



深圳市南斗星科技有限公司

SHENZHEN SOUTH STAR TECHNOLOGY CO., LTD.

承认书

APPROVAL SHEET

样品封订

客户名称 Customer Name EASTECH

产品型号 Product Model CE2 2.4GHz+5GHz

客户料号 Customer P/N

南斗星料号 Southstar P/N 3. N204. 0266

制作日期 Date Prepared 2022-05-20

制作版本 Revision A

南斗星 (Southstar)		
制作 (Prepare)	品质 (DQE)	研发 (R&D)
客户 (Customer)		
采 购 (PUR)	品质 (QC)	研发 (R&D)

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三. 概述 (Overview) :

此报告主要描述 SOUTHSTAR 给东威 CE2 项目的天线性能.

CE2 项目样机, WIFI 天线使用频段范围为 2400-2500MHz/5150-5850MHz;

四. 天线位置图片 (Antenna Picture) :

WF0



WF1

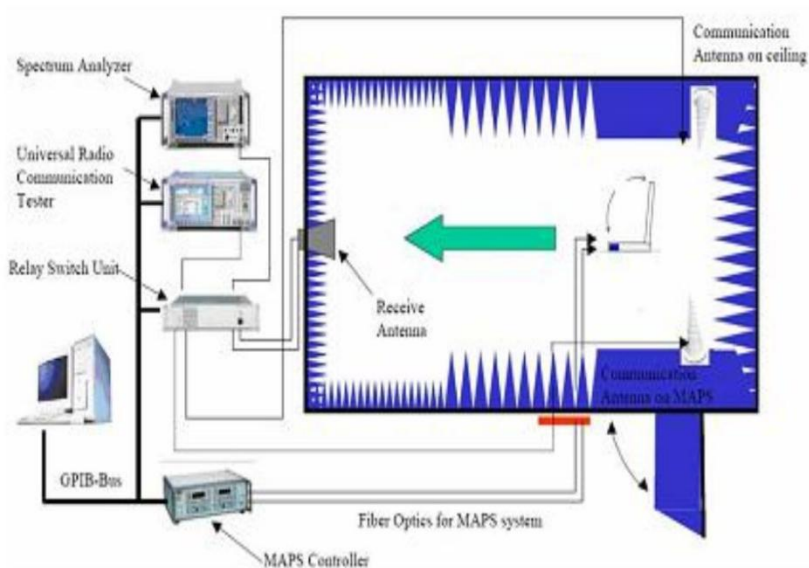


五、规格（Product Specification）：

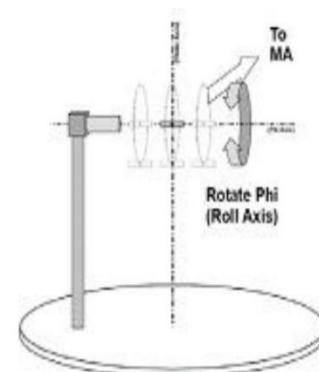
A. 电性能Electrical Characteristics	
Frequency 频率	2400 ~2500 MHz / 5150 ~5850 MHz
VSWR 电压驻波比	< 2
Efficiency 效率	>40%
Return loss 回波损耗	< -12
Impedance 阻抗	50 Ohm
Polarization 极化	线性 Linear
Peak Gain 增益	黑线： 2400~2500 MHz:4.07 . dBi 5150~5850 MHz:4.56 . dBi ; 白线： 2400~2500 MHz:3.42 . dBi 5150~5850 MHz:4.97 . dBi
Note 备注：	
B. 材料&物理性能Material & Mechanical Characteristics	
射频材料 Material of Radiator	PCB FR-4 black
射频线类型 Cable Type	Lows 银锡线 Φ1.13
接头类型 Connector Type	black&whitewhite一代端子
PCB 尺寸 PCB size	42.3*10*0.8±0.2mm
C. 环境 Environmental	
工作温度 Operation Temperature	- 30 °C ~ + 80 °C
存放温度 Storage Temperature	- 30 °C ~ + 85 °C

六、测试设备及条件（**Test Equipment & Conditions**）：

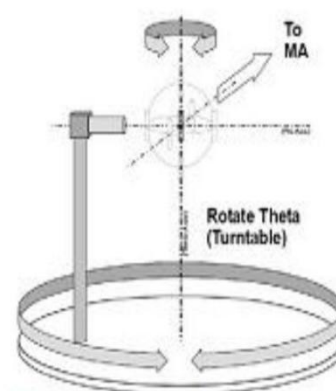
- 1.网络分析仪**Network Analyzers**： Agilent 5071C
- 2.综合测试仪**Communications Test Set**: Agilent E5515C CMW500
- 3.3D暗室测试系统 **3D Chamber Test System**



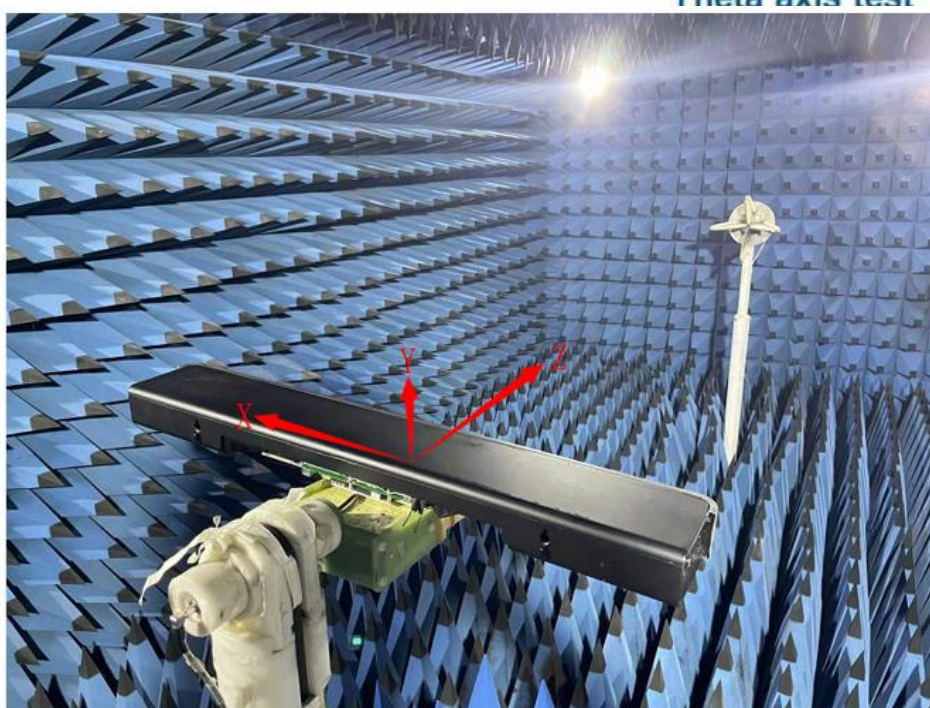
(Testing by 3D anechoic chamber)



Phi axis test

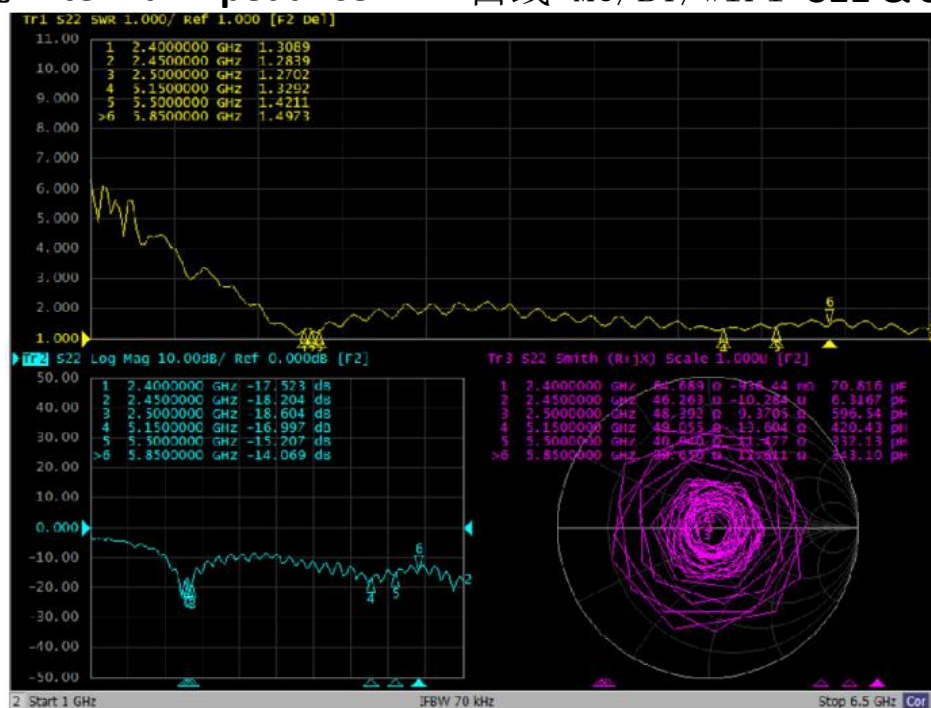


Theta axis test

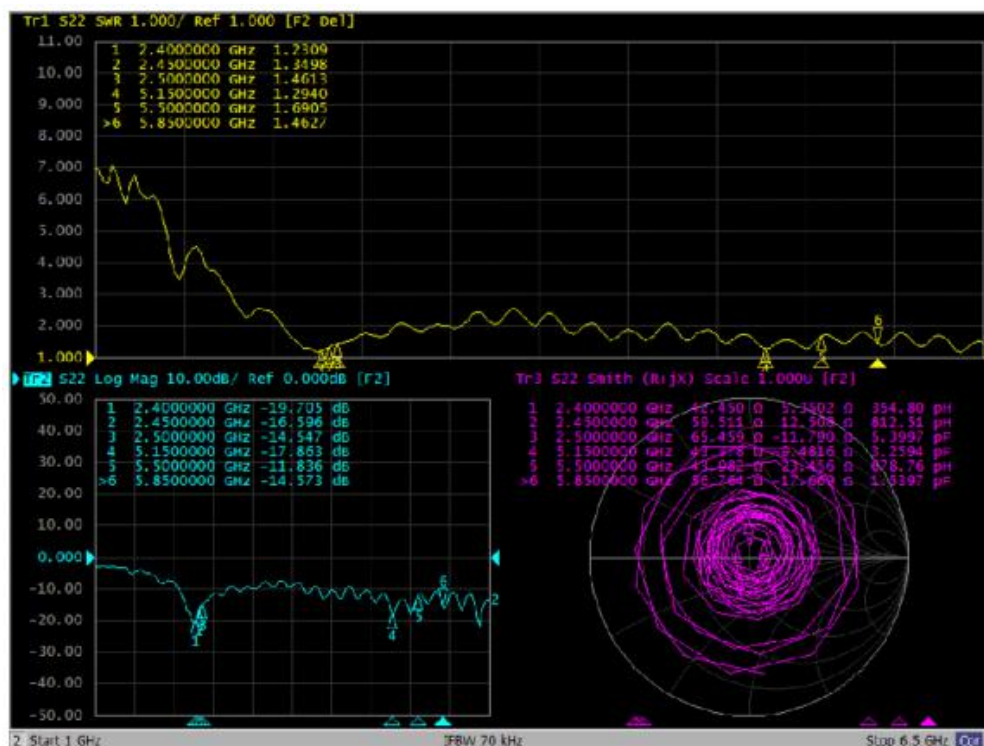


七、性能报告（Test Report）：

1. 阻抗 Antenna Impedance: WF1 白线 MC/BT/WIFI S11 & Smith



WF0 黑线 WiFi S11 & Smith



2.黑线 WIFI 效率&增益**Total Efficiency& GAIN:** WF0

Passive Test For 2.4			
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
2400	45.85	-3.39	3.79
2410	44.51	-3.52	3.66
2420	46.74	-3.30	3.64
2430	45.38	-3.43	3.87
2440	44.97	-3.47	3.93
2450	44.18	-3.55	4.01
2460	45.59	-3.41	3.93
2470	45.71	-3.40	3.96
2480	43.58	-3.61	4.07
2490	44.95	-3.47	3.69
2500	44.19	-3.55	3.58

Passive Test For 5.8			
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
5150	43.51	-3.62	1.69
5200	43.41	-3.63	1.76
5250	42.77	-3.69	2.84
5300	44.92	-3.48	2.22
5350	46.42	-3.33	2.33
5400	42.35	-3.73	2.69
5450	42.76	-3.69	2.82
5500	43.47	-3.62	1.61
5550	47.93	-3.19	2.89
5600	46.43	-3.33	2.42
5650	45.25	-3.44	1.83
5700	41.55	-3.81	2.31
5750	43.83	-3.58	3.09
5800	47.09	-3.27	4.37
5850	45.48	-3.42	4.56

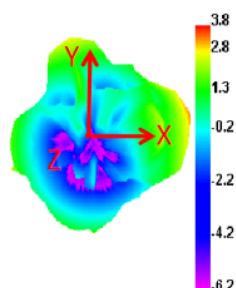
白线 MC/BT/WIFI 效率&增益**Total Efficiency& GAIN:** WF1

Passive Test For 2.4			
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
2400	45.36	-3.43	3.42
2410	44.09	-3.56	3.17
2420	43.75	-3.59	2.85
2430	42.75	-3.69	2.3
2440	43.31	-3.64	2.52
2450	45.21	-3.45	2.81
2460	44.95	-3.47	2.59
2470	44.57	-3.51	2.59
2480	45.81	-3.39	2.75
2490	44.81	-3.49	2.78
2500	46.48	-3.33	2.92

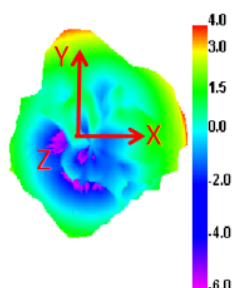
Passive Test For 5.8			
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
5150	45.11	-3.46	4.14
5200	43.54	-3.61	2.96
5250	46.98	-3.28	3.37
5300	42.22	-3.74	2.2
5350	41.72	-3.80	2.18
5400	46.51	-3.32	3.5
5450	45.59	-3.41	3.06
5500	47.21	-3.26	3.32
5550	47.57	-3.23	3.48
5600	44.66	-3.50	3.27
5650	45.62	-3.41	3.44
5700	48.29	-3.16	3.77
5750	47.6	-3.22	4.12
5800	43.2	-3.65	4.95
5850	44.64	-3.50	4.97

3. 黑线 WIFI 3D&2D场形图 WF0

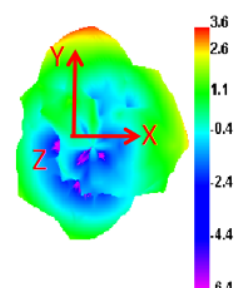
2400.000MHz



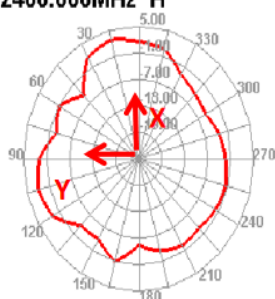
2450.000MHz



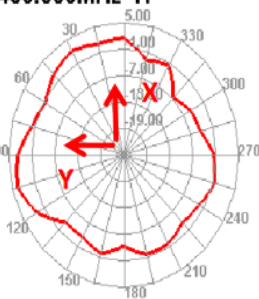
2500.000MHz



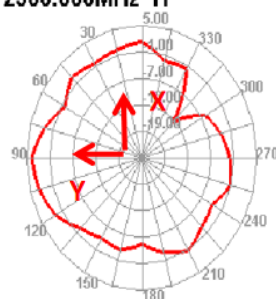
2400.000MHz H



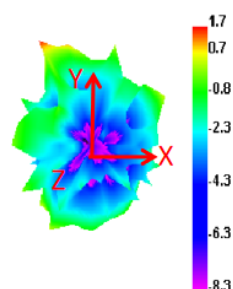
2450.000MHz H



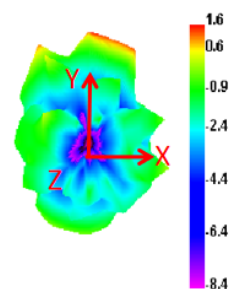
2500.000MHz H



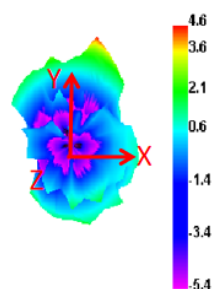
5150.000MHz



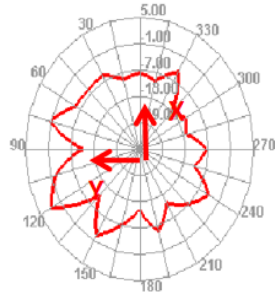
5500.000MHz



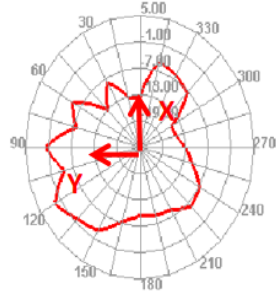
5850.000MHz



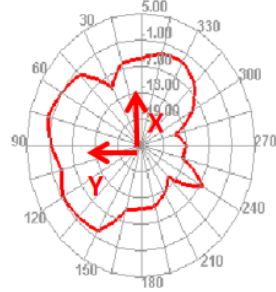
5150.000MHz H



5500.000MHz H

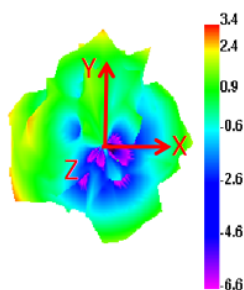


5850.000MHz H

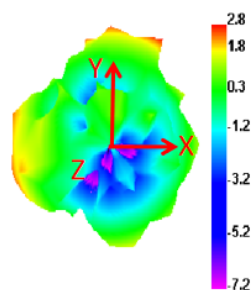


白线 MC/BT/WIFI 3D&2D场形图 WF1

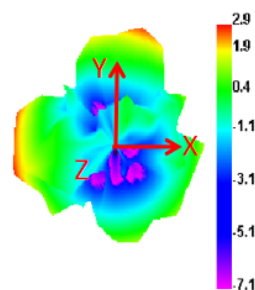
2400.000MHz



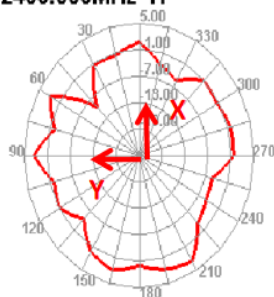
2450.000MHz



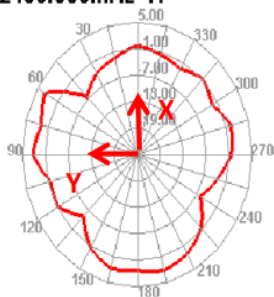
2500.000MHz



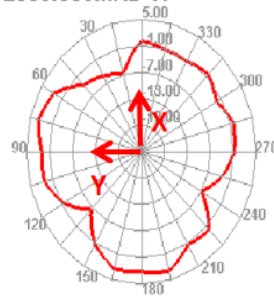
2400.000MHz H



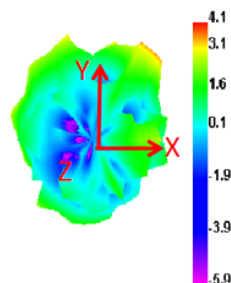
2450.000MHz H



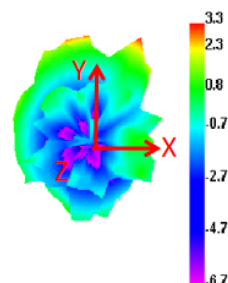
2500.000MHz H



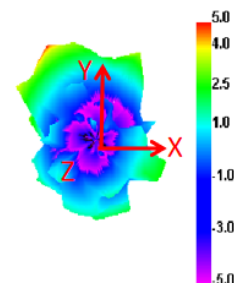
5150.000MHz



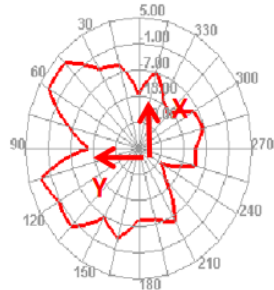
5500.000MHz



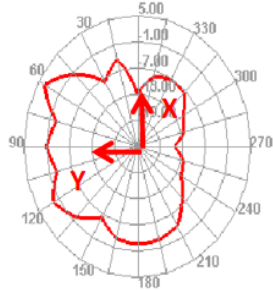
5850.000MHz



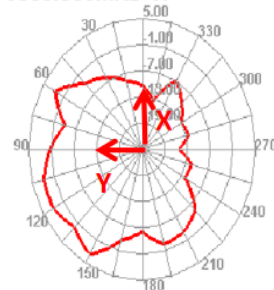
5150.000MHz H



5500.000MHz H



5850.000MHz H



Customer			Sample No.	
Description	RF CABLE 50Ω OD:1.13loss 30AWG		Rev.	D
Item (项目)		Unit	Specification(规格值)	
Awg(线规)		Awg	#32	
No.of conductor(芯线数)		p,c	1C	
Conductor 导体	Material(材质)	---	Silver Plated Copper (镀银铜线)	
	Filler (填充)	---	-----	
	Construction(结构)	No./mm	7/0.08±0.008	
Insulation 绝缘	Material(材质)	---	FEP	
	Nom. Thickness(厚度)	mm	0.22	
	Diameter(线径)	mm	0.72±0.03	
	Color(颜色)	---	Nature(本色)	
Braid Shield 编 织	Material(材质)		Tinned Copper Wire(镀锡铜线) 16/4/0.05±0.008	
		---	copper foil 銅箔	
	Coverage(遮蔽率)	%	90 ↑	
Jacket 外 被	Material(材质)	---	FEP	
	Min. Thickness(厚度)	mm	0.12	
	O.D(外径)	mm	1.15±0.05	
	Color(颜色)	---	黑	
Marking	No Marking			

Customer		Sample No.	
Description	RF CABLE 50Ω OD:1.13loss 30AWG	Rev.	
Electric Characters:			
电容(pF/m) Capacitance(pF/m)	98		
速率(%) Velocity(%)	70		
阻抗(Ω) Impedance(Ω)	50±3		
驻波比 Standing wave ratio	≤1.3@0~6GHz		
最大工作电压(V) Max.operating voltage(V)	1000		
最大工作频率(GHz) Max.operating frequency(GHz)	6		
Attenuation(衰减)	频率 Frequency	标准值 Standard value 单位 Unit:dB/m	
	1.0	≤1. 88	
	2.0	≤2. 55	
	3.0	≤3. 05	
	4.0	≤3. 52	
	5.0	≤4. 05	

	6.0	≤4.4
Dependability:		
项目 Item	单位 Unit	标准值 Standard value
最小弯曲半径(一次) Min.bending radius static	mm	5
最小弯曲半径(重复) Min.bending radius repeated	mm	-
工作温度范围 Operating temperature	℃	-55~+200
Use tips:		
存储环境 Storage environment	温度：30℃以下；湿度：20%~65%	
最佳保存周期 The best save cycle	2个月；2个月以上作业性下降，如上锡效果变差,但电性能不受影响。夏季高温高湿环境开剥后需尽快流转	
加工温度 Processing temperature	260℃的极限情况下，可短时间承受；300℃以上分子通常带有的等端基会分解；400℃以上发生显著的热分解	
铁氟龙收缩 Teflon Shrink	固有材料特性。绝缘：0.2mm以下；护套：0.3mm以下	
护套窜动 Jacket traverse	加工长度（护套残留长度）低于5cm易发生	
包装 (Packing mode)	单位 Unit	
每盘长度 Packing mode	1000米	
每盘接头数 The length of each plate	≤4	
每盘最短长度 The shortest length of each root	≥50米	

Test Report

No. SHAEC2100564501

Date: 15 Jan 2021

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3M CHINA LIMITED
222 TIANLIN ROAD, SHANGHAI

The following sample(s) was/were submitted and identified on behalf of the clients as : 3M 9448A

SGS Job No. : SP21-000647 - SH
Model No. : 3M 9448A
Client Ref. Information : 3M 9448AB
Date of Sample Received : 11 Jan 2021
Testing Period : 11 Jan 2021 - 15 Jan 2021
Test Requested : Selected test(s) as requested by client.
Test Method : Please refer to next page(s).
Test Results : Please refer to next page(s).
Conclusion : Based on the performed tests on submitted sample(s), the results of Cadmium, Lead, Mercury, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

Carol Luo

Carol Luo
Approved Signatory

scan to see the report



SHAEC2100564501



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Test Report

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Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA21-005645.001	White translucent adhesive film

Remarks :

- (1) 1 mg/kg = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to IEC 62321-4:2013+AMD1:2017, IEC62321-5:2013, IEC62321-7-2:2017, IEC 62321-6:2015 and IEC62321-8:2017, analyzed by ICP-OES, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit	MDL	001
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	ND
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	ND
Sum of PBBs	1000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND



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Test Report

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Test Item(s)	Limit	Unit	MDL	001
Pentabromodiphenyl ether	-	mg/kg	5	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND
Di-butyl Phthalate (DBP)	1000	mg/kg	50	ND
Benzyl Butyl Phthalate (BBP)	1000	mg/kg	50	ND
Di-2-Ethyl Hexyl Phthalate (DEHP)	1000	mg/kg	50	ND
Diisobutyl Phthalates (DIBP)	1000	mg/kg	50	ND

Notes :

- (1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863. IEC 62321 series is equivalent to EN 62321 series
https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101:::FSP_ORG_ID,FSP_LANG_ID:1258637,25
- (2) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.
- (3) The restriction of DEHP, BBP, DBP and DIBP shall not apply to toys which are already subject to the restriction of DEHP, BBP, DBP and DIBP through entry 51 of Annex XVII to Regulation (EC) No 1907/2006.



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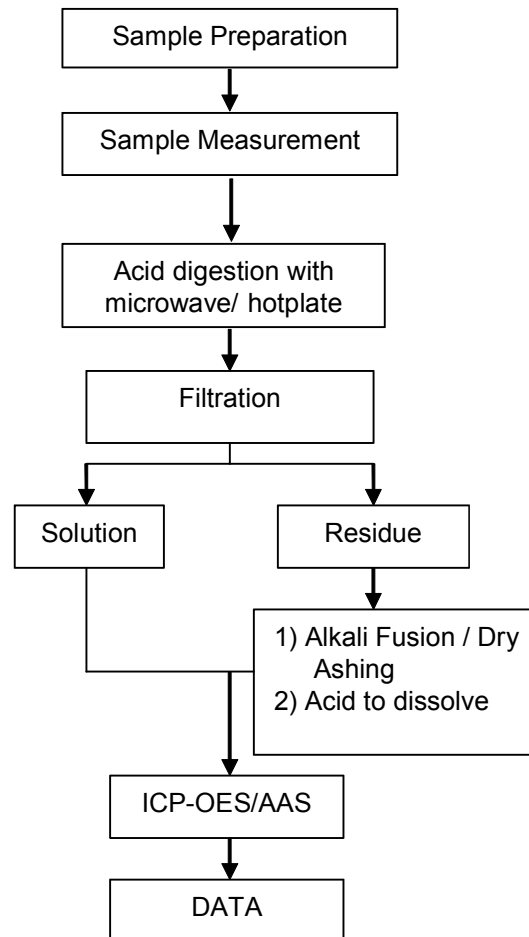
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Elements (IEC62321) Testing Flow Chart

1) These samples were dissolved totally by pre-conditioning method according to below flow chart.



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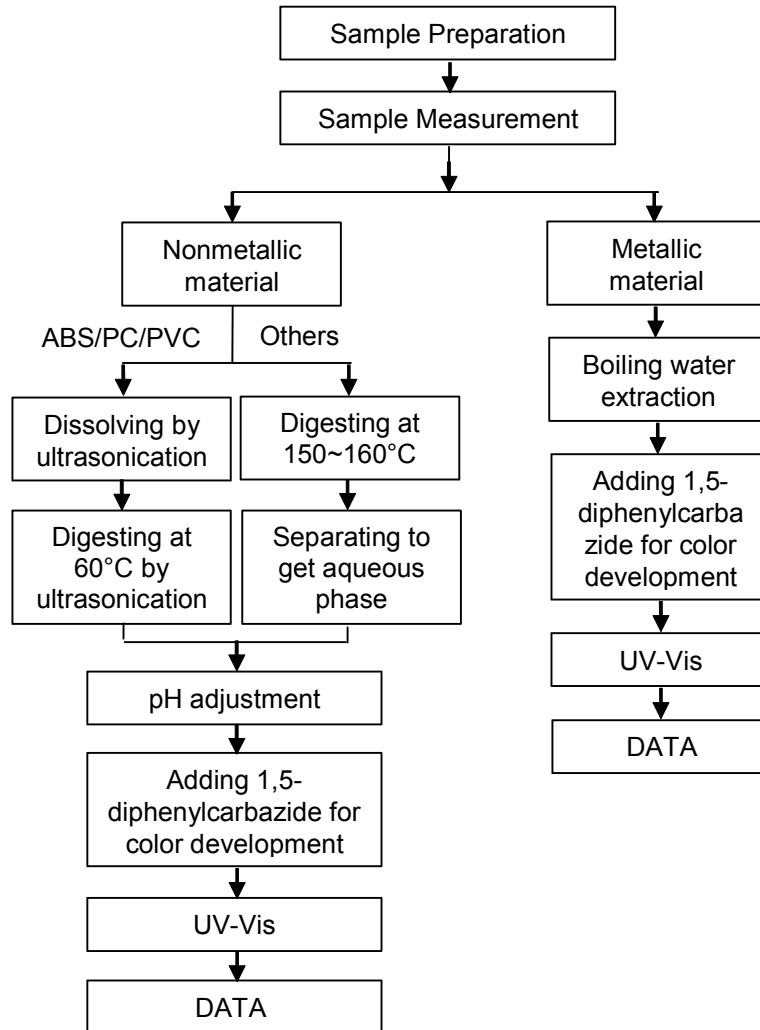
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Hexavalent Chromium (Cr(VI)) Testing Flow Chart

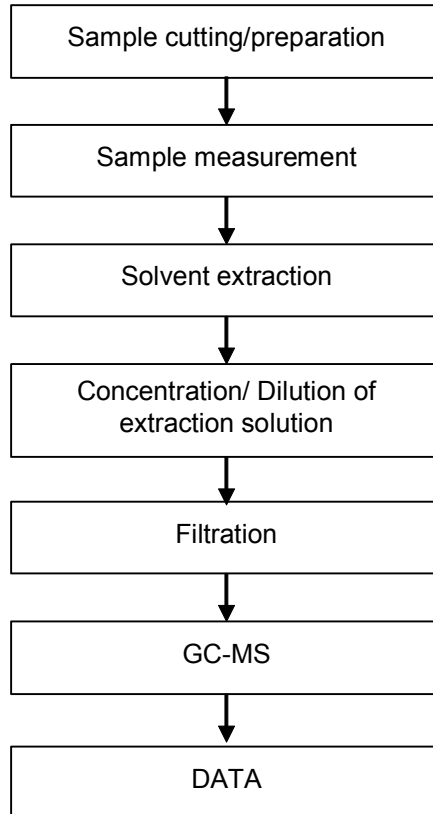


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PBBs/PBDEs Testing Flow Chart

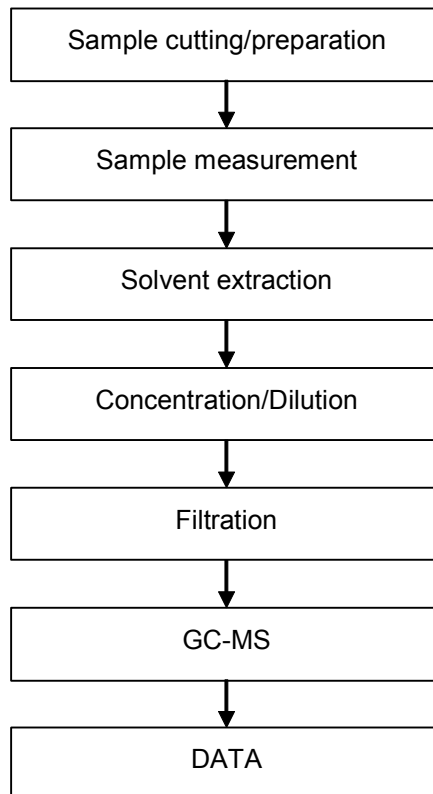


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Phthalates Testing Flow Chart



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No. SHAEC2100564501

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Sample photo:



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Test Report

No. CANEC2105719213

Date: 20 Apr 2021

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DONG GUAN HUI YANG SPONGE CO., LTD

DA LING VILLAGE DA LING SHAN TOWN, DONG GUAN CITY, GUANG DONG PROVINCE

The following sample(s) was/were submitted and identified on behalf of the clients as : SPONGE

SGS Job No. : CP21-017294 - SZ

Date of Sample Received : 12 Apr 2021

Testing Period : 12 Apr 2021 - 20 Apr 2021

Test Requested : Selected test(s) as requested by client.

Test Method : Please refer to next page(s).

Test Results : Please refer to next page(s).

Conclusion : Based on the performed tests on submitted sample(s), the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP), and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

Allie Chen

Allie Chen
Approved Signatory

scan to see the report



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Test Report

No. CANEC2105719213

Date: 20 Apr 2021

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Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	CAN21-057192.002	Black sponge

Remarks :

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to IEC 62321-4:2013+A1:2017, IEC 62321-5:2013, IEC 62321-7-2:2017 , IEC 62321-6:2015 and IEC 62321-8:2017, analyzed by ICP-OES , UV-Vis and GC-MS .

Test Item(s)	Limit	Unit	MDL	002
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1,000	mg/kg	2	ND
Mercury (Hg)	1,000	mg/kg	2	ND
Hexavalent Chromium (CrVI)	1,000	mg/kg	8	ND
Sum of PBBs	1,000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1,000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND
Pentabromodiphenyl ether	-	mg/kg	5	ND



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No. CANEC2105719213

Date: 20 Apr 2021

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Test Item(s)	Limit	Unit	MDL	002
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND
Dibutyl phthalate (DBP)	1,000	mg/kg	50	ND
Butyl benzyl phthalate (BBP)	1,000	mg/kg	50	ND
Bis (2-ethylhexyl) phthalate (DEHP)	1,000	mg/kg	50	ND
Diisobutyl Phthalates (DIBP)	1,000	mg/kg	50	ND

Notes :

- (1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
- (2) IEC 62321 series is equivalent to EN 62321 series
https://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101:::FSP_ORG_ID,FSP_LANG_ID:1258637,25
- (3) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.



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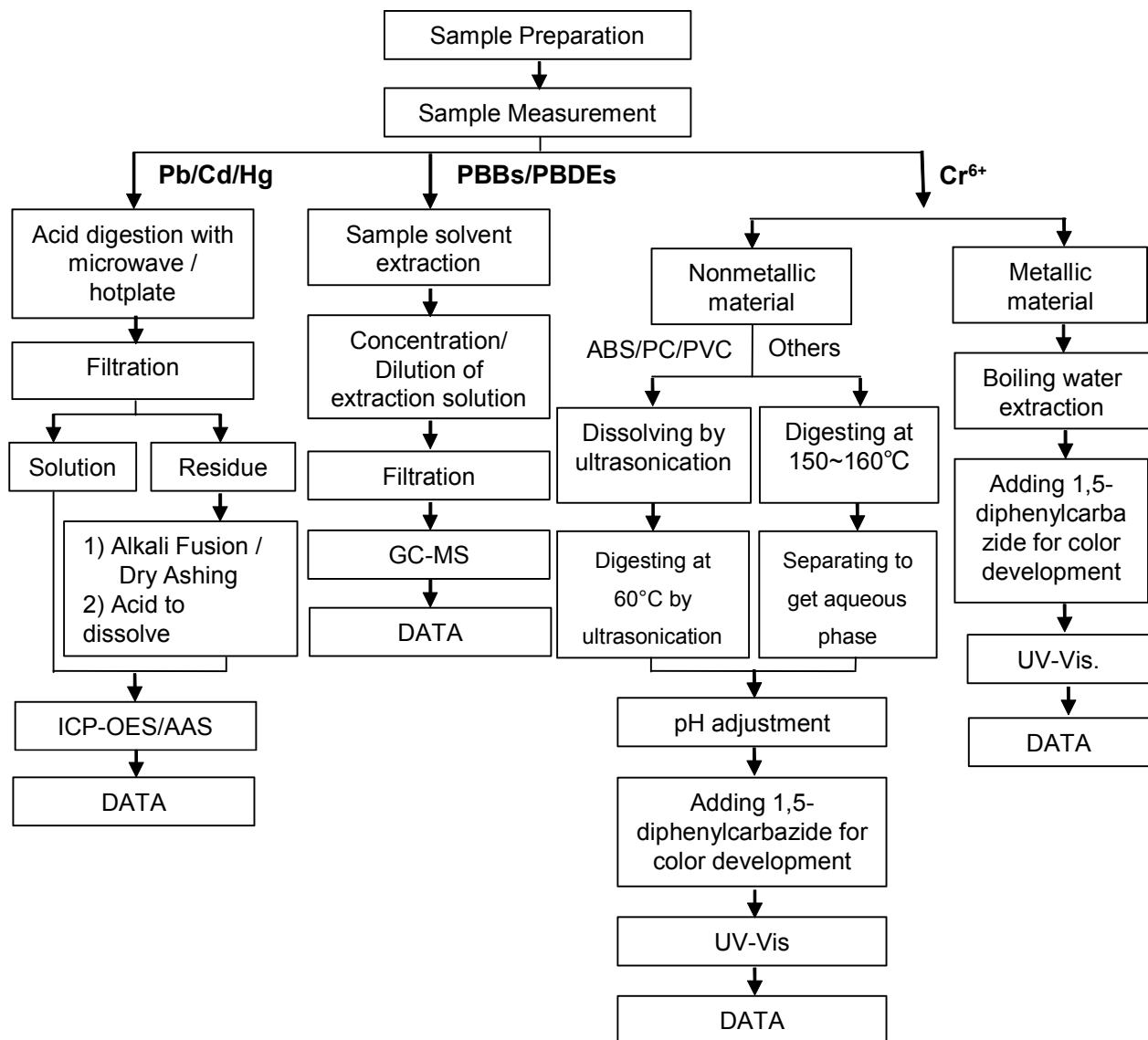
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Pb/Cd/Hg/Cr⁶⁺/PBBs/PBDEs Testing Flow Chart

- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
(Cr⁶⁺ and PBBs/PBDEs test method excluded).



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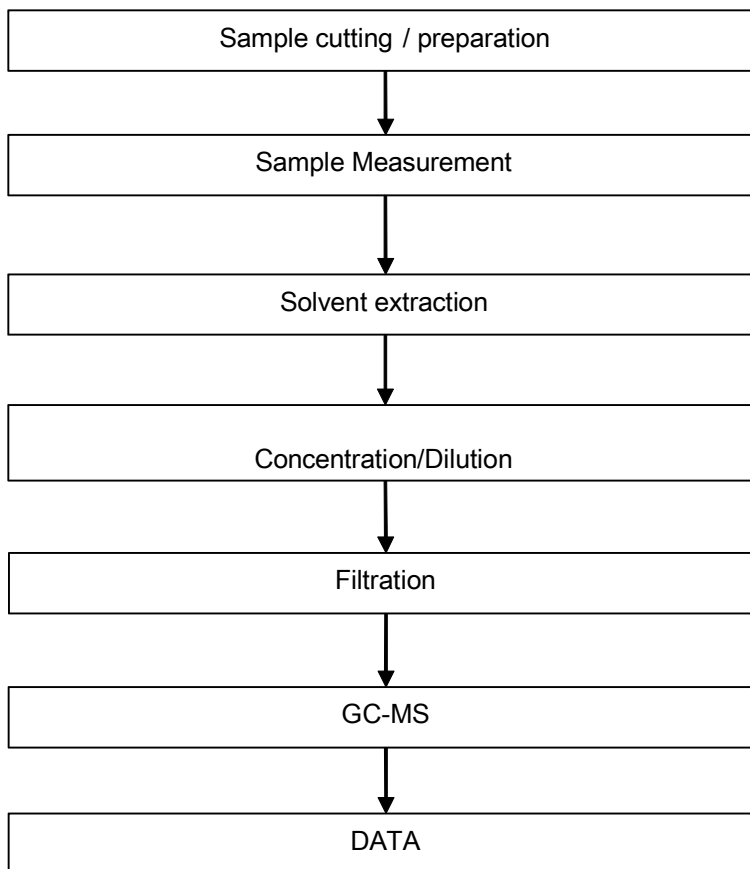
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Phthalates Testing Flow Chart



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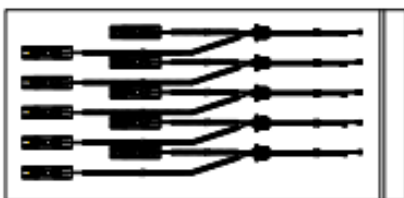
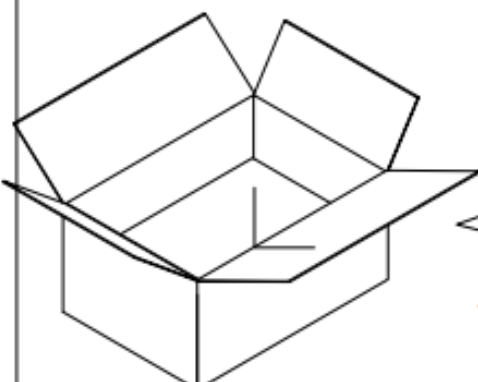
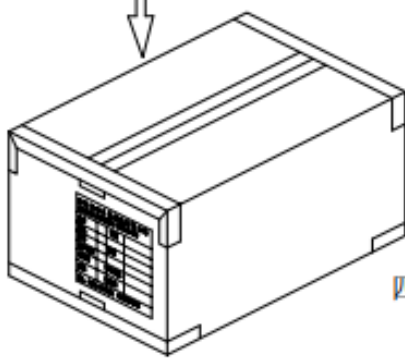
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客户：东威			
一：成品天线 			
		二：装袋，每PE袋装20PCS产品， 	
		三：装箱，以实际包装为准。	
		四：封箱，外箱贴我司生产标签和ROHS标签。	
批准：_____		确认：_____	
		拟制：雷双露	