



RTM75 Total Harmonic Distortion Test

Test Report

Version 0.2

15 January 2021

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1 TEST INFORMATION

Test name:	Total Harmonic Distortion																																								
Test Specification	IEC61000-3-4, Cl.4.2 Harmonic Current Measurement																																								
	The harmonic current limits for equipment as specified apply to line currents for all types of power connections and load. Individual harmonic currents below 0,6 % of the input fundamental current are disregarded. The current I_1 in tables 1 to 3 is the fundamental component of the rated equipment current. Test conditions for the measurement or calculation of harmonic currents are given in clause 7. a) Harmonic currents lasting for not more than 10s when a piece of equipment is brought into operation or is taken out of operation, manually or automatically, shall not exceed 1,5 times the limit values given for the relevant stage. b) The limits in tables 1 to 3 are applicable to all other harmonic currents occurring during the evaluation of equipment or parts of equipment in accordance with clause 7. However, for even harmonic currents of order from 2 to 10 and odd harmonic currents of order from 3 to 19, values up to 1,5 times the limits in tables 1 to 3 are allowed for each harmonic during a maximum of 10 % of any observation period of 2,5 min. Table 1 – Stage 1 current emission values for simplified connection of equipment ($S_{\text{equ}} \leq S_{\text{sc}}/33$) <table><tr><th>Harmonic number n</th><th>Admissible harmonic current $I_n/I_1^* \%$</th><th>Harmonic number n</th><th>Admissible harmonic current $I_n/I_1^* \%$</th></tr><tr><td>3</td><td>21,6</td><td>21</td><td>$\leq 0,6$</td></tr><tr><td>5</td><td>10,7</td><td>23</td><td>0,9</td></tr><tr><td>7</td><td>7,2</td><td>25</td><td>0,8</td></tr><tr><td>9</td><td>3,8</td><td>27</td><td>$\leq 0,6$</td></tr><tr><td>11</td><td>3,1</td><td>29</td><td>0,7</td></tr><tr><td>13</td><td>2</td><td>31</td><td>0,7</td></tr><tr><td>15</td><td>0,7</td><td>≥ 33</td><td>$\leq 0,6$</td></tr><tr><td>17</td><td>1,2</td><td></td><td></td></tr><tr><td>19</td><td>1,1</td><td>Even</td><td>$\leq 8/n$ or $\leq 0,6$</td></tr></table> * I_1 = rated fundamental current; I_n = harmonic current component.	Harmonic number n	Admissible harmonic current $I_n/I_1^* \%$	Harmonic number n	Admissible harmonic current $I_n/I_1^* \%$	3	21,6	21	$\leq 0,6$	5	10,7	23	0,9	7	7,2	25	0,8	9	3,8	27	$\leq 0,6$	11	3,1	29	0,7	13	2	31	0,7	15	0,7	≥ 33	$\leq 0,6$	17	1,2			19	1,1	Even	$\leq 8/n$ or $\leq 0,6$
Harmonic number n	Admissible harmonic current $I_n/I_1^* \%$	Harmonic number n	Admissible harmonic current $I_n/I_1^* \%$																																						
3	21,6	21	$\leq 0,6$																																						
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7	7,2	25	0,8																																						
9	3,8	27	$\leq 0,6$																																						
11	3,1	29	0,7																																						
13	2	31	0,7																																						
15	0,7	≥ 33	$\leq 0,6$																																						
17	1,2																																								
19	1,1	Even	$\leq 8/n$ or $\leq 0,6$																																						
Description of EUT:	TRI153-75-01 RTM75 User Unit Serial: 000000021, Build: 2020-12 TRI149 VP DCDC Serial: 000000022, Build: 2020-11 TRI149 VP DCDC Serial: 000000023, Build: 2020-11 TRI149 VP DCDC Serial: 000000016, Build: 2020-11 Converdan VP ACDC Serial: 800108M19341P004, Build: 2020																																								

Test name:	Total Harmonic Distortion			
	Converdan VP ACDC Serial: 800108M19341P003, Build: 2020			
EUT Ratings	Input 400V 3ØΔ, 114A, 50 Hz, / 480V 3ØΔ, 95A, 60 Hz Output 75 kW, 200 - 920 Vdc, 188A			
Test dates:	Start:	13 January 2021	Finish:	13 January 2021
Test conditions	Temperature	28°C	Humidity	65% RH
Test location:	Tritium, 48 Miller St, Murarrie QLD 4172, Australia			
Tester:	P.McWilliams, R.Aftab			

Equipment used	Make Model	ID#	Notes / Calibration
Measuring instruments	Hyundai Ioniq	Model 2018	
	Hioki Power Analyzer PW3198	SN: 130119246	TR Calibration Report dated 21-09-20



Photo of Hioki Power Analyzer PW3198

2 TEST PROCEDURE

2.1 Method

1. Install the voltage probes and current clamps of the Hioki Power Analyzer onto the RTM75s input circuit.
2. Turn on the RTM75 and prepare for normal operation.
3. Start a charge session, power will be determined by the vehicle demand.
4. Record the Total Harmonic Distortion (THD) from the Hioki PW3198.

3 TEST RESULTS

3.1 Recorded Results:

IEC 61000-3-4, Cl.4.2/Tritium RTM-75 specifications	Total Harmonic Distortion					
Phase	A	B	C			
Rated voltage (V)	400.88	399.93	396.84			
Rated current (A)	97.26	96.95	96.62			
Power Factor	0.9996	0.9997	0.9998			
U_{thd} (%)	1.49	1.41	1.14			
I_{thd} (%)	2.224	2.395	2.153			
Number of harmonics	I (A)			I (%)		
	A	B	C	A	B	C
1 st	96.54	95.84	95.11	100	100	100
2 nd	0.11	0.22	0.17	0.18	0.23	0.20
3 rd	0.29	0.50	0.19	0.31	0.46	0.22
4 th	0.07	0.04	0.05	0.05	0.05	0.06
5 th	1.69	1.23	1.24	1.41	1.28	1.34
6 th	0.05	0.01	0.01	0.01	0.00	0.01
7 th	0.86	1.60	1.34	1.43	1.72	1.39
8 th	0.04	0.01	0.02	0.02	0.02	0.03
9 th	0.16	0.10	0.04	0.13	0.08	0.04
10 th	0.01	0.01	0.01	0.03	0.02	0.02
11 th	0.72	0.54	0.51	0.52	0.56	0.56
12 th	0.01	0.01	0.01	0.01	0.02	0.01
13 th	0.35	0.48	0.47	0.47	0.51	0.49
14 th	0.01	0.00	0.01	0.01	0.01	0.01
15 th	0.03	0.04	0.06	0.03	0.04	0.06
16 th	0.01	0.00	0.00	0.01	0.00	0.00
17 th	0.18	0.32	0.31	0.32	0.35	0.32
18 th	0.02	0.01	0.00	0.00	0.00	0.01
19 th	0.26	0.10	0.06	0.12	0.09	0.06

20 th	0.01	0.00	0.01	0.01	0.01	0.01
21 st	0.05	0.06	0.04	0.04	0.05	0.05
22 nd	0.01	0.01	0.00	0.00	0.01	0.00
23 rd	0.14	0.19	0.17	0.17	0.20	0.18
24 th	0.01	0.00	0.01	0.00	0.00	0.01
25 th	0.17	0.20	0.20	0.24	0.21	0.23
26 th	0.01	0.00	0.00	0.00	0.00	0.00
27 th	0.02	0.05	0.03	0.02	0.05	0.03
28 th	0.01	0.01	0.01	0.01	0.01	0.01
29 th	0.18	0.11	0.09	0.12	0.13	0.10
30 th	0.01	0.00	0.00	0.00	0.00	0.00
31 st	0.09	0.09	0.11	0.13	0.09	0.11
32 nd	0.01	0.00	0.00	0.00	0.00	0.01
33 rd	0.04	0.01	0.02	0.03	0.02	0.01
34 th	0.00	0.01	0.01	0.00	0.01	0.01
35 th	0.06	0.12	0.13	0.07	0.12	0.12
36 th	0.01	0.00	0.00	0.00	0.00	0.00
37 th	0.11	0.07	0.05	0.10	0.07	0.06
38 th	0.00	0.01	0.00	0.01	0.01	0.00
39 th	0.03	0.03	0.04	0.03	0.03	0.05
40 th	0.01	0.00	0.01	0.00	0.00	0.01
41 st	0.05	0.06	0.04	0.03	0.05	0.05
42 nd	0.01	0.00	0.01	0.01	0.00	0.01
43 rd	0.06	0.07	0.06	0.06	0.07	0.08
44 th	0.01	0.00	0.00	0.00	0.00	0.00
45 th	0.02	0.02	0.03	0.02	0.02	0.05
46 th	0.01	0.00	0.00	0.00	0.00	0.00
47 th	0.07	0.10	0.07	0.08	0.10	0.07
48 th	0.00	0.01	0.00	0.01	0.00	0.00
49 th	0.07	0.06	0.06	0.07	0.06	0.05
50 th	0.01	0.01	0.01	0.00	0.01	0.01
Supplementary information: Hyundai IONIQ Max Power during charging: 62kW Hyundai IONIQ Max Current during charging: 171A						

All Harmonics below IEC 61000-3-4: **PASS**
THD below IEC 61000-3-4 limits: **PASS**
PWHD below IEC 61000-3-4 limits: **PASS**

Tested by:	Raza Aftab	Date of testing:	13 January 2021
Reviewed by;	John Gorman	Review Date:	15 January 2021

4 REVISION RECORD

Rev	Date	TC #	Change
0.1	13 JAN 2021		First draft
0.2	15 JAN 2021		Reviewed