



VERIFICATION OF CONFORMITY

S/N: 026189

No.: **ICR/VC/HS2607242**

Name and address of Applicant

Name and address of manufacturer:

Product name: Solar road signs

Product types: see page 2/2

Product trademark: n/a

Verification was carried within following scope:

Information on the Declaration of Conformity:

Result:	Legislation:	Standard:
1. Legislation: The <i>Health Protection Act 2003</i> and the <i>Health Protection (Coronavirus) Regulations 2020</i> provide the legal framework for public health measures. 2. Standard: The <i>Health Protection (Coronavirus) Regulations 2020</i> set out the legal basis for public health measures.	1. Legislation: The <i>Health Protection Act 2003</i> and the <i>Health Protection (Coronavirus) Regulations 2020</i> provide the legal framework for public health measures. 2. Standard: The <i>Health Protection (Coronavirus) Regulations 2020</i> set out the legal basis for public health measures.	1. Legislation: The <i>Health Protection Act 2003</i> and the <i>Health Protection (Coronavirus) Regulations 2020</i> provide the legal framework for public health measures. 2. Standard: The <i>Health Protection (Coronavirus) Regulations 2020</i> set out the legal basis for public health measures.

✓ CPR [(EU) 305/2011] EN 12899-1:2007
EN 12966:2014+A1:2018
EN 1235:1995+A1:2003

The assessment process has been carried out in accordance with individual rules and conditions agreed with the applicant
Evaluation has been carried out in accordance with:

Test report: SRSTCF0707-CPR

Tests conducted by:

Issue date: 24.07.2026

Expiration date: 23.07.2031

Remarks:

- VoC was issued on voluntary basis and does not imply meeting all essential requirements listed in Declaration of Conformity.
- For introducing this product on European market may be needed EC/EU-type examination conducted by appropriate Notified Body.



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CEO

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VERIFICATION OF CONFORMITY

S/N: 026189

No.: **ICR/VC/HS2607242**

Product name:

Solar road signs

Product types:

WDM-DKB600*800-Z/Y-01-Y, WDM-DKB800-XS-01-RY-60,
WDM-DKB800-STOP-04-Y, WDM-DKB800*800-FD-01-YW,
WDM-DKB1000-RX-C125-YG, WDM-DKB600-XS-01-RY-30,
WDM-DKB600-XS-01-RY-50, WDM-DKB600-XS-01-RY-20, WDM-DKB600-stop,
WDM-DKB600-Giveway, WDM-DKB600-Roundabout, WDM-DKB600-Pedestrian,
WDM-DKB600-Hump, WDM-DKB600-Children,
WDM-DKB600-XS-01-RY-20_79498 - TQ SEÑAL LED VELOCIDAD MÁXIMA 20KM/H 12/24H,
WDM-DKB600-XS-01-RY-30_79652 - TQ SEÑAL LED VELOCIDAD MÁXIMA 30KM/H12/24H,
WDM-DKB600-XS-01-RY-50_79653 - TQ SEÑAL LED VELOCIDAD MÁXIMA50KM/H 12/24H,
WDM-DKB600-stop_79655 - TQ SEÑAL LED STOP 12H/24H,
WDM-DKB600-Giveaway_79498 - TQ SEÑAL LED CEDA EL PASO 12H/24H,
WDM-DKB600-Roundabout_79656 - TQ SEÑAL LED ROTONDA 12H/24H,
WDM-DKB600-Pedestrian_79650 - TQ SEÑAL LED PEATON 12H/24H,
WDM-DKB600-Hump_79651 - TQ SEÑAL LED PELIGRO RESALTO 12H/24H,
WDM-DKB600-Children_79654 - TQ SEÑAL LED ESCOLAR 12H/24H

Remarks:

- VoC was issued on voluntary basis and does not imply meeting all essential requirements listed in Declaration of Conformity.
- For introducing this product on European market may be needed EC/EU-type examination conducted by appropriate Notified Body.



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Technical Construction File

File No.: SRSTCF0707-CPR

Type of Equipment:	Solar road signs
Model No.:	WDM-DKB600*800-Z/Y-01-Y,WDM-DKB800-XS-01-RY-60,WDM-DKB800-STOP-04-Y,WDM-DKB800*800-FD-01-YW,WDM-DKB1000-RX-C125-YG,WDM-DKB600-XS-01-RY-30,WDM-DKB600-XS-01-RY-50,WDM-DKB600-XS-01-RY-20,WDM-DKB600-stop,WDM-DKB600-Giveway,WDM-DKB600-Roundabout,WDM-DKB600-Pedestrian,WDM-DKB600-Hump,WDM-DKB600-Children,WDM-DKB600-XS-01-RY-20_79498 - TQ SEÑAL LED VELOCIDAD MÁXIMA 20KM/H 12/24H,WDM-DKB600-XS-01-RY-30_79652- TQ SEÑAL LED VELOCIDAD MÁXIMA 30KM/H 12/24H,WDM-DKB600-XS-01-RY-50_79653 - TQ SEÑAL LED VELOCIDAD MÁXIMA 50KM/H 12/24H,WDM-DKB600-stop_79655 - TQ SEÑAL LED STOP 12H/24H,WDM-DKB600-Giveaway_79498 - TQ SEÑAL LED CEDA EL PASO 12H/24H,WDM-DKB600-Roundabout_79656 - TQ SEÑAL LED ROTONDA 12H/24H,WDM-DKB600-Pedestrian_79650 - TQ SEÑAL LED PEATON 12H/24H,WDM-DKB600-Hump_79651 - TQ SEÑAL LED PELIGRO RESALTO 12H/24H,WDM-DKB600-Children_79654 - TQ SEÑAL LED ESCOLAR 12H/24H
Issued Date:	2026-07-23
Brand Name/Trade mark:	---
Directive(S)	Construction products Regulation (EU) No 305/2011
standard(s):	EN 12899-1:2007,EN 12966:2014+A1:2018, EN 1235:1995/A1:2003



Presented by

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EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
1	Scope		
	This document specifies requirements and test methods for new Variable Message Signs (VMS). VMS comprise two types, continuous and discontinuous signs: - continuous signs are those that are similar to fixed signs, the only difference being that by some electro-mechanical means they can show various messages. This document covers the performance requirements for Variable Message Signs used for the instruction and guidance of road users on public and private land, including tunnels. In this document a number of different performance requirements (visual performance, EMC, environmental performance, etc) are covered, as well as durability. The EMC, safety and environmental requirements for both types of VMS are included in this document together with the visual performance for the discontinuous types VMS. The visual performance for continuous signs and "externally illuminated" discontinuous signs which are externally illuminated is covered by EN 12899-1. This document defines performance limits and a range of performance classes for both sign assemblies without vertical support and assemblies complete with vertical support. Not covered by this document are: a) sign gantries, cantilevers and foundations; "deleted text" b) signal heads; c) sizes and shapes of VMS messages; d) control units and monitoring units unless inside the test module; e) sign luminance control. The control of the luminance of luminous signs with respect to the ambient light is not covered by this standard."		P
2	Normative references		-
	The following referenced documents are indispensable for the application of this document. For dated		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.		
3	Terms and definitions		-
	For the purposes of this document, the terms and definitions given in "CIE 15:2004" and CIE 17.4:1987 and the following apply		P
3.1	backing-board surround to the VMS, used depending on local circumstances, providing improved visibility of the VMS by means of broadening its size and by providing suitable visible contrast with the VMS background		- P
3.2	cantilever support support system with a single post and a cantilever arm supporting VMS(s) mounted over the traffic lane(s)		P
3.3	control device equipment used to execute a change of message other than by purely manual means		P
3.4	display surface visible part of a VMS that contains the elements that may be activated to display the message		P
3.5	element basic visual light emitting and/or reflecting object or cluster of objects in the display surface of a VMS, activated in conjunction with other elements to form the desired message		P
3.6	equivalent area see Annex A : Equivalent area		P
3.7	front panel visible part of a sign comprising the display surface; and the backing-board when this is integrated in the front of the VMS		P
3.8	front screen screen protecting the display surface or the parts of it against dust, water, etc.		P
3.9	gantry support system spanning a carriageway with one or more posts on each side of the carriageway supporting VMS mounted over the traffic lanes		P
3.10	horizontal reference plane horizontal plane containing the reference axis, when the VMS is positioned in such a way that the		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	reference axis is horizontal		
3.11	lay-out physical arrangement of characters (text) and symbols, on the display surface		P
3.12	luminance ratio (LR) ratio of luminance emitted from the sign in the ON state compared to the luminance in the OFF state. Luminance ratio shall be calculated as follows:		P
$LR = \frac{L_a - L_b}{L_b}$ where L_a is the measured luminance of the sign in the ON-state when under external illumination; L_b is the measured luminance of the sign in the OFF-state when under external illumination			
3.13	3.13.1 matrix grid whose intersections hold the centre of the elements used in a VMS. A matrix may cover the whole display surface or part of it. Axes X and Y of the grid may or may not be orthogonal 3.13.2 irregular matrix spacing of intersections on either X or Y or both axes is not constant 3.13.3 regular matrix spacing of intersections on the X and Y axes is constant but may be different		P
3.14	message configuration consisting of symbols and/or text		P
3.15	reference axis axis originating on the reference centre of the test module being perpendicular to the front of it, unless otherwise defined by the manufacturer		P
3.16	reference centre point on or near the test module which is designated to be the centre of the device for specifying its performance and which shall be defined by the manufacturer		P
3.17	test angles horizontal test angle is the angle between the test axis and the vertical reference plane; and the vertical test angle is the angle between the test axis and the horizontal reference plane		P
3.18	test axis line from the reference centre of the test module to		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	the luminance meter head		
3.19	variable message sign (VMS) sign for the purpose of displaying one of a number of messages that may be changed or switched on or off as required		P
3.20	vertical reference plane vertical plane containing the reference axis		P
3.21	VMS background part of environmental scenery, which, to the viewer, immediately surrounds the VMS		P
4	Dimensions and tolerances		
	The limits related to performance requirements and tests specified and defined in this document are minimum or maximum values as stated. Dimensions, shape and other physical parameters, character sizes, tolerances and character spacing shall be as required by the purchaser. The dimensions of the characters and symbols shall be defined using equivalent area as detailed in Annex A.		P
5	General design requirements		
	The manufacturer shall provide a maintenance manual. This shall include details of routine maintenance recommendations of spare parts and details of estimated lifetime of components. The design shall ensure that all maintenance activities can be easily carried out. The manufacturer shall also offer a maintenance service if required. All parts of the sign shall be securely connected to the VMS housing		P
6	Materials		
	Materials used for housings and front panels shall be resistant to corrosion in accordance with EN 12899-1:2001, 5.3.5 and shall conform to the European Standard for the appropriate material where it exists. Manufacturers using materials not covered by European Standards shall demonstrate the durability of the material by reference to an appropriate European technical assessment.		P
7	Visual performance		

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003																				
Clause	Requirement-Test	Result-Remark	Verdict																	
7.1	Classification																			
	The manufacturer shall declare the relevant class designations for his products. This shall be in accordance with those photometric parameter classes listed in Table 1.		P																	
Table 1 — Class designation of the photometric parameters of the VMS																				
<table><tr><th>Photometric parameter</th><th>Class designation</th><th>Remarks</th></tr><tr><td>Colour</td><td>C1, C2</td><td>C2 is the more restrictive</td></tr><tr><td rowspan="2">Luminance (L_a)</td><td>L1, L2, L3, L3(*)</td><td>L3 has the highest luminance (*) for specific situations</td></tr><tr><td>L1(T), L2(T), L3(T)</td><td>These classes are for tunnel use</td></tr><tr><td>Luminance ratio (LR)</td><td>R1, R2, R3</td><td>R3 has the highest luminance ratio</td></tr><tr><td>Beam width</td><td>B1, B2, B3, B4, B5, B6, B7</td><td>B7 has the widest beam</td></tr></table>				Photometric parameter	Class designation	Remarks	Colour	C1, C2	C2 is the more restrictive	Luminance (L_a)	L1, L2, L3, L3(*)	L3 has the highest luminance (*) for specific situations	L1(T), L2(T), L3(T)	These classes are for tunnel use	Luminance ratio (LR)	R1, R2, R3	R3 has the highest luminance ratio	Beam width	B1, B2, B3, B4, B5, B6, B7	B7 has the widest beam
Photometric parameter	Class designation	Remarks																		
Colour	C1, C2	C2 is the more restrictive																		
Luminance (L_a)	L1, L2, L3, L3(*)	L3 has the highest luminance (*) for specific situations																		
	L1(T), L2(T), L3(T)	These classes are for tunnel use																		
Luminance ratio (LR)	R1, R2, R3	R3 has the highest luminance ratio																		
Beam width	B1, B2, B3, B4, B5, B6, B7	B7 has the widest beam																		
7.2	Colour																			
	The colour coordinates shall be measured in accordance with 9.3.5. The chromaticity of the colours is defined in accordance with the CIE 1931 Standard Colorimetric Observer as referenced in CIE publication 15.2. The chromaticity for the colours of the colour class C1 shall conform to Table 2. The chromaticity for the colours of the colour class C2 shall conform to Table 3. In Figure 1 these chromaticity areas are plotted in a CIE 1931 chromaticity diagram. The colour white/yellow shall not be used when there is a need to differentiate between white and yellow. When there is a need to differentiate between white and yellow the colours shall conform to the specified chromaticities in Table 2 or Table 3 for white and yellow respectively. The chromaticity limits in Table 2 and Table 3, with the exception of white/yellow, are recommended in CIE S 004 as colours for signal lights.		P																	

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003

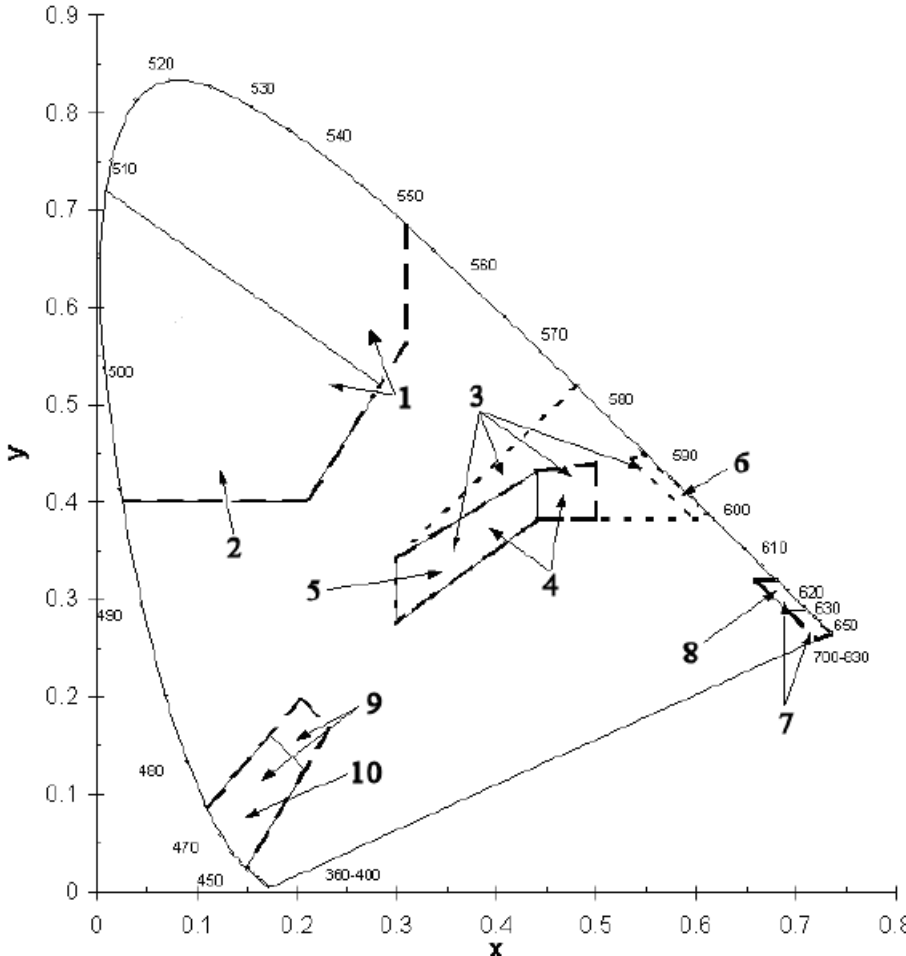
Clause	Requirement-Test	Result-Remark	Verdict
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Table 2 — Corner points (CIE 1931 chromaticity co-ordinates x, y) of the chromaticity areas for the colours of class C1

Colour	Colour co-ordinates						
	corner point =>	1	2	3	4	5	6
Red	x	0,660	0,680	0,735	0,721	-	-
	y	0,320	0,320	0,265	0,259	-	-
Yellow	x	0,536	0,547	0,613	0,593	-	-
	y	0,444	0,452	0,387	0,387	-	-
White	x	0,300	0,440	0,500	0,500	0,440	0,300
	y	0,342	0,432	0,440	0,382	0,382	0,276
White/yellow	x	0,479	0,300	0,300	0,440	0,618	
	y	0,520	0,342	0,276	0,382	0,382	
Green	x	0,310	0,310	0,209	0,028	-	-
	y	0,684	0,562	0,400	0,400	-	-
Blue	x	0,109	0,204	0,233	0,149	-	-
	y	0,087	0,196	0,167	0,025	-	-

Table 3 — Corner points (CIE 1931 chromaticity co-ordinates x, y) of the chromaticity areas for the colours of class C2

Colour	Colour co-ordinates					
	corner point = >	1	2	3	4	5
Red	x	0,660	0,680	0,710	0,690	-
	y	0,320	0,320	0,290	0,290	-
Yellow	x	0,536	0,547	0,613	0,593	-
	y	0,444	0,452	0,387	0,387	-
White	x	0,300	0,440	0,440	0,300	-
	y	0,342	0,432	0,382	0,276	-
White/yellow	x	0,479	0,300	0,300	0,440	0,618
	y	0,520	0,342	0,276	0,382	0,382
Green	x	0,009	0,284	0,209	0,028	-
	y	0,720	0,520	0,400	0,400	-
Blue	x	0,109	0,173	0,208	0,149	-
	y	0,087	0,160	0,125	0,025	-

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003																		
Clause	Requirement-Test	Result-Remark	Verdict															
	 Key <table><tr><td>--- Class C1 and C2</td><td>1 green C1</td><td>6 yellow C1, C2</td></tr><tr><td>- - Class C1</td><td>2 green C2</td><td>7 red C1</td></tr><tr><td>— Class C2</td><td>3 white/yellow C1, C2</td><td>8 red C2</td></tr><tr><td></td><td>4 white C1</td><td>9 blue C1</td></tr><tr><td></td><td>5 white C2</td><td>10 blue C2</td></tr></table> Figure 1 — Allowed chromaticity areas for the colour classes C1 and C2 plotted in the CIE 1931 chromaticity diagram			--- Class C1 and C2	1 green C1	6 yellow C1, C2	- - Class C1	2 green C2	7 red C1	— Class C2	3 white/yellow C1, C2	8 red C2		4 white C1	9 blue C1		5 white C2	10 blue C2
--- Class C1 and C2	1 green C1	6 yellow C1, C2																
- - Class C1	2 green C2	7 red C1																
— Class C2	3 white/yellow C1, C2	8 red C2																
	4 white C1	9 blue C1																
	5 white C2	10 blue C2																
7.3	Luminance																	
	!The luminance shall be measured in accordance with 9.3.2, under external illumination from a solar simulator and with the test module switched on. 'With settings prescribed by the manufacturer, the luminance values measured for the test module shall comply with those of the Tables 4a to 4f that are relevant for the colours produced by the test module.' For use in tunnels, only sign luminances corresponding to sign illuminances of 400 lx or less		P															

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003

Clause	Requirement-Test	Result-Remark	Verdict
	are required. These are designated (T) in Table 1. For specific situations (e.g. with the sun low in the sky) the purchaser can require that additional luminance and luminance ratios be measured with the external illumination set to 10 000 lx at 5°. This is denoted by an (*) in Tables 4a to Table 4f.		

Table 4a — Luminance (La) limits for white, on reference axis, for the luminance classes L1, L2, L3 and L3(*)

Sign illuminance (lx)	Luminance (cd/m ²)			
	Minimum			Maximum
	L3	L2	L1	L1, L2, L3
40 000	12 400	6 200	3 100	62 000
10 000	12 400 (*)	-	-	-
4 000	2 200	1 100	550	11 000
400	600	300	150	3 000
40	250	200	100	1 250
≤ 4	75	60	30	375

Table 4b — Luminance (La) limits for white/yellow, on reference axis, for the luminance classes L1, L2, L3 and L3(*)

Sign illuminance (lx)	Luminance (cd/m ²)			
	Minimum			Maximum
	L3	L2	L1	L1, L2, L3
40 000	10 540	5 270	2 635	52 700
10 000	10 540 (*)	-	-	-
4 000	1 870	935	468	9 350
400	510	255	128	2 550
40	213	170	85	1 065
≤ 4	64	51	26	320

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003

Clause	Requirement-Test	Result-Remark	Verdict
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**Table 4c — Luminance (La) limits for yellow, on reference axis,
for the luminance classes L1, L2, L3 and L3(*)**

Sign illuminance (lx)	Luminance (cd/m ²)			
	Minimum			Maximum
	L3	L2	L1	L1, L2, L3
40 000	7 440	3 720	1 860	37 200
10 000	7 440 (*)	-	-	-
4 000	1 320	660	330	6 600
400	360	180	90	1 800
40	150	120	60	750
≤ 4	45	36	18	225

**Table 4d — Luminance (La) limits for green, on reference axis,
for the luminance classes L1, L2, L3 and L3(*)**

Sign illuminance (lx)	Luminance (cd/m ²)			
	Minimum			Maximum
	L3	L2	L1	L1, L2, L3
40 000	3 720	1 860	930	18 600
10 000	3 720 (*)	-	-	-
4 000	660	330	165	3 300
400	180	90	45	900
40	75	60	30	375
≤ 4	23	18	9.0	115

**Table 4e — Luminance (La) limits for red, on reference axis,
for the luminance classes L1, L2, L3 and L3(*)**

Sign illuminance (lx)	Luminance (cd/m ²)			
	Minimum			Maximum
	L3	L2	L1	L1, L2, L3
40 000	3 100	1 550	775	15 500
10 000	3 100 (*)	-	-	-
4 000	550	275	138	2 750
400	150	75	38	750
40	63	50	25	315
≤ 4	19	15	7.5	95

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003				
Clause	Requirement-Test		Result-Remark	Verdict
Table 4f — Luminance (La) limits for blue, on reference axis, for the luminance classes L1, L2, L3 and L3(*)				
Sign illuminance (lx)	Luminance (cd/m ²)			
	Minimum			Maximum
	L3	L2	L1	L1, L2, L3
40 000	1 240	620	310	6 200
10 000	1 240 (*)	-	-	-
4 000	220	110	55	1 100
400	60	30	15	300
40	25	20	10	125
≤ 4	7,5	6,0	3,0	37,5
	!Additionally, for" classes L3, L3(*) and L2, the sign shall achieve the relevant luminance values without the external illumination (solar simulator OFF) when the sign is set for the 40 000 lx test. When the tunnel sign is set for the 400 lx test, the sign shall achieve the relevant luminance values without the external illumination (solar simulator OFF).			P
7.4	Luminance ratio			
	The minimum luminance ratios for the various colours shall be in accordance with Table 5. The luminance ratio values shall be maintained for all illuminances between 400 lx and 40 000 lx. The test angles are dependent on the beam width class, see 7.5 and !9.3.2.3". ⇒ between 400 lx and 40 000 lx ⇒ ratio ≥ 400 lx, and ratio ≤ 40 000 lx			P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003

Clause	Requirement-Test	Result-Remark	Verdict
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Table 5 — Minimum luminance ratios (LR) for various colours and classes R1, R2 and R3, at test angles on the reference axis and off the reference axis

Colour	Minimum luminance ratio					
	R3		R2		R1	
	on reference axis	off reference axis	on reference axis	off reference axis	on reference axis	off reference axis
White	16,7	8,35	10	5	5	3
white/yellow	14,2	7,1	8,5	4,25	4,25	2,55
Yellow	10	5	6	3	3	1.8
Green	5	2,5	3	1,5	1,5	0,9
Red	4,2	2,1	2,5	1,25	1,25	0,75
Blue	1,7	0,85	1	0,5	0,5	0,3

7.5 Beam width

Beam width shall be measured in accordance with 9.3.3.

!Within the beam width angles, the measured luminance shall not be lower than 50 % of the measured luminance on the reference axis. Table 6 shows the seven beam width classes."

At all angles the luminance shall not be more than 150 % of the measured luminance on the reference axis.

!deleted text"

Any measured luminance at any angle shall not exceed the maximum luminance in accordance with Tables 4a to 4f.

!NOTE 1 Figure 2 shows examples of passed and not passed luminance distributions for the white/yellow colour, class luminance L3, and beam width class B2 at a sign illuminance of 40 000 lx.

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EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	Key 1 = minimum luminance at reference axis 2 = maximum luminance at reference axis A1 deleted text A1 3 = maximum luminance at all angles 4 = lower limit (50 % of L_{mes}) 5 = upper limit (150 % of L_{mes}) 6 = passed distributions 7 = not passed distributions 8 = horizontal angle (degrees) 9 = luminance ($\text{cd}\cdot\text{m}^{-2}$) Figure 2— Examples of passed and not passed luminance distributions for class luminance L3, colour white/yellow, and beam width class B2 at a sign illuminance of 40 000 lx		
	The luminance for this colour at the reference axis should be in the range 10 540 to 52 700 cd/m^2. Suppose the actual measured luminance at the reference axis obeys this requirement and is 30 000 cd/m^2. Then the maximum luminance at all other angles is $1,5 \cdot 30\,000 = 45\,000 \text{ cd}/\text{m}^2$. The minimum luminance at within the beam width angles shall not be lower than $0,5 \cdot 30\,000 = 15\,000 \text{ cd}/\text{m}^2$. Outside the beam width angles the luminance is allowed to be zero, but never larger than 52 700 cd/m^2."		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003

Clause	Requirement-Test	Result-Remark	Verdict
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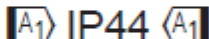
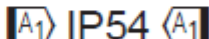
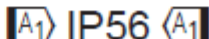
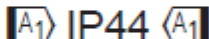
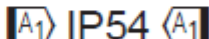
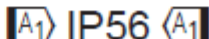
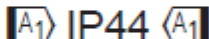
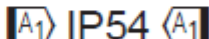
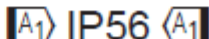
Table 6 — Test angles for the various beam width classes

Beam width class	Test angles (degrees)	
	Horizontal	Vertical
B1	-5	0
	+5	0
	0	-5
B2	-7	0
	+7	0
	0	-5
B3	-10	0
	+10	0
	0	-5
B4	-10	0
	+10	0
	0	-10
B5	-15	0
	+15	0
	0	-5
B6	-15	0
	+15	0
	0	-10
B7	-30	0
	+30	0
	0	-20

Class B7 is only recommended for specific applications.

7.6	Uniformity		
	Uniformity measurements shall be done in accordance with 9.3.4. For the luminous intensities of any individual element of the test module the ratio of the average output from the highest 12 % of the elements, to the lowest 12 %, shall be less than 3:1. The ratio of the average output from the highest 4 % of the elements, to the lowest 4 %, shall be less than 5:1. The number of elements in consideration shall be		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	rounded to the next highest whole number. The luminous intensity uniformity shall apply to for each separate colour.		
7.7	Visible flicker		
	When the light sources of a test module are operating in a pulse mode, no light flicker shall be visible. In the case of doubt, the frequency of the light emitted shall be measured. This frequency shall not be less than 90 Hz.		P
8	Physical performance		
8.1	Classification		
	The environmental parameter classes for test modules are listed in Table 7.		P
Table 7 — Class designation of environmental parameters			
Environmental parameters		Class designation	Remarks
A1 Protection		P1, P2, P3	P3 is the most restrictive A1
Pollution		D1, D2, D3, D4	D4 is the most restrictive
Protection		P1, P2, P3	P3 is the most restrictive
8.2	Environmental requirements		
8.2.1	Temperature		
	One of the following temperature classes shall be selected:		P
Table 8 — Temperature range classes			
Class	ambient temperature (°C)		
	Minimum	Maximum	
T1	-15	+60	
T2	-25	+55	
T3	-40	+40	
	Temperature performance of the test module shall be tested in accordance with 9.2.3 as relevant to the specific class.		P
8.2.2	Resistance of electrical / electronic components to the effects of pollution		
	The manufacturer shall !declare" the degree of resistance to pollution in accordance with EN		P

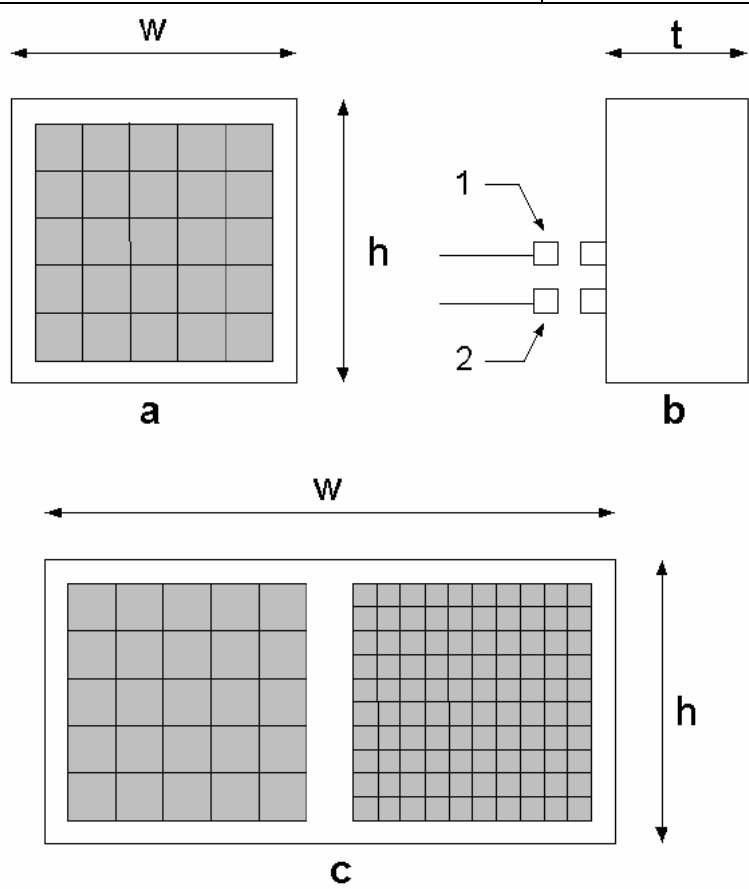
EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003											
Clause	Requirement-Test	Result-Remark	Verdict								
	60664-1. !deleted text"										
8.2.3	Resistance to corrosion										
	Test modules with a pollution degree level of 2, 3 or 4 shall be tested in accordance with 9.2.3, Table 15.		P								
8.2.4	Degrees of protection provided by enclosures (IP-level)										
	Test modules containing exposed electrical equipment shall be protected according to Table 9 (IP code as required by EN 60529:1991 Category 2) and !test modules with a pollution degree level of 2, 3 or 4 shall" be tested in accordance with 9.2.3, Table 16 and Table 17.		P								
Table 9 — Ingress protection level classes <table><tr><th>Class</th><th>Ingress Protection Level</th></tr><tr><td>P1</td><td> IP44 </td></tr><tr><td>P2</td><td> IP54 </td></tr><tr><td>P3</td><td> IP56 </td></tr></table>				Class	Ingress Protection Level	P1	 IP44 	P2	 IP54 	P3	 IP56 
Class	Ingress Protection Level										
P1	 IP44 										
P2	 IP54 										
P3	 IP56 										
8.3	Structural performance										
8.3.1	General										
	!VMS shall be designed to ensure reliable transfer of all static and dynamic forces to the fixing and mounting structures. The walls of the housing shall be designed to satisfy the static requirements." The structural performance of VMS including their supports and fixings - excluding cantilevers and gantries - shall be in accordance with EN 12899-1.		P								
8.3.2	Resistance to horizontal Loads										
	8.3.2.1 Loads The loads shall be in accordance with EN 12899-1. 8.3.2.2 Deflections Deflections shall be in accordance with EN 12899-1.		P								
8.3.3	Passive safety for VMS support										
	If the manufacturer is declaring passive safety, the VMS supports shall comply with one of the classes of		P								

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	EN 12767. If passive safety is not declared, the VMS supports shall be considered as Class 0 of EN 12767.		
8.3.4	Impact resistance		
	!The test modules shall be capable of withstanding impact, and shall be tested in accordance with 9.2.3 Table 13. After the test the test module front panel or parts of it shall show no damage other than small indentations in the front surface; it shall exhibit no cracking. The test module shall continue to meet all the requirements of the standard."		P
8.3.5	Vibration resistance		
	The test modules shall be capable of withstanding vibration, and shall be tested in accordance with 9.2.3, Table 14.		P
8.4	Electrical requirements		
8.4.1	Electrical supply and limits		
8.4.1.1	Maximum power consumption		
	The manufacturer shall state the maximum power consumption of the VMS.		P
8.4.1.2	Nominal voltages		
	The standard nominal voltage for connection to the public supply shall be taken to be 230 VAC rms. single phase or 400 VAC rms. three phase.		P
8.4.1.3	Operating voltage range		
	Variations in the nominal supply voltage of –13 % to +10 % shall have no effect. This shall be tested in accordance with 9.2.2 Table 11 and Table 12.		P
8.4.1.4	Mains frequency		
	Variations within the frequency range (50 ± 1) Hz shall have no effect. This shall be tested in accordance with 9.2.2 Table 12.		P
8.4.1.5	Power up activation		
	The VMS shall become available for activation when the supply voltage reaches a value within its operating voltage range. At no time during power up activation shall partial, incomplete or false messages be displayed. This shall be tested in accordance with 9.2.2 Table		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	11 and Table 12.		
8.4.1.6	Low voltage		
	8.4.1.6.1 Switch off voltage response A drop in the nominal voltage of more than 13 % shall not cause partial, incomplete or false messages to be displayed or cause damage to the VMS. This shall be tested in accordance with 9.2.2 Table 11. 8.4.1.6.2 Voltage interruption In the event of short voltage interruptions in the supply of specific duration (see Table 10) the VMS shall operate as follows.		P
Table 10 — Effect of voltage interruption			
Duration (ms)		Effect	
Less than 50		No effect	
50 to less than 100		The VMS shall continue displaying the current message. The VMS may be affected by a variation of luminance during the voltage interruption.	
Greater than or equal to 100		Shut down is allowed unless specified differently by the purchaser This shall not cause partial, incomplete or false messages to be displayed or cause damage to the VMS. When the power supply is restored the VMS shall behave as described in 8.4.1.5 Power up activation.	
	This shall be tested in accordance with 9.2.4.		
8.4.1.7	Temporary overvoltage		
	When protection for temporary (not transient) overvoltage is incorporated, the operating voltage range of the protective device shall be stated. This shall be tested in accordance with 9.2.2 Table 11.		P
8.4.2	Electrical safety		
	The test module shall conform to electrical safety requirements of HD 60364-4-443 and !HD 638 S1" as applicable.		P
8.5	Electromagnetic compatibility		
	8.5.1 Electromagnetic emission For all types of environment the test module shall conform to EN 50293. 8.5.2 Electromagnetic immunity		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	For all types of environment the test module shall conform to EN 50293		
9	Test methods		
9.1	Test modules		
9.1.1	General		
	In order to allow for future developments in technology and sign design, the standard uses performance requirements which are not dependent on technology and which can be demonstrated on a test module. This document contains a number of defined requirements, some of which have to be demonstrated on the test module, others that are to be certified by the manufacturer. This combination covers not only confirmation of compliance with the standard, which is required to meet the regulatory requirements but also issues of lifetime, quality, maintenance and construction, all of which affect the ability of a sign in its particular application, to meet safety and fitness for purpose. The details in the informative Annexes are provided as useful guidance on the additional aspects relating to VMS for those setting up purchasing contracts for signs or signing systems. The test module ensures that the manufacturer can demonstrate to the purchaser that his requirements have been fulfilled. The tests on the test module also cover the Initial Type Testing (ITT) and the relevant requirements of the Factory Production Control (FPC) also detailed in this document. It is not possible to define one uniform test module for all Variable Message Signs, bearing in mind the wide range of applications and technologies, the range of sizes, and various requirements for characters and symbols. Type testing, which cannot be carried out on the total VMS size for practical reasons but uses a test module to demonstrate that all the requirements of this document are achieved, is a realistic approach to the situation; and the successful type testing of a representative test module shall ensure that the		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	minimum performance requirements are fulfilled. It affords maximum freedom to supply a variety of sign sizes without the need to submit every part of every sign for testing. Test modules manufactured to comply with the following requirements shall: a) be complete with all components or devices that are fitted in a production unit and necessary to meet the performance requirements; b) be complete with all facilities necessary for function test during the environmental and optical performance tests; c) provide the necessary control system to enable performance testing, the “all ON/ all OFF” and “individual ON” modes with the respective illuminance requirements necessary for the visual performance measurements; d) include electrical test points to allow for the monitoring of the parameter(s) used for each of the visual performance test settings; e) be of sufficient elements to demonstrate the compliance of the VMS placed on the market with the requirements of this document. The manufacturer shall provide documentary and safety instructions detailing all necessary installation and operational procedures. The manufacturer shall state in detail each of the settings for all parameters relevant for the various tests.		
9.1.2	Dimensions of test modules		
	The maximum size (w x h x t) of the test module shall be (1 350 x 1 350 x 500) mm (Figure 3a, Figure 3b). If the dimensions of the production sign are within these limits, the test module can be identical to the production sign. Each optical test area in a test module shall have minimum dimensions in accordance with 9.3.2.1. A test module might have two or more optical test areas with a different number of elements (Figure 3c). !Where a production sign is used for testing, the manufacturer shall identify the test area which shall be as defined in		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	9.3.2.1."		
 Key 1 Power input 2 Control input Figure 3— Examples of variable message sign test modules in front view (a and c) and side view (b) with indications for the dimensions, width (w), height (h) and thickness (t). The shaded squares are equivalent element areas and form the optical test area			
	The spacing between the centres of the elements shall be measured for the test modules, which meet the test requirements and shall be reported as the “element spacing”. The element spacing of the actual VMS shall be within 10 % of the element spacing measured on the test module.		P
9.1.3	Function test		
9.1.3.1	General		
	The function test is based on alternate activation/deactivation of all the elements, which is the cyclic change of all elements from one state to another. The test shall be carried out at the level used for the		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	maximum applicable performance level. Each cycle “ON/OFF” shall comprise at least 1s ON followed by at least 1s OFF. The test shall comprise a minimum of 10 cycles.		
9.1.3.2	Test conditions		
	The function test shall be executed in the environmental tests conditions specified in 9.2.		P
9.1.3.3	Test Sequence		
	The test procedures are grouped and shall be conducted in following sequence: a) electrical tests; b) impact; c) vibration; d) corrosion test; e) degrees of protection provided by enclosures (IP-class); f) temperature (thermostatically controlled temperature regulation devices, if provided, shall be allowed to operate normally): 1) cold; 2) dry heat or solar radiation (solar radiation test can be conducted instead of the dry heat test Class T1); 3) damp heat-cyclic; 4) change of temperature (can be substituted for the above tests a) and b)); g) EMC test; h) optical performance.		P
9.2	Environmental, mechanical and electrical test methods		
9.2.1	General		
	A function test shall be carried out during the execution of test procedure, at the moment and with the frequency indicated in the following.		P
9.2.2	Electrical tests		
	Prior to the commencement of the environmental test the following tests shall be undertaken		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003

Clause	Requirement-Test	Result-Remark	Verdict
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Table 11 — Operating voltage range, Power up activation and Temporarily overvoltage tests

Test sequence	Voltage value	Measurements
1	No power	No power supply
2	Nominal	Switch ON the test module and check that there is no partial, incomplete or false display.
3	Nominal	Function test
4	Drop to the minimum voltage	Check that there is no partial, incomplete or false display.
5	Drop to 50 % of the nominal voltage	Check that there is no partial, incomplete or false display.
6	Nominal	Check that there is no partial, incomplete or false display.
7	Nominal	Function test
8	Raise to the maximum voltage	Check that there is no partial, incomplete or false display.
9	Nominal	Check that there is no partial, incomplete or false display.
10	Nominal	Function test
<u>This test is done only if a protection device is incorporated.</u>		
11	Maximum voltage stated by the protection device	Check that there is no partial, incomplete or false display. No visual damage of the test module.
12	Nominal	Check that there is no partial, incomplete or false display.
13	Nominal	Function test

The function test shall be repeated for different combinations of voltage and frequency as follows:

Table 12 — Frequency and voltage tests table

Test sequence	Frequency value	Voltage value
1	lower	lower
2	Nominal	nominal
3	upper	upper

9.2.3 Environmental and mechanical tests

The environmental and mechanical test methods are detailed in the following tables.

P

Table 13 — Impact test

Impact EN 60598-1	Impact tests shall be conducted on horizontally mounted test module front panel using a steel ball of 50 mm diameter with a mass of 0,51 kg dropped from a height h (1,3 m) to produce an impact energy of 6,5 Nm.
	The test module shall be conditioned at a temperature of $20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and then be subject to three single impacts, at the weakest point on the front panel of the test module, this shall be determined by the Test-House in consultation with the manufacturer.
	The test module shall be cooled to a temperature of $-5\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$, which shall be maintained for three hours. Whilst the test module is at this temperature it shall be subjected to three single impacts at the weakest point on the front panel of the test module, this shall be determined by the Test-House in consultation with the manufacturer.
	After the test the test module front panel or parts of it shall show no damage A_1 other than small indentations in the front surface; it shall exhibit no cracking. The A_1 test module shall continue to meet all the requirements of the standard.

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003

Clause	Requirement-Test	Result-Remark	Verdict	
Table 14 — Vibration test				
Vibration test EN 60068-2–64, Test Fh, Class AJ2.	Mounting:	The test module shall be securely fixed to the vibrating table.		
	Reference and check-points:	The reference point shall be chosen on the vibrating table; in the case of large test module it shall be a virtual point, where the reference signal spectrum will be defined as the arithmetic mean of ASD (Acceleration Spectrum Density) values of signals measured at the check points.		
	Frequency range:	10 Hz to 200 Hz.		
	ASD levels:	A1 0,013 g²/Hz (10 Hz to 50 Hz) 0,013 g²/Hz (50 Hz to 200 Hz with a negative slope 3 dB/octave) Overall RMS acceleration 1,2 g A1		
	Duration of conditioning:	90 min in each of 3 axes.		
	Reproducibility:	Low.		
	Initial measurements:	Visual inspection and Function test.		
	Functioning during conditioning:	No.		
	Final measurements:	Visual inspection and Function test.		
Table 15— Corrosion test				
Salt spray test A1 EN ISO 9227 A1	Initial measurements:	Visual inspection and Function test.		
	State of the test module during the test:	Unpacked, locked, switched off.		
	Duration of test:	240 hours.		
	Operating conditions:	35°C ± 2°, Neutral salt spray		
	Treatment after test:	In accordance with Clause 10		
	Final measurements:	Visual inspection and Function test.		
Table 16 — A1 Water penetration test - Severity A1				
TEST		Class P1	Class P2	Class P3
Water penetration EN 60529	Severity:	A1 IP x4 A1	A1 IP x4 A1	IP x6
		According to EN 60529.		
	Pre-conditioning:	None		
	Initial measurements:	Visual inspection and Function test shall be conducted before commencing the conditioning period.		
	Conditioning:	The equipment shall be hosed on all faces and at all angles from vertically down to horizontal concentrating on points to be “most likely” to result in water ingress.		
	Intermediate measurements:	The equipment shall be switched on and function test shall be continuously repeated throughout the test.		
	Final measurements:	Visual inspection and Function Test. Acceptance according to EN 60529.		

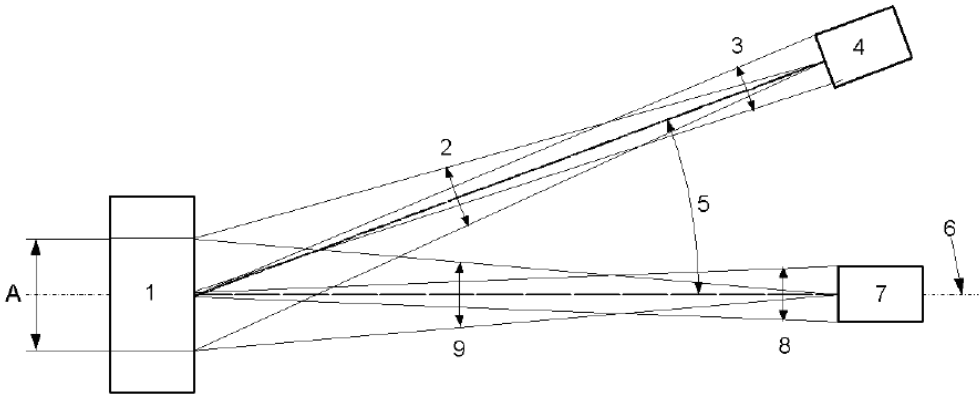
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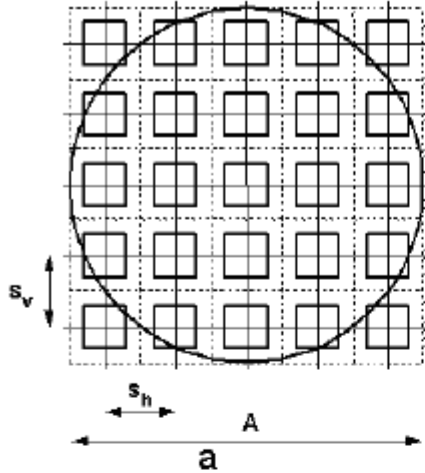
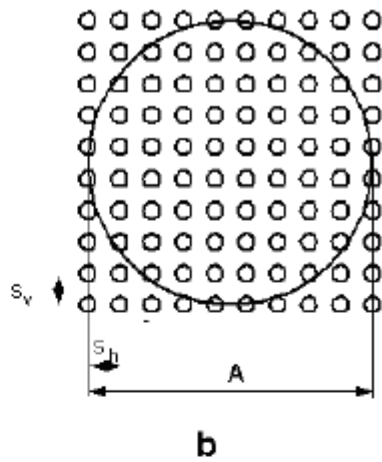
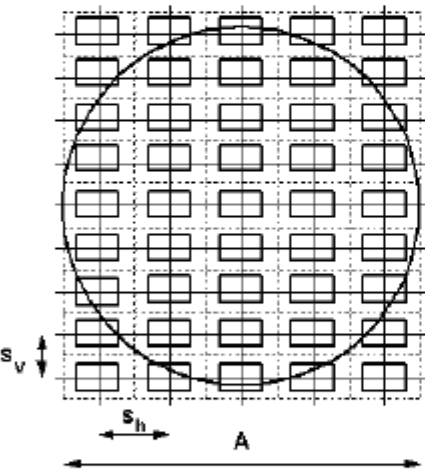
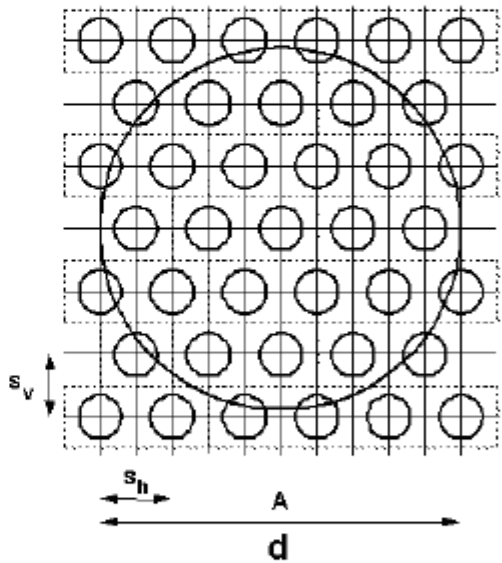
Clause	Requirement-Test	Result-Remark	Verdict		
Table 17 — A_1 Dust penetration test - Severity A_1					
Dust Penetration EN 60529	TEST	Class P1	Class P2	Class P3	
	Severity:	IP 4x	IP 5x	A_1 IP 5x A_1	
		According to EN 60529, category 2.			
	Pre-conditioning:	None.			
	Initial measurements:	None	Visual inspection and Function test shall be conducted before commencing the conditioning period.		
	Conditioning:	None	The equipment shall be switched OFF.		
	Intermediate measurements:	None.			
Final measurements:	Visual inspection and Function test. Acceptance according to EN 60529:1991, Category 2.				
Table 18 — Temperature test					
Cold EN 60068-2-1 Test Ab	TEST	Class T1	Class T2	Class T3	
	General:	During normal operation the majority of VMS generate heat, this results in increased temperatures within the equipment. Operation in high ambient air temperatures can further increase the internal temperature. When equipment is used in a situation where it can be in direct sunlight, the effects of solar radiation can result in the surface temperature of the equipment being significantly higher than the air temperature. These effects shall be tested by either conducting the dry heat test or the solar radiation test for Class T1 only.			
		The tests for dry heat and cold can be replaced by the "change of temperature" test.			
	Pre-conditioning:	None.			
	Initial measurements:	Visual inspection and Function test.			
	State of test module during conditioning:	Equipment switched off until the final hour.			
	Conditioning temperature:	-15 °C	-25 °C	-40 °C	
	Conditioning time:	16 h			
	Measurement and/or loading during conditioning:	During the final hour at test temperature; switch on and function test shall be continuously repeated. During the warm up period function test shall be continuously repeated.			
	Recovery if non-standard:	Recovery at laboratory ambient.			
	Final measurements:	Visual inspection and Function test.			
	Any deviation in procedure:	None.			
	Dry heat A_1 EN 60068-2- A_1 Test Bb	Pre-conditioning:	None.		
		Initial measurements:	Visual inspection and Function test.		
		State of test module during conditioning:	The equipment shall be switched on and function test shall be continuously repeated.		
		Conditioning temperature:	60 °C	55 °C	40 °C
		Conditioning time:	16 h		
		Measurement and/or loading during conditioning:	Function test shall be continuously repeated during the cooling period.		
		Recovery if non-standard:	Recovery at laboratory ambient.		
Final measurements:		Visual inspection and Function test.			
"to be continued"					

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003				
Clause	Requirement-Test	Result-Remark		Verdict
Table 18 (continued)				
TEST		Class T1	Class T2	Class T3
Damp heat cycling EN 60068-2-30 Method Db	Any deviation in procedure:	None.		
	Air temperature:	40 °C		
	Number of cycles:	2		
	Initial measurements:	Visual inspection and Function test.		
	State of test module during conditioning:	Unpacked, switched on and ready to use.		
	Details of mounting and supports:	None.		
	Variant:	1		
	Intermediate measurements:	Function test continuously repeated during first 3 h of each cycle; during the last hour of each cycle at 40 °C; and during the final cool down period of the last cycle.		
	Recovery conditions:	Recovery at laboratory ambient.		
	Special precautions to be taken regarding removal of surface moisture:	Not applicable.		
	Final measurements:	Visual inspection and Function test.		
Solar radiation EN 60068-2-5 Test Sa	Pre-conditioning:	None.		
	Initial measurements:	Visual Inspection and Function test.		
	Attitude of test module as installed:	Equipment in its normal operational attitude. Radiation is orthogonal to the front face of the sample.		
	Test procedure:	B		
	Object of the test:	This test can be carried out as an alternative to the dry heat test Bb for Class T1.		
	Air temperature within the test chamber during irradiation:	40 °C		
	Maximum permissible air velocity within the test chamber:	Normal air circulation is required to achieve temperature stability.		
	Humidity conditions:	No requirement.		
	Test duration:	1 cycle.		
	Measurement and/or loading during conditioning:	The test module shall be switched on and the function test will be continuously repeated during the first three hours of test, the last hour of radiation and during the cool down period.		
	Recovery conditions:	Recovery at laboratory ambient.		
	Final measurements:	Visual inspection and Function test.		
"to be continued"				

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003				
Clause	Requirement-Test	Result-Remark		Verdict
Table 18 (concluded)				
Change of temperature EN 60068-2-14 Test Nb	TEST	Class T1	Class T2	Class T3
	Mounting or supporting of the test module, if other than prescribed:	As prescribed.		
	Lower temperature TA:	-15 °C	-25 °C	-40 °C
	Upper temperature TB:	60 °C	55 °C	40 °C
	Rate of change of temperature:	1 °C / min		
	Number of cycles:	1		
	Initial measurements:	Visual inspection and Function test.		
	State of test module when introduced into the chamber:	Ready for use but switched off.		
	Exposure time t1:	16 h		
	Measurements during conditioning and the period after which they shall be carried out:	Switch on and function test continuously repeated during the warm up from laboratory ambient temperature. Switch on and function test continuously repeated during the last hour at TB and during the cool down to laboratory ambient temperature.		
	Recovery:	Minimum of 1h at laboratory ambient.		
	Final measurements:	Visual inspection and Function test.		
9.2.4	Electromagnetic compatibility (EMC)			
	The test module shall be tested according to the requirements of EN 50293			P
9.3	Optical performance test methods			
9.3.1	General			
	All optical tests shall be repeated for each individual colour of the colour class the sign is required to display. The tests shall be performed at an ambient temperature of 20 °C ± 3 °C. The luminous sources shall have been in operation for sufficient time to be stabilised before making measurements. Supplied sources shall be suitably aged so that their electrical and optical characteristics are as stable as possible. A light source is considered to be stable when its light output does not change more than ± 2 % over a time period of 15 min. Modules may be operated on any side with the agreement of the manufacturer, in order to facilitate testing. Care shall be taken to ensure the correct optical orientation of components and surfaces of the test and measurement equipment to assure a representative assessment. Any deviation from normal mounting			P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	position shall be recorded. Measurement shall be made with a photo-detector and measuring unit that is stable in operation and not subject to fatigue when exposed to maximum level of luminance. The combination of detector and measuring unit in all ranges shall have linear response to light up to the maximum level of luminance. The spectral sensitivity of the detector shall closely follow the CIE spectral luminous efficiency curve V_{λ}. For all photometric measurements it is important to eliminate stray light. The measurement configuration of the sign, solar simulator and the luminance meter shall be arranged according to Figure 4. In order to limit measuring errors some angles are limited. The measuring aperture of the luminance meter shall not be larger than 3°. The beam divergence of the solar simulator at the area of interest shall not be larger than 3°. The aperture of the solar simulator and the luminance meter, as seen from the test module, shall not be larger than 2° and $0,5^{\circ}$, respectively.		

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
 Key - A Diameter of the measurement area 1 Test module 2 $\leq 3^\circ$ 3 $\leq 2^\circ$ 4 Solar simulator 5 $(10 \pm 0,1)^\circ$ and $(5 \pm 0,1)^\circ$ for L3 (*) 6 Reference axis 7 Luminance meter 8 $\leq 0,5^\circ$ 9 $\leq 3^\circ$ Figure 4— Side elevation of the set-up for the measurement of luminance and luminance ratio			
	The solar simulator shall have a spectral content close to that of natural daylight and a correlated colour temperature within the range of 5 000 K to 6 500 K. The solar simulator, in conjunction with an optical attenuation device, shall be capable of achieving the required illuminance range, which shall be uniform ($\pm 10\%$) over the area of measurement. The illumination shall be measured in the reference centre, perpendicular to the reference axis.		P
9.3.2	Luminance and luminance ratio		
9.3.2.1	Test area for luminance ratio measurement		
	The test area shall meet the following criteria: - shall contain elements in the form of a regular matrix; - the whole of the optical test area shall be fully populated with elements; - the minimum size is 100 mm x 100 mm, including the outer dimensions of the equivalent areas of the elements; - it shall contain at least $5 \times 5 = 25$ elements; - the spacing of the elements shall be constant in each of the directions of the matrix system, but		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	these spacings need not be the same (Figure 5c and Figure 5d); - separations of the elements have to be representative for the separations on the real sign.		
 a  b  c  d Key s_v Vertical separation s_h Horizontal separation A Diameter of the measurement area Figure 5 — Layout examples for a test module and the positioning of the measuring area (circle) of the luminance meter. The equivalent areas of the elements are indicated by dotted lines.			
	When the test module has (5 x 5) elements the measuring area shall just encompass the extremities of the equivalent areas of the five elements in both the horizontal and vertical direction (Figure 5a).		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	When the test module has more than (5 x 5) elements the measuring area shall comprise a circle with a diameter of at least 100 mm (Figure 5b). When the element spacing of the horizontal and vertical direction is not equal, the measuring area shall just encompass the extremities of the equivalent areas of the five elements in direction with the largest element spacing (Figure 5c). It is also allowed to use a non-rectangular grid when it is possible to modify it to a rectangular grid by moving rows of element along horizontal and vertical lines (Figure 5d).		
9.3.2.2	Measurement of luminance and luminance ratio		
	The luminance of the area under test shall be measured under external illumination of 40 000 lx, 10 000 lx (when required by the purchaser) 4 000 lx, 400 lx, 40 lx, and 4 lx. The luminance shall also be measured with a randomly selected external illumination between 4 000 lx and 40 000 lx. For tunnel applications the luminance of the area under test shall be measured under external illumination of 400 lx, 40 lx, and 4 lx Luminance measurements shall be made with the test sign in the following states: a) all elements of the sign test area ON; b) all elements of the sign test area OFF. Luminance ratio shall be calculated as follows: $b = \frac{L}{L - L(1)}$ where: La is the measured luminance of the sign in the ON-state when under external illumination Lb is the measured luminance of the sign in the OFF-state when under external illumination. In addition to the requirements for luminance ratio, for various luminance classes, there is also a requirement for luminance. With the test module set up to achieve the stated luminance ratio requirements for		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	the 400 lx (Tunnel) and 40 000 lx illumination level, a luminance measurement shall be taken with the module element “ON” and the solar simulator “OFF”. The luminance from the test module shall be measured at the test angles listed in Table 20.		
9.3.2.3	Test angles		
	The test angles for the measurement of luminance, uniformity and colour are listed in Table 19 and Table 20.		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003

Clause	Requirement-Test	Result-Remark	Verdict
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Table 19 — Test angles (in degrees, with respect to the reference axis), used for the measurement of beam width, uniformity and colour

Beam width class	photometer	
	Horizontal	Vertical
B1	0	0
	-5	0
	+5	0
	0	-5
B2	0	0
	-7	0
	+7	0
	0	-5
B3	0	0
	-10	0
	+10	0
	0	-5
B4	0	0
	-10	0
	+10	0
	0	-10
B5	0	0
	-15	0
	+15	0
	0	-5
B6	0	0
	-15	0
	+15	0
	0	-10
B7	0	0
	-30	0
	+30	0
	0	-20

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003						
Clause	Requirement-Test			Result-Remark		Verdict
Table 20 — Test angles (in degrees, with respect to the reference axis), used for the measurement of luminance and luminance ratio						
	Beam width class	Solar simulator			Luminance meter	
		Horizontal	Vertical L1, L2, L3, L3(*)	Vertical L3(*)	Horizontal	Vertical
	B1	0	+10	+5	0	0
		0	+10	+5	-5	0
		0	+10	+5	+5	0
		0	+10	+5	0	-2,5
	B2	0	+10	+5	0	0
		0	+10	+5	-7	0
		0	+10	+5	+7	0
		0	+10	+5	0	-2,5
	B3	0	+10	+5	0	0
		0	+10	+5	-10	0
		0	+10	+5	+10	0
		0	+10	+5	0	-2,5
	B4	0	+10	+5	0	0
		0	+10	+5	-10	0
		0	+10	+5	+10	0
		0	+10	+5	0	-2,5
	B5	0	+10	+5	0	0
		0	+10	+5	-15	0
		0	+10	+5	+15	0
		0	+10	+5	0	-2,5
	B6	0	+10	+5	0	0
		0	+10	+5	-15	0
		0	+10	+5	+15	0
		0	+10	+5	0	-2,5
	B7	0	+10	+5	0	0
		0	+10	+5	-30	0
		0	+10	+5	+30	0
		0	+10	+5	0	-2,5
9.3.3	Beam width					
	The beam width shall be tested in accordance with the luminance measurements with the solar simulator off. The luminance measurements shall be repeated with steps of 1° or less in the horizontal reference plane to 1° beyond the angle requirements (Table 19) in both the positive and negative directions and at steps of 1 degree or less in the vertical reference plane in the					P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	negative direction only. Within the limits of the appropriate beam width class to be measured, the luminance shall not vary by more than 50 % when compared to the value measured in the reference axis.		
9.3.4	Uniformity		
	The luminous intensity of each individual element of the test module shall be measured without external illumination from the solar simulator. Measurements shall be carried out for luminance setting corresponding to external illumination of full brightness (40 000 lx for outside, 400 lx for tunnels) and at full dimming (≤ 4 lx). The uniformity is determined calculating the luminous intensity ratio as defined in 7.6. The luminous intensity uniformity shall be measured at the test angles specified in !Table 19", appropriate to the beam width class. !A minimum of 25 individual elements shall be measured."		P
9.3.5	Colour		
	Measurements shall be made in accordance with the procedure specified in !CIE 15". Results shall be expressed in terms of chromaticity co-ordinates. All colour measurements shall be made without solar simulator illumination. !The colour of the light emitted shall be carried out for the highest and the lowest setting specified by the manufacturer according to 7.3." The colour of the light emitted from the test module shall be measured at the test angles listed in Table 19, as appropriate to the beam width class.		P
10	Product classification codes		
	The VMS classification shall be indicated by performance codes in the following way: a) for Optical performance per colour by a combination of the codes of the following classes (see 7.1, Table 1), for example white/yellow: C2L3R2B3 red: C1L3(*)R2B3 Other combinations are possible: 1) colour C1 or C2;		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	2) luminance L1, L2 or L3, L3(*), L1(T), L2(T) or L3(T); 3) luminance ratio R1, R2 or R3; 4) beam width B1, B2, B3, B4, B5, B6 or B7; b) for environmental requirements by a combination of the codes of the following classes, for example T2!deleted text"P2 (see 8.1, Table 7): 1) temperature T1, T2 or T3; !deleted text" 2) protection P1, P2 or P3. The VMS classification will result from tests carried out on the Test Module and shall be included in the marking, labelling and product information (see Clause 11).		
11	Marking, labelling and product information		
11.1	General		
	Marking and labelling to meet regulatory requirements are given in Annex ZA.		P
11.2	Sign assemblies (with and without supports)		
11.2.1	Marking and labelling		
	Where specific marking is also a regulatory requirement it need not be repeated and is deemed to be compliant with this clause, however all non-regulatory marking shall be placed in such a position as to avoid confusion with regulatory marking. Finished VMS shall be clearly, durably and visibly marked with the following information: a) name or identifying mark of the manufacturer; b) name and registered address of the manufacturer; c) product name and its relevant characteristics; d) number and year of this document (EN12966:2005); e) electrical and physical ratings for the connection to the supplies e.g. rated or ranged voltage, current, frequency, wattage, air pressure etc.; f) year of manufacture. Additional markings shall be permitted, provided that they do not give rise to misunderstanding. Where symbols are used, they shall conform to ISO 7000 where appropriate symbols exist. The markings shall be in characters legible at a normal reading distance such that the total area of the marking is at least 100 cm² and shall be sufficiently		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	durable to last the expected life of the sign. Marking required by this document shall not be placed on the front face or any removable parts, which can be replaced in such a way that the marking would become misleading. In considering the durability of the marking, the effect of normal use shall be taken into account.		
11.2.2	Product information		
	The manufacturer shall make available the following information: a) instructions for the assembly and erection of the sign; b) details of any limitations on location or use; c) instructions for the handling, maintenance and cleaning of the sign, including component replacement; d) safety and environmental instructions and their eventually derived precaution measures in regards to the operating, installing, servicing, transporting or storing of the product; e) details of luminance control device (if required). Product information related to safety shall be in a language, which is acceptable in the country in which the product is to be installed.		P
11.3	Components		
	Full details of the component's specifications shall be supplied. Where a component conforms to a European Standard the marking shall be as specified in the relevant standard. The manufacturer shall make available the following information: a) where the component is not covered by and/or does not conform to a European Standard, a detailed technical specification of the component, which shall become part of the ITT for the VMS; b) instructions on the application of the component; c) details of any limitations on location or use, including potential incompatibility with other materials; d) instructions on the operation and maintenance of the component; e) safety and environmental information and their eventually derived protection measures in regards to the operating, installing, servicing, transporting or		P

EN 12899-1:2007,EN 12966:2014+A1:2018,EN 1235:1995/A1:2003			
Clause	Requirement-Test	Result-Remark	Verdict
	storing of the product.		
12	Evaluation of conformity		
12.1	General		
	This document contains a number of defined requirements, some of which can be demonstrated on the test module; others may be declared by the manufacturer and demonstrated by extrapolation of previous test results. In addition the manufacturer shall hold the technical documentation which demonstrates how the performance requirements are met on each sign produced. The compliance of a VMS with the requirements of this document and with the stated values (including classes) shall be demonstrated by initial type testing and factory production control.		P
12.2	Initial type testing (ITT)		
	Shall be in accordance with EN 12966-2.		P
12.3	Factory production control (FPC)		
	Shall be in accordance with EN 12966-3.		P
13	Dangerous substances		
	Materials used in products shall not release any dangerous substances in excess of the maximum permitted levels specified in a relevant document for the material or permitted in the national regulations of the member state of destination.		P



VERIFICATION OF CONFORMITY

S/N: 026190

No.: **ICR/VC/HS2607243**

Name and address of Applicant

Name and address of manufacturer:

Product name: Solar road signs

Product types: see page 2/2

Product trademark: n/a

Verification was carried within following scope:

Information on the Declaration of Conformity:

Result:	Legislation:	Standard:
1. Legislation: The <i>Health Protection (Coronavirus) Regulations 2020</i> were enacted in March 2020, providing a legal framework for public health measures during the COVID-19 pandemic. 2. Standard: The <i>Health Protection (Coronavirus) (Classification) Regulations 2020</i> were enacted in March 2020, defining COVID-19 as a notifiable disease under the Health Protection (Notification) Regulations 2002.	1. Legislation: The <i>Health Protection (Coronavirus) Regulations 2020</i> were enacted in March 2020, providing a legal framework for public health measures during the COVID-19 pandemic. 2. Standard: The <i>Health Protection (Coronavirus) (Classification) Regulations 2020</i> were enacted in March 2020, defining COVID-19 as a notifiable disease under the Health Protection (Notification) Regulations 2002.	1. Legislation: The <i>Health Protection (Coronavirus) Regulations 2020</i> were enacted in March 2020, providing a legal framework for public health measures during the COVID-19 pandemic. 2. Standard: The <i>Health Protection (Coronavirus) (Classification) Regulations 2020</i> were enacted in March 2020, defining COVID-19 as a notifiable disease under the Health Protection (Notification) Regulations 2002.

✓ EMC [2014/30/EU] EN IEC 61000-6-1:2019
EN IEC 61000-6-3:2021

The assessment process has been carried out in accordance with individual rules and conditions agreed with the applicant.
Evaluation has been carried out in accordance with:

Test report: SRSTCF0707-EMC

Tests conducted by:

Issue date: 24.07.2026

Expiration date: 23.07.2031

Remarks:

- VoC was issued on voluntary basis and does not imply meeting all essential requirements listed in Declaration of Conformity.
- For introducing this product on European market may be needed EC/EU-type examination conducted by appropriate Notified Body.



Keats and Jim

CEO

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VERIFICATION OF CONFORMITY

S/N: 026190

No.: **ICR/VC/HS2607243**

Product name:

Solar road signs

Product types:

WDM-DKB600*800-Z/Y-01-Y, WDM-DKB800-XS-01-RY-60,
WDM-DKB800-STOP-04-Y, WDM-DKB800*800-FD-01-YW,
WDM-DKB1000-RX-C125-YG, WDM-DKB600-XS-01-RY-30,
WDM-DKB600-XS-01-RY-50, WDM-DKB600-XS-01-RY-20, WDM-DKB600-stop,
WDM-DKB600-Giveway, WDM-DKB600-Roundabout, WDM-DKB600-Pedestrian,
WDM-DKB600-Hump, WDM-DKB600-Children,
WDM-DKB600-XS-01-RY-20_79498 - TQ SEÑAL LED VELOCIDAD MÁXIMA 20KM/H 12/24H,
WDM-DKB600-XS-01-RY-30_79652 - TQ SEÑAL LED VELOCIDAD MÁXIMA 30KM/H12/24H,
WDM-DKB600-XS-01-RY-50_79653 - TQ SEÑAL LED VELOCIDAD MÁXIMA 50KM/H 12/24H,
WDM-DKB600-stop_79655 - TQ SEÑAL LED STOP 12H/24H,
WDM-DKB600-Giveaway_79498 - TQ SEÑAL LED CEDA EL PASO 12H/24H,
WDM-DKB600-Roundabout_79656 - TQ SEÑAL LED ROTONDA 12H/24H,
WDM-DKB600-Pedestrian_79650 - TQ SEÑAL LED PEATON 12H/24H,
WDM-DKB600-Hump_79651 - TQ SEÑAL LED PELIGRO RESALTO 12H/24H,
WDM-DKB600-Children 79654 - TQ SEÑAL LED ESCOLAR 12H/24H

Remarks:

- VoC was issued on voluntary basis and does not imply meeting all essential requirements listed in Declaration of Conformity.
- For introducing this product on European market may be needed EC/EU-type examination conducted by appropriate Notified Body.



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page 2/2



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Edition: 5.2.0.B of 21.04.2026

Technical Construction File

File No.: SRSTCF0707-EMC

Type of Equipment:	Solar road signs
Model No.:	WDM-DKB600*800-Z/Y-01-Y,WDM-DKB800-XS-01-RY-60,WDM-DKB800-STOP-04-Y,WDM-DKB800*800-FD-01-YW,WDM-DKB1000-RX-C125-YG,WDM-DKB600-XS-01-RY-30,WDM-DKB600-XS-01-RY-50,WDM-DKB600-XS-01-RY-20,WDM-DKB600-stop,WDM-DKB600-Giveway,WDM-DKB600-Roundabout,WDM-DKB600-Pedestrian,WDM-DKB600-Hump,WDM-DKB600-Children,WDM-DKB600-XS-01-RY-20_79498 - TQ SEÑAL LED VELOCIDAD MÁXIMA 20KM/H 12/24H,WDM-DKB600-XS-01-RY-30_79652- TQ SEÑAL LED VELOCIDAD MÁXIMA 30KM/H 12/24H,WDM-DKB600-XS-01-RY-50_79653 - TQ SEÑAL LED VELOCIDAD MÁXIMA 50KM/H 12/24H,WDM-DKB600-stop_79655 - TQ SEÑAL LED STOP 12H/24H,WDM-DKB600-Giveaway_79498 - TQ SEÑAL LED CEDA EL PASO 12H/24H,WDM-DKB600-Roundabout_79656 - TQ SEÑAL LED ROTONDA 12H/24H,WDM-DKB600-Pedestrian_79650 - TQ SEÑAL LED PEATON 12H/24H,WDM-DKB600-Hump_79651 - TQ SEÑAL LED PELIGRO RESALTO 12H/24H,WDM-DKB600-Children_79654 - TQ SEÑAL LED ESCOLAR 12H/24H
Issued Date:	2026-07-23
Brand Name/Trade mark:	---
Directive(S)	Electromagnetic Compatibility Directive 2014/30/EU
standard(s):	EN IEC 61000-6-1:2019,EN IEC 61000-6-3:2021



Presented by

Presented by the **University of California, Los Angeles**
in cooperation with the **University of California, San Diego**
and the **University of California, Berkeley**

1 –EN IEC 61000-6-1:2019

1.1 Continuous Disturbance Voltage at Mains Terminal.

1.1.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Period
Albatross Projects GmbH	Shield Room	Site 1	---	2023.10	3 Year
R&S	EMI Test Receiver	ESU40	1302	2023.11	3 Year
R&S	Artificial Mains	ENV216	1107	2023.2	3 Year
R&S	EMI Test System Cabinet	---	---	N/A	N/A
R&S	EMI Test Software	EMC32	---	N/A	N/A

1.1.2 Description of Measurement Conditions

Temperature: 21°C
 Humidity: 58%
 Pressure: 1033mbar
 Electromagnetic environment: normal

1.1.3 Limits of Continuous Disturbance Voltage at Mains Terminal.

Equipment type	Frequency range MHz	Limit values dB V	
		Quasi-peak	Average
Infrared paint driers	0.15 to 0.5	66-56 ^a	56- 46 ^a
	0.5 to 5	56	46
	5 to 30	60	50
^a Decreasing linearly with logarithm of the frequency.			

Note: If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

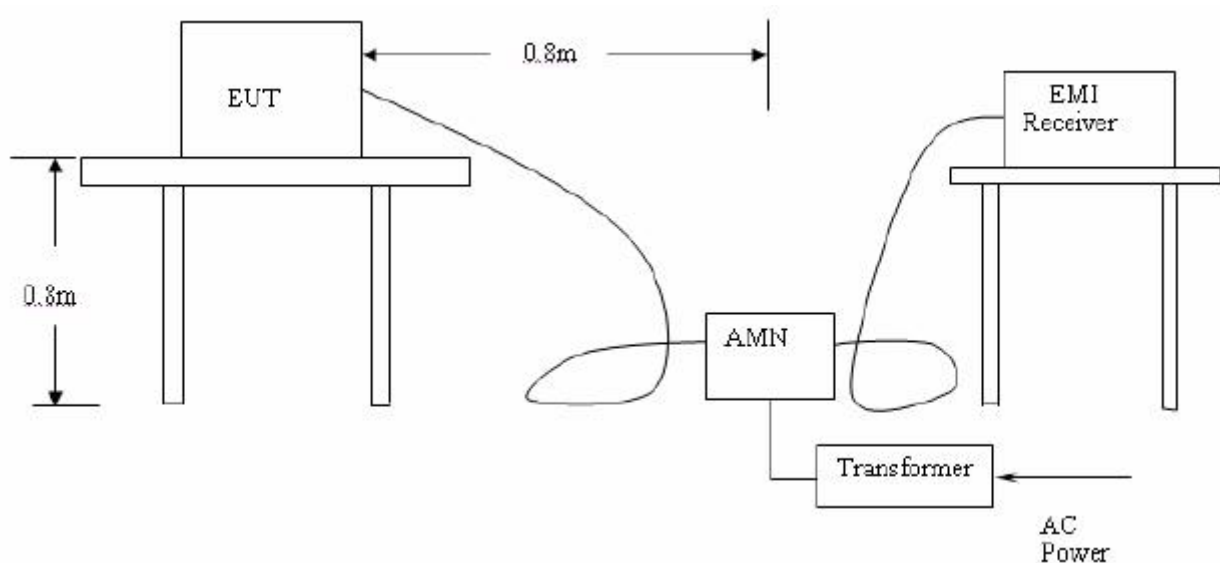
1.1.4 Test procedure and the test set-up

Procedure

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels under limit -20dB of the prescribed limits could not be reported.

Set-up

The configuration is in accordance with the requirement in EN 61000-6-4, the sketch map as follow:

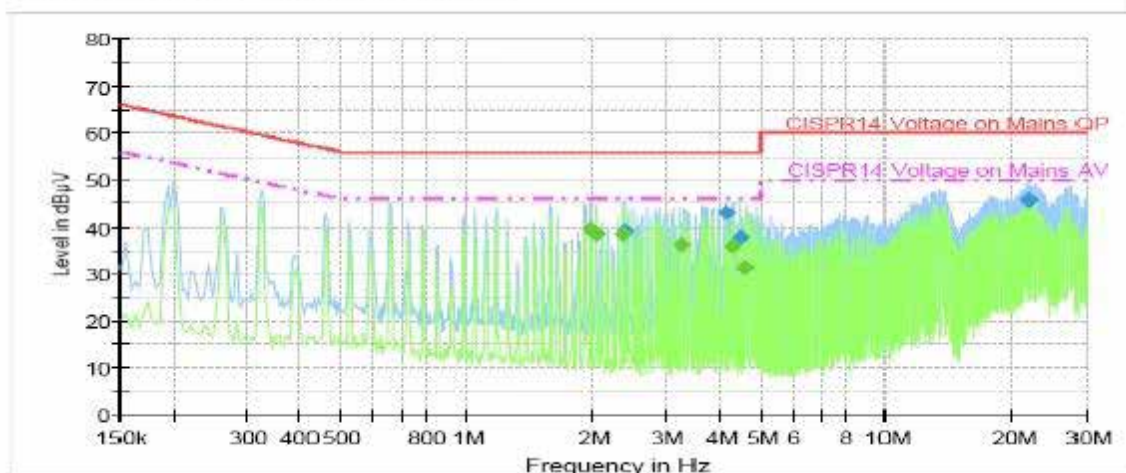


1.1.5 Test Data and Records

Passed

L&N

VOLTAGE WITH ENV216 AUTO



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
2.381600	39.3	3000.000	9.000	On	N	10.0	16.7	56.0	
4.154420	43.2	3000.000	9.000	On	N	10.0	12.8	56.0	
4.497260	37.8	3000.000	9.000	On	N	10.0	18.2	56.0	
21.777500	45.8	3000.000	9.000	On	L1	10.4	14.2	60.0	
21.841500	45.9	3000.000	9.000	On	L1	10.4	14.1	60.0	
21.981500	45.6	3000.000	9.000	On	N	10.4	14.4	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
1.971720	39.5	3000.000	9.000	On	N	10.0	6.5	46.0	
2.038700	38.4	3000.000	9.000	On	L1	10.0	7.6	46.0	
2.365600	38.6	3000.000	9.000	On	N	10.0	7.4	46.0	
3.287620	36.1	3000.000	9.000	On	L1	10.0	9.9	46.0	
4.272560	36.0	3000.000	9.000	On	N	10.0	10.0	46.0	
4.607520	31.3	3000.000	9.000	On	L1	10.0	14.8	46.0	

1.1.6 Verdict

Test model: WDM-DKB600*800-Z/Y-01-Y

The EUT met the requirement.

1.2 Radiated disturbances

1.2.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Period
Albatross Projects GmbH	Anechoic Chamber	---	9290832	2023.10	3 Year
R&S	Ultra-broadband Antennas	HL562	---	2023.1	3 Year
Inn-co GmbH	Antenna Towers	---	---	N/A	N/A
R&S	EMI Test Receiver	ESU40	1302	2023.11	3 Year
Inn-co GmbH	Turntable	DS2000S-1t		N/A	N/A
Inn-co GmbH	Controller	CO 2000	10806L	N/A	N/A
R&S	EMI Test Software	EMC32	---	N/A	N/A
R&S	EMI Test System Cabinet	---	---	N/A	N/A

1.2.2 Description of Measurement Conditions

Temperature: 20°C

Humidity: 60%

Pressure: 1033mbar

Electromagnetic environment: normal

1.2.3 Limits of radiated disturbances of class B ITE at a measuring distance of 3m.

Frequency range MHz	Quasi-peak limits(3m) dB(μV/m)
30 to 230	40
230 to 1000	47
NOTE: The lower limit shall apply at the transition frequency.	
NOTE: Additional provisions may be required for cases where interference occurs.	

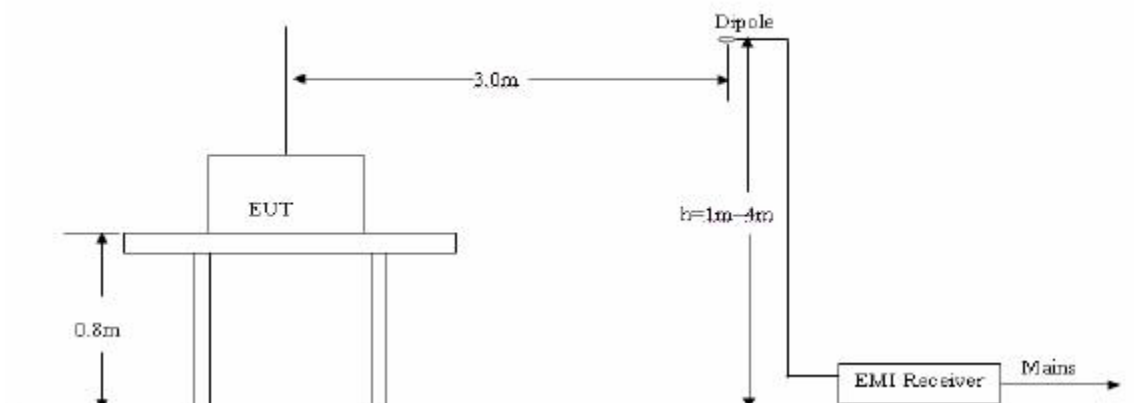
1.2.4 Test procedure and the test set-up

Procedure

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m semi/full-anechoic chamber.
- The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be retested one by one using the quasi-peak method or average method as specified and then reported In Data sheet peak mode and QP mode.

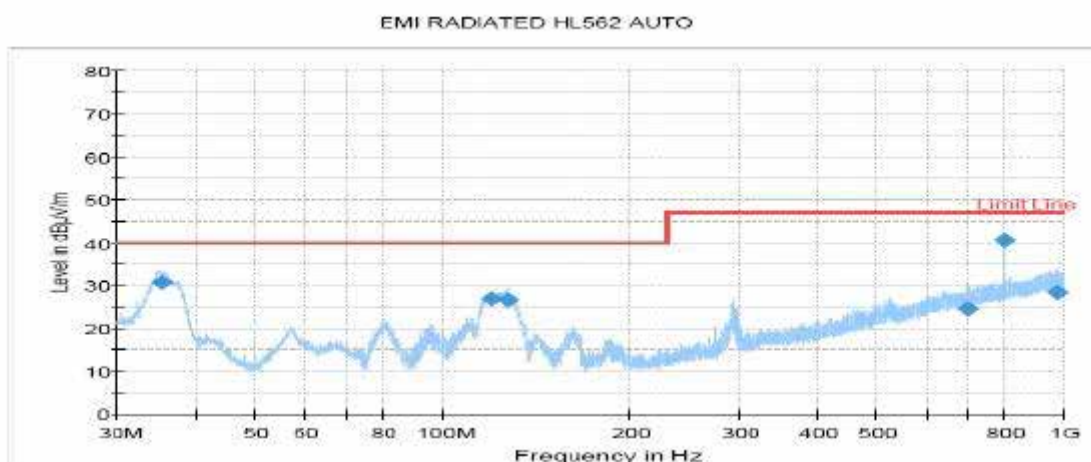
Set-up

The configuration is in accordance with the requirement in EN61000-6-4, the sketch map as follow:



1.2.5 Test Data and Records

Passed



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
35.280500	30.8	1000.0	120.000	207.0	V	8.0	17.3	9.2	40.0
120.007500	26.9	1000.0	120.000	250.0	H	8.0	11.5	13.1	40.0
127.097000	26.6	1000.0	120.000	200.0	V	0.0	11.0	13.4	40.0
704.617500	24.4	1000.0	120.000	340.0	H	191.0	23.3	22.6	47.0
800.043000	40.5	1000.0	120.000	212.0	V	185.0	24.8	6.5	47.0
978.474500	28.4	1000.0	120.000	250.0	H	85.0	27.0	18.6	47.0

1.2.6 Verdict

Test model: WDM-DKB600*800-Z/Y-01-Y

The EUT met the requirement.

2 –EN IEC 61000-6-3:2021**Description of Performance Criterion****Performance Criterion A**

The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacture, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance Criterion B

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however, no change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacture, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Performance Criterion C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

2.1 SURGES

2.1.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Period
Noise Laboratory CO., LTD	Surge Lite	LSS-6030	9099E00350	2023.11	3 Year

2.1.2 Description of Measurement Conditions

Temperature: 21°C

Humidity: 58%

Pressure: 1033mbar

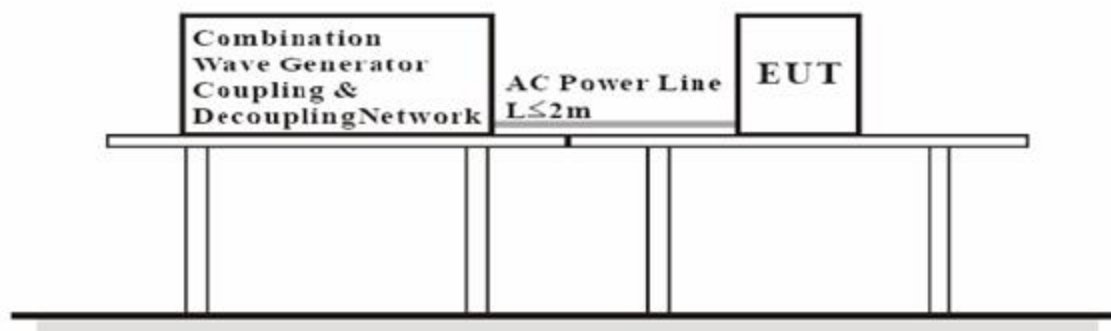
Electromagnetic environment: normal

2.1.3 test procedure and the test set-up

Procedure

- a. For EUT power supply:
The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).
- b. For test applied to unshielded unsymmetrically operated interconnection lines of EUT:
The surge is applied to the lines via the capacitive coupling. The coupling / decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).
- c. For test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT: The surge is applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).
- a. Both positive and negative polarity discharges were applied.

Set-up



2.1.4 Test Data and Records

Terminal	Voltage	Path	Phase	Number Of Impulses	Pass	Fail
	KV					
MAINS	± 1	L1-L2 L2-L3 L3-L1	0°	5	B	
MAINS	± 1	L1-L2 L2-L3 L3-L1	90°	5	B	
MAINS	± 1	L1-L2 L2-L3 L3-L1	180°	5	B	
MAINS	± 1	L1-L2 L2-L3 L3-L1	270°	5	B	
MAINS	± 2	L1-PE L2-PE L3-PE N-PE	0°	5	B	
MAINS	± 2	L1-PE L2-PE L3-PE N-PE	90°	5	B	
MAINS	± 2	L1-PE L2-PE L3-PE N-PE	180°	5	B	
MAINS	± 2	L1-PE L2-PE L3-PE N-PE	270°	5	B	

2.1.5 Verdict

Test model: WDM-DKB600*800-Z/Y-01-Y

The EUT was working as normal, so they met the requirement of performance criteria B.

2.2 ESD

2.2.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Period
Shanghai Sanki	Electrostatic Discharge tester	ESD-320	0329501C	2023.6	3 Year

2.2.2 Description of Measurement Conditions

Temperature: 21°C

Humidity: 58%

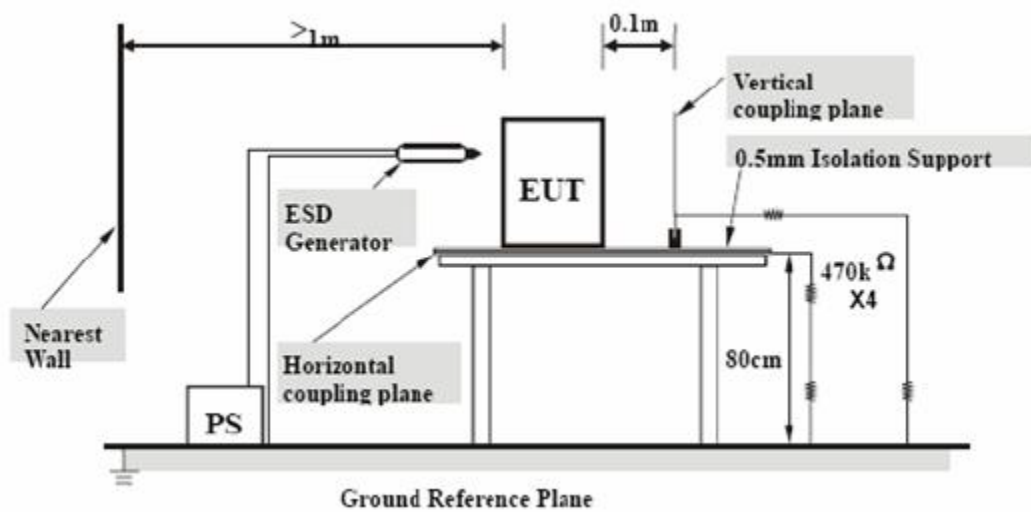
Pressure: 1033mbar

Electromagnetic environment: normal

2.2.3 Test procedure and the test set-up

Procedure

- Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- The time interval between two successive single discharges was at least 1 second.
- The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.
- Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
- At least ten single discharges (in the most sensitive polarity) were applied at the front edge of each Horizontal Coupling Plane opposite the center point of each unit of the EUT and 0.1 meters from the front of the EUT. The long axis of the discharge electrode was in the plane of the HCP and perpendicular to its front edge during the discharge.
- At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

Set-up**2.2.4 Test Data and Records****Air Discharge**

Test Levels																
EN61000-4-2 Test Points	- 2	+ 2	- 4	+ 4	- 6	+ 6	- 8	+ 8	- 1	+1 0	-12. 5	+12. 5	-1 5	+1 5	-2 0	+ 2
EUT Front Side	B	B	B	B	B	B	B	B								
EUT Top Side	B	B	B	B	B	B	B	B								
EUT Back Side	B	B	B	B	B	B	B	B								
EUT Left Side	B	B	B	B	B	B	B	B								
EUT Right Side	B	B	B	B	B	B	B	B								

Direct Contact

Test Levels																
EN61000-4-2 Test Points	- 2	+ 2	- 4	+ 4	- 6	+ 6	- 8	+ 8	- 1	+1 0	-12. 5	+12. 5	-1 5	+1 5	- 2	+2 0
EUT Front Side	B	B	B	B												
EUT Top Side	B	B	B	B												
EUT Back Side	B	B	B	B												
EUT Left Side	B	B	B	B												
EUT Right Side	B	B	B	B												

2.2.5 Verdict

Test model: WDM-DKB600*800-Z/Y-01-Y

The EUT was working as normal, so they met the requirement of performance criteria B.

2.3 EFT/B

2.3.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Period
Shanghai Sanki	E.F.TB Generator	8014	069504E	2023.6	3 Year

2.3.2 Description of Measurement Conditions

Temperature: 21°C

Humidity: 58%

Pressure: 1033mbar

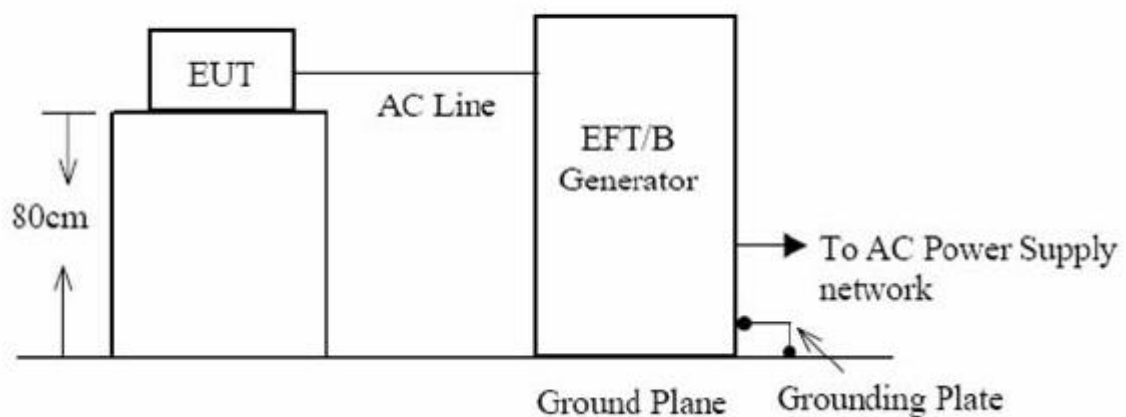
Electromagnetic environment: normal

2.3.3 Test procedure and the test set-up

Procedure

- Both positive and negative polarity discharges were applied.
- The length of the “hot wire” from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 1 meter.
- The duration time of each test sequential was 1 minute.
- The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.

Set-up



2.3.4 Test Data and Records

Test Levels (kV)									
EN61000-4-4 Test Points		+0.2	-0.2	+0.5	-0.5	+1.0	-1.0	+2.	-2.
Power Port of EUT	L1/L2/L3	A	A	A	A	A	A		
	N	A	A	A	A	A	A		
	PE	A	A	A	A	A	A		
	L1/L2/L3+ N+PE	A	A	A	A	A	A	A	A

2.3.5 Verdict

Test model: WDM-DKB600*800-Z/Y-01-Y

The EUT was working as normal, so they met the requirement of performance criteria A.

2.4 INJECTED CURRENTS

2.4.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Period
Giga-tronics	Synthesized RF Signal Generator	6061A	5130304	2023.2	3 Year
QF	Broadband Power Amplifier	QF3860	---	2023.2	3 Year
QF	Millivoltmeter	QF2281	92028	2023.2	3 Year

2.4.2 Description of Measurement Conditions

Temperature: 21°C

Humidity: 58%

Pressure: 1033mbar

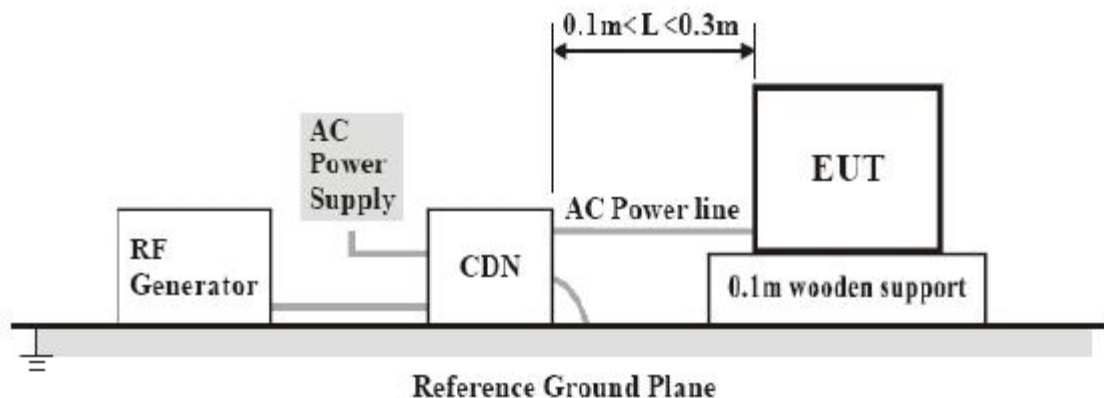
Electromagnetic environment: normal

2.4.3 Test procedure and the test set-up

Procedure

- The EUT shall be tested within its intended operating and climatic conditions.
- The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.
- The frequency range is swept from 150 kHz to 230 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate shall not exceed 1.5×10^{-3} decades/s. The step size shall not exceed 1 % of the start and thereafter 1 % of the preceding frequency value where the frequency is swept incrementally.
- The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequency(ies) and harmonics or frequencies of dominant interest, shall be analyzed separately.
- Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

Set-up



2.4.4 Test Data and Records

EN61000-4-6 Test Points	Frequency range MHz	Levels	Voltage Level (e.m.f.)V	Pass	Fail
Power Line	0.15-230MHz	1	1		
		2	3	A	
		3	10		
		X	Special		

2.4.5 Verdict

Test model: WDM-DKB600*800-Z/Y-01-Y

The EUT was working as normal, so they met the requirement of performance criteria A.

2.5 VOLTAGE DIPS AND INTERRUPTIONS

2.5.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Period
Noise Laboratory CO., LTD	Voltage Dip Simulator	VDS-220B	2199D00098	2023.10	3 Year

2.5.2 Description of Measurement Conditions

Temperature: 21°C

Humidity: 58%

Pressure: 1033mbar

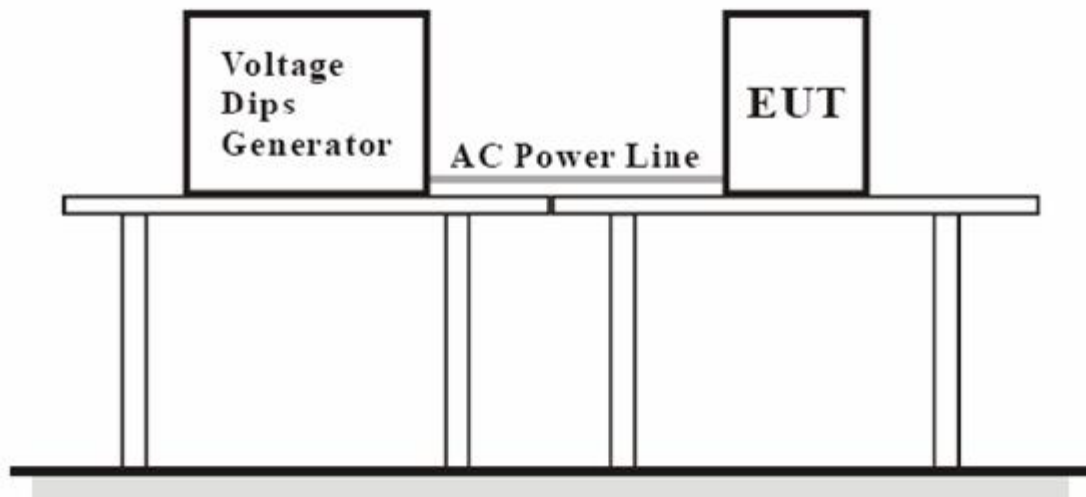
Electromagnetic environment: normal

2.5.3 Test procedure and the test set-up

Procedure

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

Set-up



2.5.4 Test Data and Records

Environmental phenomena		Test level in % U_T	Duration (in periods of the rated frequency)	Phase Angle	Pass	Fail
Interruptions		>95	0.5T	0/180	C	
Voltage dips in % U_T	60	40	10T	0/180	C	
	30	70	50T	0/180	C	

2.5.5 Verdict

Test model: WDM-DKB600*800-Z/Y-01-Y

The EUT was working as normal, so they met the requirement of performance criteria C.

2.6 Radio-frequency electromagnetic field

2.6.1 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Period
R&S	Signal Generator	SMR-40	1104	2023.11	3 Year
QF	Broadband Power Amplifier	QF3860	---	2023.2	3 Year
QF	Millivoltmeter	QF2281	92028	2023.2	3 Year
Albatross Projects GmbH	Anechoic Chamber	---	9290832	2023.10	3 Year
R&S	Ultra-broadband Antennas	HL562	---	2023.1	3 Year
Inn-co GmbH	Antenna Towers	---	---	N/A	N/A
Inn-co GmbH	Turntable	DS2000S-1t	---	N/A	N/A
Inn-co GmbH	Controller	CO 2000	10806L	N/A	N/A

2.6.2 Description of Measurement Conditions

Temperature: 20°C

Humidity: 60%

Pressure: 1033mbar

Electromagnetic environment: normal

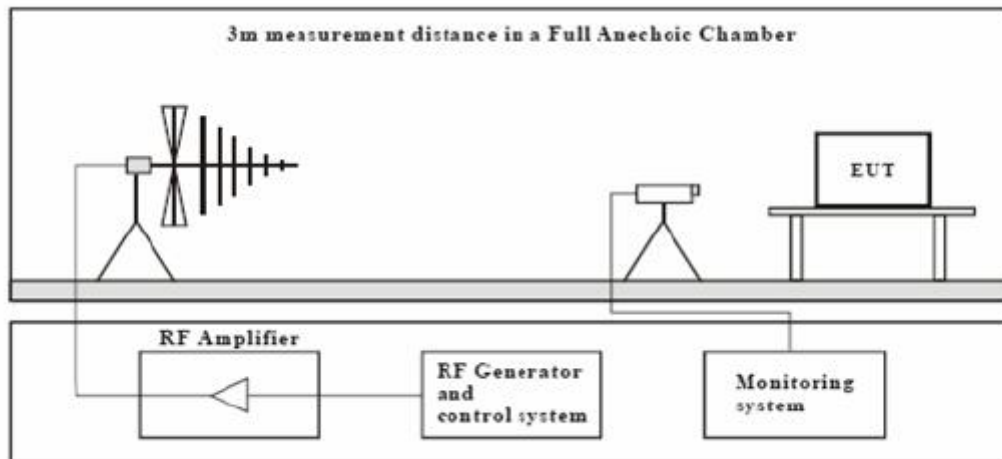
2.6.3 Test procedure and the test set-up

Procedure

The test procedure was in accordance with EN 61000-4-3

- The testing was performed in a fully-anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- The frequency range is swept from 80 MHz to 1000 MHz with the signal 80% amplitude modulated with a 1kHz sinewave. The rate of sweep did not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1 % of preceding frequency value.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- The field strength level was 3V/m.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

Set-up



2.6.4 Test Data and Records

The EUT was tested that it worked at the normal state.

Frequency Range (MHz)	Front Side (3 V/m)		Rear Side (3 V/m)		Left Side (3 V/m)		Right Side (3 V/m)	
	VERT	HOR	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	A	A	A	A	A	A	A	A

2.6.5 Verdict

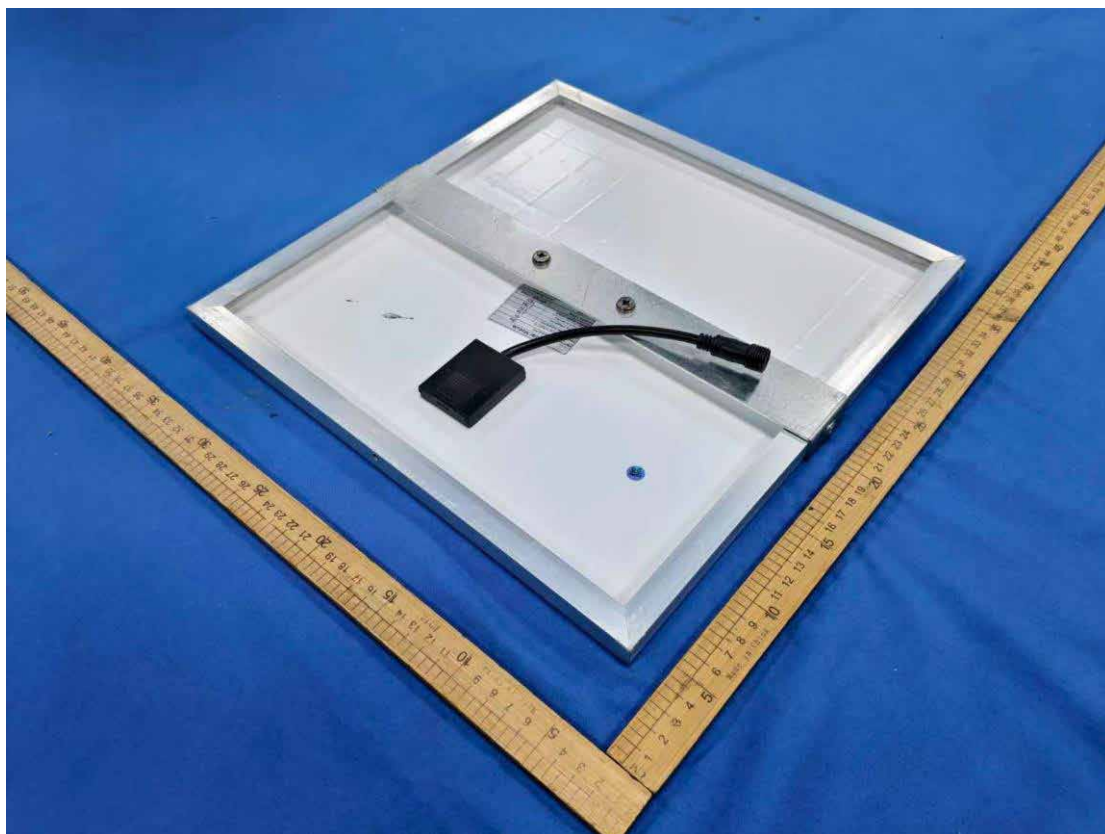
Test model: WDM-DKB600*800-Z/Y-01-Y

The EUT was working as normal, so it met the requirement of performance criteria A.

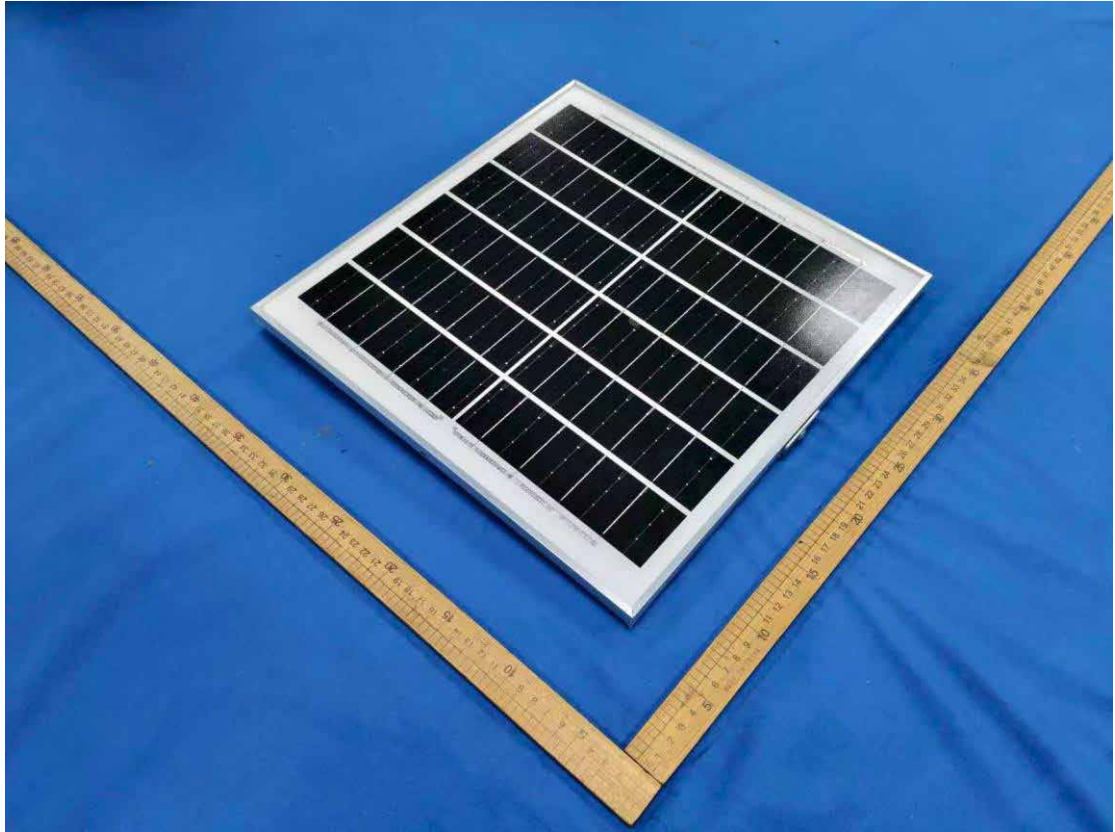
Annex : Technical Information

(1) Product Photos









A.1



VERIFICATION OF CONFORMITY

S/N: 026191

No.: **ICR/VC/HS2607244**

Name and address of Applicant

Name and address of manufacturer:

Product name: Solar road signs

Product types: see page 2/2

Product trademark: n/a

Verification was carried within following scope:

Information on the Declaration of Conformity:

Result

Legislation:

Standard:

✓ RoHS [2011/65/EU]	EN 62321-3-1:2013
	EN 62321-4:2013+A1:2017
	EN 62321-5:2013
	EN 62321-6:2015
	EN 62321-7-1:2015
	EN 62321-7-2:2017
	EN 62321-8:2017

The assessment process has been carried out in accordance with individual rules and conditions agreed with the applicant
Evaluation has been carried out in accordance with:

Test report: SRSTCF0707-ROHS

Tests conducted by:

Issue date: 24.07.2026

Expiration date: 23.07.2031

Remarks:

- VoC was issued on voluntary basis and does not imply meeting all essential requirements listed in Declaration of Conformity.
- For introducing this product on European market may be needed EC/EU-type examination conducted by appropriate Notified Body.



Keats and Jim

CEO

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No.: **ICR/VC/HS2607244**

Solar road signs

WDM-DKB600*800-Z/Y-01-Y, WDM-DKB800-XS-01-RY-60,
WDM-DKB800-STOP-04-Y, WDM-DKB800*800-FD-01-YW,
WDM-DKB1000-RX-C125-YG, WDM-DKB600-XS-01-RY-30,
WDM-DKB600-XS-01-RY-50, WDM-DKB600-XS-01-RY-20, WDM-DKB600-stop,
WDM-DKB600-Giveway, WDM-DKB600-Roundabout, WDM-DKB600-Pedestrian,
WDM-DKB600-Hump, WDM-DKB600-Children,
WDM-DKB600-XS-01-RY-20_79498 - TQ SEÑAL LED VELOCIDAD MÁXIMA 20KM/H 12/24H,
WDM-DKB600-XS-01-RY-30_79652 - TQ SEÑAL LED VELOCIDAD MÁXIMA 30KM/H12/24H,
WDM-DKB600-XS-01-RY-50_79653 - TQ SEÑAL LED VELOCIDAD MÁXIMA 50KM/H 12/24H,
WDM-DKB600-stop_79655 - TQ SEÑAL LED STOP 12H/24H,
WDM-DKB600-Giveaway_79498 - TQ SEÑAL LED CEDA EL PASO 12H/24H,
WDM-DKB600-Roundabout_79656 - TQ SEÑAL LED ROTONDA 12H/24H,
WDM-DKB600-Pedestrian_79650 - TQ SEÑAL LED PEATON 12H/24H,
WDM-DKB600-Hump_79651 - TQ SEÑAL LED PELIGRO RESALTO 12H/24H,
WDM-DKB600-Children 79654 - TQ SEÑAL LED ESCOLAR 12H/24H

- VoC was issued on voluntary basis and does not imply meeting all essential requirements listed in Declaration of Conformity.
- For introducing this product on European market may be needed EC/EU-type examination conducted by appropriate Notified Body.



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Technical Construction File

File No.: SRSTCF0707-ROHS

Type of Equipment:	Solar road signs
Model No.:	WDM-DKB600*800-Z/Y-01-Y,WDM-DKB800-XS-01-RY-60,WDM-DKB800-STOP-04-Y,WDM-DKB800*800-FD-01-YW,WDM-DKB1000-RX-C125-YG,WDM-DKB600-XS-01-RY-30,WDM-DKB600-XS-01-RY-50,WDM-DKB600-XS-01-RY-20,WDM-DKB600-stop,WDM-DKB600-Giveway,WDM-DKB600-Roundabout,WDM-DKB600-Pedestrian,WDM-DKB600-Hump,WDM-DKB600-Children,WDM-DKB600-XS-01-RY-20_79498 - TQ SEÑAL LED VELOCIDAD MÁXIMA 20KM/H 12/24H,WDM-DKB600-XS-01-RY-30_79652- TQ SEÑAL LED VELOCIDAD MÁXIMA 30KM/H 12/24H,WDM-DKB600-XS-01-RY-50_79653 - TQ SEÑAL LED VELOCIDAD MÁXIMA 50KM/H 12/24H,WDM-DKB600-stop_79655 - TQ SEÑAL LED STOP 12H/24H,WDM-DKB600-Giveaway_79498 - TQ SEÑAL LED CEDA EL PASO 12H/24H,WDM-DKB600-Roundabout_79656 - TQ SEÑAL LED ROTONDA 12H/24H,WDM-DKB600-Pedestrian_79650 - TQ SEÑAL LED PEATON 12H/24H,WDM-DKB600-Hump_79651 - TQ SEÑAL LED PELIGRO RESALTO 12H/24H,WDM-DKB600-Children_79654 - TQ SEÑAL LED ESCOLAR 12H/24H
Issued Date:	2026-07-23
Brand Name/Trade mark:	---
Directive(S)	Restriction of Hazardous Substances Directive 2011/65/EU
standard(s):	EN 62321-3-1:2013,EN 62321-4:2013+A1:2017, EN 62321-5:2013,EN 62321-6:2015,

	EN 62321-7-1:2015, EN 62321-7-2:2017, EN 62321-8:2017
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Presented by

[Faint, illegible text, likely a company name or address]

Element	Limit	Result -Remark	Detection Limit	Verdict
Hg, mg/kg	≤1000	ND(1)	2	Pass

Element	Limit	Result -Remark	Detection Limit	Verdict
Pb,mg/kg	≤1000	ND(1)	2	Pass

Element	Limit	Result -Remark	Detection Limit	Verdict
Cr ⁶⁺ ,mg/kg	≤1000	ND(1)	2	Pass

Element	Limit	Result -Remark	Detection Limit	Verdict
Cd,mg/kg	≤100	ND(1)	2	Pass

Element	Limit	Result -Remark	Detection Limit	Verdict
mono-PBB,mg/kg	/	ND(1)	5	/
di-PBB,mg/kg	/	NA (1)	5	/
tri-PBB,mg/kg	/	NA (1)	5	/
tetra-PBB,mg/kg	/	NA (1)	5	/
penta-PBB,mg/kg	/	NA (1)	5	/
hexa-PBB,mg/kg	/	NA (1)	5	/

hepta-PBB,mg/kg	/	NA (1)	5	/
octa-PBB,mg/kg	/	NA (1)	5	/
nona-PBB,mg/kg	/	NA (1)	5	/
deca-PBB,mg/kg	/	NA (1)	5	/
PBBs, mg/kg	≤1000	ND(1)	/	Pass

Element	Limit	Result -Remark	Detection Limit	Verdict
mono-PBDE,mg/kg	/	NA (1)	5	/
di-PBDE,mg/kg	/	NA (1)	5	/
tri-PBDE,mg/kg	/	NA (1)	5	/
tetra-PBDE,mg/kg	/	NA (1)	5	/
pebta-PBDE,mg/kg	/	NA (1)	5	/
hexa-PBDE,mg/kg	/	NA (1)	5	/
hepta-PBDE,mg/kg	/	NA (1)	5	/
octa-PBDE,mg/kg	/	NA (1)	5	/
nona-PBDE,mg/kg	/	NA (1)	5	/
deca-PBDE,mg/kg	/	NA (1)	5	/

PBDEs, mg/kg	≤1000	ND(1)	5	Pass
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Element	Limit	Result -Remark	Detection Limit	Verdict
HBCDD,mg/kg	≤1000	ND(1)	5	Pass

DEHP,mg/kg	≤1000	ND(1)	5	Pass
Element	Limit	Result -Remark	Detection Limit	Verdict
BBP,mg/kg	≤1000	ND(1)	5	Pass
DBP,mg/kg	≤1000	ND(1)	5	Pass

Notice 1: ND means "less than" 5 mg/kg.

2: "*" means ROHS don't request.

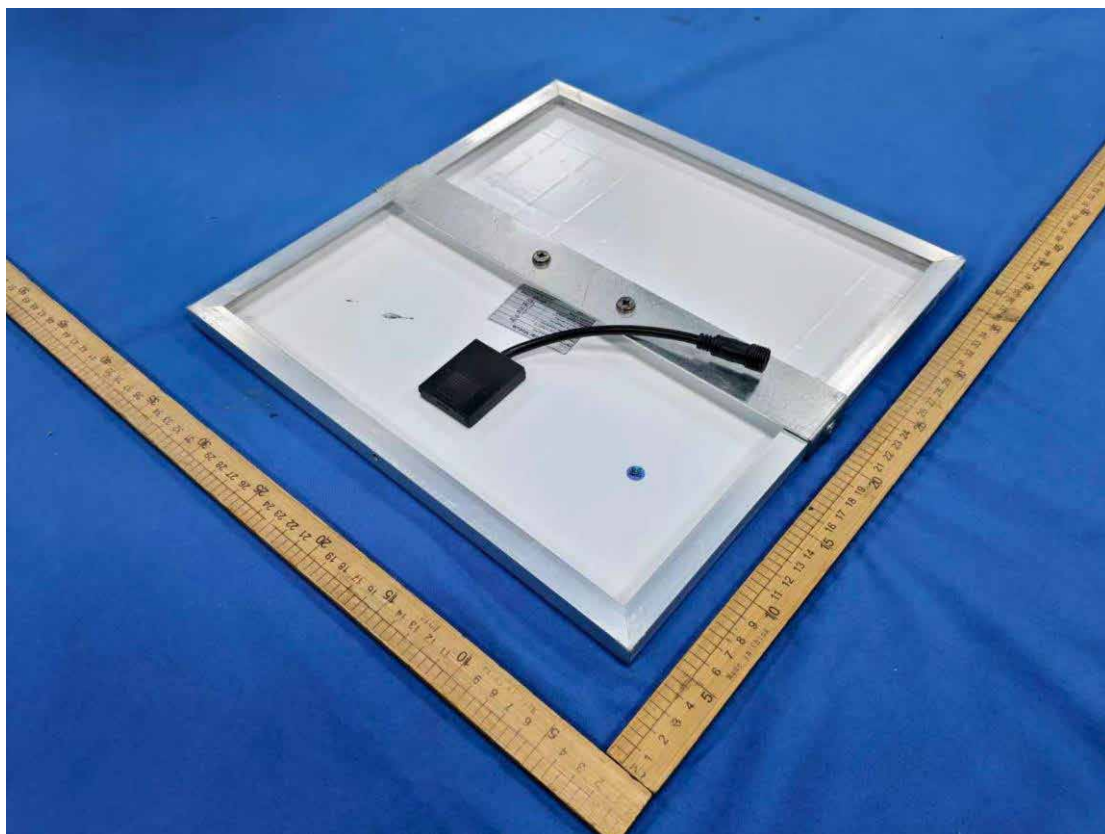
3: NA means not applicable..

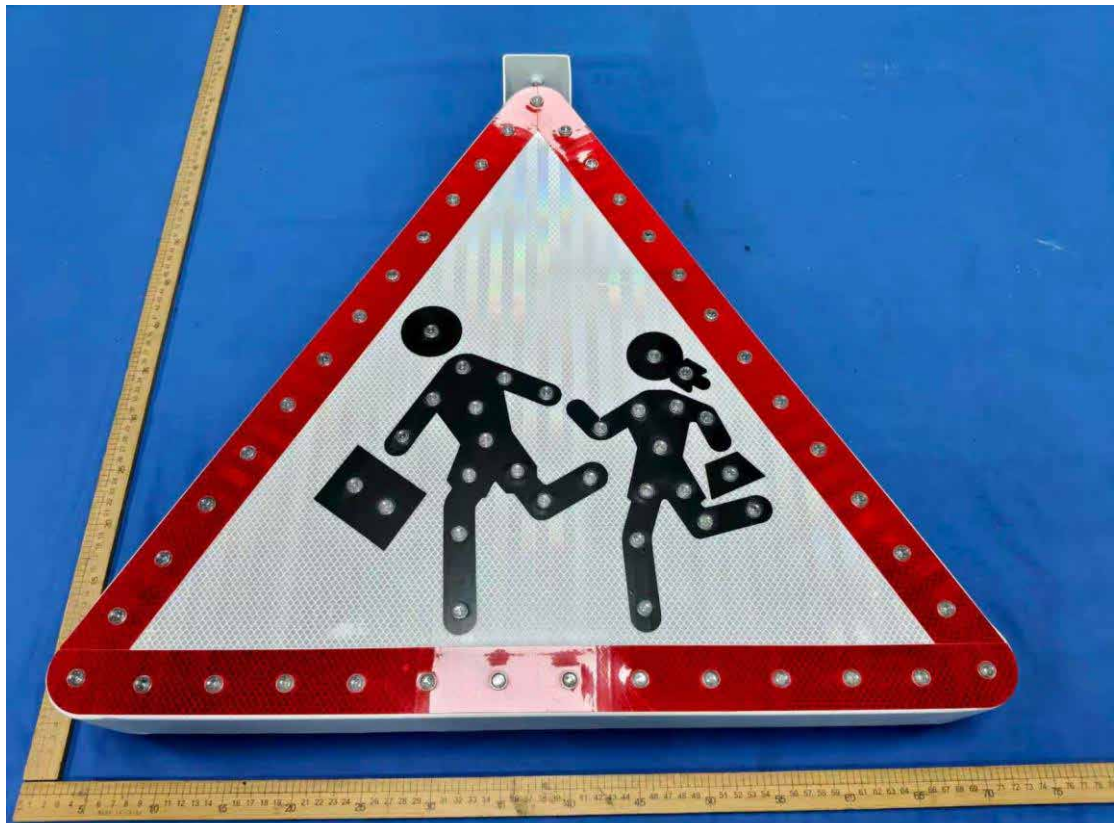
Serial number	Material name	Credential Number
1	Solar road signs	SRSTCF0707-ROHS

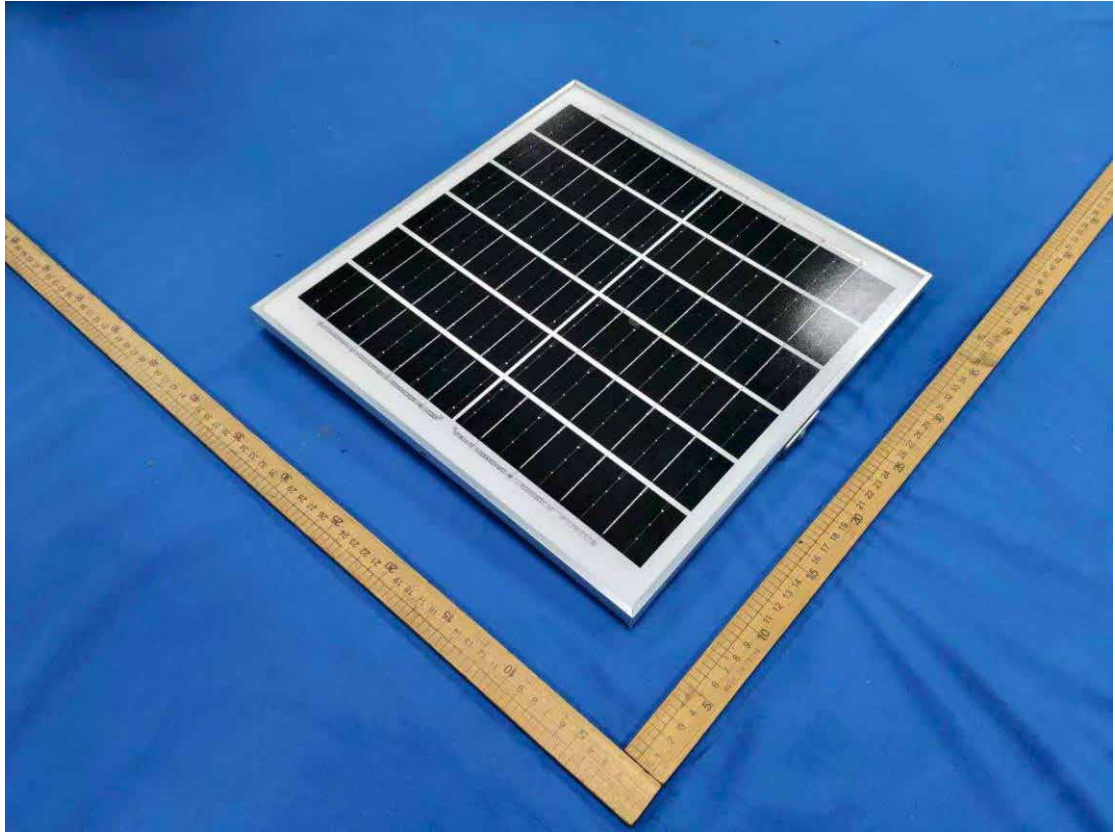
Annex : Technical Information

(1) Product Photos









A.1