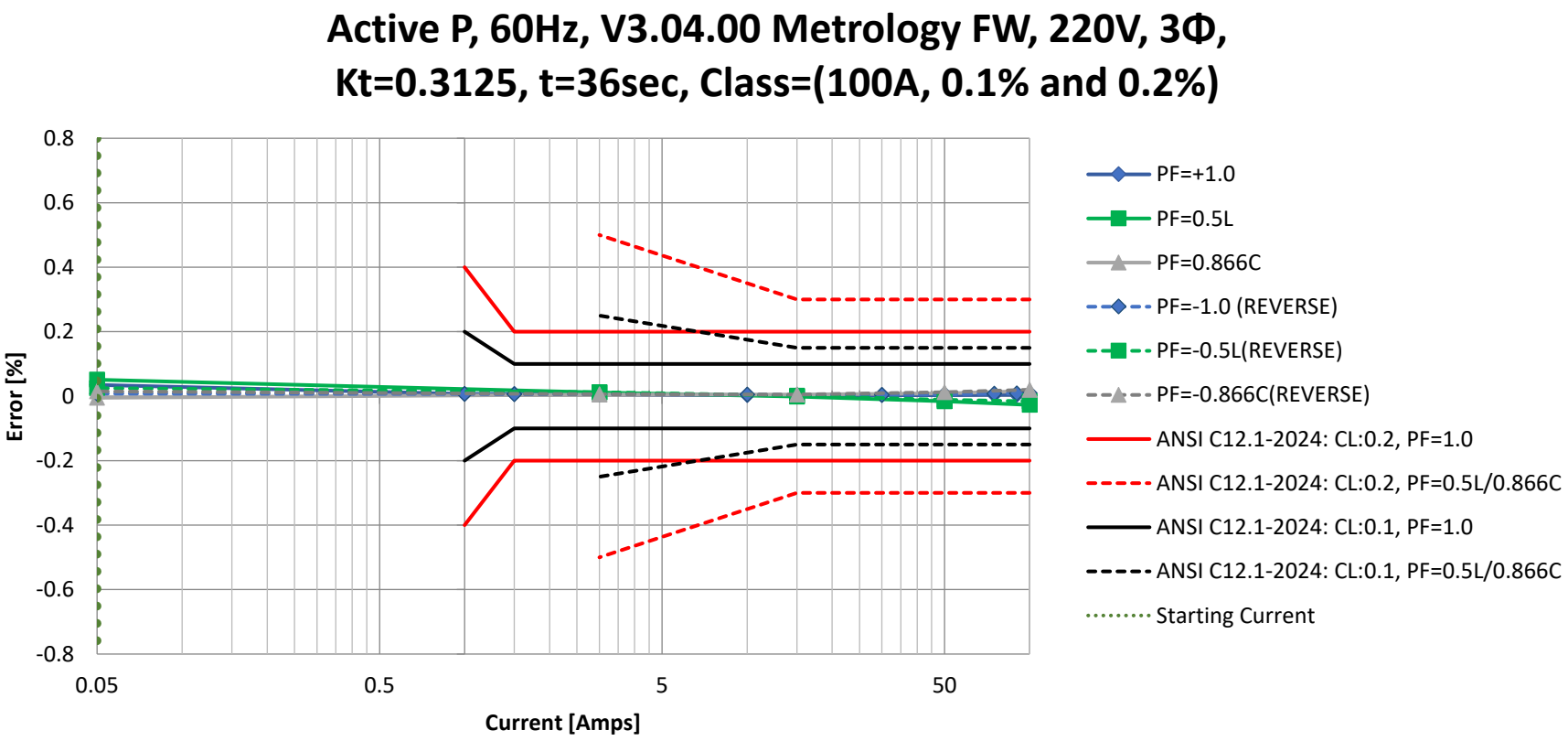
PIC32CXMTC (Multichannel board) + MCP3913. 60Hz.



Active Power offset enabled (-0.024Wh/cycle).
Meter scaled to 260A. Integration period: 1 second.

ANSI Active Power Load Curves (new test)

PIC32CXMTC (Multichannel board) + MCP3914. 60Hz.



Active Power offset enabled (0.009Wh/cycle).
Meter scaled to 260A. Integration period: 1 second.

IEC Active Power Repeatability

K_t=0.3125, 36 seconds

- The application of the same signal to be measured shall result in the close agreement of successive measurements.
- Five measurements are conducted at each test point listed under the "PF" and "CURRENT" columns.
- "AVG" denotes the average error calculated from the five measurements, while "MIN" and "MAX" represent the minimum and maximum errors observed among these measurements.

LIMITS		
0.1S	**0.2S**	**0.5S**
0.04%	0.04%	0.10%

ACTIVE POWER. PIC32CXMTSH, 50Hz					
PF	**CURRENT (A)**	**AVG (%)**	**MIN (%)**	**MAX (%)**	**MAX-MIN (%)**
PF1	150	0.0008	0	0.001	0.001
	125	0.0012	0.001	0.002	0.001
	30	0.0074	0.006	0.009	0.003
	6.25	0.0068	0.005	0.008	0.003
	3	0.0066	0.005	0.009	0.004
	1.5	-0.0018	-0.006	0.001	0.007
	1.25	-0.0072	-0.009	-0.006	0.003
PF0.5L	150	-0.0336	-0.035	-0.032	0.003
	6.25	0.0158	0.013	0.018	0.005
	3	0.0176	0.013	0.024	0.011
PF0.8L	150	-0.018	-0.019	-0.017	0.002
	6.25	0.0068	0.006	0.009	0.003
	3	0.0064	0.004	0.013	0.009
PF0.5C	150	0.0304	0.026	0.034	0.008
	6.25	-0.006	-0.011	-0.002	0.009
	3	-0.0118	-0.016	-0.008	0.008
PF0.8C	150	0.0132	0.01	0.016	0.006
	6.25	0.0014	0.001	0.002	0.001
	3	-0.0026	-0.008	0.002	0.01

ACTIVE POWER. PIC32CXMTC, 50Hz					
PF	**CURRENT (A)**	**AVG (%)**	**MIN (%)**	**MAX (%)**	**MAX-MIN (%)**
PF1	150	-0.0086	-0.009	-0.008	0.001
	125	-0.007	-0.007	-0.007	0
	30	-0.0028	-0.004	-0.001	0.003
	6.25	-0.0038	-0.005	-0.003	0.002
	3	-0.0008	-0.002	0.001	0.003
	1.5	0.0004	-0.003	0.003	0.006
	1.25	-0.001	-0.003	0.001	0.004
PF0.5L	150	-0.0358	-0.037	-0.035	0.002
	6.25	0.0166	0.014	0.018	0.004
	3	0.0252	0.022	0.029	0.007
PF0.8L	150	-0.0196	-0.02	-0.019	0.001
	6.25	0.0052	0.004	0.006	0.002
	3	0.0088	0.007	0.01	0.003
PF0.5C	150	0.0134	0.013	0.014	0.001
	6.25	-0.0202	-0.022	-0.019	0.003
	3	-0.0214	-0.024	-0.018	0.006
PF0.8C	150	0.0016	0.001	0.002	0.001
	6.25	-0.0108	-0.011	-0.01	0.001
	3	-0.0092	-0.011	-0.008	0.003

ACTIVE POWER. PIC32CXMTC + MCP3912, 50Hz					
PF	**CURRENT (A)**	**AVG (%)**	**MIN (%)**	**MAX (%)**	**MAX-MIN (%)**
PF1	150	0.0064	0.005	0.008	0.003
	125	0.0062	0.003	0.009	0.006
	30	0.0068	0.006	0.008	0.002
	6.25	0.0106	0.007	0.012	0.005
	3	0.012	0.01	0.014	0.004
	1.5	0.0154	0.014	0.018	0.004
	1.25	0.0128	0.011	0.015	0.004
PF0.5L	150	-0.0242	-0.03	-0.022	0.008
	6.25	0.0316	0.029	0.033	0.004
	3	0.037	0.034	0.041	0.007
PF0.8L	150	-0.0074	-0.008	-0.006	0.002
	6.25	0.018	0.014	0.023	0.009
	3	0.02	0.015	0.023	0.008
PF0.5C	150	0.0306	0.023	0.036	0.013
	6.25	-0.0128	-0.018	-0.005	0.013
	3	-0.0142	-0.02	-0.008	0.012
PF0.8C	150	0.016	0.015	0.018	0.003
	6.25	-0.0034	-0.005	-0.001	0.004
	3	-0.0032	-0.006	0.001	0.007

IEC Active Power Repeatability

K_t=0.3125, 36 seconds

- The application of the same signal to be measured shall result in the close agreement of successive measurements.
- Five measurements are conducted at each test point listed under the "PF" and "CURRENT" columns.
- "AVG" denotes the average error calculated from the five measurements, while "MIN" and "MAX" represent the minimum and maximum errors observed among these measurements.

LIMITS		
0.1S	**0.2S**	**0.5S**
0.04%	0.04%	0.10%

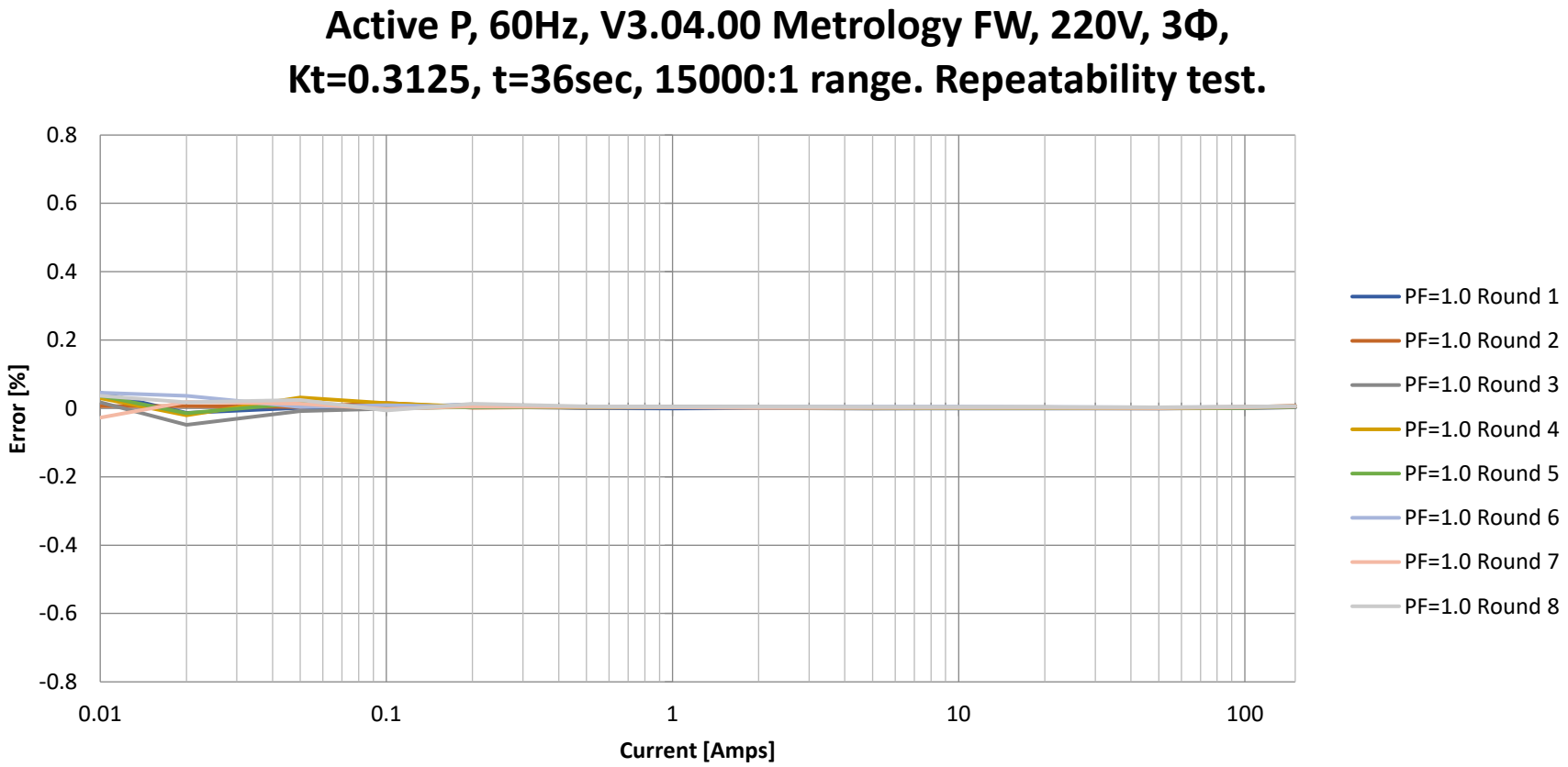
ACTIVE POWER, MCP3914, 50Hz					
PF	**CURRENT (A)**	**AVG (%)**	**MIN (%)**	**MAX (%)**	**MAX-MIN (%)**
PF1	150	-0.0016	-0.004	0.002	0.006
	125	-0.0036	-0.004	-0.003	0.001
	30	0.0006	-0.002	0.003	0.005
	6.25	0.0002	-0.003	0.003	0.006
	3	0.0012	-0.004	0.007	0.011
	1.5	0.0036	-0.004	0.014	0.018
	1.25	0.008	-0.001	0.015	0.016
PF0.5L	150	-0.0444	-0.045	-0.044	0.001
	6.25	0.0048	0	0.011	0.011
	3	0.0126	0.001	0.02	0.019
PF0.8L	150	-0.0204	-0.021	-0.02	0.001
	6.25	0.0034	0.001	0.006	0.005
	3	0.0072	-0.001	0.013	0.014
PF0.5C	150	0.034	0.032	0.037	0.005
	6.25	-0.0036	-0.007	0	0.007
	3	-0.0012	-0.016	0.005	0.021
PF0.8C	150	0.0134	0.012	0.015	0.003
	6.25	-0.0008	-0.004	0.002	0.006
	3	-0.002	-0.007	0.003	0.01

ACTIVE POWER, MULTICHANNEL + MCP3914, 50Hz					
PF	**CURRENT (A)**	**AVG (%)**	**MIN (%)**	**MAX (%)**	**MAX-MIN (%)**
PF1	150	-0.0002	-0.002	0.001	0.003
	125	-0.001	-0.002	0	0.002
	30	-0.0046	-0.006	-0.002	0.004
	6.25	-0.0034	-0.007	-0.002	0.005
	3	-0.0022	-0.003	0	0.003
	1.5	-0.0014	-0.004	0.001	0.005
	1.25	0.0014	-0.002	0.005	0.007
PF0.5L	150	-0.041	-0.043	-0.039	0.004
	6.25	0.0034	0.001	0.005	0.004
	3	0.0076	0.004	0.012	0.008
PF0.8L	150	-0.0166	-0.019	-0.013	0.006
	6.25	0.0004	-0.002	0.002	0.004
	3	0.0042	0.002	0.006	0.004
PF0.5C	150	0.036	0.034	0.038	0.004
	6.25	-0.0058	-0.007	-0.004	0.003
	3	-0.009	-0.011	-0.007	0.004
PF0.8C	150	0.0172	0.016	0.019	0.003
	6.25	-0.004	-0.008	-0.002	0.006
	3	-0.0042	-0.006	-0.002	0.004

ACTIVE POWER, MULTICHANNEL + MCP3914, 60Hz					
PF	**CURRENT (A)**	**AVG (%)**	**MIN (%)**	**MAX (%)**	**MAX-MIN (%)**
PF1	150	0.0012	-0.001	0.005	0.006
	125	-0.0004	-0.001	0	0.001
	30	-0.0028	-0.004	-0.002	0.002
	6.25	-0.0018	-0.003	-0.001	0.002
	3	0	-0.001	0.001	0.002
	1.5	-0.0004	-0.001	0.001	0.002
	1.25	0.0004	-0.002	0.003	0.005
PF0.5L	150	-0.0358	-0.037	-0.035	0.002
	6.25	0.0018	0.001	0.002	0.001
	3	0.0064	0.006	0.007	0.001
PF0.8L	150	-0.013	-0.014	-0.012	0.002
	6.25	0.0018	0.001	0.002	0.001
	3	0.0048	0.004	0.005	0.001
PF0.5C	150	0.0358	0.035	0.037	0.002
	6.25	-0.0004	-0.001	0	0.001
	3	-0.0034	-0.004	-0.003	0.001
PF0.8C	150	0.0184	0.018	0.02	0.002
	6.25	0.0008	0	0.001	0.001
	3	0.0002	-0.001	0.001	0.002

Active Power Repeatability

PIC32CXMTC (Multichannel board) + MCP3914. 60Hz.

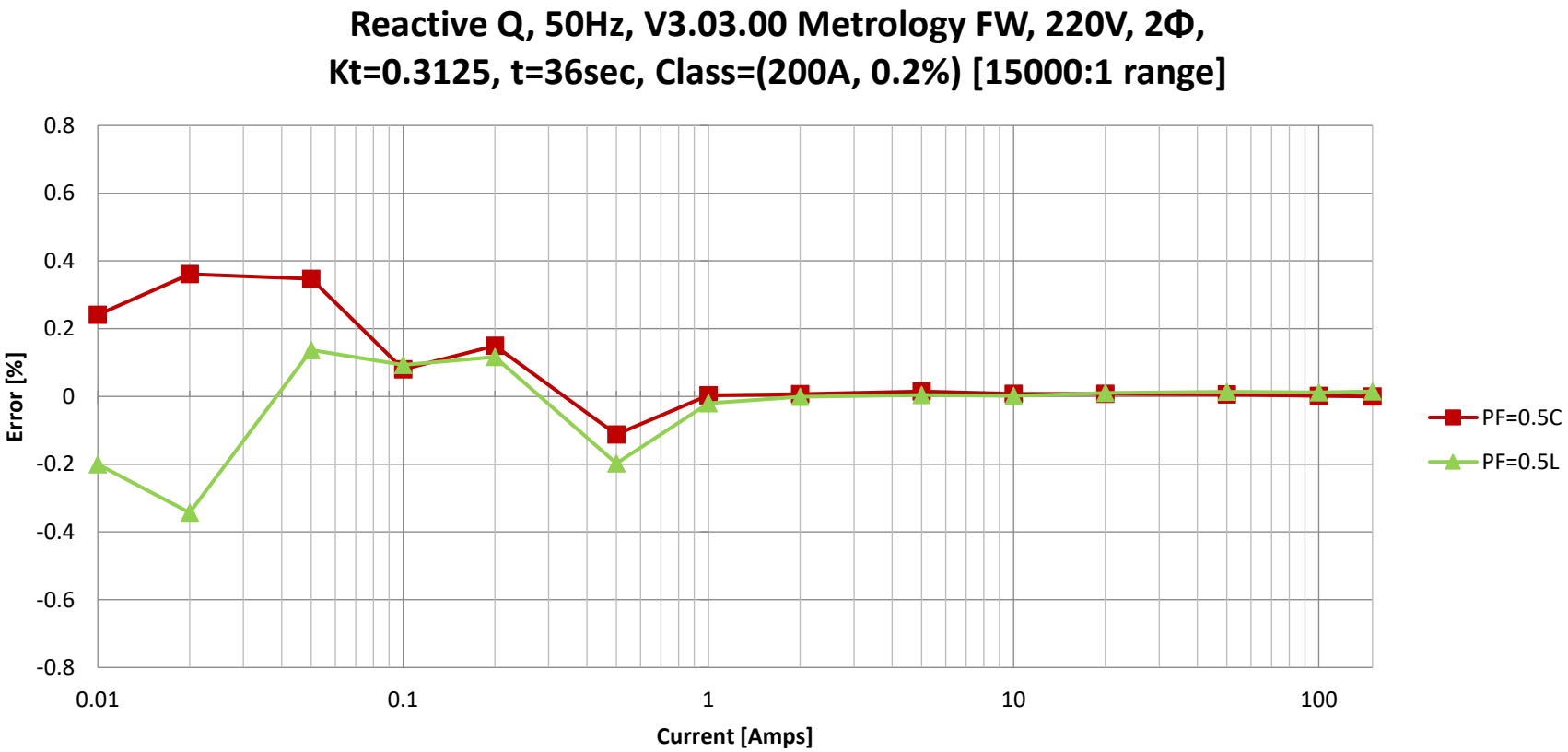


Active Power offset enabled (0.009Wh/cycle).
Meter scaled to 260A. Integration period: 1 second.

MICROCHIP

Reactive Power Load Curves

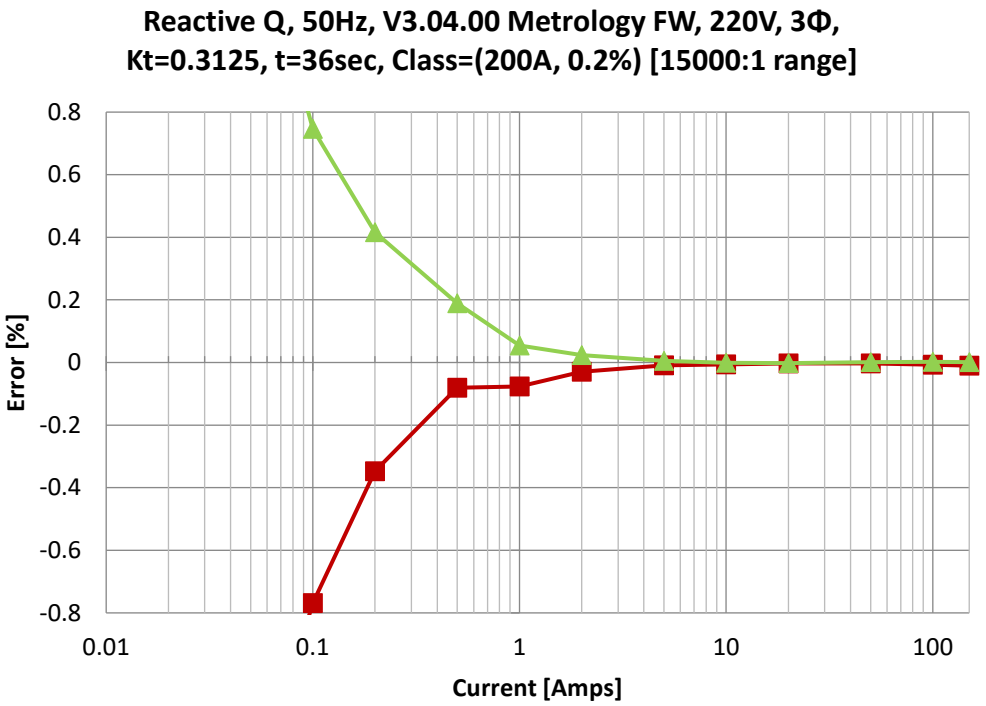
PIC32CXMTSH-Rev2. 50Hz.



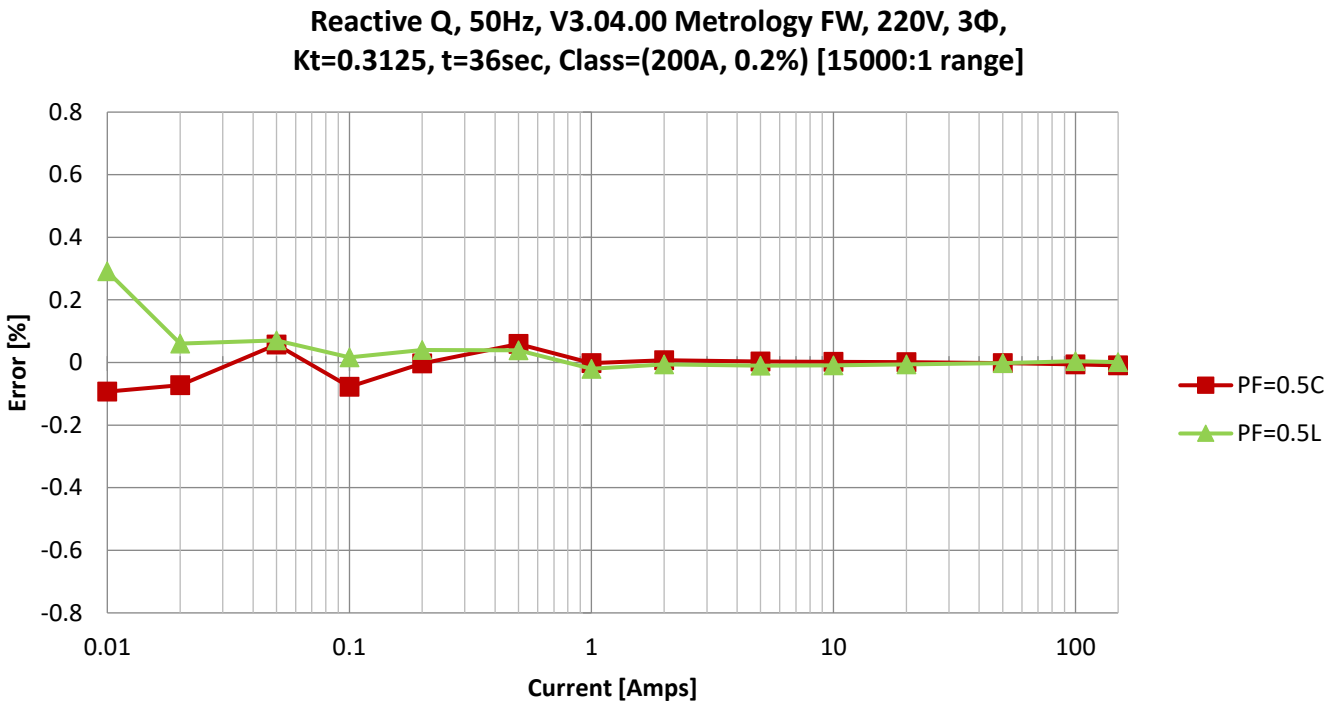
Reactive Power offset disabled.
Meter scaled to 240A. Integration period: 1 second.

Reactive Power Load Curves

PIC32CXMTC-Rev2. 50Hz.



Reactive Power offset disabled.
Meter scaled to 240A. Integration period: 1 second.

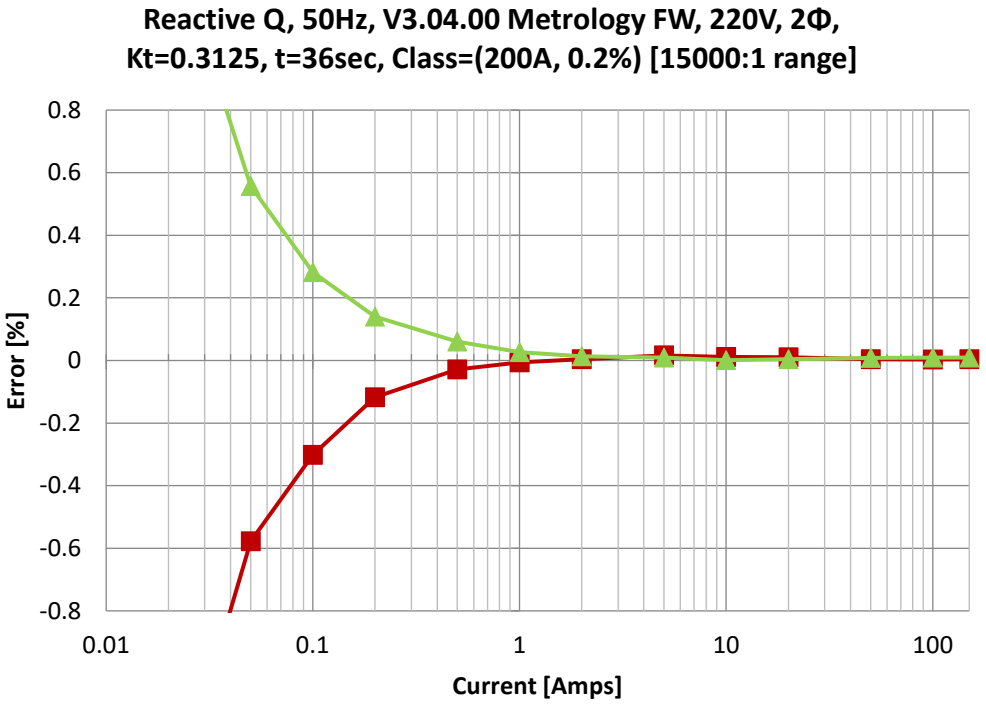


Reactive Power offset enabled and set to 0.412Varh/Cycle.
Meter scaled to 240A. Integration period: 1 second.

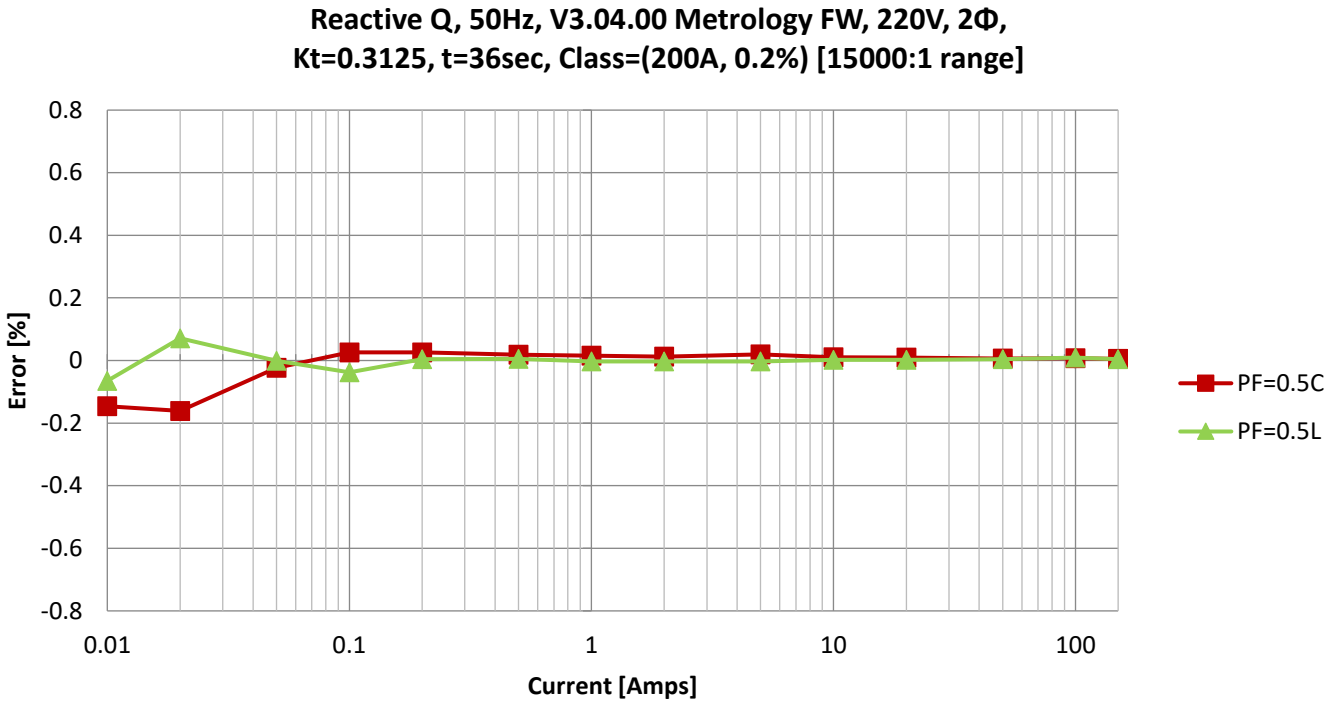
MICROCHIP

Reactive Power Load Curves

PIC32CXMTC-Rev2 + MCP3912 (flying wires). 50Hz.



Reactive Power offset disabled.
Meter scaled to 260A. Integration period: 1 second.

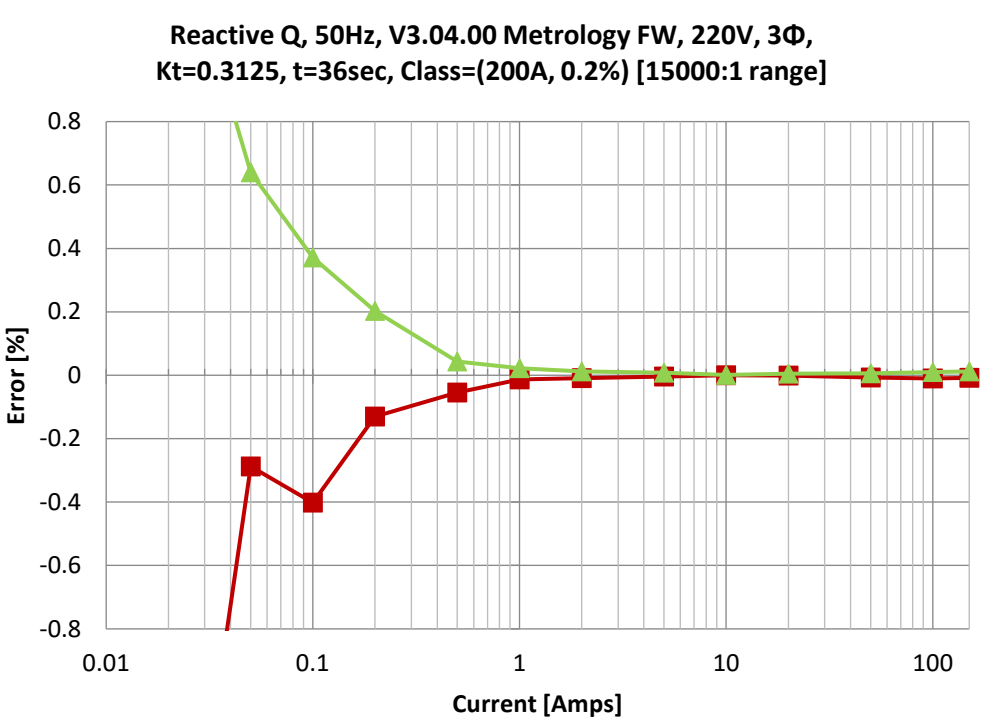


Reactive Power offset enabled and set to 0.108Varh/Cycle.
Meter scaled to 260A. Integration period: 1 second.

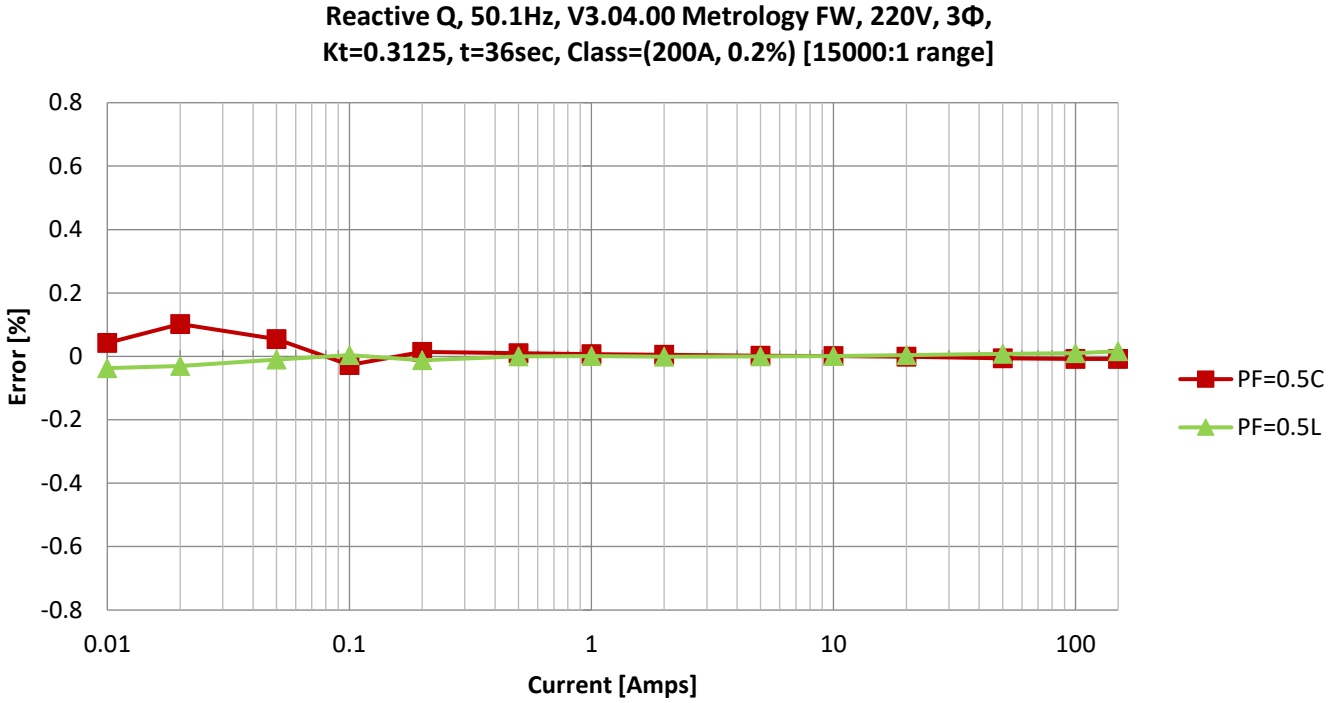
MICROCHIP

Reactive Power Load Curves

PIC32CXMTC (Multichannel board) + MCP3913. 50Hz.



Reactive Power offset disabled.
Meter scaled to 260A. Integration period: 1 second.

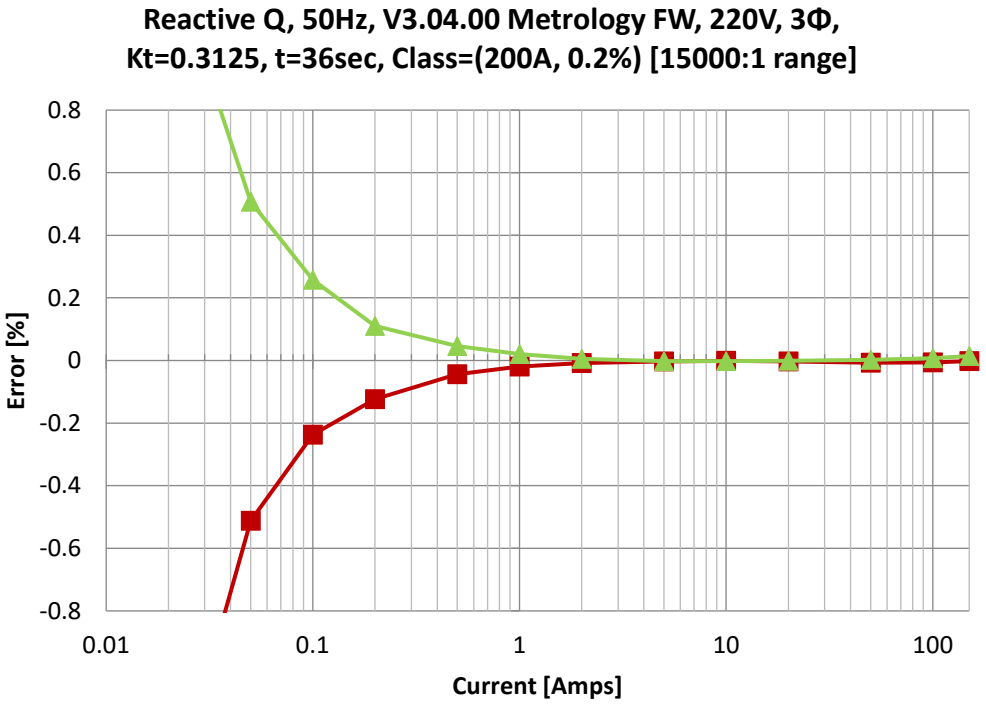


Reactive Power offset enabled and set to 0.149Varh/Cycle.
Meter scaled to 260A. Integration period: 1 second.

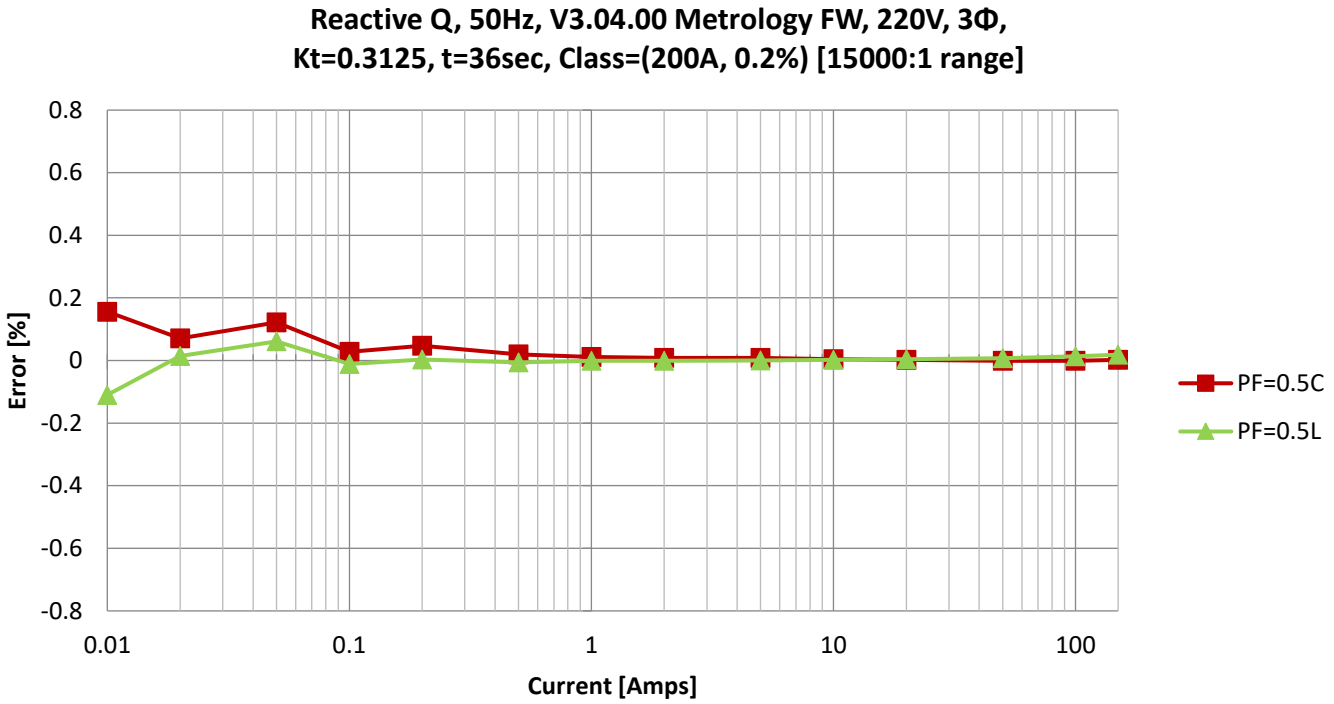
MICROCHIP

Reactive Power Load Curves

PIC32CXMTC (Multichannel board) + MCP3914. 50Hz.



Reactive Power offset disabled.
Meter scaled to 260A. Integration period: 1 second.

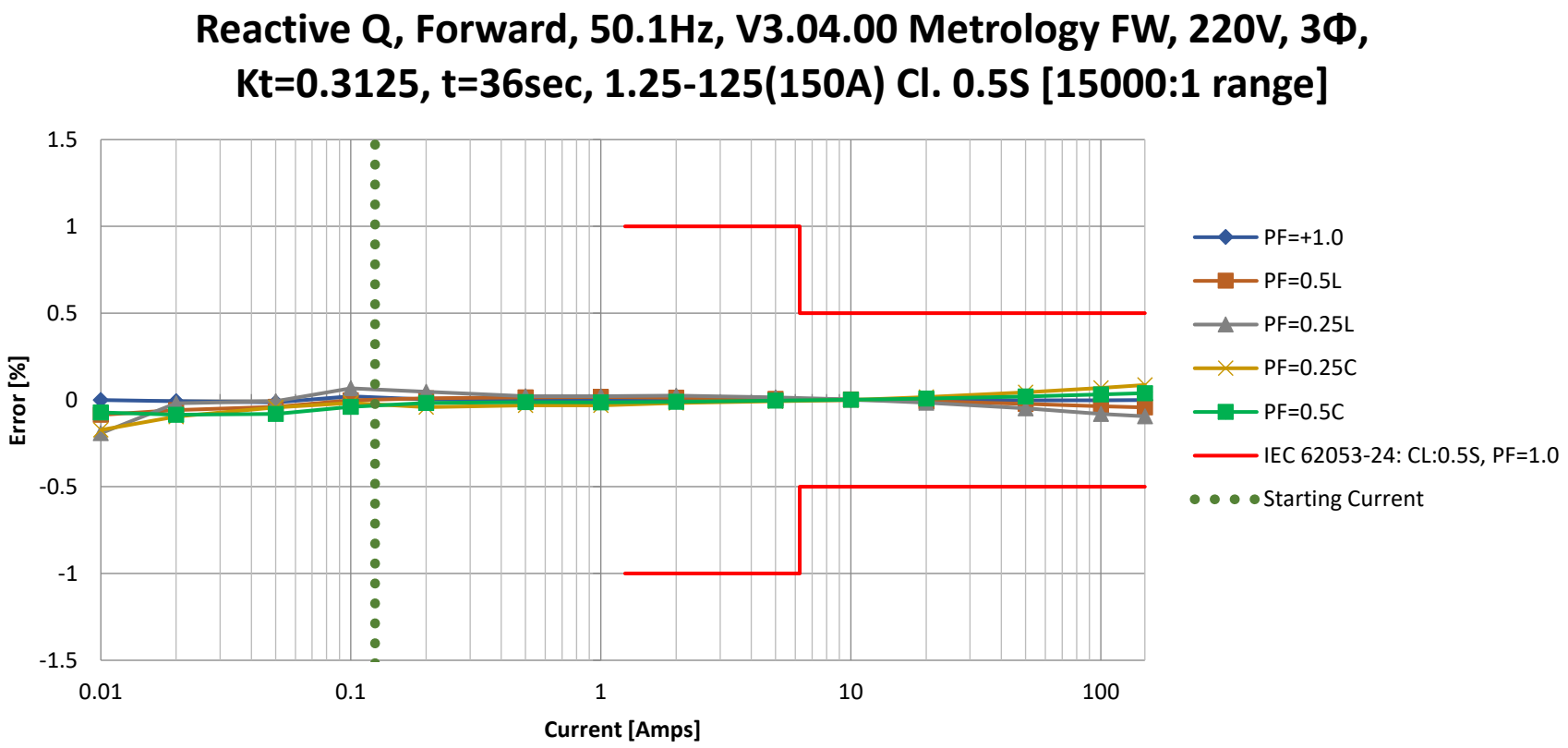


Reactive Power offset enabled and set to -0.156Varh/Cycle.
Meter scaled to 260A. Integration period: 1 second.

MICROCHIP

IEC Reactive Power Load Curves

PIC32CXMTC (Multichannel board) + MCP3913. 50Hz.

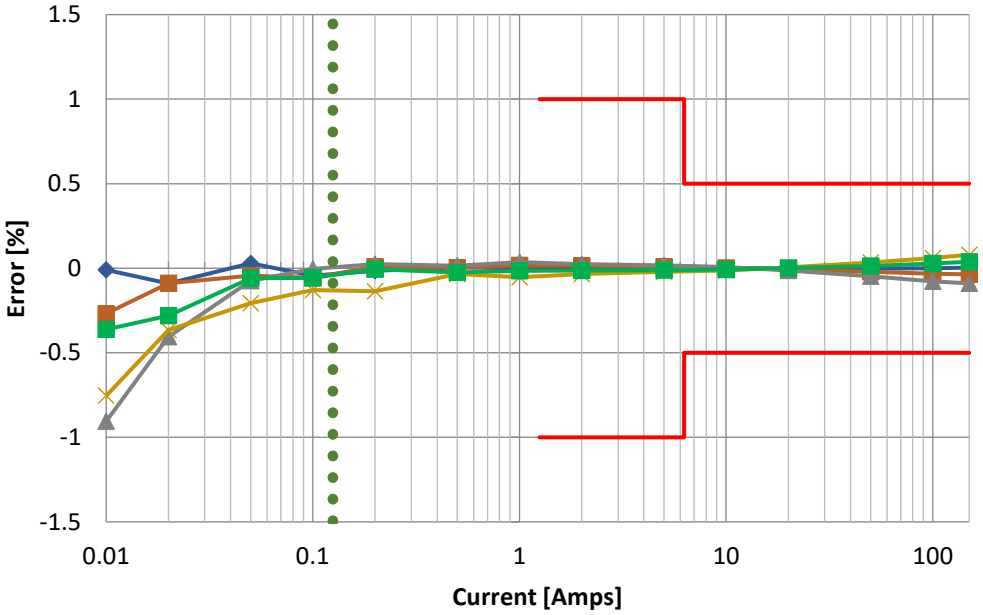


Reactive Power offset enabled and set to 0.149Varh/Cycle.
Meter scaled to 260A. Integration period: 1 second.

IEC Reactive Power Load Curves

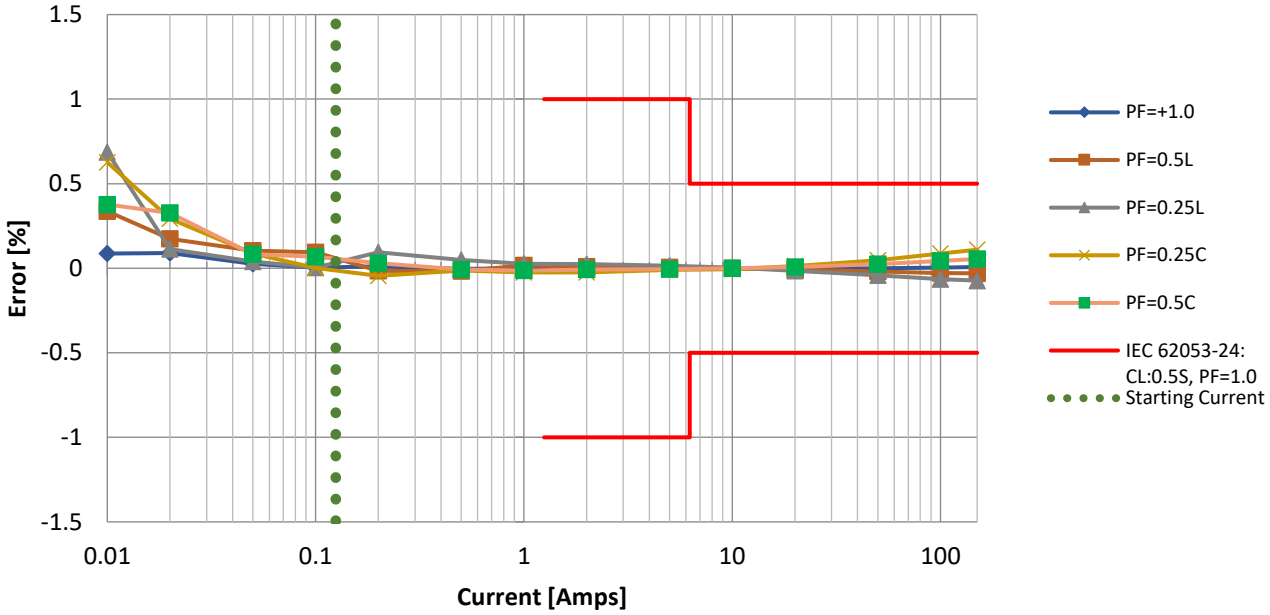
PIC32CXMTC (Multichannel board) + MCP3914. 50Hz.

Reactive Q, Forward, 50Hz, V3.04.00 Metrology FW, 220V, 3Φ, Kt=0.3125, t=36sec, 1.25-125(150A) Cl. 0.5S [15000:1 range]



Reactive Power offset enabled and set to -0.156Varh/Cycle.
Meter scaled to 260A. Integration period: 1 second.

Reactive Q, Reverse, 50Hz, V3.04.00 Metrology FW, 220V, 3Φ, Kt=0.3125, t=36sec, 1.25-125(150A) Cl. 0.5S [15000:1 range]



Reactive Power offset enabled and set to -0.156Varh/Cycle.
Meter scaled to 260A. Integration period: 1 second.

MICROCHIP

IEC Reactive Power Repeatability

50Hz, K_t=0.3125, 36 seconds

- The application of the same signal to be measured shall result in the close agreement of successive measurements.
- Five measurements are conducted at each test point listed under the "PF" and "CURRENT" columns.
- "AVG" denotes the average error calculated from the five measurements, while "MIN" and "MAX" represent the minimum and maximum errors observed among these measurements.

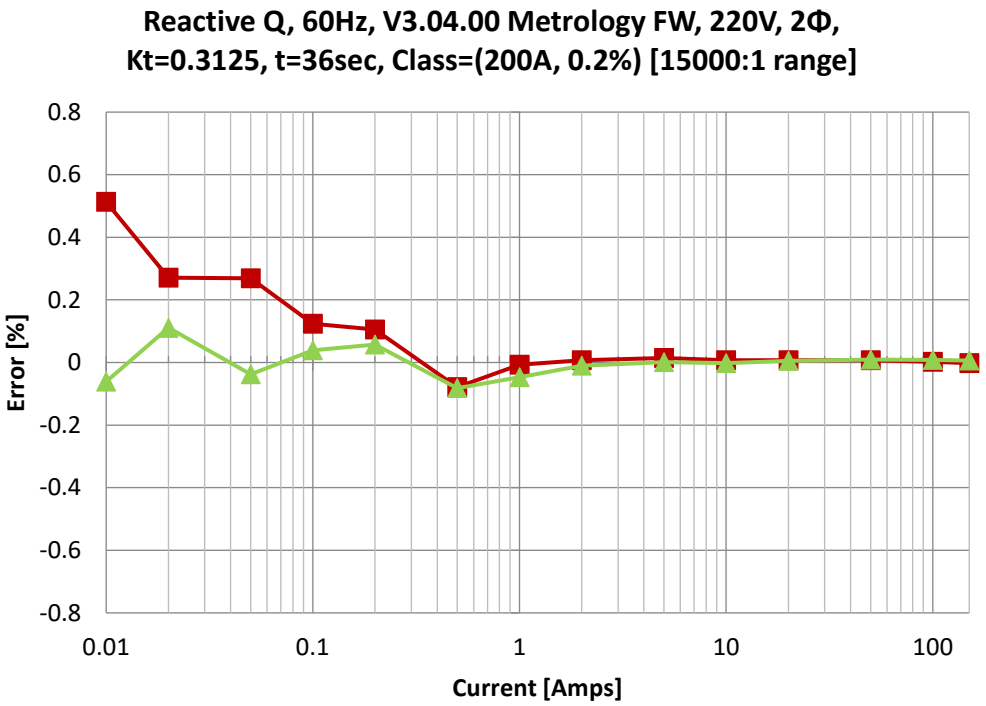
LIMITS		
0.1S	**0.2S**	**0.5S**
0.04%	0.04%	0.10%

PIC32CXMTC+ MCP3914 (MULTICHANNEL BOARD)					
	CURRENT	**AVG**	**MIN**	**MAX**	**MAX-MIN**
PF1	150	0.001	0	0.002	0.002
	125	-0.0014	-0.002	-0.001	0.001
	30	-0.0048	-0.006	-0.003	0.003
	6.25	-0.003	-0.004	-0.002	0.002
	3	-0.0018	-0.002	-0.001	0.001
	1.5	-0.0004	-0.002	0.001	0.003
	1.25	-0.0002	-0.001	-0.038	-0.037
PF0.5L	150	-0.0384	-0.039	-0.038	0.001
	6.25	0.0048	0.003	0.006	0.003
	3	0.0102	0.008	0.013	0.005
PF0.8L	150	-0.0136	-0.014	-0.013	0.001
	6.25	0.0022	0.002	0.003	0.001
	3	0.0036	0.003	0.005	0.002
PF0.5C	150	0.0398	0.039	0.04	0.001
	6.25	-0.0062	-0.007	-0.005	0.002
	3	-0.0102	-0.012	-0.007	0.005
PF0.8C	150	0.0214	0.02	0.022	0.002
	6.25	-0.0016	-0.002	-0.001	0.001
	3	-0.0032	-0.004	-0.002	0.002

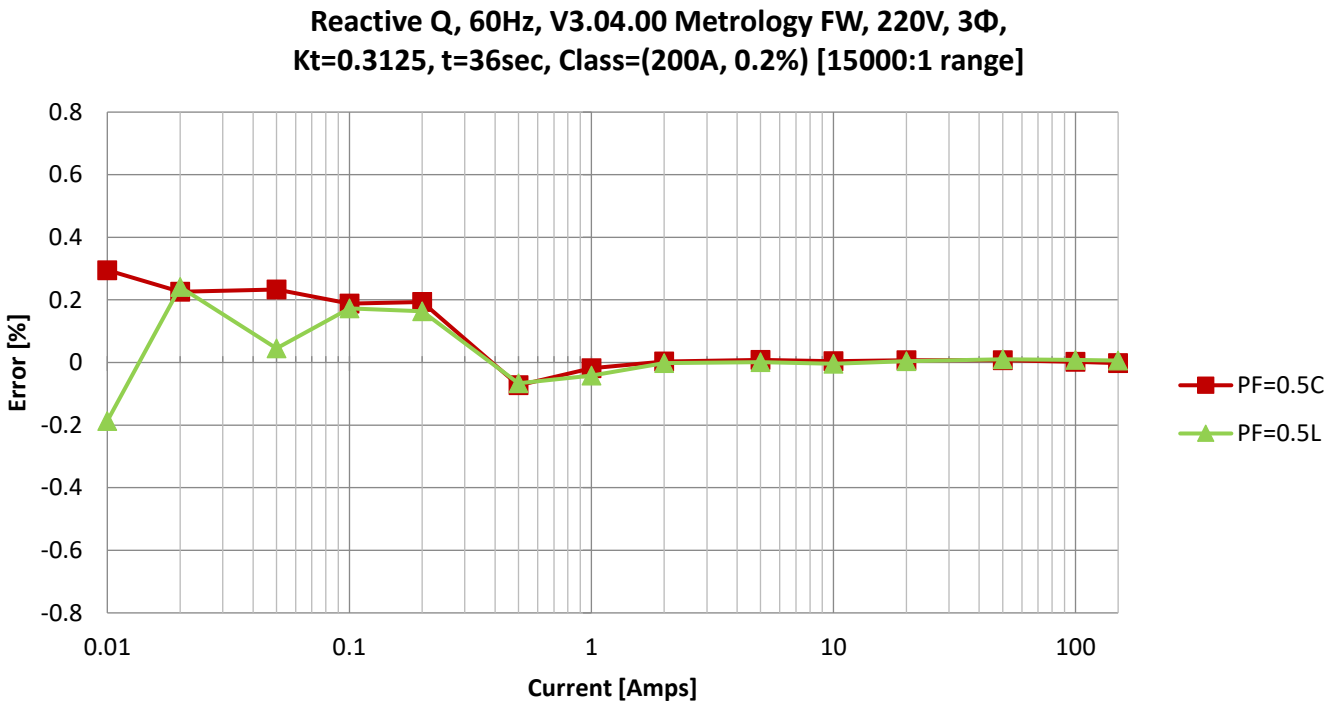
PIC32CXMTC+ MCP3913 (MULTICHANNEL BOARD)					
	CURRENT	**AVG**	**MIN**	**MAX**	**MAX-MIN**
PF1	150	-0.0012	-0.002	0	0.002
	125	-0.0014	-0.002	-0.001	0.001
	30	-0.0002	-0.001	0.001	0.002
	6.25	0.001	0.001	0.001	0
	3	0.0018	0.001	0.002	0.001
	1.5	0.0034	0.003	0.004	0.001
	1.25	0.0048	0.004	-0.041	-0.045
PF0.5L	150	-0.0416	-0.042	-0.041	0.001
	6.25	0.0048	0.001	0.007	0.006
	3	0.011	0.01	0.012	0.002
PF0.8L	150	-0.017	-0.017	-0.017	0
	6.25	0.0044	0.003	0.005	0.002
	3	0.008	0.008	0.008	0
PF0.5C	150	0.0392	0.039	0.04	0.001
	6.25	-0.0016	-0.003	0	0.003
	3	-0.004	-0.005	-0.003	0.002
PF0.8C	150	0.0182	0.017	0.02	0.003
	6.25	0.0004	-0.001	0.001	0.002
	3	0.0006	0	0.001	0.001

Reactive Power Load Curves

PIC32CXMTSH-Rev2. 60Hz.



Reactive Power offset disabled.
Meter scaled to 240A. Integration period: 1 second.

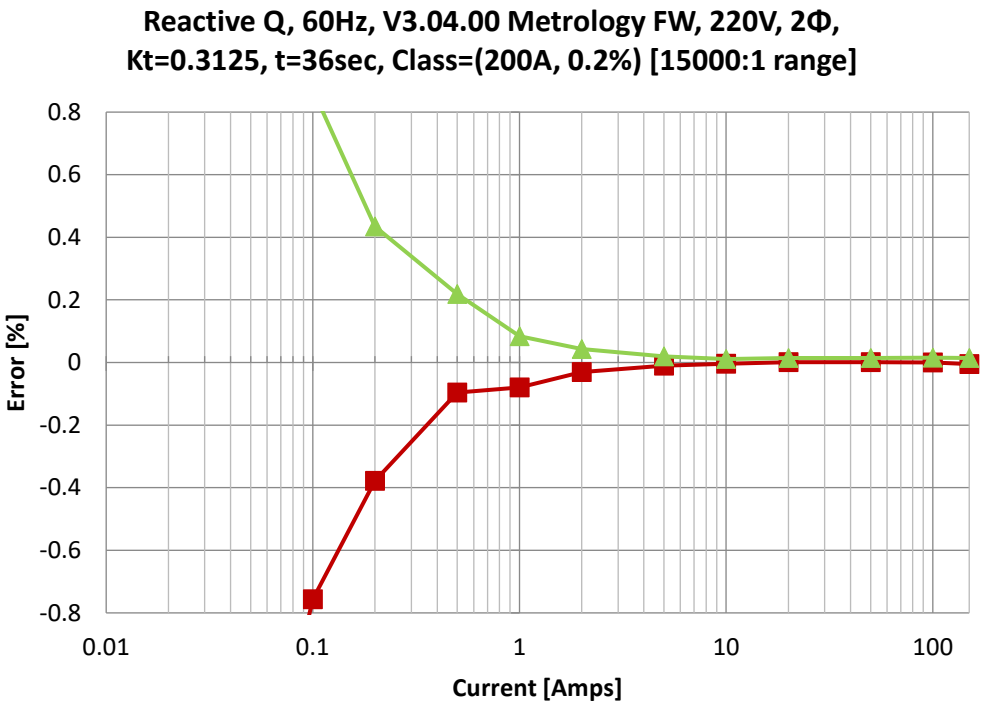


Reactive Power offset enabled and set to -0.009Varh/Cycle.
Meter scaled to 240A. Integration period: 1 second.

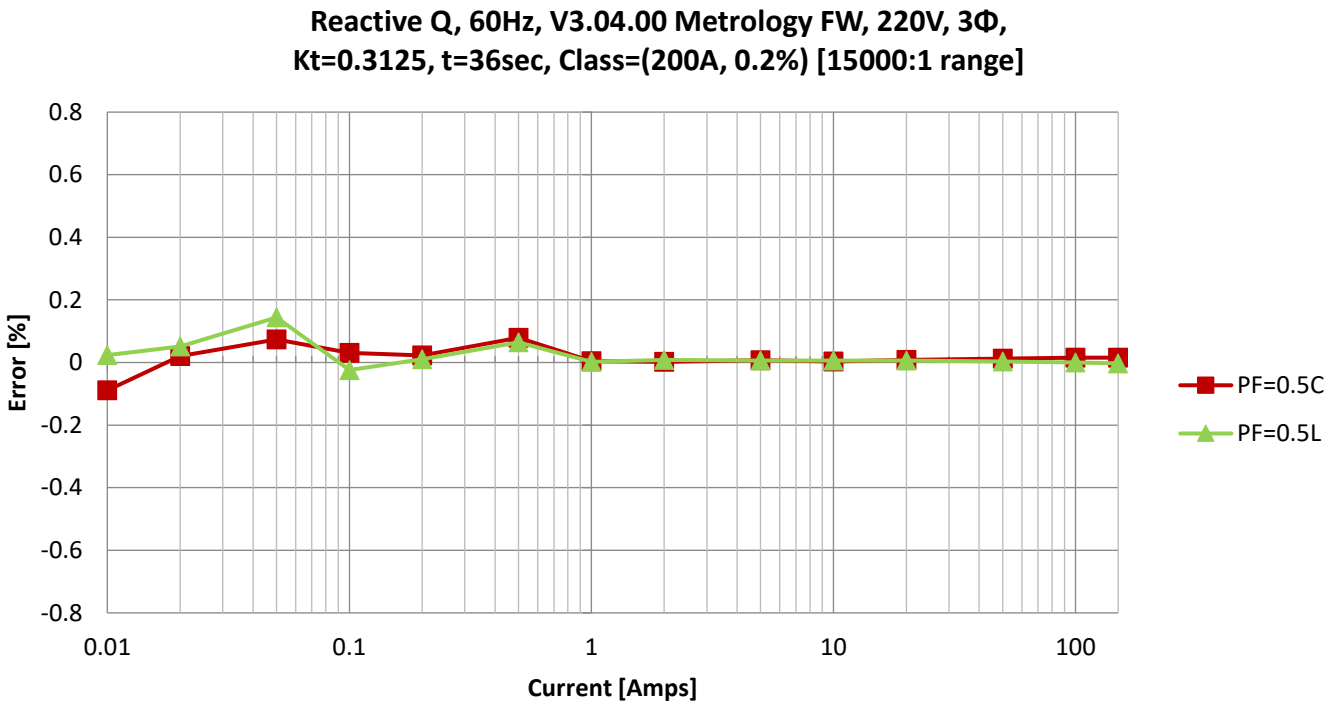
MICROCHIP

Reactive Power Load Curves

PIC32CXMTC-Rev2. 60Hz.



Reactive Power offset disabled.
Meter scaled to 240A. Integration period: 1 second.

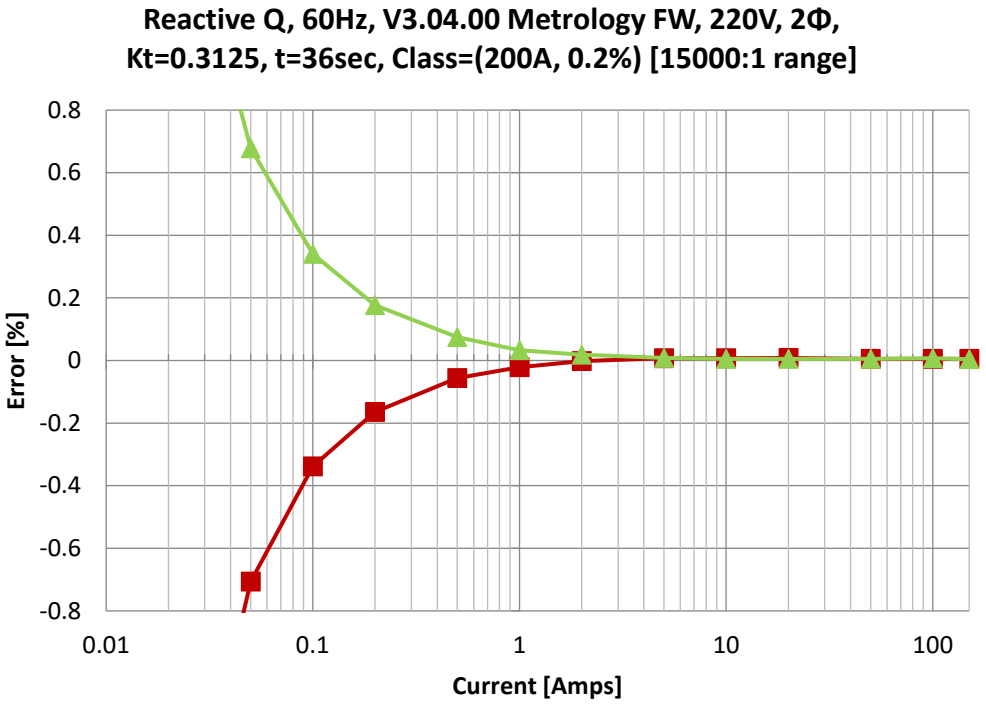


Reactive Power offset enabled and set to 0.452Varh/Cycle.
Meter scaled to 240A. Integration period: 1 second.

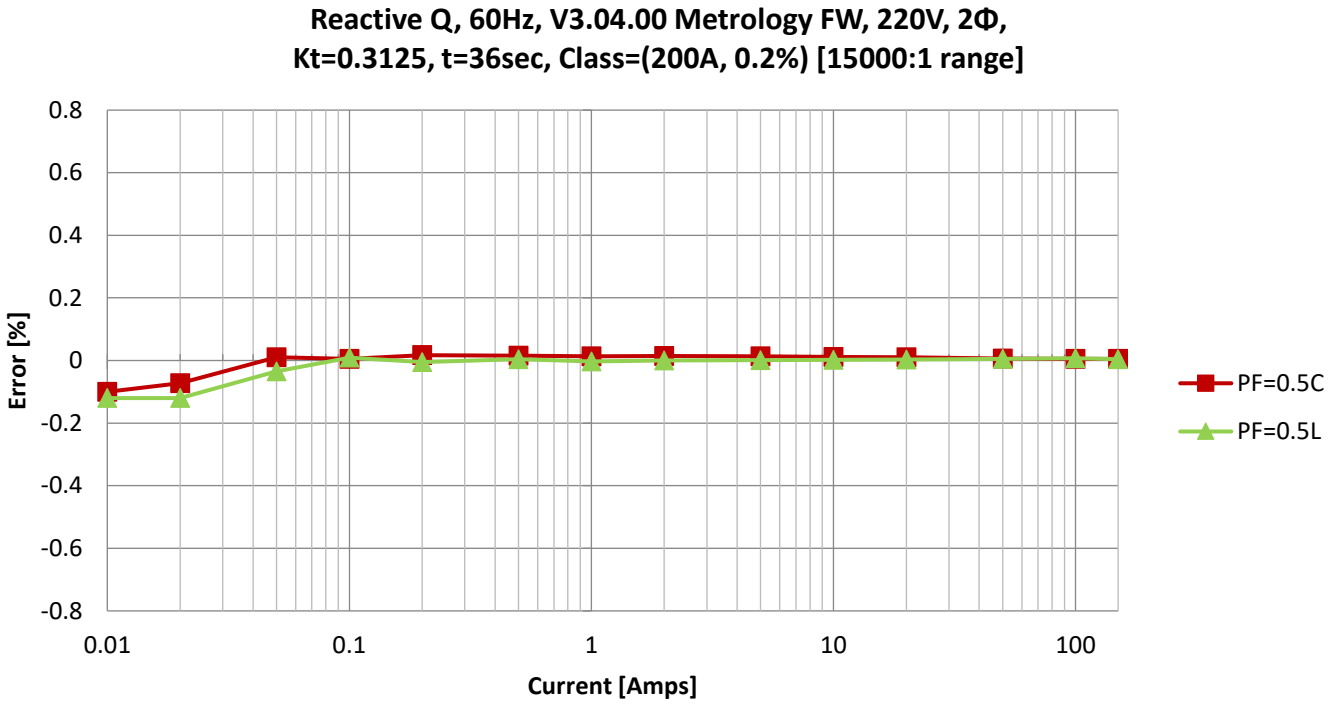
MICROCHIP

Reactive Power Load Curves

PIC32CXMTC-Rev2 + MCP3912 (flying wires). 60Hz.



Reactive Power offset disabled.
Meter scaled to 260A. Integration period: 1 second.

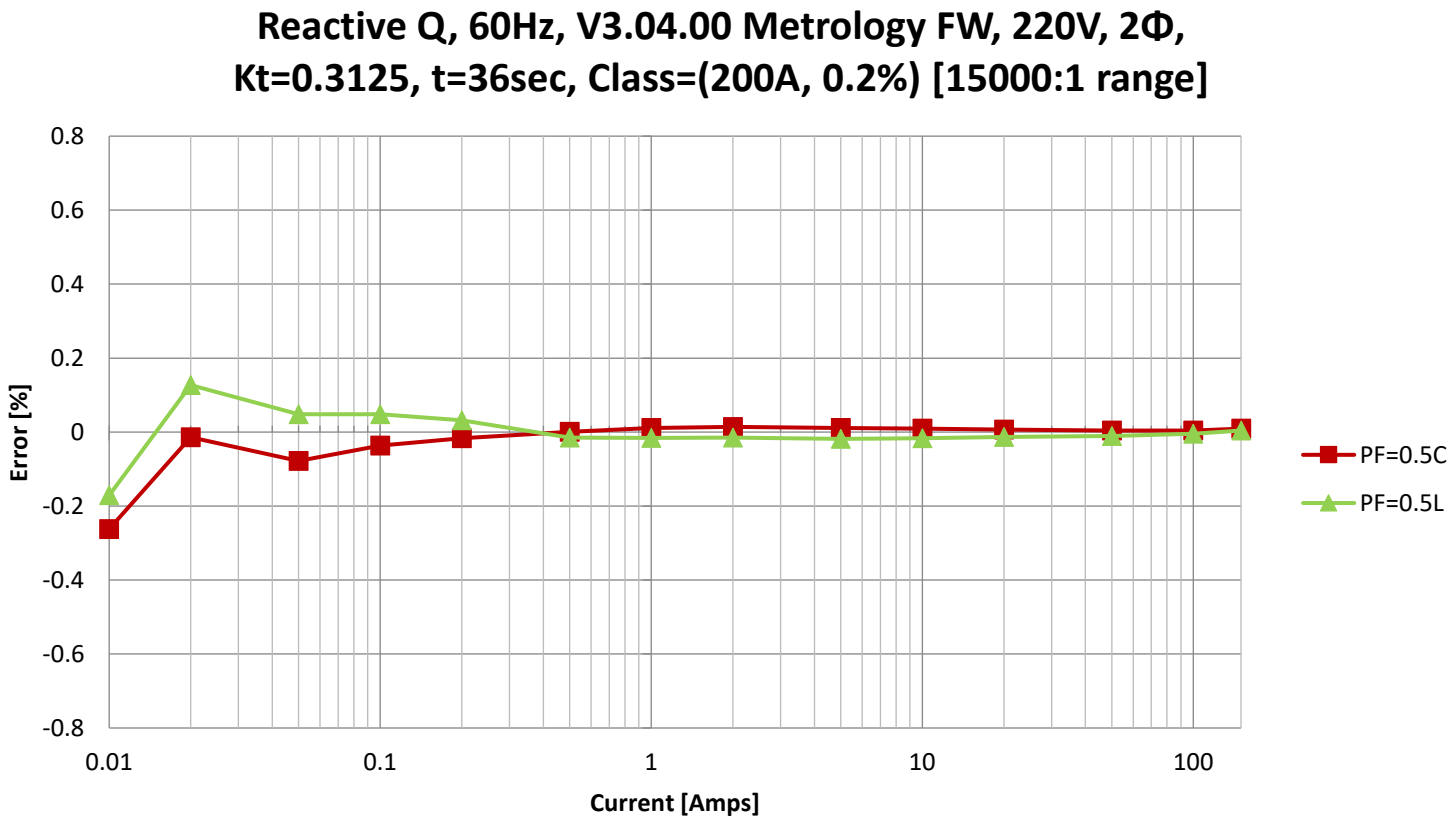


Reactive Power offset enabled and set to 0.133Varh/Cycle.
Meter scaled to 260A. Integration period: 1 second.

MICROCHIP

Reactive Power Load Curves

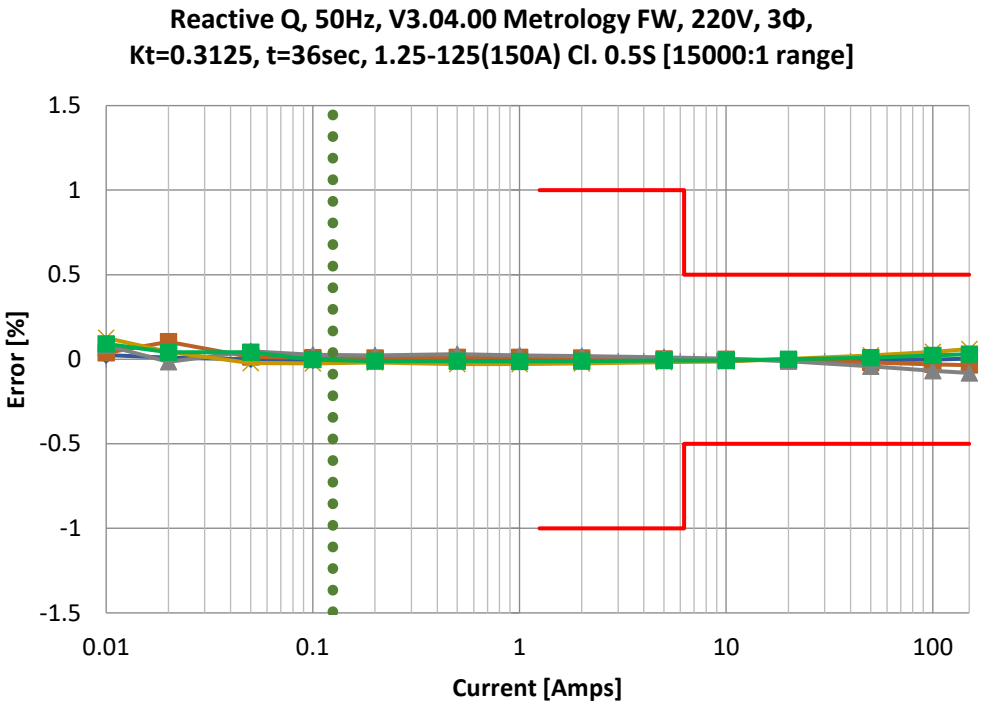
PIC32CXMTC (Multichannel board) + MCP3914. 60Hz.



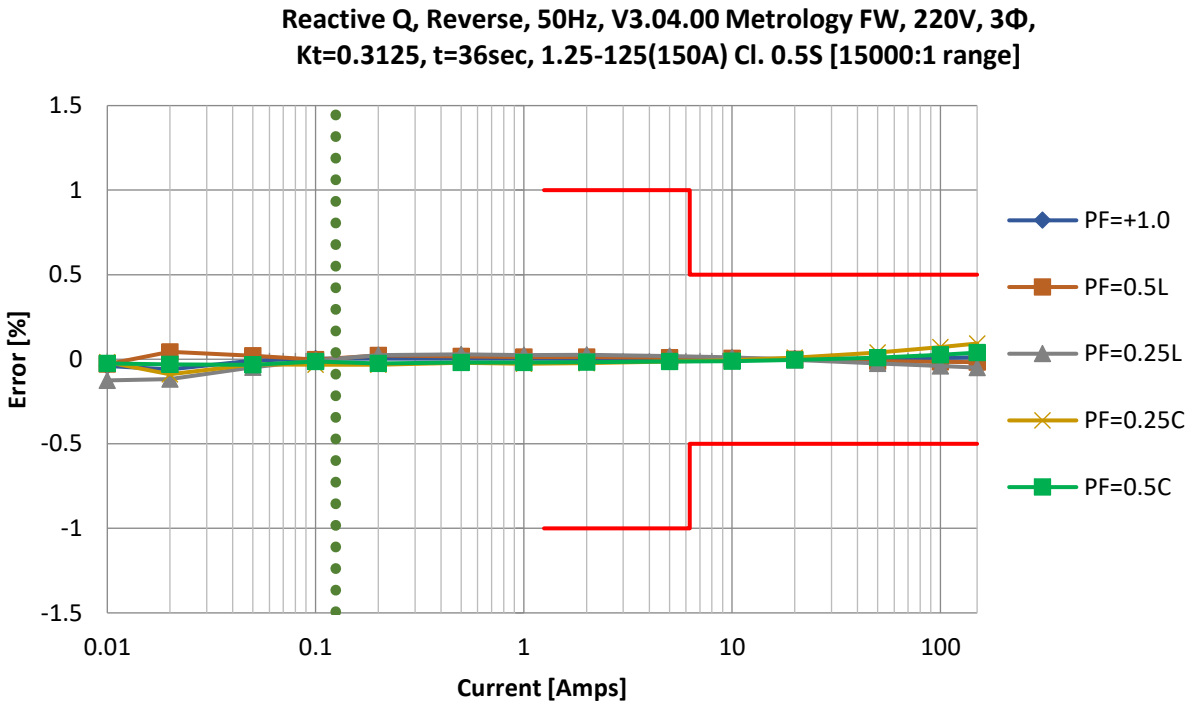
Reactive Power offset enabled and set to -0.156Varh/Cycle.
Meter scaled to 260A. Integration period: 1 second.

IEC Reactive Power Load Curves

PIC32CXMTC (Multichannel board) + MCP3914. 50Hz.



Reactive Power offset enabled and set to -0.1725Varh/Cycle.
Meter scaled to 260A. Integration period: 1 second.



Reactive Power offset enabled and set to -0.1725Varh/Cycle.
Meter scaled to 260A. Integration period: 1 second.

IEC Reactive Power Repeatability

60Hz, K_t=0.3125, 36 seconds

- The application of the same signal to be measured shall result in the close agreement of successive measurements.
- Five measurements are conducted at each test point listed under the "PF" and "CURRENT" columns.
- "AVG" denotes the average error calculated from the five measurements, while "MIN" and "MAX" represent the minimum and maximum errors observed among these measurements.

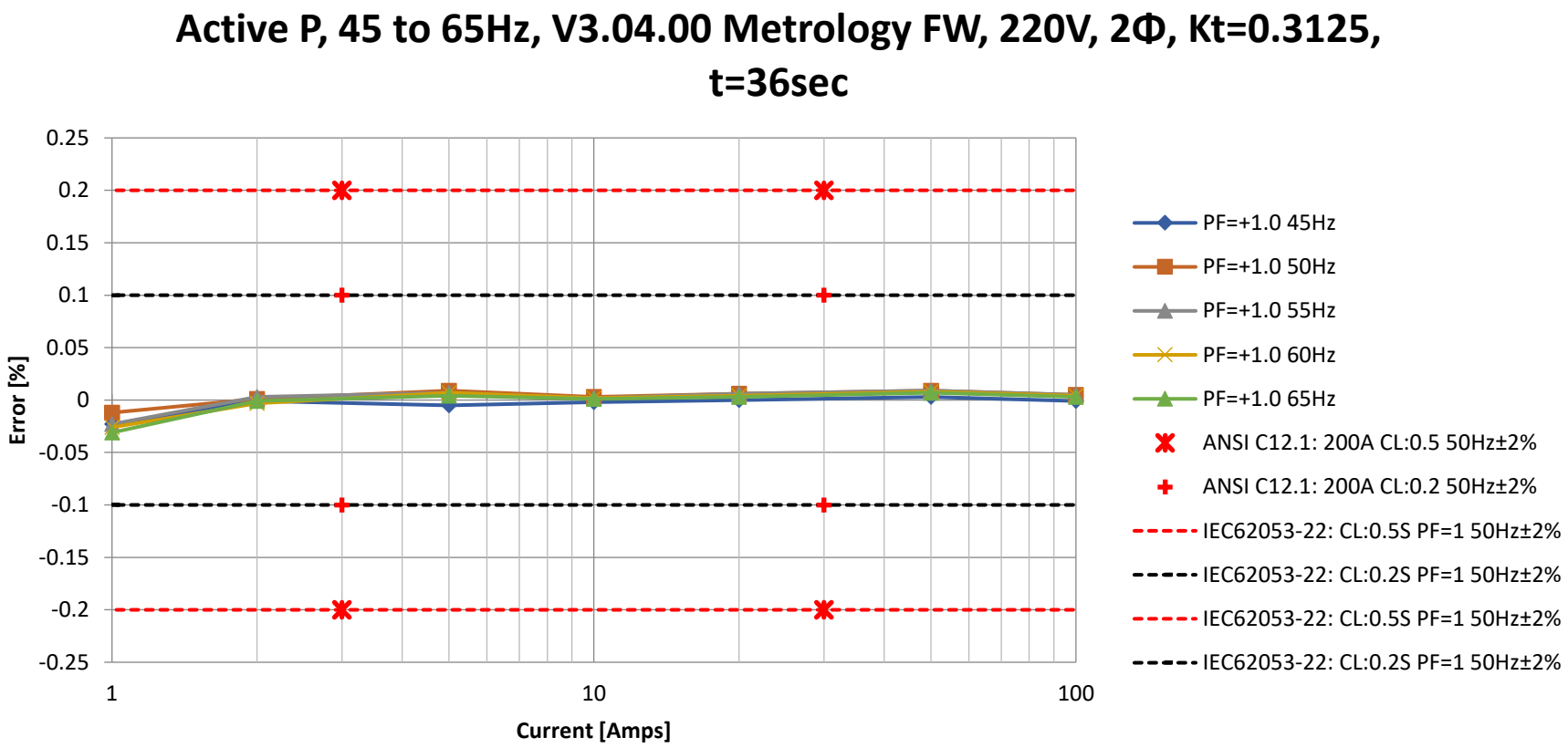
LIMITS		
0.1S	**0.2S**	**0.5S**
0.04%	0.04%	0.10%

PIC32CXMTC+ MCP3912					
	CURRENT	**AVG**	**MIN**	**MAX**	**MAX-MIN**
PF1	150	-0.002	-0.003	-0.001	0.002
	125	-0.0012	-0.002	-0.001	0.001
	30	0.0034	0.003	0.004	0.001
	6.25	0.0062	0.006	0.007	0.001
	3	0.0074	0.007	0.008	0.001
	1.5	0.0076	0.007	0.008	0.001
	1.25	0.0074	0.006	-0.03	-0.036
PF0.5L	150	-0.0302	-0.031	-0.03	0.001
	6.25	0.0228	0.022	0.024	0.002
	3	0.028	0.027	0.029	0.002
PF0.8L	150	-0.013	-0.014	-0.012	0.002
	6.25	0.0132	0.011	0.014	0.003
	3	0.0156	0.015	0.017	0.002
PF0.5C	150	0.0138	0.013	0.014	0.001
	6.25	-0.0112	-0.012	-0.01	0.002
	3	-0.0138	-0.014	-0.013	0.001
PF0.8C	150	0.0068	0.006	0.007	0.001
	6.25	-0.0008	-0.003	0	0.003
	3	-0.0004	-0.001	0	0.001

PIC32CXMTC+ MCP3914 (MULTICHANNEL BOARD)					
	CURRENT	**AVG**	**MIN**	**MAX**	**MAX-MIN**
PF1	150	0.002	0.001	0.003	0.002
	125	-0.001	-0.001	-0.001	0
	30	-0.0032	-0.004	-0.002	0.002
	6.25	-0.001	-0.004	0	0.004
	3	0.0012	0.001	0.002	0.001
	1.5	0.002	0.001	0.003	0.002
	1.25	0.0032	0.003	-0.029	-0.032
PF0.5L	150	-0.0312	-0.033	-0.029	0.004
	6.25	0.006	0.005	0.007	0.002
	3	0.0116	0.011	0.013	0.002
PF0.8L	150	-0.0122	-0.013	-0.012	0.001
	6.25	0.0014	0.001	0.003	0.002
	3	0.0058	0.005	0.006	0.001
PF0.5C	150	0.0304	0.029	0.032	0.003
	6.25	-0.0052	-0.006	-0.004	0.002
	3	-0.0062	-0.007	-0.006	0.001
PF0.8C	150	0.0164	0.015	0.017	0.002
	6.25	-0.0018	-0.002	-0.001	0.001
	3	-0.0018	-0.002	-0.001	0.001

Frequency Influence Test

PIC32CXMTSH-Rev2

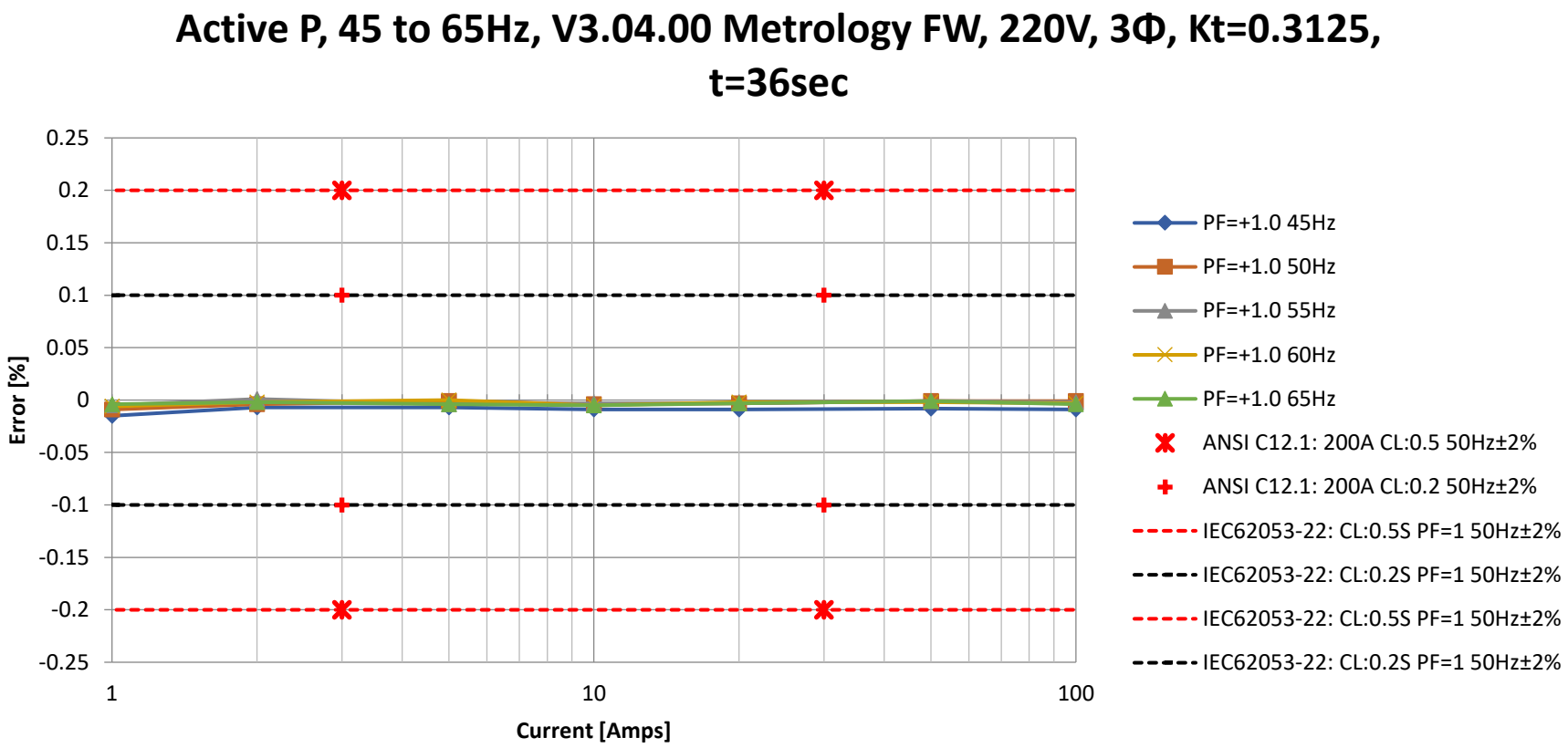


Power offset enabled (0.043Wh/cycle).
Meter scaled to 240A. Integration period: 1 second.

Conclusion: The system frequency will not influent the metrology performance.
Note: The performance of the CT could be affected by the frequency.

Frequency Influence Test

PIC32CXMTC-Rev2

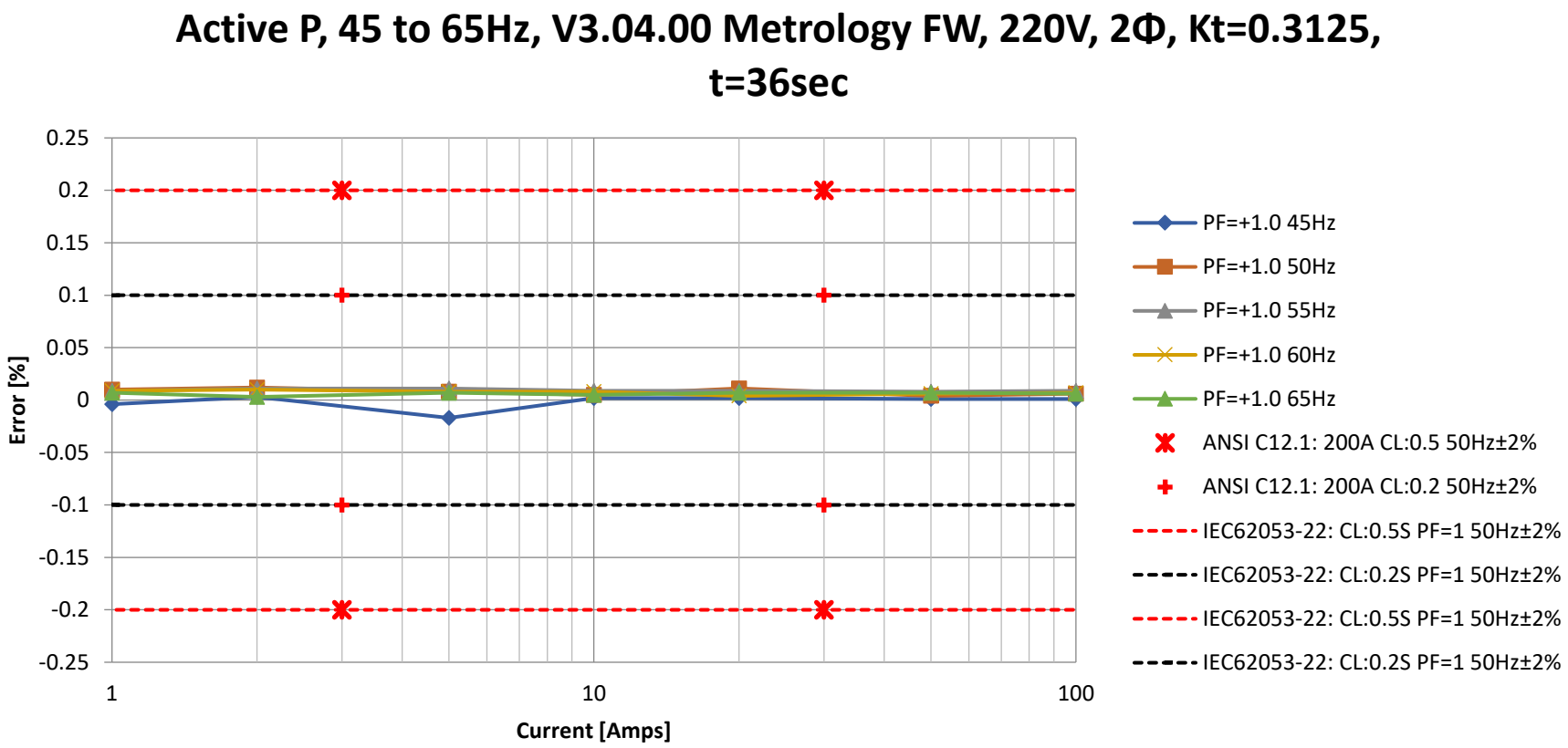


Active Power offset disabled.
Meter scaled to 240A. Integration period: 1 second.

Conclusion: The system frequency will not influent the metrology performance.
Note: The performance of the CT could be affected by the frequency.

Frequency Influence Test

PIC32CXMTC-Rev2 + MCP3912 (flying wires)



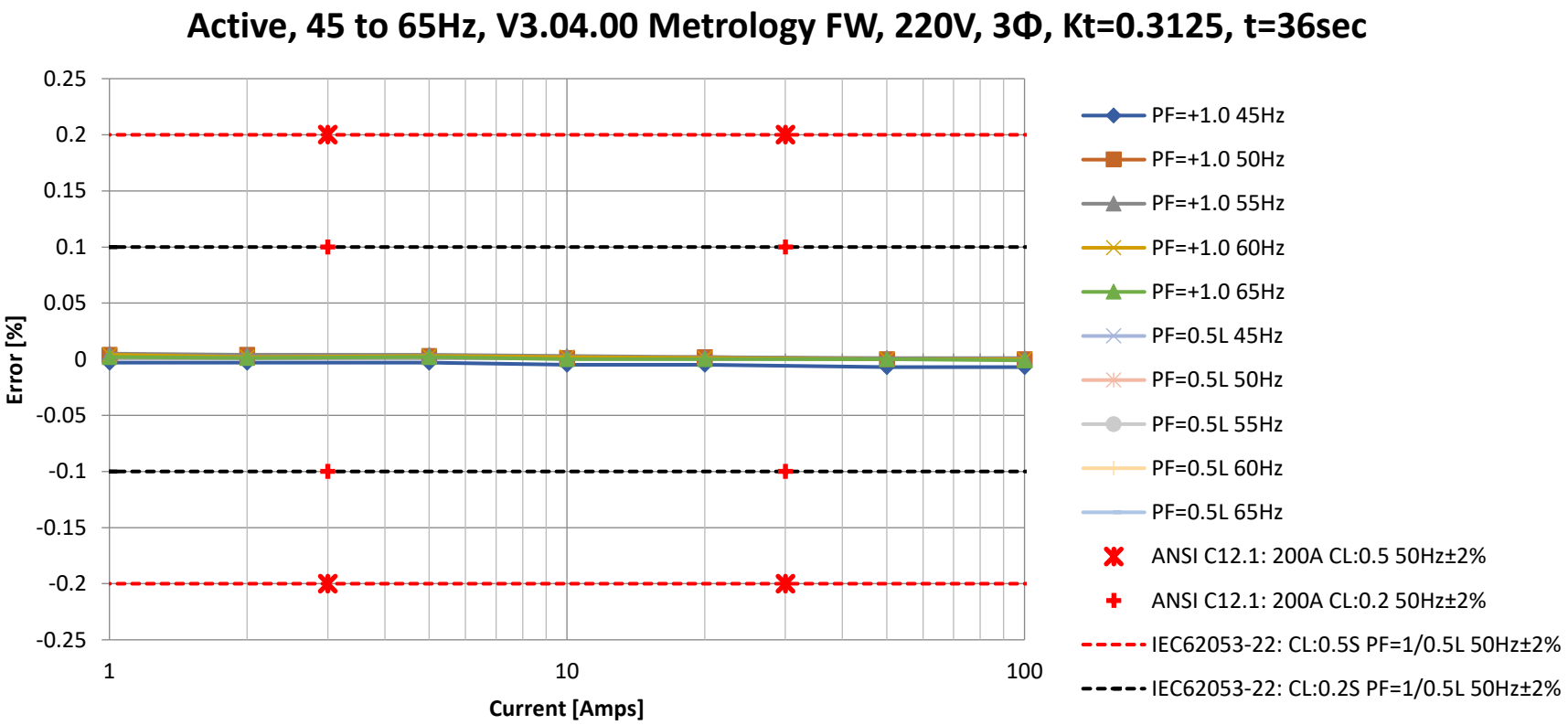
Power offset enabled (0.018Wh/cycle).
Meter scaled to 260A. Integration period: 1 second.

Conclusion: The system frequency will not influent the metrology performance.
Note: The performance of the CT could be affected by the frequency.

MICROCHIP

Frequency Influence Test

PIC32CXMTC (Multichannel board) + MCP3913.

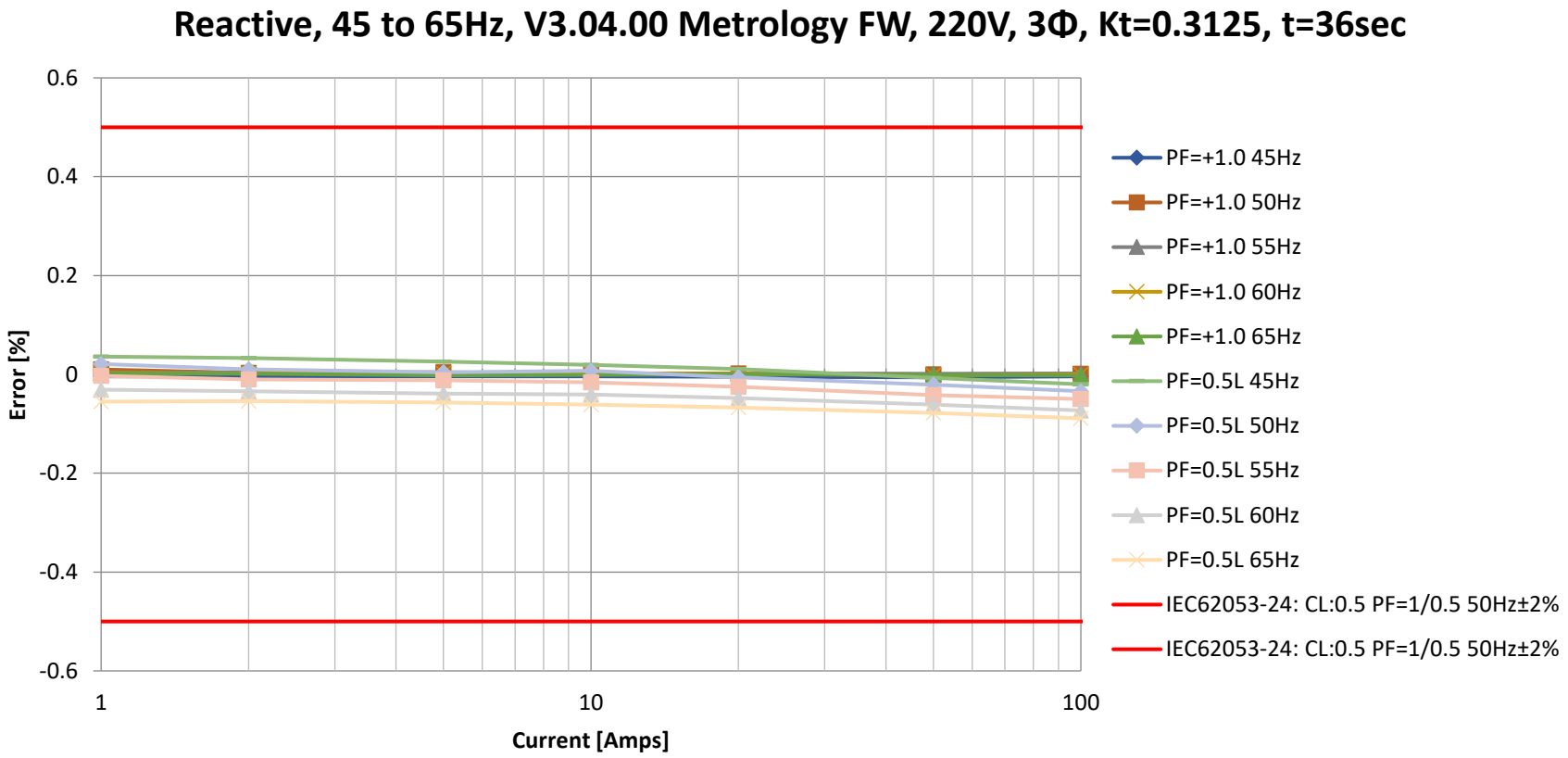


Active Power offset enabled (-0.0192Wh/cycle).
Meter scaled to 260A. Integration period: 1 second.

Conclusion: The system frequency will not influent the metrology performance.
Note: The performance of the CT could be affected by the frequency.

Frequency Influence Test Reactive

PIC32CXMTC (Multichannel board) + MCP3913.



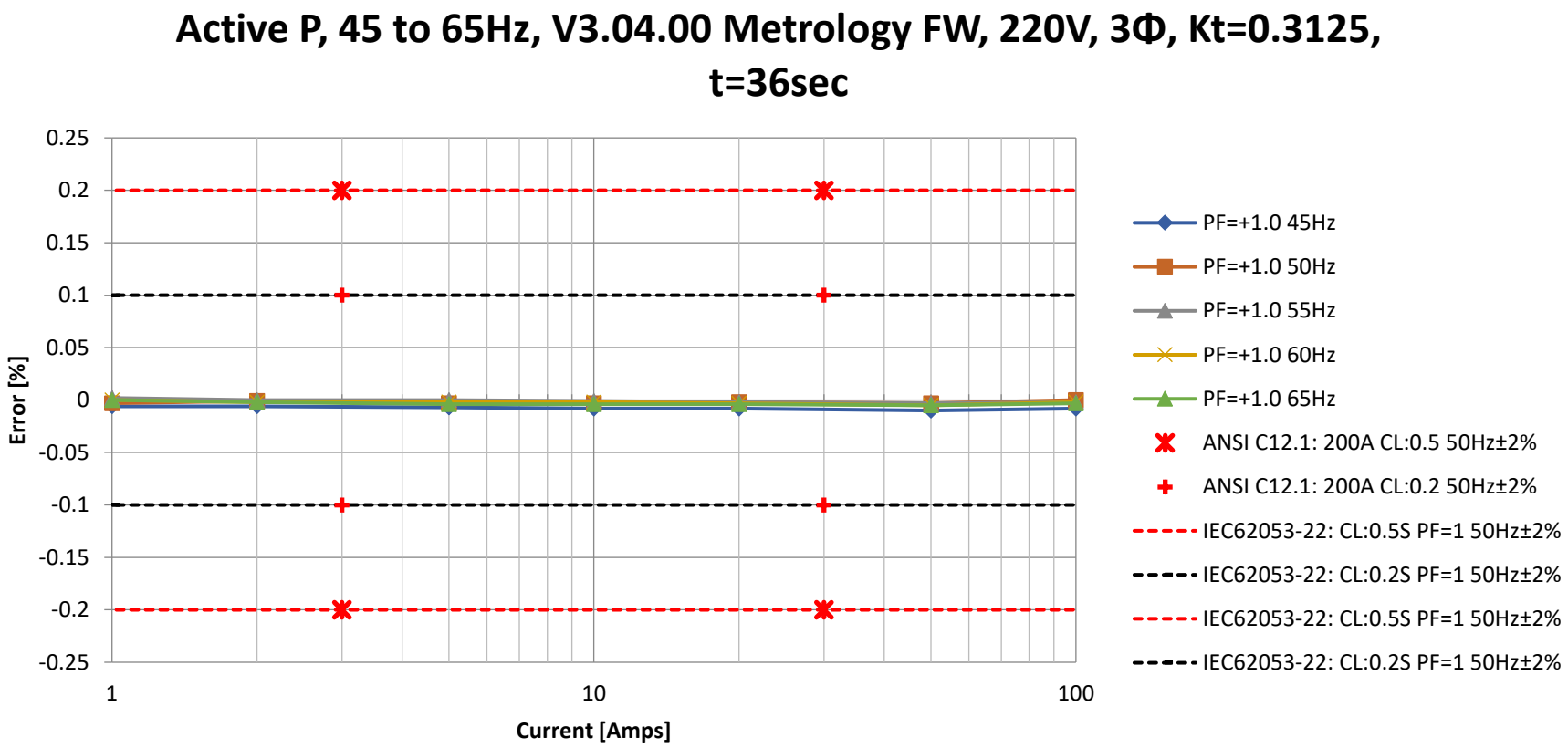
Reactive Power offset enabled (0.149VArh/cycle).
Meter scaled to 260A. Integration period: 1 second.

Conclusion: The system frequency will not influent the metrology performance.
Note: The performance of the CT could be affected by the frequency.

MICROCHIP

Frequency Influence Test

PIC32CXMTC (Multichannel board) + MCP3914.

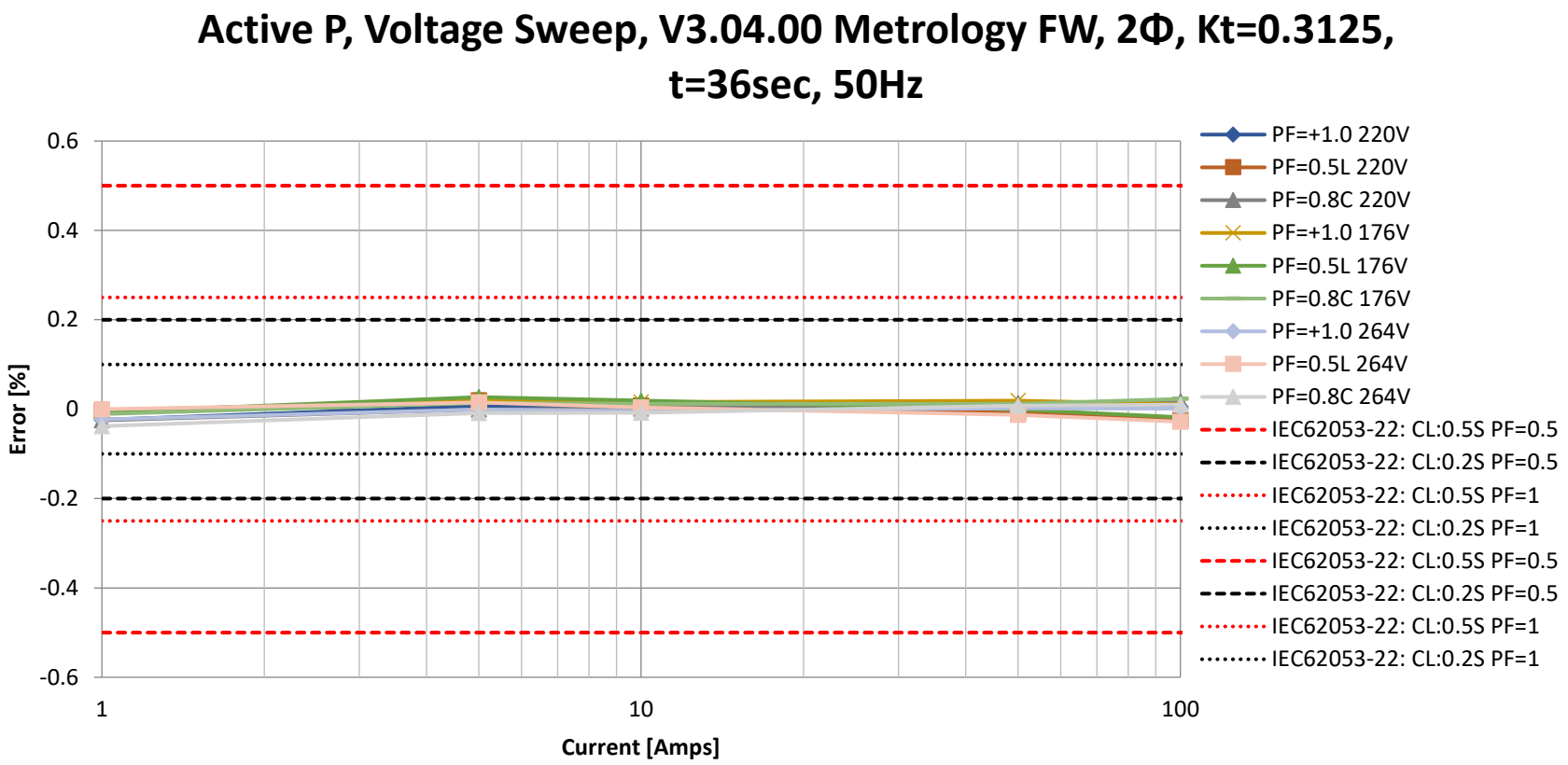


Power offset disabled.
Meter scaled to 260A. Integration period: 1 second.

Conclusion: The system frequency will not influent the metrology performance.
Note: The performance of the CT could be affected by the frequency.

Voltage Influence Test

PIC32CXMTSH-Rev2 50Hz



Voltage	Current	PF = 1.0	PF = 0.5L	PF = 0.8C
176	1	-0.003	-0.007	-0.011
220	1	-0.024	-0.004	-0.025
264	1	-0.023	0	-0.038
176	5	0.019	0.027	0.014
220	5	0.007	0.02	-0.001
264	5	-0.001	0.015	-0.009
176	10	0.016	0.019	0.012
220	10	0.003	0.008	0.001
264	10	-0.004	0.004	-0.008
176	50	0.019	-0.001	0.012
220	50	0.009	-0.008	0.014
264	50	0.002	-0.013	0.008
176	100	0.011	-0.018	0.023
220	100	0.005	-0.024	0.018
264	100	0.001	-0.028	0.01

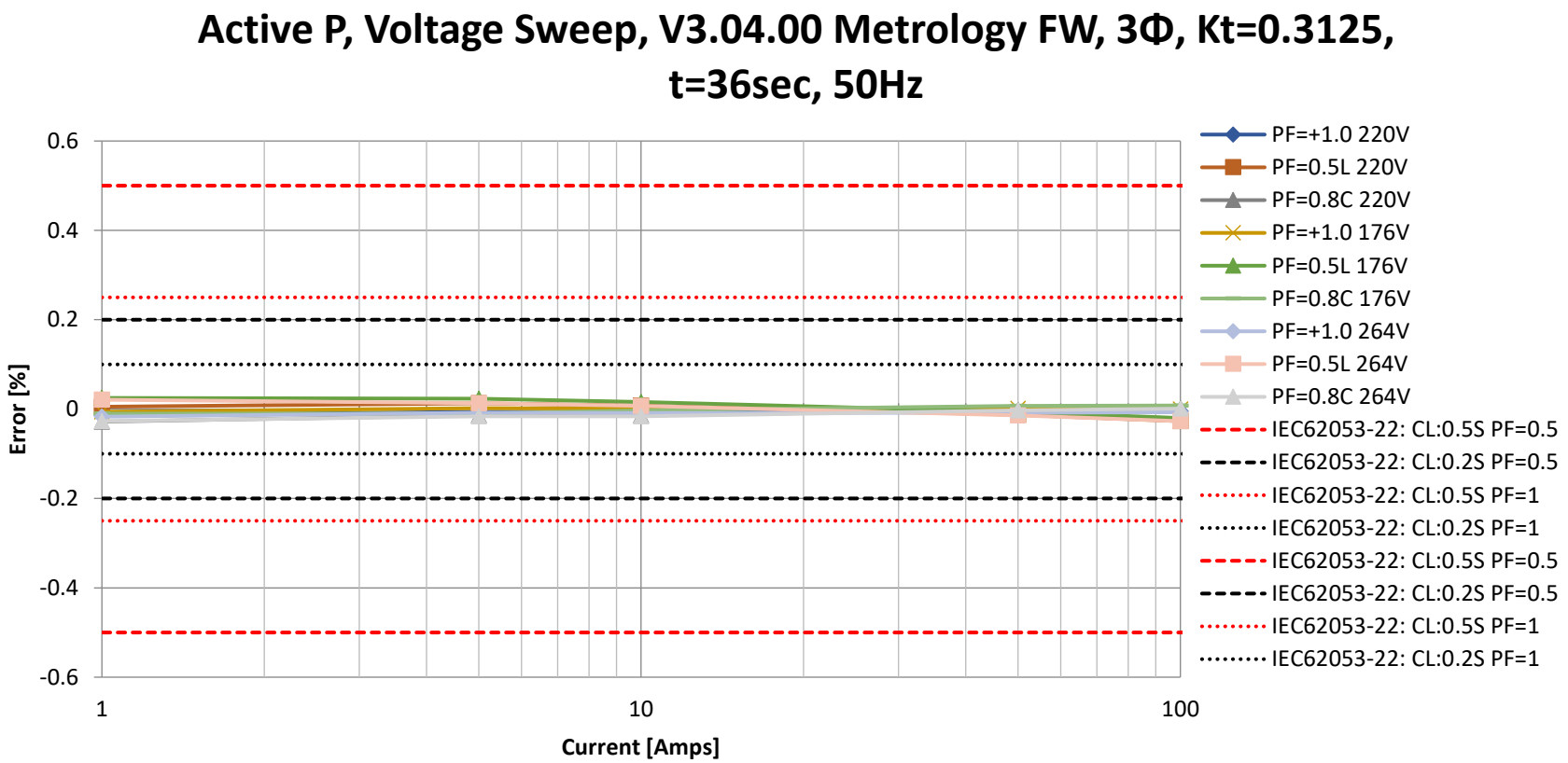
Power offset enabled (0.043Wh/cycle).
Meter scaled to 240A. Integration period: 1 second.

Conclusion: The system voltage will not influent the metrology performance.

MICROCHIP

Voltage Influence Test

PIC32CXMTC-Rev2 50Hz



Voltage	Current	PF = 1.0	PF = 0.5L	PF = 0.8C
176	1	-0.006	0.025	-0.01
220	1	-0.014	0.005	-0.028
264	1	-0.017	0.021	-0.027
176	5	0.002	0.023	-0.01
220	5	-0.006	0.013	-0.014
264	5	-0.008	0.013	-0.016
176	10	0.001	0.016	-0.003
220	10	-0.007	0.008	-0.014
264	10	-0.009	0.007	-0.016
176	50	0.001	-0.006	0.007
220	50	-0.004	-0.013	-0.002
264	50	-0.008	-0.014	-0.003
176	100	0	-0.02	0.008
220	100	-0.005	-0.027	0.002
264	100	-0.007	-0.027	0.001

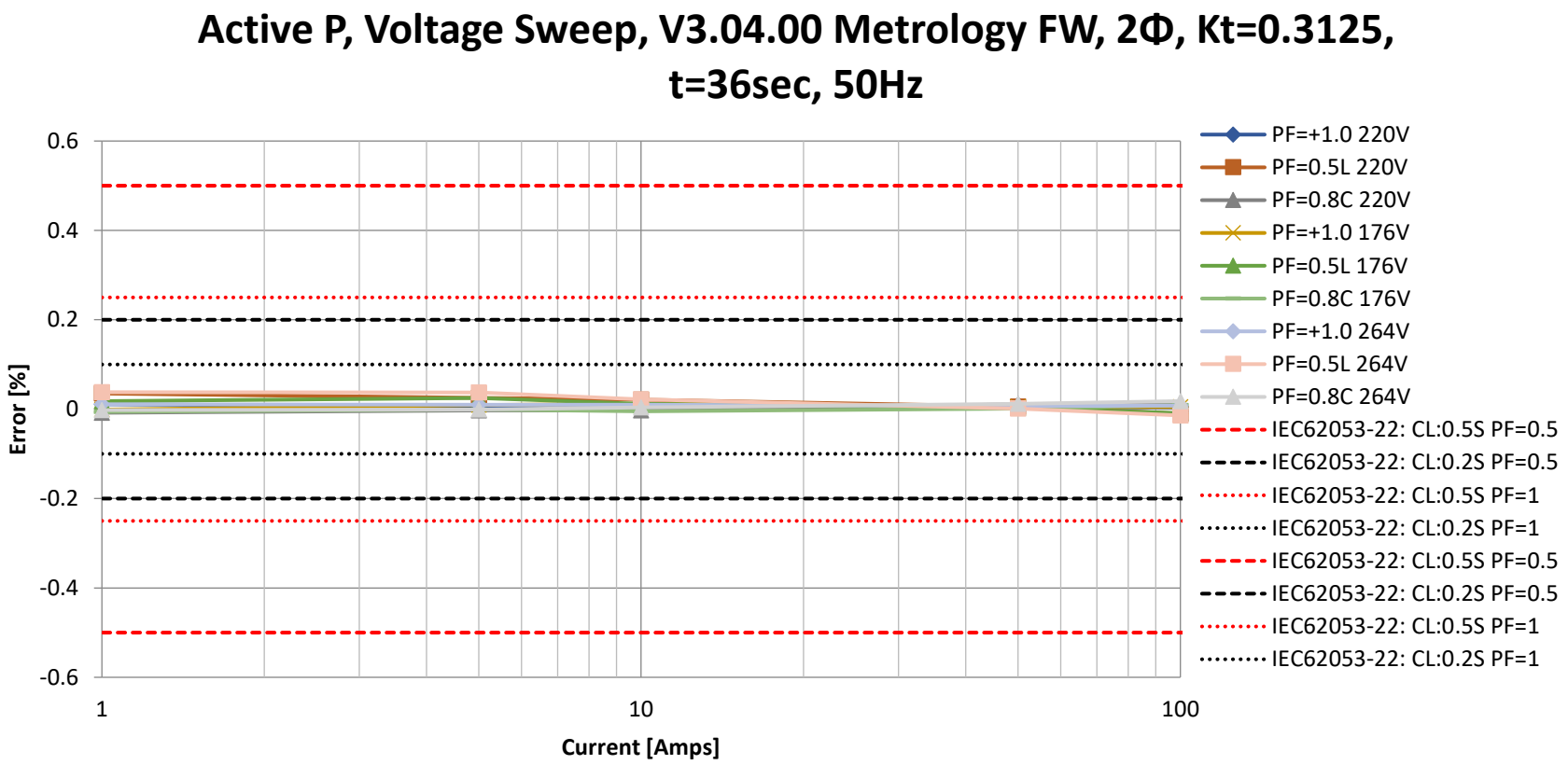
Power offset disabled.
Meter scaled to 240A. Integration period: 1 second.

Conclusion: The system voltage will not influent the metrology performance.

MICROCHIP

Voltage Influence Test

PIC32CXMTC-Rev2 + MCP3912 (flying wires) 50Hz



Voltage	Current	PF = 1.0	PF = 0.5L	PF = 0.8C
176	1	-0.001	0.018	-0.006
220	1	0.011	0.035	-0.008
264	1	0.011	0.038	-0.002
176	5	0.009	0.025	-0.001
220	5	0.006	0.025	-0.003
264	5	0.01	0.037	-0.001
176	10	0.012	0.012	-0.005
220	10	0.001	0.021	-0.003
264	10	0.01	0.022	0.004
176	50	0.005	0.003	0.001
220	50	0.009	0.006	0.011
264	50	0.007	0.001	0.012
176	100	0.005	-0.009	0.009
220	100	0.005	-0.01	0.011
264	100	0.008	-0.014	0.018

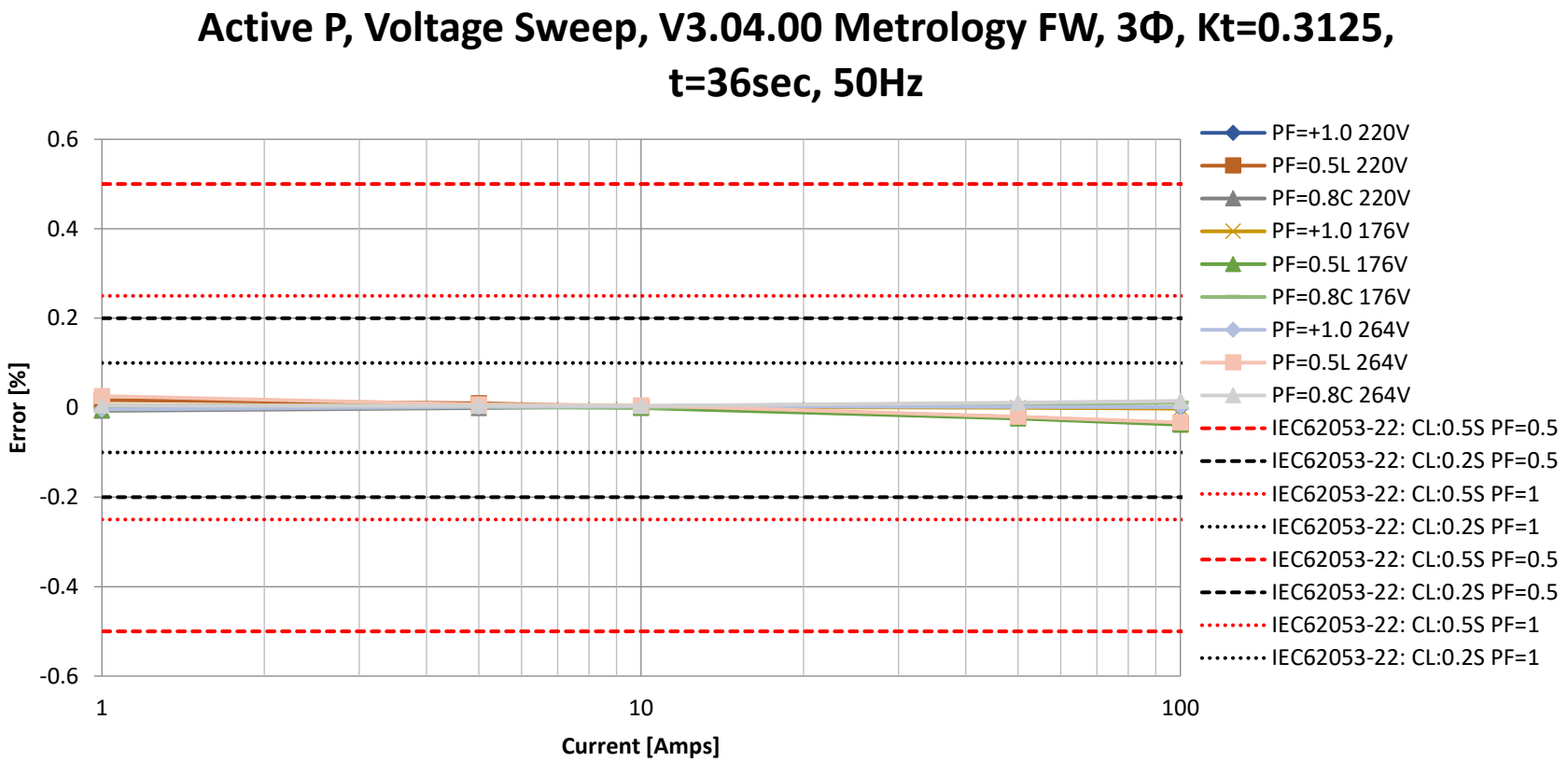
Power offset enabled (0.018Wh/cycle).
Meter scaled to 260A. Integration period: 1 second.

Conclusion: The system voltage will not influent the metrology performance.

MICROCHIP

Voltage Influence Test

PIC32CXMTC (Multichannel board) + MCP3913 50Hz



Voltage	Current	PF = 1.0	PF = 0.5L	PF = 0.8C
176	1	0.006	-0.005	-0.003
220	1	0.001	0.017	-0.007
264	1	-0.004	0.026	0.005
176	5	0.003	0.008	0.001
220	5	0.003	0.01	-0.001
264	5	0.002	0.007	0.004
176	10	0.002	-0.001	-0.001
220	10	0.002	0.002	0.003
264	10	0.003	0.005	0.004
176	50	0	-0.024	0.008
220	50	0.001	-0.021	0.01
264	50	0.002	-0.02	0.011
176	100	-0.002	-0.038	0.011
220	100	-0.001	-0.036	0.014
264	100	0.001	-0.033	0.015

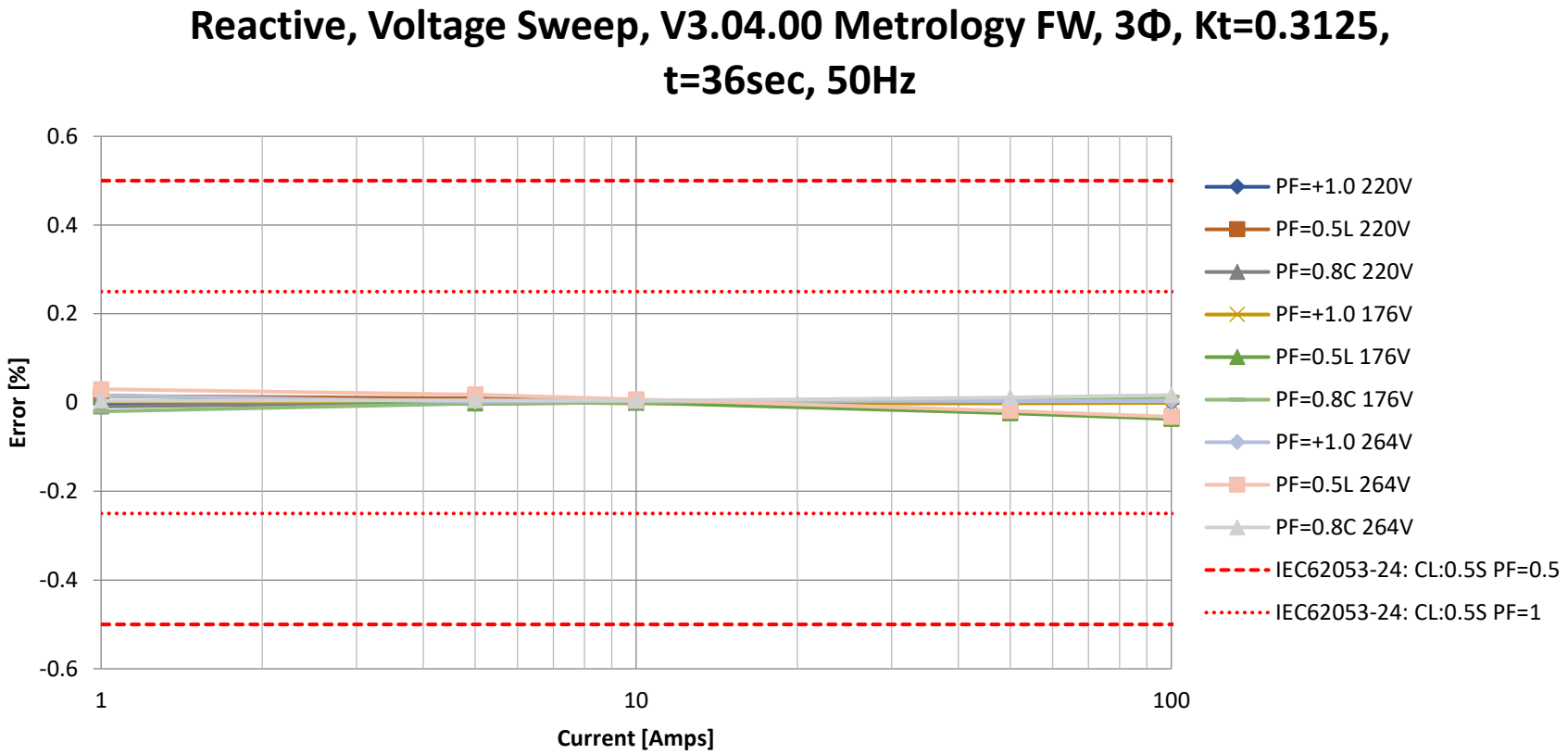
Active Power offset enabled (-0.0192Wh/cycle).
Meter scaled to 260A. Integration period: 1 second.

Conclusion: The system voltage will not influent the metrology performance.

MICROCHIP

Voltage Influence Test Reactive

PIC32CXMTC (Multichannel board) + MCP3913 50Hz



Voltage	Current	PF = 1.0	PF = 0.5L	PF = 0.8C
176	1	0.002	0.016	-0.02
220	1	-0.004	0.015	-0.009
264	1	0.016	0.03	0.004
176	5	0.002	-0.002	-0.002
220	5	-0.002	0.009	0.001
264	5	0.002	0.018	0.005
176	10	-0.002	0	0
220	10	0	0.003	0
264	10	0.005	0.007	0.004
176	50	-0.002	-0.024	0.007
220	50	-0.001	-0.021	0.01
264	50	0.003	-0.019	0.011
176	100	-0.001	-0.037	0.013
220	100	0	-0.035	0.013
264	100	0.003	-0.032	0.017

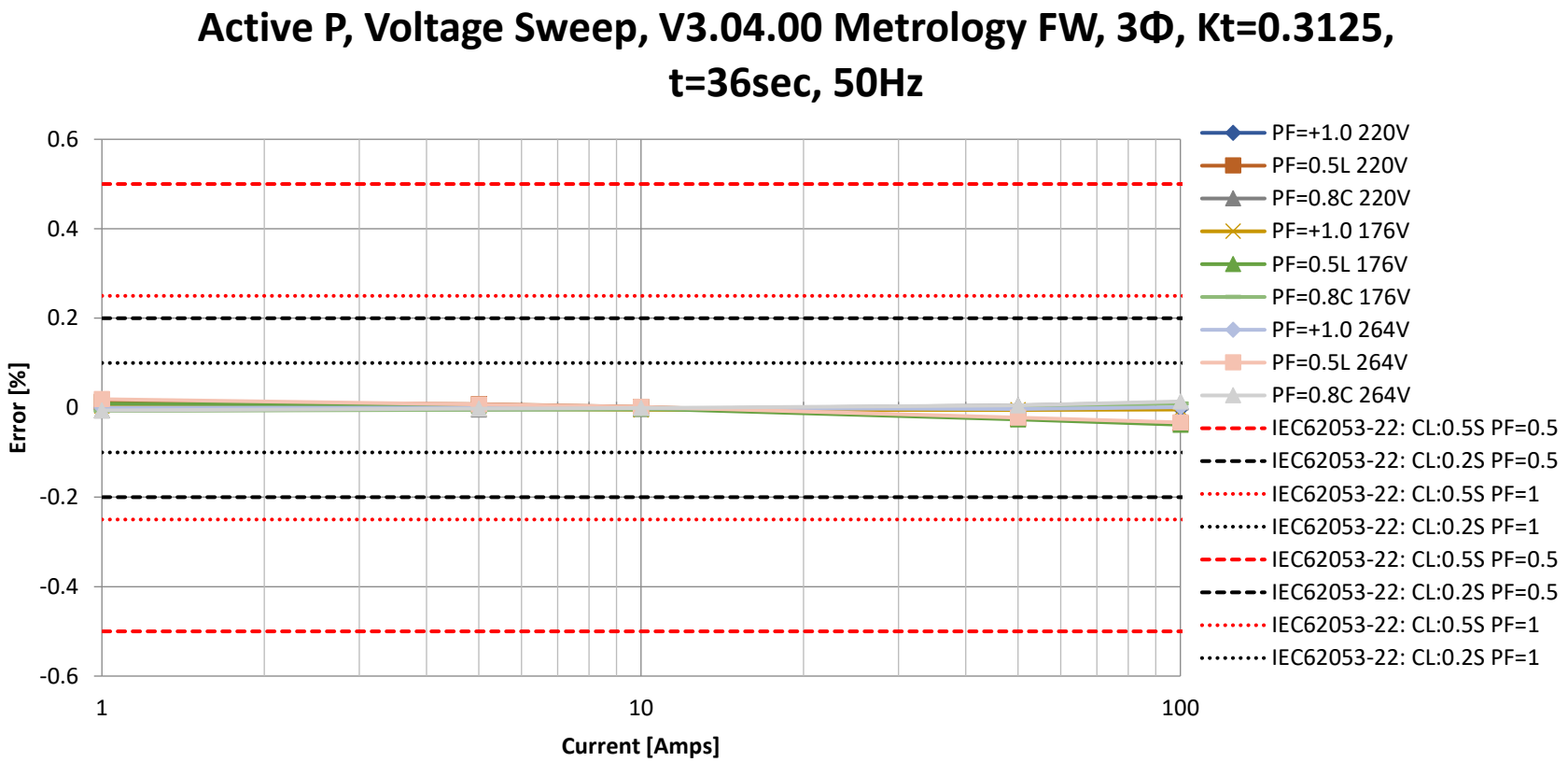
Reactive Power offset enabled (0.149Varh/cycle).
Meter scaled to 260A. Integration period: 1 second.

Conclusion: The system voltage will not influent the metrology performance.

MICROCHIP

Voltage Influence Test

PIC32CXMTC (Multichannel board) + MCP3914 50Hz



Voltage	Current	PF = 1.0	PF = 0.5L	PF = 0.8C
176	1	0.004	0.009	-0.007
220	1	-0.004	0.013	-0.006
264	1	0	0.019	-0.006
176	5	-0.002	0.005	-0.005
220	5	0	0.008	-0.004
264	5	0	0.007	-0.002
176	10	-0.005	-0.002	-0.004
220	10	-0.001	0.002	-0.003
264	10	-0.001	0.002	-0.001
176	50	-0.005	-0.026	0.002
220	50	-0.003	-0.024	0.005
264	50	-0.003	-0.022	0.005
176	100	-0.004	-0.038	0.009
220	100	-0.003	-0.035	0.012
264	100	0.001	-0.033	0.014

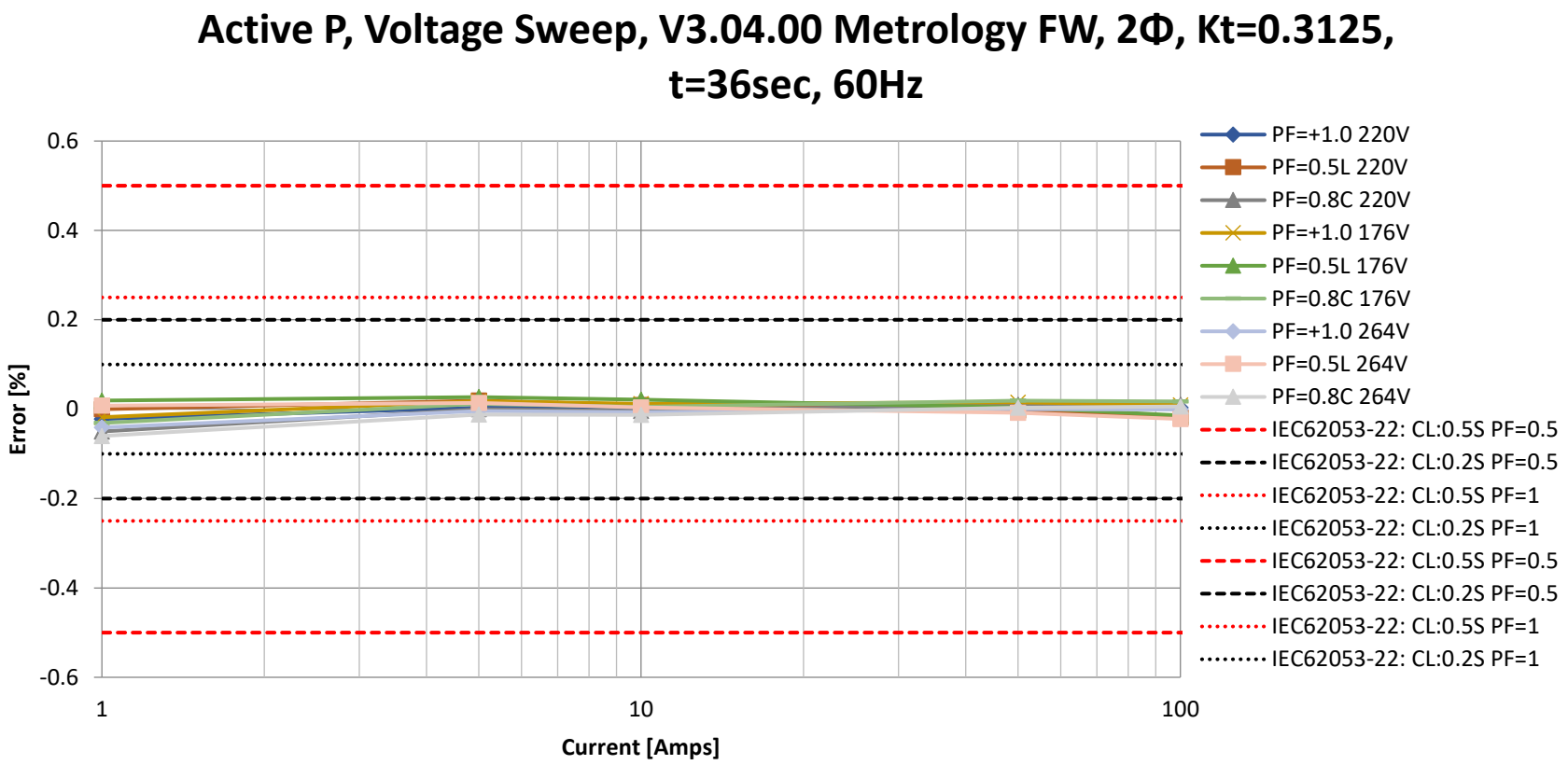
Power offset disabled.
Meter scaled to 260A. Integration period: 1 second.

Conclusion: The system voltage will not influent the metrology performance.

MICROCHIP

Voltage Influence Test

PIC32CXMTSH-Rev2 60Hz



Voltage	Current	PF = 1.0	PF = 0.5L	PF = 0.8C
176	1	-0.018	0.019	-0.031
220	1	-0.022	0	-0.05
264	1	-0.041	0.008	-0.06
176	5	0.018	0.027	0.012
220	5	0.003	0.019	0
264	5	-0.004	0.014	-0.012
176	10	0.012	0.021	0.005
220	10	0.002	0.009	-0.004
264	10	-0.007	0.004	-0.013
176	50	0.015	0.004	0.019
220	50	0.007	-0.003	0.01
264	50	0	-0.008	0.003
176	100	0.009	-0.014	0.017
220	100	0.003	-0.019	0.01
264	100	-0.001	-0.022	0.006

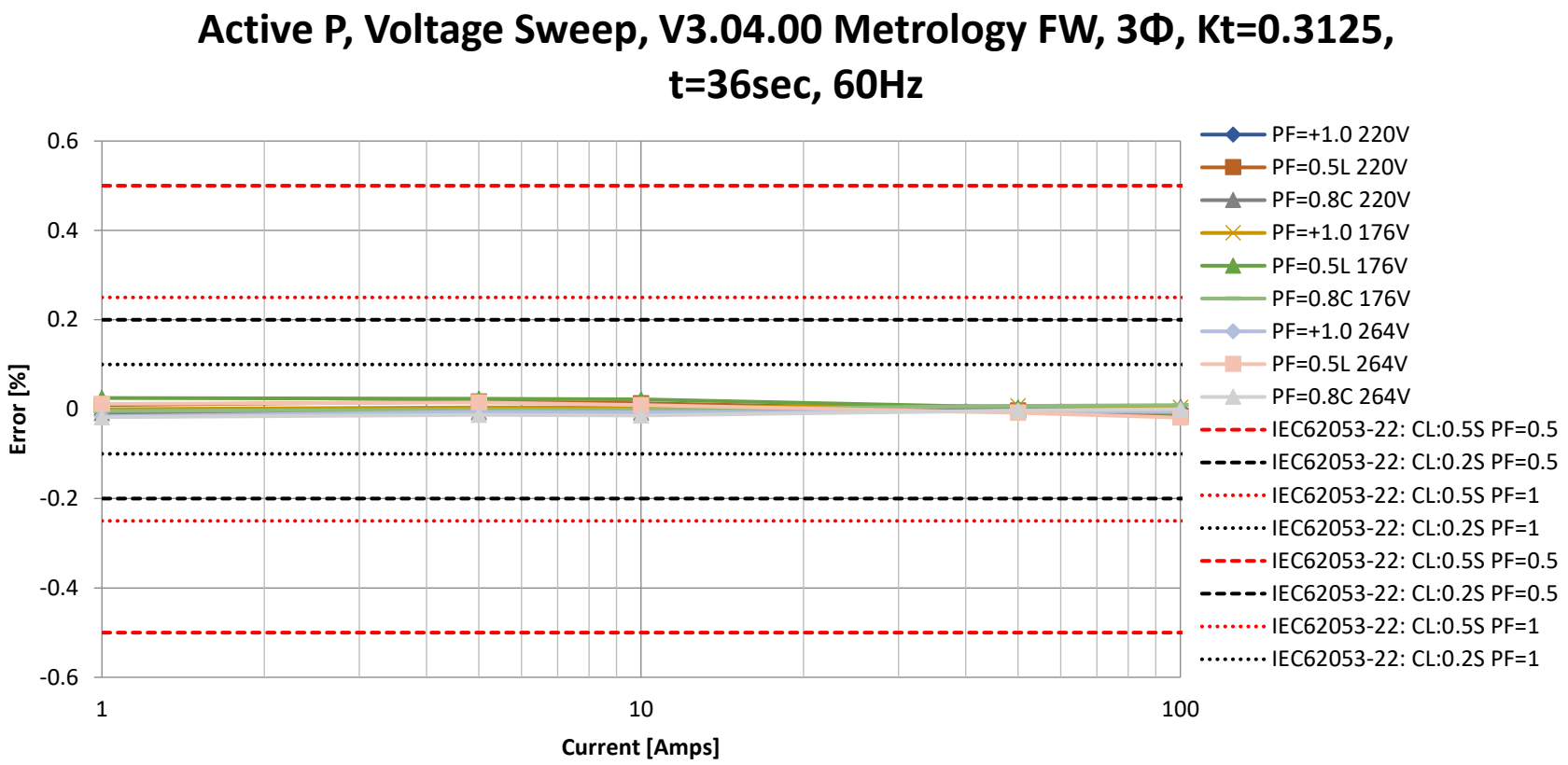
Power offset enabled (0.03Wh/cycle).
Meter scaled to 240A. Integration period: 1 second.

Conclusion: The system voltage will not influent the metrology performance.

MICROCHIP

Voltage Influence Test

PIC32CXMTC-Rev2 60Hz



Voltage	Current	PF = 1.0	PF = 0.5L	PF = 0.8C
176	1	0	0.025	-0.004
220	1	-0.013	0.009	-0.009
264	1	-0.016	0.012	-0.018
176	5	0.004	0.023	-0.001
220	5	0	0.017	-0.007
264	5	-0.006	0.015	-0.013
176	10	0.004	0.022	-0.001
220	10	-0.002	0.013	-0.008
264	10	-0.007	0.009	-0.014
176	50	0.007	0.004	0.007
220	50	0	-0.003	0.001
264	50	-0.005	-0.008	-0.003
176	100	0.004	-0.01	0.009
220	100	0	-0.015	0.005
264	100	-0.006	-0.019	0

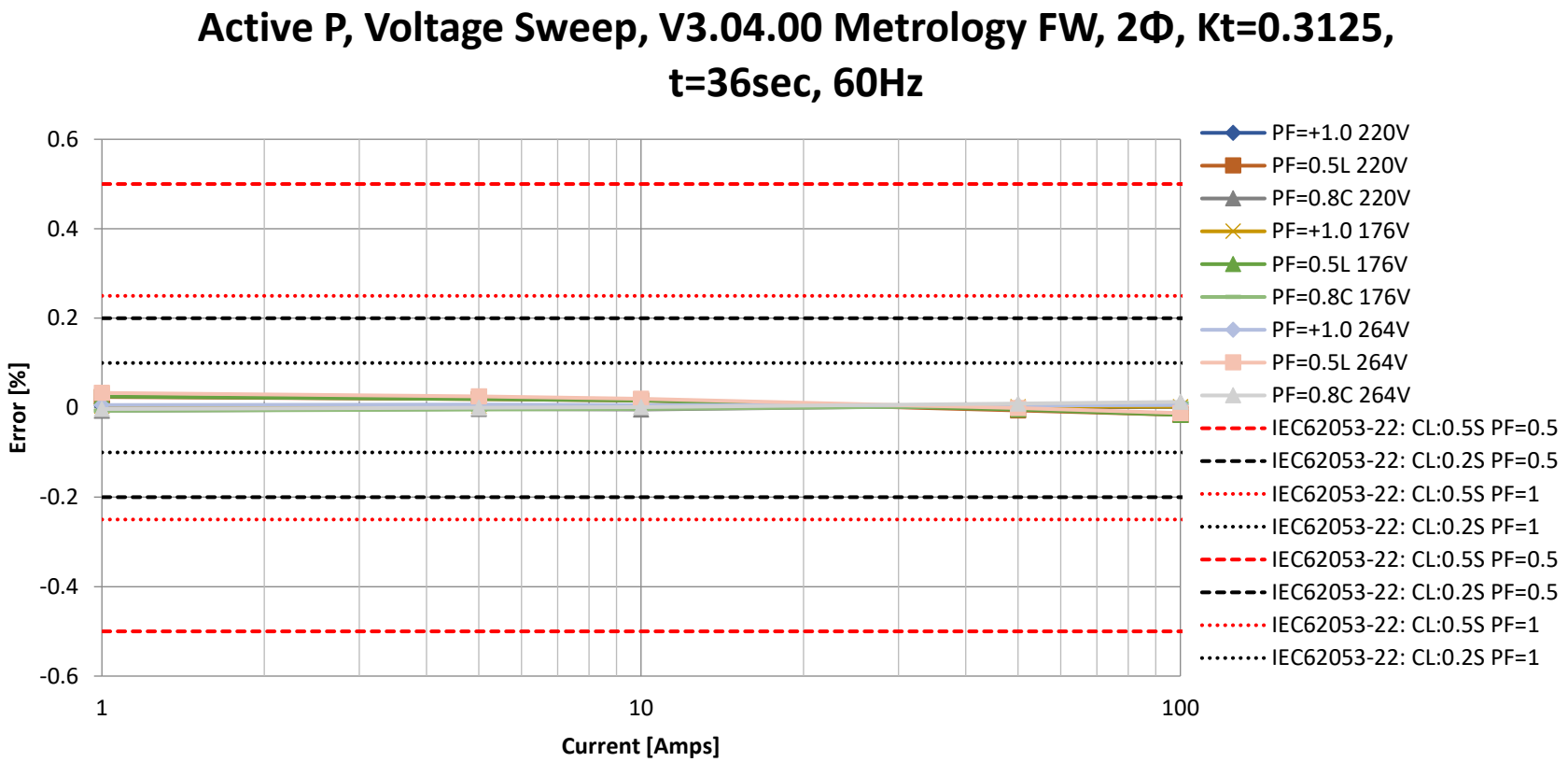
Power offset enabled (0.01Wh/cycle).
Meter scaled to 240A. Integration period: 1 second.

Conclusion: The system voltage will not influent the metrology performance.

MICROCHIP

Voltage Influence Test

PIC32CXMTC-Rev2 + MCP3912 (flying wires) 60Hz



Voltage	Current	PF = 1.0	PF = 0.5L	PF = 0.8C
176	1	0.004	0.025	-0.007
220	1	0.004	0.024	-0.007
264	1	0.006	0.033	-0.003
176	5	0.003	0.019	-0.004
220	5	0.002	0.019	-0.003
264	5	0.007	0.025	0
176	10	0.003	0.016	-0.003
220	10	0.004	0.016	-0.004
264	10	0.006	0.02	0.001
176	50	0.002	-0.004	0.004
220	50	0	-0.006	0.005
264	50	0.005	-0.001	0.009
176	100	0.002	-0.016	0.01
220	100	0.002	-0.016	0.011
264	100	0.006	-0.012	0.013

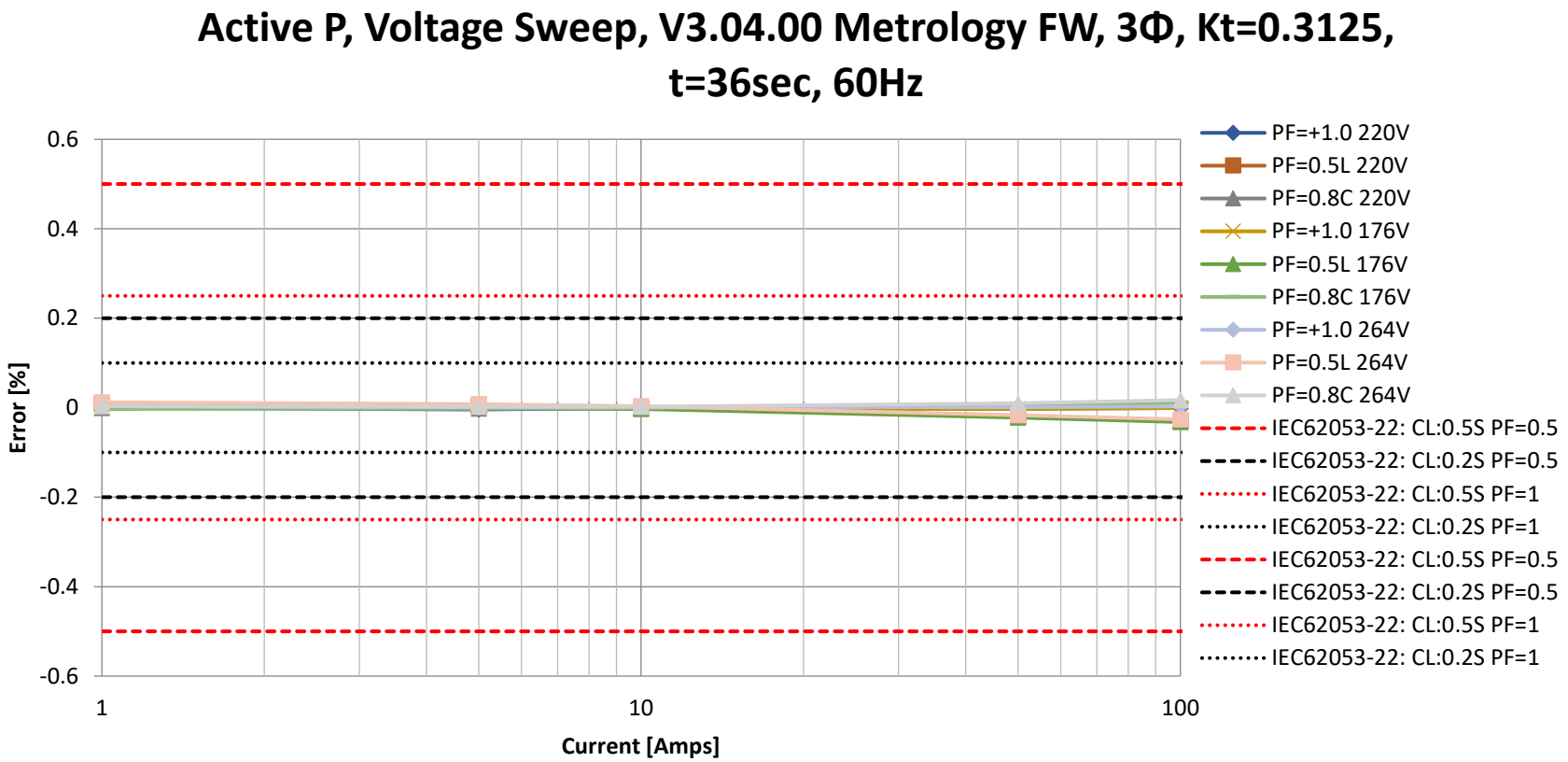
Power offset enabled (0.02Wh/cycle).
Meter scaled to 260A. Integration period: 1 second.

Conclusion: The system voltage will not influent the metrology performance.

MICROCHIP

Voltage Influence Test

PIC32CXMTC (Multichannel board) + MCP3914 60Hz



Voltage	Current	PF = 1.0	PF = 0.5L	PF = 0.8C
176	1	0.001	0.009	-0.003
220	1	0	0.01	-0.001
264	1	0.003	0.012	0.003
176	5	0	0.003	-0.002
220	5	-0.004	0.004	-0.002
264	5	0.001	0.008	0.002
176	10	-0.002	-0.003	-0.001
220	10	-0.001	-0.001	-0.002
264	10	0.002	0.003	0.002
176	50	-0.003	-0.022	0.005
220	50	-0.002	-0.021	0.005
264	50	0.001	-0.017	0.01
176	100	-0.001	-0.032	0.011
220	100	-0.001	-0.03	0.013
264	100	0.003	-0.026	0.017

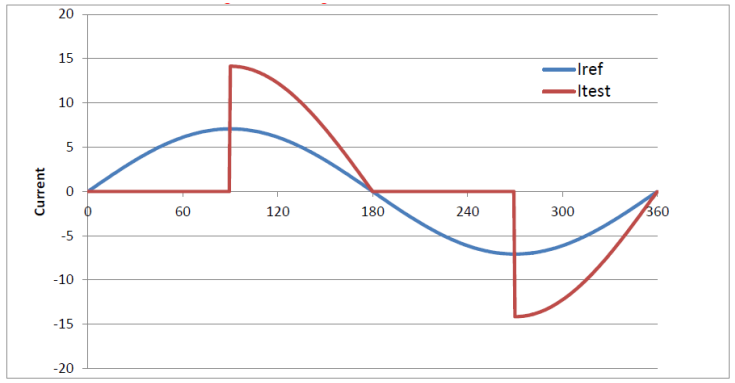
Power offset enabled (0.009Wh/cycle).
Meter scaled to 260A. Integration period: 1 second.

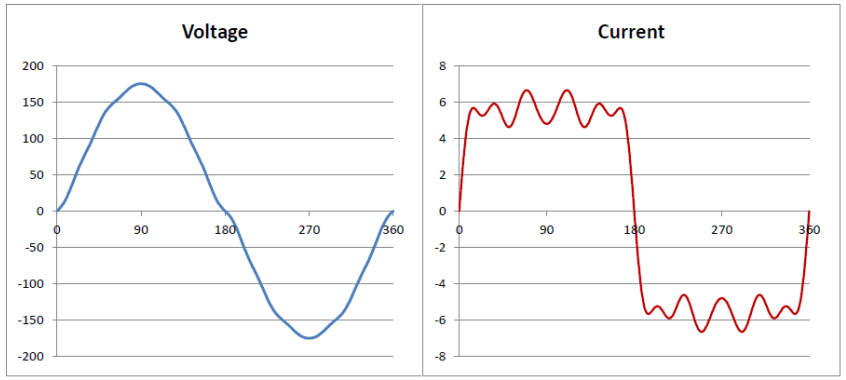
Conclusion: The system voltage will not influent the metrology performance.

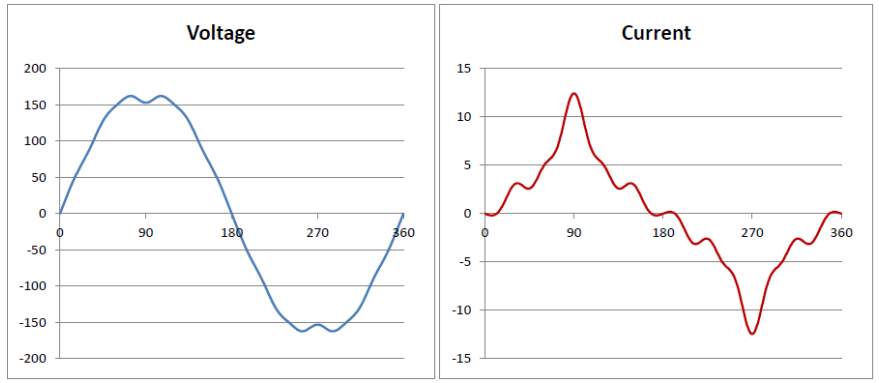
MICROCHIP

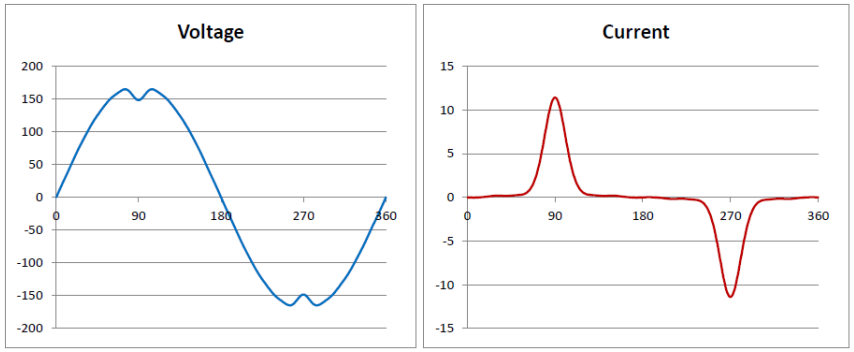
Harmonic performance

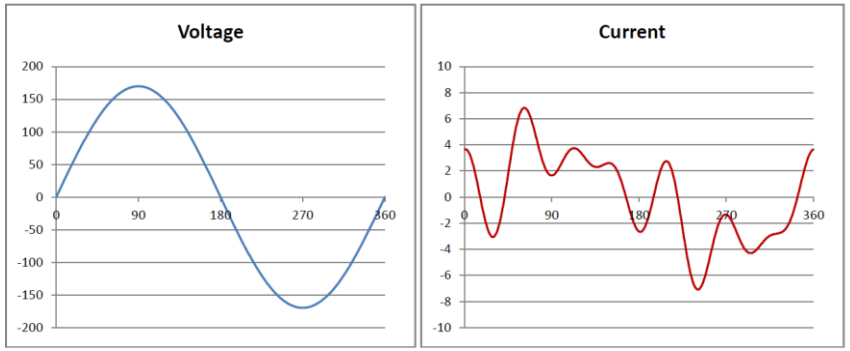
ANSI Harmonics Definitions. Waveforms summary

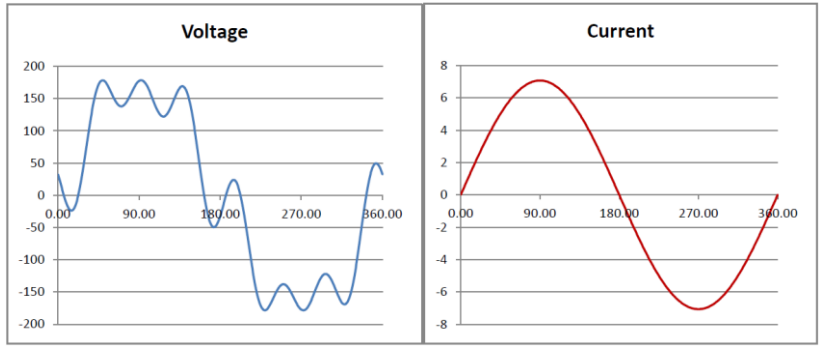










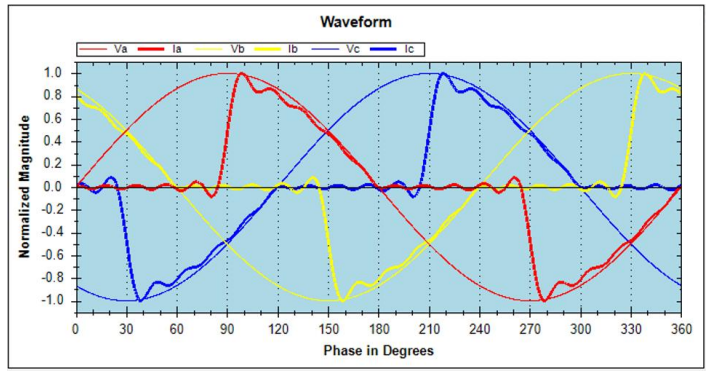


MICROCHIP

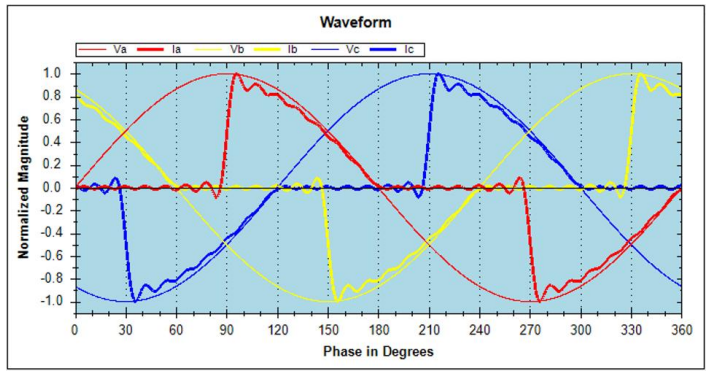
Harmonic performance

ANSI Harmonics Definitions. Waveforms detail

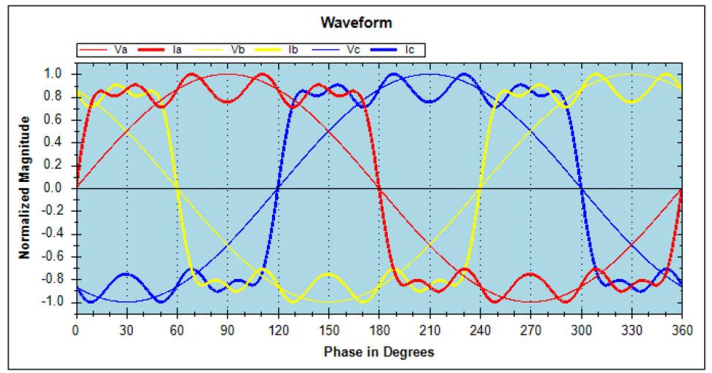
Phase Controlled – 90 Degree



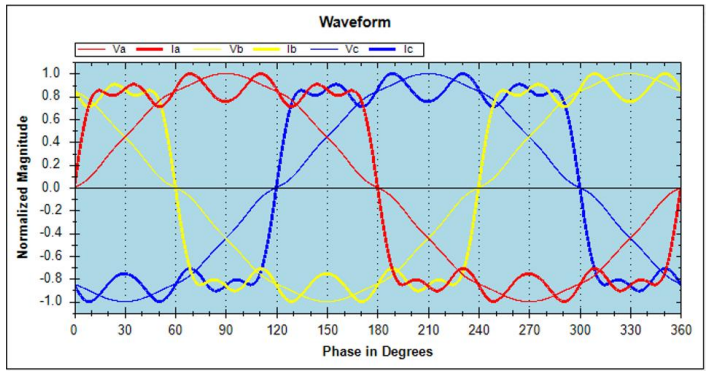
ANSI C12.1-2024 4.7.4.1 and ANSI C12.20-2015 5.5.6.1 – Condition 2



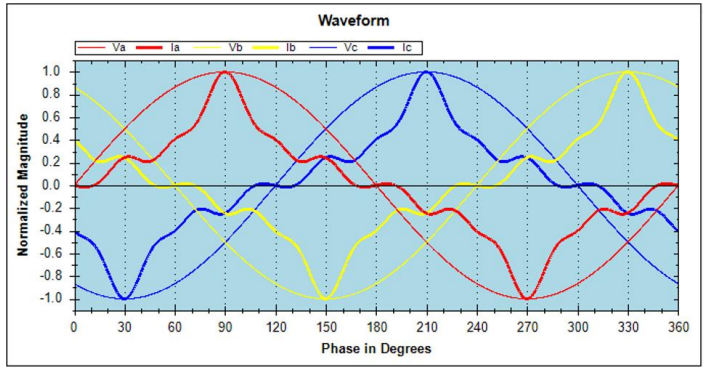
ANSI C12.1-2024 4.7.4.2 and C12.20-2015 5.5.6.2 – Condition 2



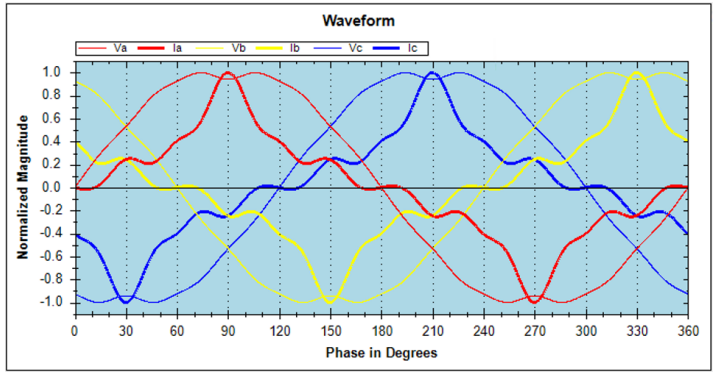
ANSI C12.1-2024 4.7.4.2 and C12.20-2015 5.5.6.2 – Condition 3



ANSI C12.1-2024 4.7.4.3 and C12.20-2015 5.5.6.3 – Condition 2



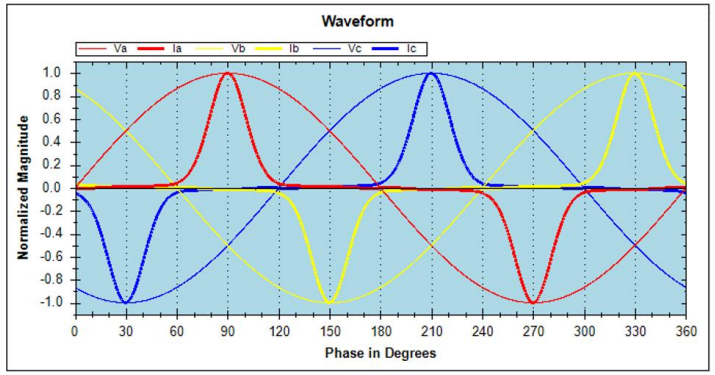
ANSI C12.1-2024 4.7.4.3 and C12.20-2015 5.5.6.3 – Condition 3



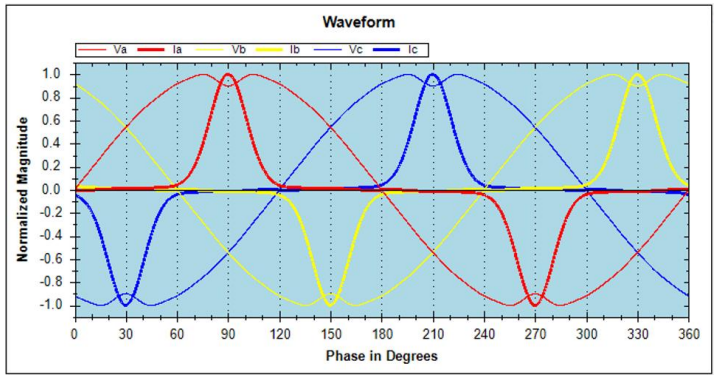
Harmonic performance

ANSI Harmonics Definitions. Waveforms detail

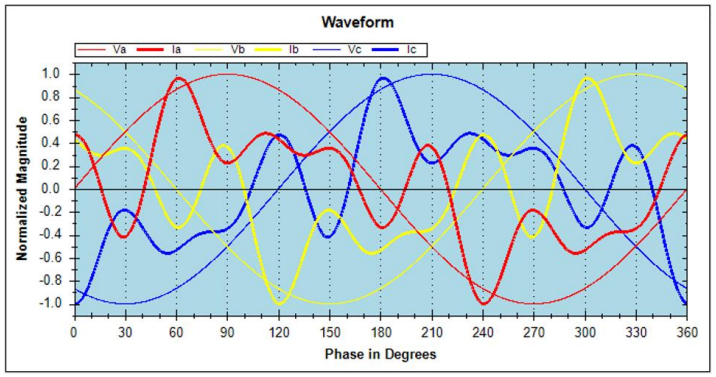
ANSI C12.1-2024 4.7.4.4 and C12.20-2015 5.5.6.4 – Condition 2



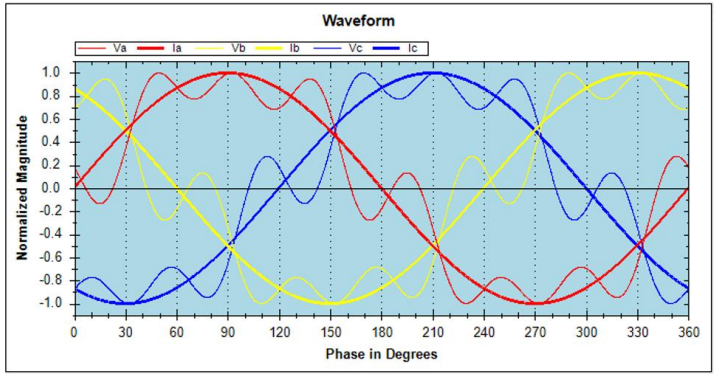
ANSI C12.1-2024 4.7.4.4 and C12.20-2015 5.5.6.4 – Condition 3



ANSI C12.1-2024 4.7.4.5 and C12.20-2015 5.5.6.5 – Condition 2



ANSI C12.1-2024 4.7.4.6 and C12.20-2015 5.5.6.6 – Condition 2



MICROCHIP

Harmonic performance

PIC32CXMTSH-Rev2.

Fundamental Frequency = 50Hz

ERROR (%)	VOLTAGE (V)	CURRENT(A)	PHASE(º)	FREQ	HARMONIC DEFINITION
0.005	220	30	0	50	Default (Sine)
0.01	220	30	0	50	PhaseControlled - 90 Degree
0.004	220	30	0	50	Default (Sine)
0.01	220	30	0	50	ANSI C12.20-2015 5.5.6.1 - Condition 2
0.005	220	30	0	50	Default (Sine)
0.004	220	30	0	50	ANSI C12.20-2015 5.5.6.2 - Condition 2
0.004	220	30	0	50	ANSI C12.20-2015 5.5.6.2 - Condition 3
0.005	220	30	0	50	Default (Sine)
0.007	220	30	0	50	ANSI C12.20-2015 5.5.6.3 - Condition 2
0.009	220	30	0	50	ANSI C12.20-2015 5.5.6.3 - Condition 3
0.007	220	30	0	50	Default (Sine)
0.009	220	30	0	50	ANSI C12.20-2015 5.5.6.4 - Condition 2
0.01	220	30	0	50	ANSI C12.20-2015 5.5.6.4 - Condition 3
0.006	220	30	0	50	Default (Sine)
0.008	220	30	0	50	ANSI C12.20-2015 5.5.6.5 - Condition 2
0.006	220	30	0	50	Default (Sine)
006	220	30	0	50	ANSI C12.20-2015 5.5.6.6 - Condition 2

Fundamental Frequency = 60Hz

ERROR (%)	VOLTAGE (V)	CURRENT(A)	PHASE(º)	FREQ	HARMONIC DEFINITION
0.004	220	30	0	60	Default (Sine)
0.01	220	30	0	60	PhaseControlled - 90 Degree
0.004	220	30	0	60	Default (Sine)
0.009	220	30	0	60	ANSI C12.20-2015 5.5.6.1 - Condition 2
0.004	220	30	0	60	Default (Sine)
0.003	220	30	0	60	ANSI C12.20-2015 5.5.6.2 - Condition 2
0.002	220	30	0	60	ANSI C12.20-2015 5.5.6.2 - Condition 3
0.004	220	30	0	60	Default (Sine)
0.005	220	30	0	60	ANSI C12.20-2015 5.5.6.3 - Condition 2
0.006	220	30	0	60	ANSI C12.20-2015 5.5.6.3 - Condition 3
0.004	220	30	0	60	Default (Sine)
0.005	220	30	0	60	ANSI C12.20-2015 5.5.6.4 - Condition 2
0.007	220	30	0	60	ANSI C12.20-2015 5.5.6.4 - Condition 3
0.004	220	30	0	60	Default (Sine)
0.006	220	30	0	60	ANSI C12.20-2015 5.5.6.5 - Condition 2
0.005	220	30	0	60	Default (Sine)
0.005	220	30	0	60	ANSI C12.20-2015 5.5.6.6 - Condition 2

Harmonic performance

PIC32CXMTC-Rev2.

Fundamental Frequency = 50Hz

ERROR (%)	VOLTAGE (V)	CURRENT(A)	PHASE(º)	FREQ	HARMONIC DEFINITION
-0.006	220	30	0	50	Default (Sine)
-0.002	220	30	0	50	PhaseControlled - 90 Degree
-0.005	220	30	0	50	Default (Sine)
-0.001	220	30	0	50	ANSI C12.20-2015 5.5.6.1 - Condition 2
-0.005	220	30	0	50	Default (Sine)
-0.006	220	30	0	50	ANSI C12.20-2015 5.5.6.2 - Condition 2
-0.007	220	30	0	50	ANSI C12.20-2015 5.5.6.2 - Condition 3
-0.005	220	30	0	50	Default (Sine)
-0.006	220	30	0	50	ANSI C12.20-2015 5.5.6.3 - Condition 2
-0.004	220	30	0	50	ANSI C12.20-2015 5.5.6.3 - Condition 3
-0.005	220	30	0	50	Default (Sine)
-0.005	220	30	0	50	ANSI C12.20-2015 5.5.6.4 - Condition 2
-0.003	220	30	0	50	ANSI C12.20-2015 5.5.6.4 - Condition 3
-0.006	220	30	0	50	Default (Sine)
-0.004	220	30	0	50	ANSI C12.20-2015 5.5.6.5 - Condition 2
-0.007	220	30	0	50	Default (Sine)
-0.006	220	30	0	50	ANSI C12.20-2015 5.5.6.6 - Condition 2

Fundamental Frequency = 60Hz

ERROR (%)	VOLTAGE (V)	CURRENT(A)	PHASE(º)	FREQ	HARMONIC DEFINITION
-0.001	220	30	0	60	Default (Sine)
0.004	220	30	0	60	PhaseControlled - 90 Degree
-0.001	220	30	0	60	Default (Sine)
0.004	220	30	0	60	ANSI C12.20-2015 5.5.6.1 - Condition 2
-0.001	220	30	0	60	Default (Sine)
-0.001	220	30	0	60	ANSI C12.20-2015 5.5.6.2 - Condition 2
-0.001	220	30	0	60	ANSI C12.20-2015 5.5.6.2 - Condition 3
-0.001	220	30	0	60	Default (Sine)
0	220	30	0	60	ANSI C12.20-2015 5.5.6.3 - Condition 2
0.001	220	30	0	60	ANSI C12.20-2015 5.5.6.3 - Condition 3
0	220	30	0	60	Default (Sine)
0.001	220	30	0	60	ANSI C12.20-2015 5.5.6.4 - Condition 2
0.003	220	30	0	60	ANSI C12.20-2015 5.5.6.4 - Condition 3
-0.002	220	30	0	60	Default (Sine)
0.001	220	30	0	60	ANSI C12.20-2015 5.5.6.5 - Condition 2
-0.001	220	30	0	60	Default (Sine)
-0.001	220	30	0	60	ANSI C12.20-2015 5.5.6.6 - Condition 2

Harmonic performance

PIC32CXMTC-Rev2 + MCP3912 (flying wires)

Fundamental Frequency = 50Hz

ERROR (%)	VOLTAGE (V)	CURRENT(A)	PHASE(º)	FREQ	HARMONIC DEFINITION
0.006	220	30	0	50	Default (Sine)
0.012	220	30	0	50	PhaseControlled - 90 Degree
0.006	220	30	0	50	Default (Sine)
0.008	220	30	0	50	ANSI C12.20-2015 5.5.6.1 - Condition 2
0.011	220	30	0	50	Default (Sine)
0	220	30	0	50	ANSI C12.20-2015 5.5.6.2 - Condition 2
0.004	220	30	0	50	ANSI C12.20-2015 5.5.6.2 - Condition 3
0.014	220	30	0	50	Default (Sine)
0.014	220	30	0	50	ANSI C12.20-2015 5.5.6.3 - Condition 2
0.012	220	30	0	50	ANSI C12.20-2015 5.5.6.3 - Condition 3
0.011	220	30	0	50	Default (Sine)
-0.002	220	30	0	50	ANSI C12.20-2015 5.5.6.4 - Condition 2
-0.003	220	30	0	50	ANSI C12.20-2015 5.5.6.4 - Condition 3
0.011	220	30	0	50	Default (Sine)
0.005	220	30	0	50	ANSI C12.20-2015 5.5.6.5 - Condition 2
0.006	220	30	0	50	Default (Sine)
0.008	220	30	0	50	ANSI C12.20-2015 5.5.6.6 - Condition 2

Fundamental Frequency = 60Hz

ERROR (%)	VOLTAGE (V)	CURRENT(A)	PHASE(º)	FREQ	HARMONIC DEFINITION
0.001	220	30	0	60	Default (Sine)
0.008	220	30	0	60	PhaseControlled - 90 Degree
0.003	220	30	0	60	Default (Sine)
0.009	220	30	0	60	ANSI C12.20-2015 5.5.6.1 - Condition 2
0.003	220	30	0	60	Default (Sine)
0.002	220	30	0	60	ANSI C12.20-2015 5.5.6.2 - Condition 2
0.003	220	30	0	60	ANSI C12.20-2015 5.5.6.2 - Condition 3
0.003	220	30	0	60	Default (Sine)
0.005	220	30	0	60	ANSI C12.20-2015 5.5.6.3 - Condition 2
0.006	220	30	0	60	ANSI C12.20-2015 5.5.6.3 - Condition 3
0.002	220	30	0	60	Default (Sine)
0.007	220	30	0	60	ANSI C12.20-2015 5.5.6.4 - Condition 2
0.009	220	30	0	60	ANSI C12.20-2015 5.5.6.4 - Condition 3
0.002	220	30	0	60	Default (Sine)
0.006	220	30	0	60	ANSI C12.20-2015 5.5.6.5 - Condition 2
0.003	220	30	0	60	Default (Sine)
0.001	220	30	0	60	ANSI C12.20-2015 5.5.6.6 - Condition 2

Harmonic performance

PIC32CXMTC (Multichannel board) + MCP3913

Fundamental Frequency = 50Hz

ERROR (%)	VOLTAGE (V)	CURRENT(A)	PHASE(º)	FREQ	HARMONIC DEFINITION
-0.002	220	30	0	50	Default (Sine)
-0.002	220	30	0	50	PhaseControlled - 90 Degree
-0.002	220	30	0	50	Default (Sine)
-0.001	220	30	0	50	ANSI C12.20-2015 5.5.6.1 - Condition 2
-0.001	220	30	0	50	Default (Sine)
-0.002	220	30	0	50	ANSI C12.20-2015 5.5.6.2 - Condition 2
-0.001	220	30	0	50	ANSI C12.20-2015 5.5.6.2 - Condition 3
0	220	30	0	50	Default (Sine)
0.001	220	30	0	50	ANSI C12.20-2015 5.5.6.3 - Condition 2
0.002	220	30	0	50	ANSI C12.20-2015 5.5.6.3 - Condition 3
-0.001	220	30	0	50	Default (Sine)
0.003	220	30	0	50	ANSI C12.20-2015 5.5.6.4 - Condition 2
0.004	220	30	0	50	ANSI C12.20-2015 5.5.6.4 - Condition 3
0	220	30	0	50	Default (Sine)
0.002	220	30	0	50	ANSI C12.20-2015 5.5.6.5 - Condition 2
0	220	30	0	50	Default (Sine)
0	220	30	0	50	ANSI C12.20-2015 5.5.6.6 - Condition 2

Fundamental Frequency = 60Hz

ERROR (%)	VOLTAGE (V)	CURRENT(A)	PHASE(º)	FREQ	HARMONIC DEFINITION
-0.006	220	30	0	60	Default (Sine)
-0.003	220	30	0	60	PhaseControlled - 90 Degree
-0.006	220	30	0	60	Default (Sine)
-0.004	220	30	0	60	ANSI C12.20-2015 5.5.6.1 - Condition 2
-0.007	220	30	0	60	Default (Sine)
-0.007	220	30	0	60	ANSI C12.20-2015 5.5.6.2 - Condition 2
-0.006	220	30	0	60	ANSI C12.20-2015 5.5.6.2 - Condition 3
-0.006	220	30	0	60	Default (Sine)
-0.003	220	30	0	60	ANSI C12.20-2015 5.5.6.3 - Condition 2
-0.003	220	30	0	60	ANSI C12.20-2015 5.5.6.3 - Condition 3
-0.005	220	30	0	60	Default (Sine)
-0.001	220	30	0	60	ANSI C12.20-2015 5.5.6.4 - Condition 2
-0.002	220	30	0	60	ANSI C12.20-2015 5.5.6.4 - Condition 3
-0.006	220	30	0	60	Default (Sine)
-0.003	220	30	0	60	ANSI C12.20-2015 5.5.6.5 - Condition 2
-0.006	220	30	0	60	Default (Sine)
-0.006	220	30	0	60	ANSI C12.20-2015 5.5.6.6 - Condition 2

MICROCHIP

Harmonic performance

PIC32CXMTC (Multichannel board) + MCP3914

Fundamental Frequency = 50Hz

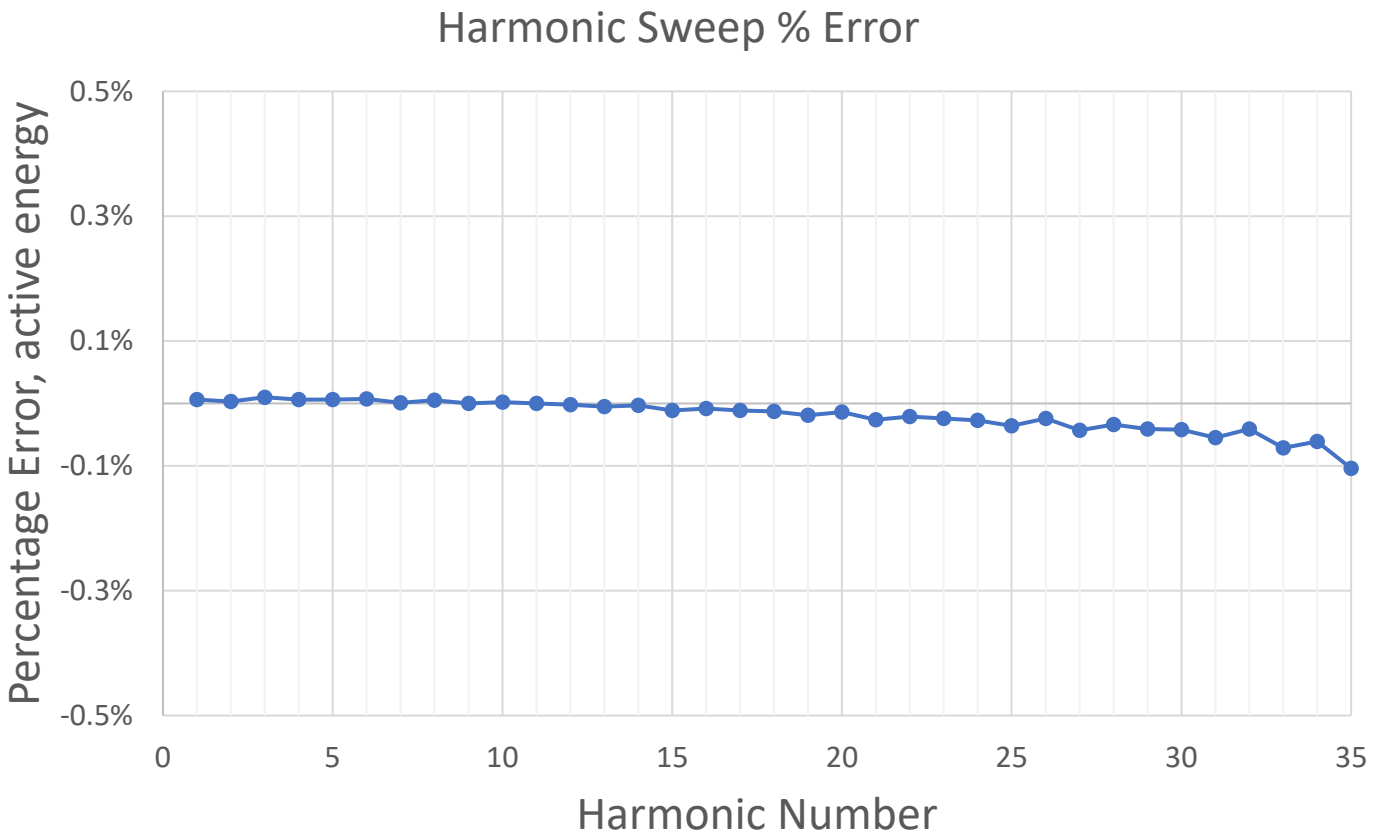
ERROR (%)	VOLTAGE (V)	CURRENT(A)	PHASE(º)	FREQ	HARMONIC DEFINITION
-0.006	220	30	0	50	Default (Sine)
-0.002	220	30	0	50	PhaseControlled - 90 Degree
-0.005	220	30	0	50	Default (Sine)
-0.001	220	30	0	50	ANSI C12.20-2015 5.5.6.1 - Condition 2
-0.005	220	30	0	50	Default (Sine)
-0.006	220	30	0	50	ANSI C12.20-2015 5.5.6.2 - Condition 2
-0.007	220	30	0	50	ANSI C12.20-2015 5.5.6.2 - Condition 3
-0.005	220	30	0	50	Default (Sine)
-0.006	220	30	0	50	ANSI C12.20-2015 5.5.6.3 - Condition 2
-0.004	220	30	0	50	ANSI C12.20-2015 5.5.6.3 - Condition 3
-0.005	220	30	0	50	Default (Sine)
-0.005	220	30	0	50	ANSI C12.20-2015 5.5.6.4 - Condition 2
-0.003	220	30	0	50	ANSI C12.20-2015 5.5.6.4 - Condition 3
-0.006	220	30	0	50	Default (Sine)
-0.004	220	30	0	50	ANSI C12.20-2015 5.5.6.5 - Condition 2
-0.007	220	30	0	50	Default (Sine)
-0.006	220	30	0	50	ANSI C12.20-2015 5.5.6.6 - Condition 2

Fundamental Frequency = 60Hz

ERROR (%)	VOLTAGE (V)	CURRENT(A)	PHASE(º)	FREQ	HARMONIC DEFINITION
0.003	220	30	0	60	Default (Sine)
0.003	220	30	0	60	PhaseControlled - 90 Degree
0.004	220	30	0	60	Default (Sine)
0.002	220	30	0	60	ANSI C12.20-2015 5.5.6.1 - Condition 2
0.003	220	30	0	60	Default (Sine)
0.002	220	30	0	60	ANSI C12.20-2015 5.5.6.2 - Condition 2
0.002	220	30	0	60	ANSI C12.20-2015 5.5.6.2 - Condition 3
0.003	220	30	0	60	Default (Sine)
0.005	220	30	0	60	ANSI C12.20-2015 5.5.6.3 - Condition 2
0.005	220	30	0	60	ANSI C12.20-2015 5.5.6.3 - Condition 3
0.003	220	30	0	60	Default (Sine)
0.007	220	30	0	60	ANSI C12.20-2015 5.5.6.4 - Condition 2
0.007	220	30	0	60	ANSI C12.20-2015 5.5.6.4 - Condition 3
0.004	220	30	0	60	Default (Sine)
0.006	220	30	0	60	ANSI C12.20-2015 5.5.6.5 - Condition 2
0.004	220	30	0	60	Default (Sine)
0.003	220	30	0	60	ANSI C12.20-2015 5.5.6.6 - Condition 2

Single Harmonic Sweep

PIC32CXMTSH-Rev2. Fundamental Frequency = 50Hz.



- I_fundamental = 100%
- V_fundamental = 100%

- I_harmonic = 40%
- V_harmonic = 25%

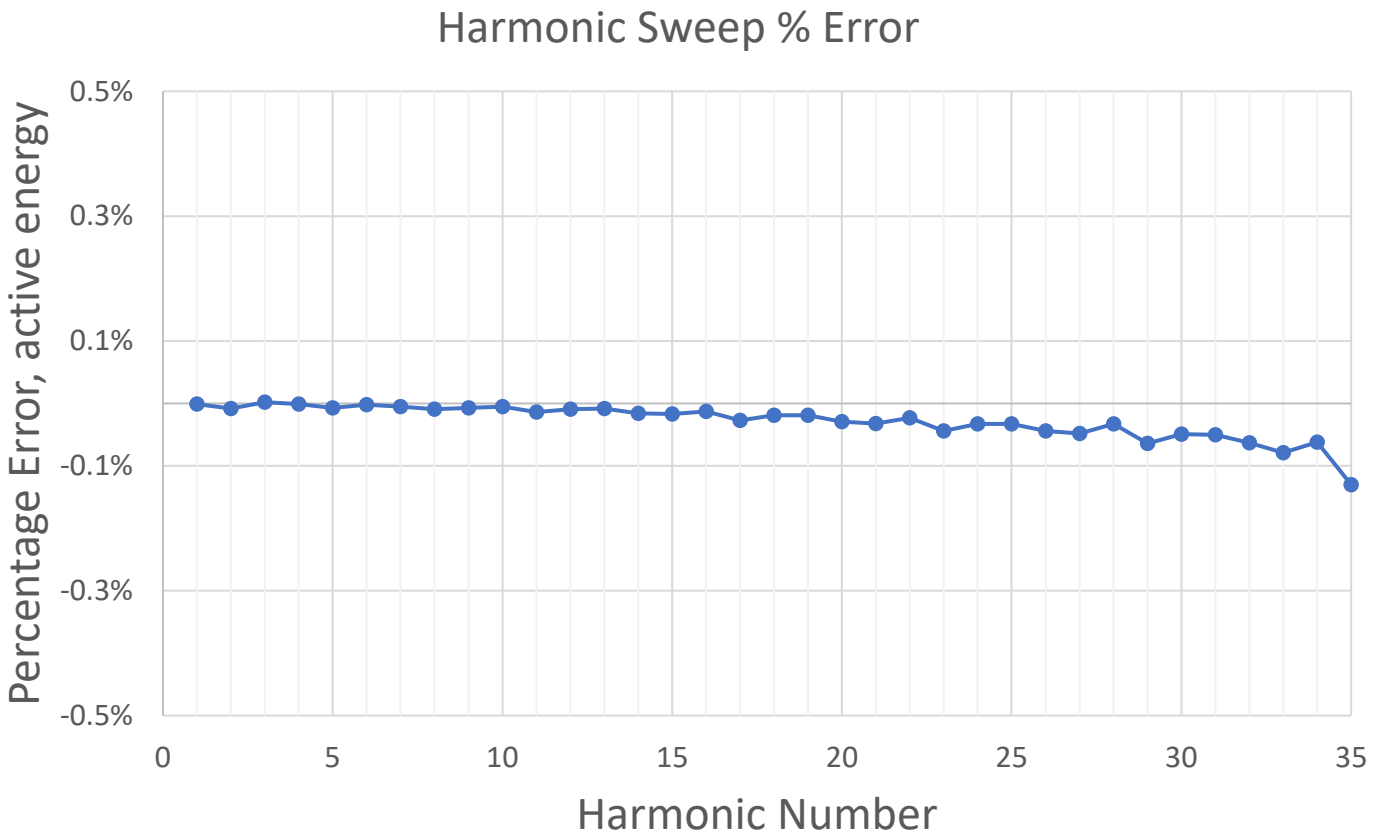
- $\frac{\text{P\_harmonic}}{\text{P\_fundamental}} = 10\%$

Test conditions:
WECO 4330X, 30A, 220V
f_fundamental = 50Hz
2ΘNetwork Meter

MICROCHIP

Single Harmonic Sweep

PIC32CXMTC-Rev2. Fundamental Frequency = 50Hz.



- I_fundamental = 100%
- V_fundamental = 100%

- I_harmonic = 40%
- V_harmonic = 25%

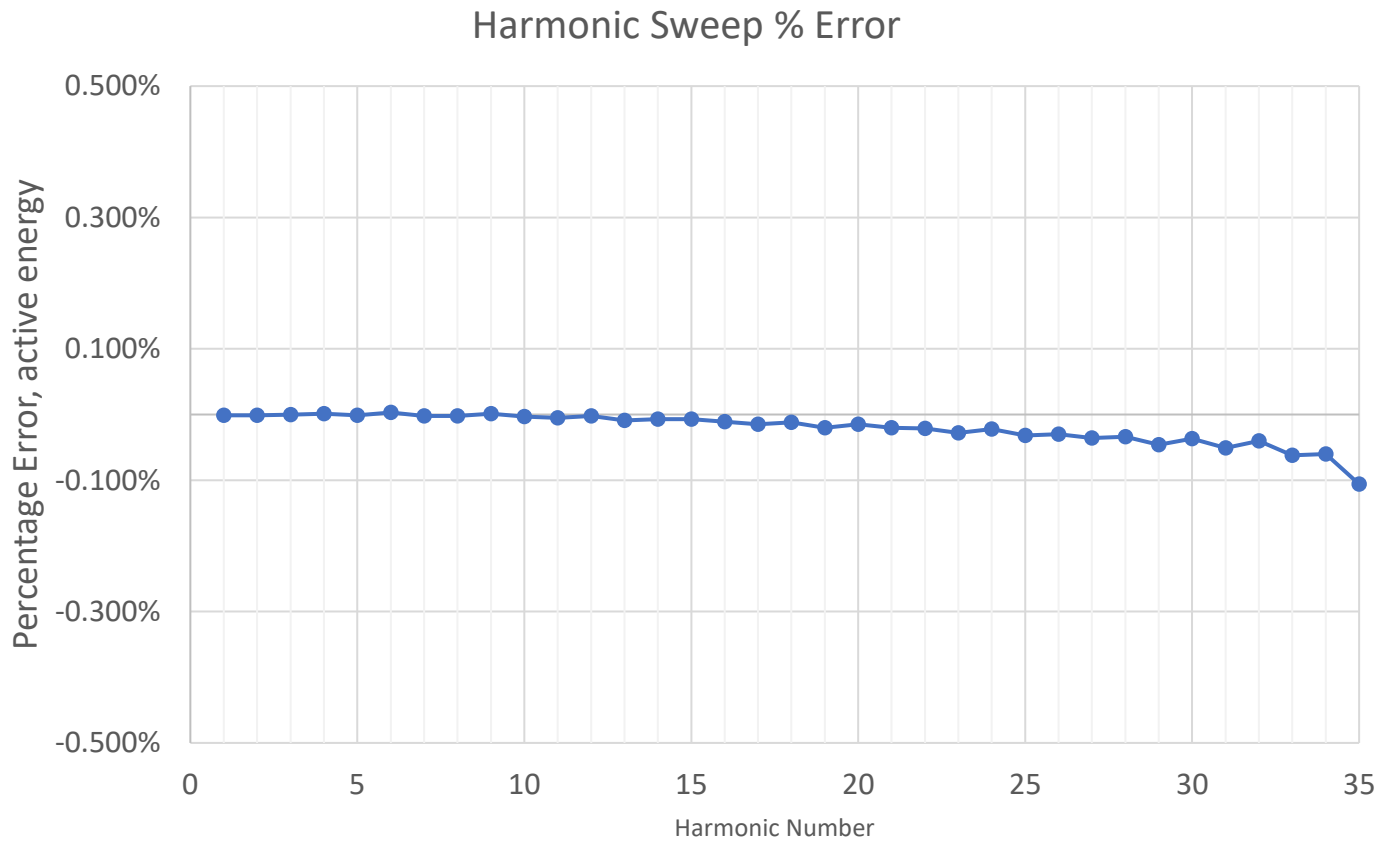
- $\frac{\text{P\_harmonic}}{\text{P\_fundamental}} = 10\%$

Test conditions:
WECO 4330X, 30A, 220V
f_fundamental = 50Hz
3ΘNetwork Meter

MICROCHIP

Single Harmonic Sweep

PIC32CXMTC (Multichannel board) + MCP3913. Fund. Freq = 50Hz.



- I_fundamental = 100%
- V_fundamental = 100%

- I_harmonic = 40%
- V_harmonic = 25%

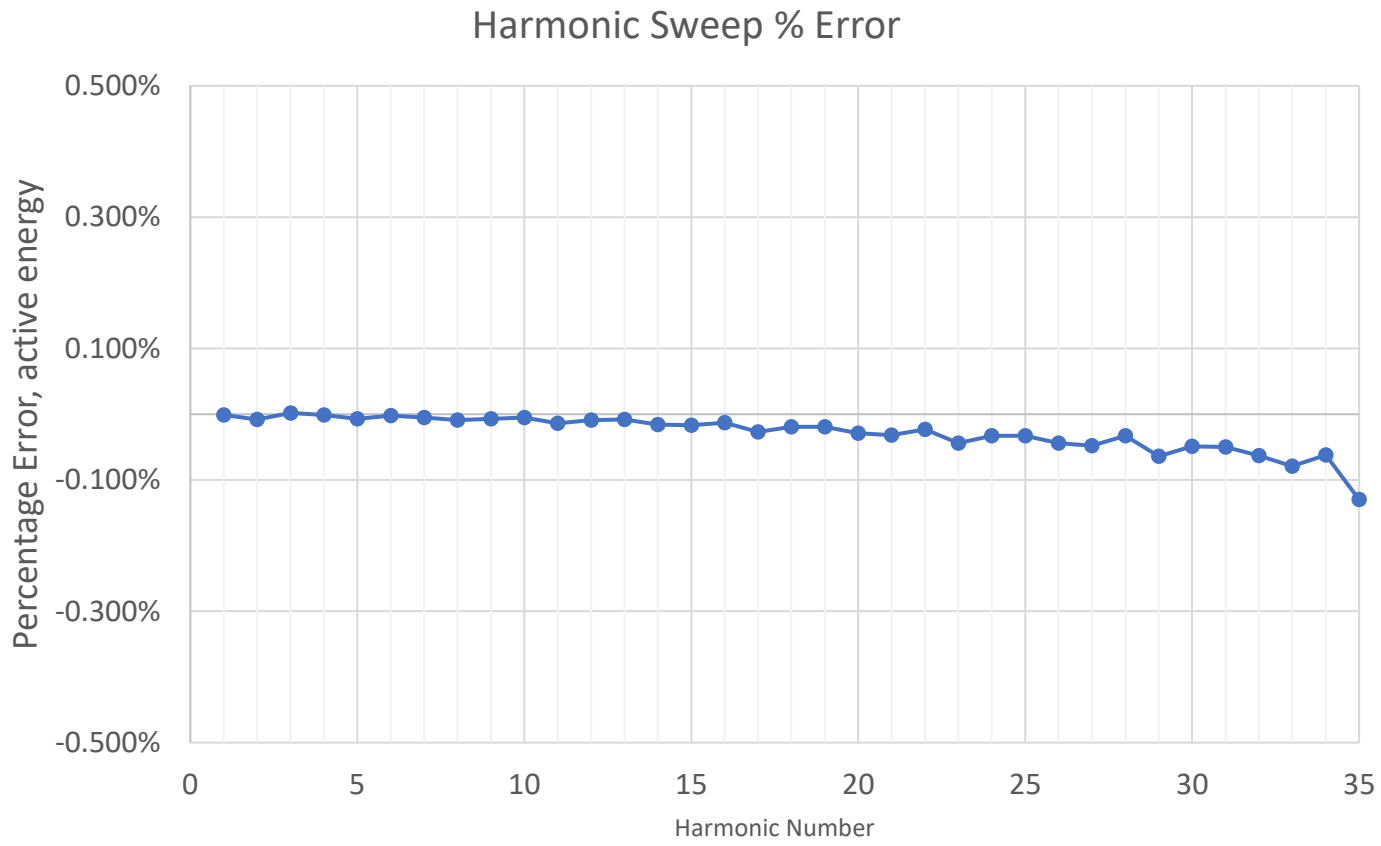
- $\frac{\text{P\_harmonic}}{\text{P\_fundamental}} = 10\%$

Test conditions:
WECO 4330X, 30A, 220V
f_fundamental = 50Hz
3ΘNetwork Meter

MICROCHIP

Single Harmonic Sweep

PIC32CXMTC (Multichannel board) + MCP3914. Fund. Freq = 50Hz.



- I_fundamental = 100%
- V_fundamental = 100%

- I_harmonic = 40%
- V_harmonic = 25%

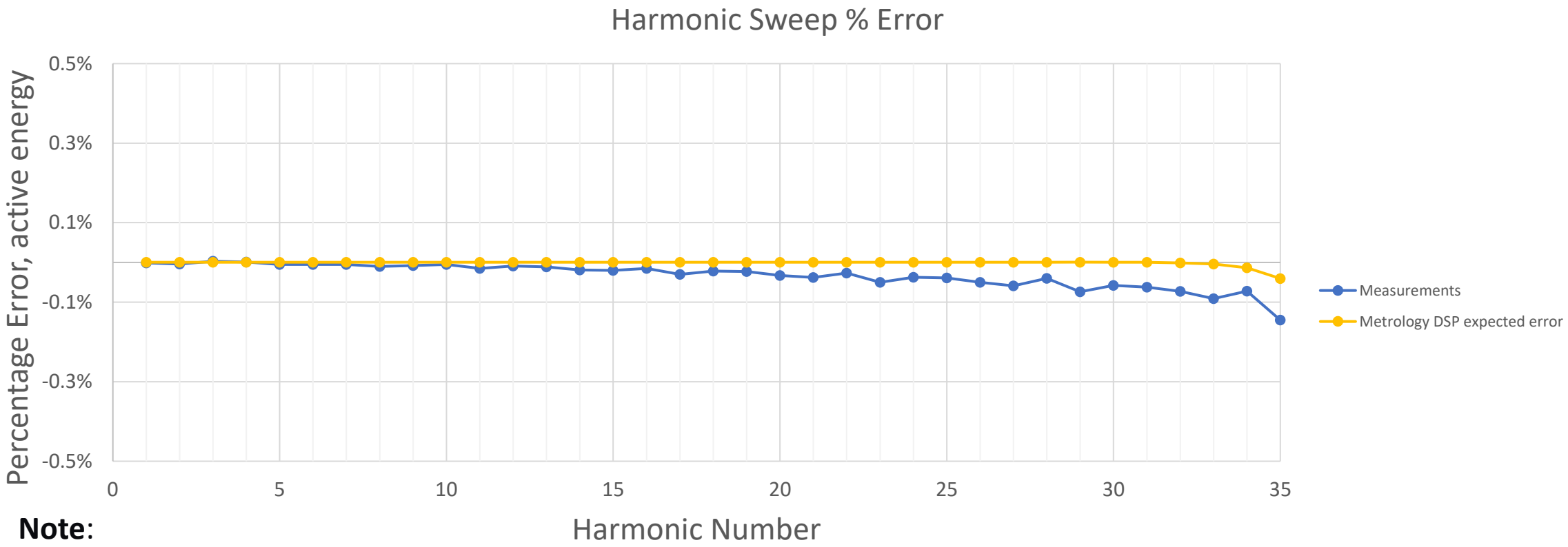
- $\frac{\text{P\_harmonic}}{\text{P\_fundamental}} = 10\%$

Test conditions:
WECO 4330X, 30A, 220V
f_fundamental = 50Hz
3ΘNetwork Meter

MICROCHIP

Single Harmonic Sweep

Effect of anti-aliasing filters in measurement performance



Note:

- The anti-aliasing filter, having a cut-off frequency of approx. 16kHz, is affecting the accuracy of the high-order harmonics measurements.
- This is due to the attenuation of the RC filter in the measurement bandwidth.
- For applications where high accuracy in the high-order harmonics measurements is needed it could be useful to modify the cut-off frequency of the anti-aliasing filter.