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Pulse | LARSEN Antennas
A YAGEO Company

TECHNICAL DATA SHEET

Description: 4G LTE antenna

Series:

PULSE P/N: *BTPA0061204G0C4Axx* – *698 to 2700MHz*



Features & Applications:

- *4G LTE All Band*
- *Nb-IoT, LTE CAT M1*
- *Omnidirectional radiation*
- *PCB radiator + Coaxial cable*
- *IPEX Connector*
- *RoHS compliant*
- *Mounting with included adhesive tape*

ELECTRICAL SPECIFICATIONS @ 25°C

General Specifications

Antenna type	Nominal Impedance	Polarization	Radiation pattern		Power withstanding
Dipole	50Ω	Vertical / Linear	Omni		1W

Frequency (MHz)	698-960; 1710-2170; 2300-2700	
Return Loss (dB)	-5~-10	
Peak Gain (dBi)	4.5	
Efficiency (%)	698-960 MHz >25% 1710-2170 MHz >40% 2300 - 2690 MHz >30%	

MECHANICAL SPECIFICATIONS

BTPA0061204G0C4Axx

Dimension (Length x Width)	Material	Color	Cable type	Connector Type	Cable length
61 x20 x 0.4 mm	PCB	Black	1.37 coaxial cable	IPEX Compatible	See PN list

ENVIRONMENTAL SPECIFICATIONS

BTPA0061204G0C4Axx

Storage Temperature	Operating Temperature	Ingress Protection	RoHS Compliant
-30/+75° C	-20/+65° C	N/A	Yes

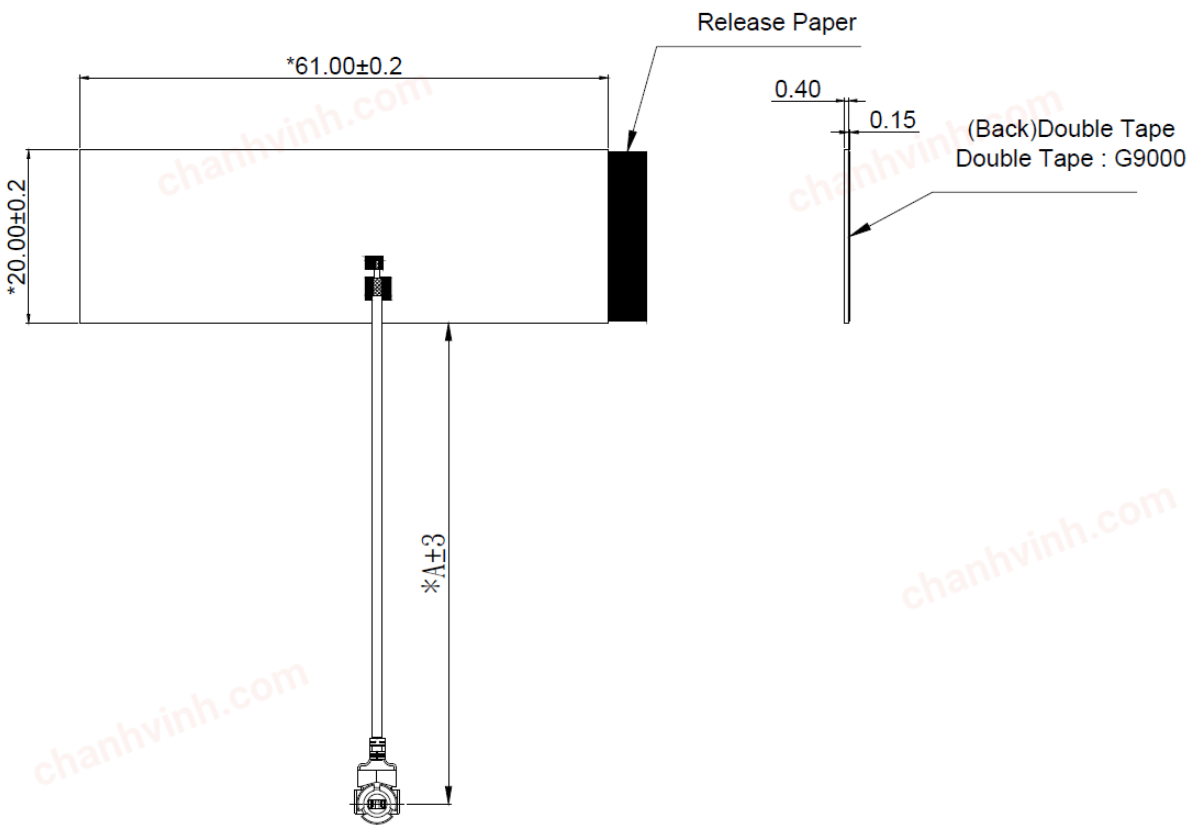
This document covers all product variants of the following product family:

PART NUMBER	Cable Type Length	Connector Type
BTPA0061204G0C4A02	312.3mm ,Ø1.37mm OD cable	IPEX Compatible
BTPA0061204G0C4A03	200mm ,Ø1.37mm OD cable	IPEX Compatible
BTPA0061204G0C4A04	100mm ,Ø1.37mm OD cable	IPEX Compatible

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Mechanical Drawing

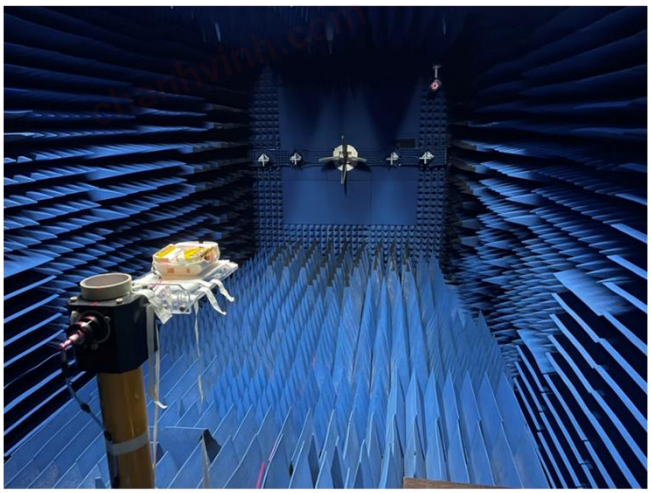
BTPA0061204G0C4Axx



Dimensions: inches (mm) Unless otherwise specified, all tolerances are ±.020 (0.5mm)

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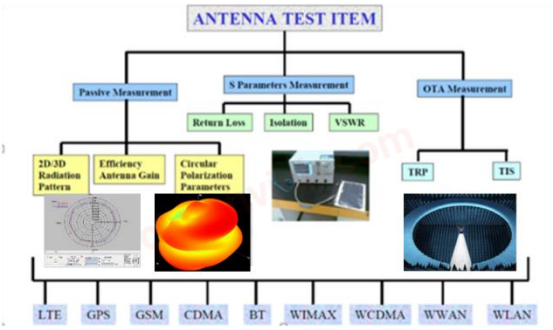
General / Chamber Setup

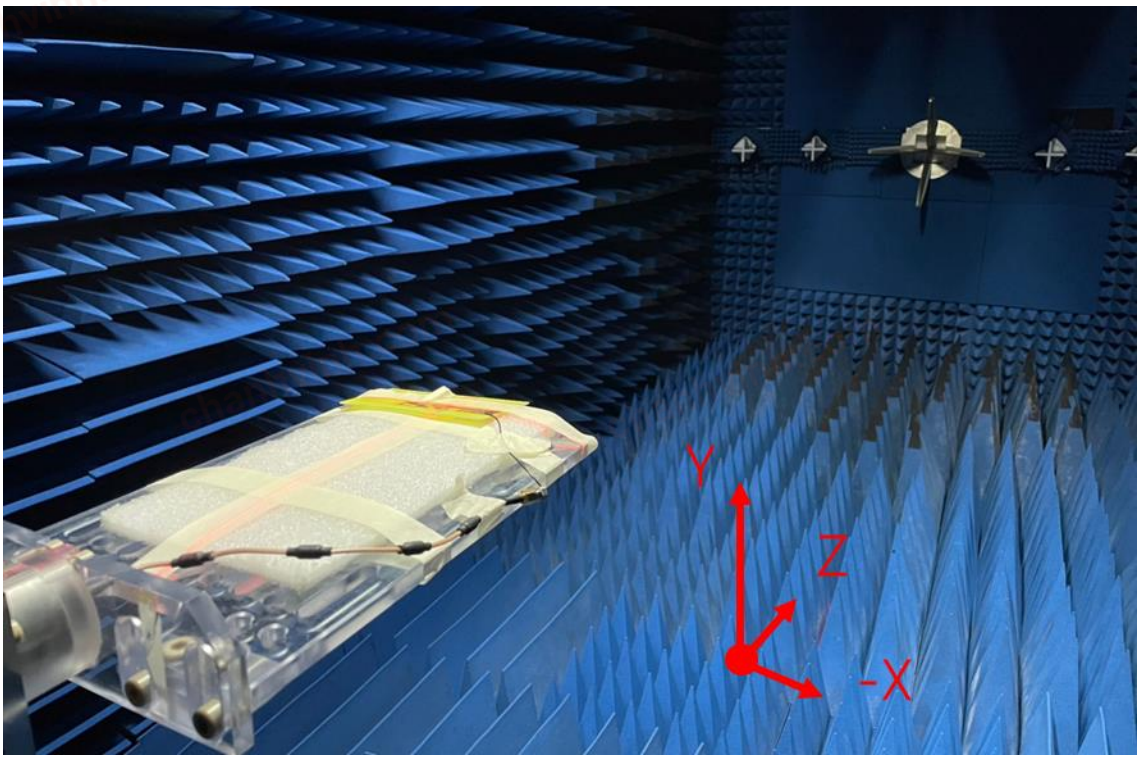


TRC Chamber



S11 measurements were taken with Agilent E5071C ENA, 9kHz- 8.5GHz

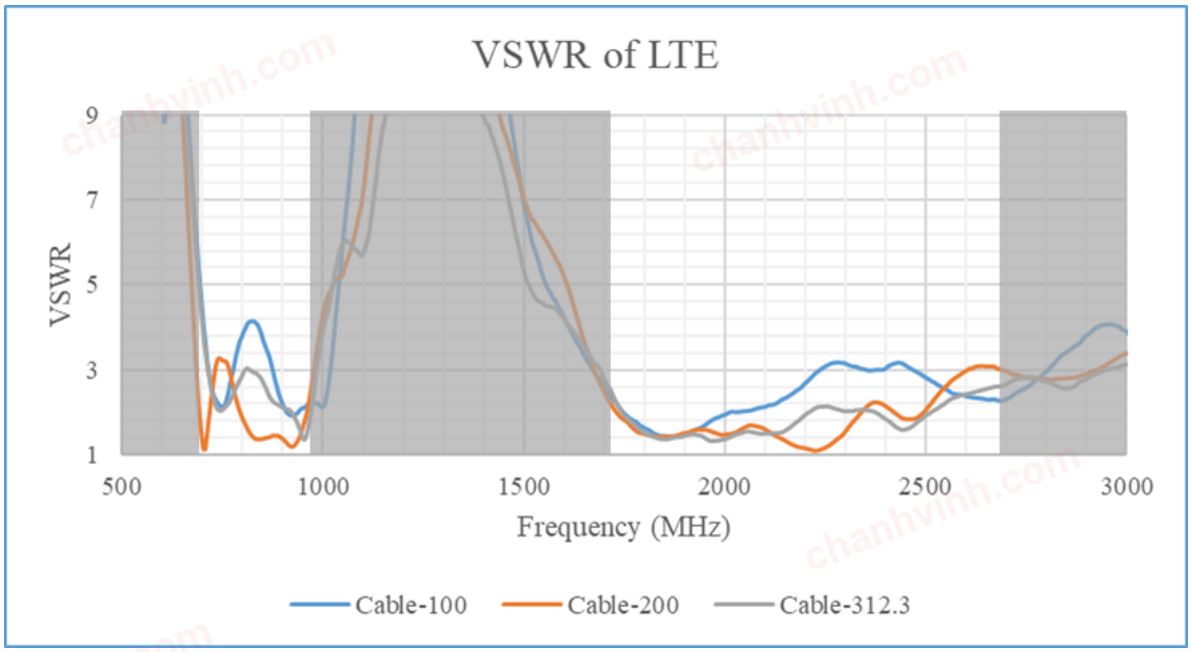




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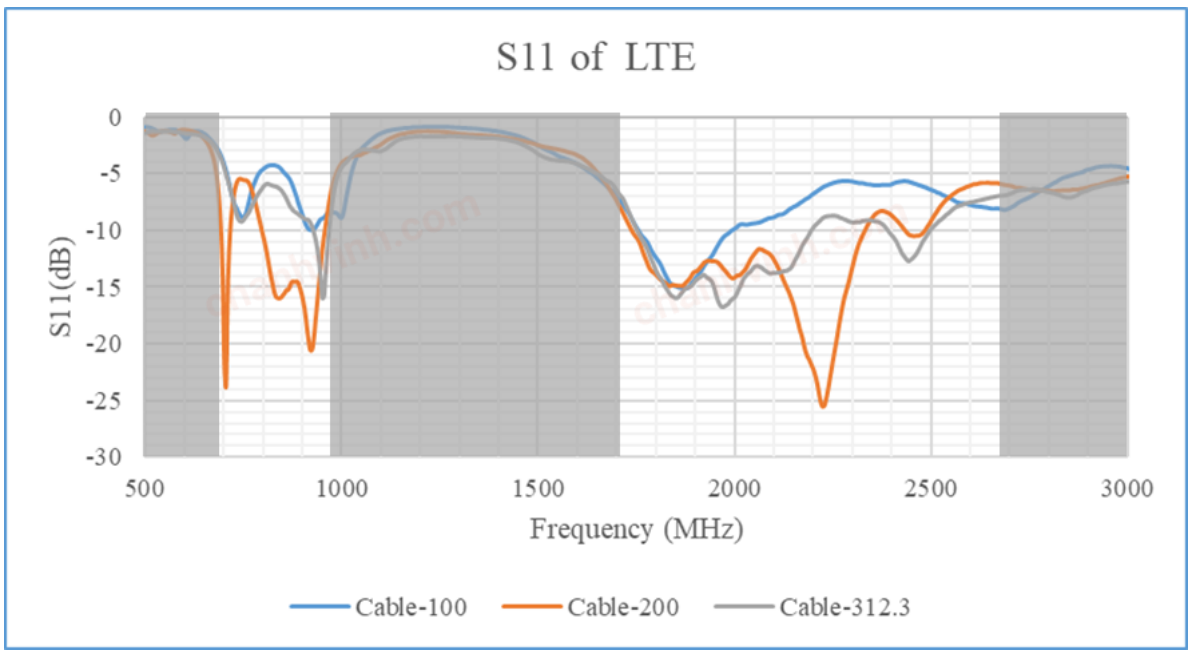
Test Setup
Charts - VSWR

Test data



Charts - Return loss

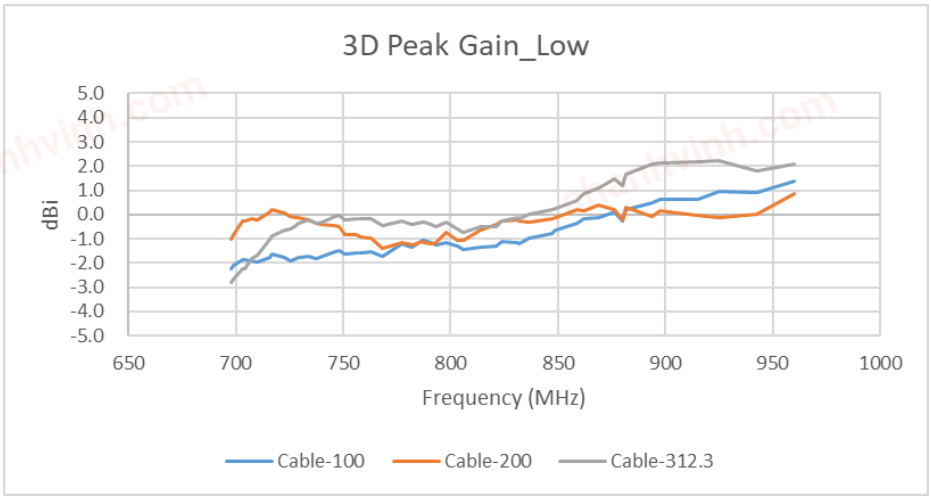
Test data

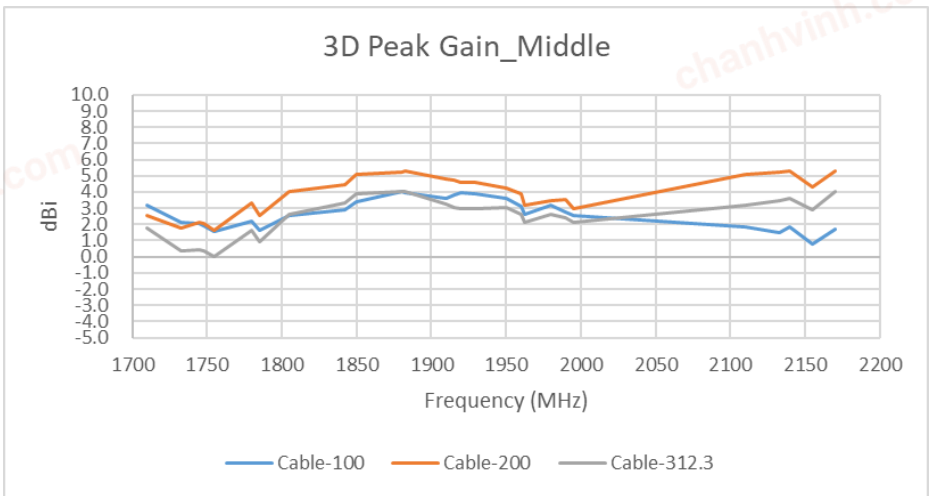


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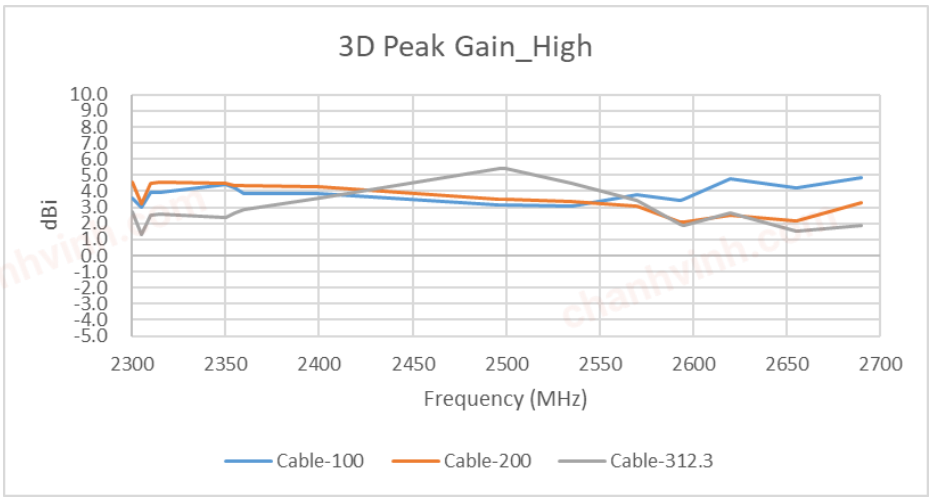
Charts – Max Gain dBi

Test data



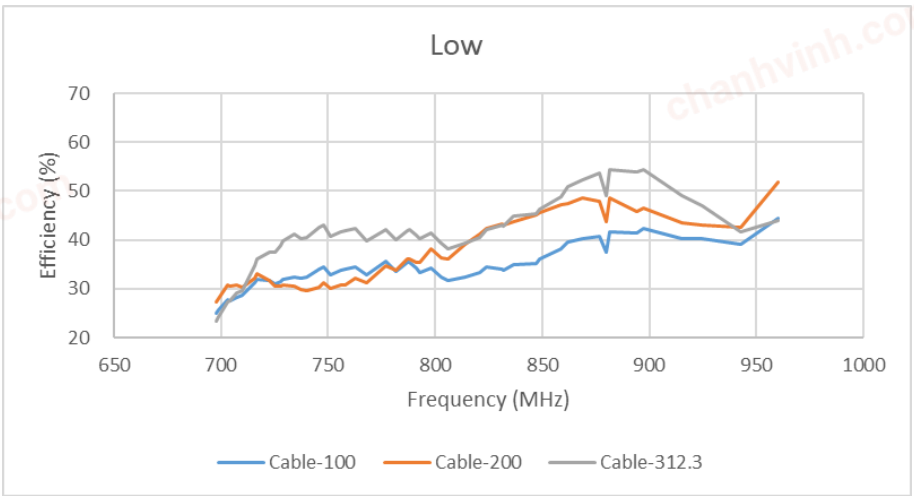


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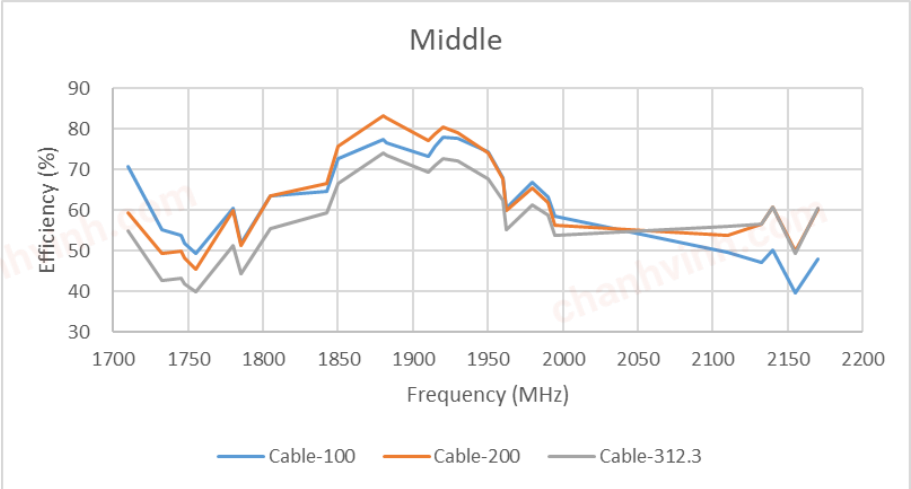


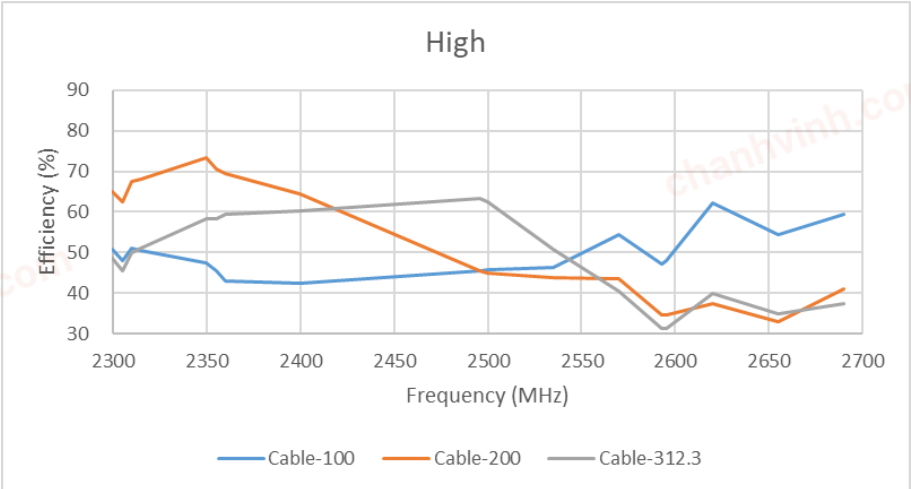
Charts - Efficiency

Test data



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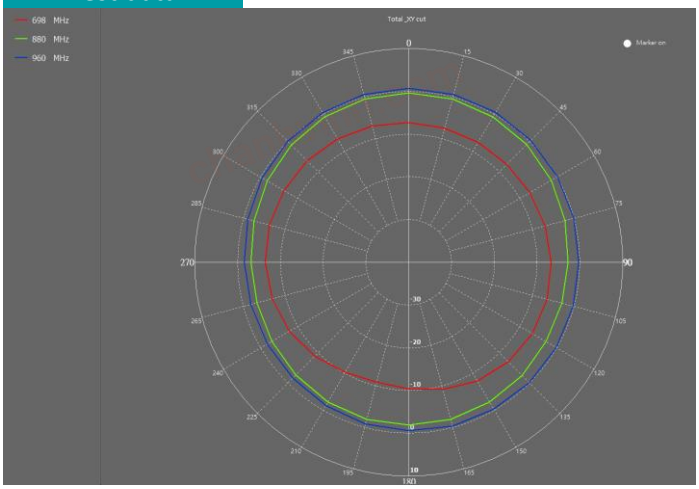


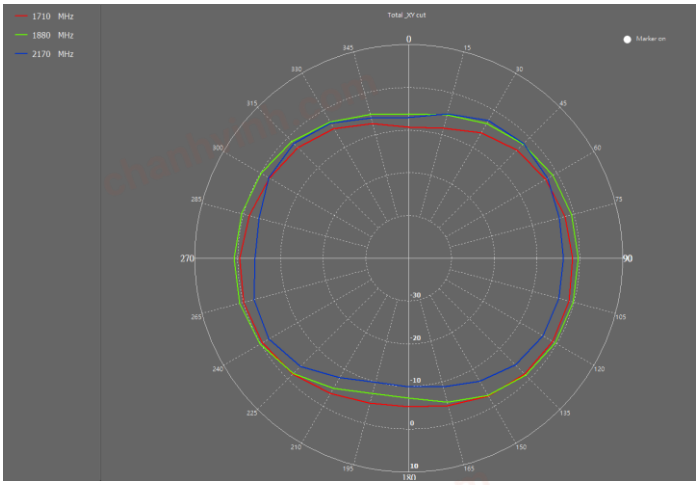


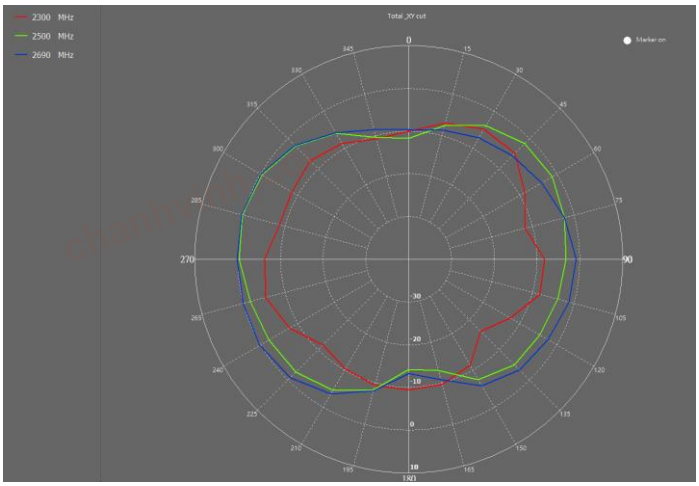
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Radiation Pattern – Cable 100mm
Frequency(MHz): 698~2700. Pattern Field: XY Cut(Theta=90)

Test data







	Max value	Min value	Average
698(MHz)	-6.28 dB	-10.97 dB	-7.62 dB
880(MHz)	-0.37 dB	-3.30 dB	-1.88 dB
960(MHz)	0.71 dB	-1.89 dB	-0.36 dB

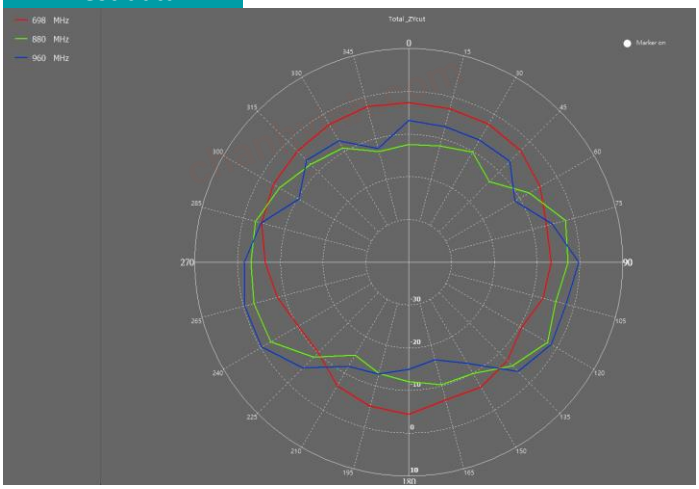
	Max value	Min value	Average
1710(MHz)	-0.10 dB	-9.33 dB	-3.67 dB
1880(MHz)	0.83 dB	-7.29 dB	-2.59 dB
2170(MHz)	-2.00 dB	-10.01 dB	-4.8 dB

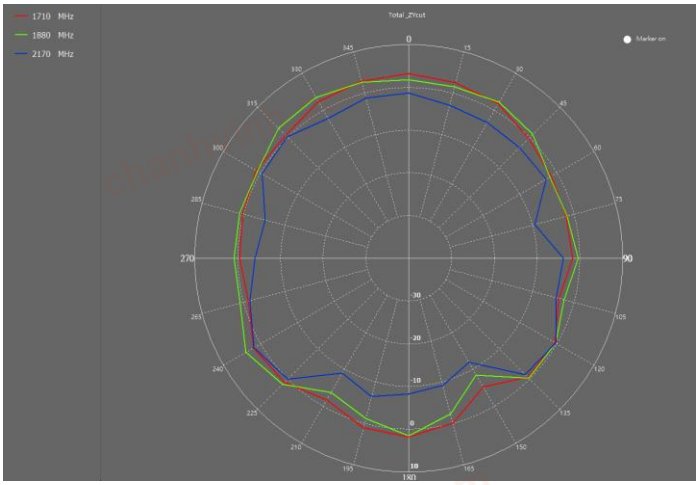
	Max value	Min value	Average
2300(MHz)	-4.81 dB	-16.29 dB	-9.14 dB
2500(MHz)	0.30 dB	-14.22 dB	-5.23 dB
2700(MHz)	0.44 dB	-13.22 dB	-4.56 dB

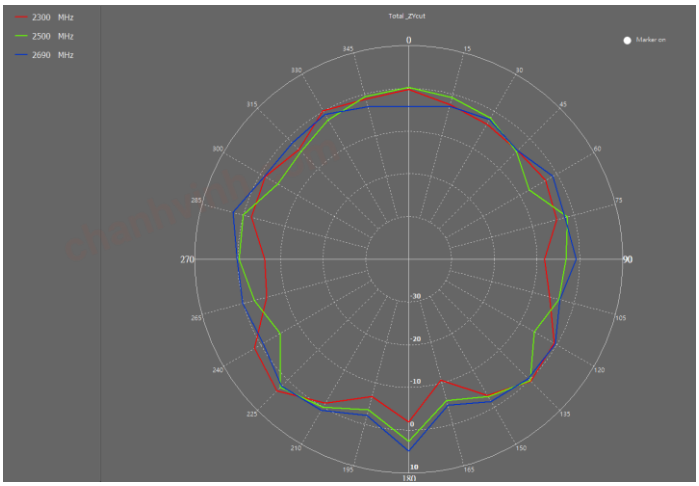
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Radiation Pattern – Cable 100mm
Frequency(MHz)：698~2700. Pattern Field：ZY Cut(Phi=90)

Test data







	Max value	Min value	Average
698(MHz)	-2.28 dB	-10.29 dB	-5.55 dB
880(MHz)	-2.06 dB	-14.95 dB	-8.02 dB
960(MHz)	-0.23 dB	-16.44 dB	-7.34 dB

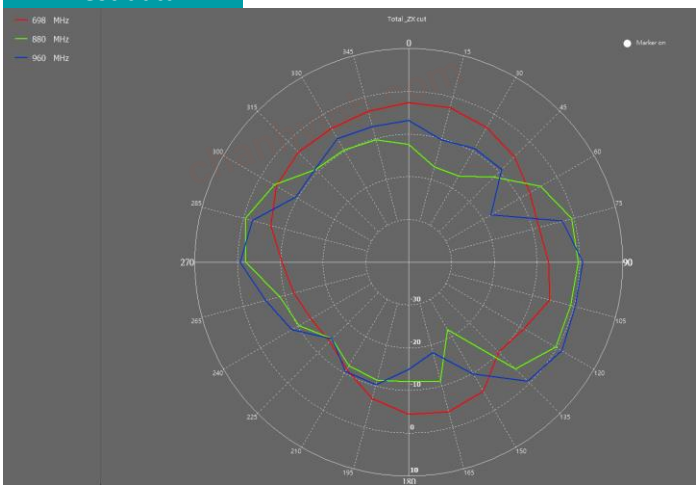
	Max value	Min value	Average
1710(MHz)	3.17 dB	-5.24 dB	0.11 dB
1880(MHz)	4.00 dB	-8.43 dB	0.19 dB
2170(MHz)	1.70 dB	-11.86 dB	-3.97 dB

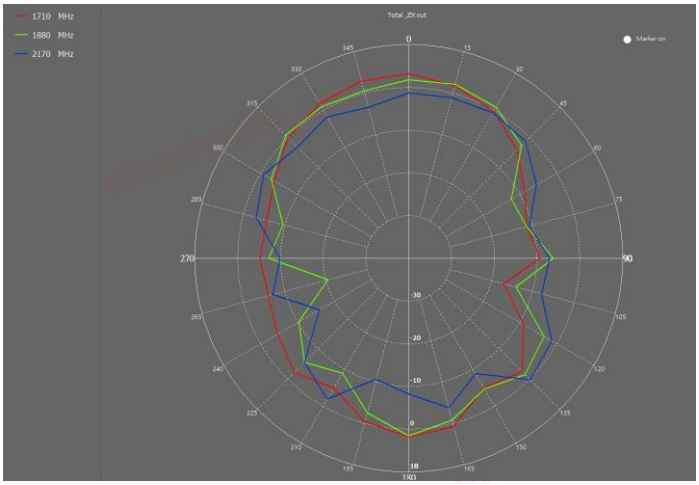
	Max value	Min value	Average
2300(MHz)	3.60 dB	-10.76 dB	-2.90 dB
2500(MHz)	2.55 dB	-7.50 dB	-2.16 dB
2700(MHz)	4.83 dB	-4.62 dB	-0.90 dB

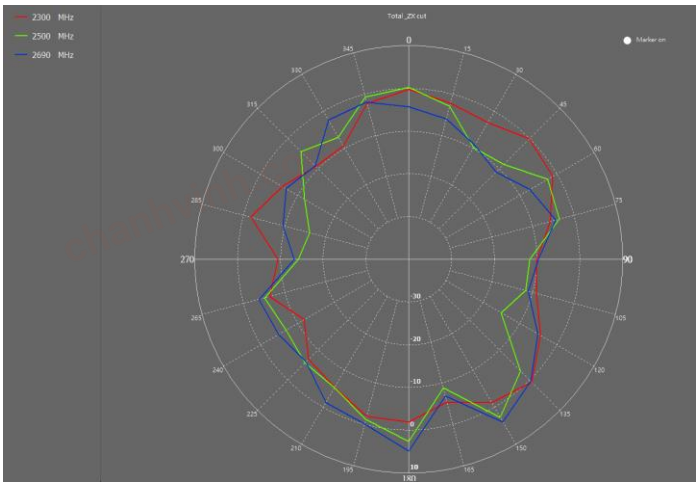
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Radiation Pattern – Cable 100mm
Frequency(MHz): 698~2700. Pattern Field: ZX Cut(Phi=0)

Test data







	Max value	Min value	Average
698(MHz)	-2.61 dB	-13.86 dB	-6.81 dB
880(MHz)	-0.32 dB	-21.81 dB	-8.77 dB
960(MHz)	1.35 dB	-18.16 dB	-7.88 dB

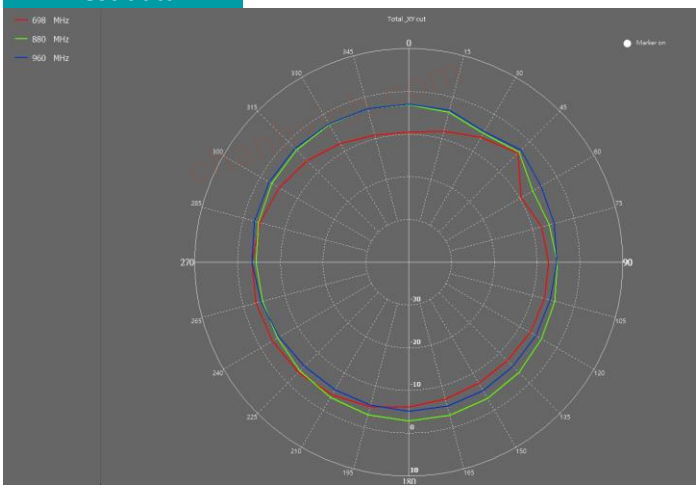
	Max value	Min value	Average
1710(MHz)	3.17 dB	-17.04 dB	-3.48 dB
1880(MHz)	2.16 dB	-20.53 dB	-4.60 dB
2170(MHz)	0.24 dB	-15.95 dB	-5.19 dB

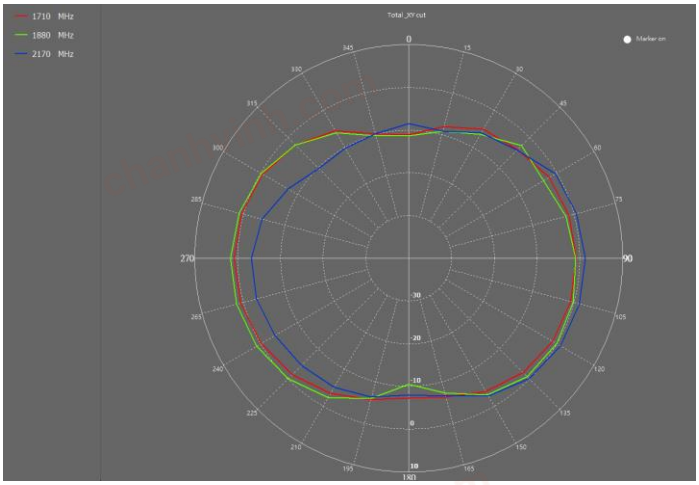
	Max value	Min value	Average
2300(MHz)	0.73 dB	-11.74 dB	-4.67 dB
2500(MHz)	2.69 dB	-16.06 dB	-5.93 dB
2700(MHz)	4.83 dB	-13.22 dB	-4.84 dB

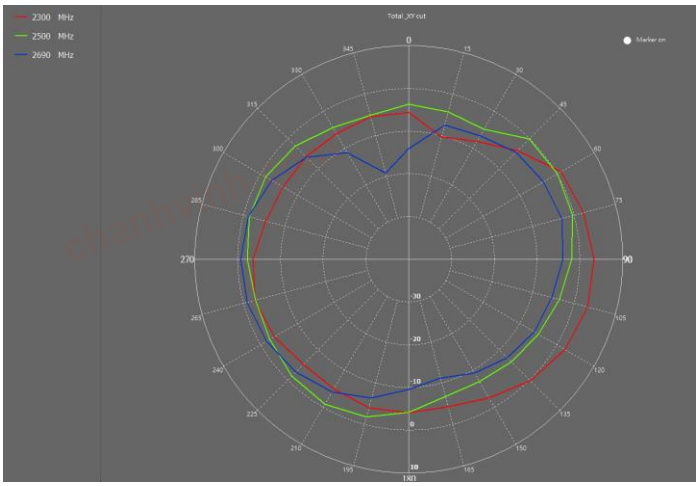
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Radiation Pattern – Cable 200mm
Frequency(MHz): 698~2700. Pattern Field: XY Cut(Theta=90)

Test data







	Max value	Min value	Average
698(MHz)	-3.11 dB	-9.67 dB	-6.39 dB
880(MHz)	-2.74 dB	-6.52 dB	-3.89 dB
960(MHz)	-2.33 dB	-5.75 dB	-4.25 dB

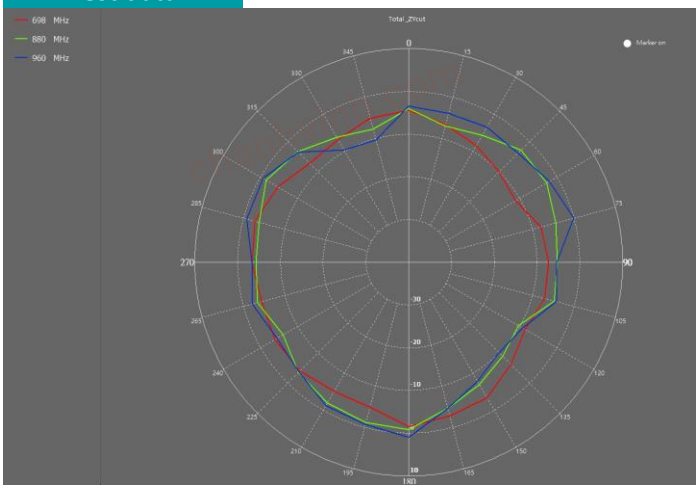
	Max value	Min value	Average
1710(MHz)	0.79 dB	-11.14 dB	-3.74 dB
1880(MHz)	1.68 dB	-11.38 dB	-3.70 dB
2170(MHz)	1.29 dB	-10.30 dB	-4.79 dB

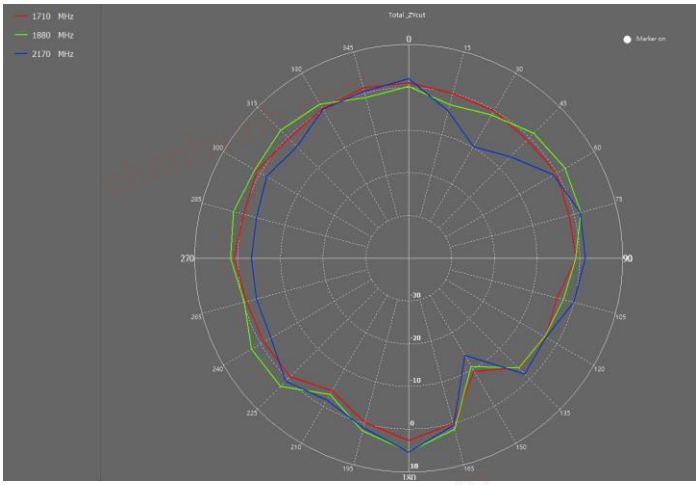
	Max value	Min value	Average
2300(MHz)	3.31 dB	-10.35 dB	-3.46 dB
2500(MHz)	0.16 dB	-6.99 dB	-3.12 dB
2700(MHz)	-0.70 dB	-19.07 dB	-6.56 dB

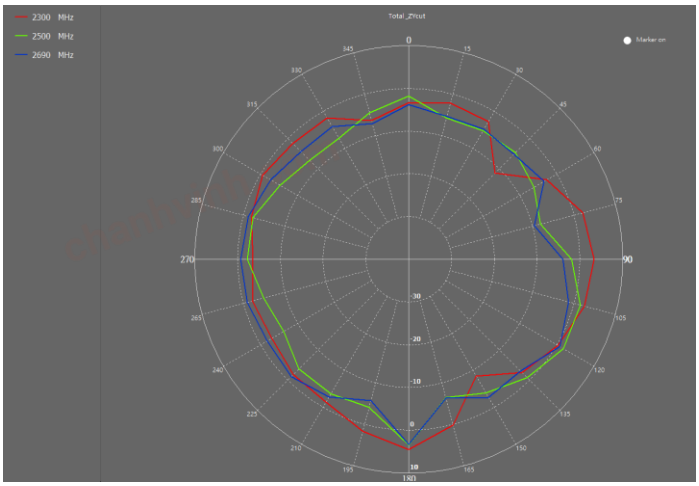
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Radiation Pattern – Cable 200mm
Frequency(MHz): 698~2700. Pattern Field: ZY Cut(Phi=90)

Test data







	Max value	Min value	Average
698(MHz)	-1.62 dB	-11.15 dB	-5.61 dB
880(MHz)	-0.91 dB	-10.39 dB	-4.52 dB
960(MHz)	0.87 dB	-10.32 dB	-3.91 dB

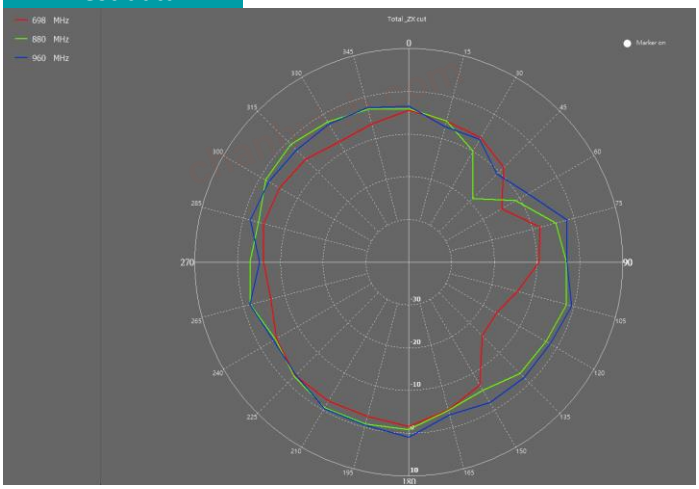
	Max value	Min value	Average
1710(MHz)	2.56 dB	-9.45 dB	-0.87 dB
1880(MHz)	5.26 dB	-10.79 dB	0.14 dB
2170(MHz)	5.29 dB	-13.79 dB	-1.63 dB

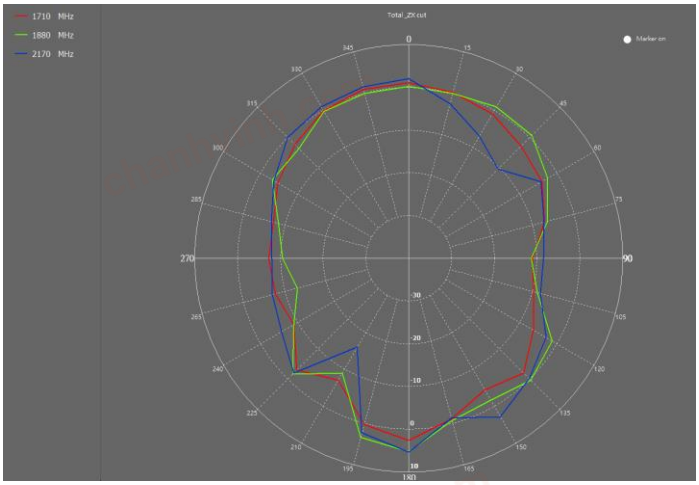
	Max value	Min value	Average
2300(MHz)	4.57 dB	-11.56 dB	-1.57 dB
2500(MHz)	3.47 dB	-8.11 dB	-3.46 dB
2700(MHz)	3.26 dB	-9.58 dB	-3.01 dB

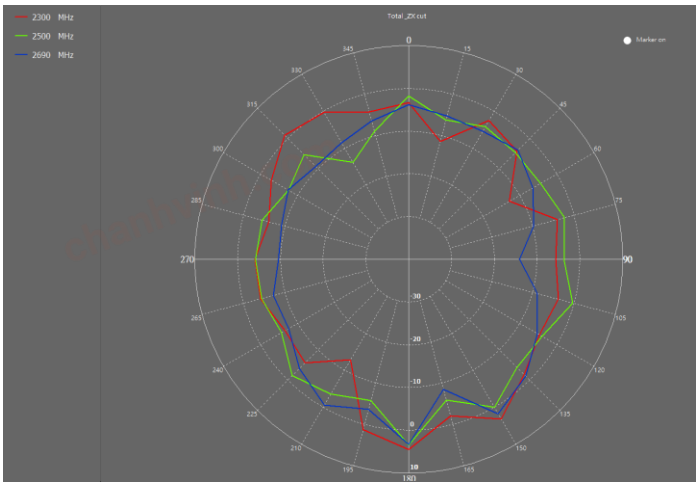
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Radiation Pattern – Cable 200mm
Frequency(MHz): 698~2700. Pattern Field: ZX Cut(Phi=0)

Test data







	Max value	Min value	Average
698(MHz)	-1.62 dB	-16.34 dB	-6.91 dB
880(MHz)	-0.73 dB	-18.94 dB	-4.03 dB
960(MHz)	0.87 dB	-10.80 dB	-2.99 dB

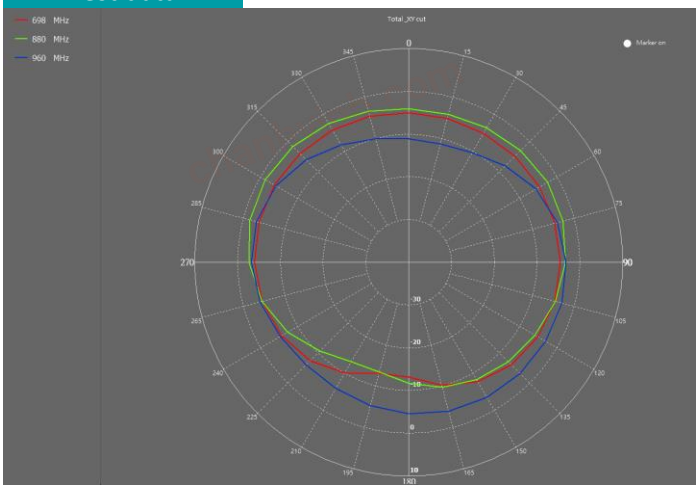
	Max value	Min value	Average
1710 (MHz)	2.56 dB	-11.14 dB	-3.65 dB
1880(MHz)	5.26 dB	-13.01 dB	-3.03 dB
2170(MHz)	5.29 dB	-15.99 dB	-3.28 dB

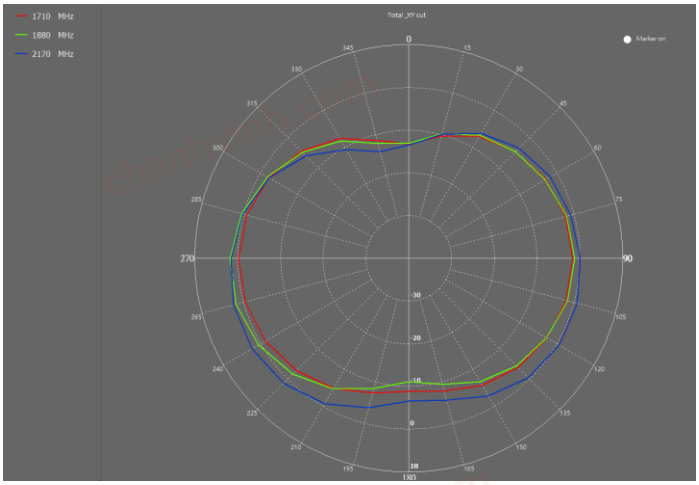
	Max value	Min value	Average
2300(MHz)	4.57 dB	-12.81 dB	-3.57 dB
2500(MHz)	3.47 dB	-13.87 dB	-4.02 dB
2700(MHz)	3.26 dB	-14.15 dB	-5.53 dB

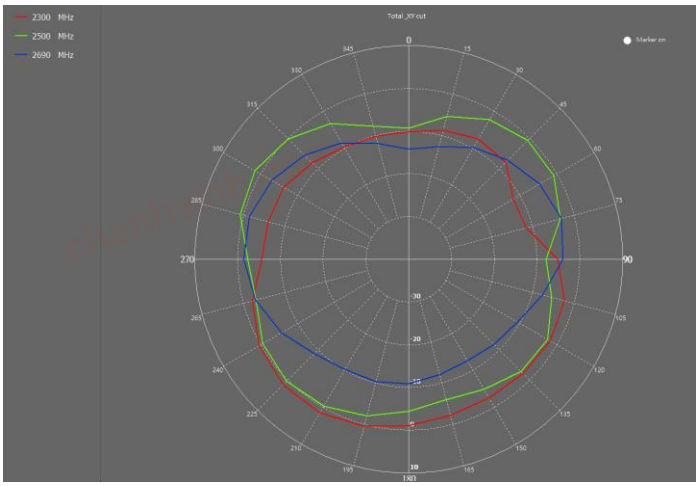
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Radiation Pattern – Cable 312.3mm
Frequency(MHz): 698~2700. Pattern Field: XY Cut(Theta=90)

Test data







	Max value	Min value	Average
698(MHz)	-3.78 dB	-13.10 dB	-6.08 dB
880(MHz)	-1.24 dB	-13.45 dB	-5.48 dB
960(MHz)	-2.98 dB	-11.34 dB	-5.92 dB

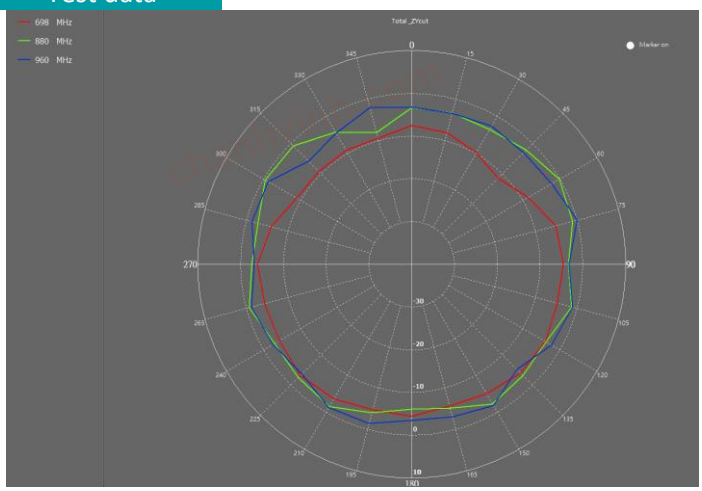
	Max value	Min value	Average
1710(MHz)	-0.26 dB	-13.31 dB	-5.23 dB
1880(MHz)	1.74 dB	-13.14 dB	-5.11 dB
2170(MHz)	2.36 dB	-14.15 dB	-3.74 dB

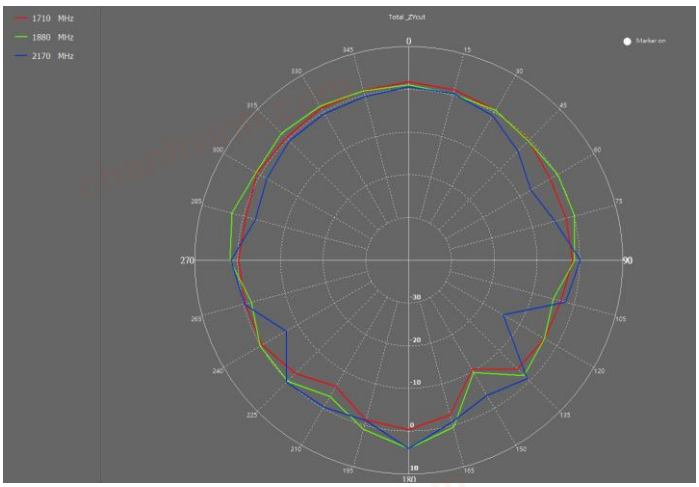
	Max value	Min value	Average
2300(MHz)	1.53 dB	-11.73 dB	-5.18 dB
2500(MHz)	1.45 dB	-9.36 dB	-3.30 dB
2700(MHz)	-1.42 dB	-14.27 dB	-8.22 dB

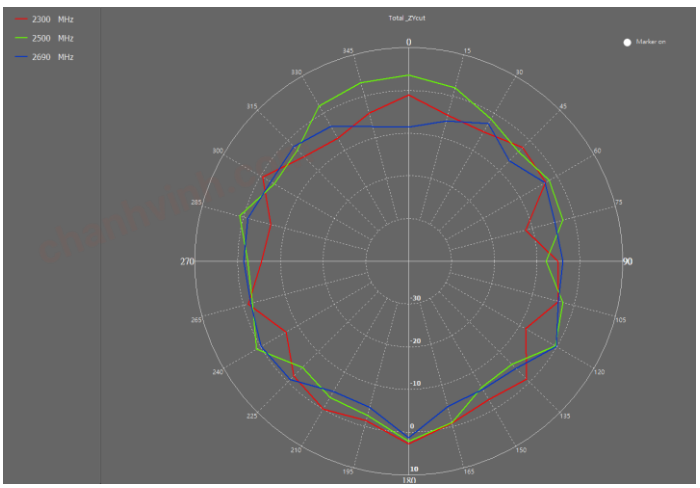
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Radiation Pattern – Cable 312.3mm
Frequency(MHz)：698~2700. Pattern Field：ZY Cut(Phi=90)

Test data







	Max value	Min value	Average
698(MHz)	-3.17 dB	-11.43 dB	-6.20 dB
880(MHz)	-0.15 dB	-8.10 dB	-3.06 dB
960(MHz)	0.06 dB	-5.86 dB	-2.67 dB

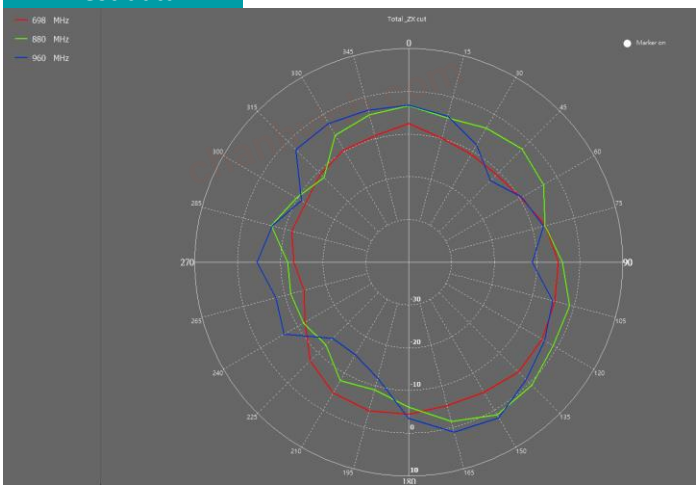
	Max value	Min value	Average
1710(MHz)	1.79 dB	-10.47 dB	-1.39 dB
1880(MHz)	4.02 dB	-9.68 dB	-0.20 dB
2170(MHz)	4.03 dB	-14.48 dB	-1.67 dB

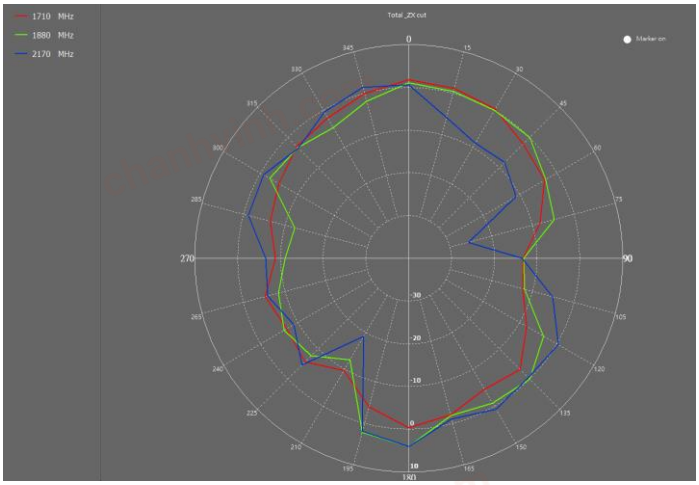
	Max value	Min value	Average
2300(MHz)	2.69 dB	-11.65 dB	-3.42 dB
2500(MHz)	3.51 dB	-7.93 dB	-1.58 dB
2700(MHz)	1.34 dB	-8.67 dB	-3.30 dB

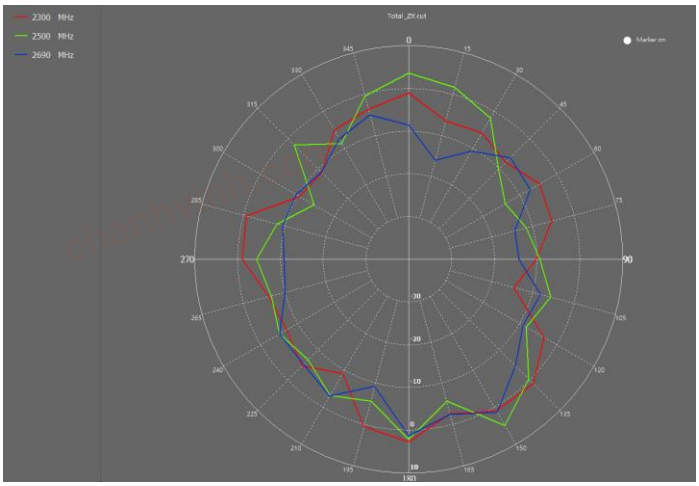
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Radiation Pattern – Cable 312.3mm
Frequency(MHz): 698~2700. Pattern Field: ZX Cut(Phi=0)

Test data







	Max value	Min value	Average
698(MHz)	-3.79 dB	-14.65 dB	-8.10 dB
880(MHz)	1.21 dB	-12.73 dB	-5.87 dB
960(MHz)	2.03 dB	-15.01 dB	-6.31 dB

	Max value	Min value	Average
1710(MHz)	1.79 dB	-13.31 dB	-4.50 dB
1880(MHz)	4.02 dB	-13.14 dB	-3.97 dB
2170(MHz)	4.03 dB	-25.51 dB	-4.72 dB

	Max value	Min value	Average
2300(MHz)	2.69 dB	-14.57 dB	-4.55 dB
2500(MHz)	4.85 dB	-14.48 dB	-4.75 dB
2700(MHz)	1.35 dB	-16.07 dB	-7.39 dB

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Pulse A YAGEO Company

Standard Operation Sheet/标准操作指南

Part Name/No. 产品名称/编号:	Process Name 工序名称:	Revision 版本:	Effective Date 生效日期:	Change Description 变更内容:	PE	QE	PRD
BTPA0061204G0C4AXX系列 標準天線	包装	A	2024/1/31	Initial release			

Standard Work Layout/标准操作工位:


图1


图2


图3


图4


图5


图6

Step	Description of Work Content/操作内容描述	Step	Description of Work Content/操作内容描述
1	将50pcs产品装入1个PE袋内，端子套上防尘帽，贴上PE袋标签，封口。如图1-3所示。	3	将外箱底部用透明胶带封好，再将40袋装满天线的PE袋共2000pcs天线放入外箱内，并用透明胶带封好口。如图5-6所示。
2	用热焊封口机将PE袋封口，如图4所示。	4	将外箱标签贴附在外箱的左上角，标签位置及内容如图5所示。

Critical Points&Tool Information/操作要点及夹具信息	Tool&Critical Parameter/夹具与重点参数检查
1.只有受过培训和确认合格的员工可以执行本操作。 2.假如发生异常问题，联系线负责人，维护人或主管。 3.在打包作业之前，操作员必须确认打包的数量是否正确。包装外箱上产品的代号必须与工单上的一致。	Tool required(使用工具): Tool Type(夹具型号): Safety Device(安全设备):

Form No.：QP8.5.2-03 30.08.2021 Confidential

Doc.No/文件编号:WI-SZHS-D4540-S05

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Reliability Test Report

Report No.: SZ-HS-ETR-2311031 Date: 2023/11/29

The Following samples were submitted and identified on behalf of the client as:

Sample Name/样品名称	： BTPA0061204G0C4AXX-2321P		
Sample Quantity/样品数量	： 30Pcs		
Date Submitted/申请日期	： 2023.11.17		
Test Period/测试周期	： 2023.11.20----------2023.11.29		
Test Request/测试要求	测试条件	样品编号	数量
	1. Cold Storage test 冷藏测试	#1~#5	5Pcs
	2. Dry Heat Storage test 热储存测试	#6~#10	5Pcs
	3. Damp Heat Cyclic test 湿热循环测试	#11~#15	5Pcs
	4. Temperature Cycling test 温度周期变化	#16~#20	5Pcs
	5. Thermal shock test 冷热冲击试验	#21~#25	5Pcs
	6. Salt mist test 盐雾测试	#26~#30	5Pcs
Test Method/测试方法	： Pulse Standard/普尔思标准	√	
	： Customer Request/客户标准		
Test Result/测试结果	： Please refer to next page.	PASS	
Conclusion/结论	NA		
Suggestion/建议	NA		

Maggie Wu(吴沛嫻)/RD	NA	HE HUAMING
Applicant by 申请人 QE/ME	Tel: 联系电话	Approval by: 确认人/LAB

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Reliability Test Report

Report No.: SZ-HS-ETR-2311031 Date: 2023/11/29

Test Result--- Cold Storage test 冷藏测试

Sample Name	: BTPA0061204G0C4AXX-2321P	
Sample No.	: 5Pcs(#1~#5)	
Test Ambient	: Temperature: 24.2℃	
	: Humidity:35%RH	
Sample Reception	: Fig.1	
Test Condition Setup	1.Room Temperature -40 degrees within 2 hours 2.Storage for 16 hours at -40 degrees; 3.-40 degrees room temperature within 2 hours	
Test Process	: Fig.2	
Photos After Test	: Fig.3	
Test Result	: 试验后样品外观无异常.	
Final Result	: OK	√
	: NG	
Confirmed by	: HU CHUNJIE	
Date	: 2023.11.21	

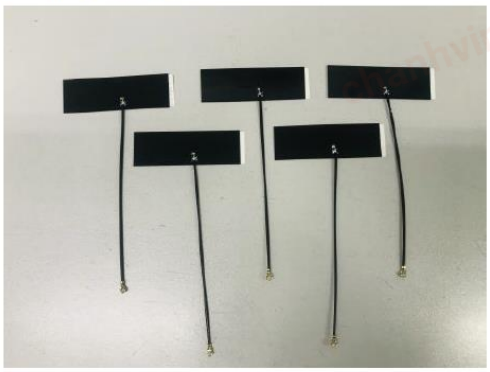
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Reliability Test Report

Report No.: SZ-HS-ETR-2311031 Date: 2023/11/29

Fig.1: Appearance photos of the samples before test.



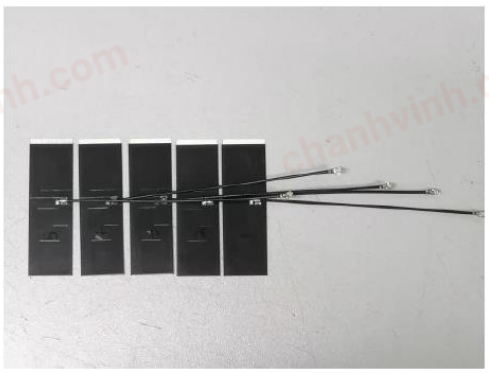
Sample No.: 2311031-#1~#5

Fig.2: Photo of samples in test process.



Sample No.: 2311031-#1~#5

Fig.3: Appearance photos of the samples after test.



Sample No.: 2311031-#1~#5

……THE END……

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Reliability Test Report

Report No.: SZ-HS-ETR-2311031 Date: 2023/11/29

Test Result--- Dry Heat Storage test 热储存测试

Sample Name	： BTPA0061204G0C4AXX-2321P	
Sample No.	： 5Pcs(#6~#10)	
Test Ambient	： Temperature: 24.2℃	
	： Humidity:35%RH	
Sample Reception	： Fig.1	
Test Condition Setup	1.Room Temperature 85 degrees within 2 hours 2.Storage for 16 hours at 85 degrees; 3.85 degrees room temperature within 2 hours	
Test Process	： Fig.2	
Photos After Test	： Fig.3	
Test Result	： 试验后样品外观无异常.	
Final Result	： OK	√
	： NG	
Confirmed by	： HU CHUNJIE	
Date	： 2023.11.21	

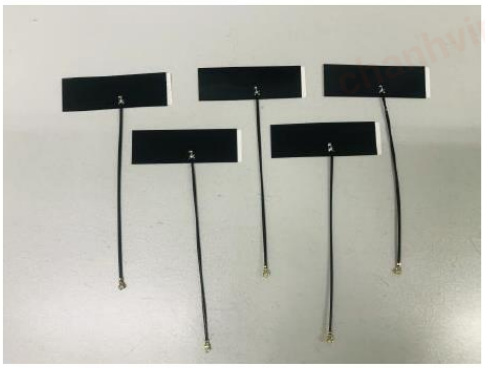
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Reliability Test Report

Report No.: SZ-HS-ETR-2311031 Date: 2023/11/29

Fig.1: Appearance photos of the samples before test.



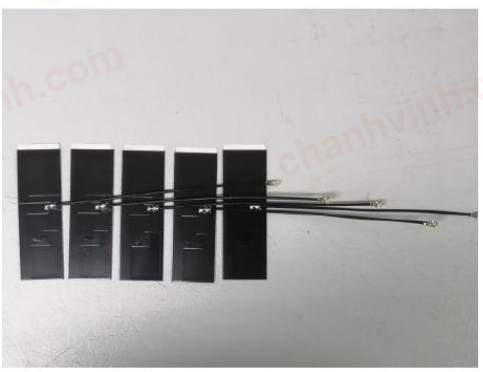
Sample No.: 2311031-#6~#10

Fig.2: Photo of samples in test process.



Sample No.: 2311031-#6~#10

Fig.3: Appearance photos of the samples after test.



Sample No.: 2311031-#6~#10

……THE END……

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Reliability Test Report

Report No.: SZ-HS-ETR-2311031 Date: 2023/11/29

Test Result--- Damp Heat Cyclic test 湿热循环测试

Sample Name	： BTPA0061204G0C4AXX-2321P	
Sample No.	： 5Pcs(#11~#15)	
Test Ambient	： Temperature: 24.2℃	
	： Humidity:35%RH	
Sample Reception	： Fig.1	
Test Condition Setup	95% RH @ +25°C for 12 h and 55°C for 12h. in 6 cycles (= 6 days)	
Test Process	： Fig.2	
Photos After Test	： Fig.3	
Test Result	： 试验后样品外观无异常.	
Final Result	： OK	√
	： NG	
Confirmed by	： HE HUAMING	
Date	： 2023.11.28	

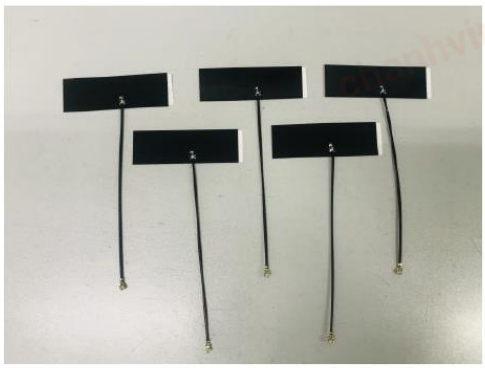
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Reliability Test Report

Report No.: SZ-HS-ETR-2311031 Date: 2023/11/29

Fig.1: Appearance photos of the samples before test.



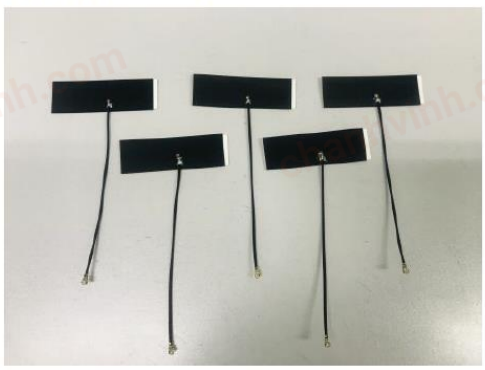
Sample No.: 2311031-#11~#15

Fig.2: Photo of samples in test process.



Sample No.: 2311031-#11~#15

Fig.3: Appearance photos of the samples after test.



Sample No.: 2311031-#11~#15

……THE END……

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Reliability Test Report

Report No.: SZ-HS-ETR-2311031 Date: 2023/11/29

Test Result--- Temperature Cycling test 温度周期变化

Sample Name	： BTPA0061204G0C4AXX-2321P	
Sample No.	： 5Pcs(#16~#20)	
Test Ambient	： Temperature: 24.2℃	
	： Humidity:35%RH	
Sample Reception	： Fig.1	
Test Condition Setup	1.Room Temperature to -40 degrees (2hours) 2.Storage for 2 hours at -40 degrees 3.-40 degrees to 85 degrees (2hours) 4.Storage for 2 hours at 85 degrees 5.85 degrees to -40 degrees (2hours) 6.Repeat from 2 to 5 for 5 times 7.-40 degrees increase to room temperature within 2 hours	
Test Process	： Fig.2	
Photos After Test	： Fig.3	
Test Result	： 试验后样品外观无异常.	
Final Result	： OK	√
	： NG	
Confirmed by	： HE HUAMING	
Date	： 2023.11.29	

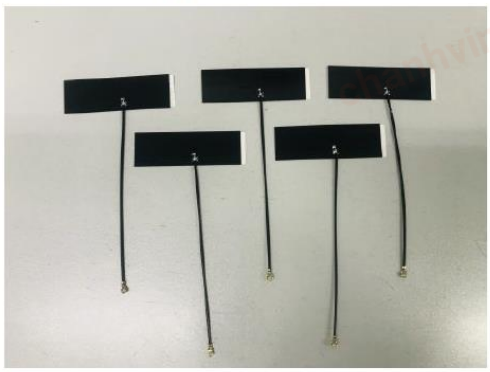
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Reliability Test Report

Report No.: SZ-HS-ETR-2311031 Date: 2023/11/29

Fig.1: Appearance photos of the samples before test.



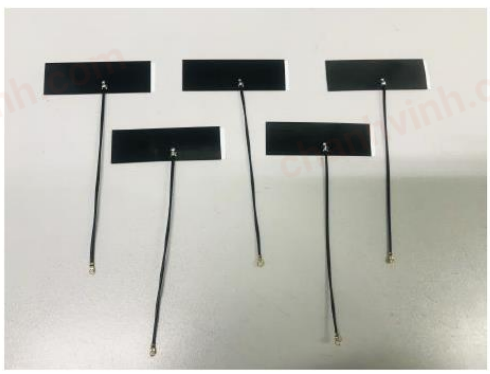
Sample No.: 2311031-#16~#20

Fig.2: Photo of samples in test process.



Sample No.: 2311031-#16~#20

Fig.3: Appearance photos of the samples after test.



Sample No.: 2311031-#16~#20

……THE END……

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Reliability Test Report

Report No.: SZ-HS-ETR-2311031 Date: 2023/11/29

Test Result--- Thermal shock test 冷热冲击试验

Sample Name	： BTPA0061204G0C4AXX-2321P	
Sample No.	： 5Pcs(#21~#25)	
Test Ambient	： Temperature: 24.2℃	
	： Humidity:35%RH	
Sample Reception	： Fig.1	
Test Condition Setup	65℃ /-35℃, 30min(hot)/20min(cold).50min per cycle,20cycles.	
Test Process	： Fig.2	
Photos After Test	： Fig.3	
Test Result	： 试验后样品外观无异常.	
Final Result	： OK	√
	： NG	
Confirmed by	： HU CHUNJIE	
Date	： 2023.11.23	

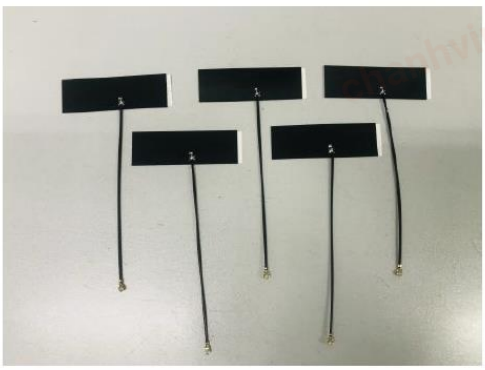
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Reliability Test Report

Report No.: SZ-HS-ETR-2311031 Date: 2023/11/29

Fig.1: Appearance photos of the samples before test.



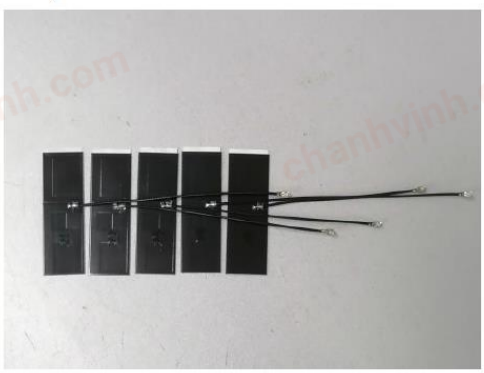
Sample No.: 2311031-#21~#25

Fig.2: Photo of samples in test process.



Sample No.: 2311031-#21~#25

Fig.3: Appearance photos of the samples after test.



Sample No.: 2311031-#21~#25

……THE END……

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Reliability Test Report

Report No.: SZ-HS-ETR-2311031 Date: 2023/11/29

Test Result--- Salt mist test 盐雾测试

Sample Name	: BTPA0061204G0C4AXX-2321P	
Sample No.	: 5Pcs(#26~#30)	
Test Ambient	: Temperature: 24.2℃	
	: Humidity:35%RH	
Sample Reception	: Fig.1	
Test Condition Setup	a) 5% NaCl spray for 24 h (with simulated phone cover), @ +35°C,+95% RH	
Test Process	: Fig.2	
Photos After Test	: Fig.3	
Test Result	: 试验后样品外观无异常.	
Final Result	: OK	√
	: NG	
Confirmed by	: HU CHUNJIE	
Date	: 2023.11.21	

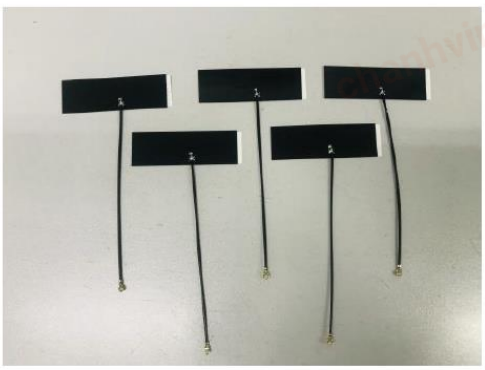
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Reliability Test Report

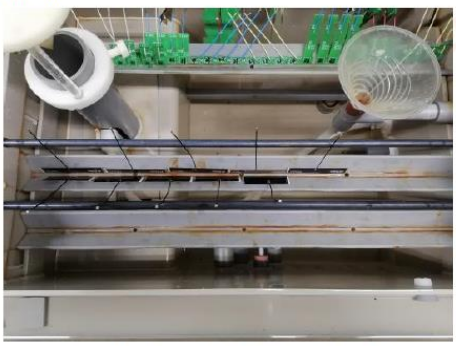
Report No.: SZ-HS-ETR-2311031 Date: 2023/11/29

Fig.1: Appearance photos of the samples before test.



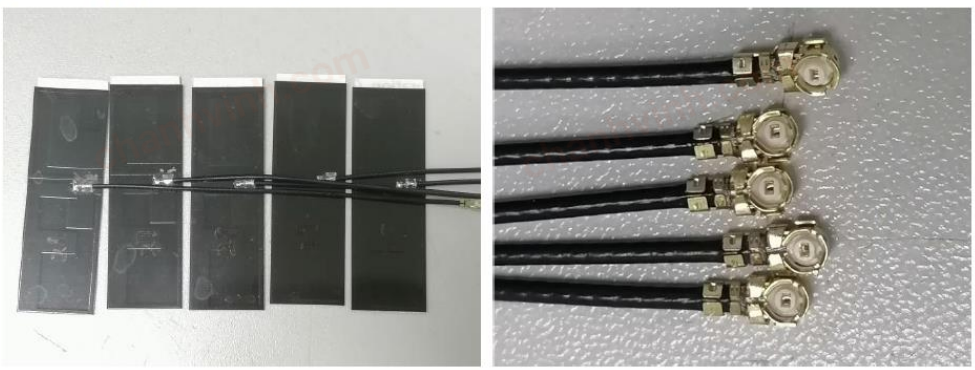
Sample No.: 2311031-#26~#30

Fig.2: Photo of samples in test process.



Sample No.: 2311031-#26~#30

Fig.3: Appearance photos of the samples after test.



Sample No.: 2311031-#26~#30

……THE END……

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Pulse a YAGEO company

REACh Declaration

(In accordance to EC 1907/2006)

Pulse Electronics manufactures products at Pulse Operations or with selected Manufacturing Partners

Subject Part Number(s):
TWA4215xx
BTPA0061204G0C4AXX

Pulse as a supplier of article, hereby declares, that part numbers reviewed does not contain any of the substances currently in the candidate list of substances of very high concern (SVHC) at concentrations above 0.1% weight by weight of the Article.

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	4,4'- Diaminodiphenylmethane (MDA)	101-77-9	202-974-4	28.10.2008	☐	☑
2	Synthetic Resin	81-15-2	201-329-4	28.10.2008	☐	☑
3	Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins)	85535-84-8	287-476-5	28.10.2008	☐	☑
4	Anthracene	120-12-7	204-371-1	28.10.2008	☐	☑
5	Benzyl butyl phthalate (BBP)	85-68-7	201-622-7	28.10.2008	☐	☑
6	Bis (2-ethylhexyl)phthalate (DEHP)	117-81-7	204-211-0	28.10.2008	☐	☑
7	Bis(tributyltin)oxide (TBTO)	56-35-9	200-268-0	28.10.2008	☐	☑
8	Cobalt dichloride	7646-79-9	231-589-4	28.10.2008	☐	☑
9	Diarsenic pentaoxide	1303-28-2	215-116-9	28.10.2008	☐	☑
10	Diarsenic trioxide	1327-53-3	215-481-4	28.10.2008	☐	☑
11	Dibutyl phthalate (DBP)	84-74-2	201-557-4	28.10.2008	☐	☑
12	Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified: Alpha-hexabromocyclododecane Beta-hexabromocyclododecane Gamma-hexabromocyclododecane	25637-99-4	247-148-4 and 221-695-9 (134237-50-6) (134237-51-7) (134237-52-8)	28.10.2008	☐	☑
13	Lead hydrogen arsenate	7784-40-9	232-064-2	28.10.2008	☐	☑
14	Sodium dichromate	7789-12-0/ 10588-01-9	234-190-3 (7789-12-0 and 10588-01-9)	28.10.2008	☐	☑
15	Triethyl arsenate	15606-95-8	427-700-2	28.10.2008	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	2,4-Dinitrotoluene	121-14-2	204-450-0	13.01.2010	☐	☑
2	Anthracene oil	90640-80-5	292-602-7	13.01.2010	☐	☑
3	Anthracene oil, anthracene-low	90640-82-7	292-604-8	13.01.2010	☐	☑
4	Anthracene oil, anthracene paste	90640-81-6	292-603-2	13.01.2010	☐	☑
5	Anthracene oil, anthracene paste, anthracene fraction	91995-15-2	295-275-9	13.01.2010	☐	☑
6	Anthracene oil, anthracene paste,distn. lights	91995-17-4	295-278-5	13.01.2010	☐	☑
7	Diisobutyl phthalate	84-69-5	201-553-2	13.01.2010	☐	☑
8	Lead chromate	7758-97-6	231-846-0	13.01.2010	☐	☑
9	Lead chromate molybdate sulphate red (C.I. Pigment Red 104)	12656-85-8	235-759-9	13.01.2010	☐	☑
10	Lead sulfochromate yellow (C.I. Pigment Yellow 34)	1344-37-2	215-693-7	13.01.2010	☐	☑
11	Pitch, coal tar, high temp.	-	266-028-2	13.01.2010	☐	☑
12	Tris(2-chloroethyl)phosphate	115-96-8	204-118-5	13.01.2010	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	Acrylamide	79-06-1	201-173-7	30.03.2010	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	Trichloroethylene	79-01-6	201-167-4	18.06.2010	☐	☑
2	Boric acid	10043-35-3 / 11113-50-1	233-139-2 / 234-343-4	18.06.2010	☐	☑
3	Disodium tetraborate, anhydrous	1303-96-4/ 1330-43-4/ 12179-04-3	215-540-4	18.06.2010	☐ ☐	☑ ☑
4	Tetraboron disodium heptaoxide, hydrate	12267-73-1	235-541-3	18.06.2010		
5	Potassium dichromate	7778-50-9	231-906-6	18.06.2010	☐	☑
6	Ammonium dichromate	9/5/7789	232-143-1	18.06.2010	☐	☑
7	Potassium chromate	7789-00-6	232-140-5	18.06.2010	☐	☑
8	Sodium chromate	11/3/7775	231-889-5	18.06.2010	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	Cobalt(II) sulphate	10124-43-3	233-334-2	15.12.2010	☐	☑
2	Cobalt(II) dinitrate	10141-05-6	233-402-1	15.12.2010	☐	☑
3	Cobalt(II) carbonate	513-79-1	208-169-4	15.12.2010	☐	☑
4	Cobalt(II) diacetate	71-48-7	200-755-8	15.12.2010	☐	☑

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5	2-Methoxyethanol	109-86-4	203-713-7	15.12.2010	☐	☑
6	2-Ethoxyethanol	110-80-5	203-804-1	15.12.2010	☐	☑
7	Chromium trioxide	1333-82-0	215-607-8	15.12.2010	☐	☑
8	Chromic acid, Oligomers of chromic acid and dichromic acid, Dichromic acid	7738-94-5 - 13530-68-2	231-801-5 - 236-881-5	15.12.2010	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	2-Ethoxyethyl acetate	111-15-9	203-839-2	20.6.2011	☐	☑
2	Strontium chromate	7789-06-2	232-142-6	20.6.2011	☐	☑
3	1,2-Benzenedicarboxylic acid,di-C7-11-branched and linear alkyl esters(DHNUP)	68515-42-4	271-084-6	20.6.2011	☐	☑
4	Hydrazine	302-01-2 /7803-57-8	206-114-9	20.6.2011	☐	☑
5	1-methyl-2-pyrrolidone	872-50-4	212-828-1	20.6.2011	☐	☑
6	1,2,3-trichloropropane	96-18-4	202-486-1	20.6.2011	☐	☑
7	1,2-Benzenedicarboxylic acid,di-C6-8-branched alkyl esters,C7-rich(DIHP)	71888-89-6	276-158-1	20.6.2011	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	Lead styphnate	15245-44-0	239-290-0	19.12.2011	☐	☑
2	Lead diazide	13424-46-9	236-542-1	19.12.2011	☐	☑
3	Lead dipicrate	6477-64-1	229-335-2	19.12.2011	☐	☑
4	Phenolphthalein	77-09-8	201-004-7	19.12.2011	☐	☑
5	2,2'-Dichloro-4,4'-methylenedianiline	101-14-4	202-918-9	19.12.2011	☐	☑
6	N,N-dimethylacetamide (DMAC)	127-19-5	204-826-4	19.12.2011	☐	☑
7	Trilead diarsenate	3687-31-8	222-979-5	19.12.2011	☐	☑
8	Calcium arsenate	7778-44-1	231-904-5	19.12.2011	☐	☑
9	Arsenic acid	7778-39-4	231-901-9	19.12.2011	☐	☑
10	Bis(2-methoxyethyl) ether	111-96-6	203-924-4	19.12.2011	☐	☑
11	1,2-Dichloroethane	107-06-2	203-458-1	19.12.2011	☐	☑
12	4-(1,1,3,3-Tetramethylbutyl)phenol; 4-tert-octyl phenol	140-66-9	205-426-2	19.12.2011	☐	☑
13	2-Methoxyaniline; o-Anisidine	90-04-0	201-963-1	19.12.2011	☐	☑
14	Bis(2-methoxyethyl) phthalate	117-82-8	204-212-6	19.12.2011	☐	☑
15	Formaldehyde, oligomeric reaction products with aniline (technical MDA)	25214-70-4	500-036-1	19.12.2011	☐	☑
16	Zirconia Aluminosilicate Refractory Ceramic Fibres(Zr-RCF)*	-	-	19.12.2011	☐	☑
17	Aluminosilicate Refractory Ceramic Fibres(RCF)*	-	-	19.12.2011	☐	☑
18	Pentazinc chromate octahydroxide	49663-84-5	256-418-0	19.12.2011	☐	☑
19	Potassium hydroxyoctaoxodizincatedichromate	11103-86-9	234-329-8	19.12.2011	☐	☑
20	Dichromium tris(chromate)	24613-89-6	246-356-2	19.12.2011	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	1,2-bis(2-methoxyethoxy)ethane (TEGDME; triglyme)	112-49-2	203-977-3	18.06.2012	☐	☑
2	1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME)	110-71-4	203-794-9	18.06.2012	☐	☑
3	Diboron trioxide	1303-86-2	215-125-8	18.06.2012	☐	☑
4	Formamide	75-12-7	200-842-0	18.06.2012	☐	☑
5	Lead(II) bis(methanesulfonate)	17570-76-2	401-750-5	18.06.2012	☐	☑
6	1,3,5-tris(oxiranylmethyl)-1,3,5-triazine-2,4,6(1H,3H,5H)-trione (TGIC)	2451-62-9	219-514-3	18.06.2012	☐	☑
7	1,3,5-tris[(2S and 2R)-2,3-epoxypropyl]-1,3,5-triazine-2,4,6-(1H,3H,5H)-trione (β-TGIC)	59653-74-6	423-400-0	18.06.2012	☐	☑
8	4,4'-bis(dimethylamino)benzophenone (Michler's ketone)	90-94-8	202-027-5	18.06.2012	☐	☑
9	N,N,N',N'-tetramethyl-4,4'-methylenedianiline (Michler's base)	101-61-1	202-959-2	18.06.2012	☐	☑
10	[4-[[4-anilino-1-naphthyl][4-(dimethylamino)phenyl]methylene]cyclohexa-2,5-dien-1-ylidene] dimethylammonium chloride (C.I. Basic Blue 26)	2580-56-5	219-943-6	18.06.2012	☐	☑
11	[4-[4,4'-bis(dimethylamino) benzhydrylidene]cyclohexa-2,5-dien-1-ylidene]dimethylammonium chloride (C.I. Basic Violet 3)	548-62-9	208-953-6	18.06.2012	☐	☑
12	4,4'-bis(dimethylamino)-4"-(methylamino)trityl alcohol	561-41-1	209-218-2	18.06.2012	☐	☑
13	α,α-Bis[4-(dimethylamino)phenyl]-4 (phenylamino)naphthalene-1-methanol (C.I. Solvent Blue 4)	6786-83-0	229-851-8	18.06.2012	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	Bis(pentabromophenyl) ether (decabromodiphenyl ether; DecaBDE)	1163-19-5	214-604-9	19.12.2012	☐	☑
2	Pentacosafluorotridecanoic acid	72629-94-8	276-745-2	19.12.2012	☐	☑

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3	Tricosafluorododecanoic acid	307-55-1	206-203-2	19.12.2012	☐	☑
4	Henicosafluoroundecanoic acid	2058-94-8	218-165-4	19.12.2012	☐	☑
5	Heptacosafluorotetradecanoic acid	376-06-7	206-803-4	19.12.2012	☐	☑
6	4-(1,1,3,3-tetramethylbutyl)phenol, ethoxylated *[covering well-defined substances and UVCB substances, polymers and homologues]*	-	-	19.12.2012	☐	☑
7	4-Nonylphenol, branched and linear *[substances with a linear and/or branched alkyl chain with a carbon number of 9 covalently bound in position 4 to phenol, covering also UVCB- and well-defined substances which include any of the individual isomers or a combination thereof]*	-	-	19.12.2012	☐	☑
8	Diazene-1,2-dicarboxamide (C,C'-azodi(formamide))	123-77-3	204-650-8	19.12.2012	☐	☑
9	Cyclohexane-1,2-dicarboxylic anhydride [1], cis-cyclohexane-1,2-dicarboxylic anhydride [2], trans-cyclohexane-1,2-dicarboxylic anhydride [3] *[The individual cis- [2] and trans- [3] isomer substances and all possible combinations of the cis- and trans-isomers [1] are covered by this entry]*	85-42-7 13149-00-3 14166-21-3	201-604-9 236-086-3 238-009-9	19.12.2012	☐	☑
10	Hexahydromethylphathalic anhydride, Hexahydro-4-methylphathalic anhydride, Hexahydro-1-methylphathalic anhydride, Hexahydro-3-methylphathalic anhydride	25550-51-0 19438-60-9 48122-14-1 57110-29-9	247-094-1 243-072-0 256-356-4 260-566-1	19.12.2012	☐	☑
11	Methoxyacetic acid	625-45-6	210-894-6	19.12.2012	☐	☑
12	1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	284-032-2	19.12.2012	☐	☑
13	Diisopentylphthalate (DIPP)	605-50-5	210-088-4	19.12.2012	☐	☑
14	N-pentyl-isopentylphthalate	776297-69-9	-	19.12.2012	☐	☑
15	1,2-Diethoxyethane	629-14-1	211-076-1	19.12.2012	☐	☑
16	N,N-dimethylformamide	68-12-2	200-679-5	19.12.2012	☐	☑
17	Dibutyltin dichloride (DBTC)	683-18-1	211-670-0	19.12.2012	☐	☑
18	Acetic acid, lead salt, basic	51404-69-4	257-175-3	19.12.2012	☐	☑
19	Trilead bis(carbonate)dihydroxide	1319-46-6	215-290-6	19.12.2012	☐	☑
20	Lead oxide sulfate	12036-76-9	234-853-7	19.12.2012	☐	☑
21	[Phthalato(2-)]dioxotrilead	69011-06-9	273-688-5	19.12.2012	☐	☑
22	Dioxobis(stearato)trilead	12578-12-0	235-702-8	19.12.2012	☐	☑
23	Fatty acids, C16-18, lead salts	91031-62-8	292-966-7	19.12.2012	☐	☑
24	Lead bis(tetrafluoroborate)	13814-96-5	237-486-0	19.12.2012	☐	☑
25	Lead cynamidate	20837-86-9	244-073-9	19.12.2012	☐	☑
26	Lead dinitrate	10099-74-8	233-245-9	19.12.2012	☐	☑
27	Lead monoxide (lead oxide)	1317-36-8	215-267-0	19.12.2012	☐	☑
28	Orange lead (lead tetroxide)	1314-41-6	215-235-6	19.12.2012	☐	☑
29	Lead titanium trioxide	12060-00-3	235-038-9	19.12.2012	☐	☑
30	Lead titanium zirconium oxide	12626-81-2	235-727-4	19.12.2012	☐	☑
31	Pentalead tetraoxide sulphate	12065-90-6	235-067-7	19.12.2012	☐	☑
32	Pyrochlore, antimony lead yellow	8012-00-8	232-382-1	19.12.2012	☐	☑
33	Silicic acid ($H_2Si_2O_5$), barium salt (1:1), lead-doped	68784-75-8	272-271-5	19.12.2012	☐	☑
34	Silicic acid, lead salt	11120-22-2	234-363-3	19.12.2012	☐	☑
35	Sulfurous acid, lead salt, dibasic	62229-08-7	263-467-1	19.12.2012	☐	☑
36	Tetraethyllead	78-00-2	201-075-4	19.12.2012	☐	☑
37	Tetralead trioxide sulphate	12202-17-4	235-380-9	19.12.2012	☐	☑
38	Trilead dioxide phosphonate	12141-20-7	235-252-2	19.12.2012	☐	☑
39	Furan	110-00-9	203-727-3	19.12.2012	☐	☑
40	Methyloxirane (Propylene oxide)	75-56-9	200-879-2	19.12.2012	☐	☑
41	Diethyl sulphate	64-67-5	200-589-6	19.12.2012	☐	☑
42	Dimethyl sulphate	77-78-1	201-058-1	19.12.2012	☐	☑
43	3-ethyl-2-methyl-2-(3-methylbutyl)-1,3-oxazolidine	143860-04-2	421-150-7	19.12.2012	☐	☑
44	Dinoseb (6-sec-butyl-2,4-dinitrophenol)	88-85-7	201-861-7	19.12.2012	☐	☑

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45	4,4'-methylenedi-o-toluidine	838-88-0	212-658-8	19.12.2012	☐	☑
46	4,4'-oxydianiline and its salts	101-80-4	202-977-0	19.12.2012	☐	☑
47	4-Aminoazobenzene	60-09-3	200-453-6	19.12.2012	☐	☑
48	4-methyl-m-phenylenediamine (toluene-2,4-diamine)	95-80-7	202-453-1	19.12.2012	☐	☑
49	6-methoxy-m-toluidine (p-cresidine)	120-71-8	204-419-1	19.12.2012	☐	☑
50	Biphenyl-4-ylamine	92-67-1	202-177-1	19.12.2012	☐	☑
51	o-aminoazotoluene	97-56-3	202-591-2	19.12.2012	☐	☑
52	o-Toluidine	95-53-4	202-429-0	19.12.2012	☐	☑
53	N-methylacetamide	79-16-3	201-182-6	19.12.2012	☐	☑
54	1-bromopropane(n-propyl bromide)	106-94-5	203-445-0	19.12.2012	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	Cadmium	7440-43-9	231-152-8	20.06.2013	☐	☑
2	Cadmium oxide	1306-19-0	215-146-2	20.06.2013	☐	☑
3	Dipentyl phthalate(DPP)	131-18-0	205-017-9	20.06.2013	☐	☑
4	4-Nonylphenol, branched and linear, ethoxylated [substances with a linear and/or branched alkyl chain with a carbon number of 9 covalently bound in position 4 to phenol, ethoxylated covering UVCB- and well-defined substances, polymers and homologues, which include any of the individual isomers and/or combinations thereof]	-	-	20.06.2013	☐	☑
5	Ammonium pentadecafluorooctanoate (APFO)	3825-26-1	223-320-4	20.06.2013	☐	☑
6	Pentadecafluorooctanoic acid (PFOA)	335-67-1	206-397-9	20.06.2013	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	Cadmium sulphide	1306-23-6	215-147-8	16.12.2013	☐	☑
2	Disodium 3,3'-[[1,1'-biphenyl]-4,4'-diylbis(azo)]bis(4-aminonaphthalene-1-sulphonate) (C.I. Direct Red 28)	573-58-0	209-358-4	16.12.2013	☐	☑
3	Disodium 4-amino-3-[[4'-[(2,4-diaminophenyl)azo][1,1'-biphenyl]-4-yl]azo] -5-hydroxy-6-(phenylazo)naphthalene-2,7-disulphonate (C.I. Direct Black 38)	1937-37-7	217-710-3	16.12.2013	☐	☑
4	Dihexyl phthalate	84-75-3	201-559-5	16.12.2013	☐	☑
5	Imidazolidine-2-thione (2-imidazoline-2-thiol)	96-45-7	202-506-9	16.12.2013	☐	☑
6	Lead di(acetate)	301-04-2	206-104-4	16.12.2013	☐	☑
7	Trixylyl phosphate	25155-23-1	246-677-8	16.12.2013	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	Cadmium chloride	10108-64-2	233-296-7	16.06.2014	☐	☑
2	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	271-093-5	16.06.2014	☐	☑
3	Sodium peroxometaborate	7632-04-4	231-556-4	16.06.2014	☐	☑
4	Sodium perborate; perboric acid, sodium salt	-	239-172-9; 234-390-0	16.06.2014	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	2-benzotriazol-2-yl-4,6-di-tertbutylphenol (UV-320)	3846-71-7	223-346-6	17.12.2014	☐	☑
2	2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE)	15571-58-1	239-622-4	17.12.2014	☐	☑
3	reaction mass of 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate and 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE and MO	–	–	17.12.2014	☐	☑
4	2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328)	25973-55-1	247-384-8	17.12.2014	☐	☑
5	Cadmium fluoride	7790-79-6	232-222-0	17.12.2014	☐	☑
6	Cadmium sulphate	10124-36-4, 31119-53-6	233-331-6	17.12.2014	☐	☑

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	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ⩾ 0.3% of dihexyl phthalate (EC No. 201-559-5)	68515-51-5 68648-93-1	271-094-0 272-013-1	15.06.2015	☐	☑
2	5-sec-butyl-2-(2,4-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [1], 5-sec-butyl-2-(4,6-dimethylcyclohex-3-en-1-yl)-5-methyl-1,3-dioxane [2] [covering any of the individual stereoisomers of [1] and [2] or any combination thereof]	-	-	15.06.2015	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	1,3-propanesultone	1120-71-4	214-317-9	17.12.2015	☐	☑
2	2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl)phenol (UV-327)	3864-99-1	223-383-8	17.12.2015	☐	☑
3	2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol(UV-350)	36437-37-3	253-037-1	17.12.2015	☐	☑
4	Nitrobenzene	98-95-3	202-716-0	17.12.2015	☐	☑
5	Perfluorononan-1-oic-acid and its sodium and ammonium salts	375-95-1 21049-39-8	206-801-3	17.12.2015	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	Benzo[def]chrysene	50-32-8	200-028-5	20.06.2016	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	4,4'-isopropylidenediphenol Bisphenol A; BPA	80-05-7	201-245-8	12.01.2017	☐	☑
2	4-heptylphenol, branched and linear substances with a linear and/or branched alkyl chain with a carbon number of 7 covalently bound predominantly in position 4 to phenol, covering also UVCB- and well-defined substances which include any of the individual isomers or a combination thereof	–	–	12.01.2017	☐	☑
3	Nonadecafluorodecanoic acid (PFDA) and its sodium and ammonium salts Decanoic acid, nonadecafluoro-, sodium salt Ammonium nonadecafluorodecanoate Nonadecafluorodecanoic acid	 3830-45-3 3108-42-7 335-76-2	 221-470-5 206-400-3	12.01.2017	☐	☑
4	p-(1,1-dimethylpropyl)phenol	80-46-6	201-280-9	12.01.2017	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	Perfluorohexane-1-sulphonic acid and its salts PFHxS	–	–	07.07.2017	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	1,6,7,8,9,14,15,16,17,17,18,18-Dodecachloropentacyclo[12.2.1.16,9.02,13.05,10]octadeca-7,15-diene ("Dechlorane Plus"™) covering any of its individual anti- and syn-isomers or any combination thereof	–	–	15.01.2018	☐	☑
2	Benz[a]anthracene	56-55-3, 1718-53-2	200-280-6	15.01.2018	☐	☑
3	Cadmium carbonate	513-78-0	208-168-9	15.01.2018	☐	☑
4	Cadmium hydroxide	21041-95-2	244-168-5	15.01.2018	☐	☑
5	Cadmium nitrate	10022-68-1, 10325-94-7	233-710-6	15.01.2018	☐	☑
6	Chrysene	218-01-9, 1719-03-5	205-923-4	15.01.2018	☐	☑

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7	Reaction products of 1,3,4-thiadiazolidine-2,5-dithione, formaldehyde and 4-heptylphenol, branched and linear (RP-HP) with ≥0.1% w/w 4-heptylphenol, branched and linear (4-HPbl)	–	–	15.01.2018	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	Benzene-1,2,4-tricarboxylic acid 1,2 anhydride trimellitic anhydride; TMA	552-30-7	209-008-0	27.06.2018	☐	☑
2	Benzo[ghi]perylene	191-24-2	205-883-8	27.06.2018	☐	☑
3	Decamethylcyclopentasiloxane D5	541-02-6	208-764-9	27.06.2018	☐	☑
4	Dicyclohexyl phthalate DCHP	84-61-7	201-545-9	27.06.2018	☐	☑
5	Disodium octaborate	12008-41-2	234-541-0	27.06.2018	☐	☑
6	Dodecamethylcyclohexasiloxane D6	540-97-6	208-762-8	27.06.2018	☐	☑
7	Ethylenediamine EDA	107-15-3	203-468-6	27.06.2018	☐	☑
8	Lead	7439-92-1	231-100-4	27.06.2018	☐	☑
9	Octamethylcyclotetrasiloxane D4	556-67-2	209-136-7	27.06.2018	☐	☑
10	Terphenyl, hydrogenated	61788-32-7	262-967-7	27.06.2018	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	1,7,7-trimethyl-3-(phenylmethylene)bicyclo[2.2.1]heptan-2-one 3-benzylidene camphor; 3-BC	15087-24-8	239-139-9	15.01.2019	☐	☑
2	2,2-bis(4'-hydroxyphenyl)-4-methylpentane	6807-17-6	401-720-1	15.01.2019	☐	☑
3	Benzo[k]fluoranthene	207-08-9	205-916-6	15.01.2019	☐	☑
4	Fluoranthene	206-44-0; 93951-69-0	205-912-4	15.01.2019	☐	☑
5	Phenanthrene	85-01-8	201-581-5	15.01.2019	☐	☑
6	Pyrene	129-00-0; 1718-52-1	204-927-3	15.01.2019	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propionic acid, its salts and its acyl halides covering any of their individual isomers and combinations thereof	–	–	16.07.2019	☐	☑
2	2-methoxyethyl acetate	110-49-6	203-772-9	16.07.2019	☐	☑
3	4-tert-butylphenol	98-54-4	202-679-0	16.07.2019	☐	☑
4	Tris(4-nonylphenyl, branched and linear) phosphite (TNPP) with ≥ 0.1% w/w of 4-nonylphenol, branched and linear (4-NP)	–	–	16.07.2019	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	Perfluorobutane sulfonic acid (PFBS) and its salts	–	–	16.01.2020	☐	☑
2	Diisohexyl phthalate	71850-09-4	276-090-2	16.01.2020	☐	☑
3	2-methyl-1-(4-methylthiophenyl)-2-morpholinopropan-1-one	71868-10-5	400-600-6	16.01.2020	☐	☑

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4	2-benzyl-2-dimethylamino-4'-morpholinobutyrophenone	119313-12-1	404-360-3	16.01.2020	☐	☑

Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
Dibutylbis(pentane-2,4-dionato-O,O')tin	22673-19-4	245-152-0	25.06.2020	☐	☑
Butyl 4-hydroxybenzoate	94-26-8	202-318-7	25.06.2020	☐	☑
2-methylimidazole	693-98-1	211-765-7	25.06.2020	☐	☑
1-vinylimidazole	1072-63-5	214-012-0	25.06.2020	☐	☑

Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
Dioctyltin dilaurate, stannane, dioctyl-, bis(coco acyloxy) derivs., and any other stannane, dioctyl-, bis(fatty acyloxy) derivs. wherein C12 is the predominant carbon number of the fatty acyloxy moiety. dioctyltin dilaurate; stannane, dioctyl-, bis(coco acyloxy) derivs.	–	–	19.01.2021	☐	☑
Dioctyltin dilaurate	3648-18-8	222-883-3	19.01.2021	☐	☑
Stannane, dioctyl-, bis(coco acyloxy) derivs.	91648-39-4	293-901-5	19.01.2021	☐	☑

Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
對十二烷基苯酚及其異構體(PDDP) Phenol, alkylation products (mainly in para position) with C12-rich branched alkyl chains from oligomerisation, covering any individual isomers and/ or combinations thereof (PDDP)	-	-	08.07.2021	☐	☑
原硼酸鈉鹽 orthoboric acid, sodium salt	-	-	08.07.2021	☐	☑
中鏈氯化石蠟(MCCP) (UVCB物質: 由含≥80%的碳鏈長度C14~C17的直鏈氯化烷烴組成) Medium-chain chlorinated paraffins (MCCP) UVCB substances consisting of more than or equal to 80%	-	-	08.07.2021	☐	☑
戊二醛 glutaral	111-30-8	203-856-5	08.07.2021	☐	☑
雙酚B 4,4'-(1-methylpropylidene)bisphenol	77-40-7	201-025-1	08.07.2021	☐	☑
2-(4-叔丁基卞基)丙醛及其立體異構體 2-(4-tert-butylbenzyl)propionaldehyde and its individual stereoisomers	-	-	08.07.2021	☐	☑
二溴新戊二醇(BMP) 三溴新戊醇(TBNPA) 2,3-二溴丙醇(2,3-DBPA) 2,2-bis(bromomethyl)propane-1,3-diol (BMP); 2,2-dimethylpropan-1-ol, tribromo derivative/3-bromo-2,2-bis(bromomethyl)-1-propanol (TBNPA); 2,3-dibromo-1-propanol (2,3-DBPA)	3296-90-0 36483-57-5/1522-92-5 96-13-9	221-967-7 253-057-0 202-480-9	08.07.2021	☐	☑
1,4-二氧己環 1,4-dioxane	123-91-1	204-661-8	08.07.2021	☐	☑

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Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
tris(2-methoxyethoxy)vinylsilane	1067-53-4	213-934-0	17.01.2022	☐	☑
S-(tricyclo(5.2.1.0'2,6)deca-3-en-8(or 9)-yl O-(isopropyl or isobutyl or 2-ethylhexyl) O-(isopropyl or isobutyl or 2-ethylhexyl) phosphorodithioate X4261	255881-94-8	401-850-9	17.01.2022	☐	☑
6,6'-di-tert-butyl-2,2'-methylenedi-p-cresol	119-47-1	204-327-1	17.01.2022	☐	☑
(±)-1,7,7-trimethyl-3-[(4-methylphenyl)methylene]bicyclo[2.2.1]heptan-2-one covering any of the individual isomers and/or combinations thereof (4-MBC) (3E)-1,7,7-trimethyl-3-(4-methylbenzylidene)bicyclo[2.2.1]heptan-2-one EG-Nr. : - | CAS-Nr. : 1782069-81-1 (1R,3E,4S)-1,7,7-trimethyl-3-(4-methylbenzylidene)bicyclo[2.2.1]heptan-2-one EG-Nr. : - | CAS-Nr. : 95342-41-9 (1S,3Z,4R)-1,7,7-trimethyl-3-(4-methylbenzylidene)bicyclo[2.2.1]heptan-2-one EG-Nr. : - | CAS-Nr. : 852541-25-4 (±)-1,7,7-trimethyl-3-[(4-methylphenyl)methylene]bicyclo[2.2.1]heptan-2-one EG-Nr. : 253-242-6 | CAS-Nr. :36861-47-9 (1R,4S)-1,7,7-trimethyl-3-(4-methylbenzylidene)bicyclo[2.2.1]heptan-2-one EG-Nr. : - | CAS-Nr. : 741687-98-9 (1S,3E,4R)-1,7,7-trimethyl-3-(4-methylbenzylidene)bicyclo[2.2.1]heptan-2-one EG-Nr. : - | CAS-Nr. : 852541-30-1 (1R,3Z,4S)-1,7,7-trimethyl-3-(4-methylbenzylidene)bicyclo[2.2.1]heptan-2-one EG-Nr. : - | CAS-Nr. : 852541-21-0	1782069-81-1 95342-41-9 852541-25-4 36861-47-9 741687-98-9 852541-30-1 852541-21-0	-	17.01.2022		

Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
N-(hydroxymethyl)acrylamide	924-42-5	213-103-2	10.06.2022	☐	☑

Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1,1'-[ethane-1,2-diylbisoxy]bis[2,4,6-tribromobenzene]	37853-59-1	253-692-3	01.17.2023	☐	☑
2,2',6,6'-tetrabromo-4,4'-isopropylidenediphenol	201-236-9	79-94-7	01.17.2023	☐	☑
4,4'-sulphonyldiphenol	201-250-5	80-09-1	01.17.2023	☐	☑
Barium diboron tetraoxide	237-222-4	13701-59-2	01.17.2023	☐	☑
Bis(2-ethylhexyl) tetrabromophthalate covering any of the individual isomers and/or combinations thereof	-	-	01.17.2023	☐	☑
Isobutyl 4-hydroxybenzoate	224-208-8	4247-02-3	01.17.2023	☐	☑
Melamine	203-615-4	108-78-1	01.17.2023	☐	☑
Perfluoroheptanoic acid and its salts	-	-	01.17.2023	☐	☑
reaction mass of 2,2,3,3,5,5,6,6-octafluoro-4-(1,1,1,2,3,3,3-heptafluoropropan-2-yl)morpholine and 2,2,3,3,5,5,6,6-octafluoro-4-(heptafluoropropyl)morpholine	473-390-7	-	01.17.2023	☐	☑

	Substance name	CAS No.	EC No.	Date of inclusion	YES	NO
1	bis(4-chlorophenyl) sulphone	80-07-9	201-247-9	06.15.2023		☑
2	Diphenyl(2,4,6-trimethylbenzoyl)phosphine oxide	75980-60-8	278-355-8	06.15.2023		☑

Signature: Justin Xu

Date: 2024/1/31

Name: Justin Xu

Phone: 86 186 6228 3062

Title: QA Manager

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Pulse a YAGEO company

Declaration of Conformity to EU RoHS Directive

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P/N:
TWA4215xx
BTPA0061204G0C4AXX

This is to certify that the parts products listed above meet the requirements of the **RoHS Directive 2011/65/EU & Directive 2015/863 amending Annex II to RoHS 2011/65/EU** The following table lists the restricted materials and their respective allowable limits:

RoHS Restricted Substance	Allowable Limit
Cadmium and its compounds	100 ppm (0.01 weight %)
Mercury and its compounds	1000 ppm (0.1 weight %)
Hexavalent chromium and its compounds	1000 ppm (0.1 weight %)
Lead and its compounds	1000 ppm (0.1 weight %)
Polybrominated biphenyls (PBB)	1000 ppm (0.1 weight %)
Polybrominated diphenyl ethers (PBDE)	1000 ppm (0.1 weight %)
Bis(2-ethylhexyl) phthalate (DEHP)	1000 ppm (0.1 weight %)
Butyl benzyl phthalate (BBP)	1000 ppm (0.1 weight %)
Dibutyl phthalate (DBP)	1000 ppm (0.1 weight %)
Diisobutyl phthalate(DIBP)	1000 ppm (0.1 weight %)

If parts/products take advantage of any exceptions, please check which exemption(s):
1. Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):
☐ (a) For general lighting purposes < 30 Watts： 2.5mg
☐ (b) For general lighting purposes ≥ 30 Watts and < 50 Watts： 3.5mg
☐ (c) For general lighting purposes ≥ 50 Watts and < 150 Watts： 5mg
☐ (d) For general lighting purposes ≥150 Watts: 15 mg
☐ (e) For general lighting purposes with circular or square structural shape and tube diameter ≤17 mm： 7mg
☐ (f) For special purposes: 5 mg

2a. Mercury in double-capped linear fluorescent lamps for general lighting purposes not exceeding (per lamp):
☐ (1) Tri-band phosphor with normal lifetime and a tube diameter < 9 mm (e.g. T2) :4mg
☐ (2) Tri-band phosphor with normal lifetime and a tube diameter ≥ 9 mm and ≤ 17 mm (e.g. T5):3mg

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☐ (3) Tri-band phosphor with normal lifetime and a tube diameter > 17 mm and ≤ 28 mm (e.g. T8):3.5mg
☐ (4) Tri-band phosphor with normal lifetime and a tube diameter > 28 mm (e.g. T12):3.5mg
☐ (5) Tri-band phosphor with long lifetime (≥ 25,000h):5mg

2b. Mercury in other fluorescent lamps not exceeding (per lamp):
☐ (3) Non-linear tri-band phosphor lamps with tube diameter > 17 mm (e.g. T9):15mg
☐ (4) Lamps for other general lighting and special purposes (e.g. induction lamps):15mg

3. Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding (per lamp):
☐ (a) Short length (≤500 mm) : 3.5mg
☐ (b) Medium length (> 500 mm and ≤1500 mm): 5mg
☐ (c) Long length (> 1500 mm) : 13mg

☐ 4a. Mercury in other low pressure discharge lamps (per lamp):15mg

4b. Mercury in High Pressure Sodium (vapor) lamps for general lighting purposes not exceeding (per burner) in lamps with improved color rendering index Ra > 60:
☐ (I) P ≤ 155 W : 30mg
☐ (II) 155 < P ≤ 405 W : 40mg
☐ (III) P > 405 W :40mg

4c. Mercury in other High Pressure Sodium (vapor) lamps for general lighting purposes not exceeding (per burner):
☐ (I) P ≤ 155 W : 25mg
☐ (II) 155 < P ≤405 W :30mg
☐ (III) P > 405 W : 40mg

☐ 4e. Mercury in metal halide lamps (MH)
☐ 4f. Mercury in other discharge lamps for special purposes not specifically mentioned in Annex

☐ 5b. Lead in glass of fluorescent tubes not exceeding 0.2% by weight

☐ 6a. Lead as an alloying element in steel for machining purposes and in galvanized steel containing up to 0.35% lead by weight
☐ 6b. Lead as an alloying element in aluminium containing up to 0.4% lead by weight
☐ 6c. Copper alloy containing up to 4% lead by weight

☐ 7a. Lead in high melting temperature type solders (i.e. lead-based alloys containing 85% by weight or more lead)

☐ 7c-I. Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound
☐ 7c-II. Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC or higher
☐ 7c-IV. Lead in PZT based dielectric ceramic materials for capacitors which are part of integrated circuits or discrete semiconductors

☐ 8b. Cadmium and its compounds in electrical contacts

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☐ 9. Hexavalent chromium as an anticorrosion agent of the carbon steel cooling system in absorption refrigerators up to 0.75% by weight in the cooling solution

☐ 9b. Lead in bearing shells and bushes for refrigerant-containing compressors for heating, ventilation, air conditioning and refrigeration (HVACR) applications

☐ 13a. Lead in white glasses used for optical applications
☐ 13b. Cadmium and lead in filter glasses and glasses used for reflectance standards

☐ 15. Lead in solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit Flip Chip packages

☐ 17. Lead halide as radiant agent in High Intensity Discharge (HID) lamps used for professional reprography applications

☐ 18b. Lead as activator in the fluorescent powder (1% lead by weight or less) of discharge lamps when used as sun tanning lamps containing phosphors such as BSP (BaSi2O5:Pb)

☐ 21. Lead and cadmium in printing inks for the application of enamels on glasses, such as borosilicate and soda lime glasses

☐ 24. Lead in solders for the soldering to machined through hole discoidal and planar array ceramic multilayer capacitors

☐ 25. Lead oxide in surface conduction electron emitter displays (SED) used in structural elements, notably in the seal frit and frit ring

☐ 29. Lead bound in crystal glass as defined in Annex I (Categories 1, 2, 3 and 4) of Council Directive 69/493/EEC

☐ 30. Cadmium alloys as electrical/mechanical solder joints to electrical conductors located directly on the voice coil in transducers used in high-powered loudspeakers with sound pressure levels of 100 dB (A) and more

☐ 31. Lead in soldering materials in mercury free flat fluorescent lamps (which e.g. are used for liquid crystal displays, design or industrial lighting)

☐ 32. Lead oxide in seal frit used for making window assemblies for Argon and Krypton laser tubes

☐ 33. Lead in solders for the soldering of thin copper wires of 100 µm diameters and less in power transformers

☐ 34. Lead in cermet-based trimmer potentiometer elements

☐ 37. Lead in the plating layer of high voltage diodes on the basis of a zinc borate glass body

☐ 38. Cadmium and cadmium oxide in thick film pastes used on aluminium bonded beryllium oxide

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☐ 41. Lead in solders and termination finishes of electrical and electronic components and finishes of printed circuit boards used in ignition modules and other electrical and electronic engine control systems, which for technical reasons must be mounted directly on or in the crankcase or cylinder of hand-held combustion engines

☐ 42. Lead in bearings and bushes of diesel or gaseous fuel powered internal combustion engines applied in non-road professional use equipment;

43. Bis(2-ethylhexyl) phthalate in rubber components in engine systems, designed for use in equipment that is not intended solely for consumer use and provided that no plasticised material comes into contact with human mucous membranes or into prolonged contact with human skin and the concentration value of bis(2-ethylhexyl) phthalate does not exceed:

☐ a) 30 % by weight of the rubber for:

(i) gasket coatings;
(ii) solid-rubber gaskets; or
(iii) rubber components included in assemblies of at least three components using electrical, mechanical or hydraulic energy to do work, and attached to the engine.

☐ b) 10 % by weight of the rubber for rubber-containing components not referred to in point (a).

☐ 44. Lead in solder of sensors, actuators, and engine control units of combustion engines within the scope of Regulation (EU) 2016/1628 of the European Parliament and of the Council, installed in equipment used a fixed positions while in operation which is designed for professionals, but also used by non-professional users

☐ 45. Cadmium and lead in rigid plastic profiles containing mixtures produced from polyvinyl chloride waste (hereinafter referred to as 'recovered rigid PVC'), used for electrical and electronic windows and doors, where the concentration in the recovered rigid PVC material does not exceed 0,1 % cadmium by weight (expressed as Cd metal) and/or 2 % lead by weight (expressed as Pb metal), provided that the components concerned are visibly, legibly and indelibly marked with the statement 'Contains recovered PVC'

Signature: Justin Xu. Date: 2024/1/31

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